SYSTEMATIC OPTIMIZATION OF YIELD-ENHANCING APPLICATIONS IN SOYBEANS

by

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Abstract

High soybean [*Glycine max.*] commodity prices in recent years have led to an increase in use of yield enhancing and protecting products. These products need to be evaluated to determine if the use of multiple inputs has a positive impact on yield and how these inputs interact with agronomic practices. The objectives of this study were to evaluate products individually and collectively in input systems, examine interactions between varieties and input systems (IS), seeding rates (SR) and IS, and row spacing (RS) and IS. Field experiments were conducted at high-yielding locations in Kansas and Minnesota in 2012 to 2014 to meet these objectives. Sixteen treatments consisting of individual inputs and inputs combined in systems were evaluated in one experiment. A second experiment evaluated the variety by IS interaction by constructing 18 treatments from a factorial combination of six glyphosate [N-(phosphonomethyl) glycine] resistant varieties and three IS's: untreated control (UTC), SOYA (combination of possible yield-enhancing products representative of those currently being marketed), and SOYA minus foliar fungicide (SOYA – foliar F). A third experiment evaluated the SR by IS interaction by constructing 12 treatments from a factorial arrangement of six SR's and two IS's: UTC and SOYA. A fourth experiment evaluated the RS by IS interaction by constructing 12 treatments from a factorial arrangement of three RS's and four IS's: UTC, fungicide and insecticide seed treatment plus foliar fungicide (STFF), SOYA, and SOYA – foliar F. Very few interactions between IS and agronomic practices were detected in any of the experiments. Varieties had an effect on multiple growth parameters but yield differences were marginal; linear-plateau and non-linear models found that seeding rates that maximized yield in this study were similar to University recommendations; and in general, narrow rows produced the greatest yields. The use of inputs and IS's typically increased seed mass and yield above the UTC across all experiments. However, given current costs and soybean prices, yield response to IS's was not great enough to cover the additional costs. Overall, it appears producers would be better served by focusing on agronomic practices rather than implementing input systems.

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Chapter 1 - Input Systems and their Interactions with Varieties and Seeding Rate on Soybean Growth and Yield

Abstract

High soybean [*Glycine max.*] commodity prices in recent years have led to an increase in use of yield enhancing and protecting products. These products need to be evaluated to determine if the use of multiple inputs has a positive impact on yield and how these inputs interact with agronomic practices. The objectives of this study were to evaluate products individually and collectively in input systems, examine the interactions between varieties and input systems, and between seeding rates and input systems. Field experiments were conducted at three high-yield locations in Kansas in 2012 to 2014 to meet these objectives. Sixteen treatments consisting of individual inputs and inputs combined in systems were evaluated in one experiment. A second experiment evaluated the variety by input system interaction by constructing 18 treatments from a factorial combination of six glyphosate [N-(phosphonomethyl) glycine] resistant varieties and three input systems: untreated control (UTC), SOYA (combination of possible yield-enhancing products representative of those being marketed today), and SOYA minus foliar fungicide (SOYA – foliar F). A third experiment evaluated the seeding rate by input system interaction by constructing 12 treatments from a factorial arrangement of six seeding rates and two input systems: UTC and SOYA. Inputs increased plant height at Manhattan and Scandia, lodging in Scandia, seed mass in Rossville and Scandia, and yield at Rossville. The effect of input system on plant density differed with variety at both Scandia and Rossville. Varieties differed in pods plant^{-1} at Manhattan and Rossville, seeds plant^{-1} at Rossville, pods m^{-2} at all three locations, seeds pod^{-1} at Manhattan, lodging at all three locations, and seed mass at all three locations, regardless of input system. Input system increased pods plant^{-1} at Rossville, lodging at Manhattan, seeds m^{-2} at Rossville, seed mass at Manhattan and Scandia, and yield at Rossville but decreased seeds m^{-2} at Scandia, all regardless of variety. No seeding rate by input system interaction occurred for any growth or yield parameter. Linear responses to increasing seeding rate were observed for most growth parameters. Plant density at both growth stages increased at all locations. Emergence and seed mass decreased, but lodging increased at Manhattan. Establishment decreased at Manhattan and

Scandia. Survival decreased at Rossville and Scandia. Seeding rates needed to for optimal yield in this study were found to be in line with University recommendations using linear-plateau and non-linear models. Input system increased seed mass at all three locations and yield at Rossville and decreased lodging at Scandia at all seeding rates. Few interactions between input system and agronomic practices were detected in any of the experiments, and those that were detected were outside of the major yield components. Although input systems influenced soybean growth parameters and yield in all three experiments, increases were minimal. Variety and seeding rate had a larger impact than inputs or input systems on soybean growth parameters and yield in these environments. Overall, producers should take into consideration soybean commodity and product prices as well as best management practices before implementing these inputs as part of their production system.

Introduction

Agronomic Practices

Soybean [*Glycine max* (L.) Merr.] production in the United States was 89.5 million metric tons from 30.7 million hectares in 2013, accounting for nearly a third of the world soybean production (USDA-NASS, 2014; FAO, 2014). With an ever increasing growth in world population and greater constraints on arable land and resources, producers are expected to increase yields past current production to meet the greater demand for food (Ray et al., 2013). An on-farm yield improvement in soybeans of 29.4 kg ha^{-1} yr^{-1} has been realized since 1983 in the United States (Specht et al., 2014). Specht et al. (2014) approximate that two-thirds of this yield progress is associated with continual advancements in genetics with the other one-third associated with the adoption of better agronomic practices. Some agronomic practices that have contributed to this yield gain are earlier planting dates (Bastidas et al., 2008; De Bruin and Pedersen, 2008; Heatherly and Elmore, 2004; Robinson et al., 2009; Villamil et al., 2012), higher seeding rates (De Bruin and Pedersen, 2008; Heatherly and Elmore, 2004), and narrower row spacing (Heatherly and Elmore, 2004; Villamil et al., 2012).

Genetic improvement has played a key role in the increase in soybean production observed across the United States (Specht et al., 2014). Studies evaluating the impact of release year on grain yield have found an increase in yield ranging from 17.4 kg ha^{-1} yr^{-1} to 29.0 kg ha^{-1} yr^{-1} (Rincker et al., 2014; Wilson et al., 2014). This increase in yield from genetic improvement can be attributed to less lodging (Rincker et al., 2014), longer leaf area duration (Kumundini et al., 2001), and increase in dry matter accumulation (Kumudini et al., 2001). It should be noted that genetic improvement has had a negative impact on seed quality with a decrease in protein content observed in newer varieties (Rowntree et al., 2013; Specht et al., 1999). Rowntree (2013) also observed a synergistic effect when earlier planting date was tied with genetic improvement.

Soybean planting dates in the United States have moved earlier at a rate of 0.49 days year^{-1} from 1981 to 2005 (Sacks and Kucharik, 2011). Research has shown that delayed planting generally leads to a decrease in soybean yield. Yield decreased at a rate of 17 kg ha^{-1} day^{-1} in 2003 and 43 kg ha^{-1} day^{-1} in 2004 in Nebraska as planting date was delayed past May 1 (Bastidas et al., 2008). De Bruin and Pedersen (2008) had similar results in Iowa with soybean yields decreasing by 130 kg ha^{-1} week^{-1} (18.6 kg ha^{-1} day^{-1}) between early May and late May and 404 kg ha^{-1} wk^{-1} (57.7 kg ha^{-1} day^{-1}) from late May to early June. Decrease in yield with later planting dates has been attributed to decreased pods m^{-2} (Robinson et al., 2009). Chen and Wiatrak (2010) found that environment led to variations in yields among different planting dates from maturity group V to maturity group VIII in South Carolina. The authors found that earlier planted soybeans had a longer duration of vegetative and reproductive stages across all maturity groups, and that shorter duration of vegetative growth stages was the main factor causing yield decreases with later planted soybeans.

Several researchers have attempted to determine the optimal seeding rate that maximizes soybean yield (De Bruin and Pedersen, 2008; Devlin et al., 1995; Edwards et al., 2005; Oplinger and Philbrook, 1992). Optimal seeding rates in these studies were inconsistent and ranged from 100,000 to 800,000 seeds ha^{-1} depending upon environmental conditions and agronomic practices such as tillage and row spacing. De Bruin and Pedersen (2008) found that a final population as low as 258,600 plants ha^{-1} could achieve 95% of maximum yield regardless of row spacing. Orlowski et al. (2012) found that soybeans planted with a grain drill achieved maximum yield when seeded at 420,000 seeds ha^{-1} while wider row spacing achieved maximum yield at 321,000 seeds ha^{-1} at a chisel tillage location but a no-tillage location had no differences in seeding rates required to achieve maximum yield.

Inputs

Higher soybean prices in recent years have led to an increase in the use of yield enhancing inputs (USDA-ERS, 2014). Several studies have evaluated different inputs, such as seed treatments (Cox and Cherney, 2011b; Gaspar et al., 2014), fungicides (Kyveryga et al., 2013; Swoboda and Pederson, 2009), insecticides (Henry et al., 2011), micronutrients (Gerwing et al., 2002; Widmar, 2013), nitrogen (Freeborn et al., 2001; Salvagiotti et al., 2009), and growth promoters (Staton and Boring, 2012; Voight et al., 2012) to examine their effect on soybean growth and yield.

Seed treatments were used on an estimated 60 to 70% of soybeans planted in 2014 (United Soybean Board, 2014). Although most studies find improved plant densities with seed treatments, these same studies have found inconsistent yield results. Gaspar et al. (2014) had an increase in plant density of 36,000 in 2011 and 2012 and 41,000 plants ha^{-1} in 2013, when using a fungicide, insecticide, and nematicide seed treatment. This same seed treatment had no effect on yield in 2011-2012 but increased yield 148 kg ha^{-1} in 2013. Another study with one treated variety had increases in plant stand of 16 and 22% and a 4% increase in yield at two locations but no increase in either stand or yield at a third location (Cox and Cherney, 2011b). Another treated variety had an increase in plant stands of 16% but no yield increase at one location and an increase in plant stands of 19% and an increase in yield of 4% at another location. Schulz and Thelen (2008) found a positive yield response to fungicide seed treatment at three of 16 environments and attributed this to early planting followed by cold, wet conditions at those three environments. The inconsistent yield response has led many producers and crop advisors to consider seed treatments as a type of insurance that provides a benefit only when conditions are present that may result in a yield reduction (Esker and Conley, 2011).

A recent review found that soybean yields have a greater likelihood to be increased by nitrogen fertilizer in environments capable of producing yields greater than 4500 kg ha^{-1} (Salvagiotti et al., 2008). Salvagiotti et al. (2009) found that nitrogen fertilizer increased yield by an average of 228 kg ha^{-1} over unfertilized soybeans that averaged 4849 kg ha^{-1}. Another study with yield environments ranging from 2400 to 5300 kg ha^{-1} found no response to nitrogen applications at any yield level (Freeborn et al., 2001). A study in Kansas found that nitrogen fertilizer increased yield an average of 464 kg ha^{-1} at six of eight environments. All six responsive environments had yields greater than 3767 kg ha^{-1}, but the nonresponsive environments had yields less than 3363 kg ha^{-1} (Wesley et al., 1998). Although these yield levels did not meet the 4500 kg ha^{-1} threshold reported by Salvagiotti et al. (2008), the results support the idea that higher yielding environments may be more responsive to nitrogen fertilizer.

Soybean area treated with foliar fungicide and insecticide in the United States increased from 1.03 million ha in 2002 to 3.2 million ha in 2006 (USDA-ERS, 2014). Fungicides and insecticides are used to control fungal diseases and insect pests. However, their use as a means to possibly improve plant health has increased (Henry et al., 2011). In Iowa, 218 of 282 on-farm strip trials had a “greening effect” observed in late-season digital imagery attributed to pyraclostrobin fungicide application (Kyveryga et al., 2013). Of the locations showing this effect, 65% had a profitable yield response to fungicide compared to only 30% of locations without the effect. The average yield response to fungicide across all trials was 162 kg ha^{-1}. In Indiana, Henry et al. (2011) reported increases in yield of 100 kg ha^{-1} due to fungicide and 150 kg ha^{-1} due to insecticide. The authors concluded that fungicide increased seed mass, and insecticide increased seed number. However, they were unsure if this response was due to changes in the soybean plant or control of unobserved pests.

Recent on-farm research has tried to examine the effects of newer products that are touted as stress reducing or growth promoting (Staton and Boring, 2012; Voight et al., 2012). On farm trials in Michigan reported inconsistent results when using two different products (Staton and Boring, 2012). A stress reducing and yield promoting seed treatment and foliar product increased yield by 135 kg ha^{-1} at one location, but a different foliar growth promoter did not affect yield when averaged across three locations. Field trials in Pennsylvania evaluated two products finding an inconsistent yield response (Voight et al., 2012). One out of nine locations had a yield increase when a growth promoter was applied (+182 kg ha^{-1}), but another similar product had no effect on yield at five locations.

Research Question and Justification

With the recent high soybean commodity prices, agrichemical companies have increasingly promoted the use of “yield-enhancing” combinations of products with little supporting data. Multiple studies have looked at a majority of the products on the market today to examine their effect but most have been tested individually. Although these studies have found inconsistent responses, it may be possible that a combination of these products could produce a synergistic effect that enhances yield. Coupling the combination of these products with the quick turnover in new varieties may allow producers to maximize the genetic improvement. Finally, using combinations of these products could potentially allow producers to increase yield by adjusting seeding rates. Our hypothesis is that input systems containing a combination of products marketed today could enhance yields especially when coupled with newer varieties and optimal seeding rates. Therefore the objectives of this study were to 1) evaluate different products marketed today individually and collectively in input systems, 2) examine the interaction between input systems and varieties, and 3) examine the interaction between input systems and seeding rates on growth and yield parameters and to determine the consistency of their effects across multiple environments.

Materials and Methods

A series of nine experiments for each of three objectives was conducted in 2012 to 2014 at Kansas State University research stations to test the hypotheses stated above. The environments included six irrigated and three dryland environments (Table 1.1). The locations were a highly productive dryland location at Manhattan, a productive irrigated location with known presence of sudden death syndrome (*Fusarium virguliforme*; SDS) and soybean cyst nematode (*Heterodera glycines* Ichinohe; SCN) at Rossville, and another productive irrigated location with no SDS or SCN at Scandia.

Experimental Design

The experimental design for all experiments was a randomized complete block with four replications with the treatment structure changing based on the objective being evaluated. Treatments evaluating inputs consisted of 16 different products or combinations of these products, which will be referred to as input systems (Tables 1.2 and1.3). To examine the variety by input system interaction, three input systems: untreated control (UTC), SOYA, and SOYA minus foliar fungicide (SOYA – Foliar F) were implemented across six glyphosate [N-(phosphonomethyl) glycine] resistant maturity group (MG) III and IV soybean varieties for a total of 18 treatments in a two-way complete factorial treatment structure. The six varieties were: Channel® CH3303R2 (Monsanto Co., St. Louis, MO; MG III), Asgrow® AG3431 (Monsanto Co., St. Louis, MO; MG III), Pioneer® P93Y92 (DuPont Pioneer, Johnston, IA; MG III), Asgrow® AG4033 (2014; MG IV), Asgrow® AG4130 (2012-2013; MG IV), and Pioneer®

P94Y23 (MG IV). Finally, the examination of the seeding rate by input system interaction consisted of six seeding rates ranging from 123,550 to 494,200 plants ha^{-1} at 74,130 plants ha^{-1} increments combined with two input systems, UTC and SOYA, for a total of 12 treatments in a two-way complete factorial treatment structure. The term "SOYA" is an abbreviation for "systematic optimization of yield-enhancing applications" and is a combination of possible "yield-enhancing" products representative of those being marketed today. These products include seed treatments of fungicide, insecticide, nematicide, and LCO, broadcasted nitrogen, and foliar applications of LCO, micronutrients, fungicide, insecticide, and antioxidant (Table 1.3).

All locations were managed intensively to maximize the possibility of achieving high soybean yields. Composite soil samples (10-15 cores) were taken to a depth of 15 cm before planting to characterize soil fertility. Fertilizer was applied, if needed, based on University recommendations to achieve soybean yields greater than 5000 kg ha^{-1}. Experiments were planted in mid-May using a modified grain drill with a precision cone seed metering system. Plot dimensions were 3.05 m wide by 9.14 to 10.67 m long. The evaluation of inputs and seeding rate by input system interaction experiments had Asgrow® glyphosate resistant soybean varieties planted with MG's suitable for each location. The evaluation of inputs and variety by input system interaction experiments were seeded at a rate of 432,425 plants ha^{-1}. Weed control consisted of pre-emergence herbicides applied after planting and post-emergence herbicides applied according to the label if needed based on University recommendations.

Soybean Growth and Yield Parameter Measurements

Soybean growth and yield responses to treatments measured for all three experiments were plant density, survival, lodging, seed mass, and seed yield. Plant density was determined at V2-V3 and R8 from a 1 m long by 1.5 m wide area. Percent stand survival was calculated by dividing R8 plant density by V2-V3 plant density and multiplying by 100. Lodging ratings were assessed at R8 based on a 1 (no lodging) to 5 (80-100% lodging) scale. Seed yield was determined by harvesting the center 1.5 m by 8.2 to 9.1 m of each plot using a modified plot combine. A 0.45 kg subsample was collected during harvest to determine percent moisture and test weight. The subsamples were shipped to the University of Minnesota where they were analyzed for seed mass and seed quality. Final yield was adjusted to 130 g kg^{-1} grain moisture content.

Additional measurements were taken in some experiments to help characterize soybean growth for the particular objectives. To further evaluate the impact of inputs, plant height was averaged across three measurements taken at R8. To further examine the interaction between varieties and input systems, pods were counted on 10 plants to determine number of pods in a square meter using the R8 plant density, and the number of seeds in a square meter was measured using seed mass and seed yield. To further evaluate the interaction between seeding rate and input systems, percent emergence at V2-V3 and stand establishment at R8 were calculated by taking V2-V3 and R8 plant density divided by the original seeding rate.

For all experiments, disease and insect assessments were made to further characterize environment and treatment effect on soybeans. Pre- and post-fungicide and insecticide application assessments for diseases and insects were conducted at R3 and R5. Disease assessment was based on percent affected, calculated from 10 plants, and severity rating on a 1 (0.5-5% affected) to 5 (>50% affected) scale. Insect assessment was based on percent insect damage estimated across the whole plot and severity rating based on the same scale used for the disease severity rating.

Statistical Analysis

Analysis of variance was conducted using PROC MIXED in SAS (SAS Institute, 2011). For all three studies, analysis was conducted with location as a fixed effect. Year and block within year were considered random based on the assumption that the three years at each location represented a random sampling of environmental conditions likely to be encountered at those locations. Also the intent of this study was not to determine environmental implications of why certain inputs worked in a given year but rather to see the impact of inputs and agronomic practices when used in a production system across multiple years. Statistical significance was established at the 0.05 probability level, and means were separated using Fisher's protected least significant difference. PROC REG was used to determine the nature of response functions describing potential relations between soybean growth parameters and seeding rate. PROC NLIN was used similarly to determine the relations between final plant stand and yield using Eq. [1]

$$Y = \alpha(1 - e^{-\beta x}) \qquad [1]$$

where Y is the percent of maximum yield, X is the R8 plant density, α is the predicted, asymptotic maximum, and β represents the responsiveness of Y as plant density increases (Edwards and Purcell, 2005). A linear-plateau model, defined by Eq. [2] and [3], was also examined to further understand the relationship between yield and seeding rate

$$Y = a + bX \quad if\ X < C \qquad [2]$$

$$Y = P \quad if\ X \geq C \qquad [3]$$

where Y is seed yield, X is seeding rate, a is the intercept, b is the slope, C is the seeding rate at which the linear response and plateau intersect, and P is the yield achieved using seeding rate C. PROC CORR was used to examine the relationship between soybean growth and yield parameter and the treatments in the evaluation of inputs and variety by input system experiments.

Results and Discussion

Environment

Growing conditions varied across locations and years. Average maximum temperature was above average in almost all months for most locations in 2012, especially early in the growing season (Table 1.4). Precipitation in 2012 was below average across all months at each location except for Manhattan in August. Extremely dry conditions during May led to poor planting conditions contributing to reduced emergence. Below average maximum temperatures during May, July, and August made 2013 much cooler than 2012, but all locations finished the growing season with above average maximum temperatures in September (Table 1.4). Below average precipitation during most of the growing season occurred again in 2013 except at Rossville in May, Scandia in August, and Manhattan and Rossville in September. Average or below average maximum temperatures characterized much of 2014 as well (Table 1.4). The exceptions were May and August when all locations experienced above average maximum temperatures. Other than June, precipitation was below average at all locations in 2014. Significant rainfall events occurred in the first half of June leading to the above-average totals, however, the second half was dry at all locations (data not shown). Rossville and Scandia were irrigated locations, and monthly irrigation totals are reported in Table 1.4.

Given that precipitation was usually below average across all locations and years, there was low incidence of diseases (data not shown). The exception was sudden death syndrome

(*Fusarium virguliforme*; SDS) present at Rossville all three years at levels that impacted yields, especially in 2013, with different levels for each variety (Table 1.5). Incidence of insect pests also was low in all environments (data not shown).

Evaluation of Inputs

Inputs and input systems did not affect plant density at either growth stage or on survival rates at any location (Table 1.6). Plant density at R8 ranged from 246,100 to 357,700 plants ha^{-1} across all locations. De Bruin and Pedersen (2008b) found that 95% of maximum yield was achieved with a range of 157,300 to 290,800 plants ha^{-1}, which is similar to final plant densities at all three locations in this study.

Inputs had an effect on height at all three locations but differences were minimal, ranging from 5 to 10 cm (Table 1.7). The defoliant treatment typically had one of the shortest plant heights at all locations and would be expected given that it burned the soybean leaves, setting these plots back. However, the SOYA + D treatment had an inconsistent effect, having the shortest height at one location and one of the tallest heights at another. Inputs also affected lodging at Scandia, but all scores were less than 2 on a 1 (no lodging) to 5 (80-100% lodging) scale and differed by only 0.55 (Table 1.7). Regression analysis found a linear relationship between plant height and lodging at all locations but low r-square values of 0.14 at Manhattan (Pr. > F = <0.001), 0.04 at Rossville (Pr. > F = 0.04), and 0.28 at Scandia (Pr. > F = <0.001) were observed. On average, a 1 cm increase in plant height led to a 0.025 increase in lodging score.

Inputs affected seed mass with differences ranging from 0.6 to 0.7 g 100 $seeds^{-1}$ at Rossville and Scandia (Table 1.8). At Rossville seed mass was increased over the UTC by 3.3% with the SOYA minus foliar fungicide, 3.8% with the defoliant, nitrogen, and SOYA minus foliar fungicide and insecticide, 5.1% with the SOYA plus defoliant, and 5.2% with the SOYA treatments. None of the SOYA input systems were significantly different from each other at Rossville, but removal of inputs, in general, decreased seed mass compared to the main SOYA treatment. Similar results were seen at Scandia with seed mass being increased over the UTC by 2.6% with the fungicide plus insecticide seed treatment, 2.8% with the foliar fungicide, 3.0% with the SOYA minus foliar fungicide, 3.1% with the SOYA minus nitrogen, 3.3% with the foliar fungicide and insecticide, and 3.8% with the SOYA plus defoliant treatments. Once again, none of the SOYA input systems were significantly different than the main SOYA treatment. Other studies evaluating foliar fungicide alone have documented an increase in seed mass (Henry et al., 2011; Swoboda and Pedersen, 2009). In the current study, foliar fungicide had an inconsistent effect on seed mass, being one of the worst treatments at Rossville and one of the best treatments at Scandia for this parameter.

The use of inputs affected yield at Rossville only (Table 1.8). At this location yield was increased over the UTC by15.8% with the defoliant, 16.4% with the SOYA minus nitrogen, 16.5% with the nitrogen, 19.8% with the SOYA minus foliar fungicide, 24.5% with the SOYA, and 25.9% with the SOYA plus defoliant treatments. Similar to seed mass at Rossville, removal of inputs reduced yield compared to the main SOYA input system. All of the SOYA input systems increased yield over the UTC except for the SOYA minus foliar fungicide and insecticide, with this treatment being significantly less (-396 kg ha^{-1}) than the SOYA plus defoliant treatment. The treatment with the least yield at Rossville was the fungicide plus insecticide seed treatment although it was not significantly different than the UTC. A possible reason for the response of yield to the inputs at Rossville may be due to the high incidence of SDS (Table 1.8). Treatments with lower SDS DX ratings typically had some of the greatest yields ($r = -0.51$, Pr. > F = <0.001).

Variety by Input System

The effect of input system on plant density differed with variety at Scandia for both growth stages and Rossville at R8 (Tables 1.9). At Scandia, the UTC had the greatest density for three varieties, SOYA had the greatest density for two varieties, and SOYA – Foliar F had the greatest density for the last variety at both V2-V3 and R8. The same trend was found at Rossville at the R8 plant density but with the input systems having the greatest density with different varieties. Variety also affected plant density at Manhattan at both growth stages and Rossville at V2-V3 (Table 1.10). At Manhattan, P93Y92 and P94Y23 had the lowest plant density at both growth stages, but AG3431 and AG4033/4130 had the greatest plant density at both growth stages. P94Y23 had the lowest density at Rossville at V2-V3, but P93Y92 had the greatest density. Overall, plant densities ranged from 257,584 to 374,091 plants ha^{-1} at R8 and were within or greater than the De Bruin and Pedersen (2008) range of 157,300 to 290,800 plants ha^{-1} needed to achieve 95% of maximum yield. Variety and input system had no effect on survival (Table 1.11).

Variety had an effect on lodging scores at all three locations but this response depended upon input systems at Manhattan (Table 1.9). At Manhattan, the UTC had the least amount of lodging for five of the six varieties, but SOYA and SOYA – foliar F had the most lodging for three of the varieties. For AG3431, the SOYA – foliar F input system had a 0.2 lower lodging score then the UTC and SOYA. AG4232 had the greatest lodging score averaging 3.0 in the SOYA and SOYA – foliar F input systems but other than this variety, lodging scores were low ranging from 1 to 1.9 on a 1 to 5 scale. Variety also impacted lodging scores at Rossville and Scandia and did not depend on input system (Table 1.11). AG4232 had the greatest lodging at both locations having an increase in lodging score above the next closest variety by 0.29 at Rossville and 0.37 at Scandia.

Variety and input system affected multiple yield components and yield, but no further interactions were found (Tables 1.12-1.14). Variety affected pods plant^{-1} at Rossville and Manhattan, and input systems had an effect at Rossville (Table 1.12). At Manhattan and Rossville, AG4232 had the greatest pods plant^{-1} followed by AG4033/4130 at Rossville and AG4033/4130 and AG3431 at Manhattan. Although the response was not significant at Scandia, AG4232 also had the greatest pods plant^{-1}. AG4232 was one of the latest maturing varieties used in the study and would have had a slightly longer reproductive duration compared to the earlier-maturing varieties. This could have led to the increase in pods plant^{-1} observed here. However, P94Y23 is similar in maturity to AG4232 and typically had some of the least pods plant^{-1}. At Rossville, the SOYA input system had 4.2 more pods plant^{-1} than the UTC. Although response to input system was not significant at Manhattan and Scandia, the SOYA input system had the greatest pods plant^{-1} at these two locations. Variety influenced pods m^{-2} at all three locations (Table 1.12). At the three locations, AG4232 had the greatest number of pods m^{-2}, and P93Y92 and P94Y23 usually had the least pods m^{-2}.

Variety and input systems did not impact seeds plant^{-1} (Table 1.13). Varieties did have an effect on seeds pod^{-1} at one location (Table 1.13). At Manhattan, P94Y23 and P93Y92 had the greatest seeds pod^{-1}. Input system did not affect seeds pod^{-1} at any of the locations (Table 1.13). Responses of all varieties were similar for seeds m^{-2}, but input systems inconsistently affected this parameter at Rossville and Scandia (Table 1.13). At Rossville, the SOYA input system had the greatest number of seeds m^{-2} with 220 more seeds than the SOYA – foliar F system and 154 more seeds than the UTC. At Scandia, the UTC had an increase in seeds m^{-2} of 198 above the SOYA system and 200 above the SOYA – foliar F system.

Variety affected seed mass at all three locations and input system affected the same parameter at Manhattan and Scandia (Table 1.14). In general, P94Y23 and P93Y92 had the greatest seed mass while AG4232 had the lowest seed mass at all three locations. At Manhattan and Scandia, the SOYA input system resulted in greater seed mass than the UTC but was similar in seed mass to the SOYA – foliar F. Although a significant response was not seen at Rossville, the SOYA input system resulted in the greatest seed mass, similar to the responses at Manhattan and Scandia.

Although variety affected most of the other soybean growth parameters measured, variety had no impact on yield (Table 1.14). Input system influenced yield at Rossville, where the SOYA input system increased yield by 285 kg ha^{-1} over the UTC and 387 kg ha^{-1} over SOYA – foliar F. Input systems at Manhattan and Scandia were inconsistent in their effect on yield.

Seeding Rate by Input System

There was no input system by seeding rate interaction for any growth and yield parameter at any location (Table 1.15). Therefore, parameter responses to input systems and regression analysis of each parameter response to seeding rate were examined independently.

Input system did not affect plant density at either growth stage, emergence, establishment, or survival at any of the locations (Table 1.15). The SOYA input system decreased lodging score by 0.06 at Scandia (Table 1.15), but all lodging scores were low, with the highest being 1.16 on a scale of 1 (no lodging) to 5 (80-100% lodging). The SOYA input system consistently increased seed mass by an average of 0.4 g $(100 \text{ seeds})^{-1}$ over the UTC across the three locations (Table 1.15). Because input systems contained several components, it is unclear which product had the greatest impact on seed mass. Studies looking at fungicide (Henry et al., 2011; Swoboda and Pedersen, 2009), insecticide (Henry et al., 2011), and nitrogen (Ruiz Diaz et al., 2009; Salvagiotti et al., 2009) have found inconsistent effects on seed mass, and studies looking at newer growth promotor products focused on their effect on yield (Staton and Boring, 2012; Voight et al., 2012). Evaluation of inputs in another experiment in this current study did not identify one product that consistently increased seed mass, but the SOYA input systems tended to have greater seed mass. Rossville was the only location where input system improved yield (Table 1.15). As mentioned for the experiment evaluating inputs, a possible explanation for this yield increase may the higher SDS levels present in the UTC compared to the SOYA input system at this location (data not shown). The UTC and SOYA systems produced comparable yields at Manhattan and Scandia.

Linear regression analysis found growth parameters that had a significant linear response to seeding rate (Table 1.16) but quadratic and cubic regression analyses were non-significant (data not shown). As might be expected, plant density at V2-V3 and R8 responded linearly to seeding rate at all locations (Table 1.16). For each additional 100,000 seeds ha^{-1}, plant density increased by an average of 74,667 plants ha^{-1} at V2-V3 and 62,667 plants ha^{-1} at R8 across all three locations (Figure 1.1a and 1.1b). Linear regression accounted for an average of 73% of the V2-V3 and 63% of the R8 plant density variability. Although plant density continued to increase as seeding rate increased, a previous study conducted in Iowa (De Bruin and Pedersen, 2008) found that final plant densities needed to achieve 95% of maximum yield ranged from 157,300 to 290,800 plants ha^{-1} indicating that our seeding rates were sufficient for achieving maximum yield.

Negative linear responses to seeding rate were found for emergence at Manhattan, establishment at Manhattan and Scandia, and survival at Rossville and Scandia (Table 1.16). For every 100,000 seeds ha^{-1} increase, emergence decreased by 2.0% at Manhattan (Figure 1.1c), establishment decreased by an average of 4.2% at Manhattan and Scandia (Figure 1.1d), and survival decreased by an average of 4.5% at Rossville and Scandia (Figure 1.1e). Oplinger and Phillbrook (1992) found a similar response of survival to seeding rate. Lodging had a linear response to seeding rate at Manhattan (Table 1.16) with a lodging score increase of 0.074 for every additional 100,000 seeds ha^{-1} (Figure 1.1f), but overall lodging scores were low.

Seed mass responded linearly to seeding rate at Manhattan (Table 1.16) with a 0.21 g $(100\ seeds)^{-1}$ decrease in seed mass for each increase of 100,000 seeds ha^{-1} (Figure 1.1g). A similar response in seed mass to seeding rate has been documented by other studies (Elmore, 1998; Ethredge et al., 1989), but another study has documented an increase in seed mass as seeding rate increased (De Bruin and Pedersen, 2008). Although the linear response at Manhattan was highly significant ($Pr > F$ = <0.001), seeding rate accounted for less than 10% of the variability in the seed mass data. Board et al. (1999) found, that among primary traits, seeds

m^{-2} had the greatest effect on yield along with pod $plant^{-1}$ while seed mass did not have as big of an effect on yield.

Yield had a linear response to seeding rate at all three locations (Table 1.16), but the fit of the model was as good or better with a linear-plateau model (Table 1.17). Similar seeding rates were observed at Rossville and Scandia where the linear response intercepted the plateau with 297,261 and 305,859 seeds ha^{-1} needed to reach this point (Figure 1.1h). Both locations also had similar yields at this point with Rossville yielding 3,235 kg ha^{-1} and Scandia yielding 3,374 kg ha^{-1}. At Manhattan, a higher seeding rate of 379,658 seeds ha^{-1} was needed to reach the plateau, but a greater yield of 3,762 kg ha^{-1} was achieved at Manhattan. The seeding rates found in this study to achieve maximum yield are in line with current University recommendations. In Kansas, 322,910 seeds ha^{-1} is recommended to maximize yield potential (Kok et. al., 1997) and at least 322,898 seeds ha^{-1} is recommended in Indiana (Robinson and Conley, 2007).

Yield also had a significant relationship with R8 plant density at all three locations when a non-linear model was used (Table 1.18). This model accounted for a large percentage of the variability in the data with an average r-squared value of 0.96 across all locations. Figure 1.2 shows the yield response to R8 plant density as well as the plant density required to achieve 95% and 99% of the maximum yield at each location. Rossville and Scandia acted similarly with 95 and 99% of maximum yield attained at 106,990 and 164,470 plants ha^{-1} at Rossville and 115,221 and 177,122 plants ha^{-1} at Scandia. Manhattan needed a greater R8 plant density to attain 95 and 99% maximum yield at 230,441 and 350,244 plants ha^{-1}. Rossville and Scandia required plant densities less than the range reported by DeBruin and Pedersen (2008b) where 95% maximum yield was achieved with 157,300 to 290,800 plants ha^{-1}, but Manhattan was within this range. If average establishment rates are taken into account for each location, a seeding rate of 437,338 seeds ha^{-1} at Manhattan, 241,868 seeds ha^{-1} at Rossville, and 253,031 seeds ha^{-1} at Scandia were needed to achieve the plant density required to attain 99% of the maximum yield. These seeding rates are within 55,000 seeds ha^{-1}, on average, of the seeding rates found previously that attained maximum yield using the linear plateau model. Also using these seeding rates, Rossville and Scandia are below, and Manhattan is above the current University recommendations of 322,910 and 322,898 seeds ha^{-1} that Kansas State University and Purdue University recommend (Kok, 1997; Robinson and Conley, 2007). One possible reason for why this study found lower optimal seeding rates at two locations than those recommended by Kansas State and Purdue may be due to the less than ideal environmental conditions observed during the three years of this study, which led to lower yields.

Conclusion

Few interactions occurred between variety or seeding rate with input systems in these experiments, and most interactions that did occur did not involve the major yield components. Evaluation of inputs alone found that inputs and input systems affected plant height, lodging, seed mass and yield, but results were inconsistent from location to location. Varieties had a consistent effect on soybean growth parameters and yield components, but did not impact yield at any of the locations. Linear responses to seeding rate were observed for all soybean growth parameters at most of the locations. A linear plateau model found that seeding rates of 297,261 to 379,658 seeds ha^{-1} were needed to achieve maximum yield, while a non-linear model showed that final plant densities of 164,470 to 354,244 plants ha^{-1} were required to achieve 99% of maximum yield. These seeding rates and final plant densities are in line with current University recommendations and results from other studies. Across all three experiments, inputs and input systems consistently had a positive effect on seed mass at all locations and seed yield at Rossville. At Rossville, the SOYA input systems tended to have the lowest SDS levels, indicating that a product or combination of products may have helped mitigate the stress from this disease. Overall, inputs tended to have a positive impact on soybean yield and yield components. However, producers should take into consideration soybean commodity and product prices as well as best management practices before implementing these inputs as part of their production system.

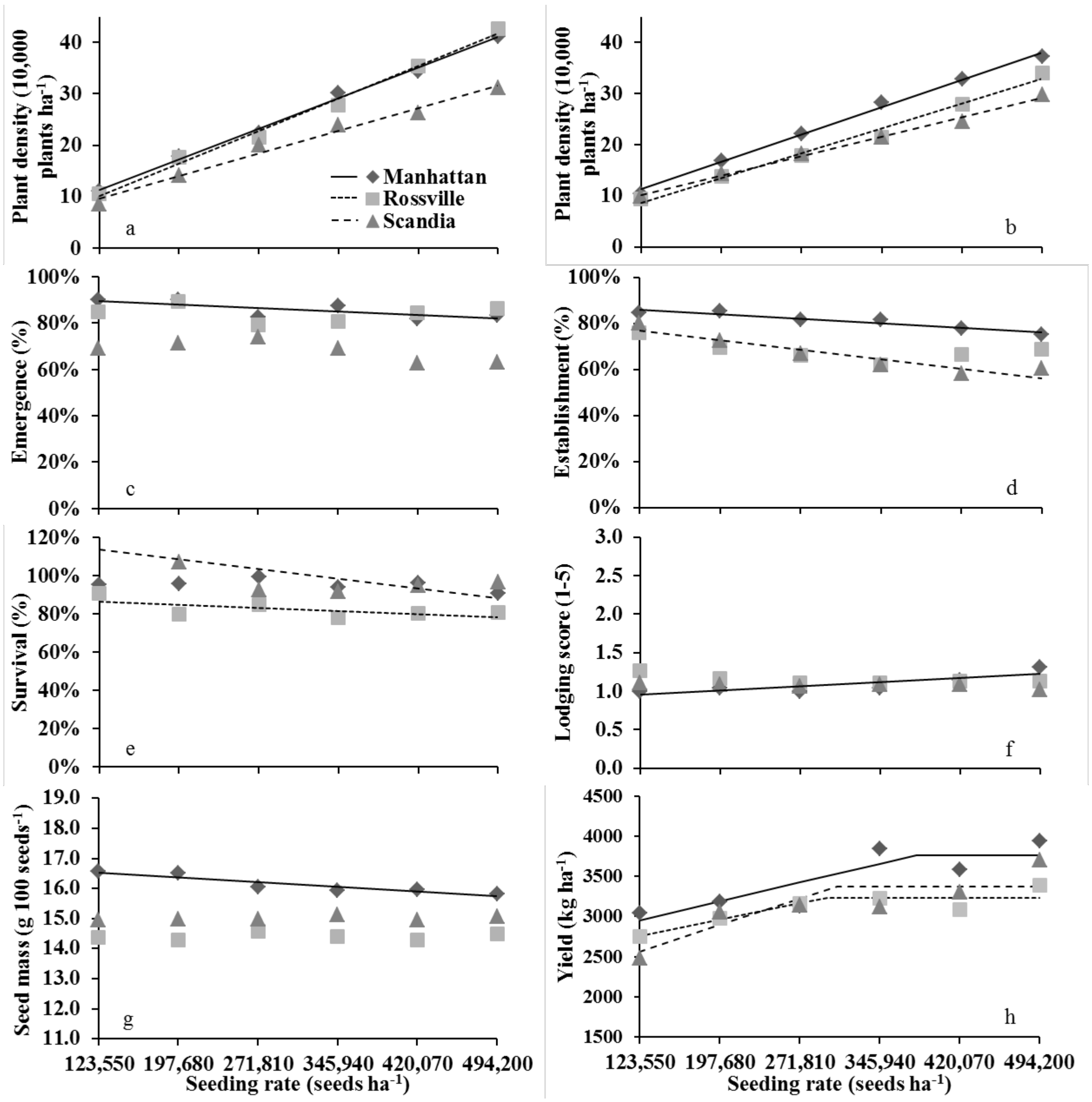

Figure 1.1 Response of multiple growth and yield parameters to seeding rate at three locations in Kansas during 2012 to 2014. Linear responses that were non-significant within each parameter are not shown.

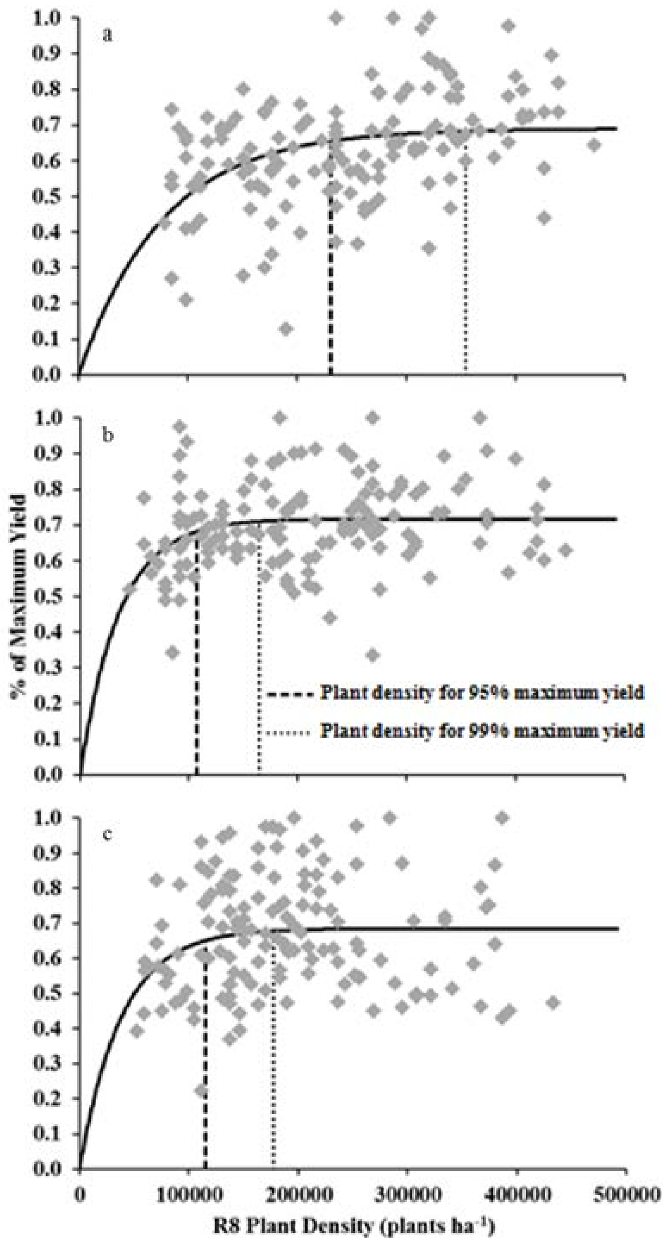

Figure 1.2 Best fit non-linear regression model [$y=\alpha(1-exp^{-\beta x})$] curves where Y = percent maximum yield, X = R8 plant density, α is the predicted, asymptotic maximum, and β represents the responsiveness of Y as plant density increases at three locations (a – Manhattan, b – Rossville, and c – Scandia) in Kansas during 2012 to 2014. Vertical lines represent the R8 plant density required to achieve 95% and 99% of the maximum yield at each location.

Table 1.1 Location descriptions and field characteristics for three experiments conducted in Kansas during 2012 to 2014 to evaluate input systems and their interactions with variety and seeding rate.

Year	Location	Coordinates	Soil series†	Previous crop	Tillage system‡	Soil fertility pH	P	K	OM	Variety§	Planting date
							— mg kg^{-1} —		g kg^{-1}		
2012	Manhattan	39.21696, -96.59180	K	sorghum	NT	7.3	19.4	211	26	AG4130	7 May
	Rossville¶	39.12021, -95.92655	B	corn	MT	6.2	20.6	180	17	AG4130	4 May
	Scandia¶	39.83426, -97.84142	C	corn	MT	6.9	8.0	295	15	AG3431	9 May
2013	Manhattan#	39.21696, -96.59087	K	sorghum	MT	7.5	32.6	286	35	AG4130	13 June
	Rossville¶	39.11870, -95.92599	E,Ki††	corn	MT	7.4	12.8	204	14	AG4130	22 May
	Scandia¶	39.83426, -97.84075	C	corn	MT	6.4	5.0	387	19	AG3431	3 June
2014	Manhattan	39.21696, -96.59033	K	soybeans	NT	6.8	25.7	170	30	AG4033	14 May
	Rossville¶	39.07815, -95.76811	Eb	corn	MT	7.0	43.8	312	19	AG4033	15 May
	Scandia¶	39.83426, -97.84019	C	corn	MT	6.6	13.6	444	31	AG3431	13 May

† Source: USDA web soil survey. Bismarckgrove-Kimo complex (B): fine-silty, mixed, superactive, mesic Fluventic Hapludolls; Crete silt loam (C): fine, smectic, mesic Pachic Udertic Arguistolls; Eudora silt loam (E): coarse-silty, mixed, superactive, mesic Fluventic Hapludolls; Eudora-Bismarckgrove silt loams (Eb): coarse-silty to fine-silty, mixed, superactive, mesic Fluventic Hapludolls: Kahola silt loam (K): fine-silty, mixed, mesic Cumulic Hapludolls; Kimo silty clay loam (Ki): clayey over loamy, smectitic, mesic Fluvaquentic Hapludolls.
‡ MT, mulch tillage; NT, no tillage.
§ Varieties planted in evaluation of inputs and seeding rate x input system experiments are listed. Varieties were a treatment factor in the variety x input system experiment and are listed in the text.
¶ irrigated location.
# Location was replanted.
†† Evaluation of input and seeding rate x input system planted on E. Variety x input system planted on Ki.

Table 1.2 Product and application information for inputs in three experiments in Kansas during 2012 to 2014.

Product†	Product Component	Active Ingredient	Application		
			Growth Stage	Product Rate	Sprayer Volume‡
Seed treatments				mL kg seed^{-1}	
Acceleron®	fungicide	pyraclostrobin + metalaxyl	seed	1.04	—
Acceleron®	insecticide	imidacloprid	seed	2.60	—
Poncho®/Votivo®	insecticide + nematicide	clothianidin + *Bacillus firmus*	seed	0.64	—
Optimize®	LCO promoter§	lipo-chitooligosaccharide	seed	1.83	—
Nitrogen				kg ha^{-1}	
Urea¶	nitrogen	46-0-0 %N-P_2O_5-K_2O	V4	84	—
ESN®	nitrogen	44-0-0 %N-P_2O_5-K_2O	V4	84	—
Foliar products				mL ha^{-1}	L ha-^{1}
Cobra®#	defoliant (D)	lactofen	V4	877	234
Ratchet™	LCO promoter	lipo-chitooligosaccharide	V4-V6	292	140
Task Force® 2	fertilizer	11-8-5-0.1-0.05-0.04-0.04-0.02-0.00025-0.00025 %N-P_2O_5-K_2O-Fe-Mn-Zn-B-Co-Mo	R1	4676	140
Bio-Forge®	antioxidant	N,N'-diformyl urea	R3	1169	187
Headline®	fungicide	pyraclostrobin	R3	438	187
Priaxor™	fungicide	fluxapyroxad + pyraclostrobin	R3	585	187
Warrior II®	insecticide	lambda-cyhalothrin	R3	140	187
Endigo®	insecticide	lambda-cyhalothrin + thiamethoxam	R3	292	187

† Acceleron® (Monsanto Co., St. Louis, MO); Poncho®/Votivo® (Bayer Crop Science, Research Triangle Park, NC); Optimize® (Novozymes, Brookfield, WI); ESN [environmentally smart nitrogen (polymer-coated urea)] (Agrium, Calgary, Alberta, Canada); Ratchet™ (Novozymes, Brookfield, WI); Cobra® (Valent USA Corp., Walnut Creek, CA); Task Force® 2 (Loveland Products, Inc., Greeley, CO); Bio-Forge® (Stoller USA, Inc., Houston, TX); Headline® (BASF Corp., Florham Park, NJ) used in 2012; Priaxor™ (BASF Corp., Florham Park, NJ) used in 2013-2014; Warrior II® (Syngenta Crop Protection, LLC, Greensboro, NC) used in 2012; Endigo® (Syngenta Crop Protection, LLC, Greensboro, NC) used in 2013-2014.

‡ Foliar applications made using a CO_2 pressurized backpack sprayer at 241 kPa with 0.76 L min^{-1} flay spray nozzles (TeeJet Technologies, Wheaton, IL) spaced 0.46 m apart on a 3.05 m boom.

§ LCO, lipo-chitooligosaccharide.

¶ Treated with Agrotain® [N-(n-butyl) thiophosphoric triamide] (Koch Agronomic Services, LLC, Wichita, KS) at 3.1 mL kg urea^{-1}.

Tank mixed with 1% v/v crop oil concentrate.

Table 1.3 Input and input system treatments and their components used in three experiments in Kansas during 2012 to 2014.

Treatment	Seed Treatment				Nitrogen†	Foliar Products					
	Acceleron® F	Acceleron® I	Poncho®/ Votivo®	Optimize®		Cobra®	Ratchet™	Task Force® 2	Bio-Forge®	Fungicide‡	Insecticide§
Untreated Control	—¶	—	—	—	—	—	—	—	—	—	—
Fungicide (F) ST	+	—	—	—	—	—	—	—	—	—	—
F+Insecticide (I) ST	+	+	+	—	—	—	—	—	—	—	—
F+I+LCO ST + Foliar LCO	+	+	+	+	—	—	+	—	—	—	—
Nitrogen (N)	—	—	—	—	+	—	—	—	—	—	—
Defoliant (D)	—	—	—	—	—	+	—	—	—	—	—
Foliar Fertilizer	—	—	—	—	—	—	—	+	—	—	—
Bio-Forge	—	—	—	—	—	—	—	—	+	—	—
Foliar F	—	—	—	—	—	—	—	—	—	+	—
Foliar I	—	—	—	—	—	—	—	—	—	—	+
Foliar F+I	—	—	—	—	—	—	—	—	—	+	+
SOYA	+	+	+	+	+	—	+	+	+	+	+
SOYA + D	+	+	+	+	+	+	+	+	+	+	+
SOYA – N	+	+	+	+	—	+	+	+	+	+	+
SOYA – Foliar F	+	+	+	+	+	+	+	+	+	—	+
SOYA – Foliar F+I	+	+	+	+	+	+	+	+	+	—	—

† 1:1 mix of ESN [environmentally smart nitrogen (polymer-coated urea)] and urea treated with Agrotain® [N-(n-butyl) thiophosphoric triamide].

‡ Headline® used in 2012. Priaxor™ used in 2013 and 2014.

§ Warrior II® used in 2012. Endigo® used in 2013 and 2014.

¶ Presence of a product in a treatment is denoted by "+", and absence by "–".

Table 1.4 Monthly average maximum temperature and total precipitation for all environments in Kansas during 2012 to 2014.

Year	Location†	May	June	July	August	September
		Average maximum temperature (°C)				
2012	Manhattan	28.7 (3.8)†	32.9 (2.9)	37.5 (4.4)	32.3 (0.0)	27.2 (-0.5)
	Rossville	28.2 (3.8)	31.3 (2.0)	35.6 (3.6)	31.6 (0.1)	27.4 (0.5)
	Scandia	28.3 (5.1)	32.6 (3.9)	35.4 (3.5)	30.3 (-0.7)	27.2 (0.8)
2013	Manhattan	23.8 (-1.0)	30.0 (0.0)	31.1 (-1.9)	30.6 (-1.7)	29.7 (2.1)
	Rossville	23.6 (-0.8)	29.3 (0.1)	30.7 (-1.2)	29.4 (-2.1)	29.1 (2.2)
	Scandia	23.5 (0.3)	30.5 (1.7)	30.6 (-1.3)	30.0 (-1.0)	28.9 (2.5)
2014	Manhattan	26.1 (1.2)	29.3 (-0.8)	30.9 (-1.0)	33.0 (0.7)	26.8 (-0.8)
	Rossville	26.1 (1.7)	28.7 (-0.6)	30.0 (-1.9)	32.2 (0.8)	26.1 (-0.8)
	Scandia	25.9 (2.7)	28.8 (0.0)	31.6 (-1.5)	31.3 (0.2)	25.3 (-1.1)
		Total Precipitation (mm)				
2012	Manhattan	27 (-102)† (-)‡	84 (-61) (-)	15 (-98) (-)	107 (2) (-)	42 (-46) (-)
	Rossville	67 (-57) (0)	98 (-39) (45)	19 (-78) (153)	79 (-29) (103)	22 (-71) (0)
	Scandia	12 (-99) (0)	98 (-13) (95)	56 (-45) (127)	61 (-33) (95)	20 (-62) (0)
2013	Manhattan	99 (-30) (-)	88 (-56) (-)	37 (-75) (-)	24 (-81) (-)	105 (18) (-)
	Rossville	158 (33) (0)	72 (-66) (0)	63 (-35) (34)	86 (-22) (18)	78 (16) (17)
	Scandia	94 (-17) (0)	35 (-77) (0)	95 (-6) (108)	115 (22) (32)	46 (-37) (0)
2014	Manhattan	49 (-80) (0)	224 (80) (0)	17 (-95) (0)	101 (-3) (0)	29 (-58) (0)
	Rossville	60 (-65) (0)	179 (42) (0)	28 (-69) (65)	82 (-26) (43)	64 (-29) (0)
	Scandia	11 (-100) (0)	121 (10) (0)	35 (-66) (127)	141 (47) (64)	85 (3) (0)

† Departure from 30-year average obtained from the National Climatic Data Center.
‡ Irrigation totals for each month. A dash indicates location was non-irrigated.

Table 1.5 Sudden death syndrome (*Fusarium virguliforme*) disease index (DX†) for the varieties in the genetic by input system study at Rossville during 2012 to 2014.

Variety	2012	2013	2014
AG3431	0.00	2.98	1.46
AG4033/AG4130‡	0.19	21.21	2.01
AG4232	0.32	19.58	2.11
CH3303R2	0.46	1.75	2.99
P93Y92	0.65	3.36	2.22
P94Y23	0.60	3.78	2.20

†DX is calculated by taking disease incidence (DI) times disease severity (DS) divided by nine. DX has a scale from 0 (no disease) to 100 (all plants dead at or before R6). Source: Southern Illinois University Carbondale.
‡ AG4130 planted in 2012 and 2013. AG4033 planted in 2014.

Table 1.6 Effect of inputs on V2-V3 plant density, R8 plant density, and survival at three locations in Kansas during 2012 to 2014.

	V2-V3 Plant Density			R8 Plant Density			Survival		
Treatment	Manhattan	Rossville	Scandia	Manhattan	Rossville	Scandia	Manhattan	Rossville	Scandia
	plants ha^{-1}						%		
Untreated Control	347,851	339,646	321,598	328,161	275,655	303,549	94.3	81.5	95.3
Bio-Forge	354,961	325,973	339,646	340,740	259,794	307,651	96.7	81.0	91.3
Fungicide (F) Seed Treatment (ST)	373,556	357,695	332,810	350,585	286,594	295,618	94.0	79.1	88.8
F + Insecticide (I) ST	377,385	349,491	362,891	357,695	265,810	313,120	95.0	77.4	87.3
F + I + LCO ST + Foliar LCO	379,573	300,267	362,071	353,320	247,215	332,424	93.4	82.7	91.4
Foliar Fertilizer	374,650	308,471	353,593	348,397	262,529	322,965	93.3	85.0	82.2
Defoliant (D)	345,663	315,034	349,491	317,769	257,059	325,153	92.2	80.1	93.0
Foliar F	374,650	309,018	324,059	333,630	261,435	301,635	89.1	85.5	93.0
Foliar I	384,495	323,785	322,145	346,757	287,688	289,055	91.2	89.2	90.6
Foliar F + I	351,132	306,283	365,352	340,740	266,357	330,349	97.1	87.8	90.8
Nitrogen (N)	384,495	311,206	321,324	353,867	257,059	291,516	92.2	83.5	91.2
SOYA	361,524	315,034	367,540	331,442	258,700	339,100	91.8	80.6	92.2
SOYA + D	354,961	290,422	365,899	334,177	248,855	331,989	94.7	87.1	90.9
SOYA – N	352,773	298,079	369,454	354,414	254,872	334,177	100.7	86.7	90.5
SOYA – F	347,851	305,190	330,896	332,536	246,121	291,790	95.8	81.2	89.0
SOYA – (F+I)	346,210	303,549	325,135	321,598	251,590	296,983	92.8	83.1	91.6
Pr > F	0.29	0.08	0.20	0.38	0.60	0.19	0.20	0.40	0.84

Table 1.7 Effect of inputs on plant height and lodging at three locations in Kansas during 2012 to 2014.

Treatment	Height			Lodging Score		
	Manhattan	Rossville	Scandia	Manhattan	Rossville	Scandia
	——— cm ———			——— 1 – 5† ———		
Untreated Control	89.2 bcdef‡	91.6 bc	93.7 abc	1.50	1.00	1.17 cde
Bio-Forge	91.4 abcd	90.9 bc	90.8 c	1.42	1.00	1.25 bcde
Fungicide (F) Seed Treatment (ST)	89.9 abcdef	91.3 bc	92.3 bc	1.33	1.00	1.25 bcde
F + Insecticide (I) ST	91.3 abcd	90.1 bc	94.3 abc	1.46	1.00	1.46 ab
F + I + LCO ST + Foliar LCO	87.5 ef	93.5 bc	94.1 abc	1.21	1.08	1.38 abcd
Foliar Fertilizer	88.3 def	89.4 c	94.4 abc	1.08	1.00	1.13 de
Defoliant (D)	87.5 ef	89.4 c	90.8 c	1.54	1.00	1.38 abcd
Foliar F	90.6 abcde	90.4 bc	90.8 c	1.42	1.04	1.29 bcde
Foliar I	92.4 ab	91.6 bc	91.4 c	1.50	1.00	1.21 bcde
Foliar F + I	90.4 abcde	91.4 bc	92.4 bc	1.46	1.00	1.25 bcde
Nitrogen (N)	89.0 cdef	94.0 b	90.8 c	1.25	1.00	1.08 e
SOYA	91.8 abc	93.8 b	95.6 ab	1.63	1.00	1.33 bcde
SOYA + D	86.7 f	91.1 bc	93.4 abc	1.50	1.08	1.33 bcde
SOYA – N	93.3 a	93.6 bc	96.4 a	1.33	1.08	1.63 a
SOYA – F	92.0 abc	99.2 a	94.4 abc	1.63	1.04	1.42 abc
SOYA – (F+I)	91.1 abcd	94.2 b	94.3 abc	1.33	1.08	1.42 abc
Pr > F	0.002	0.002	0.03	0.06	0.75	0.03

† 1 = no lodging, 2 = all plants leaning slightly (<45°) or a few plants down, 3 = all plants leaning moderately (~45°) or 25-50% of plants down, 4 = all plants leaning (>45°) or 50-80% of the plants down, 5 = 80-100% of the plants down

‡ Values within a column followed by the same letter are not significantly different at $P \leq 0.05$.

Table 1.8 Effect of inputs on seed mass, yield, and sudden death syndrome (*Fusarium virguliforme*; SDS) disease index (DX) ratings at locations in Kansas during 2012 to 2014.

	Seed Mass			Yield			SDS DX†
Treatment	Manhattan	Rossville	Scandia	Manhattan	Rossville	Scandia	Rossville
	——— g 100 seed^{-1} ———			——— yield kg ha^{-1} ———			1 - 100
Untreated Control	15.6	13.5 d‡	14.9 de	4105	2758 ef	4028	12.64 abc
Bio-Forge	15.4	13.8 bcd	15.1 bcde	4123	2773 ef	4088	9.10 abcde
Fungicide (F) Seed Treatment (ST)	15.6	13.6 cd	14.8 e	3717	2813 ef	3888	11.78 abc
F + Insecticide (I) ST	15.7	13.7 cd	15.3 abc	3940	2710 f	4127	14.24 ab
F + I + LCO ST + Foliar LCO	15.9	13.5 d	14.9 de	4075	3088 bcde	3929	6.20 cde
Foliar Fertilizer	15.6	13.9 abcd	15.1 abcde	4168	2922 def	3823	3.33 de
Defoliant (D)	15.7	14.0 abc	14.8 de	4046	3194 abcd	4203	2.25 e
Foliar F	16.2	13.9 abcd	15.3 abc	3669	2956 cdef	3763	14.58 a
Foliar I	15.9	13.7 cd	14.8 e	3918	2993 cdef	3728	10.49 abcd
Foliar F + I	16.1	13.7 cd	15.4 ab	3807	3004 cdef	4066	12.06 abc
Nitrogen (N)	15.9	14.0 abc	15.0 cde	3912	3213 abcd	3645	13.91 ab
SOYA	15.8	14.2 a	15.4 ab	3843	3435 ab	3889	8.82 abcde
SOYA + D	16.1	14.2 ab	15.4 a	3779	3472 a	4136	2.82 de
SOYA – N	15.7	13.7 cd	15.3 abc	4003	3210 abcd	3844	5.72 cde
SOYA – F	15.9	14.0 abc	15.3 abc	3839	3305 abc	4058	6.78 bcde
SOYA – (F+I)	15.8	14.0 abc	15.2 abcd	4091	3076 bcdef	4163	9.17 abcde
Pr > F	0.30	0.02	<0.001	0.73	<0.001	0.55	0.007

†DX, disease index, is calculated by taking disease incidence (DI) times disease severity (DS) divided by nine. DX has a scale from 0 (no disease) to 100 (all plants dead at or before R6). Source: Southern Illinois University Carbondale.

‡ Values within a column followed by the same letter are not significantly different at P ≤ 0.05.

Table 1.9 Effect of each variety by input system treatment on plant density and lodging at locations in Kansas where a significant (α=0.05) response occurred during 2012 to 2014.

Treatment		Plant Density			Lodging
Variety	**Input System†**	**Scandia at V2-V3**	**Rossville at R8**	**Scandia at R8**	**Manhattan**
		——— plants ha^{-1}	———		1 – 5‡
AG3431	UTC	364,459 abc§	306,041 abc	301,257 cdeg	1.40 c
	SOYA	376,162 abc	325,806 ab	348,327 abc	1.44 cd
	SOYA – FF	368,785 abc	302,841 abcde	297,471 bcdeg	1.19 cde
AG4033/4130¶	UTC	368,784 abc	347,131 a	336,845 abcde	1.32 cd
	SOYA	348,705 cd	257,584 e	281,349 efg	1.33 cd
	SOYA – FF	308,107 d	280,895 bcde	267,337 g	1.50 c
AG4232	UTC	308,192 d	284,381 bcde	283,374 eg	1.92 b
	SOYA	386,833 abc	261,821 cde	324,955 abcde	3.07 a
	SOYA – FF	413,083 a	274,132 bcde	359,408 ab	2.90 a
CH3303R2	UTC	325,720 cd	270,023 cde	290,913 cdeg	1.32 cd
	SOYA	352,944 bcd	300,993 abcd	331,633 abcd	1.37 cd
	SOYA – FF	352,982 abcd	289,850 bcde	322,634 abcde	1.42 cd
P93Y92	UTC	412,255 ab	277,408 bcde	373,757 a	1.19 cde
	SOYA	330,528 cd	307,557 abc	292,769 deg	1.59 c
	SOYA – FF	365,286 abc	339,100 a	330,523 abcdef	1.52 c
P94Y23	UTC	349,919 abcd	285,608 bcde	288,861 cdeg	0.76 e
	SOYA	329,376 cd	261,413 de	294,561 cdeg	1.04 de
	SOYA – FF	330,116 cd	263,259 de	290,512 deg	1.34 cd
	Pr > F	0.004	0.02	0.003	<0.001

† UTC, untreated control; SOYA – FF, SOYA minus foliar fungicide.
‡ 1 = no lodging, 2 = all plants leaning slightly (<45°) or a few plants down, 3 = all plants leaning moderately (~45°) or 25-50% of plants down, 4 = all plants leaning (>45°) or 50-80% of the plants down, 5 = 80-100% of the plants down.
§ Values within a column with different letters are significantly different at P ≤ 0.05.
¶ AG4130 planted in 2012 and 2013. AG4033 planted in 2014.

