AN ECONOMIC ANALYSIS OF PRODUCER DECISIONS REGARDING INSECT CONTROL IN STORED GRAIN - A STOCHASTIC DOMINANCE APPROACH

by

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CHAPTER 1

INTRODUCTION

The huge surplus of grain in recent years has increased the interest in the maintenance of quality in stored grain. As of December 1, 1987, there were 75 million bushels of wheat stored on farms and over 342 million bushels of wheat stored off the farms. Losses from the lack of proper management of this stored grain have ranged from a few dollars for invisible moisture shrink to hundreds of thousands of dollars when large quantities of grain are allowed to become severely damaged, because of excess moisture or insect activity (Kiser, et. al., 1986).

When the producer decides to store grain on the farm, managing the stored grain becomes a responsibility. The producer must make decisions regarding management practices which will maintain the quality of grain and at the same time control storage pests. For an individual producer, price discounts are the main economic incentive to maintain the quality of stored grain. According to Reed (1986), 73.3 percent of the producers surveyed felt the costs of the loss and penalties for infested and/or damaged wheat were greater than the cost of controlling pests in stored wheat.

Producers are faced with decisions regarding what method of pest management should be used to control insect activity and at the same time reduce the probability of receiving a lower net income. This decision may be based upon the costs of the chemical, the potential

loss if a chemical is not used, time and labor involved, and condition of grain when stored.

Justification for Study

Kansas has a long history of studies of on farm storage of wheat. The first studies of stored grain began in 1907. The Kansas agricultural experiment station in 1916 began working on studies which concentrated on the storage characteristics of various farm bins. In the mid 1940's Cotton and Winburn (1941) investigated field infestation of wheat by stored grain insects while Walkden (1951) investigated the economic consequences of insect infestation in farm stored grain. Wilbur and Warren (1958) surveyed more than 300 central Kansas farms in the late 1940's and early 1950's to determine the effectiveness of various chemical treatments against stored grain insects and to identify potential sources of stored grain infestation.

During the late 1970's and early 1980's, most of the work was conducted in the area of insect densities in stored grain and chemical application to control insect infestation. However, Reed (1986) described on farm wheat storage facilities and pest control practices which were substantially different than those used in the late 1950's. This particular study was not only prompted by the significant changes in on-farm grain storage, but by the increases in reserve stocks and the ban on several commonly used grain fumigants. In this analysis, emphasis was placed on determining types and location of on farm grain storage, insect densities, chemical treatments and timing patterns of treatment application and insect activity.

It is evident that the basic concerns of these researchers were in

the areas of identifying the grain storage insects and what strategies could be used to control them. However, many of the insecticides and possible treatments have either been taken off the market or can only be applied by certified pesticide applicants. The choices for controlling insects on stored grain are dwindling to the point that producers have very few options available.

Decisions regarding management of grain are part of the high risk environment in which agricultural producers operate. Every day producers are faced with some type of decision regarding what crop to plant this year based upon expected forecasts, whether to sell the crop after harvest, or to store the crop until prices become more profitable. Storing the grain seems to be one solution at this critical time in agriculture in order to take some of the pressure of surplus grain out of the market place. However, in order to guarantee the higher price without getting discounted for poor quality or most importantly, infestation, the producers must make wise pest management decisions.

Most producer decisions can be determined by the relative cost and performance of each option. Risk may also be a concern for the decision maker. Producers who are risk averse may adopt less profitable options when they are less risky. Producers may have a vague idea of the probability of the result of each strategy available, so the decision is also influenced by their own or neighbors experience commonly gained by trial and error.

Description of Data Sets

In this study, three primary data sets were used. The first

data set was a result of an on-farm study. Since listings of producers in counties who had wheat stored on the farm was not available, sample selection was randomized on the basis of location. All Kansas counties, whose production from 1979 to 1984 was at least 50 percent higher than the statewide average, was used as the criteria.

Each selected individual owning or living at the chosen location was contacted by phone to determine whether wheat was produced and stored at the chosen site. Individuals who stored more than 900 bushels of wheat on the farm for three months or more were asked to complete a mailed questionnaire. If the individual agreed, then a questionnaire was sent with a coded, stamped return envelope. Respondents were asked to answer all questions relative to wheat only and not other farm-stored grain. Also, the producers were asked about the types of pest control methods used and when treatments were applied. Approximately 250 questionnaires were mailed and 170 were returned.