Table 1.10 Effect of variety and input system on plant density at three locations in Kansas during 2012 to 2014.

Treatment	V2-V3 Plant Density			R8 Plant Density		
	Manhattan	Rossville	Scandia	Manhattan	Rossville	Scandia
	plants ha^{-1}					
Variety						
AG3431	375,894 a	344,124 ab	369,802	352,728 a†	311,562 a	315,685
AG4033/4130‡	377,454 a	340,269 ab	341,865	353,311 a	295,203 ab	295,177
AG4232	366,972 ab	340,295 ab	369,370	344,272 ab	273,445 b	322,579
CH3303R2	381,280 a	322,131 bc	343,882	350,801 a	286,955 ab	315,060
P93Y92	346,688 bc	353,122 a	369,357	320,784 b	308,022 a	332,350
P94Y23	330,836 c	305,955 c	336,470	322,049 b	270,093 b	291,311
Input System (IS)§						
UTC	361,458	338,106	354,888	335,093	295,099	312,501
SOYA	365,765	333,024	354,091	340,345	285,862	312,265
SOYA – FF	362,339	331,818	356,393	346,535	291,679	311,314
Var. x IS, Pr>F	0.65	0.11	0.004	0.31	0.02	0.003

† Values within a column with different letters are significantly different at $P \leq 0.05$.

‡ AG4130 planted in 2012 and 2013. AG4033 planted in 2014.

§ UTC, untreated control; SOYA – FF, SOYA minus foliar fungicide.

Table 1.11 Effect of variety and input system on survival and lodging at three locations in Kansas during 2012 to 2014.

Treatment	Survival			Lodging		
	Manhattan	Rossville	Scandia	Manhattan	Rossville	Scandia
		%			1 – 5†	
Variety						
AG3431	94.4	91.0	85.0	1.34 b	1.30 d‡	1.29 bc
AG4033/4130§	93.6	88.3	86.7	1.38 b	1.57 bc	1.19 c
AG4232	93.8	81.8	89.1	2.63 a	2.10 a	1.91 a
CH3303R2	92.2	89.8	92.1	1.37 b	1.53 cd	1.44 b
P93Y92	93.1	87.6	90.3	1.44 b	1.81 b	1.54 b
P94Y23	97.5	89.3	86.7	1.05 c	1.41 cd	1.33 bc
Input System (IS)¶						
UTC	93.0	88.9	88.7	1.32 b	1.62	1.45
SOYA	93.3	86.8	88.6	1.64 a	1.63	1.52
SOYA – FF	95.9	88.2	87.7	1.65 a	1.61	1.39
Var. x IS, Pr>F	0.41	0.67	0.59	<0.001	0.37	0.23

† 1 = no lodging, 2 = all plants leaning slightly (<45°) or a few plants down, 3 = all plants leaning moderately (~45°) or 25-50% of plants down, 4 = all plants leaning (>45°) or 50-80% of the plants down, 5 = 80-100% of the plants down.
‡ Values within a column with different letters are significantly different at $P \leq 0.05$.
§ AG4130 planted in 2012 and 2013. AG4033 planted in 2014.
¶ UTC, untreated control; SOYA – FF, SOYA minus foliar fungicide.

Table 1.12 Effect of variety and input system on pod number at three locations in Kansas during 2012 to 2014.

Treatment	Pod Number					
	Manhattan	Rossville	Scandia	Manhattan	Rossville	Scandia
		pods plant^{-1}			pods m^{-2}	
Variety						
AG3431	34.5 b	38.8 d†	45.9	1215 bc	1208 b	1374 abc
AG4033/4130‡	35.8 b	48.3 b	42.4	1265 b	1407 a	1252 c
AG4232	42.2 a	53.8 a	47.2	1417 a	1527 a	1498 a
CH3303R2	30.9 c	43.3 c	45.6	1085 cd	1207 b	1439 ab
P93Y92	31.2 c	40.6 cd	41.2	1000 d	1226 b	1301 bc
P94Y23	30.9 c	42.0 cd	45.7	991 d	1111 b	1286 c
Input System (IS)§						
UTC	33.1	42.2 b	44.0	1111	1232	1332
SOYA	34.9	46.4 a	45.2	1180	1311	1383
SOYA – FF	34.8	44.7 ab	44.7	1194	1300	1360
Var. x IS, Pr>F	0.09	0.31	0.20	0.77	0.22	0.18

† Values within a column with different letters are significantly different at $P \leq 0.05$.

‡ AG4130 planted in 2012 and 2013. AG4033 planted in 2014.

§ UTC, untreated control; SOYA – FF, SOYA minus foliar fungicide.

Table 1.13 Effect of variety and input system on seed number at three locations in Kansas during 2012 to 2014.

Treatment	Seed Number								
	Manhattan	Rossville	Scandia	Manhattan	Rossville	Scandia	Manhattan	Rossville	Scandia
	——— seeds plant^{-1} ———			——— seeds pod^{-1} ———			——— seeds m^{-2} ———		
Variety									
AG3431	67.7	89.2	91.9	2.03 cd†	2.33	2.34	2343	2688	2570
AG4033/4130‡	68.1	92.4	93.2	1.96 cd	1.95	2.46	2359	2518	2537
AG4232	73.9	107.3	94.8	1.82 d	2.10	2.15	2468	2786	2753
CH3303R2	65.5	97.0	88.0	2.22 bc	2.24	2.21	2252	2588	2588
P93Y92	72.3	89.6	84.7	2.35 ab	2.25	2.23	2289	2584	2539
P94Y23	77.3	98.6	99.6	2.54 a	2.41	2.49	2372	2564	2659
Input System (IS)§									
UTC	72.6	93.7	96.4	2.27	2.27	2.43	2360	2592 b	2740 a
SOYA	68.9	101.9	89.5	2.06	2.26	2.25	2310	2746 a	2542 b
SOYA – FF	70.9	91.4	90.2	2.13	2.11	2.27	2372	2526 b	2540 b
Var. x IS, Pr>F	0.75	0.61	0.19	0.85	0.75	0.91	0.85	0.90	0.60

† Values within a column with different letters are significantly different at $P \leq 0.05$.

‡ AG4130 planted in 2012 and 2013. AG4033 planted in 2014.

§ UTC, untreated control; SOYA – FF, SOYA minus foliar fungicide.

Table 1.14 Effect of variety and input system on seed mass and yield at three locations in Kansas during 2012 to 2014.

Treatment	Seed Mass			Yield		
	Manhattan	Rossville	Scandia	Manhattan	Rossville	Scandia
		g 100 seed^{-1}			kg ha^{-1}	
Variety						
AG3431	16.5 cd†	14.7 b	15.1 b	3861	3924	3870
AG4033/4130‡	16.3 d	14.6 b	14.7 c	3859	3674	3742
AG4232	15.5 e	14.4 b	14.4 d	3788	4001	3953
CH3303R2	17.2 ab	14.7 b	15.0 b	3853	3782	3886
P93Y92	16.8 bc	15.8 a	16.1 a	3853	4065	4089
P94Y23	17.4 a	15.6 a	15.9 a	4126	4003	4248
Input System (IS)§						
UTC	16.4 b	14.9	15.0 b	3853	3847 b	4133
SOYA	16.7 a	15.1	15.3 a	3845	4132 a	3895
SOYA – FF	16.8 a	14.9	15.2 a	3973	3745 b	3866
Var. x IS, Pr>F	0.64	0.27	0.53	0.70	0.94	0.35

† Values within a column with different letters are significantly different at $P \leq 0.05$.
‡ AG4130 planted in 2012 and 2013. AG4033 planted in 2014.
§ UTC, untreated control; SOYA – FF, SOYA minus foliar fungicide.

Table 1.15 Effect of input system on soybean growth and yield parameters in the seeding rate by input system experiment conducted at three locations in Kansas during 2012 to 2014.

Parameter	Location		
	Manhattan	**Rossville**	**Scandia**
V2-V3 density, plants ha^{-1}			
UTC†	264,534	253,140	209,131
SOYA	259,247	265,355	204,220
Seeding rate x input system, Pr>F	0.81	0.64	0.80
R8 density, plants ha^{-1}			
UTC	246,850	203,186	197,126
SOYA	245,665	211,846	196,522
Seeding rate x input system, Pr>F	0.70	0.37	0.84
Emergence, %			
UTC	87.0	82.5	69.0
SOYA	84.7	85.6	67.2
Seeding rate x input system, Pr>F	0.71	0.36	0.87
Establishment, %			
UTC	81.7	67.3	67.4
SOYA	80.6	69.0	65.9
Seeding rate x input system, Pr>F	0.35	0.39	0.86
Survival, %			
UTC	94.2	82.6	101.3
SOYA	95.8	82.1	100.7
Seeding rate x input system, Pr>F	0.84	0.71	0.96
Lodging score, 1 – 5§			
UTC	1.10	1.16	1.10 a¶
SOYA	1.08	1.14	1.04 b
Seeding rate x input system, Pr>F	0.68	0.94	0.88
Seed mass, g 100 seeds^{-1}			
UTC	16.0 b	14.2 b	14.8 b
SOYA	16.3 a	14.6 a	15.3 a
Seeding rate x input system, Pr>F	0.52	0.95	0.50
Seed yield, kg ha^{-1}			
UTC	3381	2836 b	3142
SOYA	3533	3362 a	3123
Seeding rate x input system, Pr>F	0.46	0.92	0.39

† UTC, untreated control.

‡ SR, seeding rate; IS, input system.

§ 1 = no lodging, 2 = all plants leaning slightly (<45°) or a few plants down, 3 = all plants leaning moderately (~45°) or 25-50% of plants down, 4 = all plants leaning (>45°) or 50-80% of the plants down, 5 = 80-100% of the plants down.

¶ Values within in a growth parameter and a column with different letters are significantly different at $P \leq 0.05$.

Table 1.16 Estimated regression parameters and model fitness from a linear regression model (parameter = intercept + slope x seeding rate) for different growth and yield parameters at three locations in Kansas during 2012 to 2014.

	Manhattan				Rossville				Scandia			
Parameter	**Intercept**	**Slope**	**R^2**	**Pr > F**	**Intercept**	**Slope**	**R^2**	**Pr > F**	**Intercept**	**Slope**	**R^2**	**Pr > F**
V2-V3 plant density plants ha^{-1}	14207	0.80	0.86	<0.001	-3932	0.85	0.70	<0.001	23498	0.59	0.53	<0.001
R8 plant density plants ha^{-1}	23479	0.72	0.84	<0.001	5639	0.65	0.69	<0.001	38071	0.51	0.47	<0.001
Emergence (%)	0.92	-2.01×10^{-7}	<0.10	0.030	0.85	-1.68×10^{-8}	<0.10	0.910	0.75	-2.30×10^{-7}	<0.10	0.140
Establishment (%)	0.89	-2.71×10^{-7}	<0.10	0.002	0.74	-1.84×10^{-7}	<0.10	0.140	0.84	-5.63×10^{-7}	0.10	<0.001
Survival (%)	0.98	-9.96×10^{-8}	<0.10	0.130	0.89	-2.12×10^{-7}	<0.10	0.040	1.22	-6.84×10^{-7}	<0.10	<0.001
Lodging score 1 – 5†	0.86	7.39×10^{-7}	0.11	<0.001	1.25	-3.29×10^{-7}	<0.10	0.140	1.12	-1.53×10^{-7}	<0.10	0.280
Seed mass g (100 seeds)$^{-1}$	16.8	-2.11×10^{-6}	<0.10	<0.001	14.4	-1.37×10^{-7}	<0.10	0.837	14.9	2.24×10^{-7}	<0.10	0.551
Seed yield kg ha^{-1}	2700	0.0025	0.12	<0.001	2673	0.0014	<0.10	0.002	2319	0.0026	<0.10	<0.001

† 1 = no lodging, 2 = all plants leaning slightly (<45°) or a few plants down, 3 = all plants leaning moderately (~45°) or 25-50% of plants down, 4 = all plants leaning (>45°) or 50-80% of the plants down, 5 = 80-100% of the plants down.

Table 1.17 Estimated regression parameters and model fit for the linear plateau model Y = a + bX if X < C, Y = P if X ≥ C; where Y = seed yield and X = seeding rate at three locations in Kansas during 2012-2014.

Location	a†	b‡	C§	P¶	R^2
	kg ha^{-1}	kg $seed^{-1}$	seeds ha^{-1}	kg ha^{-1}	
Manhattan	2,561	0.0032	379,658	3,762	0.12
Rossville	2,423	0.0027	297,261	3,235	<0.10
Scandia	2,009	0.0045	305,859	3,374	0.11

† a, intercept

‡ b, slope of the linear response

§ C, seeding rate where the linear response and plateau intersect

¶ P, yield achieved at seeding rate C

Table 1.18 Estimated regression parameters and model fit for the non-linear regression model, $Y = \alpha(1 - \exp^{-\beta X})$, where Y = percent of maximum yield and X = R8 plant density at three locations in Kansas during 2012-2014.

Location	α†	β‡	R^2	Pr > F	95% R8 Plant Density	99% R8 Plant Density
					—— plants ha^{-1} ——	
Manhattan	0.6895	0.000013	0.95	<0.001	230,441	354,244
Rossville	0.7173	0.000028	0.97	<0.001	106,990	164,470
Scandia	0.6851	0.000026	0.95	<0.001	115,220	177,122

† α, predicted, asymptotic maximum

‡ β, responsiveness of Y as plant density increases

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Chapter 2 - Effect of Row Spacing by Input System on Soybean Growth and Yield

Abstract

Yield-enhancing products in soybeans [*Glycine max.*] have become popular in recent years due to higher commodity prices. Little research has looked at a combination of these products and their interaction with different production practices. Narrow row spacing along with these input systems may be a potential approach to maximizing soybean yield. The objective of this study was to examine the interaction of input systems with row spacing to determine its effect on soybean growth and yield. Three row spacings: narrow, medium, and wide, and four input systems: untreated control (UTC); fungicide, insecticide, and nematicide seed treatment plus foliar fungicide (STFF); SOYA (combination of possible yield-enhancing products representative of those being marketed today); and SOYA minus foliar fungicide (SOYA – FF) were evaluated at three locations in Kansas (KSman, KSros, and KSsca) and two locations in Minnesota (MNstp and MNwas) in 2012 to 2014. Interactions were observed in seeds m^{-2} at MNwas and yield at MNstp. At MNwas, the SOYA – FF and STFF input systems had the greatest seeds m^{-2} in medium rows, while the SOYA and UTC input systems had the greatest seeds m^{-2} in narrow rows. At MNstp, the SOYA input system had the greatest yield in medium and wide row spacing, but the STFF system yielded the greatest in narrow rows. Row spacing had an effect on R8 plant density at KSros with greater stand in narrow and medium rows, pod number at pods m^{-2} at KSman and MNstp with an opposite effect at each location, and yield at KSman with narrow row spacing having the greatest yield. Input system affected V2-V3 and R8 plant density at KSman, KSros, and MNstp with the UTC having the greatest stand, plant height at KSros with the SOYA input system having the greatest plant height, lodging at KSsca where the UTC and STFF input systems had the highest lodging scores, seed mass at KSros, KSsca, MNstp, and MNwas where the SOYA input system generally had the greatest seed mass, and yield at KSros and MNwas with the SOYA input system having the greatest yield. Overall, narrow row spacing and the SOYA input system generally had a positive effect on soybean growth and yield parameters and produced the greatest yields across all locations. However, producers need to weigh the return on investment of these intensive input systems given their

environments since yield gains associated with these systems were not able to make up for the additional input costs.

Introduction

Agronomic Practices

Soybean [Glycine max (L.) Merr.] production in the United States was 89.5 million metric tons from 30.7 million hectares in 2013 accounting for nearly a third of the world soybean production (USDA-NASS, 2014; FAO, 2014). With an ever increasing growth in world population and greater constraints on arable land and resources, producers are expected to increase yields past current production to meet the greater demand for food (Ray et al., 2013). An on-farm yield improvement in soybeans of 29.4 kg ha^{-1} yr^{-1} has been realized since 1983 in the United States (Specht et al., 2014). Approximately two-thirds of this yield progress is likely associated with continual advancements in genetics with the other one-third associated with the adoption of better agronomic practices (Specht et al., 2014). Some agronomic practices that have contributed to this yield gain are earlier planting dates (Bastidas et al., 2008; De Bruin and Pedersen, 2008b; Heatherly and Elmore, 2004; Robinson et al., 2009), higher seeding rates (Devlin et al., 1995; Heatherly and Elmore, 2004), and narrower row spacing (Cox and Cherney, 2011a; Heatherly and Elmore, 2004).

Soybean planting dates in the United States have moved earlier at a rate of 0.49 days $year^{-1}$ from 1981 to 2005 (Sacks and Kucharik, 2011). Research has shown that delayed planting generally leads to a decrease in soybean yield. Yield decreased at a rate of 17 kg ha^{-1} day^{-1} in 2003 and 43 kg ha^{-1} day^{-1} in 2004 in Nebraska as planting date was delayed past May 1 (Bastidas et al., 2008). De Bruin and Pedersen (2008b) had similar results in Iowa with soybean yields decreasing by 130 kg ha^{-1} $week^{-1}$ (18.6 kg ha^{-1} day^{-1}) between early May and late May and 404 kg ha^{-1} wk^{-1} (57.7 kg ha^{-1} day^{-1}) from late May to early June. Decrease in yield due to later planting dates has been attributed to decreased pods m^{-2} (Robinson et al., 2009).

Several researchers have attempted to determine the optimal seeding rate that maximizes soybean yield (De Bruin and Pedersen, 2008a; Devlin et al., 1995; Oplinger and Philbrook, 1992). Optimal seeding rates were inconsistent and ranged from 100,000 to 800,000 seeds ha^{-1} depending upon environmental conditions and agronomic practices such as tillage and row spacing. Early researchers hypothesized that seeding rates in narrow rows should be higher to increase efficiency of solar radiation interception (Shibles and Weber, 1966). Devlin et al. (1995) observed this response with maximum yields being obtained at 284,165 seeds ha^{-1} in 76-cm rows and 537,440 seeds ha^{-1} 20-cm rows. However, other researchers have found that yield response to seeding rate was not affected by row spacing (Cox and Cherney, 2011a).

Soybean row spacing is commonly viewed as another agronomic practice that producers can modify to increase yields. Numerous studies across the United States have demonstrated a positive yield response to narrow rows (<76 cm) in soybeans (Cox and Cherney, 2011a; De Bruin and Pedersen, 2008a; Oplinger and Philbrook, 1992; Weber et al., 1966). This positive response has been relatively consistent in northern environments with a less consistent response south of 43°N latitude (Lee, 2006). This less consistent response in southern environments may be explained by moisture stress (Devlin et al., 1995; Taylor, 1980), biotic stresses such as soybean cyst nematode (*Heterodera glycines* Ichinohe; SCN) and sudden death syndrome (Fusarium virguliforme; SDS) (Pederson and Lauer, 2003), or other stresses such as nitrogen deficiency (Cooper and Jeffers, 1984).

Solar radiation interception and the ability of the plant to utilize radiant energy play major roles in soybean crop growth and yield (Shibles and Weber, 1966). An essential factor in radiation interception is canopy development. Narrow-row soybeans are capable of reaching full canopy closure earlier in the growing season, leading to an increased canopy leaf area compared to wide rows (Weber et al., 1966). This gives soybeans grown in narrow rows the ability to capture more radiation during the critical pod setting period (Andrade et al., 2002). A positive yield response to narrow rows was associated with greater light interception between R1 and R5, resulting in an increased growth rate (Board et al., 1992).

Rapid canopy development in narrow row soybeans also decreases weed competition (Hock et al., 2006). In narrow rows, less light penetrates to the soil surface, leading to fewer weeds resurging after an initial post-emergence herbicide application (Yelverton and Coble, 1991). Orlowski et al. (2012) found that 19 cm rows had less weed density biomass at full pod and harvest when compared to 76 cm rows. A decreased herbicide rate or frequency of herbicide application needed to effectively control weed populations was observed in soybeans planted in 19 cm rows vs 76 cm rows (Mickelson and Renner, 1997).

Inputs

Higher soybean prices in recent years have led to an increase in the use of yield enhancing inputs (USDA-ERS, 2014). Several studies have evaluated an array of different inputs, such as seed treatments (Cox and Cherney, 2011b; Gaspar et al., 2014), fungicides (Kyveryga et al., 2013; Swoboda and Pederson, 2009), insecticides (Henry et al., 2011), micronutrients (Gerwing et al., 2002; Widmar, 2013), nitrogen (Freeborn et al., 2001; Salvagiotti et al., 2009), and growth promoters (Staton and Boring, 2012; Voight et al., 2012) to examine their effect on soybean growth, yield components, and yield. However, little research has been done to examine the interaction of combinations of these inputs in systems with other agronomic practices.

Seed treatments have become widely used with an estimated 60 to 70% of soybeans planted in 2014 treated (United Soybean Board, 2014). Although most studies find improved plant densities with seed treatments, these same studies have found inconsistent yield results. Gaspar et al. (2014) had an increase in plant density of 36,000 plants ha^{-1} in 2011 and 2012 and 41,000 plants ha^{-1} in 2013 when using a combination of fungicide, insecticide, and nematicide seed treatment. This same seed treatment had no effect on yield in 2011-2012 but increased yield 148 kg ha^{-1} in 2013. Another study with one treated variety had increases in plant stand of 16 and 22% and a 4% increase in yield at two locations but no increase in either stand or yield at a third location (Cox and Cherney, 2011b). Cox and Cherney (2011b) reported that another treated variety increased plant stands by 16% but not yield at one location and increased plant stands by 19% and yield by 4% at another location. Schulz and Thelen (2008) found a positive yield response to fungicide seed treatment at 3 of 16 environments and attributed this to early planting followed by cold, wet conditions at those 3 environments. The inconsistent yield response has led many producers and crop advisors to consider seed treatments as a type of insurance that provides a benefit only when conditions are present that may result in a yield reduction (Esker and Conley, 2011).

A recent review found that soybean yields are more likely to be increased by nitrogen fertilizer in environments capable of producing yields greater than 4500 kg ha^{-1} (Salvagiotti et al., 2008). Salvagiotti et al. (2009) found that nitrogen fertilizer increased yield by an average of 228 kg ha^{-1} over unfertilized soybeans that averaged 4849 kg ha^{-1}. Another study with yield environments ranging from 2400 to 5300 kg ha^{-1} found no response to nitrogen applications at any yield level (Freeborn et al., 2001). A study in Kansas found that nitrogen fertilizer increased yield an average of 464 kg ha^{-1} at six of eight environments. All six responsive environments had yields greater than 3767 kg ha^{-1}, while the non-responsive environments had yields less than 3363 kg ha^{-1} (Wesley et al., 1998). Although these yield levels did not meet the 4500 kg ha^{-1} threshold reported by Salvagiotti et al. (2008), the results support the idea that higher yielding environments may be more responsive to nitrogen fertilizer.

Soybean area treated with foliar fungicide and insecticide in the United States increased from 1.03 million ha in 2002 to 3.2 million ha in 2006 (USDA-ERS, 2014). Although fungicides and insecticides are primarily used to control fungal diseases and insect pests, their use as a means to possibly improve plant health has increased (Henry et al., 2011). In Iowa, 218 of 282 on-farm strip trials (77%) had a “greening effect” observed in late-season digital imagery attributed to pyraclostrobin fungicide application (Kyveryga et al., 2013). Of the locations showing this “greening effect”, 65% had a profitable yield response to fungicide compared to only 30% of locations without the effect. Kyveryga et al. (2013) found the average yield response to fungicide across all trials was 162 kg ha^{-1}. Another study in Iowa reported no improved plant health and no yield response due to fungicides in environments with low disease pressure (Swoboda and Pedersen, 2009). A study in Indiana reported increases in yield of 100 kg ha^{-1} due to fungicide and 150 kg ha^{-1} due to insecticide (Henry et al., 2011). Henry et al. (2011) found increases in seed mass in response to fungicide and seed number in response to insecticide but the authors were unsure if these were due to changes in the soybean plant or control of unobserved pests.

Recent on-farm research has tried to examine the effects of newer products that are touted as stress reducing or growth promoting (Staton and Boring, 2012; Voight et al., 2012). On farm trials in Michigan reported inconsistent results when using two different products (Staton and Boring, 2012). A stress reducing and yield promoting seed treatment and foliar product increased yield by 135 kg ha^{-1} at one location, but a different foliar growth promoter did not affect yield across three locations. Field trials in Pennsylvania evaluated two products finding an inconsistent yield response (Voight et al., 2012). One out of nine locations had a yield increase when a growth promoter was applied (+182 kg ha^{-1}) while another similar product had no effect on yield at five locations.

Research Question and Justification

With the recent high commodity prices seen in soybeans, agrichemical companies have increasingly promoted the use of yield-enhancing products in combinations with little to no supporting data. Multiple studies have looked at a majority of the products on the market today to examine their effect on soybean yields, but most have been tested individually. Although these studies have found inconsistent responses, it may be possible that a combination of these products could produce a synergistic effect that enhances yield. Augment this synergistic potential with the tendency for narrow rows (<76 cm) to increase yields, and producers may be able to push soybean production past current levels. Our hypothesis is that input systems containing a combination of products marketed today in conjunction with a narrow row management system will increase soybean yields past what could be attained using only individual inputs or narrow row spacing. Therefore the objective of this study was to examine the interaction of input systems with row spacing to determine the effect on soybean growth and yield.

Materials and Methods

A series of 15 experiments was conducted in 2012-2014 at Kansas State University and University of Minnesota research stations to test the hypothesis mentioned above. The environments included six irrigated and three dryland environments in Kansas and two irrigated and four dryland environments in Minnesota (Table 2.1). Locations were chosen for their high soybean yield potential based on production history. The locations were Manhattan, Rossville, and Scandia, KS and St. Paul and Waseca, MN and will herein after be referred to as KSman, KSros, KSsca, MNstp, and MNwas, respectively.

Experimental Design

The experimental design was a randomized complete block in a split-plot arrangement with four replications. The whole-plot factor was row spacing: narrow (19 cm in 2013-2014 in Kansas and 25 cm in 2012 in Kansas and 2012-2014 in Minnesota), medium (38 cm in 2013-2014 in Kansas and 51 cm in 2012 in Kansas and 2012-2014 in Minnesota), and wide (76 cm in 2012-2014 in Kansas and Minnesota). The split-plot factor was input system: untreated control (UTC), fungicide, insecticide, and nematicide seed treatment plus foliar fungicide (STFF), SOYA, and SOYA minus foliar fungicide (SOYA – FF) (Table 2.2). "SOYA" stands for "systematic optimization of yield-enhancing applications" and is a combination of possible yield-enhancing products representative of those being marketed today. These products include seed treatments of fungicide, insecticide, nematicide, and LCO, broadcasted nitrogen, and foliar applications of LCO, micronutrients, fungicide, insecticide, and antioxidant (Table 2.2). Each of the row spacings and input systems were combined in all possible combinations for a total of 12 treatments. Plot dimensions were 3.05 to 3.81 m wide, depending on row spacing, by 9.14 to 10.67 m long.

All locations were managed intensively to maximize the possibility of achieving high soybean yields. Composite soil samples (10-15 cores) were taken to a depth of 15 cm before planting to characterize soil fertility. Fertilizer was applied, if needed, based on University recommendations to achieve yields greater than 5000 kg ha^{-1}. Experiments were planted in mid-May using a modified grain drill with a precision cone divider. Asgrow® (Monsanto Co., St. Louis, MO) glyphosate [N-(phosphonomethyl) glycine] resistant soybean cultivars were planted with maturities suitable for each location. Plots were seeded at a rate of 432,425 plants ha^{-1} across row spacing. Weed control consisted of pre-emergence herbicides applied after planting and post-emergence herbicides applied if needed. Pest control, outside of the input systems, was used across all plots if pest thresholds were met.

Soybean Growth and Yield Parameter Measurements

Soybean yield component and yield responses to treatments were characterized by measuring plant density, pod and seed number, seed mass, and seed yield. Plant density was counted at V2-V3 and R8 from a 1 m long by all harvest rows wide area. A percent stand survival was calculated by dividing R8 plant density by V2-V3 plant density. R8 plant density was used to calculate the number of pods in a square meter after counting the number of pods on 10 plants. Seed yield was determined by harvesting the center seven narrow, three medium, and two wide rows using a modified plot combine. A 0.45 kg subsample was collected during harvest to determine percent moisture and test weight. The subsamples were shipped to the University of Minnesota where they were analyzed for seed mass and seed quality. Seed number was determined by dividing plot yield by seed mass. Final yield was adjusted to 130 g kg^{-1} grain moisture content.

Plant height, lodging, and disease and insect assessments were measured to further characterize soybean response to the treatments. Plant height was averaged across three measurements taken at R8. Lodging ratings were assessed at R8 based on a 1 (no lodging) to 5 (80-100% lodging) scale. Pre- and post-fungicide and insecticide application assessments for diseases and insects were conducted at R3 and R5. Disease assessment was based on percent affected, calculated out of 10 plants, and severity rating on a 1 (0.5-5% affected) to 5 (>50% affected) scale. Insect assessment was based on percent insect damage, estimated across the whole plot, and severity rating based on the same scale used in the disease severity rating.

Canopy development was monitored across the growing season through light interception (LI) photos and normalized difference vegetation index (NDVI) readings. LI photos and NDVI readings were taken weekly starting from emergence through R6 for LI photos and R8 for NDVI. LI photos were captured with a Nikon digital camera (Nikon, Inc., Melville, NY) mounted on a monopod at a 70º angle (Purcell, 2000). The camera was held parallel to the ground at a height of 1.6 m above the soil surface. The position of the base of the monopod was marked so successive weekly pictures were taken of the same area. LI photos were analyzed using SigmaScan Pro (v. 5.0, SPSS, Inc., Chicago, IL) in which the number of green soybean pixels in each photo was converted to red pixels, summed up, and divided by the total pixel count of the picture to give fractional canopy coverage (FCC) (Purcell, 2000). NDVI was measured with a GreenSeeker sensor (Trimble Navigation, Sunnyvale, CA) held 0.6 m above the crop canopy and taken over the same row each week. Both FCC and NDVI were plotted against days after emergence. The area under both curves was found using the trapezoidal rule (Meek and Singer, 2004) to determine FCC and NDVI duration indices for different times of the growing season. These times consisted of vegetative (first reading to R2) for FCC and NDVI, reproductive (R2 to R6) for FCC and NDVI, senescence (R6 to last reading) for NDVI, and season (first reading to last reading) for FCC and NDVI.

Statistical Analysis

An economic analysis looking at break-even points across different soybean market prices was conducted. The main focus was on the costs of each input system beyond what would have occurred in the UTC. In the STFF input system, an aerial spray application was made at R3 for the foliar fungicide. In the SOYA and SOYA – FF input systems, a dry fertilizer application was made for the nitrogen fertilizer, a ground spray application was made at R1 for the micronutrients, and an aerial spray application was made at R3 for the fungicide, insecticide, and antioxidant. It was assumed that products applied at V4 were tank-mixed with a post-emergence herbicide application that would have occurred in a UTC system. The cost for each product was collected from local distributors and a 15% increase and decrease in cost was calculated to cover variations in product costs. Custom application rates for dry fertilizer application, ground spray application, and aerial spray application were obtained from Dhuyvetter (2014).

Analysis of variance was conducted using Proc Mixed in SAS (SAS Institute, 2011). Year and block within year were considered random factors and row spacing, input system, and their interaction were fixed effects for the analysis within each location. Year was deemed random based on the assumption that the three years at each location represented a random sampling of environmental conditions likely to be encountered at those locations. The nature of this study was not to determine environmental implications of why certain inputs worked in a given year but rather to examine the impact of inputs and row spacing when used in a production system across multiple years. Means were separated using Fisher's least significant difference method if a significant affect was found at the 0.05 probability level. PROC CORR was used to examine the relationship between soybean growth and yield parameters and the row spacing x input system treatments.

Results

Environment

Growing conditions varied across locations and years. Average maximum temperature was above average in almost all months for most locations in 2012, especially early in the growing season (Table 2.3). Precipitation in 2012 was below average across all months at each location except for KSman in August, MNstp in May and July, and MNwas in May. Extremely dry conditions during May in Kansas led to poor planting conditions contributing to reduced emergence. Below average maximum temperatures during May through August in Minnesota and May, July, and August in Kansas made 2013 much cooler than 2012, but all locations finished the growing season with above average maximum temperatures in September (Table 2.3). In 2013, MNstp and MNwas had above average precipitation early in the growing season but finished below average. Kansas locations had below average precipitation across the growing season except for KSros in May, KSsca in August, and KSman and KSros in September. Average or below average maximum temperatures characterized much of 2014 as well, especially in Minnesota (Table 2.3). The exceptions were May and August when all locations in Kansas experienced above average maximum temperatures. Outside of June in 2014, precipitation was generally below average at all location. Significant rainfall events occurred in the first half of June leading to the above-average totals, however, the second half was dry at all locations (data not shown). KSros, KSsca, and MNstp were irrigated locations, and monthly irrigation totals can be found in Table 2.3. A significant hail event occurred before harvest in 2014 at MNwas, making the location a complete loss for that growing season.

Given that precipitation was usually below average across all locations and years, there was low pressure from diseases that would be controlled by fungicides (data not shown). SDS was present in KSros all three years at levels that severely impacted yields, decreasing yield by 96 to 1530 kg ha^{-1} on average compared to other locations. Insect populations also were low in all environments (data not shown).

Plant Density

Aside from one location where narrow and medium averaged 34,800 plants ha^{-1} greater than wide at R8, plant density response to row spacing was inconsistent and did not interact with input system whether it was quantified in the vegetative stage or at maturity.

Input system had an effect on plant density at V2-V3 and R8 with STFF having the greatest plant density at four of five locations at V2-V3 and three of five locations at R8 (data not shown). The SOYA and SOYA-FF input systems reduced plant density compared to the UTC at three of five locations. However, plant densities ranged from 264,500 to 361,500 plants ha^{-1} at R8 across input systems at all locations. This is within or greater than the harvest plant density range of 157,300 to 290,800 plants ha^{-1} that De Bruin and Pederson (2008a) found achieved 95% of maximum yield. Correlations between yield and V2-V3 and R8 plant densities also produced low correlation coefficients that were non-significant ($\alpha = 0.05$, data not shown). Even with differences found in plants densities, densities were adequate across all input systems and did not appear to impact yield.

Plant Height and Lodging

Row spacing did not influence soybean plant height or lodging, and there was no interaction with input systems ($\alpha = 0.05$, data not shown). Plant height responded to input systems with the SOYA and SOYA – FF input systems consistently having the greatest plant height (data not shown). Differences in plants heights were small though with the SOYA having a 1.9 cm and SOYA – FF systems having a 1.2 cm advantage over the UTC across all locations. Input systems also affected lodging but responses were inconsistent from location to location and all lodging scores were below 2 on a 1-5 scale.

Yield Components

Input system did not influence pods number and no interaction was observed between row spacing and input system (Table 2.4). Row spacing affected pods m^{-2} at KSman and MNstp, but findings were opposite at the two locations (Table 2.4). KSman had more pods m^{-2} as row spacing decreased, but MNstp had fewer pods m^{-2} as row spacing decreased. Although KSros and MNwas had a non-significant pods m^{-2} response to row spacing, these locations acted similarly to KSman with an increase in pods number as row spacing decreased. Cox and Cherney (2011a) had similar findings with pods m^{-2} increasing from 875 to 1012 as row spacing decreased from 76 cm to 19 cm. Taylor (1980) found results that were similar to MNstp with the greatest pods number found in wider row spacings. Ethredge et al. (1989) found that pods m^{-2} did not respond to row spacing. The results of this study and other studies show that response of pods number to row spacing is generally inconsistent.

Row spacing and input system had an effect on seed number at two locations but the response to input system depend upon row spacing at one location (Table 2.5). At MNwas, seeds m^{-2} increased in the SOYA and UTC input systems as row spacing decreased (Figure 2.1). However, in the SOYA – FF and STFF input systems seeds m^{-2} were greatest in the medium row spacing and decreased in both wide and narrow row spacings (Figure 2.1). The correlation between seeds m^{-2} and yield across all locations was significant ($P<0.0001$) with a correlation coefficient of 0.86 (data not shown). Further looking at Figure 2.1, the general pattern is more seeds m^{-2} with narrow rows. Cox and Cherney (2011a) found results that would agree with this, finding 202 more seeds m^{-2} in 19 cm rows vs 76 cm rows. Board et al. (1999) found, that among primary traits, seeds m^{-2} had the greatest effect on yield. All of this, combined with the significant correlation and a general increase in seeds m^{-2} in narrow rows at the non-significant locations, indicates that greater seed set could be driving greater yields in narrow rows in this study.

Seed mass responded to input system at four of the five locations but did not respond to row spacing or have a row spacing by input system interaction at any location (Table 2.6). The SOYA input system had the greatest seed mass at four of the five locations with a 0.5 to 0.9 g 100 seeds^{-1} increase over the UTC (Table 2.6). The removal of the foliar fungicide from the SOYA input system had an inconsistent effect on seed mass as the SOYA – FF input system had a +0.1 to -0.3 g 100 seeds^{-1} difference compared to the SOYA input system. The SOYA input system consistently increased seed mass compared to STFF. However, the STFF input system increased seed mass compared to the UTC at the four locations where a significant response was found. In general the use of a foliar fungicide did increase seed mass but a greater increase in seed mas was seen with the use of additional products in the SOYA and SOYA – FF input systems

It is unclear which product helped increase seed mass beyond that seen with the foliar fungicide. Other studies have found a similar increase in seed mass with the use of a foliar fungicide (Henry et al., 2011; Swoboda and Pedersen, 2009). Studies looking at the addition of nitrogen fertilizers reported inconsistent effects on seed mass, with one showing a response while the other had no response (Ruiz Diaz et al., 2009; Salvagiotti et al., 2009). Another study found that foliar fungicide and insecticide used together produced the greatest seed mass, but the increase was mostly attributed to the use of foliar fungicide because an application of foliar insecticide alone had no effect (Henry et al., 2011). Studies looking at stress reducing and growth promoting products primarily looked at seed yield so their effect on seed mass has not been documented (Staton and Boring, 2012; Voight et al., 2012).

Seed Yield

Seed yield responded to either row spacing or input system at three of five locations and had a row spacing by input system interaction at MNstp (Table 2.7). Although KSman was the only location to have a significant row spacing response, narrow row spacing produced the greatest yields (Table 2.7). Medium and wide row spacing were inconsistent in their effect on row spacing. The increase in yield found with narrow row spacing is consistent with other studies (DeBruin and Pedersen, 2008a; Oplinger and Philbrook, 1992). Orlowski et al. (2012) reported equal yields for medium and wide row spacing but greater yields with narrow row spacing, however, other studies found that medium row spacing generally produced yields similar to those from narrow row spacing (Pedersen and Lauer, 2003; Bertram and Pedersen, 2004). This study in combination with other studies shows that narrow row spacing (<38 cm) fairly consistently yields greater than medium and wide row spacing, while yield response from medium and wide row spacing has been inconsistent.

At MNstp where an interaction occurred, the SOYA input system yielded the greatest followed by SOYA – FF, STFF, and UTC, in that order, in both medium and wide row spacing (Figure 2.2). However, in narrow row spacing, the STFF input system yielded the greatest while SOYA and SOYA – FF yielded similarly to the UTC. This goes against our hypothesis that narrow row spacing combined with a high input system such as the SOYA and SOYA – FF would maximize yield. However, this response was only found at MNstp and other locations did not show a similar response (data not shown).

Seed yield response to input system was fairly consistent across all locations with the SOYA and SOYA – FF input systems generally having the greatest yields (Table 2.7). The SOYA input system out yielded the UTC by 327 kg ha^{-1} at KSros and 551 kg ha^{-1} at MNwas. At both locations the removal of the foliar fungicide in the SOYA – FF input system had no effect on yield compared to the SOYA input system. When compared to the STFF input system, the SOYA system had a 228 kg ha^{-1} yield advantage at KSros and 280 kg ha^{-1} yield advantage at MNwas. At MNwas, the STFF out-yielded the UTC by 271 kg ha^{-1} and STFF generally out-yielded the UTC at the other locations. Outside of one location, UTC was the lowest yielding system overall showing that the use of products consistently increased yield. However, given the structure of the treatments, it is impossible to determine exactly which product(s) had the greatest impact.

Other studies looking at the effect of individual products on yield have found inconsistent results. Two studies looking at seed treatments found a fairly consistent increase in plant density, but seed yield response varied across years from no response up to a 4% increase with the use of fungicide, insecticide, and nematicide seed treatments (Gaspar et al., 2014; Cox and Cherney, 2011b). Aside from the UTC, all input systems had these seed treatment components, and the SOYA and SOYA – FF input systems had an additional LCO promoter component. It is possible that some of the yield gain in this study could be attributed to the use of seed treatments. However, due to the treatment structure and the inconsistent results found in other studies, it is hard to say with any confidence that seed treatments increased yield.

Nitrogen has been shown to have a greater likelihood of increasing seed yield when environments were capable of yielding greater than 4500 kg ha^{-1} (Salvagiotti et al., 2008). Both Minnesota locations were close to or greater than this 4500 kg ha^{-1} threshold and therefore may have increased yield in response to nitrogen. All Kansas locations were less than this threshold, but Wesley et al. (1998) found a yield increase of 463 kg ha^{-1} to nitrogen in environments with yields greater than 3767 kg ha^{-1} and no yield increase in environments with yields less than 3363 kg ha^{-1} in Kansas. The Kansas locations in the current study had yields greater than the Wesley et. al (1998) lower threshold with one location greater than the upper threshold, indicating that it is possible a yield gain from the use of nitrogen could have occurred.

Foliar fungicide was found to increase yield by 162 kg ha^{-1} across 282 on-farm field trials in Iowa (Kyveryga et al., 2013) but another study in Iowa found no yield response to foliar fungicide when disease pressure was low (Swoboda and Pedersen, 2009). An Indiana study found an increase in yield of 100 kg ha^{-1} with a foliar fungicide application (Henry et al., 2011). In this study, the STFF input system had an average yield increase of 140 kg ha^{-1} over the UTC. Also, an average yield decrease of 76 kg ha^{-1} was found when removing the foliar fungicide from the SOYA input system. These yield differences are similar to what the Indiana study and on-farm trials in Iowa found, however, disease pressure was low across all environments.

The rest of the products that were used in this study have inconsistent results when looked at individually in other studies. The previously mentioned Indiana study found an increase in yield of 150 kg ha^{-1} with a foliar insecticide application (Henry et al., 2011). Other studies looking at the application of foliar micronutrients tended to find no yield increase (Gerwing, 2002; Widmar, 2013). Stress reducing and growth promoting products had varying results in on-farm trials in Michigan and Pennsylvania (Staton and Boring, 2012; Voight et al., 2012). Staton and Boring (2012) had one product increase yield by 135 kg ha^{-1} at one location and another product had no yield response across three locations. Voight et al. (2012) found a 182 kg ha^{-1} yield increase at one of nine locations with the use of a growth promoter and found no yield increase with the use of another similar product at five locations. The SOYA and SOYA – FF input systems included a combination of similar products and had average yield gains across all environments of 178 kg ha^{-1} with SOYA and 102 kg ha^{-1} with the SOYA – FF above the STFF input system. These yield gains are similar to what other studies have found from the use of one of the individual products. This supports the possibility that one of these products increased yield in the current study, or that a combination of these products increased yield but at a lower response then what previous studies have found.

The structure of this experiment makes it difficult to make firm conclusions regarding which input product(s) contributed to increasing yield. The objective of this study was to examine input systems and their interaction with row spacing. Our original belief was that a combination of inputs in a system could provide a synergistic occurrence that when added with narrow rows would accelerate yields past current levels. It is likely that yields beyond what were found in this study could be achieved if producers intensively managed each field and based product decisions on a field by field basis to see if a product is needed. For instance, pest levels were monitored in this study, but products were applied according to the treatment protocol, regardless of pest levels. Not only does the approach used in this study incur additional cost with a low probability of increasing yield, it has the potential to develop pest resistance if widely used (Boethel, 2004) and products, such as nitrogen, may have a negative environmental impacts (Gutierrez-Boem et al., 2004).

Canopy Development

Normalized Difference Vegetation Index Duration Indices

Row spacing and input system interacted in the vegetative NDVI duration index at KSman (Table 2.8). Here, the STFF and SOYA input systems acted similarly in both narrow and medium row spacings and increased in the wide row spacing (Figure 2.3). The UTC and SOYA – FF input systems responded in an opposite manner with the greatest vegetative NDVI duration index in narrow rows and similar, smaller values in medium and wide row spacings. In general, the wide row spacing had some of the greater values. Vegetative NDVI duration index values at KSros agree with this observation as the wide row spacing averaged 2.2 greater than the medium and narrow row spacing (Table 2.8). This response may be related to the fact that the GreenSeeker was held directly over a row when collecting these data. The wide rows would be denser in a single row compared to the medium rows, and medium denser than narrow rows during vegetative growth. However, no difference was found between medium and narrow rows for this parameter.

Another interaction occurred in the season NDVI duration index at KSros (Table 2.8). Here, index values for the UTC, STFF, and SOYA input systems decreased from narrow to medium rows and then increased from medium to wide rows, but values for the SOYA – FF input system increased from narrow to medium to wide rows (Figure 2.4). Overall, season NDVI duration index values for the SOYA and SOYA – FF input systems were greater than the UTC and STFF input systems. KSman and MNwas had responses that agree with this observation with the SOYA and SOYA – FF input systems having significantly greater season NDVI duration indices compared to the UTC. However the STFF input system acted similarly to the SOYA and SOYA – FF systems at both locations.

Input system also had an effect on the senescence NDVI duration index at KSman and KSros (Table 2.8). At both locations, the SOYA input system was one of the greatest treatments increasing senescence NDVI duration values above the UTC. SOYA – FF acted similarly to SOYA at KSros but did not increase senescence NDVI duration index above the UTC at KSman. The STFF input system had an opposite effect at the two locations, acting similarly to the UTC at KSros and being no different than the SOYA and SOYA – FF systems at KSman. KSman ($r = 0.36$) and KSros ($r = 0.69$) had significant ($\alpha = 0.05$) correlation coefficients between senescence NDVI duration index and seed mass showing that greater late season NDVI duration indices had a strong relationship with seed fill.

Kyveryga et al. (2013) found a “greenness” effect late in the season in response to fungicide at 77% of their locations. Our results are inconsistent on pin-pointing whether fungicide is the main product that caused the late season increase in NDVI duration index values. Although STFF had NDVI duration index values that were similar to the SOYA system at KSman and MNwas, the removal of fungicide in the SOYA – FF system significantly decreased values only under the SOYA but not under the STFF system at KSman (Table 2.8). Also, the SOYA and SOYA – FF input systems consistently increased the NDVI duration index values for the reproductive, senescence, and season periods compared to both the UTC and STFF systems. All of this shows that fungicide may have a large impact on late season NDVI duration indices in some environments, but different products may also be causing a late season “greenness” effect in other environments.

Fractional Canopy Coverage Duration Indices

Input system also affected all FCC duration indices at KSman (Table 2.9). Here, the STFF, SOYA, and SOYA – FF acted similarly and increased reproductive and season FCC duration indices above the UTC. The STFF and SOYA – FF systems increased the vegetative index compared to the UTC, but the SOYA did not differ from the UTC.

Row spacing affected at least two of the FCC duration indices at both KSman and KSros, and the response did not depend on input system (Table 2.9). Narrow and medium rows acted similarly in both the reproductive and season FCC duration indices and increased these values above wide rows at both KSman and KSros. Vegetative FCC duration index also responded to row spacing at KSman where the narrow row spacing had the greatest value followed by medium, which had a greater value than the wide row spacing. These responses agree with results observed by Weber et al. (1966) who found that narrow rows reach full canopy closure earlier in the growing season and have an increased canopy leaf area compared to wide rows (Weber et al., 1966).

Andrade et al. (2002) found that soybeans grown in narrow rows had the ability to capture more radiation during the critical pod setting period and Board et al. (1992) found that a positive yield response to narrow rows was associated with greater light interception between R1 and R5. The results of this current study agree with Andrade et al. (2002) and Board et al. (1992) in the fact that narrow rows had greater FCC duration indices than wide rows. Significant ($\alpha = 0.05$) correlation coefficients were observed between numerous growth and yield parameters and the different FCC duration indices at both KSman and KSros (data not shown). However, coefficients were inconsistent showing a positive relationship at one location and a negative relationship at the other location for many of the parameters. For instance, yield had a significant correlation coefficient of 0.40 at KSman and -0.41 at KSros with the reproductive FCC duration index. Parameters that had a consistent significant correlation coefficient from location to location were plant height, pods m^{-2}, pods $plant^{-1}$ and seed mass all with the reproductive FCC duration index. Outside of seed mass, all of these coefficients were negative showing that greater reproductive FCC duration indices was related to smaller plants with fewer pods $plant^{-1}$ and pods m^{-2}. Overall, narrow rows generally had the greatest FCC duration indices but with the inconsistent correlation coefficients, it is unclear what impact and how large of an impact this had on soybean yield components and yield.

Economics

With the current cost of each product and custom application rates, there was an additional cost above the UTC of \$130.76 ha^{-1} with the STFF, \$345.34 ha^{-1} with the SOYA, and \$289.28 ha^{-1} with the SOYA – FF input system (Table 2.10). Figure 2.3 shows the break-even points at different soybean market prices and the yield increase needed to cover the current cost, a 15% reduction in cost, and a 15% increase in cost of the three input systems. Averaged across all locations and years, yield increases relative to the UTC were 172 kg ha^{-1} with the STFF, 311 kg ha^{-1} with the SOYA, and 269 kg ha^{-1} with the SOYA – FF input systems. At these levels of response, soybean market prices needed to cover the additional cost of these input systems would need to increase to \$760 t^{-1} or by 207% for the STFF, \$1,110 t^{-1} or by 302% for the SOYA, and \$1,075 t^{-1} or by 293% for the SOYA – FF systems. Even at MNwas, where the greatest yield increases above the UTC were found, price increases of 131% for the STFF, 171% for the SOYA, and 131% for the SOYA – FF would need to be realized to cover the additional cost of these systems. Yield gains needed at current soybean prices to cover the additional cost of the input systems are 356 kg ha^{-1} from the STFF, 941 kg ha^{-1} from the SOYA, and 788 kg ha^{-1} from the SOYA – FF input systems. Given the current cost and market prices, it would not be economical for a producer to invest in additional inputs unless greater yield gains are achieved, higher market prices are realized, or a combination of both occurs.

Conclusion

Row spacing and input system had a positive effect on many soybean growth parameters, yield components, and yield. Narrow row spacing, in general, had the greatest fractional canopy coverage and yield across all locations but did not differ from medium and wide row spacing in most other measurements. At two of the five locations, the use of inputs in the STFF, SOYA, and SOYA – FF input system increased yield above the UTC. These input systems also had the greatest senescence NDVI duration indices, which led to an increased seed mass above the UTC at most locations. When looking at the average yield response that the STFF, SOYA, and SOYA – FF systems achieved across all locations, current product costs and soybean market prices could not justify the use of these inputs in a system. It appears that producers would be better served to use narrow rows as a means to improve the possibility of maximizing production across their farm and to evaluate current prices to see if implementing inputs in a system can be justified.

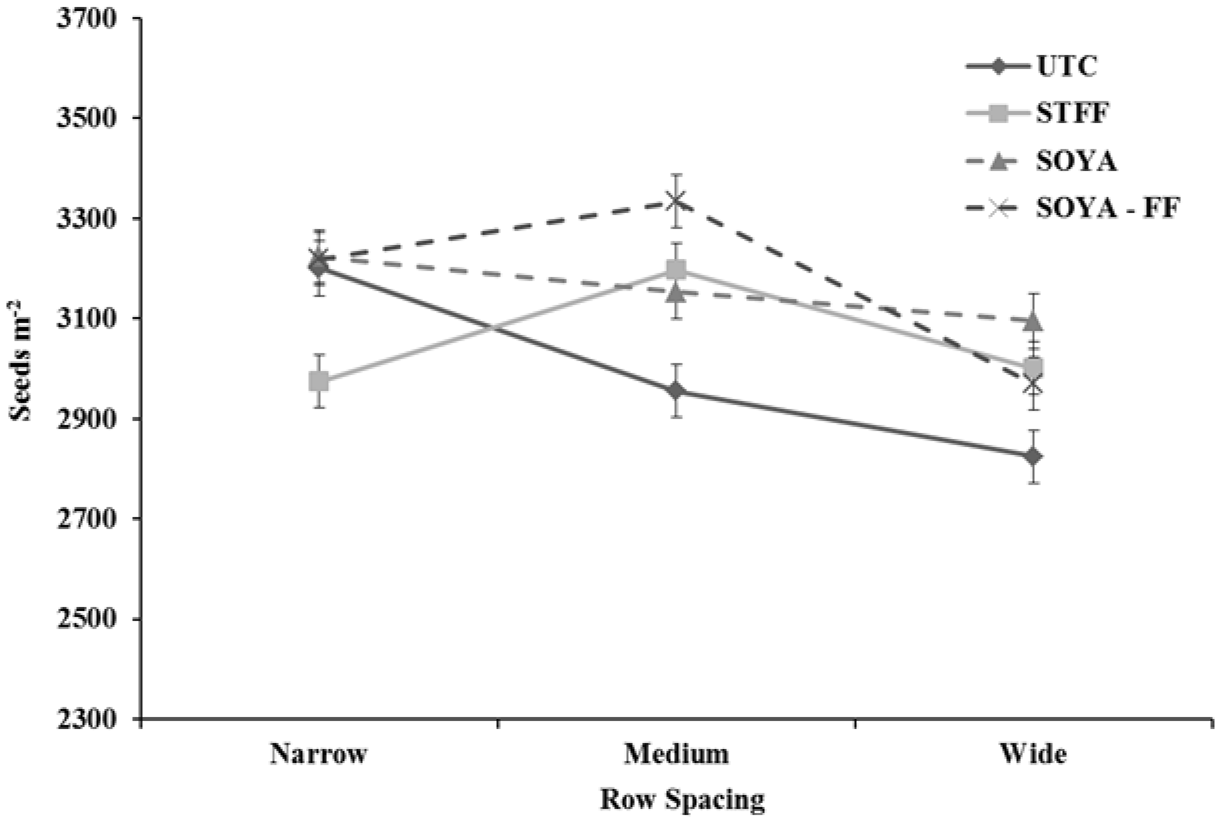

Figure 2.1 Response of seed number to each input system by row spacing treatment at MNwas in 2012 and 2013. Error bars that overlap indicate treatments are not significantly different at α = 0.05.

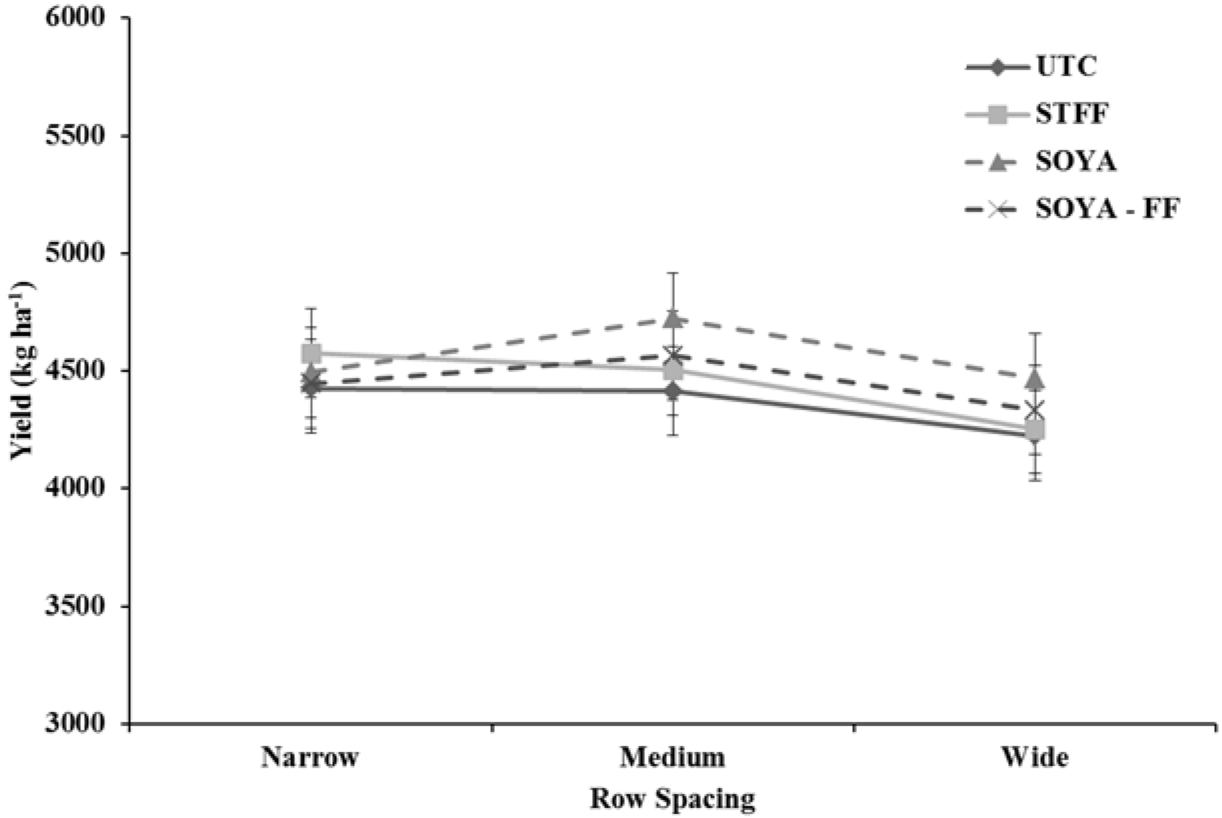

Figure 2.2 Response of yield to each input system by row spacing treatment at MNstp in 2012 to 2014. Error bars that overlap indicate treatments are not significantly different at α = 0.05.

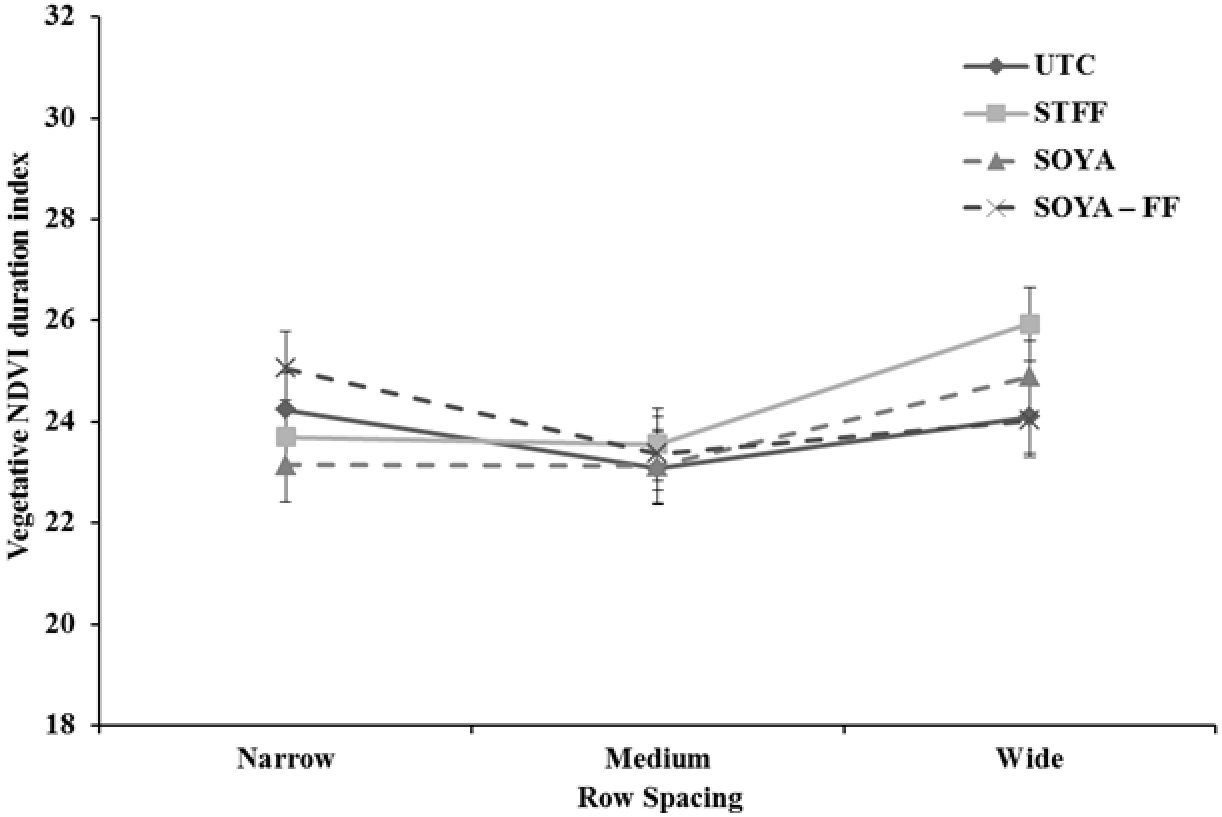

Figure 2.3 Response of vegetative normalized difference vegetation index (NDVI) duration index to input system and row spacing at KSman in 2012 to 2014. Error bars that overlap indicate treatments are not significantly different at α = 0.05.

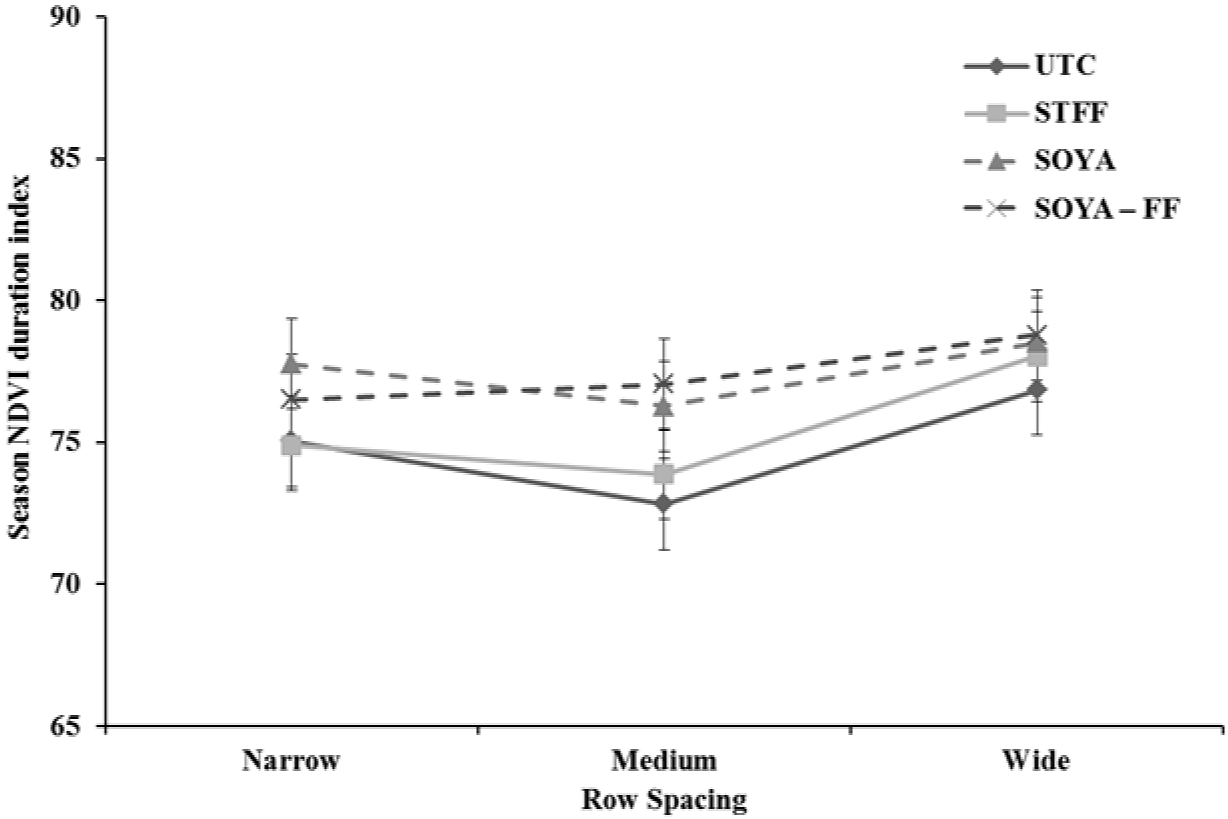

Figure 2.4 Response of season normalized difference vegetation index (NDVI) duration index to each input system by row spacing treatment at KSros in 2012 to 2014. Error bars that overlap indicate treatments are not significantly different at α = 0.05.

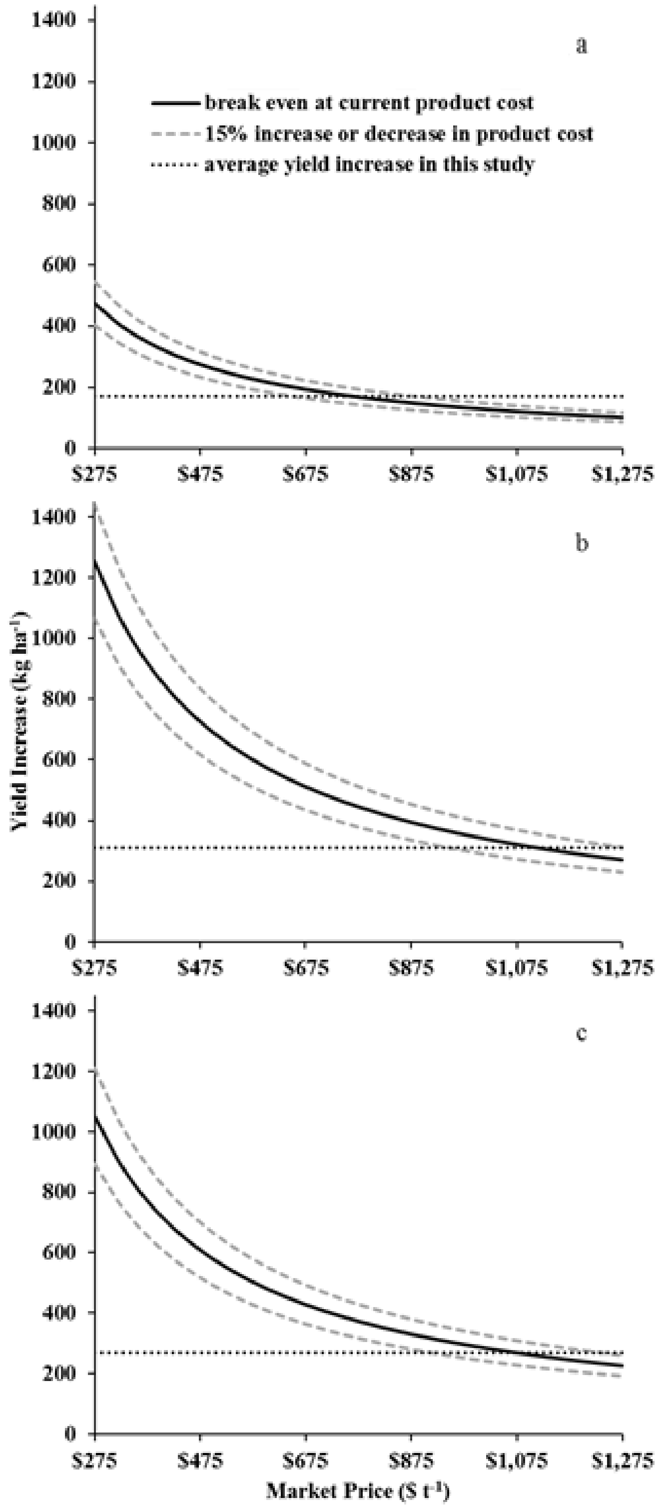

Figure 2.5 Yield increase needed to break even at different soybean market prices given product costs for each input system: a) Fungicide, insecticide, and nematicide seed treatment plus foliar fungicide, b) SOYA, and b) SOYA minus foliar fungicide.

Table 2.1 Location descriptions and field characteristics for experiments in Kansas and Minnesota during 2012 to 2014.

Year	Location†	Coordinates	Soil series‡	Previous crop	Tillage system§	Soil fertility pH	P	K	OM	Variety	Planting date
							—mg kg⁻¹—		g kg⁻¹		
2012	KSman	39.21696, -96.59180	K	sorghum	NT	7.3	19.4	211	26	AG4130	7 May
	KSros¶	39.12021, -95.92655	B	corn	CT	6.8	22.5	174	17	AG4130	4 May
	KSsca¶	39.83426, -97.84142	C	corn	CT	6.9	8.0	295	15	AG3431	8 May
	MNstp¶	44.95437, -93.11412	W	corn	CT	5.6	72.0	114	—	AG2430	18 May
	MNwas	44.07899, -93.50646	N	corn	CT	5.9	53.0	240	—	AG2430	17 May
2013	KSman	39.21696, -96.59087	K	sorghum	NT	7.5	30.5	304	36	AG4130	17 May
	KSros¶	39.11870, -95.92599	E	corn	CT	7.3	12.9	140	11	AG4130	22 May
	KSsca¶	39.83426, -97.84075	C	corn	CT	6.4	5.0	387	19	AG3431	3 June
	MNstp¶	44.95437, -93.11412	W	corn	CT	6.3	99.0	164	35	AG2431	14 May
	MNwas	44.07899, -93.50646	N	corn	CT	6.2	31.0	136	67	AG2431	16 May
2014	KSman	39.21696, -96.59033	K	soybeans	NT	6.8	25.7	170	30	AG4033	14 May
	KSros¶	39.07815, -95.76811	EB	corn	CT	6.5	20.4	179	26	AG4033	15 May
	KSsca¶	39.83426, -97.84019	C	corn	CT	6.5	13.2	382	31	AG3431	13 May
	MNstp¶	44.95437, -93.11412	W	corn	CT	6.0	67.0	90	39	AG2431	30 May
	MNwas	44.07899, -93.50646	N	corn	CT	6.0	44.0	163	59	AG2431	6 June

† KSman, Manhattan, KS; KSros, Rossville, KS; KSsca, Scandia, KS; MNstp, St. Paul, MN; MNwas, Waseca, MN.
‡ Source: USDA web soil survey. Bismarckgrove-Kimo complex (B): fine-silty, mixed, superactive, mesic Fluventic Hapludolls; Crete silt loam (C): fine, smectic, mesic Pachic Udertic Arguistolls; Eudora silt loam (E): coarse-silty, mixed, superactive, mesic Fluventic Hapludolls; Eudora-Bismarckgrove silt loams (EB): coarse-silty to fine-silty, mixed, superactive, mesic Fluventic Hapludolls: Kahola silt loam (K): fine-silty, mixed, mesic Cumulic Hapludolls; Nicollet clay loam (N): fine-loamy, mixed, superactive, mesic Aquic Hapludolls; Waukegan silt loam (W): fine-silty over sandy or sandy-skeletal, mixed, superactive, mesic Typic Hapludolls.
§ CT, conventional tillage; NT, no tillage.
¶ irrigated location.

Table 2.2 Product makeup and application information for each input system used in experiments conducted in Kansas and Minnesota during 2012 to 2014.

Product‡	Input system† UTC	STFF	SOYA	SOYA – FF	Product Component	Active Ingredient	Application Growth Stage	Product Rate	Sprayer Volume§
Seed treatments								mL kg seed^{-1}	
Acceleron®	–¶	+	+	+	fungicide	pyraclostrobin + metalaxyl	seed	1.04	—
Acceleron®	–	+	+	+	insecticide	imidacloprid	seed	2.60	—
Poncho®/ Votivo®	–	+	+	+	insecticide + nematicide	clothianidin + *Bacillus firmus*	seed	0.64	—
Optimize®	–	–	+	+	LCO# promoter	lipo-chitooligosaccharide	seed	1.83	—
Nitrogen								kg ha^{-1}	
Urea††	–	–	+	+	nitrogen	46-0-0 %N-P_2O_5-K_2O	V4	84	—
ESN®	–	–	+	+	nitrogen	44-0-0 %N-P_2O_5-K_2O	V4	84	—
Foliar products								mL ha^{-1}	L ha-^{1}
Ratchet™	–	–	+	+	LCO promoter	lipo-chitooligosaccharide	V4-V6	292	140
Task Force® 2	–	–	+	+	fertilizer	11-8-5-0.1-0.05-0.04-0.04-0.02-0.00025-0.00025 %N-P_2O_5-K_2O-Fe-Mn-Zn-B-Co-Mo	R1	4676	140
Bio-Forge®	–	–	+	+	antioxidant	N,N'-diformyl urea	R3	1169	187
Headline®	–	+	+	–	fungicide	pyraclostrobin	R3	438	187
Priaxor™	–	+	+	–	fungicide	fluxapyroxad + pyraclostrobin	R3	585	187
Warrior II®	–	–	+	+	insecticide	lambda-cyhalothrin	R3	140	187
Endigo®	–	–	+	+	insecticide	lambda-cyhalothrin + thiamethoxam	R3	292	187

† UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.
‡ Acceleron® (Monsanto Co., St. Louis, MO); Poncho®/Votivo® (Bayer Crop Science, Research Triangle Park, NC); Optimize® (Novozymes, Brookfield, WI); ESN [environmentally smart nitrogen (polymer-coated urea)] (Agrium, Calgary, Alberta, Canada); Ratchet™ (Novozymes, Brookfield, WI); Task Force® 2 (Loveland Products, Inc., Greeley, CO); Bio-Forge® (Stoller USA, Inc., Houston, TX); Headline® (BASF Corp., Florham Park, NJ) used in 2012; Priaxor™ (BASF Corp., Florham Park, NJ) used in 2013-2014; Warrior II® (Syngenta Crop Protection, LLC, Greensboro, NC) used in 2012; Endigo® (Syngenta Crop Protection, LLC, Greensboro, NC) used in 2013-2014.
§ Foliar applications made using a CO_2 pressurized backpack sprayer set at 241 kPa with 0.76 L min^{-1} flay spray nozzles (TeeJet Technologies, Wheaton, IL) spaced 0.46 m apart on a 3.05 m boom.
¶ Presence of a product in a treatment is denoted by "+", and absence by "–".
# LCO, lipo-chitooligosaccharide.
†† Treated with Agrotain® [N-(n-butyl) thiophosphoric triamide] (Koch Agronomic Services, LLC, Wichita, KS) at 3.1 mL kg urea^{-1}.

Table 2.3 Monthly average maximum temperature and total precipitation for all environments for 2012 to 2014.

Year	Location†	May	June	July	August	September
		Average maximum temperature (°C)				
2012	KSman	28.7 (3.8)‡	32.9 (2.9)	37.5 (4.4)	32.3 (0.0)	27.2 (-0.5)
	KSros	28.2 (3.8)	31.3 (2.0)	35.6 (3.6)	31.6 (0.1)	27.4 (0.5)
	KSsca	28.3 (5.1)	32.6 (3.9)	35.4 (3.5)	30.3 (-0.7)	27.2 (0.8)
	MNstp	22.1 (0.4)	26.5 (0.4)	31.3 (2.5)	27.2 (-0.2)	23.4 (0.7)
	MNwas	23.2 (2.4)	27.1 (1.0)	30.8 (2.8)	27.2 (0.4)	24.1 (1.5)
2013	KSman	23.8 (-1.0)	30.0 (0.0)	31.1 (-1.9)	30.6 (-1.7)	29.7 (2.1)
	KSros	23.6 (-0.8)	29.3 (0.1)	30.7 (-1.2)	29.4 (-2.1)	29.1 (2.2)
	KSsca	23.5 (0.3)	30.5 (1.7)	30.6 (-1.3)	30.0 (-1.0)	28.9 (2.5)
	MNstp	17.7 (-4.0)	23.4 (-2.7)	26.8 (-2.0)	27.2 (-0.2)	24.0 (1.3)
	MNwas	18.2 (-2.6)	24.6 (-1.5)	27.7 (-0.3)	26.8 (0.0)	24.6 (2.0)
2014	KSman	26.1 (1.2)	29.3 (-0.8)	30.9 (-1.0)	33.0 (0.7)	26.8 (-0.8)
	KSros	26.1 (1.7)	28.7 (-0.6)	30.0 (-1.9)	32.2 (0.8)	26.1 (-0.8)
	KSsca	25.9 (2.7)	28.8 (0.0)	31.6 (-1.5)	31.3 (0.2)	25.3 (-1.1)
	MNstp	18.4 (-3.3)	25.8 (-0.3)	26.6 (-2.2)	26.9 (-0.5)	21.4 (-1.3)
	MNwas	19.4 (-1.4)	25.1 (-1.0)	25.8 (-2.2)	27.0 (0.2)	22.2 (-0.4)
		Total Precipitation (mm)				
2012	KSman	27 (-102)‡ (-)§	84 (-61) (-)	15 (-98) (-)	107 (2) (-)	42 (-46) (-)
	KSros	67 (-57) (0)	98 (-39) (45)	19 (-78) (153)	79 (-29) (103)	22 (-71) (0)
	KSsca	12 (-99) (0)	98 (-13) (95)	56 (-45) (127)	61 (-33) (95)	20 (-62) (0)
	MNstp	216 (123) (0)	88 (-28) (0)	123 (13) (0)	34 (-88) (0)	11 (-74) (0)
	MNwas	146 (46) (-)	108 (-11) (-)	53 (-59) (-)	37 (-84) (-)	24 (-69) (-)
2013	KSman	99 (-30) (-)	88 (-56) (-)	37 (-75) (-)	24 (-81) (-)	105 (18) (-)
	KSros	158 (33) (0)	72 (-66) (0)	63 (-35) (34)	86 (-22) (18)	78 (16) (17)
	KSsca	94 (-17) (0)	35 (-77) (0)	95 (-6) (108)	115 (22) (32)	46 (-37) (0)
	MNstp	183 (90) (0)	186 (69) (0)	81 (-29) (25)	38 (-85) (96)	33 (-52) (41)
	MNwas	164 (64) (-)	169 (50) (-)	134 (22) (-)	53 (-68) (-)	49 (-44) (-)
2014	KSman	49 (-80) (0)	224 (80) (0)	17 (-95) (0)	101 (-3) (0)	29 (-58) (0)
	KSros	60 (-65) (0)	179 (42) (0)	28 (-69) (65)	82 (-26) (43)	64 (-29) (0)
	KSsca	11 (-100) (0)	121 (10) (0)	35 (-66) (127)	141 (47) (64)	85 (3) (0)
	MNstp	90 (-3) (0)	234 (117) (0)	69 (-41) (0)	79 (-43) (51)	56 (-29) (0)
	MNwas	73 (-27) (-)	328 (209) (-)	30 (-82) (-)	81 (-40) (-)	35 (-33) (-)

† KSman, Manhattan, KS; KSros, Rossville, KS; KSsca, Scandia, KS; MNstp, St. Paul, MN; MNwas, Waseca, MN.

‡ Departure from 30-year average obtained from the National Climatic Data Center.

§ Irrigation totals for each month. A dash indicates location was non-irrigated.

Table 2.4 Effects of row spacing and input system on pod number at five locations across 2012 to 2014 in Kansas and Minnesota.

Treatment	Location† KSman	KSros	KSsca	MNstp	MNwas
	pods m^{-2}				
Row Spacing (RS)					
Narrow	1242 a‡	1348	1133	995 b	1275
Medium	1140 ab	1254	1096	1088 ab	1189
Wide	1100 b	1251	1212	1202 a	1172
Input System (IS)§					
UTC	1126	1267	1092	1066	1164
STFF	1213	1354	1177	1079	1158
SOYA	1180	1278	1180	1170	1253
SOYA - FF	1123	1239	1140	1067	1275
RS x IS, Pr>F	0.55	0.60	0.73	0.53	0.36

† KSman, Manhattan, KS; KSros, Rossville, KS; KSsca, Scandia, KS; MNstp, St. Paul, MN; MNwas, Waseca, MN.

‡ Values within a column followed by the same letter are not significantly different at $P \leq 0.05$.

§ UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.

Table 2.5 Effects of row spacing and input system on seed number at five locations across 2012 and 2014 in Kansas and Minnesota.

Treatment	Location† KSman	KSros	KSsca	MNstp	MNwas
	seeds m^{-2}				
Row Spacing (RS)					
Narrow	2578	2441	2271 a‡	2782	3155
Medium	2490	2281	2026 b	2815	3159
Wide	2379	2395	2083 ab	2663	2973
Input System (IS)§					
UTC	2448	2308	2082	2752	2994 b
STFF	2403	2357	2166	2753	3057 ab
SOYA	2611	2431	2091	2789	3157 a
SOYA - FF	2466	2394	2167	2719	3174 a
RS x IS, Pr>F	0.38	0.07	0.80	0.53	0.04

† KSman, Manhattan, KS; KSros, Rossville, KS; KSsca, Scandia, KS; MNstp, St. Paul, MN; MNwas, Waseca, MN.

‡ Values within a column followed by the same letter are not significantly different at $P \leq 0.05$.

§ UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.

Table 2.6 Effects of row spacing and input system on seed mass at five locations across 2012 and 2014 in Kansas and Minnesota.

Treatment	Location†				
	KSman	KSros	KSsca	MNstp	MNwas
	grams (100 seeds)$^{-1}$				
Row Spacing (RS)					
Narrow	15.4	13.9	15.9	16.2	15.3
Medium	15.3	13.8	16.0	16.1	15.4
Wide	15.3	14.0	16.0	16.2	15.6
Input System (IS)‡					
UTC	15.2	13.6 c§	15.6 b	15.8 b	14.9 b
STFF	15.4	13.8 bc	16.2 a	16.1 ab	15.3 b
SOYA	15.4	14.3 a	16.2 a	16.3 a	15.8 a
SOYA - FF	15.3	14.0 b	15.9 b	16.3 a	15.9 a
RS x IS, Pr>F	0.99	0.51	0.63	0.48	0.65

† KSman, Manhattan, KS; KSros, Rossville, KS; KSsca, Scandia, KS; MNstp, St. Paul, MN; MNwas, Waseca, MN.

‡ UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.

§ Values within a column followed by the same letter are not significantly different at $P \leq 0.05$.

Table 2.7 Effects of row spacing and input system on seed yield at five locations across 2012 to 2014 in Kansas and Minnesota.

Treatment	Location†				
	KSman	KSros	KSsca	MNstp	MNwas
	kg ha^{-1}				
Row Spacing (RS)					
Narrow	4010 a‡	3388	3613	4485	4866
Medium	3819 ab	3166	3239	4551	4858
Wide	3645 b	3346	3337	4320	4695
Input System (IS)§					
UTC	3715	3145 b	3240	4354	4451 c
STFF	3697	3244 b	3499	4443	4722 b
SOYA	4068	3472 a	3389	4562	5002 a
SOYA - FF	3819	3339 ab	3456	4449	5051 a
RS x IS, Pr>F	0.42	0.11	0.84	0.06	0.71

† KSman, Manhattan, KS; KSros, Rossville, KS; KSsca, Scandia, KS; MNstp, St. Paul, MN; MNwas, Waseca, MN.

‡ Values within a column followed by the same letter are not significantly different at $P \leq 0.05$.

§ UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.

Table 2.8 Effects of row spacing and input systems on normalized difference vegetation index (NDVI) duration indices at four locations across 2012 to 2014 in Kansas and Minnesota.

	KSman†				KSros			
Treatment	Veg‡	Rep	Sen	Season	Veg	Rep	Sen	Season
Row Spacing (RS)								
Narrow	24.0 ab§	38.6	30.8	90.8	17.6 b	29.1	27.1	76.1 b
Medium	23.3 b	38.7	30.9	90.2	17.6 b	29.0	26.0	75.0 b
Wide	24.7 a	38.5	30.6	90.6	19.2 a	28.8	27.1	78.0 a
Input System (IS)¶								
UTC	23.8	38.5	30.2 a	89.7 b	17.8	28.8 b	25.8 b	74.9 b
STFF	24.4	38.6	31.0 ab	91.0 a	18.1	28.8 b	26.2 b	75.6 b
SOYA	23.8	38.7	31.2 a	90.8 a	18.4	29.1 a	27.4 a	77.5 a
SOYA - FF	24.2	38.8	30.6 bc	90.7 a	18.3	29.0 a	27.4 a	77.5 a
RS x IS, Pr>F	0.01	0.49	0.95	0.29	0.83	0.55	0.23	0.048
	mnstp				**mnwas**			
	veg	rep	sen	season	veg	rep	sen	season
Row Spacing (RS)								
Narrow	25.2 b	39.2	13.4	78.3	16.0	36.6 ab	8.4	60.9
Medium	26.6 a	39.2	13.1	78.8	16.9	37.1 a	8.4	62.3
Wide	27.4 a	39.2	13.2	79.2	16.5	36.3 b	8.2	61.0
Input System (IS)								
UTC	26.2	39.2	13.1	78.4	16.3	36.5	8.2	61.1
STFF	26.3	39.2	13.2	78.6	16.6	36.7	8.4	61.6
SOYA	26.6	39.2	13.2	79.1	16.4	36.7	8.3	61.5
SOYA - FF	26.5	39.2	13.3	79.0	16.5	36.7	8.4	61.5
RS x IS, Pr>F	0.75	0.89	0.87	0.98	0.52	0.73	0.10	0.96

† KSman, Manhattan, KS; KSros, Rossville, KS; MNstp, St. Paul, MN; MNwas, Waseca, MN.

‡ Veg, vegetative; Rep, reproductive; Sen, senescence.

§ Values within a column followed by the same letter are not significantly different at $P \leq 0.05$.

¶ UTC, untreated control; STFF, fungicide and insecticide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.

Table 2.9 Effects of row spacing and input systems on fractional canopy coverage (FCC) duration indices at two locations across 2012 to 2014 in Kansas.

	KSman†			KSros		
Treatment	**Veg‡**	**Rep**	**Season**	**Veg**	**Rep**	**Season**
Row Spacing (RS)						
Narrow	1544 a§	3280 a	4825 a	1525	2248 a	3773 a
Medium	1414 b	3256 a	4670 a	1461	2223 a	3684 a
Wide	1292 c	3063 b	4355 b	1390	2096 b	3486 b
Input System (IS)¶						
UTC	1338 b	3151 b	4490 b	1434	2179	3613
STFF	1450 a	3210 a	4660 a	1413	2162	3574
SOYA	1422 ab	3220 a	4641 a	1498	2216	3714
SOYA - FF	1457 a	3218 a	4675 a	1489	2199	3688
RS x IS, Pr>F	0.15	0.59	0.55	0.70	0.86	0.75

† KSman, Manhattan, KS; KSros, Rossville, KS.

‡ Veg, vegetative; Rep, reproductive.

§ Values within a column followed by the same letter are not significantly different at $P \leq 0.05$.

¶ UTC, untreated control; STFF, fungicide and insecticide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.

Table 2.10 Product and application cost for input systems in an experiment conducted at five locations across 2012 to 2014 in Kansas and Minnesota.

Product	Product Cost	Product Rate	Total Cost
Seed treatments	$ bag^{-1}	bags ha^{-1}	$ ha^{-1}
Acceleron® (F,I)†	12.50	3.09	38.61
Poncho®/Votivo®	5.50	3.09	16.99
Optimize®	4.00	3.09	12.36
Nitrogen	$ kg^{-1}	kg ha^{-1}	$ ha^{-1}
Urea	0.53	84	44.48
Agrotain®	0.08	84	6.95
ESN®‡	0.76	84	63.94
Foliar products	$ L^{-1}	mL ha^{-1}	$ ha^{-1}
Ratchet™	33.82	292	9.88
Task Force® 2	1.44	4676	6.75
Headline®	127.87	438	56.06
Priaxor™	171.73	585	100.38
Warrior II®	90.93	140	12.76
Endigo®	58.96	292	17.23
Bio-Forge®	26.42	1169	30.89
Application Rates			$ ha^{-1}
Dry fertilizer	—	—	13.12
Ground chemical	—	—	13.47
Aerial chemical	—	—	19.10
Input System§			$ ha^{-1}
UTC	—	—	—
STFF	—	—	175.08
SOYA	—	—	394.14
SOYA – FF	—	—	293.76

† F, fungicide; I, insecticide.

‡ ESN, environmentally smart nitrogen (polymer-coated urea).

§ UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.

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Appendix A - Raw Data for "Input Systems and their Interactions with Varieties and Seeding Rate on Soybean Growth and Yield"

Table A.1 Raw data for evaluation of inputs experiment conducted at three locations in Kansas during 2012 to 2014.

YR	LOC	REP	TRT	V2-V3 (plants ha^{-1})	R8 (plants ha^{-1})	SURVIVAL (%)	AVG PLANT HEIGHT (cm)	LODGING SCORE (1-5)	SEED MASS (g 100 $seeds^{-1}$)	YIELD (kg ha^{-1})	SDS DX RATING (1-100)
2012	Manhattan	1	Nitrogen (N)	231080	164678	71.3	87.0	1	17.2	4329.6	.
2012	Manhattan	1	F + Insect (I) ST	146085	138117	94.5	88.3	2	16.6	3456.0	.
2012	Manhattan	1	Bio-Forge	143429	151398	105.6	96.3	2	15.7	4842.3	.
2012	Manhattan	1	SOYA	159366	140773	88.3	96.3	3	16.0	4217.5	.
2012	Manhattan	1	SOYA - N	135461	159366	117.6	94.3	2	16.6	4884.2	.
2012	Manhattan	1	Defoliant	124837	111556	89.4	83.3	2	13.6	3531.3	.
2012	Manhattan	1	Untreated Control	151398	151398	100.0	86.3	2	16.3	4186.7	.
2012	Manhattan	1	Foliar I	138117	130149	94.2	96.0	2	16.4	3583.3	.
2012	Manhattan	1	Foliar Fert	162022	162022	100.0	75.3	1	16.7	3536.1	.
2012	Manhattan	1	F + I + LCO ST + Foliar LCO	151398	151398	100.0	82.7	1	16.1	3670.8	.
2012	Manhattan	1	Foliar Fert	148741	154054	103.6	84.3	1	16.3	3731.2	.
2012	Manhattan	1	Foliar F + I	154054	175302	113.8	94.7	3	16.5	4163.5	.
2012	Manhattan	1	SOYA - F	164678	156710	95.2	88.0	3	16.6	4411.5	.
2012	Manhattan	1	Fung (F) Seed Treatment (ST)	188583	167334	88.7	82.7	2	16.1	3456.7	.
2012	Manhattan	1	SOYA - (F+I)	151398	151398	100.0	85.3	2	17.2	4300.9	.
2012	Manhattan	1	SOYA + D	167334	159366	95.2	92.3	3	17.6	4475.3	.
2012	Manhattan	2	Foliar Fert	151398	122180	80.7	87.7	1	16.0	4427.1	.
2012	Manhattan	2	Foliar F + I	159366	154054	96.7	95.0	2	16.6	4586.1	.
2012	Manhattan	2	Untreated Control	154054	154054	100.0	95.3	2	15.7	4397.7	.
2012	Manhattan	2	Fung (F) Seed Treatment (ST)	164678	172646	104.8	101.0	2	16.3	4607.4	.
2012	Manhattan	2	Nitrogen (N)	143429	132805	92.6	96.7	2	16.4	4801.3	.
2012	Manhattan	2	Foliar I	148741	148741	100.0	101.0	3	17.0	4744.7	.
2012	Manhattan	2	SOYA	148741	146085	98.2	93.3	3	17.1	5187.7	.
2012	Manhattan	2	Foliar Fert	167334	167334	100.0	100.0	3	18.8	4739.1	.
2012	Manhattan	2	Bio-Forge	146085	154054	105.5	103.0	2	16.6	4907.0	.
2012	Manhattan	2	F + Insect (I) ST	156710	138117	88.1	104.7	3	16.8	4382.2	.
2012	Manhattan	2	SOYA + D	148741	140773	94.6	97.7	3	16.6	5442.9	.
2012	Manhattan	2	SOYA - N	172646	167334	96.9	101.3	3	17.7	4705.0	.

2012	Manhattan	2	SOYA - (F+I)	127493	135461	106.3	98.0	3	17.6	4902.3	.
2012	Manhattan	2	SOYA - F	159366	154054	96.7	97.3	3	17.6	4985.4	.
2012	Manhattan	2	Defoliant	143429	135461	94.4	96.3	3	17.9	4900.6	.
2012	Manhattan	2	F + I + LCO ST + Foliar LCO	162022	154054	95.1	99.7	3	17.8	4833.7	.
2012	Manhattan	3	F + Insect (I) ST	159366	188583	118.3	94.3	2	16.3	4285.7	.
2012	Manhattan	3	SOYA - (F+I)	162022	154054	95.1	93.3	2	16.4	3936.6	.
2012	Manhattan	3	SOYA + D	138117	132805	96.2	92.7	2	16.2	4797.0	.
2012	Manhattan	3	Foliar Fert	185927	177959	95.7	96.0	2	17.0	4467.2	.
2012	Manhattan	3	Foliar Fert	167334	148741	88.9	96.0	2	17.2	4708.8	.
2012	Manhattan	3	Fung (F) Seed Treatment (ST)	169990	159366	93.8	90.7	2	17.0	3915.0	.
2012	Manhattan	3	Foliar I	164678	151398	91.9	96.7	3	17.3	5187.8	.
2012	Manhattan	3	SOYA - F	148741	148741	100.0	94.3	3	17.8	4119.8	.
2012	Manhattan	3	SOYA - N	140773	135461	96.2	93.3	1	16.1	4527.0	.
2012	Manhattan	3	F + I + LCO ST + Foliar LCO	180615	169990	94.1	91.7	1	15.9	4007.7	.
2012	Manhattan	3	SOYA	140773	132805	94.3	96.7	3	17.6	5035.4	.
2012	Manhattan	3	Nitrogen (N)	183271	225768	123.2	92.0	3	17.1	3954.5	.
2012	Manhattan	3	Untreated Control	151398	154054	101.8	96.3	3	17.0	4898.7	.
2012	Manhattan	3	Defoliant	167334	154054	92.1	95.7	3	16.8	4654.4	.
2012	Manhattan	3	Foliar F + I	156710	146085	93.2	88.7	3	16.9	4742.2	.
2012	Manhattan	3	Bio-Forge	169990	164678	96.9	87.7	2	14.9	4215.7	.
2012	Manhattan	4	SOYA - N	148741	164678	110.7	101.3	2	17.5	5072.9	.
2012	Manhattan	4	SOYA - F	164678	167334	101.6	93.0	2	16.9	4593.7	.
2012	Manhattan	4	Defoliant	132805	127493	96.0	98.0	2	17.6	4915.3	.
2012	Manhattan	4	Foliar Fert	169990	164678	96.9	95.0	3	17.8	4719.6	.
2012	Manhattan	4	Untreated Control	164678	162022	98.4	94.3	3	16.9	4188.3	.
2012	Manhattan	4	Foliar I	180615	172646	95.6	93.3	2	16.2	4233.8	.
2012	Manhattan	4	Bio-Forge	138117	151398	109.6	96.3	3	15.9	4433.1	.
2012	Manhattan	4	F + Insect (I) ST	196551	196551	100.0	97.3	2	16.3	4534.7	.
2012	Manhattan	4	SOYA - (F+I)	154054	135461	87.9	92.3	1	16.2	4156.0	.
2012	Manhattan	4	Foliar Fert	185927	180615	97.1	87.0	1	15.5	4066.8	.
2012	Manhattan	4	Fung (F) Seed Treatment (ST)	177959	172646	97.0	89.3	2	16.0	3836.7	.
2012	Manhattan	4	Foliar F + I	172646	162022	93.8	80.3	1	17.3	4060.2	.
2012	Manhattan	4	SOYA	132805	140773	106.0	85.0	2	17.8	5007.4	.
2012	Manhattan	4	F + I + LCO ST + Foliar LCO	148741	127493	85.7	80.0	1	17.4	3692.5	.
2012	Manhattan	4	SOYA + D	119524	122180	102.2	84.7	2	17.8	4704.7	.
2012	Manhattan	4	Nitrogen (N)	164678	172646	104.8	73.7	1	18.3	3797.6	.
2012	Rossville	1	F + Insect (I) ST	167334	148741	88.9	106.0	1	13.8	3539.6	0.00
2012	Rossville	1	F + I + LCO ST + Foliar LCO	127493	106244	83.3	112.3	1	13.8	3714.1	0.00

2012	Rossville	1	Bio-Forge	151398	124837	82.5	107.3	1	13.7	3804.6	0.00
2012	Rossville	1	Foliar Fert	135461	132805	98.0	108.3	1	13.7	1741.8	0.00
2012	Rossville	1	Defoliant	151398	106244	70.2	116.7	1	13.9	3482.9	4.44
2012	Rossville	1	Foliar I	140773	138117	98.1	117.3	1	13.7	3787.1	5.56
2012	Rossville	1	SOYA - (F+I)	122180	98276	80.4	119.3	1	14.1	3490.2	2.22
2012	Rossville	1	SOYA - F	114212	90307	79.1	127.3	1	13.9	4743.4	0.00
2012	Rossville	1	SOYA	177959	185927	104.5	114.3	1	14.2	3928.1	6.67
2012	Rossville	1	Foliar Fert	183271	146085	79.7	99.7	1	14.1	4227.8	0.00
2012	Rossville	1	Fung (F) Seed Treatment (ST)	209832	175302	83.5	103.3	1	14.2	3791.4	0.00
2012	Rossville	1	Untreated Control	188583	132805	70.4	101.3	1	14.0	3253.3	0.00
2012	Rossville	1	SOYA + D	169990	138117	81.3	117.7	1	13.7	4161.1	5.00
2012	Rossville	1	SOYA - N	122180	111556	91.3	117.7	1	14.3	3618.3	1.11
2012	Rossville	1	Foliar F + I	135461	146085	107.8	111.7	1	13.6	3509.7	6.67
2012	Rossville	1	Nitrogen (N)	138117	138117	100.0	122.3	1	13.8	4287.7	0.56
2012	Rossville	2	F + I + LCO ST + Foliar LCO	175302	162022	92.4	126.7	2	13.8	3466.7	0.56
2012	Rossville	2	Foliar Fert	169990	140773	82.8	122.3	1	14.1	4131.8	0.00
2012	Rossville	2	SOYA - N	164678	146085	88.7	128.7	1	13.9	3972.8	5.00
2012	Rossville	2	Fung (F) Seed Treatment (ST)	175302	146085	83.3	125.7	1	13.9	3451.2	5.56
2012	Rossville	2	SOYA + D	175302	159366	90.9	116.7	1	14.3	4021.5	6.67
2012	Rossville	2	Nitrogen (N)	140773	111556	79.2	122.7	1	14.9	4105.7	0.56
2012	Rossville	2	F + Insect (I) ST	175302	87651	50.0	116.0	1	13.6	3144.7	33.33
2012	Rossville	2	Defoliant	154054	132805	86.2	113.0	1	14.2	4118.9	1.11
2012	Rossville	2	Foliar Fert	119524	172646	144.4	125.3	1	13.4	3311.8	16.67
2012	Rossville	2	Bio-Forge	159366	132805	83.3	113.7	1	13.6	3859.6	0.56
2012	Rossville	2	SOYA - F	148741	127493	85.7	129.7	1	14.3	3278.4	13.33
2012	Rossville	2	SOYA - (F+I)	159366	132805	83.3	122.0	1	14.5	3774.6	8.33
2012	Rossville	2	Foliar I	188583	159366	84.5	120.7	1	14.8	3124.6	26.67
2012	Rossville	2	Untreated Control	164678	159366	96.8	120.3	1	13.3	3273.6	11.11
2012	Rossville	2	SOYA	140773	130149	92.5	124.3	1	14.3	3993.0	4.44
2012	Rossville	2	Foliar F + I	148741	143429	96.4	116.3	1	13.9	3529.7	1.11
2012	Rossville	3	SOYA - N	156710	143429	91.5	127.3	2	13.7	3274.6	8.89
2012	Rossville	3	Foliar I	154054	127493	82.8	119.3	1	14.6	3958.7	15.56
2012	Rossville	3	Nitrogen (N)	172646	151398	87.7	124.3	1	14.7	3893.9	23.33
2012	Rossville	3	SOYA + D	140773	106244	75.5	120.7	2	14.3	4079.5	5.00
2012	Rossville	3	F + Insect (I) ST	196551	135461	68.9	117.7	1	13.1	2115.9	44.44
2012	Rossville	3	SOYA - (F+I)	151398	127493	84.2	130.0	1	14.0	2922.9	26.67
2012	Rossville	3	Foliar Fert	138117	98276	71.2	119.0	1	14.5	3948.5	38.89
2012	Rossville	3	Untreated Control	169990	135461	79.7	123.7	1	13.3	3202.1	20.00

2012	Rossville	3	Foliar F + I	148741	122180	82.1	115.7	1	14.4	3673.9	1.67
2012	Rossville	3	Defoliant	156710	127493	81.4	128.3	1	14.7	4879.4	0.00
2012	Rossville	3	F + I + LCO ST + Foliar LCO	146085	108900	74.5	115.3	1	13.9	3316.6	11.67
2012	Rossville	3	Fung (F) Seed Treatment (ST)	177959	138117	77.6	130.0	1	13.8	3126.8	10.00
2012	Rossville	3	SOYA - F	175302	119524	68.2	130.3	1	13.9	3648.6	3.33
2012	Rossville	3	SOYA	146085	119524	81.8	120.7	1	14.1	3544.6	16.67
2012	Rossville	3	Foliar Fert	159366	108900	68.3	116.7	1	13.8	2725.2	1.67
2012	Rossville	3	Bio-Forge	167334	127493	76.2	129.7	1	13.3	3262.5	4.44
2012	Rossville	4	Foliar Fert	175302	162022	92.4	114.7	1	14.5	3300.9	0.00
2012	Rossville	4	Nitrogen (N)	127493	106244	83.3	122.0	1	14.4	3659.5	0.00
2012	Rossville	4	Fung (F) Seed Treatment (ST)	172646	146085	84.6	113.0	1	14.4	3417.0	13.33
2012	Rossville	4	SOYA - N	169990	127493	75.0	102.0	1	13.6	2942.7	0.00
2012	Rossville	4	Defoliant	138117	138117	100.0	121.7	1	14.5	3322.9	1.11
2012	Rossville	4	Foliar F + I	159366	156710	98.3	114.3	1	13.8	3559.8	2.22
2012	Rossville	4	SOYA + D	138117	103588	75.0	119.7	1	14.1	3272.3	0.56
2012	Rossville	4	SOYA	159366	130149	81.7	127.0	1	14.2	4764.3	13.33
2012	Rossville	4	SOYA - F	180615	130149	72.1	128.7	1	13.9	3617.1	0.00
2012	Rossville	4	F + Insect (I) ST	151398	127493	84.2	120.0	1	13.6	3267.0	0.00
2012	Rossville	4	Foliar Fert	172646	148741	86.2	117.3	1	13.0	3052.7	22.22
2012	Rossville	4	SOYA - (F+I)	183271	164678	89.9	116.0	1	13.9	3283.0	6.67
2012	Rossville	4	Untreated Control	177959	148741	83.6	123.7	1	13.1	3413.7	10.00
2012	Rossville	4	F + I + LCO ST + Foliar LCO	172646	122180	70.8	123.0	1	12.4	2642.5	0.56
2012	Rossville	4	Foliar I	162022	146085	90.2	114.7	1	13.5	2900.6	3.33
2012	Rossville	4	Bio-Forge	204520	156710	76.6	119.0	1	13.8	3572.0	0.56
2012	Scandia	1	F + Insect (I) ST	140773	107572	76.4	101.3	2	14.9	4567.5	.
2012	Scandia	1	Foliar Fert	134133	126165	94.1	97.3	1.5	14.6	4121.0	.
2012	Scandia	1	Defoliant	119524	108900	91.1	94.7	1.5	14.2	3811.9	.
2012	Scandia	1	Nitrogen (N)	140773	158038	112.3	80.3	1	14.8	3966.6	.
2012	Scandia	1	SOYA - N	131477	94291	71.7	96.3	2.5	15.2	4091.1	.
2012	Scandia	1	Foliar Fert	146085	122180	83.6	107.3	1.5	15.0	5305.5	.
2012	Scandia	1	SOYA + D	142101	106244	74.8	103.7	3	15.4	3983.6	.
2012	Scandia	1	Foliar F + I	132805	114212	86.0	96.7	1.5	15.1	4469.3	.
2012	Scandia	1	SOYA - F	118196	95620	80.9	103.0	2	15.1	4263.0	.
2012	Scandia	1	Untreated Control	122180	104916	85.9	99.7	1	14.7	4198.8	.
2012	Scandia	1	Fung (F) Seed Treatment (ST)	134133	123509	92.1	87.3	1	14.4	3613.8	.
2012	Scandia	1	Bio-Forge	167334	152726	91.3	98.0	1.5	14.7	5134.4	.
2012	Scandia	1	SOYA - (F+I)	128821	103588	80.4	102.0	2	15.0	4572.4	.
2012	Scandia	1	Foliar I	181943	136789	75.2	103.7	1.5	14.9	5357.3	.

2012	Scandia	1	SOYA	118196	103588	87.6	101.0	2	15.1	3953.6	.
2012	Scandia	1	F + I + LCO ST + Foliar LCO	150070	136789	91.2	96.0	2	15.2	4675.6	.
2012	Scandia	2	F + Insect (I) ST	187255	130149	69.5	99.3	2	15.6	4434.9	.
2012	Scandia	2	SOYA + D	116868	102260	87.5	99.7	1	14.6	3957.9	.
2012	Scandia	2	Foliar I	138117	126165	91.3	99.7	2	14.6	4004.8	.
2012	Scandia	2	Foliar Fert	167334	160694	96.0	95.0	1	15.2	4538.1	.
2012	Scandia	2	Defoliant	140773	106244	75.5	96.0	2.5	14.6	4533.1	.
2012	Scandia	2	SOYA	142101	120852	85.0	103.0	2	14.8	5881.0	.
2012	Scandia	2	SOYA - F	116868	91635	78.4	103.0	3	15.0	4061.2	.
2012	Scandia	2	Untreated Control	135461	134133	99.0	102.3	1.5	14.8	4715.1	.
2012	Scandia	2	F + I + LCO ST + Foliar LCO	164678	118196	71.8	97.7	1.5	15.7	4331.8	.
2012	Scandia	2	Fung (F) Seed Treatment (ST)	163350	123509	75.6	100.3	1.5	15.5	4641.2	.
2012	Scandia	2	SOYA - N	136789	118196	86.4	96.0	2	15.5	4302.1	.
2012	Scandia	2	Bio-Forge	150070	127493	85.0	94.0	1.5	15.4	4985.0	.
2012	Scandia	2	SOYA - (F+I)	156710	106244	67.8	104.0	1.5	15.4	4842.2	.
2012	Scandia	2	Foliar F + I	187255	136789	73.0	95.3	2	15.1	4778.7	.
2012	Scandia	2	Foliar Fert	118196	96948	82.0	95.0	2.5	15.0	3992.3	.
2012	Scandia	2	Nitrogen (N)	147413	104916	71.2	93.3	1	14.9	4237.9	.
2012	Scandia	3	SOYA - F	209832	148741	70.9	97.7	1.5	15.8	4233.3	.
2012	Scandia	3	Foliar Fert	155382	128821	82.9	96.0	1	15.1	4577.4	.
2012	Scandia	3	Defoliant	156710	136789	87.3	94.7	2	15.1	4420.4	.
2012	Scandia	3	SOYA + D	144757	134133	92.7	97.0	1	15.6	4910.9	.
2012	Scandia	3	Bio-Forge	154054	132805	86.2	99.3	2	15.5	4572.4	.
2012	Scandia	3	Foliar I	158038	131477	83.2	98.7	1.5	15.3	4749.5	.
2012	Scandia	3	Untreated Control	147413	124837	84.7	94.3	2	14.6	3893.3	.
2012	Scandia	3	Nitrogen (N)	134133	139445	104.0	100.7	1	14.4	3785.8	.
2012	Scandia	3	F + Insect (I) ST	225768	183271	81.2	96.3	2.5	16.0	4528.2	.
2012	Scandia	3	Fung (F) Seed Treatment (ST)	171318	140773	82.2	96.7	1.5	15.3	4807.9	.
2012	Scandia	3	SOYA - (F+I)	136789	120852	88.3	98.0	2	15.3	4228.7	.
2012	Scandia	3	Foliar F + I	140773	123509	87.7	102.3	2	15.6	5122.5	.
2012	Scandia	3	SOYA - N	167334	131477	78.6	96.7	2.5	15.4	4405.3	.
2012	Scandia	3	SOYA	187255	166006	88.7	98.3	1	15.1	4720.2	.
2012	Scandia	3	Foliar Fert	114212	124837	109.3	99.3	2	14.8	3544.9	.
2012	Scandia	3	F + I + LCO ST + Foliar LCO	140773	.	.	105.3	1.5	14.3	4704.8	.
2012	Scandia	4	F + Insect (I) ST	92963	79683	85.7	102.7	2.5	15.5	4533.1	.
2012	Scandia	4	Untreated Control	158038	135461	85.7	101.0	1	14.8	6039.8	.
2012	Scandia	4	Defoliant	135461	119524	88.2	95.7	2	14.9	3957.9	.
2012	Scandia	4	SOYA + D	148741	106244	71.4	97.0	2	15.3	4881.9	.

2012	Scandia	4	SOYA - F	152726	119524	78.3	96.0	1.5	15.4	4208.0	.
2012	Scandia	4	Bio-Forge	168662	127493	75.6	95.0	1.5	14.9	4789.1	.
2012	Scandia	4	SOYA	128821	103588	80.4	99.3	1.5	14.8	3460.9	.
2012	Scandia	4	Foliar I	135461	124837	92.2	102.0	1	14.6	4095.6	.
2012	Scandia	4	Fung (F) Seed Treatment (ST)	98276	88979	90.5	102.7	2.5	15.0	3910.7	.
2012	Scandia	4	SOYA - N	158038	96948	61.3	95.3	2	15.1	4889.4	.
2012	Scandia	4	SOYA - (F+I)	142101	115540	81.3	100.3	2	15.2	4641.2	.
2012	Scandia	4	Foliar Fert	155382	126165	81.2	98.7	1.5	15.4	5288.6	.
2012	Scandia	4	Nitrogen (N)	158038	112884	71.4	97.0	1	15.0	4233.3	.
2012	Scandia	4	Foliar Fert	191239	160694	84.0	96.3	1	15.0	4813.1	.
2012	Scandia	4	F + I + LCO ST + Foliar LCO	166006	114212	68.8	94.0	2	14.4	3135.3	.
2012	Scandia	4	Foliar F + I	128821	122180	94.8	100.7	1.5	14.5	4331.8	.
2013	Manhattan	1	Nitrogen (N)	146085	127493	87.3	96.3	1	14.6	2296.3	.
2013	Manhattan	1	Untreated Control	140773	124837	88.7	93.3	1	14.5	4073.4	.
2013	Manhattan	1	F + Insect (I) ST	183271	156710	85.5	97.7	1	15.0	2892.7	.
2013	Manhattan	1	Foliar Fert	119524	116868	97.8	99.0	1	15.0	4292.6	.
2013	Manhattan	1	SOYA + D	138117	127493	92.3	93.3	1	15.8	2794.8	.
2013	Manhattan	1	SOYA	162022	138117	85.2	93.0	1	15.0	2392.9	.
2013	Manhattan	1	Defoliant	146085	122180	83.6	87.0	1	16.0	3812.4	.
2013	Manhattan	1	SOYA - F	148741	132805	89.3	91.3	1	15.1	2697.4	.
2013	Manhattan	1	Foliar I	164678	151398	91.9	98.0	1	15.4	4004.9	.
2013	Manhattan	1	SOYA - N	180615	183271	101.5	97.3	1	15.3	3876.9	.
2013	Manhattan	1	Bio-Forge	130149	124837	95.9	94.7	1	15.1	4320.7	.
2013	Manhattan	1	F + I + LCO ST + Foliar LCO	164678	162022	98.4	90.3	1	15.3	4073.7	.
2013	Manhattan	1	Foliar Fert	143429	151398	105.6	92.0	1	15.6	4522.1	.
2013	Manhattan	1	Foliar F + I	119524	135461	113.3	90.0	1	15.5	4527.3	.
2013	Manhattan	1	SOYA - (F+I)	156710	159366	101.7	90.7	1	16.0	4826.0	.
2013	Manhattan	1	Fung (F) Seed Treatment (ST)	146085	146085	100.0	87.0	1	15.6	4330.5	.
2013	Manhattan	2	Nitrogen (N)	132805	130149	98.0	89.7	1	15.1	3739.1	.
2013	Manhattan	2	SOYA - F	130149	138117	106.1	93.3	1	14.7	3233.2	.
2013	Manhattan	2	Foliar I	185927	111556	60.0	93.0	1	15.1	2924.2	.
2013	Manhattan	2	F + Insect (I) ST	138117	159366	115.4	94.0	1	15.0	3273.7	.
2013	Manhattan	2	SOYA	135461	122180	90.2	95.0	1	15.3	2648.4	.
2013	Manhattan	2	Fung (F) Seed Treatment (ST)	119524	114212	95.6	93.3	1	14.8	2964.4	.
2013	Manhattan	2	Bio-Forge	132805	90307	68.0	91.3	1	15.4	3218.5	.
2013	Manhattan	2	Foliar Fert	124837	106244	85.1	93.7	1	15.3	2464.5	.
2013	Manhattan	2	Foliar Fert	119524	106244	88.9	92.7	1	15.9	3857.8	.
2013	Manhattan	2	SOYA + D	127493	124837	97.9	83.3	1	15.6	3651.6	.

2013	Manhattan	2	SOYA - (F+I)	138117	124837	90.4	91.7	1	16.1	4101.3	.
2013	Manhattan	2	SOYA - N	122180	132805	108.7	95.3	1	15.7	3848.2	.
2013	Manhattan	2	Defoliant	143429	130149	90.7	89.0	1	16.4	3598.5	.
2013	Manhattan	2	Untreated Control	100932	106244	105.3	91.0	1	15.7	4934.5	.
2013	Manhattan	2	F + I + LCO ST + Foliar LCO	156710	148741	94.9	92.0	1	16.0	3649.8	.
2013	Manhattan	2	Foliar F + I	135461	119524	88.2	93.3	1	15.8	4216.4	.
2013	Manhattan	3	Defoliant	138117	111556	80.8	89.7	1	16.0	3074.8	.
2013	Manhattan	3	Foliar I	100932	106244	105.3	99.0	1	15.5	2593.2	.
2013	Manhattan	3	Foliar Fert	159366	127493	80.0	99.3	1	15.8	3784.3	.
2013	Manhattan	3	Fung (F) Seed Treatment (ST)	148741	116868	78.6	99.3	1	16.2	3807.0	.
2013	Manhattan	3	SOYA - F	154054	138117	89.7	101.0	1	16.1	3112.9	.
2013	Manhattan	3	Nitrogen (N)	127493	116868	91.7	98.0	1	15.8	4101.0	.
2013	Manhattan	3	Foliar Fert	122180	127493	104.3	97.7	1	15.5	4532.4	.
2013	Manhattan	3	SOYA + D	146085	130149	89.1	96.0	1	16.1	2432.2	.
2013	Manhattan	3	Bio-Forge	135461	135461	100.0	95.0	1	16.3	3469.3	.
2013	Manhattan	3	SOYA	148741	135461	91.1	95.7	1	16.0	3512.8	.
2013	Manhattan	3	SOYA - N	156710	130149	83.1	96.3	1	16.5	3512.8	.
2013	Manhattan	3	Untreated Control	132805	116868	88.0	98.0	1	15.7	3567.9	.
2013	Manhattan	3	Foliar F + I	138117	119524	86.5	95.3	1.5	16.9	2825.3	.
2013	Manhattan	3	SOYA - (F+I)	143429	124837	87.0	98.0	1	16.2	3789.8	.
2013	Manhattan	3	F + Insect (I) ST	148741	130149	87.5	97.3	1	15.9	3262.6	.
2013	Manhattan	3	F + I + LCO ST + Foliar LCO	156710	127493	81.4	97.0	1	15.7	4653.0	.
2013	Manhattan	4	Foliar Fert	172646	135461	78.5	95.3	1	16.4	3278.0	.
2013	Manhattan	4	Foliar I	177959	148741	83.6	96.3	1	16.2	3059.5	.
2013	Manhattan	4	SOYA + D	188583	151398	80.3	94.0	1	16.3	3274.2	.
2013	Manhattan	4	F + Insect (I) ST	159366	132805	83.3	99.7	1.5	16.2	3797.4	.
2013	Manhattan	4	Fung (F) Seed Treatment (ST)	148741	132805	89.3	101.3	1	16.0	3375.4	.
2013	Manhattan	4	SOYA - F	151398	127493	84.2	105.7	1.5	15.8	3299.7	.
2013	Manhattan	4	SOYA - (F+I)	108900	90307	82.9	106.0	1	14.5	3429.2	.
2013	Manhattan	4	Foliar F + I	130149	108900	83.7	106.7	1	15.1	3824.2	.
2013	Manhattan	4	Nitrogen (N)	154054	127493	82.8	96.3	1	16.5	3321.5	.
2013	Manhattan	4	F + I + LCO ST + Foliar LCO	183271	154054	84.1	97.3	1.5	16.0	4066.1	.
2013	Manhattan	4	Defoliant	159366	138117	86.7	91.7	1.5	15.8	3339.5	.
2013	Manhattan	4	Untreated Control	124837	111556	89.4	92.3	1	15.3	3510.8	.
2013	Manhattan	4	Foliar Fert	177959	135461	76.1	104.0	1	15.8	4565.6	.
2013	Manhattan	4	SOYA	151398	138117	91.2	106.7	1.5	16.1	3077.3	.
2013	Manhattan	4	Bio-Forge	119524	122180	102.2	102.7	1	15.4	3563.1	.
2013	Manhattan	4	SOYA - N	116868	106244	90.9	102.0	1	15.1	2872.6	.

2013	Rossville	1	Foliar I	156710	154054	98.3	77.3	1	13.8	2274.9	22.22
2013	Rossville	1	Foliar Fert	127493	119524	93.8	73.7	1	13.4	2711.3	1.11
2013	Rossville	1	F + Insect (I) ST	164678	140773	85.5	68.7	1	13.7	2114.1	1.11
2013	Rossville	1	SOYA - N	119524	116868	97.8	76.3	1	13.6	3016.3	0.56
2013	Rossville	1	Foliar Fert	162022	127493	78.7	75.0	1	12.8	1907.8	35.56
2013	Rossville	1	SOYA	108900	90307	82.9	72.0	1	13.3	2372.9	8.89
2013	Rossville	1	SOYA + D	108900	95620	87.8	70.0	1	13.2	3133.6	3.33
2013	Rossville	1	SOYA - (F+I)	122180	103588	84.8	75.3	1	12.8	1932.2	7.78
2013	Rossville	1	Untreated Control	169990	130149	76.6	73.0	1	12.6	1514.4	60.00
2013	Rossville	1	Bio-Forge	146085	116868	80.0	77.7	1	13.0	1835.5	35.56
2013	Rossville	1	Foliar F + I	132805	92963	70.0	76.7	1	13.2	1910.3	44.44
2013	Rossville	1	Nitrogen (N)	183271	132805	72.5	69.3	1	13.1	1500.7	70.00
2013	Rossville	1	F + I + LCO ST + Foliar LCO	140773	114212	81.1	83.0	1	13.8	2369.2	16.67
2013	Rossville	1	SOYA - F	116868	90307	77.3	80.0	1	13.4	2308.9	13.33
2013	Rossville	1	Defoliant	151398	140773	93.0	68.3	1	12.8	2577.6	8.89
2013	Rossville	1	Fung (F) Seed Treatment (ST)	162022	138117	85.2	70.7	1	13.0	1529.3	35.56
2013	Rossville	2	Defoliant	164678	140773	85.5	66.3	1	14.7	2692.1	0.28
2013	Rossville	2	Foliar Fert	169990	130149	76.6	69.0	1	13.6	1596.9	2.22
2013	Rossville	2	SOYA	140773	111556	79.2	73.7	1	15.6	2866.2	0.56
2013	Rossville	2	F + I + LCO ST + Foliar LCO	130149	108900	83.7	70.0	1	13.8	2750.6	1.11
2013	Rossville	2	Foliar Fert	106244	100932	95.0	71.7	1	13.6	1849.9	4.44
2013	Rossville	2	SOYA + D	100932	98276	97.4	64.7	1	15.0	2120.5	3.33
2013	Rossville	2	Bio-Forge	199207	156710	78.7	76.3	1	13.8	502.1	11.11
2013	Rossville	2	SOYA - N	151398	119524	78.9	88.7	1	12.9	2816.7	16.67
2013	Rossville	2	F + Insect (I) ST	159366	122180	76.7	72.7	1	13.1	1891.7	35.56
2013	Rossville	2	Untreated Control	124837	100932	80.9	75.7	1	12.8	1279.2	23.33
2013	Rossville	2	Nitrogen (N)	164678	138117	83.9	78.7	1	14.1	3279.1	26.67
2013	Rossville	2	Fung (F) Seed Treatment (ST)	172646	148741	86.2	84.7	1	12.8	2569.0	13.33
2013	Rossville	2	Foliar I	124837	116868	93.6	78.3	1	12.2	1795.4	33.33
2013	Rossville	2	Foliar F + I	146085	130149	89.1	76.7	1	13.3	1910.7	26.67
2013	Rossville	2	SOYA - F	175302	154054	87.9	85.0	1	14.0	4173.7	26.67
2013	Rossville	2	SOYA - (F+I)	154054	124837	81.0	79.3	1	13.7	2269.8	13.33
2013	Rossville	3	Foliar I	143429	114212	79.6	67.3	1	14.9	2100.4	2.22
2013	Rossville	3	SOYA - N	151398	103588	68.4	67.0	1	14.7	2525.0	4.44
2013	Rossville	3	Defoliant	122180	92963	76.1	64.0	1	15.2	2069.8	3.33
2013	Rossville	3	Foliar Fert	140773	122180	86.8	72.7	1	14.1	2447.5	13.33
2013	Rossville	3	Fung (F) Seed Treatment (ST)	143429	95620	66.7	85.7	1	14.2	2116.5	26.67
2013	Rossville	3	SOYA - (F+I)	154054	95620	62.1	83.7	2	14.6	2936.0	22.22

2013	Rossville	3	F + I + LCO ST + Foliar LCO	100932	90307	89.5	90.3	1	13.6	2751.6	20.00
2013	Rossville	3	Foliar F + I	154054	106244	69.0	86.7	1	13.1	2574.7	20.00
2013	Rossville	3	SOYA - F	140773	127493	90.6	90.7	1.5	14.2	2447.6	16.67
2013	Rossville	3	Nitrogen (N)	143429	114212	79.6	91.0	1	14.7	2848.1	13.33
2013	Rossville	3	Foliar Fert	103588	98276	94.9	91.0	1.5	14.0	2605.8	22.22
2013	Rossville	3	Bio-Forge	111556	98276	88.1	83.0	1	13.4	2162.6	31.11
2013	Rossville	3	Untreated Control	162022	108900	67.2	85.7	1	13.9	2049.8	11.11
2013	Rossville	3	SOYA + D	108900	98276	90.2	77.3	1	14.4	3244.7	6.67
2013	Rossville	3	F + Insect (I) ST	98276	100932	102.7	82.0	1	13.2	2115.3	38.89
2013	Rossville	3	SOYA	111556	84995	76.2	86.7	1	13.9	2566.8	17.78
2013	Rossville	4	SOYA - F	87651	63746	72.7	80.7	1	14.5	2737.6	3.33
2013	Rossville	4	Untreated Control	130149	122180	93.9	80.3	1	13.8	2583.6	15.56
2013	Rossville	4	F + Insect (I) ST	183271	119524	65.2	75.0	1	14.2	2400.6	15.56
2013	Rossville	4	Foliar I	146085	124837	85.5	80.7	1	14.0	3207.4	13.33
2013	Rossville	4	SOYA	119524	82339	68.9	75.7	1	13.9	2681.9	35.56
2013	Rossville	4	Foliar F + I	122180	84995	69.6	83.7	1	13.5	2183.3	38.89
2013	Rossville	4	SOYA + D	108900	84995	78.0	70.0	1	15.9	3387.2	1.11
2013	Rossville	4	Defoliant	164678	127493	77.4	69.7	1	14.1	2728.0	6.67
2013	Rossville	4	Nitrogen (N)	119524	74371	62.2	73.0	1	14.2	1887.4	31.11
2013	Rossville	4	Foliar Fert	151398	114212	75.4	74.7	1	13.9	1964.6	35.56
2013	Rossville	4	Bio-Forge	135461	90307	66.7	79.3	1	13.4	1945.8	23.33
2013	Rossville	4	SOYA - (F+I)	124837	114212	91.5	80.3	1	14.2	2635.3	20.00
2013	Rossville	4	SOYA - N	98276	77027	78.4	83.7	1	14.3	2486.7	26.67
2013	Rossville	4	Fung (F) Seed Treatment (ST)	132805	92963	70.0	76.3	1	13.7	1871.4	35.56
2013	Rossville	4	F + I + LCO ST + Foliar LCO	95620	98276	102.8	83.7	1	13.0	2270.6	20.00
2013	Rossville	4	Foliar Fert	100932	84995	84.2	80.7	1	13.4	2558.0	16.67
2013	Scandia	1	SOYA + D	172646	164678	95.4	80.7	1	.	4225.9	.
2013	Scandia	1	SOYA - (F+I)	164678	177959	108.1	91.3	1	17.0	5042.1	.
2013	Scandia	1	Bio-Forge	180615	162022	89.7	81.0	1	16.2	4993.9	.
2013	Scandia	1	Foliar F + I	169990	167334	98.4	86.7	1	17.1	3653.7	.
2013	Scandia	1	Fung (F) Seed Treatment (ST)	164678	159366	96.8	85.3	1	15.8	4180.3	.
2013	Scandia	1	Nitrogen (N)	127493	124837	97.9	87.7	1	16.6	3377.9	.
2013	Scandia	1	F + I + LCO ST + Foliar LCO	143429	140773	98.1	90.3	1	16.1	4716.3	.
2013	Scandia	1	Untreated Control	159366	143429	90.0	92.0	1	16.5	4556.9	.
2013	Scandia	1	Defoliant	169990	167334	98.4	82.7	1	15.9	4486.0	.
2013	Scandia	1	Foliar Fert	116868	127493	109.1	93.0	1.5	16.6	3129.3	.
2013	Scandia	1	SOYA	151398	156710	103.5	89.0	1	17.3	4372.6	.
2013	Scandia	1	Foliar I	143429	140773	98.1	84.0	1	15.9	4058.7	.