The completed questionnaires were stratified by the pest control strategy used for farm-stored wheat according to the following categories: (1) Minimum/No Treatment - no pest control chemical applied to the wheat; (2) Grain Protectant Treatment (Malathion or Chlorpyrifos-methyl) insecticide applied to the wheat during bin filling; (3) Fumigation Treatment - wheat treated with fumigants later in the storage period; (4) Fumigation and Grain Protectant Treatments - wheat treated with protectant and also fumigant. Twenty-eight Kansas counties were randomly selected which included 55 farm locations in six

district areas: northwest, west, southwest, north central, central, and south central (Figure 1.1).

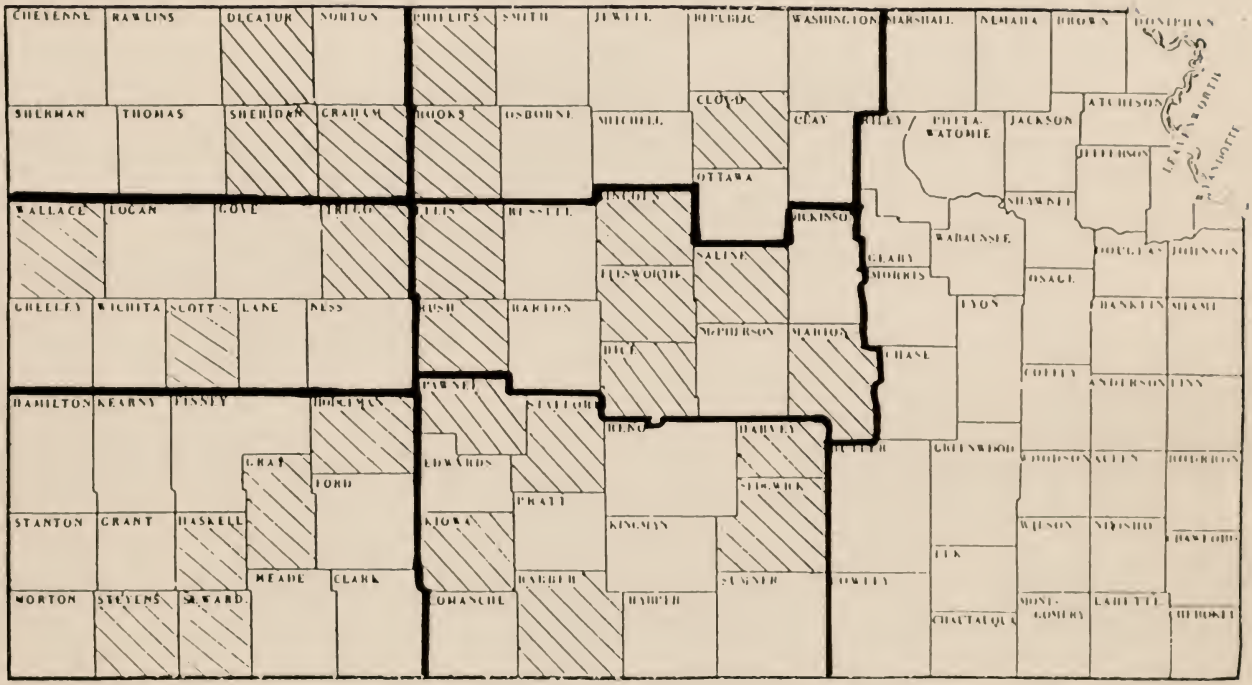
In July, investigators sampled 79 bins from the originally identified farms where wheat was produced and stored. Samples were taken from the bins and analyzed to determine the quality of the grain and also the insect activity at that particular time period. These selected bins were sampled at two month intervals from July, 1986 to March, 1987.

The second data set was from an elevator study. This included data gathered from elevators in locations including all major wheat production areas of Kansas. Six terminal and eleven country elevators were selected based on their location and history of cooperation with stored-grain research.

Elevator operators were asked to collect samples of on-farm stored wheat delivered to market. The operators collected samples from randomly selected farmers with on-farm storage. Approximately 1000 grams were retained in plastic containers and kept at room temperature at the elevator until picked up by researchers. A sample card was supplied for the elevator operator to report sample identification and date, the approximate size of the lot, the value of the discount, and the reason for the discount.

Samples were collected at intervals of no more than 10 days apart from November 1986 through May 1987 and transported to the laboratory for analysis. Moisture content, test weight, dockage, fine material, and insect counts were recorded. Finally, insect-damaged kernels were then determined by Food And Drug Administration criteria (Wingfield and

FIGURE 1.1: LOCATION OF COUNTIES SURVEYED



1986 Survey

Pederson, 1985) and expressed as number per 100 grams. In wheat, 32 or more insect-damaged kernels per 100 grams is the current FDA "defect action level."

The third data set was the chemical cost data. Costs were gathered from interviewing 49 grain elevators, cooperatives, and agricultural services located in the central, northwest, and southwest areas of Kansas. Out of the 49 surveyed, 33 were cooperatives, nine were grain elevators, three were terminal elevators, three were local department stores and one was an agricultural service. Only 69.4 percent of those surveyed sold some type of treatment that farmers could use on their stored grain.

Objectives and Organization of Thesis

The objective of this study was to analyze the pest management decisions the producer must make regarding control of insects in stored grain. In order to analyze this decision, three types of data were combined. First, data on the costs of the different treatments were needed. Second, data from samples of grain in farm bins were used as estimates of the insect activity in bins when different treatments are used. Third, data from samples collected at elevators were used to indicate the discounts received for insects in stored grain. Finally, since there are substantial differences in discounts received and in levels of insect activity, the pest management decisions were analyzed in a framework that allowed consideration of the risk associated with the decision.

The remaining chapters are organized in the following way. The literature cited in Chapter 2 concentrates on the biological and

chemical aspects of grain storage insects. Most of the previous research was related to the production side of agriculture rather than economic studies. This study was an economic study of the selection of management strategies for maintenance of quality in stored grain. The methods used for analysis as well as the theory relevant to the analysis are discussed in Chapter 3. The results and implications of the analysis are discussed in Chapter 4. Summary and discussion of needs in future research are discussed in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

Most research has concentrated primarily on biological studies and chemical control of insects which infest stored grain. There has been very little research on the economics of insect infestation. Moreover, little risk analysis or decision making analysis regarding the choice of pest management strategies for storage insects has been reported. Therefore, a brief overview of studies reported in the biological area and possible causes of outbreaks of insect infestation is presented. Secondly, some economic studies related to economic thresholds, and risk and decision making analysis are discussed.

Biological Studies

Reports of problems faced by Kansas wheat producers storing grain started in the late 1930's and the early 1940's. Investigations of the outbreaks of infestations and factors causing infestation were conducted during this time and have continued until the present. Winburn (1940) reported that 25 of 27 bins surveyed in late October in one central Kansas county showed more or less heavy infestation. In October, 1971, Bell et al. (1972) sampled 154 bins of Kansas farm-stored wheat and found that 88 percent of those bins were infested.

McGaughey et al. (1978) investigated single bins of wheat at 58 farm sites and two bins at four sites in a 23 county area in central and south-central Kansas. Only bins containing wheat harvested that

year were examined. Inspection period was from August to May. Throughout this period, 79 percent of the bins became infested. Eighteen of the 32 non-infested bins became infested between August and November. No new infestations were found during the February to May visits, but evidence that larval activity had occurred during the winter months was noted in several infested bins. At each visit, evidence of Indian meal moth infestation was noted by visual examination of grain surface and exposed areas of the bin walls and roof.

During the four visits to the farm, the incidence and severity of Indian meal moth in prior years were established by interviewing the producers. When infestation history was compared with infestation during the study, the results were similar. Twenty-one percent of the non-infested bins had had no previous problems and none had had severe problems. However, 15 percent of the infested bins had a history of severe infestation, and only two percent had a history of no infestation. This tendency toward a history of more severe infestation for infested bins was consistent regardless of bin construction.

McGaughey et al. concluded that the Indian meal moth infestation is a much greater problem than what was initially assumed. Infestation began in the early months immediately after harvest and through the fall months. The frequency and severity of infestations can be predicted by evaluating prior experience at the bin site. Thus, effective control and preventive measures for the Indian meal moth are needed.