2013	Scandia	1	Foliar Fert	159366	154054	96.7	85.3	1	16.7	4049.7	.
2013	Scandia	1	SOYA - F	119524	114212	95.6	90.0	1.5	16.7	3340.5	.
2013	Scandia	1	F + Insect (I) ST	167334	138117	82.5	97.0	1	16.3	4180.3	.
2013	Scandia	1	SOYA - N	177959	175302	98.5	97.3	1.5	16.5	3709.6	.
2013	Scandia	2	Nitrogen (N)	132805	122180	92.0	84.3	1	16.3	4222.1	.
2013	Scandia	2	Foliar F + I	143429	148741	103.7	89.3	1	16.4	4170.9	.
2013	Scandia	2	Foliar Fert	138117	138117	100.0	85.0	1	16.9	4124.0	.
2013	Scandia	2	Foliar I	119524	111556	93.3	87.0	1	15.7	3198.4	.
2013	Scandia	2	SOYA - (F+I)	148741	146085	98.2	89.0	1	16.8	4114.8	.
2013	Scandia	2	Bio-Forge	127493	130149	102.1	88.3	1	16.2	2933.2	.
2013	Scandia	2	F + Insect (I) ST	135461	127493	94.1	93.0	1	16.5	3680.6	.
2013	Scandia	2	SOYA - F	114212	111556	97.7	101.3	1.5	16.5	4124.3	.
2013	Scandia	2	Defoliant	148741	143429	96.4	78.3	1	15.5	4049.7	.
2013	Scandia	2	Foliar Fert	111556	108900	97.6	87.3	1	16.6	3124.8	.
2013	Scandia	2	Untreated Control	103588	100932	97.4	86.0	1	16.3	4180.3	.
2013	Scandia	2	Fung (F) Seed Treatment (ST)	140773	130149	92.5	90.0	1	16.1	3314.3	.
2013	Scandia	2	SOYA + D	191239	177959	93.1	94.3	1	16.6	3089.6	.
2013	Scandia	2	F + I + LCO ST + Foliar LCO	116868	122180	104.5	97.7	1.5	16.8	3033.4	.
2013	Scandia	2	SOYA	156710	143429	91.5	99.3	1.5	16.8	3232.2	.
2013	Scandia	2	SOYA - N	100932	92963	92.1	101.0	2	16.2	3023.3	.
2013	Scandia	3	SOYA - F	98276	98276	100.0	84.0	1	16.2	3705.5	.
2013	Scandia	3	SOYA	183271	177959	97.1	93.3	1	17.0	2588.3	.
2013	Scandia	3	Fung (F) Seed Treatment (ST)	122180	114212	93.5	82.0	1	15.9	3122.1	.
2013	Scandia	3	SOYA - (F+I)	106157	103576	97.6	84.7	1	16.0	3584.4	.
2013	Scandia	3	F + Insect (I) ST	162022	135461	83.6	90.0	1.5	16.9	4873.8	.
2013	Scandia	3	SOYA - N	172646	180615	104.6	100.3	1.5	16.7	1765.0	.
2013	Scandia	3	SOYA + D	116868	135461	115.9	95.7	1.5	16.6	3643.2	.
2013	Scandia	3	Nitrogen (N)	143429	122180	85.2	98.3	2	15.3	3138.7	.
2013	Scandia	3	Foliar Fert	127493	119524	93.8	84.3	1	16.0	3746.9	.
2013	Scandia	3	Foliar F + I	177959	154054	86.6	94.0	1	17.2	3243.6	.
2013	Scandia	3	Foliar I	140773	124837	88.7	84.7	1	16.4	4039.2	.
2013	Scandia	3	Foliar Fert	138117	132805	96.2	87.3	1	15.8	3115.2	.
2013	Scandia	3	Bio-Forge	132805	130149	98.0	89.7	1.5	.	3726.2	.
2013	Scandia	3	Defoliant	146085	156710	107.3	92.7	1.5	16.7	5053.5	.
2013	Scandia	3	Untreated Control	111556	116868	104.8	95.7	1.5	16.4	3647.3	.
2013	Scandia	3	F + I + LCO ST + Foliar LCO	122180	116868	95.7	97.7	2	14.6	2578.3	.
2013	Scandia	4	Foliar F + I	116868	95620	81.8	84.3	1	16.6	3206.3	.
2013	Scandia	4	Untreated Control	154054	146085	94.8	90.0	1	16.1	3579.1	.

2013	Scandia	4	Nitrogen (N)	132805	122180	92.0	82.0	1	16.2	2987.2	.
2013	Scandia	4	SOYA - N	204520	212488	103.9	92.7	1.5	16.1	3261.7	.
2013	Scandia	4	SOYA + D	127493	116868	91.7	85.0	1.5	16.8	3138.7	.
2013	Scandia	4	Foliar Fert	180615	154054	85.3	95.0	1.5	16.4	3527.2	.
2013	Scandia	4	Foliar I	103588	100932	97.4	89.7	1.5	15.9	2359.3	.
2013	Scandia	4	Fung (F) Seed Treatment (ST)	140773	127493	90.6	94.3	1.5	14.2	3333.0	.
2013	Scandia	4	Defoliant	138117	127493	92.3	81.7	1	15.9	6139.9	.
2013	Scandia	4	SOYA - F	175302	185927	106.1	94.7	1	16.4	3639.1	.
2013	Scandia	4	F + I + LCO ST + Foliar LCO	167334	167334	100.0	78.7	1	16.4	3930.9	.
2013	Scandia	4	F + Insect (I) ST	167334	164678	98.4	80.3	1	16.2	3115.2	.
2013	Scandia	4	Foliar Fert	135461	138117	102.0	79.3	1	16.7	1814.3	.
2013	Scandia	4	Bio-Forge	138117	140773	101.9	88.3	1	15.6	3036.8	.
2013	Scandia	4	SOYA	124837	127493	102.1	95.7	2	15.4	2980.5	.
2013	Scandia	4	SOYA - (F+I)	82339	84995	103.2	92.3	2.5	14.3	3280.5	.
2014	Manhattan	1	F + I + LCO ST + Foliar LCO	154054	140773	91.4	79.0	1	15.7	4189.0	.
2014	Manhattan	1	Defoliant	103588	108900	105.1	77.3	1	15.5	4166.2	.
2014	Manhattan	1	Bio-Forge	106244	122180	115.0	79.3	1	15.6	4504.5	.
2014	Manhattan	1	Foliar Fert	106244	95620	90.0	78.0	1	15.8	3299.6	.
2014	Manhattan	1	Foliar I	162022	140773	86.9	77.0	1	16.0	3229.1	.
2014	Manhattan	1	SOYA + D	138117	132805	96.2	71.3	1	16.1	3273.7	.
2014	Manhattan	1	Foliar F + I	140773	143429	101.9	79.7	1	15.7	3414.0	.
2014	Manhattan	1	Untreated Control	159366	143429	90.0	86.3	1	15.7	4078.3	.
2014	Manhattan	1	SOYA - N	143429	132805	92.6	81.3	1	15.7	4613.5	.
2014	Manhattan	1	Nitrogen (N)	127493	108900	85.4	78.7	1	15.6	3414.7	.
2014	Manhattan	1	F + Insect (I) ST	122180	116868	95.7	80.7	1	15.1	5203.1	.
2014	Manhattan	1	Foliar Fert	138117	127493	92.3	79.0	1	15.4	4314.3	.
2014	Manhattan	1	SOYA - (F+I)	119524	111556	93.3	83.0	1	15.0	4962.4	.
2014	Manhattan	1	SOYA - F	114212	103588	90.7	82.0	1	15.5	3114.3	.
2014	Manhattan	1	Fung (F) Seed Treatment (ST)	114212	108900	95.3	84.7	1	14.4	3210.5	.
2014	Manhattan	1	SOYA	135461	111556	82.4	90.7	1	14.6	2620.5	.
2014	Manhattan	2	Foliar F + I	148741	143429	96.4	89.0	1	16.1	3103.8	.
2014	Manhattan	2	Fung (F) Seed Treatment (ST)	169990	162022	95.3	83.7	1	14.8	3503.5	.
2014	Manhattan	2	SOYA	148741	138117	92.9	86.3	1	14.7	3451.8	.
2014	Manhattan	2	F + Insect (I) ST	124837	122180	97.9	81.0	1	15.0	4004.0	.
2014	Manhattan	2	Untreated Control	130149	108900	83.7	80.3	1	14.8	4610.6	.
2014	Manhattan	2	F + I + LCO ST + Foliar LCO	111556	111556	100.0	84.7	1	14.7	4240.3	.
2014	Manhattan	2	SOYA - (F+I)	143429	130149	90.7	85.7	1	14.4	2932.2	.
2014	Manhattan	2	Bio-Forge	175302	143429	81.8	90.3	1	14.4	3699.1	.

2014	Manhattan	2	Foliar I	132805	122180	92.0	85.0	1	15.6	4305.5	.
2014	Manhattan	2	SOYA - F	111556	103588	92.9	84.3	1	15.4	4975.3	.
2014	Manhattan	2	SOYA + D	127493	116868	91.7	74.0	1	14.9	2684.9	.
2014	Manhattan	2	Foliar Fert	146085	130149	89.1	77.3	1	15.3	3674.5	.
2014	Manhattan	2	SOYA - N	135461	138117	102.0	86.3	1	14.2	3678.6	.
2014	Manhattan	2	Defoliant	127493	119524	93.8	83.7	1	14.4	4277.3	.
2014	Manhattan	2	Nitrogen (N)	127493	108900	85.4	91.0	1	13.7	3944.0	.
2014	Manhattan	2	Foliar Fert	135461	108900	80.4	86.0	1	14.3	4415.5	.
2014	Manhattan	3	F + I + LCO ST + Foliar LCO	138117	130149	94.2	80.3	1	15.5	3588.1	.
2014	Manhattan	3	Foliar Fert	143429	135461	94.4	80.7	1	15.2	4129.2	.
2014	Manhattan	3	Bio-Forge	172646	156710	90.8	81.7	1	15.4	5320.7	.
2014	Manhattan	3	SOYA + D	156710	154054	98.3	80.3	1	15.0	3781.6	.
2014	Manhattan	3	SOYA - F	135461	132805	98.0	87.3	1	15.0	4328.9	.
2014	Manhattan	3	Defoliant	132805	124837	94.0	83.0	1	14.6	3883.0	.
2014	Manhattan	3	Foliar I	148741	140773	94.6	88.3	1	14.2	4406.9	.
2014	Manhattan	3	SOYA - N	122180	130149	106.5	89.3	1	13.6	3972.1	.
2014	Manhattan	3	Foliar Fert	148741	132805	89.3	83.0	1	15.8	2555.3	.
2014	Manhattan	3	SOYA - (F+I)	114212	103588	90.7	81.0	1	15.3	3014.8	.
2014	Manhattan	3	Foliar F + I	124837	116868	93.6	86.3	1	15.8	2969.3	.
2014	Manhattan	3	F + Insect (I) ST	148741	130149	87.5	82.7	1	15.8	3763.1	.
2014	Manhattan	3	Fung (F) Seed Treatment (ST)	119524	122180	102.2	84.3	1	15.6	3921.1	.
2014	Manhattan	3	Untreated Control	148741	138117	92.9	77.0	1	15.6	3344.2	.
2014	Manhattan	3	Nitrogen (N)	151398	140773	93.0	83.3	1	15.3	4143.0	.
2014	Manhattan	3	SOYA	156710	143429	91.5	79.3	1	14.4	4180.0	.
2014	Manhattan	4	Foliar I	162022	159366	98.4	85.3	1	15.3	4745.5	.
2014	Manhattan	4	SOYA	135461	122180	90.2	83.3	1	15.2	4788.0	.
2014	Manhattan	4	SOYA - (F+I)	162022	140773	86.9	87.7	1	15.0	4740.2	.
2014	Manhattan	4	Foliar F + I	124837	130149	104.3	86.0	1	15.2	3247.7	.
2014	Manhattan	4	SOYA - F	106244	111556	105.0	86.0	1	14.4	3192.0	.
2014	Manhattan	4	Untreated Control	130149	122180	93.9	79.7	1	14.6	3466.5	.
2014	Manhattan	4	Bio-Forge	154054	138117	89.7	78.7	1	14.6	2977.8	.
2014	Manhattan	4	SOYA - N	138117	140773	101.9	81.0	1	14.5	2472.8	.
2014	Manhattan	4	Nitrogen (N)	177959	162022	91.0	85.0	1	14.7	5097.7	.
2014	Manhattan	4	Foliar Fert	156710	143429	91.5	81.0	1	14.5	3730.2	.
2014	Manhattan	4	Fung (F) Seed Treatment (ST)	146085	127493	87.3	81.7	1	14.4	3680.6	.
2014	Manhattan	4	SOYA + D	127493	130149	102.1	81.0	1	14.9	4036.6	.
2014	Manhattan	4	Defoliant	159366	159366	100.0	75.3	1	14.1	4393.3	.
2014	Manhattan	4	Foliar Fert	185927	154054	82.9	86.3	1	15.0	2240.5	.

2014	Manhattan	4	F + Insect (I) ST	148741	127493	85.7	77.3	1	15.0	4430.4	.
2014	Manhattan	4	F + I + LCO ST + Foliar LCO	135461	138117	102.0	75.3	1	14.7	4235.5	.
2014	Rossville	1	Nitrogen (N)	66402	63746	96.0	73.7	1	15.2	2051.8	0.00
2014	Rossville	1	Foliar I	77027	74371	96.6	78.0	1	15.1	2889.4	0.56
2014	Rossville	1	Foliar Fert	74371	63746	85.7	72.3	1	15.1	3079.6	0.56
2014	Rossville	1	Foliar Fert	98276	90307	91.9	73.3	1	14.7	3368.9	1.11
2014	Rossville	1	Untreated Control	87651	82339	93.9	82.0	1	15.0	3093.6	0.28
2014	Rossville	1	Defoliant	90307	82339	91.2	82.7	1	14.3	3178.2	0.00
2014	Rossville	1	F + Insect (I) ST	92963	55778	60.0	72.7	1	14.9	2581.4	0.28
2014	Rossville	1	Foliar F + I	77027	79683	103.4	76.0	1	14.3	3171.0	0.56
2014	Rossville	1	SOYA	138117	116868	84.6	76.3	1	15.3	3507.8	0.28
2014	Rossville	1	SOYA - N	95620	84995	88.9	76.7	1	15.0	3702.4	0.83
2014	Rossville	1	SOYA + D	111556	100932	90.5	86.3	1	14.6	3500.5	0.83
2014	Rossville	1	SOYA - (F+I)	79683	82339	103.3	80.7	1	14.7	3383.7	1.11
2014	Rossville	1	Fung (F) Seed Treatment (ST)	92963	63746	68.6	68.3	1	14.6	1908.5	0.00
2014	Rossville	1	F + I + LCO ST + Foliar LCO	84995	69059	81.3	73.3	1	13.8	3145.5	0.56
2014	Rossville	1	Bio-Forge	53122	53122	100.0	72.3	1	15.4	2656.6	0.56
2014	Rossville	1	SOYA - F	79683	66402	83.3	79.0	1	13.5	2750.9	0.28
2014	Rossville	2	F + Insect (I) ST	98276	92963	94.6	80.7	1	15.0	2987.1	0.28
2014	Rossville	2	Bio-Forge	84995	79683	93.8	76.3	1	14.6	3346.1	0.83
2014	Rossville	2	SOYA - (F+I)	90307	79683	88.2	82.3	1	14.6	3497.8	0.83
2014	Rossville	2	SOYA + D	98276	87651	89.2	80.0	1	14.0	3623.1	0.56
2014	Rossville	2	Defoliant	77027	61090	79.3	78.7	1	13.7	2985.8	0.28
2014	Rossville	2	SOYA - F	87651	82339	93.9	85.3	1	14.4	3273.7	2.22
2014	Rossville	2	Untreated Control	108900	98276	90.2	76.7	1	14.2	2846.1	0.28
2014	Rossville	2	Foliar Fert	53122	45154	85.0	78.3	1	14.3	3534.2	0.00
2014	Rossville	2	F + I + LCO ST + Foliar LCO	98276	74371	75.7	80.3	1	13.8	3387.7	0.56
2014	Rossville	2	Fung (F) Seed Treatment (ST)	58434	45154	77.3	73.7	1	13.6	3373.0	0.28
2014	Rossville	2	Foliar I	90307	69059	76.5	81.0	1	13.6	2827.6	1.11
2014	Rossville	2	Nitrogen (N)	95620	82339	86.1	85.0	1	13.0	3787.3	0.83
2014	Rossville	2	SOYA	103588	71715	69.2	78.3	1	14.7	3093.8	0.00
2014	Rossville	2	Foliar Fert	95620	74371	77.8	76.0	1	13.8	2895.6	0.28
2014	Rossville	2	SOYA - N	66402	50466	76.0	79.3	1	13.5	3155.9	0.56
2014	Rossville	2	Foliar F + I	98276	77027	78.4	72.0	1	13.8	3376.5	0.56
2014	Rossville	3	SOYA - (F+I)	50466	37185	73.7	75.3	1	14.0	2763.8	0.00
2014	Rossville	3	Defoliant	66402	34529	52.0	81.3	1	13.4	2930.2	0.83
2014	Rossville	3	Foliar Fert	103588	66402	64.1	79.0	1	14.8	3149.1	0.00
2014	Rossville	3	Bio-Forge	92963	69059	74.3	76.7	1	13.4	3046.3	0.83

2014	Rossville	3	Foliar F + I	87651	66402	75.8	84.3	1	14.3	3288.3	1.11
2014	Rossville	3	Untreated Control	82339	50466	61.3	80.7	1	12.9	3255.3	0.00
2014	Rossville	3	SOYA - F	87651	69059	78.8	82.3	1	14.3	3109.1	0.00
2014	Rossville	3	F + Insect (I) ST	111556	87651	78.6	82.3	1	13.7	3203.9	0.83
2014	Rossville	3	Foliar Fert	114212	79683	69.8	81.0	1	13.6	3353.9	0.56
2014	Rossville	3	F + I + LCO ST + Foliar LCO	92963	74371	80.0	82.0	1	13.2	3980.2	1.11
2014	Rossville	3	SOYA - N	69059	63746	92.3	90.0	1	12.8	3211.1	2.22
2014	Rossville	3	Fung (F) Seed Treatment (ST)	130149	130149	100.0	81.7	1	12.0	3233.2	0.56
2014	Rossville	3	SOYA + D	47810	50466	105.6	81.7	1	13.9	3580.7	0.56
2014	Rossville	3	Nitrogen (N)	84995	66402	78.1	85.7	1	14.2	3799.4	0.56
2014	Rossville	3	Foliar I	106244	92963	87.5	81.3	1	13.0	3346.9	0.83
2014	Rossville	3	SOYA	119524	84995	71.1	87.3	1	13.4	4268.3	0.83
2014	Rossville	4	Bio-Forge	77027	55778	72.4	79.7	1	13.7	3281.0	0.28
2014	Rossville	4	Foliar Fert	74371	58434	78.6	81.7	1	13.3	3974.6	0.83
2014	Rossville	4	Fung (F) Seed Treatment (ST)	108900	71715	65.9	82.0	1	12.9	3369.7	0.56
2014	Rossville	4	Untreated Control	82339	69059	83.9	76.7	1	13.1	3336.1	0.00
2014	Rossville	4	Defoliant	92963	63746	68.6	82.7	1	12.7	3358.5	0.00
2014	Rossville	4	SOYA + D	100932	84995	84.2	88.3	1	13.0	3539.2	0.28
2014	Rossville	4	Foliar F + I	77027	87651	113.8	82.3	1	13.6	3365.5	0.83
2014	Rossville	4	Nitrogen (N)	74371	69059	92.9	80.7	1	12.2	3457.1	0.00
2014	Rossville	4	SOYA - N	82339	92963	112.9	86.0	1	12.2	3797.8	1.67
2014	Rossville	4	F + I + LCO ST + Foliar LCO	92963	71715	77.1	82.3	1	12.9	3255.3	1.67
2014	Rossville	4	SOYA	63746	47810	75.0	89.3	1	13.7	3637.4	0.83
2014	Rossville	4	F + Insect (I) ST	98276	71715	73.0	87.3	1	12.0	3159.3	0.56
2014	Rossville	4	Foliar Fert	69059	58434	84.6	83.7	1	12.8	3089.4	1.11
2014	Rossville	4	SOYA - F	87651	74371	84.8	91.3	1	13.1	3564.3	2.22
2014	Rossville	4	Foliar I	82339	79683	96.8	82.7	1	11.6	3701.4	1.11
2014	Rossville	4	SOYA - (F+I)	82339	61090	74.2	85.7	1	13.1	4016.7	0.83
2014	Scandia	1	Bio-Forge	103588	95620	92.3	88.7	1	14.2	3542.4	.
2014	Scandia	1	Defoliant	138117	135461	98.1	94.0	1	13.4	3277.2	.
2014	Scandia	1	F + I + LCO ST + Foliar LCO	124837	119524	95.7	96.0	1	14.1	3724.1	.
2014	Scandia	1	SOYA - (F+I)	138117	130149	94.2	95.0	1	14.3	4040.0	.
2014	Scandia	1	SOYA + D	183271	177959	97.1	96.0	1	14.4	4643.7	.
2014	Scandia	1	Nitrogen (N)	103588	90307	87.2	86.3	1	13.9	3740.8	.
2014	Scandia	1	Untreated Control	116868	127493	109.1	85.7	1	13.0	2957.8	.
2014	Scandia	1	SOYA - F	138117	114212	82.7	89.0	1	14.2	3918.3	.
2014	Scandia	1	Foliar Fert	103588	84995	82.1	89.7	1	14.2	2402.9	.
2014	Scandia	1	Fung (F) Seed Treatment (ST)	92963	71715	77.1	92.0	1	13.5	3475.8	.

2014	Scandia	1	SOYA - N	119524	116868	97.8	93.0	1	14.4	3682.7	.
2014	Scandia	1	Foliar Fert	135461	130149	96.1	86.7	1	13.4	3690.9	.
2014	Scandia	1	Foliar F + I	143429	143429	100.0	86.7	1	13.8	3765.7	.
2014	Scandia	1	SOYA	172646	169990	98.5	82.7	1	14.4	3541.3	.
2014	Scandia	1	Foliar I	119524	108900	91.1	79.3	1	13.6	2388.8	.
2014	Scandia	1	F + Insect (I) ST	132805	127493	96.0	89.7	1	13.6	4811.1	.
2014	Scandia	2	Nitrogen (N)	127493	108900	85.4	88.7	1	13.8	3224.0	.
2014	Scandia	2	Foliar Fert	124837	100932	80.9	92.0	1	13.6	3131.8	.
2014	Scandia	2	Defoliant	143429	132805	92.6	90.0	1	13.8	3209.9	.
2014	Scandia	2	SOYA - F	143429	127493	88.9	86.0	1	13.9	2996.0	.
2014	Scandia	2	Foliar Fert	130149	122180	93.9	88.0	1	14.2	3915.3	.
2014	Scandia	2	SOYA - N	135461	114212	84.3	92.0	1	13.9	4309.6	.
2014	Scandia	2	Bio-Forge	90307	90307	100.0	83.3	1	13.8	3355.4	.
2014	Scandia	2	SOYA + D	138117	130149	94.2	89.0	1	14.2	4394.4	.
2014	Scandia	2	SOYA - (F+I)	114212	100932	88.4	90.3	1	14.1	3302.0	.
2014	Scandia	2	Foliar I	119524	103588	86.7	92.3	1	13.7	3873.1	.
2014	Scandia	2	Untreated Control	127493	108900	85.4	92.0	1	13.8	3802.8	.
2014	Scandia	2	Fung (F) Seed Treatment (ST)	122180	114212	93.5	88.3	1	13.5	4194.3	.
2014	Scandia	2	SOYA	122180	124837	102.2	97.0	1	14.5	3470.3	.
2014	Scandia	2	F + Insect (I) ST	124837	106244	85.1	94.0	1	13.7	3160.1	.
2014	Scandia	2	Foliar F + I	151398	132805	87.7	84.0	1	13.7	3628.9	.
2014	Scandia	2	F + I + LCO ST + Foliar LCO	169990	148741	87.5	90.7	1	13.8	3666.2	.
2014	Scandia	3	Defoliant	108900	106244	97.6	91.0	1	14.0	3291.7	.
2014	Scandia	3	SOYA - F	95620	84995	88.9	94.3	1	14.2	4324.8	.
2014	Scandia	3	Foliar Fert	130149	111556	85.7	92.7	1	14.8	4130.6	.
2014	Scandia	3	F + I + LCO ST + Foliar LCO	143429	135461	94.4	95.3	1	13.6	4289.4	.
2014	Scandia	3	Foliar Fert	140773	132805	94.3	100.0	1	13.8	3491.4	.
2014	Scandia	3	Untreated Control	100932	111556	110.5	96.3	1	14.0	3409.0	.
2014	Scandia	3	Foliar I	92963	90307	97.1	91.0	1	13.7	3678.6	.
2014	Scandia	3	SOYA + D	177959	154054	86.6	89.7	1	14.1	4786.3	.
2014	Scandia	3	Bio-Forge	132805	111556	84.0	91.7	1	14.1	4195.8	.
2014	Scandia	3	Fung (F) Seed Treatment (ST)	127493	111556	87.5	93.0	1	14.1	4195.8	.
2014	Scandia	3	SOYA - (F+I)	106244	95620	90.0	97.7	1	14.9	4558.7	.
2014	Scandia	3	Foliar F + I	122180	119524	97.8	97.3	1	14.6	4483.9	.
2014	Scandia	3	SOYA - N	175302	154054	87.9	99.0	1	14.2	3990.2	.
2014	Scandia	3	Nitrogen (N)	84995	79683	93.8	92.3	1	14.4	3160.1	.
2014	Scandia	3	SOYA	156710	127493	81.4	88.0	1	14.1	3823.4	.
2014	Scandia	3	F + Insect (I) ST	111556	114212	102.4	91.0	1	13.8	3819.1	.

2014	Scandia	4	Bio-Forge	103588	92963	89.7	92.0	1	14.1	3794.3	.
2014	Scandia	4	SOYA + D	116868	106244	90.9	93.3	1	14.9	3976.8	.
2014	Scandia	4	Foliar Fert	108900	108900	100.0	97.0	1	14.5	3430.0	.
2014	Scandia	4	Fung (F) Seed Treatment (ST)	138117	130149	94.2	95.0	1	13.9	3865.5	.
2014	Scandia	4	F + Insect (I) ST	114212	106244	93.0	97.0	1	14.2	3815.6	.
2014	Scandia	4	Foliar Fert	127493	122180	95.8	94.3	1	14.1	4031.0	.
2014	Scandia	4	Foliar I	111556	103588	92.9	85.0	1	13.2	2929.6	.
2014	Scandia	4	SOYA - (F+I)	154054	156710	101.7	87.3	1	13.8	3748.9	.
2014	Scandia	4	SOYA - F	124837	124837	100.0	94.0	1	14.6	5884.1	.
2014	Scandia	4	SOYA - N	114212	135461	118.6	97.3	1	14.7	4692.4	.
2014	Scandia	4	Defoliant	151398	138117	91.2	98.3	1	14.1	4200.5	.
2014	Scandia	4	Nitrogen (N)	127493	130149	102.1	98.0	1	14.4	3666.0	.
2014	Scandia	4	SOYA	140773	124837	88.7	100.3	1	15.1	4638.6	.
2014	Scandia	4	Foliar F + I	159366	146085	91.7	91.3	1	14.5	3931.5	.
2014	Scandia	4	Untreated Control	124837	119524	95.7	89.3	1	13.6	3351.7	.
2014	Scandia	4	F + I + LCO ST + Foliar LCO	148741	154054	103.6	89.3	1	13.7	4359.8	.

Table A.2 Raw data for variety by input systems experiment conducted at three locations in Kansas during 2012 to 2014.

YR	LOC	REP	VARIETY	INPUT SYSTEM	V2-V3 (plants ha^{-1})	R8 (plants ha^{-1})	SURVIVAL (%)	PODS PLANT^{-1}	PODS M^{-2}
2012	Manhattan	1	P93Y92	UTC	328161	328161	100.0	23.8	782
2012	Manhattan	1	AG4232	SOYA - foliar F	328161	308471	94.0	65.8	2030
2012	Manhattan	1	AG4130	SOYA - foliar F	406919	347851	85.5	39.0	1356
2012	Manhattan	1	P93Y92	SOYA	551310	492241	89.3	31.2	1533
2012	Manhattan	1	AG3431	UTC	413483	380667	92.1	38.2	1452
2012	Manhattan	1	AG4130	UTC	393793	420046	106.7	29.3	1232
2012	Manhattan	1	AG4232	SOYA	439736	433172	98.5	46.0	1992
2012	Manhattan	1	AG4232	UTC	446299	413483	92.6	44.5	1839
2012	Manhattan	1	CH3303R2	SOYA	380667	374103	98.3	23.8	891
2012	Manhattan	1	AG3431	SOYA	498804	420046	84.2	42.0	1763
2012	Manhattan	1	AG4130	SOYA	374103	295345	78.9	46.7	1378
2012	Manhattan	1	P94Y23	UTC	347851	321598	92.5	33.2	1066
2012	Manhattan	1	CH3303R2	SOYA - foliar F	413483	380667	92.1	36.3	1382
2012	Manhattan	1	AG3431	SOYA - foliar F	380667	406919	106.9	28.2	1146
2012	Manhattan	1	P93Y92	SOYA - foliar F	367540	341287	92.9	23.7	807
2012	Manhattan	1	P94Y23	SOYA	393793	406919	103.3	25.8	1051
2012	Manhattan	1	P94Y23	SOYA - foliar F	387230	446299	115.3	28.8	1286
2012	Manhattan	1	CH3303R2	UTC	406919	387230	95.2	14.7	568
2012	Manhattan	2	P93Y92	UTC	380667	288782	75.9	27.7	799
2012	Manhattan	2	AG4130	SOYA - foliar F	301908	288782	95.7	43.7	1260
2012	Manhattan	2	AG4130	UTC	492241	452862	92.0	38.5	1743
2012	Manhattan	2	P94Y23	SOYA	354414	321598	90.7	29.3	943
2012	Manhattan	2	AG3431	SOYA - foliar F	420046	406919	96.9	29.7	1207
2012	Manhattan	2	AG4232	UTC	380667	380667	100.0	39.8	1516
2012	Manhattan	2	AG4232	SOYA - foliar F	413483	459425	111.1	32.3	1485
2012	Manhattan	2	CH3303R2	UTC	393793	308471	78.3	26.2	807
2012	Manhattan	2	CH3303R2	SOYA - foliar F	406919	387230	95.2	17.5	677
2012	Manhattan	2	AG3431	UTC	328161	321598	98.0	24.3	782
2012	Manhattan	2	P94Y23	UTC	354414	301908	85.2	25.2	759
2012	Manhattan	2	AG4130	SOYA	380667	347851	91.4	21.2	736
2012	Manhattan	2	AG4232	SOYA	452862	426609	94.2	17.5	746
2012	Manhattan	2	P93Y92	SOYA	426609	433172	101.5	29.0	1256
2012	Manhattan	2	CH3303R2	SOYA	393793	341287	86.7	51.7	1762
2012	Manhattan	2	P94Y23	SOYA - foliar F	433172	439736	101.5	26.3	1157
2012	Manhattan	2	AG3431	SOYA	393793	367540	93.3	42.0	1543
2012	Manhattan	2	P93Y92	SOYA - foliar F	341287	328161	96.2	31.2	1022
2012	Manhattan	3	P93Y92	SOYA	288782	269092	93.2	30.0	807

2012	Manhattan	3	AG3431	SOYA	288782	288782	100.0	44.3	1280
2012	Manhattan	3	P94Y23	SOYA - foliar F	328161	321598	98.0	32.5	1045
2012	Manhattan	3	AG4130	SOYA	406919	321598	79.0	46.8	1505
2012	Manhattan	3	AG3431	SOYA - foliar F	439736	420046	95.5	49.3	2071
2012	Manhattan	3	AG4232	SOYA	380667	315034	82.8	57.5	1811
2012	Manhattan	3	AG3431	UTC	459425	393793	85.7	30.3	1194
2012	Manhattan	3	AG4130	SOYA - foliar F	498804	525057	105.3	47.5	2493
2012	Manhattan	3	P93Y92	SOYA - foliar F	393793	367540	93.3	41.2	1512
2012	Manhattan	3	CH3303R2	UTC	393793	328161	83.3	33.5	1099
2012	Manhattan	3	CH3303R2	SOYA	380667	301908	79.3	42.0	1267
2012	Manhattan	3	P93Y92	UTC	288782	282218	97.7	37.3	1053
2012	Manhattan	3	CH3303R2	SOYA - foliar F	367540	308471	83.9	39.8	1228
2012	Manhattan	3	P94Y23	UTC	420046	387230	92.2	32.5	1258
2012	Manhattan	3	AG4232	UTC	459425	347851	75.7	34.3	1194
2012	Manhattan	3	AG4232	SOYA - foliar F	479115	465988	97.3	47.5	2212
2012	Manhattan	3	P94Y23	SOYA	380667	347851	91.4	38.2	1327
2012	Manhattan	3	AG4130	UTC	426609	426609	100.0	39.7	1691
2012	Manhattan	4	AG3431	SOYA	347851	321598	92.5	54.8	1763
2012	Manhattan	4	CH3303R2	SOYA	393793	321598	81.7	33.2	1066
2012	Manhattan	4	AG3431	SOYA - foliar F	459425	367540	80.0	35.7	1310
2012	Manhattan	4	AG4130	SOYA	393793	380667	96.7	46.3	1763
2012	Manhattan	4	AG4130	UTC	387230	433172	111.9	35.8	1551
2012	Manhattan	4	AG4232	SOYA	374103	387230	103.5	36.2	1400
2012	Manhattan	4	AG4232	UTC	354414	301908	85.2	40.0	1207
2012	Manhattan	4	P93Y92	SOYA	341287	341287	100.0	48.5	1654
2012	Manhattan	4	P94Y23	SOYA - foliar F	288782	295345	102.3	33.0	974
2012	Manhattan	4	AG4232	SOYA - foliar F	301908	203460	67.4	66.2	1346
2012	Manhattan	4	P93Y92	UTC	498804	367540	73.7	30.7	1127
2012	Manhattan	4	AG4130	SOYA - foliar F	393793	328161	83.3	37.8	1241
2012	Manhattan	4	P93Y92	SOYA - foliar F	393793	374103	95.0	29.3	1097
2012	Manhattan	4	P94Y23	SOYA	413483	472552	114.3	27.7	1307
2012	Manhattan	4	AG3431	UTC	426609	374103	87.7	34.5	1290
2012	Manhattan	4	CH3303R2	UTC	380667	380667	100.0	31.7	1205
2012	Manhattan	4	CH3303R2	SOYA - foliar F	393793	400356	101.7	54.7	2188
2012	Manhattan	4	P94Y23	UTC	360977	315034	87.3	34.3	1081
2012	Rossville	1	CH3303R2	UTC	242839	203460	83.8	53.2	1081
2012	Rossville	1	AG4130	UTC	374103	393793	105.3	64.0	2519
2012	Rossville	1	P93Y92	SOYA	387230	400356	103.4	42.3	1694
2012	Rossville	1	P94Y23	SOYA	334724	420046	125.5	45.5	1910
2012	Rossville	1	AG4232	SOYA	341287	347851	101.9	72.8	2532
2012	Rossville	1	AG4130	SOYA	393793	367540	93.3	53.8	1978
2012	Rossville	1	AG4130	SOYA - foliar F	393793	282218	71.7	75.7	2134
2012	Rossville	1	P94Y23	SOYA - foliar F	295345	262529	88.9	49.3	1295

2012	Rossville	1	CH3303R2	SOYA - foliar F	334724	321598	96.1	39.8	1280
2012	Rossville	1	P93Y92	SOYA - foliar F	367540	288782	78.6	43.5	1256
2012	Rossville	1	AG4232	UTC	400356	406919	101.6	59.2	2406
2012	Rossville	1	P93Y92	UTC	354414	315034	88.9	46.5	1464
2012	Rossville	1	AG3431	SOYA	354414	295345	83.3	35.7	1053
2012	Rossville	1	AG3431	UTC	374103	387230	103.5	50.3	1948
2012	Rossville	1	AG3431	SOYA - foliar F	374103	420046	112.3	46.2	1938
2012	Rossville	1	CH3303R2	SOYA	360977	393793	109.1	46.8	1843
2012	Rossville	1	AG4232	SOYA - foliar F	413483	472552	114.3	70.3	3322
2012	Rossville	1	P94Y23	UTC	328161	328161	100.0	51.0	1673
2012	Rossville	2	P93Y92	UTC	347851	347851	100.0	38.0	1321
2012	Rossville	2	AG4232	UTC	308471	308471	100.0	67.8	2091
2012	Rossville	2	AG3431	UTC	374103	374103	100.0	45.5	1701
2012	Rossville	2	P94Y23	SOYA - foliar F	367540	315034	85.7	35.7	1123
2012	Rossville	2	P93Y92	SOYA - foliar F	465988	426609	91.5	40.3	1720
2012	Rossville	2	CH3303R2	SOYA - foliar F	275655	275655	100.0	49.5	1364
2012	Rossville	2	P93Y92	SOYA	360977	301908	83.6	46.5	1403
2012	Rossville	2	P94Y23	UTC	354414	334724	94.4	44.5	1489
2012	Rossville	2	AG3431	SOYA - foliar F	367540	354414	96.4	44.3	1570
2012	Rossville	2	P94Y23	SOYA	315034	236276	75.0	43.5	1027
2012	Rossville	2	AG4130	SOYA	295345	262529	88.9	58.8	1544
2012	Rossville	2	AG3431	SOYA	374103	354414	94.7	43.2	1529
2012	Rossville	2	AG4130	SOYA - foliar F	288782	262529	90.9	61.5	1614
2012	Rossville	2	AG4130	UTC	380667	426609	112.1	49.2	2096
2012	Rossville	2	CH3303R2	UTC	295345	308471	104.4	45.2	1393
2012	Rossville	2	AG4232	SOYA	321598	282218	87.8	61.8	1744
2012	Rossville	2	CH3303R2	SOYA	354414	341287	96.3	45.7	1558
2012	Rossville	2	AG4232	SOYA - foliar F	387230	393793	101.7	71.2	2801
2012	Rossville	3	CH3303R2	SOYA - foliar F	367540	328161	89.3	37.3	1225
2012	Rossville	3	P93Y92	UTC	380667	387230	101.7	36.7	1419
2012	Rossville	3	CH3303R2	UTC	354414	334724	94.4	40.2	1344
2012	Rossville	3	AG3431	SOYA	420046	492241	117.2	44.8	2206
2012	Rossville	3	AG4130	UTC	413483	426609	103.2	31.8	1357
2012	Rossville	3	P93Y92	SOYA	433172	452862	104.5	36.7	1660
2012	Rossville	3	AG4232	SOYA - foliar F	387230	301908	78.0	62.7	1891
2012	Rossville	3	P93Y92	SOYA - foliar F	452862	472552	104.3	42.0	1984
2012	Rossville	3	AG4130	SOYA	328161	334724	102.0	60.3	2019
2012	Rossville	3	AG4130	SOYA - foliar F	406919	406919	100.0	46.7	1898
2012	Rossville	3	AG4232	UTC	367540	354414	96.4	45.0	1594
2012	Rossville	3	P94Y23	SOYA	367540	354414	96.4	41.5	1470
2012	Rossville	3	AG3431	UTC	380667	374103	98.3	15.7	586
2012	Rossville	3	CH3303R2	SOYA	479115	452862	94.5	46.5	2105
2012	Rossville	3	P94Y23	UTC	374103	315034	84.2	32.8	1034

2012	Rossville	3	AG4232	SOYA	439736	367540	83.6	65.0	2388
2012	Rossville	3	P94Y23	SOYA - foliar F	413483	413483	100.0	31.7	1309
2012	Rossville	3	AG3431	SOYA - foliar F	367540	380667	103.6	33.7	1281
2012	Rossville	4	AG4130	SOYA - foliar F	380667	347851	91.4	72.8	2532
2012	Rossville	4	P93Y92	SOYA	459425	393793	85.7	59.7	2348
2012	Rossville	4	P94Y23	UTC	288782	301908	104.5	45.7	1378
2012	Rossville	4	CH3303R2	SOYA - foliar F	360977	321598	89.1	43.3	1393
2012	Rossville	4	AG4130	SOYA	387230	301908	78.0	70.2	2117
2012	Rossville	4	AG3431	UTC	413483	426609	103.2	46.2	1969
2012	Rossville	4	AG4232	SOYA - foliar F	354414	315034	88.9	55.7	1753
2012	Rossville	4	AG4130	UTC	315034	315034	100.0	59.0	1858
2012	Rossville	4	AG4232	SOYA	288782	249402	86.4	63.5	1583
2012	Rossville	4	P93Y92	UTC	374103	301908	80.7	43.2	1303
2012	Rossville	4	AG3431	SOYA	406919	400356	98.4	46.2	1847
2012	Rossville	4	P94Y23	SOYA	315034	295345	93.8	41.3	1220
2012	Rossville	4	AG4232	UTC	446299	334724	75.0	42.2	1411
2012	Rossville	4	CH3303R2	UTC	354414	400356	113.0	40.0	1601
2012	Rossville	4	AG3431	SOYA - foliar F	400356	393793	98.4	41.5	1633
2012	Rossville	4	P93Y92	SOYA - foliar F	472552	498804	105.6	33.8	1687
2012	Rossville	4	P94Y23	SOYA - foliar F	301908	262529	87.0	43.5	1141
2012	Rossville	4	CH3303R2	SOYA	334724	380667	113.7	43.5	1655
2012	Scandia	1	CH3303R2	UTC	311753	321598	103.2	66.2	2127
2012	Scandia	1	AG4232	UTC	387230	272374	70.3	73.3	1996
2012	Scandia	1	AG4232	SOYA	301908	239557	79.3	79.5	1904
2012	Scandia	1	AG3431	SOYA - foliar F	390511	285500	73.1	81.8	2335
2012	Scandia	1	P94Y23	SOYA	216586	213305	98.5	82.5	1759
2012	Scandia	1	AG4130	SOYA - foliar F	390511	298626	76.5	60.5	1806
2012	Scandia	1	AG4232	SOYA - foliar F	426609	403638	94.6	59.3	2394
2012	Scandia	1	P93Y92	SOYA	531621	469270	88.3	48.8	2290
2012	Scandia	1	CH3303R2	SOYA	334724	328161	98.0	59.0	1935
2012	Scandia	1	P94Y23	UTC	308471	239557	77.7	121.5	2909
2012	Scandia	1	CH3303R2	SOYA - foliar F	360977	298626	82.7	77.5	2313
2012	Scandia	1	AG3431	SOYA	328161	265810	81.0	88.0	2338
2012	Scandia	1	P93Y92	UTC	295345	282218	95.6	55.5	1566
2012	Scandia	1	AG4130	UTC	255965	196897	76.9	62.0	1220
2012	Scandia	1	AG3431	UTC	433172	380667	87.9	59.5	2264
2012	Scandia	1	P93Y92	SOYA - foliar F	400356	387230	96.7	49.3	1909
2012	Scandia	1	AG4130	SOYA	479115	370822	77.4	78.5	2910
2012	Scandia	1	P94Y23	SOYA - foliar F	370822	341287	92.0	47.2	1609
2012	Scandia	2	P94Y23	SOYA - foliar F	341287	269092	78.8	118.0	3174
2012	Scandia	2	AG3431	SOYA - foliar F	354414	331442	93.5	74.0	2451
2012	Scandia	2	AG4232	UTC	364259	282218	77.5	79.7	2247
2012	Scandia	2	CH3303R2	SOYA	357695	357695	100.0	61.2	2187

2012	Scandia	2	P94Y23	UTC	482396	344569	71.4	50.8	1751
2012	Scandia	2	P94Y23	SOYA	377385	393793	104.3	57.7	2270
2012	Scandia	2	AG3431	SOYA	472552	449580	95.1	63.0	2831
2012	Scandia	2	AG4130	SOYA	420046	278937	66.4	63.2	1761
2012	Scandia	2	AG4130	SOYA - foliar F	338006	301908	89.3	65.5	1977
2012	Scandia	2	AG3431	UTC	423328	328161	77.5	69.0	2263
2012	Scandia	2	P93Y92	UTC	344569	305190	88.6	82.2	2506
2012	Scandia	2	P93Y92	SOYA	249402	213305	85.5	110.5	2356
2012	Scandia	2	CH3303R2	SOYA - foliar F	298626	272374	91.2	77.5	2110
2012	Scandia	2	CH3303R2	UTC	541465	354414	65.5	63.5	2249
2012	Scandia	2	AG4232	SOYA - foliar F	525057	370822	70.6	68.7	2545
2012	Scandia	2	AG4232	SOYA	662885	511931	77.2	58.3	2985
2012	Scandia	2	P93Y92	SOYA - foliar F	515213	426609	82.8	58.7	2502
2012	Scandia	2	AG4130	UTC	465988	393793	84.5	63.3	2493
2012	Scandia	3	P94Y23	UTC	423328	331442	78.3	50.8	1684
2012	Scandia	3	AG4130	SOYA - foliar F	354414	259247	73.1	86.0	2228
2012	Scandia	3	P93Y92	SOYA - foliar F	288782	229713	79.5	67.8	1557
2012	Scandia	3	AG4232	SOYA - foliar F	498804	338006	67.8	77.5	2618
2012	Scandia	3	AG3431	SOYA	360977	265810	73.6	76.7	2037
2012	Scandia	3	CH3303R2	SOYA	328161	338006	103.0	70.5	2382
2012	Scandia	3	P93Y92	SOYA	508649	475833	93.5	46.8	2227
2012	Scandia	3	AG4130	SOYA	469270	351132	74.8	53.5	1878
2012	Scandia	3	AG3431	SOYA - foliar F	397075	318316	80.2	60.3	1920
2012	Scandia	3	AG3431	UTC	436454	357695	82.0	50.3	1800
2012	Scandia	3	CH3303R2	UTC	292063	265810	91.0	95.5	2537
2012	Scandia	3	AG4232	UTC	282218	242839	86.0	89.3	2168
2012	Scandia	3	P94Y23	SOYA	360977	315034	87.3	67.3	2120
2012	Scandia	3	AG4130	UTC	443017	370822	83.7	69.5	2576
2012	Scandia	3	AG4232	SOYA	459425	400356	87.1	65.7	2628
2012	Scandia	3	P94Y23	SOYA - foliar F	410201	360977	88.0	49.3	1780
2012	Scandia	3	P93Y92	UTC	515213	416764	80.9	41.2	1715
2012	Scandia	3	CH3303R2	SOYA - foliar F	282218	295345	104.7	83.5	2465
2012	Scandia	4	AG4130	SOYA - foliar F	347851	216586	62.3	77.3	1674
2012	Scandia	4	AG4232	UTC	308471	265810	86.2	75.7	2010
2012	Scandia	4	P93Y92	SOYA	324879	285500	87.9	66.0	1883
2012	Scandia	4	P93Y92	SOYA - foliar F	285500	246121	86.2	87.5	2153
2012	Scandia	4	AG3431	SOYA - foliar F	475833	216586	45.5	84.7	1833
2012	Scandia	4	CH3303R2	SOYA - foliar F	465988	472552	101.4	79.3	3747
2012	Scandia	4	AG4130	SOYA	370822	262529	70.8	54.8	1439
2012	Scandia	4	P93Y92	UTC	475833	397075	83.4	65.0	2580
2012	Scandia	4	P94Y23	SOYA - foliar F	360977	351132	97.3	70.3	2468
2012	Scandia	4	P94Y23	SOYA	370822	206741	55.8	76.0	1570
2012	Scandia	4	AG4232	SOYA	324879	239557	73.7	113.0	2706

2012	Scandia	4	AG3431	UTC	262529	255965	97.5	67.7	1731
2012	Scandia	4	AG3431	SOYA	298626	295345	98.9	113.2	3341
2012	Scandia	4	AG4232	SOYA - foliar F	423328	436454	103.1	46.3	2021
2012	Scandia	4	AG4130	UTC	433172	360977	83.3	59.2	2135
2012	Scandia	4	P94Y23	UTC	351132	311753	88.8	78.5	2446
2012	Scandia	4	CH3303R2	SOYA	443017	416764	94.1	74.8	3117
2012	Scandia	4	CH3303R2	UTC	318316	315034	99.0	71.2	2241
2013	Manhattan	1	AG3431	SOYA - foliar F	308392	301831	97.9	28.2	851
2013	Manhattan	1	AG3431	SOYA	321515	282146	87.8	34.3	967
2013	Manhattan	1	P94Y23	SOYA - foliar F	236215	249338	105.6	29.1	725
2013	Manhattan	1	P93Y92	SOYA	321515	242777	75.5	32.5	789
2013	Manhattan	1	AG4130	SOYA	380569	301831	79.3	26.0	784
2013	Manhattan	1	AG4232	SOYA	367446	334638	91.1	33.7	1127
2013	Manhattan	1	P94Y23	SOYA	354323	295269	83.3	22.2	655
2013	Manhattan	1	CH3303R2	SOYA - foliar F	288708	275585	95.5	20.6	567
2013	Manhattan	1	AG3431	UTC	321515	288708	89.8	28.8	831
2013	Manhattan	1	AG4130	UTC	308392	269023	87.2	31.8	855
2013	Manhattan	1	CH3303R2	UTC	328077	275585	84.0	22.1	609
2013	Manhattan	1	P94Y23	UTC	262461	249338	95.0	35.5	885
2013	Manhattan	1	CH3303R2	SOYA	374008	308392	82.5	19.5	601
2013	Manhattan	1	P93Y92	UTC	374008	367446	98.2	34.6	1271
2013	Manhattan	1	AG4232	UTC	314954	242777	77.1	33.8	820
2013	Manhattan	1	P93Y92	SOYA - foliar F	288708	275585	95.5	27.6	760
2013	Manhattan	1	AG4232	SOYA - foliar F	413377	380569	92.1	39.4	1499
2013	Manhattan	1	AG4130	SOYA - foliar F	295269	269023	91.1	32.4	871
2013	Manhattan	2	CH3303R2	SOYA	406815	314954	77.4	30.2	951
2013	Manhattan	2	AG4130	UTC	328077	308392	94.0	31.6	974
2013	Manhattan	2	AG4130	SOYA - foliar F	419938	393692	93.8	27.2	1070
2013	Manhattan	2	CH3303R2	UTC	360885	308392	85.5	37.2	1147
2013	Manhattan	2	AG4232	SOYA	367446	328077	89.3	38.9	1276
2013	Manhattan	2	P94Y23	SOYA	308392	288708	93.6	35.9	1036
2013	Manhattan	2	CH3303R2	SOYA - foliar F	314954	314954	100.0	24.2	762
2013	Manhattan	2	AG3431	UTC	295269	249338	84.4	36.2	902
2013	Manhattan	2	P93Y92	SOYA - foliar F	301831	301831	100.0	32.0	965
2013	Manhattan	2	P94Y23	UTC	308392	295269	95.7	30.2	891
2013	Manhattan	2	P94Y23	SOYA - foliar F	203408	196846	96.8	33.2	653
2013	Manhattan	2	AG4130	SOYA	334638	347761	103.9	28.0	973
2013	Manhattan	2	P93Y92	SOYA	236215	229654	97.2	36.4	836
2013	Manhattan	2	AG3431	SOYA	328077	314954	96.0	35.3	1111
2013	Manhattan	2	AG4232	SOYA - foliar F	.	.	.	.	.
2013	Manhattan	2	P93Y92	UTC	301831	282146	93.5	30.5	860
2013	Manhattan	2	AG4232	UTC	308392	249338	80.9	46.7	1164
2013	Manhattan	2	AG3431	SOYA - foliar F	301831	295269	97.8	29.0	856

2013	Manhattan	3	CH3303R2	UTC	367446	334638	91.1	32.8	1097
2013	Manhattan	3	AG4130	SOYA	360885	334638	92.7	32.5	1087
2013	Manhattan	3	AG3431	SOYA	328077	308392	94.0	26.1	805
2013	Manhattan	3	AG3431	UTC	360885	341200	94.5	25.5	870
2013	Manhattan	3	AG3431	SOYA - foliar F	485554	413377	85.1	24.7	1021
2013	Manhattan	3	P94Y23	SOYA	249338	249338	100.0	27.3	680
2013	Manhattan	3	P94Y23	UTC	223092	203408	91.2	38.7	787
2013	Manhattan	3	AG4130	SOYA - foliar F	314954	314954	100.0	29.2	919
2013	Manhattan	3	CH3303R2	SOYA	459308	387131	84.3	33.7	1304
2013	Manhattan	3	AG4232	UTC	406815	380569	93.5	44.1	1677
2013	Manhattan	3	P93Y92	SOYA	328077	341200	104.0	29.0	989
2013	Manhattan	3	AG4232	SOYA	341200	308392	90.4	30.6	943
2013	Manhattan	3	AG4130	UTC	367446	328077	89.3	24.0	787
2013	Manhattan	3	P93Y92	SOYA - foliar F	.	.	.	.	.
2013	Manhattan	3	CH3303R2	SOYA - foliar F	446185	439623	98.5	24.0	1055
2013	Manhattan	3	AG4232	SOYA - foliar F	282146	269023	95.3	35.0	941
2013	Manhattan	3	P94Y23	SOYA - foliar F	301831	262461	87.0	20.3	533
2013	Manhattan	3	P93Y92	UTC	334638	301831	90.2	26.0	784
2013	Manhattan	4	AG3431	SOYA	406815	360885	88.7	26.4	952
2013	Manhattan	4	AG3431	SOYA - foliar F	301831	288708	95.7	31.6	912
2013	Manhattan	4	AG4130	SOYA	321515	262461	81.6	30.0	787
2013	Manhattan	4	AG4232	SOYA	308392	301831	97.9	47.9	1445
2013	Manhattan	4	P93Y92	SOYA	269023	255900	95.1	30.4	778
2013	Manhattan	4	P93Y92	SOYA - foliar F	413377	367446	88.9	28.2	1036
2013	Manhattan	4	CH3303R2	SOYA	380569	314954	82.8	32.0	1007
2013	Manhattan	4	P94Y23	SOYA	347761	321515	92.5	39.8	1279
2013	Manhattan	4	P94Y23	SOYA - foliar F	308392	314954	102.1	27.5	866
2013	Manhattan	4	AG4232	SOYA - foliar F	262461	269023	102.5	54.4	1463
2013	Manhattan	4	CH3303R2	SOYA - foliar F	446185	393692	88.2	25.3	996
2013	Manhattan	4	AG4130	SOYA - foliar F	374008	360885	96.5	29.8	1075
2013	Manhattan	4	AG3431	UTC	216531	223092	103.0	32.4	722
2013	Manhattan	4	AG4130	UTC	347761	308392	88.7	45.7	1409
2013	Manhattan	4	CH3303R2	UTC	413377	400254	96.8	37.8	1512
2013	Manhattan	4	P93Y92	UTC	301831	262461	87.0	24.4	640
2013	Manhattan	4	P94Y23	UTC	183723	190285	103.6	27.0	514
2013	Manhattan	4	AG4232	UTC	446185	367446	82.4	47.4	1741
2013	Rossville	1	AG4232	SOYA	452746	242777	53.6	45.4	1102
2013	Rossville	1	AG4232	SOYA - foliar F	472431	255900	54.2	61.3	1568
2013	Rossville	1	CH3303R2	SOYA - foliar F	380569	321515	84.5	40.5	1301
2013	Rossville	1	P94Y23	SOYA - foliar F	249338	203408	81.6	44.1	897
2013	Rossville	1	P94Y23	UTC	406815	347761	85.5	29.0	1008
2013	Rossville	1	AG3431	SOYA - foliar F	406815	347761	85.5	28.7	998
2013	Rossville	1	AG4130	SOYA	360885	314954	87.3	37.4	1177

2013	Rossville	1	AG4130	SOYA - foliar F	308392	288708	93.6	40.2	1160
2013	Rossville	1	AG3431	SOYA	334638	360885	107.8	39.0	1407
2013	Rossville	1	AG4130	UTC	367446	341200	92.9	40.0	1364
2013	Rossville	1	P93Y92	SOYA	465869	308392	66.2	27.4	845
2013	Rossville	1	CH3303R2	SOYA	360885	216531	60.0	41.1	890
2013	Rossville	1	P93Y92	UTC	446185	183723	41.2	32.7	600
2013	Rossville	1	P93Y92	SOYA - foliar F	400254	380569	95.1	37.1	1411
2013	Rossville	1	AG4232	UTC	400254	295269	73.8	43.4	1281
2013	Rossville	1	CH3303R2	UTC	328077	255900	78.0	34.6	885
2013	Rossville	1	P94Y23	SOYA	314954	236215	75.0	32.9	777
2013	Rossville	1	AG3431	UTC	400254	314954	78.7	34.1	1073
2013	Rossville	2	AG3431	UTC	354323	249338	70.4	33.1	825
2013	Rossville	2	P93Y92	SOYA - foliar F	393692	308392	78.3	31.0	956
2013	Rossville	2	AG3431	SOYA	393692	255900	65.0	26.4	675
2013	Rossville	2	AG4130	UTC	603661	459308	76.1	27.1	1244
2013	Rossville	2	P94Y23	SOYA - foliar F	249338	229654	92.1	34.2	785
2013	Rossville	2	AG4130	SOYA - foliar F	360885	301831	83.6	28.9	872
2013	Rossville	2	CH3303R2	UTC	341200	347761	101.9	35.8	1244
2013	Rossville	2	P93Y92	SOYA	347761	262461	75.5	40.4	1060
2013	Rossville	2	P94Y23	SOYA	314954	249338	79.2	29.5	735
2013	Rossville	2	CH3303R2	SOYA	354323	269023	75.9	32.0	860
2013	Rossville	2	P94Y23	UTC	518361	334638	64.6	28.6	957
2013	Rossville	2	AG4232	SOYA - foliar F	328077	209969	64.0	41.5	871
2013	Rossville	2	CH3303R2	SOYA - foliar F	400254	328077	82.0	30.5	1000
2013	Rossville	2	AG4232	SOYA	393692	223092	56.7	43.2	963
2013	Rossville	2	AG4130	SOYA	544608	275585	50.6	34.4	948
2013	Rossville	2	AG3431	SOYA - foliar F	387131	262461	67.8	31.9	837
2013	Rossville	2	P93Y92	UTC	406815	374008	91.9	38.2	1428
2013	Rossville	2	AG4232	UTC	406815	269023	66.1	38.5	1035
2013	Rossville	3	AG4130	SOYA	341200	242777	71.2	32.3	784
2013	Rossville	3	AG4130	UTC	446185	308392	69.1	38.5	1187
2013	Rossville	3	AG3431	SOYA	492115	380569	77.3	32.7	1244
2013	Rossville	3	AG4232	SOYA	354323	328077	92.6	59.3	1945
2013	Rossville	3	CH3303R2	SOYA - foliar F	459308	321515	70.0	40.3	1295
2013	Rossville	3	AG3431	UTC	334638	288708	86.3	42.8	1235
2013	Rossville	3	AG4232	SOYA - foliar F	380569	236215	62.1	47.7	1126
2013	Rossville	3	CH3303R2	SOYA	472431	538046	113.9	30.6	1646
2013	Rossville	3	P93Y92	UTC	400254	321515	80.3	33.1	1064
2013	Rossville	3	P93Y92	SOYA - foliar F	439623	341200	77.6	37.5	1279
2013	Rossville	3	CH3303R2	UTC	328077	249338	76.0	41.5	1034
2013	Rossville	3	P94Y23	UTC	269023	255900	95.1	36.9	944
2013	Rossville	3	AG3431	SOYA - foliar F	314954	249338	79.2	37.2	927
2013	Rossville	3	AG4232	UTC	446185	314954	70.6	37.5	1180

2013	Rossville	3	P94Y23	SOYA	301831	288708	95.7	34.7	1001
2013	Rossville	3	P93Y92	SOYA	400254	341200	85.2	29.7	1013
2013	Rossville	3	AG4130	SOYA - foliar F	374008	334638	89.5	40.0	1338
2013	Rossville	3	P94Y23	SOYA - foliar F	275585	249338	90.5	40.6	1012
2013	Rossville	4	CH3303R2	SOYA - foliar F	374008	229654	61.4	44.3	1017
2013	Rossville	4	P94Y23	SOYA	314954	262461	83.3	37.4	981
2013	Rossville	4	P94Y23	SOYA - foliar F	419938	288708	68.8	43.6	1258
2013	Rossville	4	P93Y92	UTC	328077	249338	76.0	35.3	880
2013	Rossville	4	P93Y92	SOYA - foliar F	347761	.	.	26.8	.
2013	Rossville	4	P93Y92	SOYA	406815	321515	79.0	31.4	1009
2013	Rossville	4	AG4232	SOYA - foliar F	347761	269023	77.4	32.1	863
2013	Rossville	4	AG4130	SOYA	262461	216531	82.5	40.0	866
2013	Rossville	4	AG4130	UTC	511800	367446	71.8	43.5	1598
2013	Rossville	4	AG3431	UTC	354323	295269	83.3	34.2	1009
2013	Rossville	4	CH3303R2	UTC	518361	321515	62.0	33.5	1077
2013	Rossville	4	AG3431	SOYA - foliar F	314954	275585	87.5	35.6	981
2013	Rossville	4	AG4232	UTC	426500	328077	76.9	57.1	1872
2013	Rossville	4	AG4232	SOYA	393692	314954	80.0	40.9	1288
2013	Rossville	4	AG3431	SOYA	478992	328077	68.5	34.1	1118
2013	Rossville	4	P94Y23	UTC	295269	328077	111.1	50.4	1653
2013	Rossville	4	AG4130	SOYA - foliar F	295269	229654	77.8	40.8	937
2013	Rossville	4	CH3303R2	SOYA	275585	249338	90.5	39.6	987
2013	Scandia	1	AG4130	SOYA	288708	288708	100.0	33.5	967
2013	Scandia	1	AG4232	SOYA - foliar F	511800	439623	85.9	28.4	1248
2013	Scandia	1	CH3303R2	SOYA - foliar F	433061	400254	92.4	24.6	984
2013	Scandia	1	AG4130	SOYA - foliar F	328077	288708	88.0	39.6	1143
2013	Scandia	1	P93Y92	SOYA - foliar F	498677	413377	82.9	28.6	1182
2013	Scandia	1	P94Y23	UTC	275585	282146	102.4	36.1	1018
2013	Scandia	1	CH3303R2	SOYA	314954	321515	102.1	35.2	1131
2013	Scandia	1	AG4232	SOYA	551169	452746	82.1	30.0	1358
2013	Scandia	1	CH3303R2	UTC	380569	360885	94.8	33.5	1208
2013	Scandia	1	AG4232	UTC	380569	380569	100.0	28.8	1096
2013	Scandia	1	AG4130	UTC	367446	419938	114.3	21.0	881
2013	Scandia	1	AG3431	SOYA	538046	597100	111.0	15.9	949
2013	Scandia	1	P94Y23	SOYA - foliar F	328077	314954	96.0	21.0	661
2013	Scandia	1	AG3431	SOYA - foliar F	406815	400254	98.4	24.5	980
2013	Scandia	1	P93Y92	SOYA	236215	242777	102.8	27.0	655
2013	Scandia	1	P94Y23	SOYA	433061	498677	115.2	26.6	1326
2013	Scandia	1	AG3431	UTC	354323	367446	103.7	25.3	929
2013	Scandia	1	P93Y92	UTC	524923	472431	90.0	29.6	1398
2013	Scandia	2	AG4130	SOYA	334638	334638	100.0	23.6	789
2013	Scandia	2	AG4130	UTC	439623	478992	109.0	20.8	996
2013	Scandia	2	AG4232	SOYA - foliar F	387131	393692	101.7	16.2	637

2013	Scandia	2	P94Y23	SOYA	393692	360885	91.7	15.8	570
2013	Scandia	2	CH3303R2	SOYA	367446	380569	103.6	18.8	715
2013	Scandia	2	CH3303R2	SOYA - foliar F	413377	393692	95.2	28.7	1129
2013	Scandia	2	P93Y92	SOYA - foliar F	472431	452746	95.8	18.5	837
2013	Scandia	2	AG4232	SOYA	321515	314954	98.0	35.7	1124
2013	Scandia	2	AG3431	UTC	308392	288708	93.6	25.3	730
2013	Scandia	2	AG4232	UTC	328077	314954	96.0	30.4	957
2013	Scandia	2	AG4130	SOYA - foliar F	308392	301831	97.9	20.4	615
2013	Scandia	2	P93Y92	UTC	360885	374008	103.6	23.8	890
2013	Scandia	2	P93Y92	SOYA	439623	374008	85.1	21.4	800
2013	Scandia	2	P94Y23	UTC	452746	452746	100.0	16.3	738
2013	Scandia	2	CH3303R2	UTC	400254	387131	96.7	27.8	1076
2013	Scandia	2	AG3431	SOYA	406815	380569	93.5	31.3	1191
2013	Scandia	2	AG3431	SOYA - foliar F	301831	282146	93.5	28.0	790
2013	Scandia	2	P94Y23	SOYA - foliar F	354323	282146	79.6	27.3	770
2013	Scandia	3	CH3303R2	UTC	269023	282146	104.9	32.3	911
2013	Scandia	3	CH3303R2	SOYA - foliar F	433061	472431	109.1	23.1	1091
2013	Scandia	3	AG4232	SOYA - foliar F	387131	393692	101.7	22.0	866
2013	Scandia	3	P93Y92	SOYA - foliar F	459308	452746	98.6	18.1	819
2013	Scandia	3	AG3431	UTC	426500	419938	98.5	20.7	869
2013	Scandia	3	P93Y92	UTC	511800	538046	105.1	18.8	1011
2013	Scandia	3	CH3303R2	SOYA	387131	393692	101.7	25.1	988
2013	Scandia	3	P94Y23	SOYA - foliar F	255900	249338	97.4	32.4	807
2013	Scandia	3	AG4130	SOYA - foliar F	321515	321515	100.0	28.5	916
2013	Scandia	3	AG4232	SOYA	295269	308392	104.4	34.8	1073
2013	Scandia	3	AG4130	SOYA	262461	262461	100.0	39.4	1034
2013	Scandia	3	AG3431	SOYA	387131	406815	105.1	20.3	825
2013	Scandia	3	AG4130	UTC	347761	367446	105.7	28.1	1032
2013	Scandia	3	P94Y23	SOYA	334638	354323	105.9	21.9	776
2013	Scandia	3	P93Y92	SOYA	196846	203408	103.3	33.8	687
2013	Scandia	3	P94Y23	UTC	387131	347761	89.8	32.6	1133
2013	Scandia	3	AG3431	SOYA - foliar F	446185	439623	98.5	21.9	962
2013	Scandia	3	AG4232	UTC	249338	262461	105.3	46.3	1215
2013	Scandia	4	AG4130	SOYA - foliar F	269023	262461	97.6	36.9	968
2013	Scandia	4	AG4130	UTC	393692	367446	93.3	29.0	1065
2013	Scandia	4	P94Y23	SOYA	328077	301831	92.0	19.2	579
2013	Scandia	4	AG3431	UTC	354323	393692	111.1	26.8	1055
2013	Scandia	4	AG3431	SOYA	413377	387131	93.7	28.6	1107
2013	Scandia	4	CH3303R2	SOYA	465869	426500	91.5	26.6	1134
2013	Scandia	4	P93Y92	SOYA	367446	360885	98.2	21.6	779
2013	Scandia	4	P94Y23	SOYA - foliar F	419938	413377	98.4	23.4	967
2013	Scandia	4	AG4232	UTC	321515	295269	91.8	37.1	1095
2013	Scandia	4	AG4232	SOYA - foliar F	341200	360885	105.8	41.1	1483

2013	Scandia	4	P93Y92	UTC	465869	465869	100.0	25.7	1197
2013	Scandia	4	AG4232	SOYA	374008	393692	105.3	34.0	1338
2013	Scandia	4	CH3303R2	SOYA - foliar F	446185	433061	97.1	23.8	1030
2013	Scandia	4	P93Y92	SOYA - foliar F	452746	413377	91.3	26.8	1107
2013	Scandia	4	CH3303R2	UTC	288708	301831	104.5	29.8	899
2013	Scandia	4	P94Y23	UTC	314954	262461	83.3	34.3	900
2013	Scandia	4	AG4130	SOYA	288708	269023	93.2	35.1	944
2013	Scandia	4	AG3431	SOYA - foliar F	374008	367446	98.2	34.0	1249
2014	Manhattan	1	P93Y92	SOYA	321499	354306	110.2	32.0	1133
2014	Manhattan	1	AG4033	SOYA - foliar F	426480	314938	73.8	34.0	1070
2014	Manhattan	1	AG4033	SOYA	308378	314938	102.1	42.6	1341
2014	Manhattan	1	P94Y23	SOYA - foliar F	373988	419918	112.3	28.3	1188
2014	Manhattan	1	AG4033	SOYA - foliar F	354307	400234	113.0	28.3	1132
2014	Manhattan	1	AG4232	UTC	373988	347744	93.0	40.1	1394
2014	Manhattan	1	P93Y92	SOYA - foliar F	321499	295255	91.8	32.1	947
2014	Manhattan	1	AG4232	UTC	288694	373989	129.5	39.0	1458
2014	Manhattan	1	P93Y92	SOYA	393672	387112	98.3	23.3	902
2014	Manhattan	1	AG3431	UTC	439601	439602	100.0	31.4	1380
2014	Manhattan	1	AG3431	UTC	341183	334622	98.1	33.2	1110
2014	Manhattan	1	CH3303R2	SOYA	413356	413357	100.0	36.4	1504
2014	Manhattan	1	P94Y23	SOYA - foliar F	367428	393673	107.1	39.7	1562
2014	Manhattan	1	AG4232	UTC	419917	387112	92.2	41.4	1602
2014	Manhattan	1	AG3431	UTC	288694	269010	93.2	33.5	901
2014	Manhattan	1	CH3303R2	SOYA - foliar F	439601	393673	89.6	25.7	1011
2014	Manhattan	1	CH3303R2	SOYA	341183	400234	117.3	28.3	1132
2014	Manhattan	1	P94Y23	SOYA	347744	360867	103.8	24.9	898
2014	Manhattan	2	CH3303R2	SOYA	334623	347744	103.9	32.3	1123
2014	Manhattan	2	P94Y23	SOYA	465845	393673	84.5	31.4	1236
2014	Manhattan	2	P93Y92	SOYA	301815	282132	93.5	37.4	1055
2014	Manhattan	2	AG3431	UTC	400235	347744	86.9	48.3	1679
2014	Manhattan	2	P93Y92	SOYA	452724	413357	91.3	33.0	1363
2014	Manhattan	2	AG4232	UTC	360867	321500	89.1	40.8	1311
2014	Manhattan	2	CH3303R2	SOYA	321499	328061	102.0	33.3	1092
2014	Manhattan	2	AG3431	UTC	308378	334622	108.5	38.5	1288
2014	Manhattan	2	AG4232	UTC	400235	334622	83.6	32.0	1070
2014	Manhattan	2	AG4033	SOYA - foliar F	459285	406795	88.6	38.8	1578
2014	Manhattan	2	AG4033	SOYA	328060	301816	92.0	47.0	1418
2014	Manhattan	2	AG3431	UTC	413356	439602	106.3	33.6	1476
2014	Manhattan	2	CH3303R2	SOYA - foliar F	360867	373989	103.6	38.8	1450
2014	Manhattan	2	AG4232	UTC	314939	314938	100.0	39.1	1231
2014	Manhattan	2	P93Y92	SOYA - foliar F	282131	288694	102.3	34.7	1001
2014	Manhattan	2	AG4033	SOYA - foliar F	400235	367428	91.8	35.1	1289
2014	Manhattan	2	P94Y23	SOYA - foliar F	321499	341183	106.1	29.9	1020

2014	Manhattan	2	P94Y23	SOYA - foliar F	347744	373989	107.5	27.2	1017
2014	Manhattan	3	AG4033	SOYA - foliar F	354307	334622	94.4	42.0	1405
2014	Manhattan	3	AG4232	UTC	400235	308377	77.0	39.4	1214
2014	Manhattan	3	P93Y92	SOYA	269010	262449	97.6	38.5	1010
2014	Manhattan	3	CH3303R2	SOYA - foliar F	373988	347744	93.0	33.7	1171
2014	Manhattan	3	AG4232	UTC	282131	295255	104.7	37.6	1110
2014	Manhattan	3	P94Y23	SOYA - foliar F	288694	328061	113.6	31.7	1039
2014	Manhattan	3	AG3431	UTC	413356	446163	107.9	32.4	1445
2014	Manhattan	3	CH3303R2	SOYA	446164	400234	89.7	30.4	1216
2014	Manhattan	3	AG4232	UTC	380551	354306	93.1	33.3	1179
2014	Manhattan	3	AG4033	SOYA - foliar F	446164	406795	91.2	34.5	1403
2014	Manhattan	3	AG3431	UTC	367428	354306	96.4	34.3	1215
2014	Manhattan	3	AG3431	UTC	511774	472408	92.3	31.7	1497
2014	Manhattan	3	P93Y92	SOYA	367428	334622	91.1	34.8	1164
2014	Manhattan	3	P93Y92	SOYA - foliar F	334623	288694	86.3	29.9	863
2014	Manhattan	3	AG4033	SOYA	373988	380551	101.8	32.2	1225
2014	Manhattan	3	P94Y23	SOYA - foliar F	367428	334622	91.1	33.8	1130
2014	Manhattan	3	P94Y23	SOYA	321499	328061	102.0	34.6	1135
2014	Manhattan	3	CH3303R2	SOYA	295255	249326	84.4	27.0	673
2014	Manhattan	4	AG4033	SOYA	413356	373989	90.5	40.1	1499
2014	Manhattan	4	P94Y23	SOYA	380551	341183	89.7	29.2	996
2014	Manhattan	4	AG4232	UTC	347744	328061	94.3	35.4	1161
2014	Manhattan	4	AG4033	SOYA - foliar F	393672	373989	95.0	33.8	1263
2014	Manhattan	4	CH3303R2	SOYA - foliar F	360867	354306	98.2	32.0	1133
2014	Manhattan	4	P93Y92	SOYA - foliar F	341183	321500	94.2	32.0	1028
2014	Manhattan	4	AG3431	UTC	321499	321500	100.0	30.8	990
2014	Manhattan	4	P93Y92	SOYA	354307	321500	90.7	33.1	1064
2014	Manhattan	4	AG4033	SOYA - foliar F	334623	301816	90.2	42.8	1291
2014	Manhattan	4	AG3431	UTC	511774	452724	88.5	26.3	1190
2014	Manhattan	4	P94Y23	SOYA - foliar F	334623	334622	100.0	24.2	809
2014	Manhattan	4	CH3303R2	SOYA	426480	413357	96.9	27.5	1136
2014	Manhattan	4	P93Y92	SOYA	341183	314938	92.3	33.8	1064
2014	Manhattan	4	AG4232	UTC	406796	419918	103.2	32.9	1381
2014	Manhattan	4	CH3303R2	SOYA	308378	301816	97.9	30.6	923
2014	Manhattan	4	AG3431	UTC	373988	328061	87.7	37.2	1220
2014	Manhattan	4	P94Y23	SOYA - foliar F	308378	328061	106.4	35.3	1157
2014	Manhattan	4	AG4232	UTC	328060	314938	96.0	45.4	1429
2014	Rossville	1	P93Y92	SOYA	255887	236276	92.3	62.0	1464
2014	Rossville	1	AG4232	UTC	387112	341287	88.2	60.9	2077
2014	Rossville	1	AG4033	SOYA - foliar F	236203	275655	116.7	50.7	1397
2014	Rossville	1	AG4033	SOYA	229642	190333	82.9	57.1	1086
2014	Rossville	1	P93Y92	SOYA	249326	229713	92.1	58.1	1334
2014	Rossville	1	CH3303R2	SOYA - foliar F	321499	354414	110.2	51.4	1821

2014	Rossville	1	P94Y23	SOYA - foliar F	229642	216586	94.3	36.6	792
2014	Rossville	1	P93Y92	SOYA - foliar F	216521	170644	78.8	41.8	713
2014	Rossville	1	CH3303R2	SOYA	170590	131264	76.9	52.9	694
2014	Rossville	1	AG4033	SOYA - foliar F	295255	216586	73.4	54.4	1178
2014	Rossville	1	AG4232	UTC	229642	216586	94.3	51.6	1117
2014	Rossville	1	AG4232	UTC	255887	190333	74.4	46.6	887
2014	Rossville	1	CH3303R2	SOYA	170590	131264	76.9	57.6	756
2014	Rossville	1	P94Y23	SOYA - foliar F	249326	269092	107.9	48.8	1313
2014	Rossville	1	P94Y23	SOYA	229642	183770	80.0	63.1	1159
2014	Rossville	1	AG3431	UTC	282131	203460	72.1	37.0	752
2014	Rossville	1	AG3431	UTC	223082	157517	70.6	39.5	622
2014	Rossville	1	AG3431	UTC	334623	295345	88.3	34.0	1004
2014	Rossville	2	AG3431	UTC	288694	301908	104.6	41.4	1249
2014	Rossville	2	CH3303R2	SOYA	321499	301908	93.9	35.9	1083
2014	Rossville	2	P94Y23	SOYA - foliar F	177153	164080	92.6	63.0	1033
2014	Rossville	2	AG4033	SOYA - foliar F	295255	315034	106.7	42.1	1326
2014	Rossville	2	AG4033	SOYA	236203	190333	80.6	40.3	767
2014	Rossville	2	P93Y92	SOYA	341183	334724	98.1	27.5	920
2014	Rossville	2	P93Y92	SOYA	282131	229713	81.4	54.9	1261
2014	Rossville	2	AG4232	UTC	255887	177207	69.3	37.0	655
2014	Rossville	2	AG4232	UTC	216521	183770	84.9	49.1	902
2014	Rossville	2	AG4033	SOYA - foliar F	137785	98448	71.5	45.4	447
2014	Rossville	2	CH3303R2	SOYA - foliar F	216521	210023	97.0	48.0	1008
2014	Rossville	2	P94Y23	SOYA - foliar F	282131	210023	74.4	38.9	817
2014	Rossville	2	AG3431	UTC	249326	183770	73.7	38.3	703
2014	Rossville	2	P94Y23	SOYA	328060	183770	56.0	37.4	687
2014	Rossville	2	AG3431	UTC	308378	223149	72.4	43.3	966
2014	Rossville	2	CH3303R2	SOYA	196837	157517	80.0	42.1	663
2014	Rossville	2	P93Y92	SOYA - foliar F	229642	190333	82.9	49.4	940
2014	Rossville	2	AG4232	UTC	242766	275655	113.5	36.6	1008
2014	Rossville	3	AG4033	SOYA - foliar F	242766	229713	94.6	51.3	1178
2014	Rossville	3	P93Y92	SOYA - foliar F	269010	295345	109.8	28.8	850
2014	Rossville	3	P94Y23	SOYA	229642	216586	94.3	53.0	1147
2014	Rossville	3	AG4033	SOYA - foliar F	209958	236276	112.5	60.6	1431
2014	Rossville	3	AG3431	UTC	216521	242839	112.2	37.0	898
2014	Rossville	3	AG3431	UTC	229642	269092	117.2	33.1	890
2014	Rossville	3	P93Y92	SOYA	301815	170644	56.5	77.5	1322
2014	Rossville	3	AG4232	UTC	249326	131264	52.6	54.8	719
2014	Rossville	3	AG4033	SOYA	255887	183770	71.8	57.5	1056
2014	Rossville	3	P94Y23	SOYA - foliar F	242766	190333	78.4	58.8	1119
2014	Rossville	3	AG4232	UTC	229642	183770	80.0	50.7	931
2014	Rossville	3	P94Y23	SOYA - foliar F	275571	183770	66.7	43.4	797
2014	Rossville	3	CH3303R2	SOYA	190274	203460	106.9	69.9	1421

2014	Rossville	3	P93Y92	SOYA	183714	255965	139.3	48.8	1248
2014	Rossville	3	CH3303R2	SOYA	308378	295345	95.8	41.1	1213
2014	Rossville	3	AG3431	UTC	262450	269092	102.5	37.6	1011
2014	Rossville	3	AG4232	UTC	229642	216586	94.3	30.8	667
2014	Rossville	3	CH3303R2	SOYA - foliar F	328060	269092	82.0	23.0	619
2014	Rossville	4	CH3303R2	SOYA	216521	229713	106.1	44.2	1015
2014	Rossville	4	P94Y23	SOYA - foliar F	203398	216586	106.5	48.2	1043
2014	Rossville	4	AG3431	UTC	242766	275655	113.5	44.9	1237
2014	Rossville	4	AG4033	SOYA - foliar F	177153	190333	107.4	50.6	963
2014	Rossville	4	AG4232	UTC	196837	216586	110.0	56.9	1232
2014	Rossville	4	AG4033	SOYA	229642	210023	91.5	50.1	1052
2014	Rossville	4	P93Y92	SOYA	209958	190333	90.7	46.4	883
2014	Rossville	4	AG4232	UTC	269010	210023	78.1	42.0	882
2014	Rossville	4	AG3431	UTC	255887	223149	87.2	49.8	1111
2014	Rossville	4	AG4232	UTC	262450	210023	80.0	44.3	930
2014	Rossville	4	AG3431	UTC	249326	242839	97.4	50.0	1214
2014	Rossville	4	P94Y23	SOYA	242766	210023	86.5	49.8	1045
2014	Rossville	4	AG4033	SOYA - foliar F	269010	216586	80.5	48.9	1059
2014	Rossville	4	P94Y23	SOYA - foliar F	288694	275655	95.5	24.3	670
2014	Rossville	4	CH3303R2	SOYA	262450	262529	100.0	61.0	1601
2014	Rossville	4	P93Y92	SOYA - foliar F	341183	354414	103.9	40.7	1442
2014	Rossville	4	P93Y92	SOYA	242766	229713	94.6	36.6	840
2014	Rossville	4	CH3303R2	SOYA - foliar F	249326	196897	79.0	66.8	1315
2014	Scandia	1	AG4033	SOYA	354307	236204	66.7	29.8	704
2014	Scandia	1	AG3431	UTC	347744	249326	71.7	30.6	763
2014	Scandia	1	P94Y23	SOYA	249326	150908	60.5	28.0	422
2014	Scandia	1	P93Y92	SOYA	334623	236204	70.6	27.6	652
2014	Scandia	1	CH3303R2	SOYA	358680	157469	43.9	33.4	526
2014	Scandia	1	AG3431	UTC	380551	262449	69.0	22.8	598
2014	Scandia	1	AG3431	UTC	334623	196837	58.8	29.8	586
2014	Scandia	1	P94Y23	SOYA - foliar F	354307	190275	53.7	36.5	694
2014	Scandia	1	AG4232	UTC	203398	236204	116.1	40.0	944
2014	Scandia	1	AG4033	SOYA - foliar F	255887	196837	76.9	28.1	553
2014	Scandia	1	AG4232	UTC	314939	236204	75.0	30.4	718
2014	Scandia	1	P93Y92	SOYA - foliar F	262450	242765	92.5	31.0	752
2014	Scandia	1	P93Y92	SOYA	328060	262449	80.0	34.5	905
2014	Scandia	1	CH3303R2	SOYA	314939	323687	102.8	55.8	1805
2014	Scandia	1	AG4033	SOYA - foliar F	275571	229643	83.3	25.5	585
2014	Scandia	1	CH3303R2	SOYA - foliar F	177153	124663	70.4	28.5	355
2014	Scandia	1	P94Y23	SOYA - foliar F	275571	255887	92.9	32.5	831
2014	Scandia	1	AG4232	UTC	288694	223081	77.3	47.0	1048
2014	Scandia	2	CH3303R2	SOYA	328060	255887	78.0	24.6	629
2014	Scandia	2	P94Y23	SOYA - foliar F	242766	196837	81.1	37.0	728

2014	Scandia	2	CH3303R2	SOYA - foliar F	275571	236204	85.7	30.1	711
2014	Scandia	2	AG4232	UTC	269010	229643	85.4	42.5	976
2014	Scandia	2	P93Y92	SOYA - foliar F	236203	340729	144.3	33.5	1141
2014	Scandia	2	P93Y92	SOYA	170590	196837	115.4	28.7	565
2014	Scandia	2	AG4232	UTC	209958	150908	71.9	53.0	799
2014	Scandia	2	AG3431	UTC	328060	282132	86.0	24.0	677
2014	Scandia	2	P94Y23	SOYA	269010	229643	85.4	30.3	695
2014	Scandia	2	AG4033	SOYA - foliar F	295255	269010	91.1	47.0	1264
2014	Scandia	2	AG4232	UTC	328060	321500	98.0	31.0	996
2014	Scandia	2	AG4033	SOYA - foliar F	255887	196837	76.9	28.7	565
2014	Scandia	2	P93Y92	SOYA	295255	242765	82.2	46.1	1119
2014	Scandia	2	AG4033	SOYA	279945	288694	103.1	36.4	1050
2014	Scandia	2	CH3303R2	SOYA	242766	282132	116.2	39.9	1125
2014	Scandia	2	P94Y23	SOYA - foliar F	223082	249326	111.8	46.0	1146
2014	Scandia	2	AG3431	UTC	262450	164030	62.5	56.9	933
2014	Scandia	2	AG3431	UTC	314939	223081	70.8	39.8	887
2014	Scandia	3	AG4033	SOYA - foliar F	242766	183714	75.7	31.6	580
2014	Scandia	3	P93Y92	SOYA - foliar F	236203	183714	77.8	52.0	955
2014	Scandia	3	P93Y92	SOYA	236203	190275	80.6	34.1	649
2014	Scandia	3	AG4033	SOYA	308378	209959	68.1	30.0	630
2014	Scandia	3	CH3303R2	SOYA	262450	314519	119.8	22.7	714
2014	Scandia	3	CH3303R2	SOYA - foliar F	314939	150908	47.9	41.0	618
2014	Scandia	3	P94Y23	SOYA - foliar F	255887	236204	92.3	50.1	1183
2014	Scandia	3	AG3431	UTC	295255	209959	71.1	33.6	705
2014	Scandia	3	CH3303R2	SOYA	328060	269010	82.0	34.2	920
2014	Scandia	3	AG4232	UTC	262450	262449	100.0	40.8	1070
2014	Scandia	3	AG4232	UTC	301815	216520	71.7	41.2	892
2014	Scandia	3	AG4033	SOYA - foliar F	275571	255887	92.9	50.1	1281
2014	Scandia	3	AG3431	UTC	347744	144347	41.5	28.5	411
2014	Scandia	3	P94Y23	SOYA	297442	253700	85.3	29.8	756
2014	Scandia	3	P94Y23	SOYA - foliar F	308378	262449	85.1	50.5	1325
2014	Scandia	3	P93Y92	SOYA	242766	236204	97.3	41.0	968
2014	Scandia	3	AG3431	UTC	242766	209959	86.5	36.8	772
2014	Scandia	3	AG4232	UTC	262450	288694	110.0	30.0	866
2014	Scandia	4	CH3303R2	SOYA - foliar F	334623	321500	96.1	40.9	1314
2014	Scandia	4	AG4232	UTC	229642	183714	80.0	30.0	551
2014	Scandia	4	AG4033	SOYA - foliar F	203398	196837	96.8	20.8	409
2014	Scandia	4	AG4232	UTC	301815	216520	71.7	31.0	671
2014	Scandia	4	AG4033	SOYA - foliar F	271197	236204	87.1	38.0	897
2014	Scandia	4	P93Y92	SOYA - foliar F	275571	177153	64.3	40.1	710
2014	Scandia	4	AG4033	SOYA	328060	223081	68.0	31.6	705
2014	Scandia	4	AG3431	UTC	308378	196837	63.8	40.0	787
2014	Scandia	4	P94Y23	SOYA	321499	255887	79.6	51.0	1304

2014	Scandia	4	AG4232	UTC	177153	262449	148.1	36.3	952
2014	Scandia	4	P93Y92	SOYA	269010	196837	73.2	27.0	531
2014	Scandia	4	CH3303R2	SOYA	328060	269010	82.0	30.0	807
2014	Scandia	4	P94Y23	SOYA - foliar F	269010	216520	80.5	32.0	693
2014	Scandia	4	CH3303R2	SOYA	288694	209959	72.7	26.0	546
2014	Scandia	4	AG3431	UTC	400235	308377	77.0	31.0	956
2014	Scandia	4	P94Y23	SOYA - foliar F	314939	196837	62.5	39.5	777
2014	Scandia	4	P93Y92	SOYA	360867	236204	65.5	31.5	744
2014	Scandia	4	AG3431	UTC	334623	262449	78.4	24.0	630

Table A.3 Raw data for variety by input systems experiment conducted at three locations in Kansas during 2012 to 2014 (continued).

YEAR	LOC	REP	VARIETY	INPUT SYSTEM	SEEDS PLANT^{-1}	SEEDS POD^{-1}	SEEDS M^{-2}	LODGING SCORE (1-5)	SEED MASS (g 100 seeds^{-1})	YIELD (kg ha^{-1})
2012	Manhattan	1	P93Y92	UTC	65.5	2.7	2153.3	2	17.2	3702.8
2012	Manhattan	1	AG4232	SOYA - foliar F	101.9	1.5	3148.6	4	15.9	4991.6
2012	Manhattan	1	AG4130	SOYA - foliar F	68.7	1.8	2393.9	3	17.8	4260.1
2012	Manhattan	1	P93Y92	SOYA	49.7	1.6	2453.6	3	17.4	4265.7
2012	Manhattan	1	AG3431	UTC	69.1	1.8	2637.6	2	17.0	4489.4
2012	Manhattan	1	AG4130	UTC	68.1	2.3	2865.1	3	17.0	4875.0
2012	Manhattan	1	AG4232	SOYA	71.1	1.5	3084.3	4.5	15.5	4767.7
2012	Manhattan	1	AG4232	UTC	71.1	1.6	2944.0	4	17.1	5027.7
2012	Manhattan	1	CH3303R2	SOYA	44.3	1.9	1662.3	1	19.4	3218.0
2012	Manhattan	1	AG3431	SOYA	52.7	1.3	2216.2	1	16.1	3558.6
2012	Manhattan	1	AG4130	SOYA	90.7	1.9	2683.6	1.5	15.9	4275.3
2012	Manhattan	1	P94Y23	UTC	49.9	1.5	1608.1	1	16.4	2642.7
2012	Manhattan	1	CH3303R2	SOYA - foliar F	58.9	1.6	2247.0	1	17.6	3965.4
2012	Manhattan	1	AG3431	SOYA - foliar F	62.2	2.2	2536.9	1.5	16.9	4289.3
2012	Manhattan	1	P93Y92	SOYA - foliar F	69.7	2.9	2384.0	2	17.4	4159.2
2012	Manhattan	1	P94Y23	SOYA	52.7	2.0	2150.0	1	18.4	3964.8
2012	Manhattan	1	P94Y23	SOYA - foliar F	47.8	1.7	2135.8	1	18.4	3936.6
2012	Manhattan	1	CH3303R2	UTC	34.3	2.3	1332.0	1	19.6	2607.0
2012	Manhattan	2	P93Y92	UTC	72.0	2.6	2084.7	2	16.6	3450.4
2012	Manhattan	2	AG4130	SOYA - foliar F	85.4	2.0	2470.8	2	16.2	4002.7
2012	Manhattan	2	AG4130	UTC	50.4	1.3	2285.5	2	15.1	3452.2
2012	Manhattan	2	P94Y23	SOYA	66.4	2.3	2141.0	1	18.4	3929.1
2012	Manhattan	2	AG3431	SOYA - foliar F	58.7	2.0	2395.1	1.5	16.7	4003.3
2012	Manhattan	2	AG4232	UTC	63.1	1.6	2405.9	4	14.3	3432.7
2012	Manhattan	2	AG4232	SOYA - foliar F	68.4	2.1	3149.0	4	14.4	4541.0
2012	Manhattan	2	CH3303R2	UTC	97.8	3.7	3023.8	1.5	17.8	5386.9
2012	Manhattan	2	CH3303R2	SOYA - foliar F	56.0	3.2	2171.8	2.5	18.3	3969.8
2012	Manhattan	2	AG3431	UTC	57.0	2.3	1837.5	1	16.4	3019.6
2012	Manhattan	2	P94Y23	UTC	69.7	2.8	2110.0	1	17.5	3696.1
2012	Manhattan	2	AG4130	SOYA	57.3	2.7	1997.0	1	16.2	3239.6
2012	Manhattan	2	AG4232	SOYA	68.9	3.9	2944.5	3	14.6	4303.9
2012	Manhattan	2	P93Y92	SOYA	59.1	2.0	2564.0	2	16.8	4304.3
2012	Manhattan	2	CH3303R2	SOYA	63.1	1.2	2158.6	1	17.0	3668.1
2012	Manhattan	2	P94Y23	SOYA - foliar F	52.3	2.0	2304.7	2	18.3	4207.7
2012	Manhattan	2	AG3431	SOYA	71.9	1.7	2649.4	3	18.0	4780.6
2012	Manhattan	2	P93Y92	SOYA - foliar F	84.2	2.7	2768.5	3	18.3	5066.8

2012	Manhattan	3	P93Y92	SOYA	91.0	3.0	2453.5	2	16.7	4104.1
2012	Manhattan	3	AG3431	SOYA	94.4	2.1	2730.9	2.5	17.1	4682.3
2012	Manhattan	3	P94Y23	SOYA - foliar F	67.9	2.1	2187.0	2	17.7	3871.1
2012	Manhattan	3	AG4130	SOYA	100.3	2.1	3233.8	3	17.0	5493.3
2012	Manhattan	3	AG3431	SOYA - foliar F	64.5	1.3	2714.1	2	16.8	4560.2
2012	Manhattan	3	AG4232	SOYA	100.5	1.7	3171.4	4	14.9	4723.9
2012	Manhattan	3	AG3431	UTC	54.9	1.8	2164.5	2.5	17.3	3737.9
2012	Manhattan	3	AG4130	SOYA - foliar F	.	.	.	3	.	4971.4
2012	Manhattan	3	P93Y92	SOYA - foliar F	73.0	1.8	2689.7	2	18.1	4861.8
2012	Manhattan	3	CH3303R2	UTC	66.3	2.0	2180.0	3	16.2	3534.4
2012	Manhattan	3	CH3303R2	SOYA	95.3	2.3	2884.0	2	16.7	4825.6
2012	Manhattan	3	P93Y92	UTC	76.8	2.1	2171.7	1.5	16.3	3535.4
2012	Manhattan	3	CH3303R2	SOYA - foliar F	87.3	2.2	2699.7	1.5	16.4	4417.6
2012	Manhattan	3	P94Y23	UTC	64.1	2.0	2485.9	1	17.3	4304.3
2012	Manhattan	3	AG4232	UTC	81.8	2.4	2851.4	3.5	14.9	4240.2
2012	Manhattan	3	AG4232	SOYA - foliar F	68.3	1.4	3191.1	3.5	16.3	5214.3
2012	Manhattan	3	P94Y23	SOYA	65.7	1.7	2291.3	1.5	19.7	4505.2
2012	Manhattan	3	AG4130	UTC	63.4	1.6	2711.6	2	17.0	4606.2
2012	Manhattan	4	AG3431	SOYA	89.3	1.6	2879.4	3	16.4	4718.2
2012	Manhattan	4	CH3303R2	SOYA	90.2	2.7	2907.1	2.5	17.3	5028.3
2012	Manhattan	4	AG3431	SOYA - foliar F	49.5	1.4	1823.4	2.5	17.0	3094.4
2012	Manhattan	4	AG4130	SOYA	79.8	1.7	3042.7	2	17.0	5158.5
2012	Manhattan	4	AG4130	UTC	55.4	1.5	2406.0	1.5	16.8	4044.1
2012	Manhattan	4	AG4232	SOYA	93.2	2.6	3615.3	4	15.6	5643.6
2012	Manhattan	4	AG4232	UTC	89.8	2.2	2715.6	3.5	16.3	4429.4
2012	Manhattan	4	P93Y92	SOYA	92.2	1.9	3153.4	3	18.6	5850.9
2012	Manhattan	4	P94Y23	SOYA - foliar F	84.9	2.6	2513.1	2.5	20.0	5016.3
2012	Manhattan	4	AG4232	SOYA - foliar F	171.3	2.6	3493.0	4	16.1	5634.9
2012	Manhattan	4	P93Y92	UTC	58.7	1.9	2161.8	2	16.5	3563.5
2012	Manhattan	4	AG4130	SOYA - foliar F	105.2	2.8	3459.4	2	16.8	5797.4
2012	Manhattan	4	P93Y92	SOYA - foliar F	63.2	2.2	2367.4	2	17.5	4139.2
2012	Manhattan	4	P94Y23	SOYA	54.4	2.0	2575.1	1	18.5	4767.2
2012	Manhattan	4	AG3431	UTC	58.3	1.7	2186.8	2.5	16.7	3652.1
2012	Manhattan	4	CH3303R2	UTC	67.6	2.1	2577.4	2	17.6	4542.6
2012	Manhattan	4	CH3303R2	SOYA - foliar F	54.6	1.0	2192.0	2.5	19.0	4173.3
2012	Manhattan	4	P94Y23	UTC	70.2	2.0	2215.7	1	18.6	4119.2
2012	Rossville	1	CH3303R2	UTC	137.7	2.6	2807.5	3	15.8	4431.7
2012	Rossville	1	AG4130	UTC	80.0	1.3	3158.2	2	14.8	4670.4
2012	Rossville	1	P93Y92	SOYA	92.3	2.2	3701.7	3	15.7	5828.2
2012	Rossville	1	P94Y23	SOYA	81.7	1.8	3440.5	3	16.5	5691.1
2012	Rossville	1	AG4232	SOYA	100.6	1.4	3507.7	4	13.8	4839.9
2012	Rossville	1	AG4130	SOYA	79.1	1.5	2913.8	3	14.8	4300.7
2012	Rossville	1	AG4130	SOYA - foliar F	100.1	1.3	2831.4	2	14.7	4164.5

2012	Rossville	1	P94Y23	SOYA - foliar F	126.1	2.6	3317.0	2	15.4	5106.6
2012	Rossville	1	CH3303R2	SOYA - foliar F	90.9	2.3	2930.4	3	14.9	4362.8
2012	Rossville	1	P93Y92	SOYA - foliar F	115.2	2.6	3333.4	4	15.9	5303.3
2012	Rossville	1	AG4232	UTC	78.6	1.3	3203.8	3	13.9	4440.8
2012	Rossville	1	P93Y92	UTC	98.4	2.1	3106.2	3	16.0	4971.9
2012	Rossville	1	AG3431	SOYA	119.3	3.3	3529.4	1	13.8	4871.3
2012	Rossville	1	AG3431	UTC	122.7	2.4	4761.5	3	14.5	6915.1
2012	Rossville	1	AG3431	SOYA - foliar F	73.1	1.6	3075.3	3	14.1	4325.2
2012	Rossville	1	CH3303R2	SOYA	84.1	1.8	3320.6	3	14.4	4772.9
2012	Rossville	1	AG4232	SOYA - foliar F	71.9	1.0	3405.1	4	14.3	4866.9
2012	Rossville	1	P94Y23	UTC	82.3	1.6	2706.9	3	16.8	4549.1
2012	Rossville	2	P93Y92	UTC	106.0	2.8	3696.3	3	15.2	5635.8
2012	Rossville	2	AG4232	UTC	111.7	1.6	3452.0	4	14.4	4977.8
2012	Rossville	2	AG3431	UTC	80.7	1.8	3023.8	3	14.4	4354.8
2012	Rossville	2	P94Y23	SOYA - foliar F	99.5	2.8	3142.1	3	16.9	5307.3
2012	Rossville	2	P93Y92	SOYA - foliar F	51.4	1.3	2195.5	3	16.5	3632.0
2012	Rossville	2	CH3303R2	SOYA - foliar F	103.1	2.1	2846.6	1	15.0	4267.8
2012	Rossville	2	P93Y92	SOYA	87.5	1.9	2648.2	3	16.0	4230.0
2012	Rossville	2	P94Y23	UTC	94.3	2.1	3162.3	2	15.9	5036.1
2012	Rossville	2	AG3431	SOYA - foliar F	100.6	2.3	3572.7	2	14.3	5100.2
2012	Rossville	2	P94Y23	SOYA	154.6	3.6	3660.2	1	16.4	6014.6
2012	Rossville	2	AG4130	SOYA	125.1	2.1	3289.8	2	15.3	5046.1
2012	Rossville	2	AG3431	SOYA	120.3	2.8	4274.2	1	14.8	6305.7
2012	Rossville	2	AG4130	SOYA - foliar F	109.0	1.8	2868.4	4	15.2	4369.2
2012	Rossville	2	AG4130	UTC	78.4	1.6	3351.1	4	14.5	4853.5
2012	Rossville	2	CH3303R2	UTC	110.5	2.4	3416.6	3	14.3	4892.3
2012	Rossville	2	AG4232	SOYA	145.2	2.3	4106.0	3	14.6	5998.3
2012	Rossville	2	CH3303R2	SOYA	97.6	2.1	3336.7	2	15.1	5027.4
2012	Rossville	2	AG4232	SOYA - foliar F	88.1	1.2	3477.5	3	14.1	4918.6
2012	Rossville	3	CH3303R2	SOYA - foliar F	87.5	2.3	2877.6	2	14.0	4037.0
2012	Rossville	3	P93Y92	UTC	85.0	2.3	3296.4	4	15.5	5120.3
2012	Rossville	3	CH3303R2	UTC	109.0	2.7	3656.1	2	14.3	5219.3
2012	Rossville	3	AG3431	SOYA	71.6	1.6	3532.3	2	14.7	5192.6
2012	Rossville	3	AG4130	UTC	73.8	2.3	3155.1	2	13.8	4340.2
2012	Rossville	3	P93Y92	SOYA	72.2	2.0	3276.9	3	15.2	4988.8
2012	Rossville	3	AG4232	SOYA - foliar F	105.8	1.7	3201.8	2	13.2	4230.5
2012	Rossville	3	P93Y92	SOYA - foliar F	71.3	1.7	3374.9	2	15.5	5217.1
2012	Rossville	3	AG4130	SOYA	101.0	1.7	3388.4	2	14.8	5011.8
2012	Rossville	3	AG4130	SOYA - foliar F	85.5	1.8	3487.6	3	14.1	4920.1
2012	Rossville	3	AG4232	UTC	97.4	2.2	3458.7	3	13.9	4803.9
2012	Rossville	3	P94Y23	SOYA	78.0	1.9	2768.5	2	16.1	4445.4
2012	Rossville	3	AG3431	UTC	74.9	4.8	2807.1	1	13.6	3826.2
2012	Rossville	3	CH3303R2	SOYA	95.1	2.0	4316.9	2	13.6	5876.3

2012	Rossville	3	P94Y23	UTC	105.9	3.2	3342.7	2	15.9	5298.5
2012	Rossville	3	AG4232	SOYA	78.3	1.2	2883.7	3	13.9	4001.0
2012	Rossville	3	P94Y23	SOYA - foliar F	70.4	2.2	2918.0	1	15.5	4533.3
2012	Rossville	3	AG3431	SOYA - foliar F	110.1	3.3	4201.5	1	15.2	6384.0
2012	Rossville	4	AG4130	SOYA - foliar F	87.5	1.2	3051.6	2	14.2	4341.8
2012	Rossville	4	P93Y92	SOYA	79.2	1.3	3126.0	3	15.1	4731.1
2012	Rossville	4	P94Y23	UTC	99.4	2.2	3008.2	2	14.9	4475.7
2012	Rossville	4	CH3303R2	SOYA - foliar F	94.5	2.2	3046.2	3	15.0	4564.8
2012	Rossville	4	AG4130	SOYA	105.5	1.5	3190.9	2	14.4	4589.7
2012	Rossville	4	AG3431	UTC	82.7	1.8	3534.7	2	15.5	5481.7
2012	Rossville	4	AG4232	SOYA - foliar F	56.1	1.0	1771.2	2	13.7	2419.8
2012	Rossville	4	AG4130	UTC	93.2	1.6	2941.8	2	14.2	4190.6
2012	Rossville	4	AG4232	SOYA	139.7	2.2	3492.0	3	14.0	4875.5
2012	Rossville	4	P93Y92	UTC	79.1	1.8	2394.0	2	16.2	3873.5
2012	Rossville	4	AG3431	SOYA	78.4	1.7	3147.1	2	14.2	4483.1
2012	Rossville	4	P94Y23	SOYA	82.1	2.0	2429.7	1	16.3	3960.0
2012	Rossville	4	AG4232	UTC	74.2	1.8	2490.3	1	13.0	3241.9
2012	Rossville	4	CH3303R2	UTC	87.3	2.2	3501.0	2	13.8	4825.2
2012	Rossville	4	AG3431	SOYA - foliar F	72.1	1.7	2846.9	2	14.2	4046.7
2012	Rossville	4	P93Y92	SOYA - foliar F	63.9	1.9	3195.2	3	14.5	4631.2
2012	Rossville	4	P94Y23	SOYA - foliar F	103.2	2.4	2714.3	1	16.6	4503.7
2012	Rossville	4	CH3303R2	SOYA	70.8	1.6	2702.0	1	15.4	4173.5
2012	Scandia	1	CH3303R2	UTC	116.1	1.8	3741.2	2.5	15.9	5941.1
2012	Scandia	1	AG4232	UTC	142.4	1.9	3886.7	4	14.9	5780.7
2012	Scandia	1	AG4232	SOYA	125.8	1.6	3018.9	3	15.1	4573.6
2012	Scandia	1	AG3431	SOYA - foliar F	93.4	1.1	2671.5	1	15.8	4228.7
2012	Scandia	1	P94Y23	SOYA	137.1	1.7	2930.5	1	16.9	4939.8
2012	Scandia	1	AG4130	SOYA - foliar F	105.2	1.7	3149.5	1.5	15.2	4797.4
2012	Scandia	1	AG4232	SOYA - foliar F	84.2	1.4	3404.0	1.5	14.4	4900.2
2012	Scandia	1	P93Y92	SOYA	60.5	1.2	2842.9	1.5	17.0	4842.2
2012	Scandia	1	CH3303R2	SOYA	85.8	1.5	2822.8	1.5	15.5	4375.7
2012	Scandia	1	P94Y23	UTC	121.3	1.0	2912.4	2	17.1	4968.7
2012	Scandia	1	CH3303R2	SOYA - foliar F	117.2	1.5	3508.2	2	15.8	5529.0
2012	Scandia	1	AG3431	SOYA	113.5	1.3	3023.0	2.5	15.7	4739.2
2012	Scandia	1	P93Y92	UTC	105.9	1.9	2995.2	2	17.2	5145.6
2012	Scandia	1	AG4130	UTC	155.0	2.5	3058.3	1	15.6	4763.1
2012	Scandia	1	AG3431	UTC	87.2	1.5	3325.0	2	15.1	5024.8
2012	Scandia	1	P93Y92	SOYA - foliar F	73.5	1.5	2851.4	1.5	17.0	4842.2
2012	Scandia	1	AG4130	SOYA	78.1	1.0	2902.1	1	15.8	4596.8
2012	Scandia	1	P94Y23	SOYA - foliar F	86.3	1.8	2950.3	1	16.4	4842.2
2012	Scandia	2	P94Y23	SOYA - foliar F	110.7	0.9	2983.7	3	18.1	5408.2
2012	Scandia	2	AG3431	SOYA - foliar F	111.9	1.5	3715.3	3	15.9	5906.8
2012	Scandia	2	AG4232	UTC	138.7	1.7	3923.2	3	14.9	5848.8

2012	Scandia	2	CH3303R2	SOYA	90.6	1.5	3246.0	2	15.9	5156.9
2012	Scandia	2	P94Y23	UTC	95.4	1.9	3295.4	1	16.7	5510.9
2012	Scandia	2	P94Y23	SOYA	84.3	1.5	3325.4	1.5	17.4	5778.4
2012	Scandia	2	AG3431	SOYA	67.3	1.1	3031.8	1	16.0	4852.8
2012	Scandia	2	AG4130	SOYA	119.9	1.9	3351.3	1	15.7	5248.6
2012	Scandia	2	AG4130	SOYA - foliar F	94.8	1.4	2868.2	1	15.6	4464.4
2012	Scandia	2	AG3431	UTC	112.7	1.6	3707.2	2.5	15.8	5844.5
2012	Scandia	2	P93Y92	UTC	123.9	1.5	3788.8	3.5	16.4	6229.7
2012	Scandia	2	P93Y92	SOYA	146.5	1.3	3132.0	2.5	17.5	5476.7
2012	Scandia	2	CH3303R2	SOYA - foliar F	116.5	1.5	3178.7	2	15.7	4985.0
2012	Scandia	2	CH3303R2	UTC	93.8	1.5	3333.0	1.5	15.6	5191.3
2012	Scandia	2	AG4232	SOYA - foliar F	94.1	1.4	3495.9	3	15.5	5426.0
2012	Scandia	2	AG4232	SOYA	77.6	1.3	3978.9	2.5	15.4	6120.8
2012	Scandia	2	P93Y92	SOYA - foliar F	76.3	1.3	3263.2	1.5	16.8	5466.3
2012	Scandia	2	AG4130	UTC	69.7	1.1	2751.0	1	16.0	4395.7
2012	Scandia	3	P94Y23	UTC	96.7	1.9	3210.8	3	16.9	5430.5
2012	Scandia	3	AG4130	SOYA - foliar F	134.1	1.6	3482.6	3	16.1	5601.3
2012	Scandia	3	P93Y92	SOYA - foliar F	142.0	2.1	3269.5	3	17.2	5634.9
2012	Scandia	3	AG4232	SOYA - foliar F	126.6	1.6	4286.6	3	15.3	6567.8
2012	Scandia	3	AG3431	SOYA	116.3	1.5	3097.0	2	15.5	4797.4
2012	Scandia	3	CH3303R2	SOYA	94.0	1.3	3185.2	2	15.0	4782.2
2012	Scandia	3	P93Y92	SOYA	77.7	1.7	3704.9	3.5	17.0	6297.7
2012	Scandia	3	AG4130	SOYA	98.3	1.8	3458.6	2	16.2	5591.6
2012	Scandia	3	AG3431	SOYA - foliar F	87.9	1.5	2805.2	1	15.8	4444.6
2012	Scandia	3	AG3431	UTC	97.2	1.9	3483.0	2	15.7	5466.3
2012	Scandia	3	CH3303R2	UTC	129.5	1.4	3450.5	3	15.7	5420.1
2012	Scandia	3	AG4232	UTC	148.9	1.7	3623.1	3	15.0	5448.0
2012	Scandia	3	P94Y23	SOYA	115.0	1.7	3631.5	3	16.7	6066.1
2012	Scandia	3	AG4130	UTC	91.9	1.3	3415.1	1	15.1	5168.6
2012	Scandia	3	AG4232	SOYA	100.0	1.5	4012.2	3	14.9	5971.6
2012	Scandia	3	P94Y23	SOYA - foliar F	84.3	1.7	3050.1	1	17.0	5174.3
2012	Scandia	3	P93Y92	UTC	73.1	1.8	3053.2	1.5	16.7	5088.1
2012	Scandia	3	CH3303R2	SOYA - foliar F	91.9	1.1	2718.9	1.5	15.6	4237.9
2012	Scandia	4	AG4130	SOYA - foliar F	126.1	1.6	2737.9	3	15.6	4274.0
2012	Scandia	4	AG4232	UTC	155.9	2.1	4152.5	3	14.7	6114.0
2012	Scandia	4	P93Y92	SOYA	119.0	1.8	3405.1	3	16.7	5677.0
2012	Scandia	4	P93Y92	SOYA - foliar F	136.2	1.6	3358.1	3	16.9	5675.8
2012	Scandia	4	AG3431	SOYA - foliar F	144.7	1.7	3139.7	2	15.1	4749.5
2012	Scandia	4	CH3303R2	SOYA - foliar F	88.1	1.1	4173.4	1.5	15.1	6303.9
2012	Scandia	4	AG4130	SOYA	131.9	2.4	3469.3	2	15.7	5436.5
2012	Scandia	4	P93Y92	UTC	88.5	1.4	3519.7	1.5	16.9	5941.1
2012	Scandia	4	P94Y23	SOYA - foliar F	90.2	1.3	3173.2	1.5	17.0	5379.9
2012	Scandia	4	P94Y23	SOYA	144.8	1.9	3000.1	2.5	16.2	4855.2

2012	Scandia	4	AG4232	SOYA	169.3	1.5	4063.8	4	14.1	5731.6
2012	Scandia	4	AG3431	UTC	98.9	1.5	2537.1	2	15.2	3858.9
2012	Scandia	4	AG3431	SOYA	129.3	1.1	3827.5	2	15.1	5784.3
2012	Scandia	4	AG4232	SOYA - foliar F	72.1	1.6	3155.4	1.5	13.7	4322.3
2012	Scandia	4	AG4130	UTC	98.5	1.7	3563.8	2.5	14.6	5208.6
2012	Scandia	4	P94Y23	UTC	107.2	1.4	3350.1	1.5	15.4	5146.0
2012	Scandia	4	CH3303R2	SOYA	100.4	1.3	4195.1	1.5	14.9	6270.8
2012	Scandia	4	CH3303R2	UTC	96.8	1.4	3055.4	2.5	15.6	4754.7
2013	Manhattan	1	AG3431	SOYA - foliar F	81.9	2.9	2476.8	1	16.1	3999.5
2013	Manhattan	1	AG3431	SOYA	74.4	2.2	2103.7	1	16.7	3518.1
2013	Manhattan	1	P94Y23	SOYA - foliar F	106.7	3.7	2665.3	1	16.4	4365.0
2013	Manhattan	1	P93Y92	SOYA	82.4	2.5	2004.3	2	17.7	3543.2
2013	Manhattan	1	AG4130	SOYA	57.9	2.2	1751.9	1	16.8	2939.3
2013	Manhattan	1	AG4232	SOYA	39.3	1.2	1317.4	3	16.8	2210.9
2013	Manhattan	1	P94Y23	SOYA	70.8	3.2	2094.6	1	16.6	3481.1
2013	Manhattan	1	CH3303R2	SOYA - foliar F	66.8	3.2	1843.8	2	16.8	3095.7
2013	Manhattan	1	AG3431	UTC	75.1	2.6	2172.1	1	16.4	3561.6
2013	Manhattan	1	AG4130	UTC	89.6	2.8	2415.9	1	16.2	3912.9
2013	Manhattan	1	CH3303R2	UTC	71.6	3.2	1976.9	1	17.1	3379.3
2013	Manhattan	1	P94Y23	UTC	105.8	3.0	2644.1	1	16.6	4388.4
2013	Manhattan	1	CH3303R2	SOYA	60.9	3.1	1881.5	2	17.6	3307.0
2013	Manhattan	1	P93Y92	UTC	89.6	2.6	3298.9	1	16.6	5486.2
2013	Manhattan	1	AG4232	UTC	78.2	2.3	1901.7	1.5	16.4	3109.6
2013	Manhattan	1	P93Y92	SOYA - foliar F	68.3	2.5	1885.5	2	17.3	3255.3
2013	Manhattan	1	AG4232	SOYA - foliar F	31.0	0.8	1181.7	3	17.6	2076.3
2013	Manhattan	1	AG4130	SOYA - foliar F	34.9	1.1	940.3	1	16.4	1540.3
2013	Manhattan	2	CH3303R2	SOYA	59.6	2.0	1882.2	1	17.4	3281.1
2013	Manhattan	2	AG4130	UTC	76.6	2.4	2367.1	1	16.2	3843.8
2013	Manhattan	2	AG4130	SOYA - foliar F	36.9	1.4	1454.4	1	16.9	2461.7
2013	Manhattan	2	CH3303R2	UTC	70.5	1.9	2179.8	1	17.1	3717.6
2013	Manhattan	2	AG4232	SOYA	33.0	0.8	1085.0	3	17.2	1863.3
2013	Manhattan	2	P94Y23	SOYA	76.6	2.1	2217.5	1	16.8	3731.9
2013	Manhattan	2	CH3303R2	SOYA - foliar F	.	.	.	1	16.6	.
2013	Manhattan	2	AG3431	UTC	85.5	2.4	2135.6	1	16.5	3528.7
2013	Manhattan	2	P93Y92	SOYA - foliar F	56.5	1.8	1708.4	1	17.5	2992.9
2013	Manhattan	2	P94Y23	UTC	70.8	2.3	2095.2	1	16.9	3536.6
2013	Manhattan	2	P94Y23	SOYA - foliar F	134.0	4.0	2642.3	1	17.0	4494.4
2013	Manhattan	2	AG4130	SOYA	43.0	1.5	1498.2	1	16.8	2519.6
2013	Manhattan	2	P93Y92	SOYA	98.2	2.7	2259.7	1	16.8	3805.3
2013	Manhattan	2	AG3431	SOYA	65.3	1.9	2062.3	1	17.3	3573.7
2013	Manhattan	2	AG4232	SOYA - foliar F	.	.	.	.	.	.
2013	Manhattan	2	P93Y92	UTC	92.1	3.0	2605.1	1	17.0	4423.9
2013	Manhattan	2	AG4232	UTC	56.6	1.2	1414.5	1.5	16.2	2291.9

2013	Manhattan	2	AG3431	SOYA - foliar F	62.9	2.2	1859.9	1	16.5	3077.2
2013	Manhattan	3	CH3303R2	UTC	86.6	2.6	2903.1	1.5	16.5	4800.2
2013	Manhattan	3	AG4130	SOYA	44.2	1.4	1481.5	1	17.0	2520.8
2013	Manhattan	3	AG3431	SOYA	73.1	2.8	2257.6	1	16.2	3668.2
2013	Manhattan	3	AG3431	UTC	59.7	2.3	2042.0	1	16.7	3418.4
2013	Manhattan	3	AG3431	SOYA - foliar F	54.3	2.2	2249.7	1	16.2	3640.1
2013	Manhattan	3	P94Y23	SOYA	83.5	3.1	2086.7	1	16.8	3512.8
2013	Manhattan	3	P94Y23	UTC	148.6	3.8	3028.5	1	16.3	4936.1
2013	Manhattan	3	AG4130	SOYA - foliar F	57.5	2.0	1813.2	1	16.7	3027.7
2013	Manhattan	3	CH3303R2	SOYA	54.7	1.6	2122.5	1.5	17.4	3699.6
2013	Manhattan	3	AG4232	UTC	48.1	1.1	1833.8	2.5	16.7	3055.6
2013	Manhattan	3	P93Y92	SOYA	44.4	1.5	1516.7	1	13.0	1965.7
2013	Manhattan	3	AG4232	SOYA	81.8	2.7	2527.4	1.5	16.4	4150.8
2013	Manhattan	3	AG4130	UTC	67.4	2.8	2216.7	1	16.0	3555.8
2013	Manhattan	3	P93Y92	SOYA - foliar F	.	.	.	.	.	.
2013	Manhattan	3	CH3303R2	SOYA - foliar F	43.5	1.8	1918.4	1.5	17.1	3276.1
2013	Manhattan	3	AG4232	SOYA - foliar F	55.6	1.6	1498.8	1	16.7	2506.4
2013	Manhattan	3	P94Y23	SOYA - foliar F	80.0	3.9	2105.1	1	16.1	3387.9
2013	Manhattan	3	P93Y92	UTC	55.4	2.1	1677.0	1	16.9	2838.4
2013	Manhattan	4	AG3431	SOYA	59.9	2.3	2165.4	1	16.3	3531.6
2013	Manhattan	4	AG3431	SOYA - foliar F	76.6	2.4	2215.5	1	16.9	3742.4
2013	Manhattan	4	AG4130	SOYA	72.9	2.4	1918.1	1.5	16.4	3142.0
2013	Manhattan	4	AG4232	SOYA	60.2	1.3	1821.7	3.5	15.6	2847.0
2013	Manhattan	4	P93Y92	SOYA	95.7	3.1	2455.3	1.5	17.7	4347.0
2013	Manhattan	4	P93Y92	SOYA - foliar F	53.6	1.9	1972.5	1	16.6	3273.0
2013	Manhattan	4	CH3303R2	SOYA	84.5	2.6	2665.9	1	15.1	4016.8
2013	Manhattan	4	P94Y23	SOYA	73.0	1.8	2352.1	1	17.2	4045.9
2013	Manhattan	4	P94Y23	SOYA - foliar F	99.5	3.6	3140.0	1	16.8	5278.8
2013	Manhattan	4	AG4232	SOYA - foliar F	63.3	1.2	1707.5	3	15.4	2633.1
2013	Manhattan	4	CH3303R2	SOYA - foliar F	52.4	2.1	2065.9	1	16.8	3462.7
2013	Manhattan	4	AG4130	SOYA - foliar F	58.8	2.0	2127.9	1	15.7	3343.3
2013	Manhattan	4	AG3431	UTC	91.9	2.8	2055.6	1	17.2	3541.7
2013	Manhattan	4	AG4130	UTC	69.6	1.5	2151.9	1	16.8	3604.6
2013	Manhattan	4	CH3303R2	UTC	57.4	1.5	2302.5	1.5	18.1	4163.0
2013	Manhattan	4	P93Y92	UTC	81.6	3.3	2145.6	1	15.8	3384.7
2013	Manhattan	4	P94Y23	UTC	100.6	3.7	1918.6	1	17.2	3302.5
2013	Manhattan	4	AG4232	UTC	48.3	1.0	1777.8	2	16.9	3013.1
2013	Rossville	1	AG4232	SOYA	141.9	3.1	3452.8	1.5	13.9	4815.3
2013	Rossville	1	AG4232	SOYA - foliar F	117.2	1.9	3004.7	2	14.1	4234.8
2013	Rossville	1	CH3303R2	SOYA - foliar F	56.4	1.4	1815.8	1.5	16.5	2993.8
2013	Rossville	1	P94Y23	SOYA - foliar F	116.4	2.6	2373.3	1	15.4	3660.8
2013	Rossville	1	P94Y23	UTC	62.2	2.1	2168.8	1	15.8	3432.4
2013	Rossville	1	AG3431	SOYA - foliar F	55.0	1.9	1917.2	1	15.4	2960.7

2013	Rossville	1	AG4130	SOYA	74.8	2.0	2359.7	1	15.9	3745.1
2013	Rossville	1	AG4130	SOYA - foliar F	86.4	2.1	2499.4	1	16.0	4007.7
2013	Rossville	1	AG3431	SOYA	71.0	1.8	2567.5	1.5	16.5	4243.8
2013	Rossville	1	AG4130	UTC	65.0	1.6	2223.3	1.5	15.6	3462.2
2013	Rossville	1	P93Y92	SOYA	78.2	2.9	2415.3	1	17.1	4120.7
2013	Rossville	1	CH3303R2	SOYA	103.2	2.5	2239.6	1	15.6	3485.8
2013	Rossville	1	P93Y92	UTC	143.8	4.4	2646.9	1	16.5	4359.9
2013	Rossville	1	P93Y92	SOYA - foliar F	63.3	1.7	2414.6	1	15.3	3696.3
2013	Rossville	1	AG4232	UTC	88.0	2.0	2603.2	1	16.2	4211.2
2013	Rossville	1	CH3303R2	UTC	70.2	2.0	1800.7	1	16.0	2874.6
2013	Rossville	1	P94Y23	SOYA	105.9	3.2	2507.2	1.5	17.6	4418.2
2013	Rossville	1	AG3431	UTC	70.7	2.1	2231.4	1	15.6	3474.6
2013	Rossville	2	AG3431	UTC	68.8	2.1	1717.9	1	14.1	2425.4
2013	Rossville	2	P93Y92	SOYA - foliar F	62.5	2.0	1932.6	1	16.9	3262.6
2013	Rossville	2	AG3431	SOYA	56.4	2.1	1445.8	1	15.6	2259.2
2013	Rossville	2	AG4130	UTC	28.7	1.1	1320.9	1	14.3	1894.5
2013	Rossville	2	P94Y23	SOYA - foliar F	72.0	2.1	1656.9	1	14.8	2457.1
2013	Rossville	2	AG4130	SOYA - foliar F	34.1	1.2	1031.5	1	14.2	1465.0
2013	Rossville	2	CH3303R2	UTC	66.6	1.9	2321.6	1	14.3	3329.3
2013	Rossville	2	P93Y92	SOYA	75.9	1.9	1996.5	1	16.6	3313.7
2013	Rossville	2	P94Y23	SOYA	86.4	2.9	2159.7	1	15.9	3426.8
2013	Rossville	2	CH3303R2	SOYA	77.4	2.4	2086.9	1	14.8	3098.7
2013	Rossville	2	P94Y23	UTC	56.7	2.0	1901.3	1	14.4	2739.7
2013	Rossville	2	AG4232	SOYA - foliar F	80.4	1.9	1691.2	1	14.8	2502.8
2013	Rossville	2	CH3303R2	SOYA - foliar F	64.2	2.1	2111.1	1	15.4	3258.8
2013	Rossville	2	AG4232	SOYA	99.9	2.3	2232.8	1	15.6	3492.0
2013	Rossville	2	AG4130	SOYA	73.8	2.1	2037.6	1	14.5	2957.3
2013	Rossville	2	AG3431	SOYA - foliar F	78.1	2.4	2054.4	1	15.0	3083.0
2013	Rossville	2	P93Y92	UTC	44.2	1.2	1657.9	1	15.4	2556.5
2013	Rossville	2	AG4232	UTC	81.3	2.1	2191.9	1	15.5	3391.2
2013	Rossville	3	AG4130	SOYA	106.7	3.3	2596.1	1	16.8	4365.0
2013	Rossville	3	AG4130	UTC	70.2	1.8	2169.6	1	14.1	3051.5
2013	Rossville	3	AG3431	SOYA	63.1	1.9	2405.9	1	15.6	3757.8
2013	Rossville	3	AG4232	SOYA	92.1	1.6	3029.3	2.5	16.9	5113.2
2013	Rossville	3	CH3303R2	SOYA - foliar F	57.7	1.4	1859.8	1.5	16.1	2991.8
2013	Rossville	3	AG3431	UTC	73.1	1.7	2115.5	1	14.8	3129.3
2013	Rossville	3	AG4232	SOYA - foliar F	135.5	2.8	3206.4	1.5	15.3	4905.8
2013	Rossville	3	CH3303R2	SOYA	40.0	1.3	2154.0	1	14.4	3096.4
2013	Rossville	3	P93Y92	UTC	70.4	2.1	2267.7	1	16.5	3745.5
2013	Rossville	3	P93Y92	SOYA - foliar F	67.8	1.8	2318.0	1.5	17.0	3948.1
2013	Rossville	3	CH3303R2	UTC	84.0	2.0	2098.5	1.5	15.9	3332.9
2013	Rossville	3	P94Y23	UTC	92.5	2.5	2371.2	1	15.4	3644.3
2013	Rossville	3	AG3431	SOYA - foliar F	60.7	1.6	1516.8	1	15.1	2298.0

2013	Rossville	3	AG4232	UTC	82.9	2.2	2615.1	1	16.3	4271.9
2013	Rossville	3	P94Y23	SOYA	82.9	2.4	2398.7	1	16.2	3884.3
2013	Rossville	3	P93Y92	SOYA	60.3	2.0	2060.6	1.5	17.5	3615.8
2013	Rossville	3	AG4130	SOYA - foliar F	77.1	1.9	2586.8	1	15.6	4034.2
2013	Rossville	3	P94Y23	SOYA - foliar F	99.8	2.5	2494.1	1	16.3	4058.0
2013	Rossville	4	CH3303R2	SOYA - foliar F	102.1	2.3	2349.7	1.5	14.9	3499.8
2013	Rossville	4	P94Y23	SOYA	95.2	2.5	2502.6	1	15.6	3907.7
2013	Rossville	4	P94Y23	SOYA - foliar F	74.8	1.7	2163.0	1	15.5	3361.8
2013	Rossville	4	P93Y92	UTC	87.8	2.5	2194.2	1	15.4	3377.7
2013	Rossville	4	P93Y92	SOYA - foliar F	.	.	1850.1	1	16.1	2984.1
2013	Rossville	4	P93Y92	SOYA	73.9	2.4	2380.9	1	16.3	3892.1
2013	Rossville	4	AG4232	SOYA - foliar F	54.4	1.7	1465.4	2.5	14.7	2154.2
2013	Rossville	4	AG4130	SOYA	83.8	2.1	1818.8	1.5	14.7	2670.6
2013	Rossville	4	AG4130	UTC	51.8	1.2	1908.4	1	14.7	2802.3
2013	Rossville	4	AG3431	UTC	64.7	1.9	1913.8	1	15.0	2876.5
2013	Rossville	4	CH3303R2	UTC	55.0	1.6	1772.2	1	14.8	2615.9
2013	Rossville	4	AG3431	SOYA - foliar F	82.2	2.3	2269.8	1	15.2	3459.2
2013	Rossville	4	AG4232	UTC	75.9	1.3	2495.7	2	14.3	3566.6
2013	Rossville	4	AG4232	SOYA	80.1	2.0	2527.3	3	14.7	3723.9
2013	Rossville	4	AG3431	SOYA	67.0	2.0	2201.3	1.5	15.0	3292.2
2013	Rossville	4	P94Y23	UTC	76.9	1.5	2527.2	1	15.8	4004.0
2013	Rossville	4	AG4130	SOYA - foliar F	86.8	2.1	1996.8	1	14.6	2921.0
2013	Rossville	4	CH3303R2	SOYA	79.3	2.0	1981.1	1	15.1	2984.8
2013	Scandia	1	AG4130	SOYA	66.8	2.0	1933.9	1	13.4	2584.4
2013	Scandia	1	AG4232	SOYA - foliar F	41.4	1.5	1823.2	2.5	13.5	2453.3
2013	Scandia	1	CH3303R2	SOYA - foliar F	51.7	2.1	2074.3	1.5	13.4	2780.6
2013	Scandia	1	AG4130	SOYA - foliar F	59.9	1.5	1733.8	1.5	13.7	2372.5
2013	Scandia	1	P93Y92	SOYA - foliar F	44.3	1.5	1833.8	1	15.6	2869.1
2013	Scandia	1	P94Y23	UTC	92.7	2.6	2621.8	1.5	15.1	3948.4
2013	Scandia	1	CH3303R2	SOYA	65.2	1.9	2101.4	2	14.4	3016.5
2013	Scandia	1	AG4232	SOYA	39.6	1.3	1795.8	4	14.2	2541.9
2013	Scandia	1	CH3303R2	UTC	63.4	1.9	2292.8	2	14.2	3258.9
2013	Scandia	1	AG4232	UTC	42.5	1.5	1621.1	1	13.7	2223.4
2013	Scandia	1	AG4130	UTC	25.8	1.2	1084.2	1	13.7	1480.7
2013	Scandia	1	AG3431	SOYA	19.5	1.2	1164.2	1	15.0	1741.8
2013	Scandia	1	P94Y23	SOYA - foliar F	45.3	2.2	1430.2	1	14.9	2127.0
2013	Scandia	1	AG3431	SOYA - foliar F	33.5	1.4	1343.3	1	15.5	2085.5
2013	Scandia	1	P93Y92	SOYA	44.4	1.6	1079.4	1	16.0	1728.8
2013	Scandia	1	P94Y23	SOYA	39.8	1.5	1988.9	1	15.3	3040.1
2013	Scandia	1	AG3431	UTC	50.7	2.0	1868.4	1.5	14.4	2697.3
2013	Scandia	1	P93Y92	UTC	41.1	1.4	1945.8	1.5	15.2	2962.5
2013	Scandia	2	AG4130	SOYA	47.0	2.0	1574.6	1	14.2	2228.5
2013	Scandia	2	AG4130	UTC	35.0	1.7	1679.5	1	13.6	2288.5

2013	Scandia	2	AG4232	SOYA - foliar F	27.5	1.7	1084.6	1	15.1	1635.9
2013	Scandia	2	P94Y23	SOYA	31.7	2.0	1144.7	1	15.8	1806.4
2013	Scandia	2	CH3303R2	SOYA	37.9	2.0	1446.4	1	15.7	2271.7
2013	Scandia	2	CH3303R2	SOYA - foliar F	34.2	1.2	1349.0	1	14.5	1953.0
2013	Scandia	2	P93Y92	SOYA - foliar F	31.7	1.7	1440.0	1	16.1	2314.7
2013	Scandia	2	AG4232	SOYA	57.3	1.6	1808.5	1	14.4	2608.6
2013	Scandia	2	AG3431	UTC	56.9	2.2	1645.2	1.5	14.3	2346.3
2013	Scandia	2	AG4232	UTC	61.2	2.0	1933.0	1	14.4	2792.6
2013	Scandia	2	AG4130	SOYA - foliar F	34.0	1.7	1028.5	1	16.2	1663.2
2013	Scandia	2	P93Y92	UTC	44.6	1.9	1672.9	1	15.1	2529.4
2013	Scandia	2	P93Y92	SOYA	25.0	1.2	936.9	1	15.8	1484.6
2013	Scandia	2	P94Y23	UTC	18.1	1.1	822.4	1	14.8	1217.5
2013	Scandia	2	CH3303R2	UTC	49.4	1.8	1916.6	1	14.8	2836.2
2013	Scandia	2	AG3431	SOYA	47.2	1.5	1801.8	1	15.2	2731.1
2013	Scandia	2	AG3431	SOYA - foliar F	75.6	2.7	2138.6	1	15.1	3225.5
2013	Scandia	2	P94Y23	SOYA - foliar F	82.3	3.0	2326.1	1	15.2	3532.7
2013	Scandia	3	CH3303R2	UTC	75.1	2.3	2122.4	1	15.2	3218.5
2013	Scandia	3	CH3303R2	SOYA - foliar F	35.8	1.6	1696.5	1	14.6	2478.4
2013	Scandia	3	AG4232	SOYA - foliar F	25.4	1.2	1001.0	1	15.4	1545.6
2013	Scandia	3	P93Y92	SOYA - foliar F	30.0	1.7	1361.2	1	16.7	2278.0
2013	Scandia	3	AG3431	UTC	38.5	1.9	1621.2	1	14.9	2423.4
2013	Scandia	3	P93Y92	UTC	44.8	2.4	2414.1	1	16.1	3876.2
2013	Scandia	3	CH3303R2	SOYA	42.3	1.7	1670.7	1	15.1	2521.1
2013	Scandia	3	P94Y23	SOYA - foliar F	49.3	1.5	1231.6	1	15.9	1956.1
2013	Scandia	3	AG4130	SOYA - foliar F	64.9	2.3	2090.1	1	15.1	3160.2
2013	Scandia	3	AG4232	SOYA	66.2	1.9	2046.0	1	14.7	3001.1
2013	Scandia	3	AG4130	SOYA	59.5	1.5	1564.9	1	14.4	2259.9
2013	Scandia	3	AG3431	SOYA	49.8	2.5	2028.4	1	16.2	3295.8
2013	Scandia	3	AG4130	UTC	55.3	2.0	2035.9	1	14.7	2984.2
2013	Scandia	3	P94Y23	SOYA	34.7	1.6	1232.7	1	16.5	2032.2
2013	Scandia	3	P93Y92	SOYA	25.6	0.8	521.8	1	16.5	861.8
2013	Scandia	3	P94Y23	UTC	60.8	1.9	2117.1	1	15.7	3318.0
2013	Scandia	3	AG3431	SOYA - foliar F	46.8	2.1	2059.9	1	15.8	3251.6
2013	Scandia	3	AG4232	UTC	118.3	2.6	3110.4	1.5	14.8	4613.2
2013	Scandia	4	AG4130	SOYA - foliar F	37.4	1.0	983.1	1	14.9	1462.2
2013	Scandia	4	AG4130	UTC	70.8	2.4	2608.8	1	15.1	3936.6
2013	Scandia	4	P94Y23	SOYA	64.0	3.3	1935.7	1	17.3	3339.7
2013	Scandia	4	AG3431	UTC	52.1	1.9	2055.0	1	15.1	3111.7
2013	Scandia	4	AG3431	SOYA	47.9	1.7	1859.2	1	16.4	3050.4
2013	Scandia	4	CH3303R2	SOYA	38.5	1.4	1645.0	1	15.8	2592.3
2013	Scandia	4	P93Y92	SOYA	43.7	2.0	1578.9	1	17.5	2761.4
2013	Scandia	4	P94Y23	SOYA - foliar F	57.0	2.4	2362.9	1	15.5	3655.8
2013	Scandia	4	AG4232	UTC	61.0	1.6	1805.2	1	15.2	2736.2

2013	Scandia	4	AG4232	SOYA - foliar F	51.1	1.2	1848.2	1.5	15.2	2813.8
2013	Scandia	4	P93Y92	UTC	60.9	2.4	2842.0	1.5	16.6	4728.9
2013	Scandia	4	AG4232	SOYA	16.9	0.5	668.0	1	16.4	1094.7
2013	Scandia	4	CH3303R2	SOYA - foliar F	47.5	2.0	2063.4	1	16.4	3377.1
2013	Scandia	4	P93Y92	SOYA - foliar F	11.9	0.4	492.9	1	17.9	882.1
2013	Scandia	4	CH3303R2	UTC	71.7	2.4	2168.4	1	16.4	3545.5
2013	Scandia	4	P94Y23	UTC	101.6	3.0	2672.5	1	16.2	4335.5
2013	Scandia	4	AG4130	SOYA	74.7	2.1	2013.7	1	16.2	3269.2
2013	Scandia	4	AG3431	SOYA - foliar F	68.2	2.0	2509.5	1	15.7	3949.7
2014	Manhattan	1	P93Y92	SOYA	52	1.6	1833	1	17.1	3134.9
2014	Manhattan	1	AG4033	SOYA - foliar F	78	2.3	2459	1	15.8	3885.7
2014	Manhattan	1	AG4033	SOYA	102	2.4	3229	1	15.8	5102.2
2014	Manhattan	1	P94Y23	SOYA - foliar F	60	2.1	2535	1	18.6	4715.9
2014	Manhattan	1	AG4033	SOYA - foliar F	63	2.2	2512	1	16.2	4069.0
2014	Manhattan	1	AG4232	UTC	62	1.5	2161	1	14.4	3111.7
2014	Manhattan	1	P93Y92	SOYA - foliar F	85	2.6	2508	1	15.6	3912.2
2014	Manhattan	1	AG4232	UTC	31	0.8	1154	1	14.5	1673.6
2014	Manhattan	1	P93Y92	SOYA	78	3.4	3033	1	15.9	4822.2
2014	Manhattan	1	AG3431	UTC	56	1.8	2460	1	17.3	4256.1
2014	Manhattan	1	AG3431	UTC	64	1.9	2141	1	16.9	3619.0
2014	Manhattan	1	CH3303R2	SOYA	46	1.3	1909	1	17.2	3283.6
2014	Manhattan	1	P94Y23	SOYA - foliar F	32	0.8	1245	1	17.9	2227.9
2014	Manhattan	1	AG4232	UTC	56	1.4	2180	1	14.7	3203.9
2014	Manhattan	1	AG3431	UTC	110	3.3	2975	1	14.7	4373.6
2014	Manhattan	1	CH3303R2	SOYA - foliar F	68	2.6	2687	1	15.9	4271.6
2014	Manhattan	1	CH3303R2	SOYA	59	2.1	2386	1	16.9	4032.0
2014	Manhattan	1	P94Y23	SOYA	54	2.2	1950	1	16.5	3218.2
2014	Manhattan	2	CH3303R2	SOYA	90	2.8	3141	1	16.3	5120.4
2014	Manhattan	2	P94Y23	SOYA	64	2.0	2507	1	16.6	4161.2
2014	Manhattan	2	P93Y92	SOYA	101	2.7	2859	1	15.7	4488.4
2014	Manhattan	2	AG3431	UTC	62	1.3	2168	1	15.8	3424.7
2014	Manhattan	2	P93Y92	SOYA	77	2.3	3175	1	16.2	5143.8
2014	Manhattan	2	AG4232	UTC	72	1.8	2314	1	14.5	3354.8
2014	Manhattan	2	CH3303R2	SOYA	70	2.1	2299	1	16.3	3747.6
2014	Manhattan	2	AG3431	UTC	63	1.6	2110	1	16.2	3417.8
2014	Manhattan	2	AG4232	UTC	96	3.0	3207	1	14.4	4618.7
2014	Manhattan	2	AG4033	SOYA - foliar F	61	1.6	2479	1	16.1	3991.2
2014	Manhattan	2	AG4033	SOYA	46	1.0	1395	1	16.1	2246.3
2014	Manhattan	2	AG3431	UTC	52	1.6	2300	1	15.7	3610.8
2014	Manhattan	2	CH3303R2	SOYA - foliar F	66	1.7	2478	1	16.7	4138.1
2014	Manhattan	2	AG4232	UTC	89	2.3	2800	1	14.6	4087.5
2014	Manhattan	2	P93Y92	SOYA - foliar F	80	2.3	2317	1	17.2	3986.0
2014	Manhattan	2	AG4033	SOYA - foliar F	75	2.1	2771	1	16.6	4600.2

2014	Manhattan	2	P94Y23	SOYA - foliar F	108	3.6	3710	1	17.8	6602.9
2014	Manhattan	2	P94Y23	SOYA - foliar F	80	2.9	3001	1	16.6	4980.9
2014	Manhattan	3	AG4033	SOYA - foliar F	99	2.4	3326	1	15.0	4989.7
2014	Manhattan	3	AG4232	UTC	99	2.5	3054	1	13.7	4184.3
2014	Manhattan	3	P93Y92	SOYA	94	2.4	2476	1	17.2	4258.0
2014	Manhattan	3	CH3303R2	SOYA - foliar F	79	2.4	2760	1	17.9	4940.1
2014	Manhattan	3	AG4232	UTC	102	2.7	3014	1	13.9	4189.0
2014	Manhattan	3	P94Y23	SOYA - foliar F	57	1.8	1885	1	17.8	3354.8
2014	Manhattan	3	AG3431	UTC	54	1.7	2420	1	15.8	3824.3
2014	Manhattan	3	CH3303R2	SOYA	19	0.6	752	1	17.9	1345.6
2014	Manhattan	3	AG4232	UTC	89	2.7	3147	1	14.5	4563.3
2014	Manhattan	3	AG4033	SOYA - foliar F	69	2.0	2819	1	15.1	4257.1
2014	Manhattan	3	AG3431	UTC	68	2.0	2398	1	14.4	3453.7
2014	Manhattan	3	AG3431	UTC	55	1.7	2612	1	16.3	4258.0
2014	Manhattan	3	P93Y92	SOYA	44	1.3	1472	1	17.1	2516.8
2014	Manhattan	3	P93Y92	SOYA - foliar F	76	2.5	2198	1	15.6	3428.6
2014	Manhattan	3	AG4033	SOYA	57	1.8	2188	1	16.7	3653.9
2014	Manhattan	3	P94Y23	SOYA - foliar F	94	2.8	3142	1	17.6	5530.2
2014	Manhattan	3	P94Y23	SOYA	70	2.0	2304	1	18.9	4355.1
2014	Manhattan	3	CH3303R2	SOYA	85	3.2	2127	1	15.7	3340.2
2014	Manhattan	4	AG4033	SOYA	60	1.5	2232	1	15.8	3527.2
2014	Manhattan	4	P94Y23	SOYA	71	2.4	2436	1	17.7	4312.2
2014	Manhattan	4	AG4232	UTC	85	2.4	2792	1	13.4	3741.9
2014	Manhattan	4	AG4033	SOYA - foliar F	68	2.0	2557	1	16.2	4142.8
2014	Manhattan	4	CH3303R2	SOYA - foliar F	60	1.9	2134	1	17.1	3649.8
2014	Manhattan	4	P93Y92	SOYA - foliar F	56	1.8	1814	1	17.9	3247.9
2014	Manhattan	4	AG3431	UTC	76	2.5	2446	1	16.6	4059.7
2014	Manhattan	4	P93Y92	SOYA	59	1.8	1910	1	17.6	3362.4
2014	Manhattan	4	AG4033	SOYA - foliar F	76	1.8	2303	1	15.1	3477.2
2014	Manhattan	4	AG3431	UTC	57	2.2	2606	1	15.7	4092.1
2014	Manhattan	4	P94Y23	SOYA - foliar F	85	3.5	2867	1	17.0	4873.7
2014	Manhattan	4	CH3303R2	SOYA	37	1.3	1529	1	17.1	2614.5
2014	Manhattan	4	P93Y92	SOYA	58	1.7	1841	1	17.1	3148.5
2014	Manhattan	4	AG4232	UTC	64	1.9	2693	1	14.2	3824.3
2014	Manhattan	4	CH3303R2	SOYA	72	2.4	2180	1	16.4	3576.0
2014	Manhattan	4	AG3431	UTC	66	1.8	2184	1	16.3	3559.1
2014	Manhattan	4	P94Y23	SOYA - foliar F	91	2.6	2994	1	17.3	5178.8
2014	Manhattan	4	AG4232	UTC	83	1.8	2613	1	14.0	3658.0
2014	Rossville	1	P93Y92	SOYA	112	1.8	2641	1	14.6	3855.5
2014	Rossville	1	AG4232	UTC	53	0.9	1826	1	14.5	2648.4
2014	Rossville	1	AG4033	SOYA - foliar F	85	1.7	2335	1	13.8	3222.1
2014	Rossville	1	AG4033	SOYA	149	2.6	2849	1	13.8	3932.2
2014	Rossville	1	P93Y92	SOYA	131	2.2	3007	1	14.6	4390.8

2014	Rossville	1	CH3303R2	SOYA - foliar F	62	1.2	2206	1	13.0	2867.7
2014	Rossville	1	P94Y23	SOYA - foliar F	80	2.2	1741	1	16.7	2907.1
2014	Rossville	1	P93Y92	SOYA - foliar F	102	2.4	1743	1	16.6	2893.1
2014	Rossville	1	CH3303R2	SOYA	240	4.5	3160	1	13.8	4361.3
2014	Rossville	1	AG4033	SOYA - foliar F	111	2.0	2402	1	15.0	3603.6
2014	Rossville	1	AG4232	UTC	116	2.3	2524	2	15.1	3811.8
2014	Rossville	1	AG4232	UTC	148	3.2	2831	1	14.5	4105.0
2014	Rossville	1	CH3303R2	SOYA	198	3.4	2611	1	15.9	4151.1
2014	Rossville	1	P94Y23	SOYA - foliar F	90	1.8	2418	1	15.3	3699.8
2014	Rossville	1	P94Y23	SOYA	105	1.7	1929	1	16.0	3085.7
2014	Rossville	1	AG3431	UTC	118	3.2	2398	1	14.1	3380.9
2014	Rossville	1	AG3431	UTC	184	4.7	2900	1	13.5	3914.4
2014	Rossville	1	AG3431	UTC	71	2.1	2110	1	14.9	3144.5
2014	Rossville	2	AG3431	UTC	104	2.5	3139	1	14.5	4552.2
2014	Rossville	2	CH3303R2	SOYA	77	2.1	2325	1	13.7	3185.1
2014	Rossville	2	P94Y23	SOYA - foliar F	148	2.4	2436	1	14.5	3532.1
2014	Rossville	2	AG4033	SOYA - foliar F	86	2.0	2706	1	14.3	3869.9
2014	Rossville	2	AG4033	SOYA	119	3.0	2268	1	13.7	3107.3
2014	Rossville	2	P93Y92	SOYA	79	2.9	2637	1	15.4	4060.5
2014	Rossville	2	P93Y92	SOYA	70	1.3	1617	1	14.9	2409.3
2014	Rossville	2	AG4232	UTC	138	3.7	2449	1	14.6	3576.0
2014	Rossville	2	AG4232	UTC	170	3.5	3133	1	14.0	4385.8
2014	Rossville	2	AG4033	SOYA - foliar F	228	5.0	2252	1	14.9	3355.0
2014	Rossville	2	CH3303R2	SOYA - foliar F	101	2.1	2121	1	13.7	2905.7
2014	Rossville	2	P94Y23	SOYA - foliar F	106	2.7	2238	1	13.7	3065.8
2014	Rossville	2	AG3431	UTC	125	3.3	2301	1	15.6	3588.8
2014	Rossville	2	P94Y23	SOYA	146	3.9	2688	1	16.1	4328.1
2014	Rossville	2	AG3431	UTC	95	2.2	2114	1	14.4	3043.8
2014	Rossville	2	CH3303R2	SOYA	127	3.0	2005	1	14.5	2907.5
2014	Rossville	2	P93Y92	SOYA - foliar F	140	2.8	2661	1	15.4	4098.6
2014	Rossville	2	AG4232	UTC	82	2.2	2270	1	13.2	2996.3
2014	Rossville	3	AG4033	SOYA - foliar F	89	1.7	2050	1	13.9	2849.3
2014	Rossville	3	P93Y92	SOYA - foliar F	77	2.7	2272	1	14.8	3362.0
2014	Rossville	3	P94Y23	SOYA	100	1.9	2177	1	15.5	3373.7
2014	Rossville	3	AG4033	SOYA - foliar F	92	1.5	2184	1	13.5	2948.2
2014	Rossville	3	AG3431	UTC	99	2.7	2401	1	14.3	3433.4
2014	Rossville	3	AG3431	UTC	81	2.4	2173	1	14.4	3129.3
2014	Rossville	3	P93Y92	SOYA	150	1.9	2571	1	14.1	3624.7
2014	Rossville	3	AG4232	UTC	243	4.4	3200	2	15.2	4864.3
2014	Rossville	3	AG4033	SOYA	122	2.1	2245	1	14.7	3299.6
2014	Rossville	3	P94Y23	SOYA - foliar F	139	2.4	2648	2	14.0	3707.0
2014	Rossville	3	AG4232	UTC	95	1.9	1752	2	14.1	2470.1
2014	Rossville	3	P94Y23	SOYA - foliar F	151	3.5	2780	1	13.3	3697.2

2014	Rossville	3	CH3303R2	SOYA	149	2.1	3039	2	14.4	4375.9
2014	Rossville	3	P93Y92	SOYA	69	1.4	1775	2	17.1	3034.8
2014	Rossville	3	CH3303R2	SOYA	69	1.7	2035	1	13.6	2768.1
2014	Rossville	3	AG3431	UTC	106	2.8	2850	1	13.6	3876.7
2014	Rossville	3	AG4232	UTC	136	4.4	2941	2	12.8	3764.6
2014	Rossville	3	CH3303R2	SOYA - foliar F	96	4.2	2584	1	12.8	3306.9
2014	Rossville	4	CH3303R2	SOYA	140	3.2	3225	1	15.2	4901.4
2014	Rossville	4	P94Y23	SOYA - foliar F	99	2.1	2147	1	14.8	3177.8
2014	Rossville	4	AG3431	UTC	90	2.0	2489	1	14.2	3533.7
2014	Rossville	4	AG4033	SOYA - foliar F	127	2.5	2422	1	13.5	3270.0
2014	Rossville	4	AG4232	UTC	68	1.2	1470	2	15.3	2249.1
2014	Rossville	4	AG4033	SOYA	120	2.4	2516	2	14.6	3674.1
2014	Rossville	4	P93Y92	SOYA	128	2.8	2436	2	16.2	3946.8
2014	Rossville	4	AG4232	UTC	164	3.9	3454	1	14.4	4973.0
2014	Rossville	4	AG3431	UTC	103	2.1	2293	1	13.7	3141.3
2014	Rossville	4	AG4232	UTC	118	2.7	2479	1	14.8	3668.2
2014	Rossville	4	AG3431	UTC	100	2.0	2424	1	13.2	3199.9
2014	Rossville	4	P94Y23	SOYA	104	2.1	2196	2	14.1	3096.8
2014	Rossville	4	AG4033	SOYA - foliar F	109	2.2	2364	1	15.1	3570.0
2014	Rossville	4	P94Y23	SOYA - foliar F	107	4.4	2967	2	14.2	4213.3
2014	Rossville	4	CH3303R2	SOYA	104	1.7	2732	1	14.0	3825.5
2014	Rossville	4	P93Y92	SOYA - foliar F	83	2.0	2933	2	16.3	4781.3
2014	Rossville	4	P93Y92	SOYA	153	4.2	3529	2	15.4	5435.1
2014	Rossville	4	CH3303R2	SOYA - foliar F	120	1.8	2372	1	15.1	3581.1
2014	Scandia	1	AG4033	SOYA	121	4.1	2861	1	13.6	3890.4
2014	Scandia	1	AG3431	UTC	117	3.8	2931	1	13.7	4015.1
2014	Scandia	1	P94Y23	SOYA	166	5.9	2513	1	15.3	3844.8
2014	Scandia	1	P93Y92	SOYA	166	6.0	3933	2	15.3	6016.9
2014	Scandia	1	CH3303R2	SOYA	114	3.4	1796	1	14.7	2640.5
2014	Scandia	1	AG3431	UTC	106	4.6	2777	1	14.4	3999.0
2014	Scandia	1	AG3431	UTC	114	3.8	2246	1	14.8	3324.2
2014	Scandia	1	P94Y23	SOYA - foliar F	183	5.0	3494	1	16.2	5661.0
2014	Scandia	1	AG4232	UTC	169	4.2	3989	2	13.1	5225.4
2014	Scandia	1	AG4033	SOYA - foliar F	147	5.2	2894	1	13.1	3790.6
2014	Scandia	1	AG4232	UTC	138	4.5	3266	1	13.3	4344.1
2014	Scandia	1	P93Y92	SOYA - foliar F	109	3.5	2663	1	15.0	3994.6
2014	Scandia	1	P93Y92	SOYA	103	3.0	2718	1	15.8	4294.2
2014	Scandia	1	CH3303R2	SOYA	87	1.6	2815	2	14.9	4194.3
2014	Scandia	1	AG4033	SOYA - foliar F	120	4.7	2770	1	14.8	4099.0
2014	Scandia	1	CH3303R2	SOYA - foliar F	153	5.4	1907	1	14.5	2765.1
2014	Scandia	1	P94Y23	SOYA - foliar F	136	4.2	3490	1	15.9	5548.7
2014	Scandia	1	AG4232	UTC	156	3.3	3477	1	14.1	4901.9
2014	Scandia	2	CH3303R2	SOYA	105	4.3	2684	1	14.0	3757.3

2014	Scandia	2	P94Y23	SOYA - foliar F	152	4.1	3000	1	14.3	4289.4
2014	Scandia	2	CH3303R2	SOYA - foliar F	94	3.1	2233	1	14.2	3170.7
2014	Scandia	2	AG4232	UTC	132	3.1	3043	1	13.9	4230.1
2014	Scandia	2	P93Y92	SOYA - foliar F	112	3.3	3812	2	14.8	5642.4
2014	Scandia	2	P93Y92	SOYA	110	3.8	2179	2	15.7	3420.4
2014	Scandia	2	AG4232	UTC	186	3.5	2808	1	13.5	3790.6
2014	Scandia	2	AG3431	UTC	105	4.4	2965	1	14.5	4299.0
2014	Scandia	2	P94Y23	SOYA	96	3.2	2218	1	15.8	3504.6
2014	Scandia	2	AG4033	SOYA - foliar F	96	2.0	2587	1	13.4	3466.4
2014	Scandia	2	AG4232	UTC	93	3.0	2996	1	13.5	4044.5
2014	Scandia	2	AG4033	SOYA - foliar F	139	4.8	2733	1	13.9	3799.1
2014	Scandia	2	P93Y92	SOYA	99	2.2	2412	1	15.3	3690.9
2014	Scandia	2	AG4033	SOYA	74	2.0	2150	1	14.3	3074.3
2014	Scandia	2	CH3303R2	SOYA	68	1.7	1934	1	14.6	2824.3
2014	Scandia	2	P94Y23	SOYA - foliar F	117	2.5	2923	1	15.7	4588.7
2014	Scandia	2	AG3431	UTC	153	2.7	2517	1	13.9	3499.2
2014	Scandia	2	AG3431	UTC	109	2.7	2439	1	13.6	3316.8
2014	Scandia	3	AG4033	SOYA - foliar F	144	4.5	2643	1	13.4	3541.3
2014	Scandia	3	P93Y92	SOYA - foliar F	108	2.1	1995	1	14.8	2952.6
2014	Scandia	3	P93Y92	SOYA	127	3.7	2418	1	14.8	3578.1
2014	Scandia	3	AG4033	SOYA	125	4.2	2636	1	14.3	3769.9
2014	Scandia	3	CH3303R2	SOYA	83	3.6	2602	1	14.6	3799.1
2014	Scandia	3	CH3303R2	SOYA - foliar F	126	3.1	1909	1	14.5	2768.2
2014	Scandia	3	P94Y23	SOYA - foliar F	135	2.7	3192	1	15.8	5043.2
2014	Scandia	3	AG3431	UTC	133	3.9	2789	1	13.8	3849.1
2014	Scandia	3	CH3303R2	SOYA	122	3.6	3298	1	14.2	4683.2
2014	Scandia	3	AG4232	UTC	102	2.5	2684	1	13.3	3570.2
2014	Scandia	3	AG4232	UTC	104	2.5	2260	1	13.7	3095.8
2014	Scandia	3	AG4033	SOYA - foliar F	87	1.7	2238	1	14.1	3156.2
2014	Scandia	3	AG3431	UTC	172	6.0	2483	1	12.9	3202.8
2014	Scandia	3	P94Y23	SOYA	132	4.4	3366	1	15.0	5048.8
2014	Scandia	3	P94Y23	SOYA - foliar F	102	2.0	2682	1	15.3	4103.6
2014	Scandia	3	P93Y92	SOYA	108	2.6	2566	1	15.6	4003.5
2014	Scandia	3	AG3431	UTC	138	3.8	2910	1	14.0	4074.0
2014	Scandia	3	AG4232	UTC	92	3.1	2649	1	13.9	3682.7
2014	Scandia	4	CH3303R2	SOYA - foliar F	77	1.9	2494	1	13.6	3391.6
2014	Scandia	4	AG4232	UTC	114	3.8	2101	2	13.9	2921.1
2014	Scandia	4	AG4033	SOYA - foliar F	164	7.9	3233	1	13.7	4428.9
2014	Scandia	4	AG4232	UTC	160	5.2	3472	2	12.9	4478.9
2014	Scandia	4	AG4033	SOYA - foliar F	122	3.2	2899	1	14.0	4058.0
2014	Scandia	4	P93Y92	SOYA - foliar F	.	.	.	1	.	3674.1
2014	Scandia	4	AG4033	SOYA	117	3.7	2621	1	14.4	3774.1
2014	Scandia	4	AG3431	UTC	146	3.7	2881	1	14.4	4149.0

2014	Scandia	4	P94Y23	SOYA	134	2.6	3439	2	15.7	5399.6
2014	Scandia	4	AG4232	UTC	108	3.0	2834	1	13.8	3911.0
2014	Scandia	4	P93Y92	SOYA	112	4.2	2214	1	14.9	3299.2
2014	Scandia	4	CH3303R2	SOYA	89	3.0	2395	1	14.0	3352.9
2014	Scandia	4	P94Y23	SOYA - foliar F	122	3.8	2649	1	15.0	3974.0
2014	Scandia	4	CH3303R2	SOYA	122	4.7	2571	1	13.9	3574.1
2014	Scandia	4	AG3431	UTC	66	2.1	2035	1	14.0	2849.3
2014	Scandia	4	P94Y23	SOYA - foliar F	158	4.0	3107	1	14.8	4598.9
2014	Scandia	4	P93Y92	SOYA	112	3.5	2644	1	15.6	4124.0
2014	Scandia	4	AG3431	UTC	100	4.2	2641	1	13.6	3591.1

Table A.4 Raw data for seeding rate by input systems experiment conducted at three locations in Kansas during 2012 to 2014.

YR	LOC	REP	SEEDING RATE (seeds ha^{-1})	INPUT SYSTEM	V2-V3 (plants ha^{-1})	R8 (plants ha^{-1})	EMERG-ENCE (%)	ESTABLISH-MENT (%)	SURVIVAL (%)	LODGING SCORE (1-5)	SEED MASS (g 100 seeds^{-1})	YIELD (kg ha^{-1})
2012	Manhattan	1	271,810	UTC	210023	150954	77.3	55.5	71.9	1	16.4	3420.1
2012	Manhattan	1	123,550	UTC	144391	118138	116.9	95.6	81.8	1	17.0	3690.3
2012	Manhattan	1	420,070	UTC	380667	334724	90.6	79.7	87.9	1	16.6	3563.7
2012	Manhattan	1	197,680	UTC	203460	170644	102.9	86.3	83.9	1	16.6	4167.7
2012	Manhattan	1	345,940	SOYA	236276	236276	68.3	68.3	100.0	1	16.5	4154.0
2012	Manhattan	1	123,550	SOYA	157517	150954	127.5	122.2	95.8	1	17.0	4519.4
2012	Manhattan	1	420,070	SOYA	341287	328161	81.2	78.1	96.2	1	16.7	4923.6
2012	Manhattan	1	271,810	SOYA	216586	236276	79.7	86.9	109.1	1	.	5642.3
2012	Manhattan	1	345,940	UTC	367540	347851	106.2	100.6	94.6	1	16.8	4556.5
2012	Manhattan	1	494,200	UTC	354414	439736	71.7	89.0	124.1	2	16.7	4613.4
2012	Manhattan	1	494,200	SOYA	334724	406919	67.7	82.3	121.6	1	15.6	4499.6
2012	Manhattan	1	197,680	SOYA	203460	177207	102.9	89.6	87.1	1	17.6	4305.3
2012	Manhattan	2	345,940	UTC	269092	269092	77.8	77.8	100.0	1	16.7	4756.2
2012	Manhattan	2	494,200	SOYA	492241	433172	99.6	87.7	88.0	2	16.5	5044.6
2012	Manhattan	2	420,070	SOYA	328161	341287	78.1	81.2	104.0	2	16.6	3864.2
2012	Manhattan	2	345,940	SOYA	334724	334724	96.8	96.8	100.0	1	17.4	4900.6
2012	Manhattan	2	494,200	UTC	459425	413483	93.0	83.7	90.0	2	16.6	4091.4
2012	Manhattan	2	123,550	SOYA	118138	118138	95.6	95.6	100.0	1	16.8	4069.7
2012	Manhattan	2	197,680	UTC	249402	236276	126.2	119.5	94.7	1	16.1	3495.8
2012	Manhattan	2	420,070	UTC	413483	393793	98.4	93.7	95.2	1	16.4	4403.9
2012	Manhattan	2	197,680	SOYA	196897	177207	99.6	89.6	90.0	1	16.2	3246.4
2012	Manhattan	2	271,810	SOYA	255965	288782	94.2	106.2	112.8	1	17.6	3999.8
2012	Manhattan	2	271,810	UTC	223149	242839	82.1	89.3	108.8	1	16.3	3381.6
2012	Manhattan	2	123,550	UTC	131264	111575	106.2	90.3	85.0	1	16.1	3118.5
2012	Manhattan	3	494,200	UTC	498804	439736	100.9	89.0	88.2	2	14.2	4154.4
2012	Manhattan	3	345,940	UTC	301908	321598	87.3	93.0	106.5	2	15.0	3814.1
2012	Manhattan	3	123,550	UTC	85322	85322	69.1	69.1	100.0	1	15.8	3118.8
2012	Manhattan	3	197,680	UTC	177207	183770	89.6	93.0	103.7	1	15.6	3739.7
2012	Manhattan	3	420,070	SOYA	367540	354414	87.5	84.4	96.4	2	15.2	3380.5
2012	Manhattan	3	123,550	SOYA	118138	91885	95.6	74.4	77.8	1	16.3	3899.0
2012	Manhattan	3	271,810	SOYA	183770	196897	67.6	72.4	107.1	1	15.3	3583.4
2012	Manhattan	3	494,200	SOYA	374103	406919	75.7	82.3	108.8	2	15.3	4038.2
2012	Manhattan	3	420,070	UTC	400356	426609	95.3	101.6	106.6	1	15.2	3258.8
2012	Manhattan	3	345,940	SOYA	360977	347851	104.3	100.6	96.4	1	16.4	4373.0
2012	Manhattan	3	197,680	SOYA	210023	157517	106.2	79.7	75.0	1	16.4	3258.8
2012	Manhattan	3	271,810	UTC	262529	288782	96.6	106.2	110.0	1	16.1	3609.2

2012	Manhattan	4	197,680	UTC	229713	203460	116.2	102.9	88.6	2	15.3	3914.1
2012	Manhattan	4	197,680	SOYA	150954	144391	76.4	73.0	95.7	1	16.2	4071.9
2012	Manhattan	4	123,550	UTC	111575	111575	90.3	90.3	100.0	1	16.4	2454.6
2012	Manhattan	4	420,070	UTC	400356	406919	95.3	96.9	101.6	2	15.6	4113.7
2012	Manhattan	4	345,940	SOYA	295345	269092	85.4	77.8	91.1	1	14.9	3848.2
2012	Manhattan	4	494,200	UTC	393793	360977	79.7	73.0	91.7	2	15.1	4025.7
2012	Manhattan	4	345,940	UTC	328161	341287	94.9	98.7	104.0	1	15.3	2630.8
2012	Manhattan	4	271,810	SOYA	262529	275655	96.6	101.4	105.0	1	15.9	4469.4
2012	Manhattan	4	271,810	UTC	236276	269092	86.9	99.0	113.9	1	15.3	2665.7
2012	Manhattan	4	123,550	SOYA	131264	111575	106.2	90.3	85.0	1	17.0	2973.6
2012	Manhattan	4	420,070	SOYA	288782	321598	68.7	76.6	111.4	1	16.0	3029.4
2012	Manhattan	4	494,200	SOYA	459425	472552	93.0	95.6	102.9	2	15.5	3631.8
2013	Manhattan	1	420,070	SOYA	282218	288782	67.2	68.7	102.3	1.5	15.7	3141.8
2013	Manhattan	1	345,940	SOYA	341287	321598	98.7	93.0	94.2	1	16.9	4538.0
2013	Manhattan	1	271,810	SOYA	242839	229713	89.3	84.5	94.6	1	16.2	2965.9
2013	Manhattan	1	420,070	UTC	301908	262529	71.9	62.5	87.0	1	15.4	2325.1
2013	Manhattan	1	197,680	SOYA	157517	157517	79.7	79.7	100.0	1	17.5	3244.0
2013	Manhattan	1	494,200	SOYA	380667	321598	77.0	65.1	84.5	1	16.0	4114.6
2013	Manhattan	1	271,810	UTC	210023	203460	77.3	74.9	96.9	1	15.2	2029.9
2013	Manhattan	1	123,550	UTC	78759	85322	63.7	69.1	108.3	1	16.8	2706.2
2013	Manhattan	1	494,200	UTC	433172	367540	87.7	74.4	84.8	1	16.4	3492.9
2013	Manhattan	1	123,550	SOYA	78759	78759	63.7	63.7	100.0	1	17.0	2168.8
2013	Manhattan	1	197,680	UTC	177207	170644	89.6	86.3	96.3	1	17.1	1529.1
2013	Manhattan	1	345,940	UTC	288782	236276	83.5	68.3	81.8	1	15.2	2688.2
2013	Manhattan	2	271,810	UTC	210023	177207	77.3	65.2	84.4	1	16.2	2907.7
2013	Manhattan	2	494,200	SOYA	341287	262529	69.1	53.1	76.9	1	16.1	2822.7
2013	Manhattan	2	197,680	UTC	157517	157517	79.7	79.7	100.0	1	16.2	2374.6
2013	Manhattan	2	494,200	UTC	531621	393793	107.6	79.7	74.1	1	16.8	4998.1
2013	Manhattan	2	345,940	SOYA	341287	308471	98.7	89.2	90.4	1	16.0	3258.8
2013	Manhattan	2	420,070	UTC	328161	295345	78.1	70.3	90.0	1	16.9	3977.4
2013	Manhattan	2	123,550	SOYA	111575	98448	90.3	79.7	88.2	1	16.6	1067.9
2013	Manhattan	2	197,680	SOYA	177207	183770	89.6	93.0	103.7	1	15.7	3024.3
2013	Manhattan	2	420,070	SOYA	367540	341287	87.5	81.2	92.9	1	16.3	4292.6
2013	Manhattan	2	345,940	UTC	229713	229713	66.4	66.4	100.0	1	15.4	3017.4
2013	Manhattan	2	123,550	UTC	105011	98448	85.0	79.7	93.8	1	16.4	2095.9
2013	Manhattan	2	271,810	SOYA	229713	229713	84.5	84.5	100.0	1	17.0	2630.4
2013	Manhattan	3	420,070	UTC	341287	295345	81.2	70.3	86.5	1	15.9	3350.4
2013	Manhattan	3	271,810	UTC	229713	236276	84.5	86.9	102.9	1	16.5	2411.2
2013	Manhattan	3	123,550	SOYA	91885	85322	74.4	69.1	92.9	1	17.2	1383.5
2013	Manhattan	3	271,810	SOYA	190333	177207	70.0	65.2	93.1	1	17.0	3149.0
2013	Manhattan	3	345,940	UTC	374103	315034	108.1	91.1	84.2	1	16.8	4969.7
2013	Manhattan	3	494,200	UTC	360977	288782	73.0	58.4	80.0	1	17.0	5119.6
2013	Manhattan	3	420,070	SOYA	374103	275655	89.1	65.6	73.7	1	15.9	2816.2

2013	Manhattan	3	123,550	UTC	105011	105011	85.0	85.0	100.0	1	18.3	2107.9
2013	Manhattan	3	197,680	UTC	183770	190333	93.0	96.3	103.6	1	16.9	657.8
2013	Manhattan	3	494,200	SOYA	400356	341287	81.0	69.1	85.2	1	16.6	3982.1
2013	Manhattan	3	345,940	SOYA	275655	262529	79.7	75.9	95.2	1	16.7	2397.4
2013	Manhattan	3	197,680	SOYA	157517	150954	79.7	76.4	95.8	1	18.3	3091.7
2013	Manhattan	4	123,550	UTC	98448	98448	79.7	79.7	100.0	1	17.1	3357.2
2013	Manhattan	4	197,680	UTC	177207	164080	89.6	83.0	92.6	1	16.5	2715.8
2013	Manhattan	4	494,200	SOYA	413483	328161	83.7	66.4	79.4	1.5	16.8	3578.2
2013	Manhattan	4	420,070	SOYA	262529	341287	62.5	81.2	130.0	1	17.3	3466.7
2013	Manhattan	4	345,940	UTC	236276	223149	68.3	64.5	94.4	1	16.1	3361.8
2013	Manhattan	4	271,810	SOYA	144391	157517	53.1	58.0	109.1	1	16.9	2712.7
2013	Manhattan	4	123,550	SOYA	91885	85322	74.4	69.1	92.9	1	18.0	2716.4
2013	Manhattan	4	197,680	SOYA	157517	150954	79.7	76.4	95.8	1	17.5	1423.3
2013	Manhattan	4	494,200	UTC	282218	236276	57.1	47.8	83.7	1	15.7	3423.6
2013	Manhattan	4	345,940	SOYA	288782	275655	83.5	79.7	95.5	1	17.2	2512.1
2013	Manhattan	4	271,810	UTC	229713	216586	84.5	79.7	94.3	1	18.0	2912.6
2013	Manhattan	4	420,070	UTC	269092	249402	64.1	59.4	92.7	1	17.1	2916.0
2014	Manhattan	1	197,680	UTC	164080	177207	83.0	89.6	108.0	1	15.7	2389.2
2014	Manhattan	1	494,200	UTC	420046	393793	85.0	79.7	93.8	1	15.4	3668.8
2014	Manhattan	1	123,550	UTC	118138	105011	95.6	85.0	88.9	1	15.5	2978.6
2014	Manhattan	1	271,810	SOYA	229713	236276	84.5	86.9	102.9	1	15.6	3814.1
2014	Manhattan	1	494,200	SOYA	420046	426609	85.0	86.3	101.6	1	15.6	2470.1
2014	Manhattan	1	345,940	SOYA	288782	275655	83.5	79.7	95.5	1	15.8	4444.7
2014	Manhattan	1	271,810	UTC	183770	177207	67.6	65.2	96.4	1	15.9	1902.7
2014	Manhattan	1	197,680	SOYA	183770	170644	93.0	86.3	92.9	1	15.2	4122.8
2014	Manhattan	1	345,940	UTC	308471	282218	89.2	81.6	91.5	1	15.1	3818.5
2014	Manhattan	1	420,070	UTC	406919	400356	96.9	95.3	98.4	1	15.2	4699.8
2014	Manhattan	1	123,550	SOYA	78759	85322	63.7	69.1	108.3	1	17.1	4182.1
2014	Manhattan	1	420,070	SOYA	328161	315034	78.1	75.0	96.0	1	16.3	3576.1
2014	Manhattan	2	123,550	UTC	137828	137828	111.6	111.6	100.0	1	15.7	3320.7
2014	Manhattan	2	494,200	UTC	426609	426609	86.3	86.3	100.0	1	14.9	4137.6
2014	Manhattan	2	197,680	SOYA	137828	137828	69.7	69.7	100.0	1	19.5	3914.1
2014	Manhattan	2	345,940	UTC	288782	236276	83.5	68.3	81.8	1	14.5	3625.0
2014	Manhattan	2	420,070	UTC	295345	288782	70.3	68.7	97.8	1	15.2	3653.3
2014	Manhattan	2	123,550	SOYA	124701	131264	100.9	106.2	105.3	1	15.5	3720.8
2014	Manhattan	2	420,070	SOYA	347851	321598	82.8	76.6	92.5	1	15.4	1997.9
2014	Manhattan	2	494,200	SOYA	433172	387230	87.7	78.4	89.4	1	15.5	3872.5
2014	Manhattan	2	271,810	UTC	190333	203460	70.0	74.9	106.9	1	15.3	4264.6
2014	Manhattan	2	271,810	SOYA	196897	196897	72.4	72.4	100.0	1	15.2	3050.5
2014	Manhattan	2	197,680	UTC	137828	131264	69.7	66.4	95.2	1	15.7	3830.8
2014	Manhattan	2	345,940	SOYA	288782	262529	83.5	75.9	90.9	1	15.7	3449.8
2014	Manhattan	3	345,940	SOYA	374103	321598	108.1	93.0	86.0	1	15.4	5632.5
2014	Manhattan	3	271,810	UTC	301908	255965	111.1	94.2	84.8	1	15.6	2064.1

2014	Manhattan	3	494,200	SOYA	446299	341287	90.3	69.1	76.5	1	15.7	3087.0
2014	Manhattan	3	494,200	UTC	400356	380667	81.0	77.0	95.1	1	14.8	3419.7
2014	Manhattan	3	197,680	UTC	210023	210023	106.2	106.2	100.0	1	15.4	4018.6
2014	Manhattan	3	420,070	SOYA	413483	341287	98.4	81.2	82.5	1	15.4	4763.4
2014	Manhattan	3	345,940	UTC	275655	236276	79.7	68.3	85.7	1	15.4	3922.8
2014	Manhattan	3	197,680	SOYA	131264	131264	66.4	66.4	100.0	1	16.1	3899.6
2014	Manhattan	3	420,070	UTC	282218	275655	67.2	65.6	97.7	1	15.8	3298.7
2014	Manhattan	3	123,550	SOYA	105011	105011	85.0	85.0	100.0	1	16.3	2962.5
2014	Manhattan	3	123,550	UTC	137828	118138	111.6	95.6	85.7	1	15.9	3328.3
2014	Manhattan	3	271,810	SOYA	242839	236276	89.3	86.9	97.3	1	15.0	2091.9
2014	Manhattan	4	494,200	SOYA	354414	301908	71.7	61.1	85.2	1	15.5	4517.0
2014	Manhattan	4	345,940	UTC	282218	275655	81.6	79.7	97.7	1	15.6	4435.6
2014	Manhattan	4	271,810	SOYA	262529	249402	96.6	91.8	95.0	1	15.0	2864.6
2014	Manhattan	4	123,550	UTC	105011	98448	85.0	79.7	93.8	1	15.6	3430.2
2014	Manhattan	4	271,810	UTC	236276	190333	86.9	70.0	80.6	1	15.4	2657.7
2014	Manhattan	4	420,070	SOYA	413483	354414	98.4	84.4	85.7	1	15.4	3788.6
2014	Manhattan	4	420,070	UTC	315034	308471	75.0	73.4	97.9	1	15.3	3515.2
2014	Manhattan	4	197,680	SOYA	170644	170644	86.3	86.3	100.0	1	17.7	2911.0
2014	Manhattan	4	123,550	SOYA	98448	98448	79.7	79.7	100.0	1	16.1	3762.9
2014	Manhattan	4	345,940	SOYA	275655	255965	79.7	74.0	92.9	1	15.4	3225.8
2014	Manhattan	4	494,200	UTC	479115	347851	96.9	70.4	72.6	1	15.4	3674.1
2014	Manhattan	4	197,680	UTC	170644	150954	86.3	76.4	88.5	1	14.9	3170.9
2012	Rossville	1	345,940	UTC	367540	308471	106.2	89.2	83.9	2	12.3	3058.7
2012	Rossville	1	197,680	SOYA	190333	177207	96.3	89.6	93.1	2	14.8	4076.4
2012	Rossville	1	123,550	SOYA	78759	59069	63.7	47.8	75.0	2	15.0	3628.4
2012	Rossville	1	420,070	SOYA	315034	255965	75.0	60.9	81.3	2	13.4	3561.9
2012	Rossville	1	123,550	UTC	157517	98448	127.5	79.7	62.5	2.5	13.6	2749.1
2012	Rossville	1	271,810	UTC	288782	210023	106.2	77.3	72.7	2.5	13.3	2484.6
2012	Rossville	1	197,680	UTC	210023	216586	106.2	109.6	103.1	2	12.6	2433.1
2012	Rossville	1	494,200	SOYA	439736	262529	89.0	53.1	59.7	1.5	13.1	3689.5
2012	Rossville	1	271,810	SOYA	242839	196897	89.3	72.4	81.1	2	13.0	3546.5
2012	Rossville	1	420,070	UTC	439736	393793	104.7	93.7	89.6	2	12.7	2650.2
2012	Rossville	1	345,940	SOYA	367540	301908	106.2	87.3	82.1	1.5	12.6	2882.2
2012	Rossville	1	494,200	UTC	485678	426609	98.3	86.3	87.8	1.5	13.1	2816.4
2012	Rossville	2	420,070	SOYA	367540	328161	87.5	78.1	89.3	1	13.4	3401.1
2012	Rossville	2	494,200	UTC	472552	400356	95.6	81.0	84.7	1.5	15.1	4137.4
2012	Rossville	2	345,940	UTC	433172	229713	125.2	66.4	53.0	1	14.5	3040.8
2012	Rossville	2	123,550	UTC	137828	144391	111.6	116.9	104.8	1	14.4	2985.0
2012	Rossville	2	271,810	UTC	269092	190333	99.0	70.0	70.7	1	12.9	2497.0
2012	Rossville	2	345,940	SOYA	347851	269092	100.6	77.8	77.4	1	14.0	3816.7
2012	Rossville	2	420,070	UTC	354414	223149	84.4	53.1	63.0	1.5	14.3	3031.4
2012	Rossville	2	197,680	SOYA	203460	98448	102.9	49.8	48.4	2	13.7	3315.4
2012	Rossville	2	123,550	SOYA	111575	98448	90.3	79.7	88.2	2	13.6	3291.1

2012	Rossville	2	197,680	UTC	190333	131264	96.3	66.4	69.0	1	13.8	2965.1
2012	Rossville	2	271,810	SOYA	229713	190333	84.5	70.0	82.9	1	13.4	3460.6
2012	Rossville	2	494,200	SOYA	354414	249402	71.7	50.5	70.4	1.5	13.4	4179.3
2012	Rossville	3	420,070	UTC	426609	367540	101.6	87.5	86.2	1	13.4	3029.2
2012	Rossville	3	420,070	SOYA	347851	269092	82.8	64.1	77.4	1	14.9	4679.2
2012	Rossville	3	271,810	UTC	301908	255965	111.1	94.2	84.8	1	14.3	3314.6
2012	Rossville	3	197,680	SOYA	164080	150954	83.0	76.4	92.0	1	14.3	3725.7
2012	Rossville	3	123,550	SOYA	124701	131264	100.9	106.2	105.3	2	13.7	3292.7
2012	Rossville	3	345,940	SOYA	255965	255965	74.0	74.0	100.0	1	13.7	3969.7
2012	Rossville	3	494,200	UTC	433172	321598	87.7	65.1	74.2	1	13.3	2581.6
2012	Rossville	3	123,550	UTC	137828	124701	111.6	100.9	90.5	1.5	13.3	3283.3
2012	Rossville	3	271,810	SOYA	262529	242839	96.6	89.3	92.5	1	13.6	3216.2
2012	Rossville	3	494,200	SOYA	485678	426609	98.3	86.3	87.8	1	14.2	3800.0
2012	Rossville	3	197,680	UTC	164080	144391	83.0	73.0	88.0	1	12.3	2929.1
2012	Rossville	3	345,940	UTC	242839	249402	70.2	72.1	102.7	1	13.3	3451.1
2012	Rossville	4	494,200	UTC	518494	420046	104.9	85.0	81.0	1	13.4	3482.7
2012	Rossville	4	271,810	SOYA	203460	157517	74.9	58.0	77.4	1	15.2	3869.0
2012	Rossville	4	123,550	UTC	150954	144391	122.2	116.9	95.7	2	14.0	2829.2
2012	Rossville	4	197,680	UTC	196897	144391	99.6	73.0	73.3	1.5	13.9	3179.6
2012	Rossville	4	345,940	UTC	269092	170644	77.8	49.3	63.4	1	13.5	2602.2
2012	Rossville	4	420,070	UTC	354414	301908	84.4	71.9	85.2	1	13.0	3152.9
2012	Rossville	4	345,940	SOYA	308471	262529	89.2	75.9	85.1	1	13.3	3270.3
2012	Rossville	4	494,200	SOYA	433172	308471	87.7	62.4	71.2	1	13.7	3668.4
2012	Rossville	4	271,810	UTC	295345	249402	108.7	91.8	84.4	1	13.4	3200.7
2012	Rossville	4	123,550	SOYA	98448	111575	79.7	90.3	113.3	1.5	13.8	3395.6
2012	Rossville	4	420,070	SOYA	341287	269092	81.2	64.1	78.8	1	12.8	1559.6
2012	Rossville	4	197,680	SOYA	190333	183770	96.3	93.0	96.6	1	13.8	3075.3
2013	Rossville	1	494,200	UTC	196897	183770	39.8	37.2	93.3	1.5	15.4	3676.6
2013	Rossville	1	123,550	UTC	78759	59069	63.7	47.8	75.0	1	14.6	2374.6
2013	Rossville	1	197,680	UTC	111575	105011	56.4	53.1	94.1	1	14.4	2037.2
2013	Rossville	1	271,810	SOYA	150954	111575	55.5	41.0	73.9	1	14.9	2867.1
2013	Rossville	1	420,070	SOYA	393793	288782	93.7	68.7	73.3	1	15.2	2670.6
2013	Rossville	1	271,810	UTC	164080	118138	60.4	43.5	72.0	1	14.1	2294.2
2013	Rossville	1	345,940	UTC	203460	111575	58.8	32.3	54.8	1.5	14.8	2456.9
2013	Rossville	1	345,940	SOYA	334724	196897	96.8	56.9	58.8	1.5	16.4	3306.4
2013	Rossville	1	197,680	SOYA	137828	91885	69.7	46.5	66.7	1	15.5	3291.2
2013	Rossville	1	123,550	SOYA	85322	91885	69.1	74.4	107.7	1	15.2	3584.3
2013	Rossville	1	494,200	SOYA	328161	269092	66.4	54.5	82.0	1.5	16.3	3178.1
2013	Rossville	1	420,070	UTC	301908	275655	71.9	65.6	91.3	1.5	14.8	2533.8
2013	Rossville	2	494,200	UTC	577563	420046	116.9	85.0	72.7	1	13.5	2404.8
2013	Rossville	2	420,070	SOYA	420046	242839	100.0	57.8	57.8	1	14.5	2506.2
2013	Rossville	2	420,070	UTC	433172	288782	103.1	68.7	66.7	1	14.3	2879.7
2013	Rossville	2	197,680	SOYA	236276	150954	119.5	76.4	63.9	1	13.7	2735.8

2013	Rossville	2	123,550	UTC	59069	85322	47.8	69.1	144.4	1	14.1	1259.4
2013	Rossville	2	123,550	SOYA	118138	124701	95.6	100.9	105.6	1	13.8	2432.3
2013	Rossville	2	345,940	SOYA	367540	269092	106.2	77.8	73.2	1	14.8	2617.4
2013	Rossville	2	271,810	SOYA	242839	183770	89.3	67.6	75.7	1	14.4	2546.2
2013	Rossville	2	197,680	UTC	196897	183770	99.6	93.0	93.3	1.5	13.7	2191.1
2013	Rossville	2	345,940	UTC	301908	242839	87.3	70.2	80.4	1	15.6	2580.6
2013	Rossville	2	271,810	UTC	157517	157517	58.0	58.0	100.0	1	13.6	2326.8
2013	Rossville	2	494,200	SOYA	544747	315034	110.2	63.7	57.8	1	13.7	2947.0
2013	Rossville	3	494,200	UTC	525057	334724	106.2	67.7	63.8	1	13.5	2701.7
2013	Rossville	3	271,810	SOYA	216586	203460	79.7	74.9	93.9	1	15.3	3321.2
2013	Rossville	3	345,940	SOYA	354414	262529	102.4	75.9	74.1	1	14.7	2709.2
2013	Rossville	3	420,070	SOYA	433172	374103	103.1	89.1	86.4	1	13.6	2589.5
2013	Rossville	3	494,200	SOYA	465988	354414	94.3	71.7	76.1	1	14.7	3046.8
2013	Rossville	3	197,680	SOYA	150954	78759	76.4	39.8	52.2	1	14.1	2394.7
2013	Rossville	3	271,810	UTC	236276	177207	86.9	65.2	75.0	1	13.0	2183.7
2013	Rossville	3	123,550	UTC	131264	118138	106.2	95.6	90.0	1	15.3	2184.9
2013	Rossville	3	420,070	UTC	328161	275655	78.1	65.6	84.0	1	14.9	2336.7
2013	Rossville	3	123,550	SOYA	111575	91885	90.3	74.4	82.4	1	13.4	2660.2
2013	Rossville	3	345,940	UTC	249402	190333	72.1	55.0	76.3	1	13.7	2253.7
2013	Rossville	3	197,680	UTC	164080	177207	83.0	89.6	108.0	1	14.6	2515.1
2013	Rossville	4	271,810	SOYA	439736	334724	161.8	123.1	76.1	1	14.7	3280.2
2013	Rossville	4	271,810	UTC	223149	210023	82.1	77.3	94.1	1	17.6	2222.0
2013	Rossville	4	420,070	UTC	518494	275655	123.4	65.6	53.2	1	13.5	1910.5
2013	Rossville	4	494,200	UTC	538184	413483	108.9	83.7	76.8	1	13.5	2280.1
2013	Rossville	4	123,550	UTC	105011	91885	85.0	74.4	87.5	1	13.9	2142.0
2013	Rossville	4	345,940	UTC	288782	229713	83.5	66.4	79.5	1	14.0	1614.7
2013	Rossville	4	420,070	SOYA	492241	347851	117.2	82.8	70.7	1	14.4	2940.3
2013	Rossville	4	197,680	SOYA	360977	177207	182.6	89.6	49.1	1	14.2	2808.9
2013	Rossville	4	494,200	SOYA	511931	446299	103.6	90.3	87.2	1	14.4	2307.3
2013	Rossville	4	197,680	UTC	196897	196897	99.6	99.6	100.0	1	13.5	1873.8
2013	Rossville	4	123,550	SOYA	137828	91885	111.6	74.4	66.7	1	15.9	2849.2
2013	Rossville	4	345,940	SOYA	341287	269092	98.7	77.8	78.8	1	15.4	2471.6
2014	Rossville	1	123,550	SOYA	85322	78759	69.1	63.7	92.3	1	14.4	2433.8
2014	Rossville	1	345,940	UTC	223149	203460	64.5	58.8	91.2	1	15.9	3785.8
2014	Rossville	1	420,070	SOYA	321598	275655	76.6	65.6	85.7	1	13.9	3902.2
2014	Rossville	1	197,680	SOYA	131264	118138	66.4	59.8	90.0	1	16.7	3440.5
2014	Rossville	1	271,810	UTC	124701	105011	45.9	38.6	84.2	1	14.6	3567.4
2014	Rossville	1	197,680	UTC	124701	91885	63.1	46.5	73.7	1	14.1	2755.2
2014	Rossville	1	494,200	UTC	262529	210023	53.1	42.5	80.0	1	16.3	2806.5
2014	Rossville	1	420,070	UTC	269092	216586	64.1	51.6	80.5	1	15.7	3529.7
2014	Rossville	1	494,200	SOYA	406919	374103	82.3	75.7	91.9	1	14.9	4508.3
2014	Rossville	1	271,810	SOYA	196897	183770	72.4	67.6	93.3	1	15.0	4394.5
2014	Rossville	1	345,940	SOYA	164080	157517	47.4	45.5	96.0	1	14.2	4377.2

2014	Rossville	1	123,550	UTC	85322	78759	69.1	63.7	92.3	1	14.3	2581.6
2014	Rossville	2	123,550	UTC	105011	78759	85.0	63.7	75.0	1	14.5	2576.2
2014	Rossville	2	345,940	UTC	137828	91885	39.8	26.6	66.7	1	15.2	4151.5
2014	Rossville	2	197,680	SOYA	137828	131264	69.7	66.4	95.2	1	14.8	3743.2
2014	Rossville	2	271,810	SOYA	170644	98448	62.8	36.2	57.7	1	16.2	4635.0
2014	Rossville	2	271,810	UTC	118138	91885	43.5	33.8	77.8	1	14.8	3146.9
2014	Rossville	2	197,680	UTC	105011	91885	53.1	46.5	87.5	1	13.3	3501.4
2014	Rossville	2	494,200	UTC	400356	374103	81.0	75.7	93.4	1	14.7	3620.5
2014	Rossville	2	420,070	SOYA	275655	216586	65.6	51.6	78.6	1	14.4	4537.0
2014	Rossville	2	345,940	SOYA	282218	242839	81.6	70.2	86.0	1	15.0	4524.8
2014	Rossville	2	494,200	SOYA	406919	367540	82.3	74.4	90.3	1	16.2	4968.0
2014	Rossville	2	123,550	SOYA	72195	65632	58.4	53.1	90.9	1	14.5	3031.4
2014	Rossville	2	420,070	UTC	216586	190333	51.6	45.3	87.9	1	14.4	3638.8
2014	Rossville	3	420,070	UTC	242839	190333	57.8	45.3	78.4	1	16.0	2713.9
2014	Rossville	3	197,680	SOYA	98448	78759	49.8	39.8	80.0	1	16.2	3143.9
2014	Rossville	3	420,070	SOYA	387230	295345	92.2	70.3	76.3	1	16.5	4015.2
2014	Rossville	3	197,680	UTC	150954	118138	76.4	59.8	78.3	1	15.4	3180.6
2014	Rossville	3	494,200	UTC	360977	295345	73.0	59.8	81.8	1	14.7	4076.2
2014	Rossville	3	345,940	SOYA	236276	170644	68.3	49.3	72.2	1	14.7	4036.1
2014	Rossville	3	271,810	UTC	157517	216586	58.0	79.7	137.5	1	16.1	3029.3
2014	Rossville	3	123,550	SOYA	85322	65632	69.1	53.1	76.9	1	15.5	2794.8
2014	Rossville	3	494,200	SOYA	360977	420046	73.0	85.0	116.4	1	15.7	3537.2
2014	Rossville	3	271,810	SOYA	144391	131264	53.1	48.3	90.9	1	15.5	3314.5
2014	Rossville	3	123,550	UTC	72195	45943	58.4	37.2	63.6	1	14.3	2581.6
2014	Rossville	3	345,940	UTC	131264	98448	37.9	28.5	75.0	1	13.8	3273.5
2014	Rossville	4	197,680	UTC	210023	72195	106.2	36.5	34.4	1	14.2	2937.9
2014	Rossville	4	345,940	UTC	229713	164080	66.4	47.4	71.4	1	14.2	3344.1
2014	Rossville	4	494,200	UTC	328161	255965	66.4	51.8	78.0	1	14.9	3221.2
2014	Rossville	4	271,810	SOYA	144391	131264	53.1	48.3	90.9	1	16.3	3623.6
2014	Rossville	4	345,940	SOYA	242839	203460	70.2	58.8	83.8	1	15.7	3858.8
2014	Rossville	4	271,810	UTC	170644	157517	62.8	58.0	92.3	1	14.6	3411.4
2014	Rossville	4	197,680	SOYA	203460	183770	102.9	93.0	90.3	1	15.5	3288.4
2014	Rossville	4	420,070	SOYA	216586	229713	51.6	54.7	106.1	1	14.1	3228.8
2014	Rossville	4	123,550	UTC	105011	91885	85.0	74.4	87.5	1	14.2	2429.8
2014	Rossville	4	420,070	UTC	308471	308471	73.4	73.4	100.0	1	14.9	3180.4
2014	Rossville	4	123,550	SOYA	78759	78759	63.7	63.7	100.0	1	15.6	2659.0
2014	Rossville	4	494,200	SOYA	413483	328161	83.7	66.4	79.4	1	15.8	3645.9
2012	Scandia	1	271,810	UTC	79651	81804	29.3	30.1	102.7	1	15.1	2480.7
2012	Scandia	1	420,070	UTC	230343	254023	54.8	60.5	110.3	1	14.7	2878.4
2012	Scandia	1	197,680	UTC	135622	146386	68.6	74.1	107.9	1	14.2	1768.6
2012	Scandia	1	345,940	SOYA	198052	146386	57.3	42.3	73.9	1	14.9	1976.7
2012	Scandia	1	420,070	SOYA	234648	256175	55.9	61.0	109.2	1	14.9	2427.5
2012	Scandia	1	197,680	SOYA	86109	92568	43.6	46.8	107.5	1	14.8	2150.1

2012	Scandia	1	494,200	UTC	228190	251870	46.2	51.0	110.4	1	14.6	2462.2
2012	Scandia	1	123,550	SOYA	83957	90415	68.0	73.2	107.7	1.5	14.8	2739.7
2012	Scandia	1	271,810	SOYA	118400	137775	43.6	50.7	116.4	1	15.3	2358.2
2012	Scandia	1	494,200	SOYA	309994	372423	62.7	75.4	120.1	1	14.7	3329.2
2012	Scandia	1	123,550	UTC	66735	60277	54.0	48.8	90.3	1.5	15.2	2517.9
2012	Scandia	1	345,940	UTC	208815	180830	60.4	52.3	86.6	1.5	15.0	2947.7
2012	Scandia	2	345,940	UTC	210968	213121	61.0	61.6	101.0	1	15.4	2670.3
2012	Scandia	2	494,200	SOYA	195899	230343	39.6	46.6	117.6	1	14.6	3294.5
2012	Scandia	2	197,680	SOYA	96873	88262	49.0	44.6	91.1	1	14.6	2115.4
2012	Scandia	2	345,940	SOYA	157150	142081	45.4	41.1	90.4	1	15.1	2496.9
2012	Scandia	2	420,070	SOYA	219579	232495	52.3	55.3	105.9	1	14.9	2809.0
2012	Scandia	2	271,810	UTC	146386	144233	53.9	53.1	98.5	1	14.9	3051.8
2012	Scandia	2	420,070	UTC	170066	191593	40.5	45.6	112.7	1	14.6	2756.3
2012	Scandia	2	197,680	UTC	120553	120553	61.0	61.0	100.0	1.5	15.3	3502.6
2012	Scandia	2	494,200	UTC	294925	374576	59.7	75.8	127.0	1	15.6	3363.9
2012	Scandia	2	123,550	UTC	77498	71040	62.7	57.5	91.7	1.5	14.9	2878.4
2012	Scandia	2	123,550	SOYA	62429	60277	50.5	48.8	96.6	1	15.2	2635.6
2012	Scandia	2	271,810	SOYA	131317	129164	48.3	47.5	98.4	1	14.8	2774.3
2012	Scandia	3	345,940	SOYA	221732	206663	64.1	59.7	93.2	1.5	15.9	3759.6
2012	Scandia	3	271,810	UTC	170066	187288	62.6	68.9	110.1	1	15.0	3398.6
2012	Scandia	3	123,550	UTC	77498	75346	62.7	61.0	97.2	1	15.0	2011.4
2012	Scandia	3	345,940	UTC	195899	204510	56.6	59.1	104.4	1	15.7	3363.9
2012	Scandia	3	123,550	SOYA	71040	75346	57.5	61.0	106.1	1	15.3	3104.3
2012	Scandia	3	420,070	SOYA	185135	178677	44.1	42.5	96.5	1.5	15.1	3710.7
2012	Scandia	3	271,810	SOYA	193746	187288	71.3	68.9	96.7	1	15.5	2878.4
2012	Scandia	3	197,680	SOYA	133470	142081	67.5	71.9	106.5	1	15.4	3739.2
2012	Scandia	3	494,200	SOYA	262634	305688	53.1	61.9	116.4	1	15.7	3155.8
2012	Scandia	3	494,200	UTC	264786	284161	53.6	57.5	107.3	1.5	15.3	4474.2
2012	Scandia	3	420,070	UTC	223884	223884	53.3	53.3	100.0	2	15.7	3940.7
2012	Scandia	3	197,680	UTC	105484	111942	53.4	56.6	106.1	2	15.6	3849.4
2012	Scandia	4	271,810	UTC	193746	180830	71.3	66.5	93.3	2	16.0	4100.1
2012	Scandia	4	123,550	UTC	75346	71040	61.0	57.5	94.3	2	15.0	3676.0
2012	Scandia	4	197,680	UTC	167913	189441	84.9	95.8	112.8	1	15.2	2809.0
2012	Scandia	4	494,200	SOYA	217426	254023	44.0	51.4	116.8	1	15.6	4370.9
2012	Scandia	4	197,680	SOYA	105484	114095	53.4	57.7	108.2	1.5	15.7	3380.2
2012	Scandia	4	345,940	UTC	142081	137775	41.1	39.8	97.0	1.5	15.1	4277.0
2012	Scandia	4	420,070	SOYA	198052	206663	47.1	49.2	104.3	1	15.9	3606.6
2012	Scandia	4	271,810	SOYA	148539	163608	54.6	60.2	110.1	1.5	15.9	4092.1
2012	Scandia	4	123,550	SOYA	66735	64582	54.0	52.3	96.8	1	16.0	2566.3
2012	Scandia	4	494,200	UTC	254023	254023	51.4	51.4	100.0	1	14.3	3884.1
2012	Scandia	4	420,070	UTC	243259	219579	57.9	52.3	90.3	1.5	15.5	3537.3
2012	Scandia	4	345,940	SOYA	202357	204510	58.5	59.1	101.1	1.5	15.7	4057.5
2013	Scandia	1	123,550	UTC	196897	157517	159.4	127.5	80.0	1	15.2	2160.4

2013	Scandia	1	345,940	SOYA	380667	295345	110.0	85.4	77.6	1	16.2	3572.0
2013	Scandia	1	420,070	UTC	249402	321598	59.4	76.6	128.9	1	15.0	2335.7
2013	Scandia	1	123,550	SOYA	65632	78759	53.1	63.7	120.0	1	15.7	2171.3
2013	Scandia	1	494,200	SOYA	420046	505368	85.0	102.3	120.3	1	16.1	2777.5
2013	Scandia	1	271,810	SOYA	315034	236276	115.9	86.9	75.0	1	15.3	2414.7
2013	Scandia	1	197,680	SOYA	131264	196897	66.4	99.6	150.0	1	15.6	2845.1
2013	Scandia	1	197,680	UTC	144391	164080	73.0	83.0	113.6	1	15.0	2420.2
2013	Scandia	1	271,810	UTC	236276	236276	86.9	86.9	100.0	1	14.4	1953.0
2013	Scandia	1	345,940	UTC	367540	308471	106.2	89.2	83.9	1	14.4	2046.0
2013	Scandia	1	420,070	SOYA	315034	321598	75.0	76.6	102.1	1	14.6	2020.6
2013	Scandia	1	494,200	UTC	498804	380667	100.9	77.0	76.3	1	14.7	2620.5
2013	Scandia	2	123,550	UTC	91885	105011	74.4	85.0	114.3	1	13.8	1874.4
2013	Scandia	2	494,200	UTC	380667	360977	77.0	73.0	94.8	1	14.6	2394.0
2013	Scandia	2	420,070	SOYA	275655	367540	65.6	87.5	133.3	1	15.1	1895.0
2013	Scandia	2	123,550	SOYA	118138	111575	95.6	90.3	94.4	1	15.2	2496.9
2013	Scandia	2	345,940	UTC	183770	183770	53.1	53.1	100.0	1	14.7	2229.5
2013	Scandia	2	271,810	UTC	354414	275655	130.4	101.4	77.8	1	15.1	2438.7
2013	Scandia	2	345,940	SOYA	262529	288782	75.9	83.5	110.0	1	15.6	2164.0
2013	Scandia	2	420,070	UTC	393793	341287	93.7	81.2	86.7	1	14.1	2104.1
2013	Scandia	2	197,680	SOYA	196897	137828	99.6	69.7	70.0	1	15.1	1925.7
2013	Scandia	2	271,810	SOYA	288782	223149	106.2	82.1	77.3	1	15.2	2549.5
2013	Scandia	2	494,200	SOYA	354414	367540	71.7	74.4	103.7	1	15.7	3284.8
2013	Scandia	2	197,680	UTC	105011	150954	53.1	76.4	143.8	1	15.7	2777.1
2013	Scandia	3	345,940	SOYA	315034	308471	91.1	89.2	97.9	1	15.6	2016.0
2013	Scandia	3	271,810	UTC	341287	295345	125.6	108.7	86.5	1	14.3	1882.8
2013	Scandia	3	271,810	SOYA	288782	269092	106.2	99.0	93.2	1	15.1	1849.6
2013	Scandia	3	420,070	SOYA	354414	387230	84.4	92.2	109.3	1	15.3	1757.1
2013	Scandia	3	123,550	SOYA	144391	98448	116.9	79.7	68.2	1	15.6	2073.8
2013	Scandia	3	197,680	SOYA	223149	170644	112.9	86.3	76.5	1	15.4	2746.2
2013	Scandia	3	420,070	UTC	472552	380667	112.5	90.6	80.6	1	14.7	2619.6
2013	Scandia	3	197,680	UTC	196897	190333	99.6	96.3	96.7	1	14.7	1938.7
2013	Scandia	3	123,550	UTC	131264	111575	106.2	90.3	85.0	1	14.1	906.6
2013	Scandia	3	345,940	UTC	301908	255965	87.3	74.0	84.8	1	14.8	2555.3
2013	Scandia	3	494,200	SOYA	446299	531621	90.3	107.6	119.1	1	14.9	2641.9
2013	Scandia	3	494,200	UTC	406919	334724	82.3	67.7	82.3	1	16.0	2889.4
2013	Scandia	4	123,550	SOYA	105011	105011	85.0	85.0	100.0	1	14.9	1740.5
2013	Scandia	4	123,550	UTC	52506	52506	42.5	42.5	100.0	1	14.1	1603.2
2013	Scandia	4	345,940	UTC	433172	433172	125.2	125.2	100.0	1	14.5	1934.4
2013	Scandia	4	271,810	UTC	249402	236276	91.8	86.9	94.7	1	15.1	2878.8
2013	Scandia	4	197,680	SOYA	170644	210023	86.3	106.2	123.1	1	16.3	2278.0
2013	Scandia	4	494,200	UTC	315034	380667	63.7	77.0	120.8	1	15.5	3543.7
2013	Scandia	4	345,940	SOYA	459425	393793	132.8	113.8	85.7	1	15.7	1849.6
2013	Scandia	4	271,810	SOYA	236276	242839	86.9	89.3	102.8	1	15.0	2152.7

2013	Scandia	4	197,680	UTC	183770	164080	93.0	83.0	89.3	1	14.2	1922.2
2013	Scandia	4	420,070	SOYA	262529	255965	62.5	60.9	97.5	1	15.6	2238.7
2013	Scandia	4	420,070	UTC	446299	334724	106.2	79.7	75.0	1	16.4	2949.0
2013	Scandia	4	494,200	SOYA	446299	387230	90.3	78.4	86.8	1	15.9	4100.6
2014	Scandia	1	123,550	SOYA	78759	131264	63.7	106.2	166.7	1	16.5	2642.4
2014	Scandia	1	420,070	UTC	164080	150954	39.1	35.9	92.0	1	14.5	3870.1
2014	Scandia	1	123,550	UTC	65632	137828	53.1	111.6	210.0	1	14.9	2672.9
2014	Scandia	1	345,940	UTC	269092	144391	77.8	41.7	53.7	1	14.4	3825.4
2014	Scandia	1	494,200	SOYA	282218	164080	57.1	33.2	58.1	1	14.8	4669.7
2014	Scandia	1	197,680	UTC	170644	131264	86.3	66.4	76.9	1	14.2	4320.7
2014	Scandia	1	345,940	SOYA	190333	170644	55.0	49.3	89.7	1	15.4	3449.8
2014	Scandia	1	494,200	UTC	170644	177207	34.5	35.9	103.8	1	14.8	3988.0
2014	Scandia	1	420,070	SOYA	137828	150954	32.8	35.9	109.5	1	15.3	4046.1
2014	Scandia	1	271,810	SOYA	216586	137828	79.7	50.7	63.6	1	15.0	4536.6
2014	Scandia	1	271,810	UTC	150954	118138	55.5	43.5	78.3	1	14.3	4590.8
2014	Scandia	1	197,680	SOYA	216586	137828	109.6	69.7	63.6	1	14.6	2844.5
2014	Scandia	2	271,810	UTC	150954	196897	55.5	72.4	130.4	1	15.1	3376.4
2014	Scandia	2	197,680	UTC	85322	131264	43.2	66.4	153.8	1	14.8	3747.6
2014	Scandia	2	494,200	UTC	301908	190333	61.1	38.5	63.0	1	14.6	3899.0
2014	Scandia	2	197,680	SOYA	111575	118138	56.4	59.8	105.9	1	15.0	3829.8
2014	Scandia	2	271,810	SOYA	190333	137828	70.0	50.7	72.4	1	14.8	4301.1
2014	Scandia	2	420,070	UTC	236276	196897	56.2	46.9	83.3	1	14.4	3756.1
2014	Scandia	2	345,940	SOYA	223149	150954	64.5	43.6	67.6	1	15.5	2991.7
2014	Scandia	2	123,550	SOYA	78759	118138	63.7	95.6	150.0	1	15.3	3257.7
2014	Scandia	2	345,940	UTC	144391	157517	41.7	45.5	109.1	1	14.8	3702.8
2014	Scandia	2	494,200	SOYA	275655	183770	55.8	37.2	66.7	1	15.3	5259.6
2014	Scandia	2	420,070	SOYA	269092	170644	64.1	40.6	63.4	1	14.8	5302.7
2014	Scandia	2	123,550	UTC	91885	78759	74.4	63.7	85.7	1	13.6	3065.2
2014	Scandia	3	123,550	UTC	72195	183770	58.4	148.7	254.5	1	14.4	3082.8
2014	Scandia	3	197,680	UTC	85322	137828	43.2	69.7	161.5	1	14.2	3988.0
2014	Scandia	3	123,550	SOYA	59069	137828	47.8	111.6	233.3	1	14.5	2008.5
2014	Scandia	3	345,940	SOYA	131264	183770	37.9	53.1	140.0	1	15.0	4075.2
2014	Scandia	3	345,940	UTC	183770	164080	53.1	47.4	89.3	1	14.2	4202.7
2014	Scandia	3	420,070	UTC	236276	177207	56.2	42.2	75.0	1	14.1	5296.7
2014	Scandia	3	271,810	UTC	196897	150954	72.4	55.5	76.7	1	14.2	3519.2
2014	Scandia	3	494,200	SOYA	242839	216586	49.1	43.8	89.2	1	15.1	4550.7
2014	Scandia	3	271,810	SOYA	170644	203460	62.8	74.9	119.2	1	14.8	3653.8
2014	Scandia	3	494,200	UTC	341287	236276	69.1	47.8	69.2	1	14.3	4506.9
2014	Scandia	3	420,070	SOYA	288782	216586	68.7	51.6	75.0	1	15.0	5080.1
2014	Scandia	3	197,680	SOYA	131264	170644	66.4	86.3	130.0	1	14.9	2764.7
2014	Scandia	4	420,070	UTC	288782	210023	68.7	50.0	72.7	1	14.2	3441.9
2014	Scandia	4	494,200	UTC	282218	216586	57.1	43.8	76.7	1	14.3	4037.0
2014	Scandia	4	123,550	SOYA	39379	59069	31.9	47.8	150.0	1	15.4	2400.4

2014	Scandia	4	420,070	SOYA	223149	124701	53.1	29.7	55.9	1	14.6	4762.6
2014	Scandia	4	345,940	SOYA	164080	131264	47.4	37.9	80.0	1	15.3	4384.7
2014	Scandia	4	345,940	UTC	177207	137828	51.2	39.8	77.8	1	14.2	4315.9
2014	Scandia	4	123,550	UTC	72195	137828	58.4	111.6	190.9	1	14.3	3267.3
2014	Scandia	4	271,810	SOYA	118138	72195	43.5	26.6	61.1	1	15.0	3131.7
2014	Scandia	4	197,680	SOYA	98448	91885	49.8	46.5	93.3	1	14.8	4398.9
2014	Scandia	4	494,200	SOYA	288782	196897	58.4	39.8	68.2	1	14.6	5437.7
2014	Scandia	4	271,810	UTC	131264	111575	48.3	41.0	85.0	1	14.6	5068.7
2014	Scandia	4	197,680	UTC	170644	131264	86.3	66.4	76.9	1	13.9	5137.9

Appendix B - Additional Data for "Effect of Row Spacing by Input System on Soybean Growth and Yield"

Table B.1 Effects of row spacing and input system treatments on soybean growth and yield at Manhattan, KS in 2012 to 2014.

Row Spacing	Input System†	V2-V3 Stand	R8 Stand	Survival	Height	Lodging	Pod Number	Seed Number‡	Seed Number‡	Seed Mass	Yield
		———plants ha^{-1}———		%	cm	1-5	——no. m^{-2}——		no. pod^{-1}	g 100 $seed^{-1}$	kg ha^{-1}
Narrow	UTC	328,205	295,733	90.7	90.4	1.00	1186	2435	2.26	15.2	3708
	STFF	327,182	298,129	91.1	91.5	1.00	1302	2718	2.21	15.4	4177
	SOYA	333,042	305,248	91.9	89.4	1.00	1330	2656	2.25	15.5	4236
	SOYA - FF	318,324	258,117	83.7	89.0	1.00	1150	2502	2.31	15.3	3920
Medium	UTC	307,880	272,995	89.0	90.7	1.00	1100	2500	2.37	15.2	3793
	STFF	333,756	295,091	89.4	89.3	1.00	1215	2305	2.01	15.3	3527
	SOYA	285,589	255,246	90.2	91.3	1.00	1103	2669	2.58	15.4	4132
	SOYA - FF	306,612	281,018	91.7	91.7	1.04	1140	2484	2.38	15.4	3824
Wide	UTC	306,873	268,959	86.9	90.9	1.00	1090	2410	2.26	15.1	3646
	STFF	328,701	283,121	86.2	92.3	1.08	1123	2184	2.10	15.4	3387
	SOYA	265,707	236,842	88.1	92.1	1.04	1106	2508	2.34	15.3	3836
	SOYA - FF	277,537	254,258	90.8	92.2	1.04	1078	2414	2.31	15.4	3712
	Pr > F	0.2515	0.0524	0.0661	0.3916	0.5461	0.5538	0.38	0.84	0.99	0.4221
Narrow		326,688	289,307	89.3	90.1	1.00	1242 A‡	2578	2.26	15.4	4010 A
Medium		308,459	276,087	90.1	90.7	1.01	1140 AB	2490	2.34	15.3	3819 AB
Wide		294,705	260,795	88.0	91.9	1.04	1100 B	2379	2.25	15.3	3645 B
	Pr > F	0.1773	0.1877	0.4291	0.0992	0.1168	0.0369	0.09	0.76	0.93	0.0402
	UTC	314,319 AB	279,229 AB	88.9	90.7	1.00	1126	2448	2.30	15.2	3715
	STFF	329,880 A	292,114 A	88.9	91.0	1.03	1213	2403	2.11	15.4	3697
	SOYA	294,779 B	265,779 B	90.0	91.0	1.01	1180	2611	2.39	15.4	4068
	SOYA - FF	300,825 B	264,464 B	88.8	90.9	1.03	1123	2466	2.33	15.3	3819
	Pr > F	0.0126	0.0166	0.8704	0.9809	0.4781	0.1364	0.21	0.16	0.35	0.0594

† UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.
‡ Values within a column followed by the same letter are not significantly different at $P \leq 0.05$.

Table B.2 Effects of row spacing and input system treatments on soybean growth and yield at Rossville, KS in 2012 to 2014.

Row Spacing	Input System†	V2-V3 Stand	R8 Stand	Survival	Height	Lodging	Pod Number	Seed Number	Seed Number	Seed Mass	Yield
		——plants ha^{-1}——		%	cm	1-5	——no. m^{-2}——		no. pod^{-1}	g 100 seed^{-1}	kg ha^{-1}
Narrow	UTC	364,319	282,279	78.5	98.6	1.21	1293	2532	1.96	13.6	3420
	STFF	378,600	317,101	84.8	101.1	1.08	1420	2373	1.72	13.9	3298
	SOYA	367,722	298,383	80.4	103.8	1.08	1367	2521	1.87	14.2	3574
	SOYA - FF	353,016	294,008	85.0	100.7	1.00	1312	2340	1.88	14.0	3260
Medium	UTC	370,494	294,032	79.7	99.9	1.17	1196	2140	1.80	13.6	2911
	STFF	408,998	344,022	84.3	99.6	1.25	1304	2228	1.78	13.5	2994
	SOYA	328,051	276,093	84.4	100.9	1.25	1289	2288	1.78	14.4	3319
	SOYA - FF	362,508	289,875	81.2	103.2	1.21	1226	2467	2.07	13.9	3440
Wide	UTC	344,022	280,578	82.9	96.9	1.17	1312	2251	1.92	13.8	3104
	STFF	398,715	287,688	73.4	99.5	1.25	1338	2471	1.90	14.0	3440
	SOYA	315,581	249,402	79.1	104.2	1.33	1177	2483	2.20	14.2	3524
	SOYA - FF	294,798	241,198	82.6	100.6	1.13	1178	2374	2.07	14.0	3318
	Pr > F	0.1946	0.3109	0.1764	0.0639	0.6226	0.6001	0.07	0.49	0.51	0.1089
Narrow		365,915	297,943 A‡	82.2	101.0	1.09	1348	2441	1.86	13.9	3388
Medium		367,513	301,006 A	82.4	100.9	1.22	1254	2281	1.86	13.8	3166
Wide		338,279	264,716 B	79.5	100.3	1.22	1251	2395	2.02	14.0	3346
	Pr > F	0.2703	0.0489	0.3900	0.8436	0.0624	0.3185	0.19	0.21	0.78	0.2347
	UTC	359,612 B	285,630 B	80.4	98.5 C	1.18	1267	2308	1.89	13.6 C	3145 B
	STFF	395,438 A	316,270 A	80.8	100.1 BC	1.19	1354	2357	1.80	13.8 BC	3244 B
	SOYA	337,118 B	274,626 B	81.3	103.0 A	1.22	1278	2431	1.95	14.3 A	3472 A
	SOYA - FF	336,774 B	275,027 B	82.9	101.5 AB	1.11	1239	2394	2.01	14.0 B	3339 AB
	Pr > F	0.0002	0.0008	0.7845	<0.0001	0.4373	0.1427	0.37	0.20	<0.001	0.0176

† UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.
‡ Values within a column followed by the same letter are not significantly different at P ≤ 0.05.

Table B.3 Effects of row spacing and input system treatments on soybean growth and yield at Scandia, KS in 2012 to 2014.

Row Spacing	Input System†	V2-V3 Stand	R8 Stand	Survival	Height	Lodging	Pod Number	Seed Number	Seed Number	Seed Mass	Yield
		—plants ha^{-1}—		%	cm	1-5	——no. m^{-2}——		no. pod^{-1}	g 100 $seed^{-1}$	kg ha^{-1}
Narrow	UTC	289,346	276,614	94.4	93.8	1.21	1089	2168	2.08	15.5	3353
	STFF	284,583	270,063	94.3	93.6	1.33	1152	2346	2.06	16.1	3765
	SOYA	314,522	296,298	93.8	95.1	1.13	1180	2211	2.00	16.2	3575
	SOYA - FF	320,588	292,166	90.4	93.6	1.08	1111	2359	2.18	15.9	3757
Medium	UTC	286,904	256,495	90.1	93.8	1.17	998	1999	1.99	15.7	3129
	STFF	310,060	292,982	93.2	93.8	1.29	1131	1965	1.75	16.4	3212
	SOYA	289,521	279,777	96.5	96.1	1.08	1182	2080	1.77	16.1	3353
	SOYA - FF	282,949	267,832	94.1	94.8	1.17	1073	2059	1.95	15.8	3262
Wide	UTC	299,655	277,278	91.7	93.3	1.21	1188	2079	1.76	15.6	3238
	STFF	327,618	306,253	93.1	97.3	1.21	1247	2186	1.77	16.0	3521
	SOYA	298,456	281,737	93.8	93.8	1.08	1179	1982	1.72	16.4	3240
	SOYA - FF	313,976	296,496	93.7	95.3	1.17	1236	2084	1.75	16.1	3349
	Pr > F	0.2802	0.4961	0.6527	0.2123	0.8297	0.7316	0.80	0.96	0.63	0.8373
Narrow		302,260	283,785	93.2	94.0	1.19	1133	2271 A	2.08 A	15.9	3613
Medium		292,359	274,271	93.5	94.6	1.18	1096	2026 B	1.86 AB	16.0	3239
Wide		309,926	290,441	93.1	94.9	1.17	1212	2083 AB	1.75 B	16.0	3337
	Pr > F	0.5815	0.4526	0.9716	0.7860	0.9334	0.1046	0.05	0.03	0.61	0.0759
	UTC	291,968	270,129	92.1	93.6	1.19 AB ‡	1092	2082	1.94	15.6 B	3240
	STFF	307,420	289,766	93.5	94.9	1.28 A	1177	2166	1.86	16.2 A	3499
	SOYA	300,833	285,937	94.7	95.0	1.10 B	1180	2091	1.83	16.2 A	3389
	SOYA - FF	305,837	285,498	92.7	93.8	1.14 B	1140	2167	1.96	15.9 B	3456
	Pr > F	0.5438	0.3311	0.5438	0.4783	0.0156	0.2223	0.67	0.58	<0.001	0.2509

† UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.

‡ Values within a column followed by the same letter are not significantly different at P ≤ 0.05.

Table B.4 Effects of row spacing and input system treatments on soybean growth and yield at St. Paul, MN in 2012 to 2014.

Row Spacing	Input System†	V2-V3 Stand	R8 Stand	Survival	Height	Lodging	Pod Number	Seed Number	Seed Number	Seed Mass	Yield
		plants ha^{-1}		%	cm	1-5	no. m^{-2}		no. pod^{-1}	g 100 seed^{-1}	kg ha^{-1}
Narrow	UTC	364,259	342,928	94.6	107.0	1.75	964	2851	2.89	15.6	4425
	STFF	383,948	347,030	90.1	103.8	1.63	995	2829	2.96	16.2	4575
	SOYA	380,667	342,928	88.9	105.9	1.88	1079	2744	2.56	16.4	4493
	SOYA - FF	387,230	342,928	88.7	104.6	1.63	944	2705	3.01	16.5	4446
Medium	UTC	357,695	333,904	93.7	101.3	1.38	1099	2758	2.53	16.0	4413
	STFF	335,544	321,598	96.3	102.1	1.38	1112	2797	2.69	15.9	4503
	SOYA	365,899	325,700	88.2	104.9	1.88	1032	2915	2.90	16.2	4724
	SOYA - FF	378,205	367,540	97.0	105.1	1.88	1109	2790	2.58	16.3	4565
Wide	UTC	373,283	342,928	93.3	104.6	1.63	1134	2647	2.56	15.9	4225
	STFF	353,593	321,598	91.8	103.6	1.75	1129	2634	2.53	16.1	4253
	SOYA	372,463	363,438	98.9	106.6	1.88	1399	2709	2.41	16.4	4470
	SOYA - FF	394,613	374,103	95.9	102.9	1.63	1147	2662	2.40	16.2	4334
	Pr > F	0.7917	0.3163	0.1529	0.7202	0.8336	0.3551	0.53	0.18	0.48	0.7081
Narrow		379,026	343,954	90.6	105.3	1.72	995 B‡	2782	2.86 A	16.2	4485
Medium		359,336	337,185	93.8	103.4	1.63	1088 AB	2815	2.67 AB	16.1	4551
Wide		373,488	350,517	95.0	104.4	1.72	1202 A	2663	2.47 B	16.2	4320
	Pr > F	0.1823	0.7231	0.6547	0.7011	0.9208	0.0144	0.06	0.01	0.94	0.0586
	UTC	365,079	339,920	93.9	104.3	1.58	1066	2752	2.66	15.8 B	4354
	STFF	357,695	330,075	92.7	103.2	1.58	1079	2753	2.73	16.1 AB	4443
	SOYA	373,010	344,022	92.0	105.8	1.88	1170	2789	2.62	16.3 A	4562
	SOYA - FF	386,683	361,524	93.9	104.2	1.71	1067	2719	2.66	16.3 A	4449
	Pr > F	0.1290	0.0531	0.8443	0.4533	0.4132	0.3294	0.67	0.86	0.003	0.0823

† UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.

‡ Values within a column followed by the same letter are not significantly different at P ≤ 0.05.

Table B.5 Effects of row spacing and input system treatments on soybean growth and yield at Waseca, MN in 2012 to 2014.

Row Spacing	Input System†	V2-V3 Stand	R8 Stand	Survival	Height	Lodging	Pod Number	Seed Number‡	Seed Number‡	Seed Mass	Yield‡
		——plants ha^{-1}——		%	cm	1-5	no. m^{-2}		no. pod^{-1}	g 100 seed^{-1}	kg ha^{-1}
Narrow	UTC	420,046	360,977	86.3	93.3	1.72	1109	3201 ABC§	2.93	14.8	4803
	STFF	402,817	363,438	90.5	93.1	1.32	1225	2974 DEF	2.79	15.1	4585
	SOYA	374,103	353,593	94.8	91.1	1.52	1348	3224 ABC	2.43	15.5	4993
	SOYA - FF	374,103	335,544	89.9	96.5	1.72	1421	3219 ABC	2.39	15.7	5083
Medium	UTC	386,409	351,953	91.7	95.1	1.15	1146	2955 CEF	2.78	14.8	4305
	STFF	372,463	338,826	92.9	94.6	1.81	1169	3197 ABD	2.87	15.2	4872
	SOYA	344,569	301,088	87.9	97.5	1.81	1159	3153 ABCD	3.26	16.0	5019
	SOYA - FF	382,307	331,442	87.4	96.7	1.98	1283	3334 A	2.89	15.8	5238
Wide	UTC	383,128	336,365	87.4	91.8	1.65	1236	2825 E	2.39	14.9	4246
	STFF	415,944	338,006	81.9	92.3	1.48	1080	3001 BCDE	2.86	15.5	4708
	SOYA	388,871	345,389	88.5	94.6	1.89	1252	3095 ABCD	2.62	16.0	4994
	SOYA - FF	324,059	294,524	91.3	95.6	1.48	1122	2970 BCDE	2.68	16.1	4831
	Pr > F	0.0708	0.4238	0.0716	0.5824	0.7327	0.5283	0.0410	0.3904	0.9351	0.0644
Narrow		392,768	353,388	90.4	93.5	1.57	1275	3155	2.64	15.3	4866
Medium		371,437	330,827	89.9	96.0	1.69	1189	3159	2.95	15.4	4858
Wide		378,000	328,571	87.3	93.6	1.62	1172	2973	2.64	15.6	4695
	Pr > F	0.4208	0.3509	0.8194	0.4423	0.9755	0.3797	0.0971	0.4226	0.1891	0.4514
	UTC	396,528 A	349,765	88.5	93.4	1.51	1164	2994 B	2.70	14.9 B	4451 C
	STFF	397,075 A	346,757	88.4	93.3	1.54	1158	3057 AB	2.84	15.3 B	4722 B
	SOYA	369,181 AB	333,357	90.4	94.4	1.74	1253	3157 A	2.77	15.8 A	5002 A
	SOYA - FF	360,157 B	320,504	89.5	96.3	1.73	1275	3174 A	2.66	15.9 A	5051 A
	Pr > F	0.0226	0.1569	0.8021	0.1306	0.8100	0.4064	0.0223	0.8289	<0.0001	<0.0001

† UTC, untreated control; STFF, fungicide, insecticide, and nematicide seed treatment plus foliar fungicide; SOYA – FF, SOYA minus foliar fungicide.
‡ Seed number, seed mass, and yield only have data from 2012 and 2013.
§ Values within a column followed by the same letter are not significantly different at P ≤ 0.05.

Table B.6 Raw yield component and yield data for row spacing by input systems experiment conducted at five locations in Kansas and Minnesota during 2012 to 2014.

YR	LOC	REP	ROW SPACING (cm)	INPUT SYSTEM	V2-V3 (plants ha^{-1})	R8 (plants ha^{-1})	AVG PLT HEIGHT (cm)	LODGING SCORE (1-5)	PODS M^{-2}	SEEDS M^{-2}	SEEDS POD^{-1}	SEED MASS (g 100 $seeds^{-1}$)	YIELD (kg ha^{-1})
2012	KSman	1	25	STFF	232495	201496	101.0	1	1396.4	2162.8	1.5	14.5	3149.0
2012	KSman	1	25	UTC	235940	209246	99.7	1	808.7	2071.8	2.6	15.0	3112.6
2012	KSman	1	25	SOYA - FF	182552	160163	90.3	1	891.1	2003.9	2.2	14.1	2826.9
2012	KSman	1	25	SOYA	274689	233356	81.3	1	1061.3	2330.1	2.2	14.3	3352.1
2012	KSman	1	51	SOYA	181691	164469	94.7	1	808.2	2796.4	3.5	15.3	4300.1
2012	KSman	1	51	UTC	179969	172219	94.3	1	723.0	2437.5	3.4	15.1	3698.7
2012	KSman	1	51	SOYA - FF	174802	155858	91.0	1	711.4	2904.6	4.1	14.6	4265.1
2012	KSman	1	51	STFF	291050	260912	87.3	1	1130.1	2983.2	2.6	14.5	4344.8
2012	KSman	1	76	UTC	254884	229912	97.7	1	1198.8	1940.5	1.6	15.6	3029.4
2012	KSman	1	76	SOYA - FF	192885	177385	100.7	1.5	638.3	2239.9	3.5	15.2	3424.1
2012	KSman	1	76	STFF	150691	135192	89.7	1	603.6	1929.1	3.2	13.8	2661.6
2012	KSman	1	76	SOYA	160163	145525	91.3	1	727.3	2133.8	2.9	14.2	3029.4
2012	KSman	2	76	STFF	253162	208385	98.0	1.5	857.4	2443.8	2.9	15.5	3795.3
2012	KSman	2	76	UTC	286744	247995	102.3	1	1326.1	2397.0	1.8	14.9	3583.4
2012	KSman	2	76	SOYA	158441	147247	97.0	1	1032.7	2523.1	2.4	14.6	3702.8
2012	KSman	2	76	SOYA - FF	197191	181691	94.3	1	1092.6	2550.3	2.3	15.0	3835.2
2012	KSman	2	25	SOYA	138636	133470	93.0	1	1062.8	2144.6	2.0	15.2	3268.6
2012	KSman	2	25	UTC	170497	163608	96.0	1	1185.6	2254.8	1.9	14.8	3348.3
2012	KSman	2	25	STFF	167052	150691	92.0	1	1300.3	2407.5	1.9	15.0	3631.4
2012	KSman	2	25	SOYA - FF	145525	129164	89.7	1	1009.1	2204.1	2.2	15.0	3319.6
2012	KSman	2	51	UTC	148969	136914	94.3	1	1072.0	2490.7	2.3	15.0	3751.1
2012	KSman	2	51	SOYA - FF	142081	136053	91.7	1	1110.6	2370.3	2.1	15.4	3663.0
2012	KSman	2	51	SOYA	124859	117109	90.3	1	879.8	2832.0	3.2	14.7	4185.3
2012	KSman	2	51	STFF	201496	179969	94.3	1	1013.3	2857.3	2.8	14.2	4070.4
2012	KSman	3	51	SOYA - FF	120553	103331	90.0	1	588.7	1981.2	3.4	15.1	2992.9
2012	KSman	3	51	SOYA	137775	121414	96.3	1	633.1	2373.9	3.7	15.4	3663.0
2012	KSman	3	51	STFF	170497	134331	88.7	1	939.9	2615.5	2.8	14.5	3795.3
2012	KSman	3	51	UTC	238523	185996	94.7	1	901.6	2562.1	2.8	14.9	3835.2
2012	KSman	3	76	UTC	213551	154136	95.0	1	742.1	2479.1	3.3	15.4	3830.9
2012	KSman	3	76	SOYA - FF	157580	129164	97.3	1	959.6	2672.2	2.8	15.7	4199.5
2012	KSman	3	76	STFF	180830	131747	89.0	1	921.8	2610.5	2.8	15.2	3990.5
2012	KSman	3	76	SOYA	172219	138636	94.0	1	942.3	2556.6	2.7	15.4	3950.6
2012	KSman	3	25	UTC	262634	219579	100.7	1	548.7	2454.7	4.5	15.0	3687.9
2012	KSman	3	25	SOYA	160163	145525	99.0	1	552.7	2477.3	4.5	15.5	3839.6
2012	KSman	3	25	STFF	172219	150691	91.0	1	833.4	2382.8	2.9	15.4	3671.3
2012	KSman	3	25	SOYA - FF	179108	165330	88.7	1	1008.0	2534.6	2.5	15.3	3883.9

2012	KSman	4	25	SOYA - FF	150691	128303	96.7	1	816.5	2945.6	3.6	15.3	4509.3
2012	KSman	4	25	STFF	204079	186857	103.0	1	1101.9	2950.8	2.7	14.8	4384.7
2012	KSman	4	25	UTC	177385	161886	89.3	1	1076.0	2891.2	2.7	15.3	4434.5
2012	KSman	4	25	SOYA	237662	216135	87.0	1	1235.0	2969.3	2.4	14.9	4429.5
2012	KSman	4	51	UTC	192024	176524	102.0	1	1043.9	2304.0	2.2	15.4	3567.6
2012	KSman	4	51	STFF	212690	204079	100.3	1	1213.7	2329.4	1.9	15.9	3715.4
2012	KSman	4	51	SOYA	189441	181691	95.7	1	1062.4	2558.2	2.4	15.3	3924.0
2012	KSman	4	51	SOYA - FF	180830	167913	94.3	1	1074.1	2464.2	2.3	15.0	3711.2
2012	KSman	4	76	SOYA	177385	146386	100.0	1.5	899.8	2334.7	2.6	14.8	3475.7
2012	KSman	4	76	STFF	281578	257467	99.3	1.5	1475.4	2343.6	1.6	15.3	3603.6
2012	KSman	4	76	UTC	262634	219579	92.0	1	1152.2	2322.0	2.0	15.4	3595.5
2012	KSman	4	76	SOYA - FF	242829	206663	92.0	1	1039.7	2428.3	2.3	14.9	3635.5
2012	KSros	1	76	SOYA	347851	275655	122.3	1	1111.7	2989.6	2.7	13.6	4066.4
2012	KSros	1	76	STFF	452862	301908	113.0	1	1510.1	3093.4	2.0	13.0	4017.3
2012	KSros	1	76	SOYA - FF	288782	249402	106.0	1	1297.3	2501.5	1.9	14.5	3629.9
2012	KSros	1	76	UTC	354414	295345	120.7	2	1643.3	2733.7	1.7	13.8	3791.4
2012	KSros	1	25	SOYA	406919	413483	122.7	1	1640.4	3985.4	2.4	13.7	5484.2
2012	KSros	1	25	SOYA - FF	282218	282218	112.3	1	1523.2	3362.8	2.2	13.3	4490.3
2012	KSros	1	25	STFF	393793	328161	115.7	1	1649.4	3453.4	2.1	14.2	4899.9
2012	KSros	1	25	UTC	328161	288782	119.3	2	1508.1	2790.2	1.9	14.4	4040.2
2012	KSros	1	51	UTC	472552	420046	119.3	1	1215.8	3193.0	2.6	13.6	4361.9
2012	KSros	1	51	SOYA	262529	229713	109.3	2	1638.5	2815.3	1.7	16.9	4782.0
2012	KSros	1	51	STFF	498804	492241	114.3	2	918.4	2770.7	3.0	13.1	3651.0
2012	KSros	1	51	SOYA - FF	393793	288782	121.3	2	1141.2	3095.6	2.7	13.2	4092.5
2012	KSros	2	76	UTC	367540	308471	118.0	1	1706.0	2741.0	1.6	13.3	3653.1
2012	KSros	2	76	SOYA - FF	301908	269092	117.0	1	1600.3	2954.1	1.8	13.1	3872.4
2012	KSros	2	76	SOYA	341287	262529	123.0	2	1618.1	2596.1	1.6	14.0	3656.8
2012	KSros	2	76	STFF	511931	347851	121.0	2	1941.2	2818.0	1.5	14.4	4066.7
2012	KSros	2	25	STFF	538184	406919	122.3	1	2311.5	2231.6	1.0	13.7	3069.7
2012	KSros	2	25	SOYA - FF	374103	308471	123.0	1	1865.3	2818.2	1.5	14.0	3953.6
2012	KSros	2	25	SOYA	288782	255965	120.7	1	1739.7	2982.8	1.7	13.6	4061.3
2012	KSros	2	25	UTC	420046	328161	122.0	2	1847.7	4075.4	2.2	13.1	5358.5
2012	KSros	2	51	SOYA - FF	315034	229713	122.7	1	1304.9	2379.9	1.8	13.7	3264.1
2012	KSros	2	51	UTC	387230	295345	121.0	2	1579.3	2551.2	1.6	13.2	3383.9
2012	KSros	2	51	SOYA	255965	203460	120.3	1	1237.1	2451.4	2.0	14.2	3480.9
2012	KSros	2	51	STFF	387230	341287	122.7	2	1916.0	2252.5	1.2	13.5	3058.9
2012	KSros	3	76	SOYA - FF	367540	321598	117.7	2	1682.2	2864.3	1.7	14.0	4017.7
2012	KSros	3	76	STFF	413483	328161	121.3	2	1661.9	3000.8	1.8	13.1	3946.1
2012	KSros	3	76	UTC	446299	393793	112.7	2	2709.3	2666.3	1.0	13.5	3596.7
2012	KSros	3	76	SOYA	347851	321598	120.7	2	2003.6	2631.9	1.3	14.0	3704.0
2012	KSros	3	25	UTC	400356	255965	110.7	1	1138.5	2942.1	2.6	13.9	4094.4
2012	KSros	3	25	SOYA - FF	308471	269092	118.7	1	1335.8	3241.3	2.4	13.6	4419.2
2012	KSros	3	25	STFF	295345	242839	115.3	1	1407.8	3138.6	2.2	14.3	4501.5

2012	KSros	3	25	SOYA	334724	262529	124.0	2	1661.9	2666.6	1.6	15.4	4116.5
2012	KSros	3	51	STFF	452862	315034	113.3	1	1464.2	3142.5	2.1	13.0	4090.2
2012	KSros	3	51	UTC	360977	282218	113.3	2	1495.0	3126.4	2.1	13.6	4269.6
2012	KSros	3	51	SOYA - FF	334724	255965	113.7	1	1368.7	3035.4	2.2	14.7	4464.8
2012	KSros	3	51	SOYA	367540	301908	122.0	2	1810.6	3092.8	1.7	14.7	4557.0
2012	KSros	4	51	SOYA	262529	236276	122.3	1.5	1554.7	2934.7	1.9	13.8	4069.5
2012	KSros	4	51	STFF	413483	275655	127.3	2	1598.0	2921.7	1.8	13.5	3954.4
2012	KSros	4	51	UTC	400356	288782	121.7	1	1587.5	3137.6	2.0	13.8	4328.2
2012	KSros	4	51	SOYA - FF	387230	288782	124.7	2	1674.1	2878.4	1.7	14.2	4089.8
2012	KSros	4	76	SOYA - FF	426609	308471	126.3	1.5	1623.8	3298.9	2.0	12.9	4282.0
2012	KSros	4	76	STFF	465988	301908	126.3	2	1634.5	2827.6	1.7	13.3	3759.1
2012	KSros	4	76	UTC	472552	315034	114.3	1	1689.9	2908.1	1.7	14.1	4099.6
2012	KSros	4	76	SOYA	367540	269092	129.3	2	1367.2	2932.1	2.1	14.1	4150.4
2012	KSros	4	25	STFF	334724	295345	120.7	2	1608.8	2963.6	1.8	13.1	3905.8
2012	KSros	4	25	UTC	446299	262529	128.7	1	1469.4	3237.0	2.2	12.3	4000.8
2012	KSros	4	25	SOYA - FF	301908	282218	115.7	1	1527.9	3006.2	2.0	13.3	4015.8
2012	KSros	4	25	SOYA	354414	262529	128.0	1	1574.4	3156.6	2.0	13.6	4310.7
2012	KSsca	1	25	STFF	144233	127011	92.3	2	996.6	2052.1	2.1	15.3	3155.8
2012	KSsca	1	25	SOYA	191593	178677	99.0	1.5	1515.0	2241.5	1.5	16.1	3612.4
2012	KSsca	1	25	SOYA - FF	167913	129164	93.0	1.5	1185.6	1733.6	1.5	15.8	2739.7
2012	KSsca	1	25	UTC	161455	133470	93.7	1	486.9	1544.3	3.2	15.7	2427.5
2012	KSsca	1	76	UTC	271245	226037	92.3	1	933.8	1785.4	1.9	15.9	2843.7
2012	KSsca	1	76	STFF	325063	260481	96.3	1	1310.4	1774.5	1.4	17.0	3017.1
2012	KSsca	1	76	SOYA	223884	206663	92.7	1.5	1174.0	1530.9	1.3	16.3	2496.9
2012	KSsca	1	76	SOYA - FF	275550	234648	94.3	1	1286.0	1156.4	0.9	17.3	2011.4
2012	KSsca	1	51	SOYA	178677	161455	94.3	1	952.1	1258.9	1.3	15.7	1976.7
2012	KSsca	1	51	STFF	204510	189441	89.0	1.5	801.6	1275.6	1.6	16.5	2115.4
2012	KSsca	1	51	SOYA - FF	185135	167913	84.7	1	967.8	867.3	0.9	16.4	1421.8
2012	KSsca	1	51	UTC	189441	176524	86.3	1.5	632.2	911.8	1.4	17.8	1629.9
2012	KSsca	2	51	SOYA	189441	170066	89.7	1	906.6	1563.4	1.7	15.8	2483.4
2012	KSsca	2	51	SOYA - FF	174372	148539	95.0	1	1007.1	1428.6	1.4	16.2	2323.5
2012	KSsca	2	51	UTC	236801	219579	90.0	1	1079.1	1413.7	1.3	16.4	2323.5
2012	KSsca	2	51	STFF	234648	198052	89.7	1	1191.0	1288.6	1.1	17.2	2219.5
2012	KSsca	2	76	STFF	273397	195899	106.3	2	1452.2	2278.3	1.6	16.2	3710.7
2012	KSsca	2	76	SOYA - FF	241106	198052	100.3	1.5	1567.1	1931.4	1.2	15.8	3051.8
2012	KSsca	2	76	UTC	284161	238954	93.0	1.5	1524.6	1724.2	1.1	15.8	2739.7
2012	KSsca	2	76	SOYA	294925	234648	96.3	1	1000.7	1530.8	1.5	16.9	2600.9
2012	KSsca	2	25	SOYA	185135	178677	98.3	1	765.0	2121.2	2.8	16.2	3449.2
2012	KSsca	2	25	STFF	198052	167913	100.0	2	993.0	2230.0	2.2	16.3	3641.3
2012	KSsca	2	25	SOYA - FF	195899	182982	92.7	1	1246.7	2036.0	1.6	16.5	3363.9
2012	KSsca	2	25	UTC	195899	172219	91.7	2	1116.0	1925.9	1.7	16.2	3121.1
2012	KSsca	3	25	UTC	206663	182982	102.0	2	.	2309.3	.	16.2	3745.4
2012	KSsca	3	25	STFF	189441	180830	97.7	1.5	.	2222.9	.	16.7	3732.9

2012	KSsca	3	25	SOYA - FF	189441	161455	95.0	1.5	.	1640.5	.	16.2	2670.3
2012	KSsca	3	25	SOYA	202357	193746	90.0	1	.	1509.2	.	16.7	2531.6
2012	KSsca	3	76	UTC	215274	180830	100.7	2	.	2608.2	.	15.0	3932.1
2012	KSsca	3	76	STFF	288467	241106	108.0	2	.	2483.4	.	16.5	4100.1
2012	KSsca	3	76	SOYA - FF	286314	264786	99.0	1	.	1923.3	.	17.0	3276.7
2012	KSsca	3	76	SOYA	258328	215274	100.0	1.5	.	1783.2	.	18.2	3259.8
2012	KSsca	3	51	UTC	215274	178677	105.0	1.5	.	2253.9	.	14.6	3307.6
2012	KSsca	3	51	SOYA - FF	221732	200204	109.0	2	.	1926.2	.	15.9	3069.8
2012	KSsca	3	51	SOYA	185135	187288	103.7	1	.	1928.5	.	16.2	3135.3
2012	KSsca	3	51	STFF	245412	210968	104.3	1.5	.	1536.0	.	17.9	2759.3
2012	KSsca	4	25	STFF	234648	198052	102.7	2	1121.7	2416.5	2.2	15.9	3858.9
2012	KSsca	4	25	UTC	230343	193746	101.7	1.5	1016.7	2404.9	2.4	15.4	3710.7
2012	KSsca	4	25	SOYA - FF	236801	167913	100.3	1	814.0	2192.9	2.7	16.0	3518.2
2012	KSsca	4	25	SOYA	202357	180830	98.7	1.5	768.1	1711.6	2.2	17.6	3017.1
2012	KSsca	4	76	STFF	320758	266939	109.3	1.5	1592.0	2610.2	1.6	15.2	3988.1
2012	KSsca	4	76	SOYA	290619	236801	111.7	1	1388.6	2327.7	1.7	16.1	3759.6
2012	KSsca	4	76	SOYA - FF	247565	202357	106.0	2.5	1537.2	2093.7	1.4	16.1	3380.2
2012	KSsca	4	76	UTC	219579	174372	102.3	2	973.1	1795.2	1.8	18.1	3259.8
2012	KSsca	4	51	UTC	286314	245412	104.7	2	1234.6	2707.8	2.2	16.4	4439.8
2012	KSsca	4	51	SOYA - FF	251870	198052	108.0	2	1313.1	2617.3	2.0	16.0	4194.3
2012	KSsca	4	51	SOYA	327216	260481	109.0	2	1488.4	2798.6	1.9	16.1	4513.5
2012	KSsca	4	51	STFF	269092	176524	109.7	2	1108.6	2365.8	2.1	18.0	4272.3
2012	MNstp	1	76	STFF	354414	380667	108.4	1	1110.6	2747.0	2.5	13.6	3752.7
2012	MNstp	1	25	UTC	282218	295345	119.4	1	816.7	2963.5	3.6	13.6	4036.3
2012	MNstp	1	51	SOYA	282218	216586	112.6	1	1110.0	3044.5	2.7	13.7	4178.2
2012	MNstp	1	76	SOYA - FF	341287	406919	110.9	2	1529.7	2781.3	1.8	14.1	3942.4
2012	MNstp	1	25	SOYA	315034	282218	130.4	1	1024.0	2798.4	2.7	14.5	4078.4
2012	MNstp	1	51	UTC	262529	216586	111.8	1	967.8	2897.1	3.0	13.4	3878.9
2012	MNstp	1	76	UTC	321598	341287	123.6	2	1308.8	2615.6	2.0	13.5	3543.7
2012	MNstp	1	25	STFF	288782	301908	130.4	1	1158.8	3195.4	2.8	13.1	4185.6
2012	MNstp	1	51	STFF	144391	144391	119.4	2	1023.0	2598.3	2.5	13.5	3508.4
2012	MNstp	1	76	SOYA	262529	295345	122.8	2	1528.5	2324.9	1.5	14.3	3332.7
2012	MNstp	1	25	SOYA - FF	367540	413483	127.8	2	578.6	2833.3	4.9	14.4	4093.4
2012	MNstp	1	51	SOYA - FF	360977	341287	113.5	2	1120.4	2970.7	2.7	13.6	4044.8
2012	MNstp	2	76	SOYA - FF	347851	275655	121.9	2	1298.4	2427.5	1.9	14.0	3405.9
2012	MNstp	2	25	UTC	288782	288782	132.9	2	1071.6	2939.3	2.7	13.9	4082.5
2012	MNstp	2	51	SOYA	315034	262529	112.6	4	1048.1	2629.5	2.5	14.7	3870.1
2012	MNstp	2	76	UTC	295345	288782	128.7	2	1469.4	2401.1	1.6	13.0	3122.9
2012	MNstp	2	25	SOYA - FF	308471	288782	113.5	2	716.8	2872.4	4.0	13.8	3966.6
2012	MNstp	2	51	STFF	262529	262529	115.1	2	1477.5	2526.6	1.7	13.7	3471.1
2012	MNstp	2	76	STFF	301908	275655	119.4	1	834.1	2602.8	3.1	13.3	3464.1
2012	MNstp	2	25	STFF	334724	354414	126.2	1	1476.0	2848.4	1.9	13.6	3889.9
2012	MNstp	2	51	UTC	321598	301908	118.5	2	1091.0	2551.4	2.3	13.4	3440.2

2012	MNstp	2	76	SOYA	301908	288782	112.6	2	2074.6	2502.7	1.2	14.3	3592.5
2012	MNstp	2	25	SOYA	341287	275655	132.1	1	1398.3	2854.4	2.0	14.1	4041.9
2012	MNstp	2	51	SOYA - FF	400356	354414	119.4	3	1051.5	2653.1	2.5	14.0	3726.7
2012	MNstp	3	51	SOYA	288782	242839	126.2	2	701.7	3038.9	4.3	14.1	4297.9
2012	MNstp	3	76	SOYA - FF	315034	328161	133.8	1	1076.9	2916.6	2.7	13.5	3939.4
2012	MNstp	3	25	SOYA - FF	426609	255965	118.5	2	1202.4	2669.9	2.2	14.3	3826.8
2012	MNstp	3	51	UTC	321598	347851	118.5	1	1337.5	2885.4	2.2	13.4	3864.2
2012	MNstp	3	76	UTC	315034	328161	130.4	2	1530.7	2979.9	1.9	14.0	4197.3
2012	MNstp	3	25	UTC	288782	249402	128.7	3	1232.2	2687.0	2.2	14.1	3788.5
2012	MNstp	3	51	SOYA - FF	301908	295345	124.5	3	1204.4	2945.6	2.4	14.3	4227.0
2012	MNstp	3	76	SOYA	315034	367540	132.1	2	2236.3	2675.5	1.2	15.0	4015.6
2012	MNstp	3	25	STFF	321598	210023	118.5	4	772.5	3087.1	4.0	15.5	4811.5
2012	MNstp	3	51	STFF	321598	295345	116.8	2	1310.7	2770.4	2.1	13.9	3873.2
2012	MNstp	3	76	STFF	315034	334724	126.2	1	1530.6	2822.7	1.8	14.1	4001.0
2012	MNstp	3	25	SOYA	301908	196897	123.6	4	1056.2	3006.4	2.8	15.4	4639.1
2012	MNstp	4	51	STFF	334724	308471	115.1	1	946.1	2456.8	2.6	14.5	3568.5
2012	MNstp	4	51	SOYA - FF	334724	308471	122.8	3	1248.7	2823.6	2.3	14.1	4000.8
2012	MNstp	4	51	UTC	413483	275655	116.0	3	1280.4	2811.9	2.2	14.4	4068.7
2012	MNstp	4	51	SOYA	367540	282218	120.2	3	1346.1	2208.7	1.6	15.7	3471.9
2012	MNstp	4	76	SOYA	406919	360977	112.6	5	895.1	2436.2	2.7	15.0	3671.1
2012	MNstp	4	76	STFF	433172	301908	110.1	5	1119.1	2390.7	2.1	14.0	3349.8
2012	MNstp	4	76	SOYA - FF	341287	347851	110.9	3	1041.8	2387.6	2.3	14.6	3494.6
2012	MNstp	4	76	UTC	321598	295345	112.6	2	979.5	2432.8	2.5	14.0	3421.5
2012	MNstp	4	25	STFF	347851	249402	121.1	2	739.5	2724.1	3.7	13.5	3673.7
2012	MNstp	4	25	UTC	380667	301908	121.9	3	930.0	3532.0	3.8	12.1	4296.7
2012	MNstp	4	25	SOYA	328161	255965	121.9	4	1341.3	2664.7	2.0	15.2	4055.2
2012	MNstp	4	25	SOYA - FF	334724	216586	120.2	2	1431.2	2932.8	2.0	14.1	4151.5
2012	MNwas	1	51	UTC	360977	328161	107.5	1	1256.7	2821.5	2.2	12.0	3391.6
2012	MNwas	1	76	SOYA - FF	387230	315034	114.3	2	998.8	2469.1	2.5	14.3	3530.0
2012	MNwas	1	25	STFF	354414	269092	105.8	1	840.5	2609.7	3.1	12.0	3139.8
2012	MNwas	1	51	STFF	295345	308471	105.0	2	1611.7	3147.0	2.0	12.2	3856.8
2012	MNwas	1	76	STFF	420046	308471	107.5	3	1175.8	2895.0	2.5	12.5	3631.2
2012	MNwas	1	25	SOYA	413483	367540	104.1	2	1500.9	3126.5	2.1	12.7	3973.9
2012	MNwas	1	51	SOYA	262529	255965	110.9	3	1057.5	3451.1	3.3	14.1	4888.9
2012	MNwas	1	76	SOYA	374103	288782	116.8	5	903.4	3305.6	3.7	15.0	4956.5
2012	MNwas	1	25	UTC	505368	367540	115.1	4	975.2	3184.3	3.3	14.1	4500.3
2012	MNwas	1	51	SOYA - FF	269092	223149	110.1	3	1141.4	4334.1	3.8	13.9	6059.3
2012	MNwas	1	76	UTC	387230	275655	117.7	5	1125.5	2939.8	2.6	12.8	3766.2
2012	MNwas	1	25	SOYA - FF	347851	282218	117.7	5	1628.0	3228.9	2.0	14.0	4540.9
2012	MNwas	2	76	STFF	433172	315034	107.5	2	1270.0	2885.9	2.3	12.5	3615.2
2012	MNwas	2	25	UTC	367540	354414	97.4	2	1098.1	3083.2	2.8	12.6	3881.7
2012	MNwas	2	51	STFF	413483	177207	105.8	1	863.8	3522.6	4.1	12.6	4445.4
2012	MNwas	2	76	SOYA	452862	354414	106.7	1	1447.8	2924.1	2.0	12.4	3631.4

2012	MNwas	2	25	SOYA - FF	334724	347851	110.9	1	1543.7	3224.9	2.1	11.8	3807.0
2012	MNwas	2	51	SOYA - FF	439736	229713	112.6	1	740.2	3350.3	4.5	12.0	4037.5
2012	MNwas	2	76	UTC	367540	236276	105.8	1	957.9	2734.6	2.9	12.1	3308.0
2012	MNwas	2	25	STFF	301908	334724	104.1	1	1108.8	2691.7	2.4	11.9	3215.2
2012	MNwas	2	51	SOYA	334724	216586	114.3	1	569.0	3506.7	6.2	12.3	4340.7
2012	MNwas	2	76	SOYA - FF	354414	301908	107.5	2	918.4	2969.1	3.2	12.5	3722.4
2012	MNwas	2	25	SOYA	341287	328161	91.4	2	1151.3	2925.5	2.5	12.6	3687.6
2012	MNwas	2	51	UTC	433172	249402	101.6	1	796.0	3576.2	4.5	12.4	4431.7
2012	MNwas	3	76	SOYA - FF	328161	282218	102.4	2	1198.1	2868.0	2.4	13.3	3827.3
2012	MNwas	3	51	UTC	354414	393793	105.0	1	1062.7	.	.	13.1	.
2012	MNwas	3	25	SOYA	347851	282218	93.1	1	1363.4	2797.8	2.1	12.9	3610.0
2012	MNwas	3	76	SOYA	334724	282218	100.8	2	970.4	2798.8	2.9	12.9	3612.1
2012	MNwas	3	51	SOYA - FF	360977	308471	104.1	1	1068.1	.	.	13.3	.
2012	MNwas	3	25	UTC	354414	301908	88.1	1	1096.4	2783.1	2.5	12.1	3367.2
2012	MNwas	3	76	UTC	439736	426609	103.3	1	1193.9	2792.0	2.3	12.3	3440.5
2012	MNwas	3	51	STFF	334724	354414	105.0	1	991.9	2897.8	2.9	11.9	3469.2
2012	MNwas	3	25	STFF	380667	282218	99.9	1	448.5	2579.8	5.8	13.2	3413.7
2012	MNwas	3	76	STFF	452862	334724	96.5	1	1062.2	2996.5	2.8	12.9	3866.2
2012	MNwas	3	51	SOYA	380667	295345	101.6	1	689.3	3117.4	4.5	12.6	3933.3
2012	MNwas	3	25	SOYA - FF	341287	262529	99.9	1	1065.3	3128.5	2.9	12.4	3900.5
2012	MNwas	4	51	UTC	426609	433172	115.1	1	1558.7	2691.8	1.7	11.6	3139.7
2012	MNwas	4	51	SOYA	380667	374103	114.3	4	1520.6	2996.2	2.0	13.9	4170.5
2012	MNwas	4	51	SOYA - FF	328161	341287	115.1	5	2201.4	3120.1	1.4	14.5	4537.1
2012	MNwas	4	51	STFF	315034	347851	111.8	5	1420.9	3119.5	2.2	12.6	3925.8
2012	MNwas	4	25	SOYA - FF	347851	334724	85.5	1	2234.9	2929.5	1.3	13.0	3823.5
2012	MNwas	4	25	STFF	400356	347851	104.1	2	1234.3	2994.0	2.4	12.3	3682.4
2012	MNwas	4	25	SOYA	315034	341287	96.5	1	1422.5	3734.8	2.6	9.6	3581.9
2012	MNwas	4	25	UTC	406919	387230	104.1	1	1069.2	3087.2	2.9	12.2	3769.2
2012	MNwas	4	76	SOYA - FF	308471	315034	107.5	1	1219.8	2937.9	2.4	13.0	3843.6
2012	MNwas	4	76	UTC	420046	426609	102.4	1	1865.9	2630.6	1.4	12.1	3179.5
2012	MNwas	4	76	STFF	321598	295345	107.5	1	1042.1	2633.5	2.5	12.0	3166.3
2012	MNwas	4	76	SOYA	334724	360977	99.1	1	1231.2	3094.9	2.5	12.6	3911.8
2013	KSman	1	19	SOYA - FF	437548	291699	92.3	1	1626.9	.	.	.	4454.0
2013	KSman	1	19	SOYA	408378	373374	102.3	1	1985.4	2590.8	1.3	14.5	3774.6
2013	KSman	1	19	STFF	437548	396710	97.3	1	1931.0	2804.3	1.5	14.5	4089.2
2013	KSman	1	19	UTC	379208	315034	101.3	1	1583.8	2631.0	1.7	14.1	3730.2
2013	KSman	1	38	SOYA	236276	189021	99.3	1	751.9	2488.1	3.3	14.3	3555.0
2013	KSman	1	38	STFF	430547	325536	104.0	1	1395.9	2078.2	1.5	14.7	3057.6
2013	KSman	1	38	UTC	414795	325536	105.3	1	1405.6	.	.	14.6	.
2013	KSman	1	38	SOYA - FF	367540	304533	105.0	1	1628.5	2639.2	1.6	15.5	4111.5
2013	KSman	1	76	STFF	426609	269092	101.3	1	1320.6	1735.6	1.3	13.9	2416.7
2013	KSman	1	76	SOYA - FF	262529	242839	101.0	1	1140.8	1533.4	1.3	14.5	2236.1
2013	KSman	1	76	SOYA	229713	183770	104.3	1	1126.0	3281.0	2.9	14.6	4807.6

2013	KSman	1	76	UTC	341287	341287	101.7	1	1681.7	1699.6	1.0	14.3	2432.2
2013	KSman	2	19	UTC	478386	414212	98.0	1	1780.2	2635.0	1.5	14.2	3739.4
2013	KSman	2	19	SOYA - FF	530891	338370	103.0	1	1521.9	1537.6	1.0	14.9	2297.2
2013	KSman	2	19	STFF	466718	414212	104.7	1	1800.9	3186.5	1.8	15.0	4784.5
2013	KSman	2	19	SOYA	449216	408378	103.0	1	1845.0	3430.2	1.9	15.0	5142.5
2013	KSman	2	38	STFF	593315	435798	101.0	1	1659.6	1245.8	0.8	14.1	1765.6
2013	KSman	2	38	UTC	462050	404294	100.7	1	1571.9	3260.6	2.1	13.6	4448.4
2013	KSman	2	38	SOYA - FF	451549	409545	105.7	1	1817.5	2621.2	1.4	14.5	3800.3
2013	KSman	2	38	SOYA	346538	294032	99.7	1	1622.3	2909.5	1.8	15.0	4384.3
2013	KSman	2	76	SOYA	334724	282218	98.3	1	1345.5	2595.6	1.9	13.5	3524.7
2013	KSman	2	76	UTC	262529	255965	96.7	1	1189.7	2793.7	2.3	13.1	3672.3
2013	KSman	2	76	STFF	400356	229713	103.0	1	1214.6	2279.3	1.9	14.3	3259.0
2013	KSman	2	76	SOYA - FF	249402	203460	100.0	1	1201.9	1705.0	1.4	15.5	2657.7
2013	KSman	3	19	SOYA - FF	437548	297533	101.3	1	1287.7	3146.3	2.4	14.1	4443.9
2013	KSman	3	19	UTC	414212	367540	100.0	1	1565.0	1757.2	1.1	14.4	2542.5
2013	KSman	3	19	STFF	385042	268363	103.7	1	1258.0	4216.7	3.4	14.0	5915.0
2013	KSman	3	19	SOYA	385042	326702	101.7	1	1538.0	2874.4	1.9	14.7	4222.5
2013	KSman	3	38	SOYA - FF	393793	346538	104.3	1.5	1458.2	2374.4	1.6	14.2	3373.6
2013	KSman	3	38	STFF	325536	278280	101.7	1	1426.9	1481.8	1.0	13.8	2045.1
2013	KSman	3	38	SOYA	320285	273030	103.0	1	1397.2	2603.7	1.9	14.6	3821.1
2013	KSman	3	38	UTC	236276	189021	102.7	1	1022.1	3710.1	3.6	14.7	5470.9
2013	KSman	3	76	STFF	426609	420046	101.7	1	1557.6	1507.8	1.0	13.8	2087.6
2013	KSman	3	76	SOYA - FF	229713	223149	102.7	1	1273.6	2873.8	2.3	13.8	3967.6
2013	KSman	3	76	SOYA	288782	216586	104.0	1	1127.9	3049.4	2.7	14.6	4460.8
2013	KSman	3	76	UTC	262529	183770	97.7	1	1061.7	3162.9	3.0	14.5	4605.4
2013	KSman	4	38	SOYA - FF	388542	257278	100.3	1	1020.9	2086.3	2.0	14.0	2918.2
2013	KSman	4	38	UTC	404294	325536	97.0	1	1249.4	1571.5	1.3	14.2	2236.8
2013	KSman	4	38	SOYA	467301	294032	105.0	1	1184.4	2627.3	2.2	14.7	3867.9
2013	KSman	4	38	STFF	304533	273030	101.7	1	1320.8	2609.9	2.0	14.9	3903.4
2013	KSman	4	76	UTC	347851	242839	95.7	1	1109.2	2418.9	2.2	14.1	3429.4
2013	KSman	4	76	SOYA	275655	210023	96.7	1	1259.5	1961.5	1.6	14.4	2826.6
2013	KSman	4	76	STFF	367540	295345	99.3	1	1600.0	2592.2	1.6	15.0	3898.2
2013	KSman	4	76	SOYA - FF	321598	275655	102.3	1	1352.8	3236.9	2.4	15.2	4938.3
2013	KSman	4	19	SOYA - FF	367540	291699	97.3	1	1323.7	2361.5	1.8	14.3	3374.1
2013	KSman	4	19	STFF	455050	431714	99.7	1	1566.4	1799.6	1.1	14.2	2558.9
2013	KSman	4	19	UTC	344204	309200	102.3	1	1492.7	2803.4	1.9	14.6	4105.5
2013	KSman	4	19	SOYA	472552	420046	101.7	1	2048.8	.	.	.	5291.0
2013	KSros	1	19	UTC	303366	285865	70.7	1	1117.2	2395.9	2.1	15.1	3624.6
2013	KSros	1	19	STFF	320868	291699	86.0	1	895.1	1780.2	2.0	14.5	2584.0
2013	KSros	1	19	SOYA - FF	408378	402544	83.0	1	1532.9	1486.7	1.0	14.4	2145.6
2013	KSros	1	19	SOYA	361706	344204	90.7	1	1128.4	1408.4	1.2	15.2	2141.3
2013	KSros	1	76	STFF	420046	282218	80.7	1	1297.6	2143.7	1.7	15.4	3301.2
2013	KSros	1	76	SOYA	295345	236276	91.7	1	814.8	2106.8	2.6	15.3	3228.7

2013	KSros	1	76	UTC	347851	288782	80.7	1	915.0	1259.8	1.4	13.6	1722.1
2013	KSros	1	76	SOYA - FF	236276	177207	87.7	1	742.1	1463.1	2.0	15.0	2202.4
2013	KSros	1	38	STFF	488303	430547	78.7	1	1411.5	2124.2	1.5	15.2	3243.9
2013	KSros	1	38	SOYA - FF	273030	252028	86.3	1	856.5	2206.2	2.6	14.8	3281.5
2013	KSros	1	38	UTC	388542	299283	82.3	1	876.5	1796.7	2.0	15.2	2735.8
2013	KSros	1	38	SOYA	504055	441048	81.3	1	1146.2	1286.5	1.1	14.8	1905.3
2013	KSros	2	19	STFF	577563	484220	83.0	1	1572.9	2196.1	1.4	15.5	3403.7
2013	KSros	2	19	SOYA	519223	431714	89.7	1	1402.4	2074.3	1.5	15.6	3234.9
2013	KSros	2	19	SOYA - FF	595065	390876	83.7	1	1133.0	1437.2	1.3	15.2	2189.4
2013	KSros	2	19	UTC	525057	414212	83.7	1	1242.0	1222.1	1.0	13.9	1699.7
2013	KSros	2	38	SOYA - FF	309784	309784	84.0	1	1185.9	2179.9	1.8	15.2	3329.1
2013	KSros	2	38	SOYA	346538	294032	83.0	1	1099.1	1997.0	1.8	15.9	3190.3
2013	KSros	2	38	STFF	467301	425296	74.3	1	1279.5	1207.2	0.9	14.5	1751.6
2013	KSros	2	38	UTC	388542	336037	81.0	1	1000.9	1043.7	1.0	13.5	1409.7
2013	KSros	2	76	STFF	426609	328161	82.0	1	1253.0	1445.8	1.2	15.2	2205.8
2013	KSros	2	76	SOYA - FF	255965	262529	85.3	1	997.1	1524.8	1.5	14.3	2183.3
2013	KSros	2	76	UTC	341287	269092	79.3	1	944.0	1081.6	1.1	13.7	1490.3
2013	KSros	2	76	SOYA	282218	242839	87.0	1	805.8	1480.3	1.8	13.2	1961.0
2013	KSros	3	19	SOYA	525057	420046	84.0	1	1213.3	1885.4	1.6	14.4	2728.9
2013	KSros	3	19	UTC	355872	320868	80.7	1.5	1019.9	2559.0	2.5	13.4	3430.4
2013	KSros	3	19	STFF	443382	361706	85.7	1	1167.7	1426.5	1.2	13.3	1897.5
2013	KSros	3	19	SOYA - FF	326702	320868	84.0	1	1051.9	1274.5	1.2	13.6	1734.8
2013	KSros	3	38	SOYA - FF	525057	315034	92.3	1	1076.9	2217.7	2.1	13.6	3025.5
2013	KSros	3	38	STFF	367540	325536	89.3	1	946.8	1666.8	1.8	13.5	2263.5
2013	KSros	3	38	UTC	446299	336037	83.7	1	1155.4	1349.1	1.2	12.8	1737.6
2013	KSros	3	38	SOYA	399044	372791	87.3	1	1184.9	1664.8	1.4	13.7	2290.1
2013	KSros	3	76	SOYA	308471	223149	91.7	1.5	950.2	2223.1	2.3	15.5	3447.2
2013	KSros	3	76	STFF	518494	328161	91.7	1	1216.9	1957.7	1.6	14.3	2809.4
2013	KSros	3	76	SOYA - FF	360977	262529	91.7	1	915.8	1886.0	2.1	14.2	2688.2
2013	KSros	3	76	UTC	380667	288782	86.7	1	981.4	1801.8	1.8	13.3	2393.6
2013	KSros	4	19	UTC	355872	297533	88.7	1	972.5	1769.9	1.8	13.6	2417.8
2013	KSros	4	19	SOYA - FF	495888	449216	96.3	1	1652.3	1709.4	1.0	14.3	2456.4
2013	KSros	4	19	SOYA	420046	320868	90.0	1	1273.2	1781.4	1.4	14.0	2502.5
2013	KSros	4	19	STFF	408378	390876	89.0	1	1465.1	1739.7	1.2	13.4	2333.2
2013	KSros	4	76	SOYA	301908	223149	96.0	1.5	889.9	2268.5	2.5	15.4	3505.7
2013	KSros	4	76	UTC	498804	374103	87.7	1	1121.8	1723.2	1.5	14.0	2415.8
2013	KSros	4	76	SOYA - FF	275655	216586	93.0	1	883.2	1834.2	2.1	14.2	2608.6
2013	KSros	4	76	STFF	301908	315034	89.3	1	1023.4	1573.1	1.5	13.4	2120.0
2013	KSros	4	38	SOYA	420046	325536	99.7	1.5	1080.2	2108.0	2.0	14.5	3065.7
2013	KSros	4	38	UTC	472552	378041	97.3	1	1212.9	1323.3	1.1	14.2	1880.6
2013	KSros	4	38	SOYA - FF	451549	393793	97.3	1.5	1314.6	1762.3	1.3	14.3	2520.4
2013	KSros	4	38	STFF	567062	430547	89.0	1	1260.9	1975.8	1.6	14.0	2766.1
2013	KSsca	1	76	SOYA - FF	341287	367540	86.0	1	1370.3	2355.8	1.7	16.4	3884.6

2013	KSsca	1	76	STFF	380667	406919	88.3	1	1252.7	2111.1	1.7	16.6	3513.2
2013	KSsca	1	76	SOYA	406919	433172	91.7	1	1424.4	1983.3	1.4	16.7	3313.9
2013	KSsca	1	76	UTC	367540	321598	88.3	1	1134.7	2638.2	2.3	15.8	4180.0
2013	KSsca	1	38	SOYA - FF	462050	420046	87.0	1	1192.3	2172.5	1.8	15.9	3453.0
2013	KSsca	1	38	STFF	362290	483053	91.0	1.5	1265.0	2397.1	1.9	16.7	4017.4
2013	KSsca	1	38	UTC	320285	262529	88.3	1	1020.7	1892.6	1.9	15.6	2967.4
2013	KSsca	1	38	SOYA	288782	309784	87.3	1	1099.2	2101.5	1.9	16.0	3374.1
2013	KSsca	1	19	STFF	495888	460884	91.0	1.5	1377.4	2617.2	1.9	16.2	4258.4
2013	KSsca	1	19	SOYA - FF	437548	420046	91.3	1	969.8	2124.2	2.2	16.3	3464.5
2013	KSsca	1	19	SOYA	554227	565895	93.7	1	1583.7	2481.2	1.6	16.5	4096.0
2013	KSsca	1	19	UTC	373374	320868	87.0	1	978.2	2000.5	2.0	15.9	3180.0
2013	KSsca	2	19	SOYA - FF	420046	443382	98.0	1	1023.7	2051.6	2.0	15.9	3263.7
2013	KSsca	2	19	UTC	396710	390876	92.3	1	1113.5	1959.7	1.8	16.0	3143.0
2013	KSsca	2	19	SOYA	385042	309200	94.7	1	1131.1	2586.0	2.3	16.2	4200.9
2013	KSsca	2	19	STFF	350038	320868	88.3	1	1090.4	2590.8	2.4	15.8	4096.0
2013	KSsca	2	38	SOYA - FF	346538	378041	93.0	1	982.4	1910.5	1.9	16.2	3103.0
2013	KSsca	2	38	STFF	420046	362290	92.3	1.5	930.6	1993.7	2.1	16.6	3325.3
2013	KSsca	2	38	SOYA	283531	267779	92.0	1	875.2	1951.8	2.2	16.5	3219.9
2013	KSsca	2	38	UTC	236276	210023	86.7	1	755.7	1977.3	2.6	15.0	2982.5
2013	KSsca	2	76	SOYA - FF	282218	282218	94.7	1	1055.0	2127.1	2.0	16.3	3479.5
2013	KSsca	2	76	UTC	380667	380667	90.7	1	1092.0	1327.6	1.2	16.1	2141.7
2013	KSsca	2	76	STFF	328161	341287	92.7	1	1176.9	2215.9	1.9	16.4	3644.7
2013	KSsca	2	76	SOYA	203460	210023	86.7	1	864.9	2090.7	2.4	16.5	3456.8
2013	KSsca	3	19	UTC	332536	350038	81.3	1	1326.0	1977.1	1.5	15.0	2979.1
2013	KSsca	3	19	STFF	367540	350038	82.7	1	1329.5	1583.8	1.2	15.8	2510.5
2013	KSsca	3	19	SOYA	367540	367540	86.0	1	1080.0	1417.0	1.3	16.0	2276.2
2013	KSsca	3	19	SOYA - FF	501721	420046	89.0	1	1381.3	3516.1	2.5	15.8	5567.2
2013	KSsca	3	38	SOYA - FF	351788	341287	89.3	1	1112.1	1920.3	1.7	16.4	3148.2
2013	KSsca	3	38	UTC	441048	341287	84.3	1	873.3	2175.8	2.5	15.2	3321.2
2013	KSsca	3	38	SOYA	367540	372791	88.3	1	1248.2	1967.2	1.6	16.5	3260.8
2013	KSsca	3	38	STFF	346538	341287	90.0	1.5	1098.4	1587.9	1.4	16.4	2603.0
2013	KSsca	3	76	SOYA	328161	341287	78.0	1	1016.5	1931.3	1.9	16.7	3242.1
2013	KSsca	3	76	SOYA - FF	387230	367540	82.0	1	1124.1	2438.0	2.2	16.2	3962.8
2013	KSsca	3	76	UTC	223149	223149	82.3	1	945.7	2227.5	2.4	15.5	3468.3
2013	KSsca	3	76	STFF	413483	420046	87.7	1	1053.8	1925.5	1.8	16.3	3147.9
2013	KSsca	4	38	SOYA - FF	283531	294032	81.7	1	878.7	2405.8	2.7	15.8	3815.2
2013	KSsca	4	38	STFF	346538	330786	89.0	1	1144.0	1824.0	1.6	16.4	3000.9
2013	KSsca	4	38	UTC	357039	367540	93.3	1	1142.5	2672.1	2.3	16.3	4368.3
2013	KSsca	4	38	SOYA	309784	320285	95.3	1	1024.4	2299.5	2.2	16.4	3787.5
2013	KSsca	4	19	UTC	420046	431714	85.0	1	1290.2	2274.3	1.8	15.9	3631.9
2013	KSsca	4	19	STFF	297533	315034	87.7	1	1013.9	2494.1	2.5	16.2	4054.8
2013	KSsca	4	19	SOYA - FF	501721	431714	89.7	1	1178.0	2983.3	2.5	16.0	4786.7
2013	KSsca	4	19	SOYA	624235	589231	98.0	1.5	1525.4	1815.3	1.2	16.4	2992.6

2013	KSsca	4	76	SOYA	347851	387230	82.3	1	1428.2	2130.1	1.5	16.5	3532.0
2013	KSsca	4	76	UTC	439736	439736	88.3	1	1103.2	2243.9	2.0	15.6	3513.2
2013	KSsca	4	76	SOYA - FF	426609	433172	89.3	1	917.9	2297.6	2.5	16.9	3894.7
2013	KSsca	4	76	STFF	452862	420046	87.7	1	881.7	2763.6	3.1	17.2	4769.4
2013	MNstp	1	51	STFF	433172	393793	88.9	1	776.0	2927.0	3.8	17.6	5178.6
2013	MNstp	1	51	SOYA	413483	426609	83.0	1	986.3	2734.8	2.8	18.9	5188.1
2013	MNstp	1	51	SOYA - FF	387230	387230	91.4	1	939.1	2842.1	3.0	17.5	4983.9
2013	MNstp	1	51	UTC	420046	387230	91.4	1	1155.6	2497.0	2.2	19.1	4770.2
2013	MNstp	1	25	UTC	420046	400356	97.4	1	832.3	2643.3	3.2	18.5	4900.6
2013	MNstp	1	25	SOYA	334724	374103	81.3	1	758.5	2197.7	2.9	18.8	4145.2
2013	MNstp	1	25	SOYA - FF	439736	413483	91.4	1	826.6	2640.1	3.2	18.9	5013.5
2013	MNstp	1	25	STFF	472552	433172	99.1	1	1195.0	2848.7	2.4	17.6	5014.4
2013	MNstp	1	76	SOYA	459425	433172	92.3	1	1276.5	2863.2	2.2	18.5	5305.9
2013	MNstp	1	76	SOYA - FF	452862	459425	86.4	1	1104.7	2541.4	2.3	18.1	4605.5
2013	MNstp	1	76	UTC	433172	400356	85.5	1	1040.4	2481.3	2.4	17.9	4457.5
2013	MNstp	1	76	STFF	347851	301908	95.7	3	971.9	2597.3	2.7	17.4	4538.9
2013	MNstp	2	25	SOYA - FF	328161	321598	89.7	2	791.5	2767.4	3.5	18.2	5049.1
2013	MNstp	2	25	UTC	420046	439736	90.6	2	1020.3	3006.9	2.9	17.6	5291.9
2013	MNstp	2	25	SOYA	465988	446299	83.0	1	1111.1	3016.6	2.7	17.5	5281.5
2013	MNstp	2	25	STFF	446299	433172	80.4	1	854.1	2717.8	3.2	18.5	5043.9
2013	MNstp	2	51	SOYA - FF	433172	433172	83.8	1	1084.6	2608.2	2.4	18.8	4913.6
2013	MNstp	2	51	UTC	387230	374103	88.1	1	913.4	2847.3	3.1	17.9	5112.2
2013	MNstp	2	51	STFF	400356	374103	91.4	1	1162.3	3525.1	3.0	17.6	6215.5
2013	MNstp	2	51	SOYA	420046	380667	95.7	1	1192.8	2983.8	2.5	18.4	5493.9
2013	MNstp	2	76	STFF	367540	288782	93.1	1	1051.5	2687.5	2.6	18.3	4922.6
2013	MNstp	2	76	SOYA - FF	413483	374103	94.0	1	1037.0	2894.2	2.8	18.5	5376.5
2013	MNstp	2	76	UTC	393793	341287	81.3	1	827.8	2736.5	3.3	17.1	4700.9
2013	MNstp	2	76	SOYA	387230	400356	89.7	1	1167.4	2585.7	2.2	19.9	5164.3
2013	MNstp	3	25	UTC	367540	380667	82.1	1	916.1	2372.7	2.6	16.9	4008.5
2013	MNstp	3	25	STFF	452862	413483	78.7	1	843.1	2322.9	2.8	17.9	4172.0
2013	MNstp	3	25	SOYA	479115	420046	95.7	1	1000.6	2779.5	2.8	16.7	4641.0
2013	MNstp	3	25	SOYA - FF	439736	426609	88.9	1	1038.6	3277.3	3.2	16.9	5566.8
2013	MNstp	3	51	SOYA	380667	400356	91.4	2	966.7	3259.1	3.4	17.1	5572.7
2013	MNstp	3	51	STFF	400356	406919	82.1	1	981.0	2695.7	2.7	17.9	4830.0
2013	MNstp	3	51	UTC	393793	400356	81.3	1	853.1	2708.2	3.2	17.5	4744.0
2013	MNstp	3	51	SOYA - FF	433172	439736	88.9	1	901.8	2721.7	3.0	18.4	5021.0
2013	MNstp	3	76	STFF	374103	374103	81.3	1	1027.6	2533.5	2.5	19.2	4870.4
2013	MNstp	3	76	UTC	498804	367540	84.7	2	944.8	2654.5	2.8	17.8	4750.1
2013	MNstp	3	76	SOYA	433172	406919	89.7	1	921.9	3057.5	3.3	17.9	5496.6
2013	MNstp	3	76	SOYA - FF	505368	374103	85.5	1	1015.3	3293.2	3.2	16.9	5565.5
2013	MNstp	4	51	SOYA - FF	374103	380667	96.5	1	1325.0	3586.5	2.7	18.0	6457.3
2013	MNstp	4	51	STFF	387230	387230	88.1	1	1218.0	3271.2	2.7	17.9	5876.0
2013	MNstp	4	51	UTC	341287	367540	84.7	1	1193.9	2990.0	2.5	17.4	5221.4

2013	MNstp	4	51	SOYA	459425	393793	97.4	1	905.3	3037.5	3.4	18.1	5515.7
2013	MNstp	4	76	SOYA	413483	354414	100.8	1	1090.3	3317.8	3.0	18.1	6014.3
2013	MNstp	4	76	STFF	334724	315034	94.8	1	1390.1	3083.1	2.2	17.9	5545.6
2013	MNstp	4	76	UTC	406919	380667	89.7	1	972.6	3125.5	3.2	17.3	5427.4
2013	MNstp	4	76	SOYA - FF	439736	426609	79.6	2	1074.8	2962.5	2.8	18.1	5374.1
2013	MNstp	4	25	STFF	406919	380667	76.2	2	918.6	2979.8	3.2	18.5	5528.7
2013	MNstp	4	25	SOYA	479115	492241	79.6	2	943.0	2896.1	3.1	17.5	5093.3
2013	MNstp	4	25	SOYA - FF	452862	406919	86.4	1	962.6	2644.2	2.7	17.9	4752.2
2013	MNstp	4	25	UTC	465988	387230	83.0	1	890.2	3141.1	3.5	16.4	5160.3
2013	MNwas	1	25	SOYA - FF	387230	413483	90.6	1	1311.2	3409.3	2.6	17.5	5969.0
2013	MNwas	1	25	SOYA	400356	400356	83.0	2	1388.2	3630.3	2.6	17.6	6422.0
2013	MNwas	1	25	STFF	459425	420046	75.4	2	1390.1	3455.1	2.5	17.7	6139.2
2013	MNwas	1	25	UTC	452862	380667	87.2	1	1009.7	3430.8	3.4	17.2	5910.7
2013	MNwas	1	76	STFF	465988	360977	72.8	1	1001.8	3136.5	3.1	18.2	5735.2
2013	MNwas	1	76	SOYA - FF	249402	242839	83.8	1	1355.8	3153.8	2.3	18.5	5852.9
2013	MNwas	1	76	SOYA	288782	210023	79.6	1	968.4	2988.8	3.1	19.1	5736.8
2013	MNwas	1	76	UTC	328161	295345	72.0	1	1315.3	2981.1	2.3	17.3	5185.5
2013	MNwas	1	51	STFF	347851	341287	88.1	1	838.9	3015.8	3.6	18.7	5651.6
2013	MNwas	1	51	SOYA - FF	518494	465988	72.8	1	1622.8	3242.8	2.0	18.0	5857.6
2013	MNwas	1	51	UTC	420046	400356	80.4	1	1270.5	2908.6	2.3	17.9	5228.8
2013	MNwas	1	51	SOYA	269092	262529	78.7	1	718.6	2974.3	4.1	19.1	5687.7
2013	MNwas	2	51	STFF	465988	413483	79.6	1	1352.9	3455.9	2.6	18.4	6377.4
2013	MNwas	2	51	UTC	374103	354414	80.4	2	1141.0	3222.5	2.8	16.8	5426.1
2013	MNwas	2	51	SOYA	367540	301908	81.3	1	1209.1	3021.0	2.5	18.8	5694.5
2013	MNwas	2	51	SOYA - FF	374103	341287	89.7	1	1394.6	3154.8	2.3	18.3	5781.8
2013	MNwas	2	76	STFF	433172	341287	79.6	1	872.3	2961.4	3.4	18.5	5478.3
2013	MNwas	2	76	UTC	374103	360977	76.2	1	919.4	2745.7	3.0	17.6	4853.6
2013	MNwas	2	76	SOYA - FF	347851	308471	80.4	1	962.6	2782.5	2.9	19.0	5303.7
2013	MNwas	2	76	SOYA	374103	367540	83.8	.	1217.7	3218.5	2.6	18.0	5803.4
2013	MNwas	2	25	UTC	413483	315034	84.7	.	918.0	3193.5	3.5	16.7	5346.3
2013	MNwas	2	25	SOYA	400356	380667	83.0	.	1678.9	3283.3	2.0	19.8	6503.4
2013	MNwas	2	25	STFF	459425	433172	86.4	.	1881.0	2980.2	1.6	18.1	5398.2
2013	MNwas	2	25	SOYA - FF	400356	347851	86.4	.	1201.4	3516.9	2.9	19.1	6718.5
2013	MNwas	3	76	SOYA - FF	282218	242839	82.1	.	1002.4	3112.9	3.1	18.9	5893.8
2013	MNwas	3	76	STFF	393793	360977	85.5	.	1333.5	2981.4	2.2	19.4	5785.6
2013	MNwas	3	76	SOYA	367540	347851	85.5	.	1215.7	3046.4	2.5	19.1	5846.4
2013	MNwas	3	76	UTC	374103	334724	75.4	.	1167.1	2834.1	2.4	18.2	5184.8
2013	MNwas	3	25	STFF	380667	374103	87.2	.	1582.9	3192.4	2.0	18.5	5931.8
2013	MNwas	3	25	UTC	452862	446299	86.4	.	1346.4	3469.8	2.6	16.9	5873.9
2013	MNwas	3	25	SOYA - FF	413483	347851	91.4	.	1223.8	3123.8	2.6	18.8	5882.4
2013	MNwas	3	25	SOYA	393793	328161	90.6	.	1283.3	3353.6	2.6	19.1	6415.3
2013	MNwas	3	51	STFF	347851	360977	78.7	.	1136.5	3292.5	2.9	17.2	5674.7
2013	MNwas	3	51	UTC	374103	328161	90.6	.	844.6	2774.2	3.3	17.2	4782.9

2013	MNwas	3	51	SOYA	360977	354414	92.3	.	1768.7	3077.6	1.7	18.5	5717.3
2013	MNwas	3	51	SOYA - FF	321598	315034	85.5	.	1070.6	3283.5	3.1	18.2	5975.8
2013	MNwas	4	76	UTC	374103	334724	81.3	.	1345.8	2943.2	2.2	17.1	5045.9
2013	MNwas	4	76	SOYA	584126	551310	84.7	.	2060.9	3382.7	1.6	19.0	6454.5
2013	MNwas	4	76	SOYA - FF	334724	347851	86.4	.	1318.4	3470.4	2.6	19.2	6677.1
2013	MNwas	4	76	STFF	406919	387230	81.3	.	879.8	3516.9	4.0	18.1	6386.2
2013	MNwas	4	51	UTC	347851	328161	80.4	.	1239.8	2785.7	2.2	17.2	4809.1
2013	MNwas	4	51	STFF	459425	406919	83.0	.	1137.3	3124.9	2.7	17.8	5574.3
2013	MNwas	4	51	SOYA	400356	347851	86.4	.	1741.3	3075.9	1.8	18.5	5716.7
2013	MNwas	4	51	SOYA - FF	446299	426609	83.8	.	1026.3	2947.2	2.9	18.6	5489.6
2013	MNwas	4	25	UTC	406919	334724	83.8	.	1355.0	3377.8	2.5	17.1	5777.6
2013	MNwas	4	25	SOYA - FF	420046	347851	89.7	.	1157.8	3190.9	2.8	18.8	6018.5
2013	MNwas	4	25	STFF	485678	446299	82.1	.	1311.5	3292.6	2.5	17.5	5760.7
2013	MNwas	4	25	SOYA	380667	400356	87.2	.	994.7	2937.7	3.0	19.5	5748.2
2014	KSman	1	76	SOYA - FF	413483	406919	77.3	1	919.2	2075.5	2.3	16.8	3495.9
2014	KSman	1	76	STFF	334724	334724	78.3	1	829.7	1743.2	2.1	18.5	3233.2
2014	KSman	1	76	UTC	347851	301908	74.0	1	899.2	1897.6	2.1	16.7	3177.1
2014	KSman	1	76	SOYA	393793	360977	78.7	1	1262.8	2291.8	1.8	17.6	4044.0
2014	KSman	1	19	STFF	285865	297533	72.7	1	850.5	2212.8	2.6	18.2	4037.7
2014	KSman	1	19	SOYA	315034	309200	75.0	1	899.3	2177.3	2.4	18.7	4082.0
2014	KSman	1	19	UTC	338370	315034	74.3	1	790.3	2136.6	2.7	17.5	3748.7
2014	KSman	1	19	SOYA - FF	355872	326702	79.3	1	1074.3	2376.9	2.2	17.6	4194.1
2014	KSman	1	38	STFF	320285	320285	68.7	1	851.5	2125.5	2.5	17.1	3644.0
2014	KSman	1	38	SOYA - FF	341287	357039	76.3	1	888.6	2284.6	2.6	17.8	4077.1
2014	KSman	1	38	UTC	378041	351788	70.7	1	1030.2	2328.2	2.3	16.1	3758.1
2014	KSman	1	38	SOYA	325536	309784	74.0	1	1065.1	2596.6	2.4	17.3	4503.8
2014	KSman	2	19	SOYA	414212	402544	69.3	1	1154.7	2538.6	2.2	17.2	4377.6
2014	KSman	2	19	SOYA - FF	367540	350038	75.0	1	1154.6	2523.0	2.2	17.5	4426.7
2014	KSman	2	19	STFF	379208	350038	74.7	1	913.2	2459.4	2.7	17.3	4265.7
2014	KSman	2	19	UTC	338370	373374	72.3	1	1112.1	2322.6	2.1	17.1	3981.8
2014	KSman	2	76	UTC	387230	367540	74.0	1	753.1	.	.	.	3892.2
2014	KSman	2	76	SOYA	354414	360977	73.0	1	1205.1	1986.7	1.6	17.5	3485.8
2014	KSman	2	76	STFF	413483	433172	82.0	1	1043.4	2271.8	2.2	16.3	3712.5
2014	KSman	2	76	SOYA - FF	367540	360977	79.7	1	1111.3	2204.1	2.0	17.6	3889.2
2014	KSman	2	38	STFF	425296	388542	68.7	1	1285.4	1668.7	1.3	18.5	3095.0
2014	KSman	2	38	UTC	383292	367540	73.7	1	859.6	2008.4	2.3	17.2	3463.4
2014	KSman	2	38	SOYA - FF	388542	404294	82.3	1	1030.4	2906.1	2.8	14.8	4312.0
2014	KSman	2	38	SOYA	378041	362290	81.7	1	1281.9	2565.1	2.0	16.4	4217.7
2014	KSman	3	19	SOYA	361706	367540	74.7	1	1219.6	2802.8	2.3	15.7	4411.7
2014	KSman	3	19	SOYA - FF	332536	309200	77.7	1	1019.9	2919.4	2.9	15.2	4449.0
2014	KSman	3	19	UTC	490054	414212	78.3	1	1242.0	2795.9	2.3	15.0	4204.6
2014	KSman	3	19	STFF	385042	379208	76.3	1	1322.8	2963.5	2.2	16.5	4902.4
2014	KSman	3	38	SOYA	330786	330786	74.7	1	1110.9	2771.7	2.5	16.1	4473.9

2014	KSman	3	38	STFF	309784	320285	78.3	1	1027.6	2978.6	2.9	15.4	4598.8
2014	KSman	3	38	UTC	294032	288782	77.0	1	1105.5	2661.3	2.4	15.4	4109.0
2014	KSman	3	38	SOYA - FF	336037	357039	82.7	1	1441.7	2653.7	1.8	16.6	4416.4
2014	KSman	3	76	STFF	288782	288782	81.0	1	923.6	2330.6	2.5	16.9	3948.9
2014	KSman	3	76	SOYA	334724	360977	81.7	1	1396.3	2355.8	1.7	17.2	4062.5
2014	KSman	3	76	SOYA - FF	341287	334724	79.7	1	1298.1	2737.2	2.1	15.4	4226.2
2014	KSman	3	76	UTC	380667	347851	80.0	1	1029.1	2790.3	2.7	15.5	4336.1
2014	KSman	4	38	UTC	362290	351788	76.0	1	1220.1	2227.3	1.8	15.9	3550.6
2014	KSman	4	38	SOYA - FF	393793	372791	76.3	1	912.9	2521.3	2.8	16.8	4246.8
2014	KSman	4	38	SOYA	388542	425296	81.3	1	1436.8	2904.7	2.0	16.1	4688.7
2014	KSman	4	38	STFF	420046	420046	76.7	1	1314.1	2691.8	2.0	15.9	4291.0
2014	KSman	4	76	SOYA - FF	354414	308471	79.3	1	909.5	2705.5	3.0	14.9	4041.5
2014	KSman	4	76	STFF	420046	393793	85.3	1	1133.6	2425.6	2.1	16.6	4036.9
2014	KSman	4	76	UTC	334724	334724	84.3	1	940.1	2696.5	2.9	15.4	4163.2
2014	KSman	4	76	SOYA	308471	288782	86.7	1	949.6	3021.0	3.2	15.4	4664.4
2014	KSman	4	19	UTC	309200	285865	72.3	1	1051.5	2467.0	2.3	15.6	3858.4
2014	KSman	4	19	SOYA - FF	332536	309200	76.3	1	1066.2	3030.3	2.8	16.0	4860.9
2014	KSman	4	19	STFF	355872	350038	81.7	1	1347.0	3065.9	2.3	15.4	4733.6
2014	KSman	4	19	SOYA	379208	326702	85.0	1	1355.2	2928.6	2.2	15.8	4639.0
2014	KSros	1	76	UTC	249402	223149	77.3	1	939.0	2330.7	2.5	14.2	3318.1
2014	KSros	1	76	SOYA	288782	269092	86.0	1	1492.7	3105.8	2.1	13.2	4110.3
2014	KSros	1	76	STFF	400356	321598	83.0	1	1350.0	2534.9	1.9	14.6	3710.5
2014	KSros	1	76	SOYA - FF	315034	236276	86.0	1	1258.7	2474.2	2.0	14.1	3497.6
2014	KSros	1	19	UTC	274197	280031	86.3	1	1497.4	2367.2	1.6	12.9	3061.5
2014	KSros	1	19	STFF	338370	297533	99.0	1	1460.2	2542.5	1.7	13.5	3441.2
2014	KSros	1	19	SOYA	379208	274197	101.7	1	1595.0	2475.6	1.6	13.7	3400.3
2014	KSros	1	19	SOYA - FF	367540	192521	100.7	1	1064.1	2614.2	2.5	14.2	3721.7
2014	KSros	1	38	UTC	220524	225775	89.3	1	1056.1	1839.9	1.7	12.9	2379.6
2014	KSros	1	38	STFF	299283	304533	94.7	1	1348.4	2246.2	1.7	12.3	2769.9
2014	KSros	1	38	SOYA	304533	241526	98.0	1	1274.6	2097.8	1.6	12.3	2586.9
2014	KSros	1	38	SOYA - FF	357039	246777	102.0	1	841.1	2317.0	2.8	12.0	2787.5
2014	KSros	2	19	SOYA - FF	163351	163351	97.7	1	963.3	2241.5	2.3	13.4	3011.3
2014	KSros	2	19	SOYA	326702	245027	100.7	1	1212.3	2544.6	2.1	13.9	3546.0
2014	KSros	2	19	STFF	320868	233359	105.0	1	1107.9	2378.1	2.1	12.2	2908.8
2014	KSros	2	19	UTC	355872	239193	98.7	1	1224.1	2493.7	2.0	12.1	3025.1
2014	KSros	2	38	SOYA	204772	199522	88.7	1	1282.3	2388.2	1.9	15.2	3639.5
2014	KSros	2	38	UTC	231025	168018	97.7	1	1115.1	2231.4	2.0	14.3	3199.2
2014	KSros	2	38	SOYA - FF	309784	309784	101.3	1	1452.2	2637.3	1.8	14.0	3701.8
2014	KSros	2	38	STFF	315034	204772	101.3	1	990.6	2266.5	2.3	13.4	3045.0
2014	KSros	2	76	UTC	177207	177207	91.7	1	588.0	2303.9	3.9	14.9	3441.6
2014	KSros	2	76	STFF	203460	144391	87.3	1	795.2	2204.9	2.8	14.5	3205.3
2014	KSros	2	76	SOYA - FF	216586	196897	96.3	1	793.1	2313.4	2.9	13.9	3223.9
2014	KSros	2	76	SOYA	315034	249402	100.3	1	917.4	2121.1	2.3	14.5	3083.6

2014	KSros	3	38	STFF	351788	325536	94.3	1	1604.1	2295.3	1.4	13.3	3060.6
2014	KSros	3	38	UTC	362290	273030	93.0	1	1337.2	2355.9	1.8	12.8	3023.3
2014	KSros	3	38	SOYA	262529	199522	96.7	1	1092.8	2552.8	2.3	13.3	3404.0
2014	KSros	3	38	SOYA - FF	399044	351788	91.0	1	1322.1	2429.3	1.8	13.9	3385.4
2014	KSros	3	76	STFF	288782	236276	98.0	1	1275.3	3040.5	2.4	13.3	4054.2
2014	KSros	3	76	UTC	216586	137828	94.7	1	788.0	2281.6	2.9	13.9	3179.7
2014	KSros	3	76	SOYA	282218	216586	100.3	1	1047.8	2594.9	2.5	13.2	3434.0
2014	KSros	3	76	SOYA - FF	236276	229713	98.0	1	1377.6	2476.1	1.8	13.2	3276.9
2014	KSros	3	19	SOYA - FF	414212	320868	98.3	1	1462.4	2756.1	1.9	13.5	3730.4
2014	KSros	3	19	STFF	379208	274197	98.0	1	1208.6	2515.2	2.1	13.9	3505.1
2014	KSros	3	19	SOYA	262529	198355	96.7	1	1040.9	2721.0	2.6	12.6	3437.2
2014	KSros	3	19	UTC	355872	239193	97.7	1	1374.7	2669.7	1.9	12.9	3452.8
2014	KSros	4	38	STFF	299283	257278	96.0	1	910.3	1869.7	2.1	12.1	2268.1
2014	KSros	4	38	UTC	315034	225775	99.7	1	717.6	1731.5	2.4	12.8	2222.0
2014	KSros	4	38	SOYA	346538	267779	102.3	1	1067.9	2068.0	1.9	13.8	2861.1
2014	KSros	4	38	SOYA - FF	294032	236276	101.3	1	1173.7	2462.6	2.1	13.5	3333.0
2014	KSros	4	76	UTC	275655	295345	99.3	1	1715.1	3179.2	1.9	13.0	4143.6
2014	KSros	4	76	STFF	380667	216586	100.0	1	1091.1	3013.7	2.8	13.5	4079.0
2014	KSros	4	76	SOYA	308471	203460	102.3	1	1104.2	2745.2	2.5	14.3	3935.8
2014	KSros	4	76	SOYA - FF	255965	164080	102.7	1	964.3	2902.0	3.0	14.9	4335.1
2014	KSros	4	19	STFF	192521	198355	93.3	1	1185.6	2107.2	1.8	14.8	3126.8
2014	KSros	4	19	UTC	250861	175019	96.3	1	1102.1	1859.9	1.7	15.2	2834.3
2014	KSros	4	19	SOYA	233359	151683	96.7	1	920.3	2575.0	2.8	15.2	3924.1
2014	KSros	4	19	SOYA - FF	198355	145849	94.7	1	637.0	2130.5	3.3	15.2	3246.7
2014	KSsca	1	19	SOYA - FF	347851	303366	97.7	1	1109.8	2470.4	2.2	15.9	3938.1
2014	KSsca	1	19	UTC	291699	280031	97.0	1	1500.2	2227.0	1.5	14.4	3215.1
2014	KSsca	1	19	SOYA	210023	198355	101.7	1	985.3	2354.6	2.4	16.3	3847.9
2014	KSsca	1	19	STFF	256695	256695	99.3	1	1285.4	2290.8	1.8	15.1	3468.1
2014	KSsca	1	76	SOYA - FF	334724	341287	99.3	1	1132.5	1504.4	1.3	15.1	2277.5
2014	KSsca	1	76	SOYA	262529	229713	91.3	1	1083.7	1657.7	1.5	16.6	2758.9
2014	KSsca	1	76	STFF	288782	249402	99.3	1	1156.7	2305.0	2.0	15.0	3466.5
2014	KSsca	1	76	UTC	301908	262529	94.7	1	1002.4	2370.1	2.4	14.9	3540.6
2014	KSsca	1	38	STFF	294032	273030	101.3	1	1279.9	3277.9	2.6	15.1	4962.4
2014	KSsca	1	38	SOYA	288782	294032	95.0	1	1348.9	2492.1	1.8	16.4	4097.6
2014	KSsca	1	38	UTC	252028	231025	95.3	1	935.2	2254.6	2.4	15.4	3481.1
2014	KSsca	1	38	SOYA - FF	278280	267779	94.3	1	1134.8	1619.0	1.4	15.0	2434.8
2014	KSsca	2	38	SOYA	330786	330786	101.0	1	1266.3	1511.0	1.2	16.9	2560.2
2014	KSsca	2	38	UTC	393793	325536	96.7	1	1256.0	1834.7	1.5	15.5	2851.1
2014	KSsca	2	38	SOYA - FF	288782	283531	100.7	1	938.0	2880.7	3.1	15.7	4534.3
2014	KSsca	2	38	STFF	336037	330786	100.3	1	1348.9	2637.6	2.0	15.4	4072.4
2014	KSsca	2	76	STFF	341287	321598	102.0	1	1260.0	2223.4	1.8	15.8	3522.1
2014	KSsca	2	76	SOYA	360977	308471	103.3	1	1236.4	2133.4	1.7	15.6	3336.7
2014	KSsca	2	76	UTC	301908	315034	103.3	1	1322.5	1969.2	1.5	15.1	2981.1

2014	KSsca	2	76	SOYA - FF	334724	288782	101.0	1	1010.2	2818.4	2.8	15.5	4379.7
2014	KSsca	2	19	UTC	297533	315034	99.7	1	.	2356.3	.	15.1	3567.1
2014	KSsca	2	19	STFF	297533	291699	95.7	1	1099.2	2688.7	2.4	15.5	4178.2
2014	KSsca	2	19	SOYA - FF	262529	280031	90.3	1	1066.4	2399.9	2.3	15.1	3633.2
2014	KSsca	2	19	SOYA	285865	245027	96.7	1	1236.8	3065.3	2.5	15.1	4640.6
2014	KSsca	3	38	STFF	383292	378041	69.0	1	1356.5	2147.2	1.6	15.0	3229.1
2014	KSsca	3	38	SOYA	367540	367540	96.7	1	1414.3	2693.0	1.9	15.5	4184.9
2014	KSsca	3	38	SOYA - FF	236276	241526	96.7	1	987.4	2534.2	2.6	15.3	3887.3
2014	KSsca	3	38	UTC	236276	225775	94.7	1	909.4	1865.4	2.1	15.1	2824.0
2014	KSsca	3	19	UTC	233359	233359	97.7	1	1121.9	2129.1	1.9	14.7	3137.8
2014	KSsca	3	19	SOYA - FF	326702	274197	94.0	1	1074.3	2117.2	2.0	15.5	3290.1
2014	KSsca	3	19	SOYA	285865	268363	95.3	1	1287.5	2361.6	1.8	15.1	3575.1
2014	KSsca	3	19	STFF	280031	239193	94.7	1	901.3	1816.6	2.0	18.7	3405.8
2014	KSsca	3	76	UTC	269092	255965	90.7	1	1504.3	2020.4	1.3	14.4	2916.9
2014	KSsca	3	76	SOYA	282218	269092	93.7	1	1170.0	1979.2	1.7	14.7	2916.9
2014	KSsca	3	76	STFF	255965	255965	92.3	1	1366.2	1851.0	1.4	15.1	2802.3
2014	KSsca	3	76	SOYA - FF	288782	295345	94.7	1	1242.8	1731.2	1.4	15.2	2638.2
2014	KSsca	4	19	UTC	332536	315034	96.3	1	947.8	2912.6	3.1	15.0	4380.1
2014	KSsca	4	19	SOYA - FF	297533	291699	92.3	1	1177.9	3045.2	2.6	15.9	4854.4
2014	KSsca	4	19	SOYA	280031	280031	89.0	1	1105.6	2865.9	2.6	16.2	4654.7
2014	KSsca	4	19	STFF	303366	332536	90.7	1	1469.1	3143.6	2.1	15.3	4822.0
2014	KSsca	4	38	SOYA	357039	315034	101.0	1	1385.5	2389.5	1.7	15.2	3641.5
2014	KSsca	4	38	UTC	278280	294032	100.7	1	1143.2	2026.1	1.8	15.0	3046.9
2014	KSsca	4	38	SOYA - FF	315034	273030	98.0	1	1288.1	2419.8	1.9	15.5	3760.4
2014	KSsca	4	38	STFF	278280	241526	100.0	1	917.4	1254.4	1.4	15.6	1961.9
2014	KSsca	4	76	SOYA - FF	321598	282218	96.7	1	1351.2	2628.5	1.9	15.0	3952.9
2014	KSsca	4	76	SOYA	321598	308471	97.3	1	1180.9	2707.8	2.3	15.5	4208.0
2014	KSsca	4	76	STFF	262529	295345	97.0	1	1216.2	1687.0	1.4	15.2	2570.9
2014	KSsca	4	76	UTC	321598	308471	93.3	1	1535.4	2238.7	1.5	14.9	3344.2
2014	MNstp	1	51	UTC	656322	564437	99.0	4	1458.5	3160.9	2.2	15.5	4912.0
2014	MNstp	1	51	SOYA - FF	446299	452862	95.0	1	1232.2	2624.7	2.1	16.5	4341.9
2014	MNstp	1	51	SOYA	505368	492241	98.3	3	1074.5	2805.1	2.6	15.5	4359.1
2014	MNstp	1	51	STFF	544747	505368	97.7	2	935.6	2669.8	2.9	16.3	4362.9
2014	MNstp	1	25	STFF	597253	577563	87.7	3	952.5	2242.9	2.4	17.5	3935.1
2014	MNstp	1	25	UTC	603816	577563	95.7	2	1380.7	2454.5	1.8	15.8	3888.1
2014	MNstp	1	25	SOYA - FF	538184	544747	98.7	2	877.6	2431.7	2.8	16.4	3998.2
2014	MNstp	1	25	SOYA	616942	571000	96.0	4	941.7	2273.3	2.4	16.4	3737.8
2014	MNstp	1	76	UTC	597253	452862	80.0	5	924.7	2351.3	2.5	17.1	4031.0
2014	MNstp	1	76	STFF	590690	485678	81.7	3	785.8	2230.6	2.8	16.6	3712.3
2014	MNstp	1	76	SOYA	590690	479115	92.7	5	742.3	2092.4	2.8	17.6	3692.1
2014	MNstp	1	76	SOYA - FF	485678	446299	84.7	4	819.2	1891.3	2.3	17.4	3299.3
2014	MNstp	2	76	SOYA	511931	479115	94.7	4	978.5	2917.5	3.0	14.5	4241.3
2014	MNstp	2	76	STFF	498804	518494	92.3	5	1149.2	2789.4	2.4	15.9	4446.6

2014	MNstp	2	76	UTC	643195	525057	87.3	5	1288.8	2691.3	2.1	16.4	4425.2
2014	MNstp	2	76	SOYA - FF	584126	551310	79.0	4	1248.2	2644.4	2.1	16.8	4454.0
2014	MNstp	2	51	UTC	597253	623506	85.0	1	874.6	2588.1	3.0	16.3	4229.4
2014	MNstp	2	51	SOYA - FF	498804	472552	88.7	1	893.5	2434.3	2.7	17.0	4148.9
2014	MNstp	2	51	SOYA	518494	511931	84.0	1	952.5	2901.0	3.0	16.6	4828.0
2014	MNstp	2	51	STFF	511931	538184	102.0	2	899.1	2670.7	3.0	16.5	4418.0
2014	MNstp	2	25	UTC	656322	643195	82.0	3	954.4	2806.2	2.9	16.3	4585.9
2014	MNstp	2	25	SOYA - FF	643195	656322	99.3	2	969.9	2684.4	2.8	16.8	4521.5
2014	MNstp	2	25	SOYA	616942	662885	90.0	2	1287.9	2852.6	2.2	16.6	4747.5
2014	MNstp	2	25	STFF	498804	531621	86.0	2	952.0	2916.1	3.1	16.2	4736.3
2014	MNstp	3	76	UTC	656322	610379	74.0	4	854.1	2743.3	3.2	15.6	4290.5
2014	MNstp	3	76	SOYA	446299	420046	87.3	4	1137.8	2701.4	2.4	15.8	4279.2
2014	MNstp	3	76	STFF	538184	479115	94.0	3	722.8	2280.7	3.2	16.3	3727.2
2014	MNstp	3	76	SOYA - FF	426609	380667	82.3	2	1093.2	2258.1	2.1	16.8	3803.3
2014	MNstp	3	51	UTC	544747	557873	92.0	3	949.6	2440.0	2.6	17.7	4330.0
2014	MNstp	3	51	STFF	597253	571000	92.7	2	976.8	2381.0	2.4	15.8	3771.7
2014	MNstp	3	51	SOYA - FF	498804	446299	87.0	1	892.2	2350.7	2.6	16.8	3959.4
2014	MNstp	3	51	SOYA	518494	544747	90.3	1	897.5	3143.6	3.5	15.5	4885.1
2014	MNstp	3	25	STFF	584126	544747	91.7	1	896.6	3039.7	3.4	16.3	4967.4
2014	MNstp	3	25	UTC	551310	511931	96.0	2	1130.3	2824.4	2.5	16.8	4757.3
2014	MNstp	3	25	SOYA	564437	531621	98.3	2	1009.6	2415.5	2.4	16.7	4044.3
2014	MNstp	3	25	SOYA - FF	643195	603816	101.3	3	813.0	2114.3	2.6	17.9	3794.3
2014	MNstp	4	76	SOYA	459425	400356	86.7	5	936.9	3033.6	3.2	15.9	4835.9
2014	MNstp	4	76	SOYA - FF	538184	465988	92.7	4	1190.6	2944.5	2.5	16.1	4752.8
2014	MNstp	4	76	UTC	551310	525057	85.3	5	813.4	2554.1	3.1	16.9	4327.6
2014	MNstp	4	76	STFF	511931	511931	94.0	5	1137.7	2842.1	2.5	16.5	4701.5
2014	MNstp	4	51	UTC	584126	525057	93.0	4	1350.4	2715.6	2.0	16.1	4383.4
2014	MNstp	4	51	STFF	492241	465988	84.3	3	1103.0	3073.6	2.8	16.1	4961.3
2014	MNstp	4	51	SOYA - FF	511931	492241	90.0	1	1204.3	2923.0	2.4	16.9	4952.6
2014	MNstp	4	51	SOYA	498804	479115	84.7	2	1352.1	3190.4	2.4	15.7	5021.8
2014	MNstp	4	25	SOYA	518494	498804	86.3	2	1213.2	3171.6	2.6	17.0	5405.6
2014	MNstp	4	25	STFF	492241	387230	86.7	2	1075.1	3021.4	2.8	16.3	4937.6
2014	MNstp	4	25	UTC	485678	393793	97.3	3	973.3	2846.4	2.9	15.1	4309.2
2014	MNstp	4	25	SOYA - FF	538184	492241	102.3	2	1169.4	2589.8	2.2	17.8	4621.7
2014	MNwas	1	51	SOYA	255965	.	.	.	.	.	.	.	.
2014	MNwas	1	51	SOYA	439736	.	.	.	.	.	.	.	.
2014	MNwas	1	51	SOYA - FF	538184	.	.	.	.	.	.	.	.
2014	MNwas	1	51	STFF	597253	.	.	.	.	.	.	.	.
2014	MNwas	1	25	UTC	571000	.	.	.	.	.	.	.	.
2014	MNwas	1	25	UTC	702264	.	.	.	.	.	.	.	.
2014	MNwas	1	25	UTC	603816	.	.	.	.	.	.	.	.
2014	MNwas	1	25	STFF	341287	.	.	.	.	.	.	.	.
2014	MNwas	1	76	SOYA - FF	255965	.	.	.	.	.	.	.	.

2014	MNwas	1	76	SOYA - FF	255965	.	.	.	.	.	.	.	.
2014	MNwas	1	76	STFF	400356	.	.	.	.	.	.	.	.
2014	MNwas	1	76	SOYA	360977	.	.	.	.	.	.	.	.
2014	MNwas	2	25	UTC	584126	.	.	.	.	.	.	.	.
2014	MNwas	2	25	STFF	282218	.	.	.	.	.	.	.	.
2014	MNwas	2	25	SOYA - FF	255965	.	.	.	.	.	.	.	.
2014	MNwas	2	25	STFF	360977	.	.	.	.	.	.	.	.
2014	MNwas	2	51	UTC	577563	.	.	.	.	.	.	.	.
2014	MNwas	2	51	STFF	321598	.	.	.	.	.	.	.	.
2014	MNwas	2	51	SOYA - FF	420046	.	.	.	.	.	.	.	.
2014	MNwas	2	51	SOYA	459425	.	.	.	.	.	.	.	.
2014	MNwas	2	76	STFF	334724	.	.	.	.	.	.	.	.
2014	MNwas	2	76	UTC	229713	.	.	.	.	.	.	.	.
2014	MNwas	2	76	SOYA	354414	.	.	.	.	.	.	.	.
2014	MNwas	2	76	SOYA	380667	.	.	.	.	.	.	.	.
2014	MNwas	3	25	UTC	367540	.	.	.	.	.	.	.	.
2014	MNwas	3	25	SOYA	308471	.	.	.	.	.	.	.	.
2014	MNwas	3	25	SOYA	538184	.	.	.	.	.	.	.	.
2014	MNwas	3	25	SOYA - FF	492241	.	.	.	.	.	.	.	.
2014	MNwas	3	51	SOYA	255965	.	.	.	.	.	.	.	.
2014	MNwas	3	51	SOYA - FF	590690	.	.	.	.	.	.	.	.
2014	MNwas	3	51	SOYA	295345	.	.	.	.	.	.	.	.
2014	MNwas	3	51	SOYA - FF	393793	.	.	.	.	.	.	.	.
2014	MNwas	3	76	SOYA - FF	328161	.	.	.	.	.	.	.	.
2014	MNwas	3	76	UTC	203460	.	.	.	.	.	.	.	.
2014	MNwas	3	76	STFF	433172	.	.	.	.	.	.	.	.
2014	MNwas	3	76	UTC	400356	.	.	.	.	.	.	.	.
2014	MNwas	4	51	UTC	315034	.	.	.	.	.	.	.	.
2014	MNwas	4	51	STFF	518494	.	.	.	.	.	.	.	.
2014	MNwas	4	51	SOYA	531621	.	.	.	.	.	.	.	.
2014	MNwas	4	51	SOYA - FF	656322	.	.	.	.	.	.	.	.
2014	MNwas	4	76	SOYA - FF	295345	.	.	.	.	.	.	.	.
2014	MNwas	4	76	SOYA	269092	.	.	.	.	.	.	.	.
2014	MNwas	4	76	UTC	334724	.	.	.	.	.	.	.	.
2014	MNwas	4	76	SOYA - FF	400356	.	.	.	.	.	.	.	.
2014	MNwas	4	25	STFF	380667	.	.	.	.	.	.	.	.
2014	MNwas	4	25	STFF	400356	.	.	.	.	.	.	.	.
2014	MNwas	4	25	UTC	577563	.	.	.	.	.	.	.	.
2014	MNwas	4	25	STFF	557873	.	.	.	.	.	.	.	.