Samples from more than 8000 farm bins were examined by Storey et

al. (1983). They found live insects in 25.1 percent of the wheat. Mean insect densities of the 20 samples examined from several states ranged from 1 to 135/1000 grams. The mean insect density of the samples from Kansas was 15 insects per 1000 grams.

On three-month intervals beginning in July, Reed (1986) sampled bins from 40 farms. The frequency of infested farm-stored wheat was highest in late fall. The insect densities within the grain mass were also highest in November and were reduced during the winter. Bran bugs were the most commonly found stored-product insects, and were present in over 75 percent of the infested bins. The more destructive insects (internal-infesting insects) were not as abundant as the other species. Only 15.5 percent of the insects present in the samples were classified as weevils, and this primarily because one bin was heavily infested.

Causes and Control of Insect Outbreaks

The more important factors affecting the rise or fall of insect populations in stored grain are food supply, temperature and moisture, and control or prevention measures. With the large quantities of stored grain on the farm, the availability of food supplies for insects is always at hand. Wilbur and Warren (1958) surveyed 335 Kansas farms during the late 1940's and early 1950's and found that stored marketable wheat in close proximity to feed grains and/or ground feeds was infested on more than one-half of the farms. On every farm surveyed, insect-infested grain and feed in bins, adjacent buildings and equipment were found to be potential sources of contamination.

Temperature and moisture are the most important factors affecting the prevalence of stored-grain insects. Most of the insects are

thought to be of subtropical origin and do not hibernate. Therefore, storage insects are more likely to cause considerable damage when high temperatures and moisture contents are noticeable.

Wilken (1985) found that stored grain insect pests require minimum temperatures (54° to 64° F), depending upon species, to complete their life cycles. Optimum temperatures for maximum rates of reproduction range between 80° and 104° F.

Oxley (1948) found that when dry grain heats, insect infestations are the cause, and the source of heat is the metabolism of the insects themselves. This ability of insects to heat grain enables them to breed throughout the winter in areas where normal grain temperatures would be too low to support insect development.

The insect pests of stored grain are dependent upon their food supply for the moisture requirements to carry on their life processes. For this reason grain moisture is an important factor in their life cycle. Cotton et al. (1960) investigated storage conditions on central Kansas farms and reported that from 1946-1950 the majority of farm-stored wheat contained from 11 to 13 percent moisture content. They found a positive correlation between moisture content and insect infestation. In fact, when moisture content was between 12 and 13 percent, insect populations were substantially higher than when moisture content was 11 to 12 percent.

The type of pest control and other physical and sanitation conditions may affect the ease with which the quality of stored grain is maintained. Storey et al. (1984) examined 4,171 samples of wheat submitted from 27 states. According to the information submitted with

the samples, less than 10 percent had been fumigated and only 15 percent of the samples were treated with malathion protectant.

In a study of farm-stored corn and wheat in Minnesota, Barak and Harein (1981) reported that less than 10 percent of the wheat had received a "post-harvest treatment". All surveyed bins had been cleaned before newly-harvested wheat was added, but less than 10 percent were treated with insecticide and none of the wheat had received a protectant treatment during bin filling.

The percentage of wheat bins equipped for aeration was found to be 32.8 and 52.5 percent, respectively, when Prickett et al. (1983) sampled Oklahoma farms in 1982 and 1983. Insect densities were substantially lower in aerated than in non-aerated bins, while no reduction in insect density was found in grain treated with protectant.

Aeration is not always available as a pest management strategy, however. In a study of farm-stored wheat in Kansas, Reed (1986) found that only one-third (35.9 percent) of the producers surveyed reported having aerated storage. Another 37.1 percent reported having both aerated and non-aerated bins, and 27.1 percent had only non-aerated storage capacity.

It was also determined that the storage location of the newly harvested grain relative to old grain in storage, may be another factor increasing the risk of deterioration and loss in farm-stored wheat. While only 8.2 percent of the respondents reported having stored wheat from two crop years in the same bin, 37.3 percent of the producers had stored old and new crop wheat close together.

Moreover, Reed found that producers who used the protectant

treatment method were more common and collectively stored more on-farm wheat than producers who used other treatment strategies. The use of both grain protectant and fumigation was selected by the fewest producers, but these producers had 18.6 percent of the total quantity stored. Essentially, producers who indicated using the grain protectant and fumigation treatment method tended to report large storage capacities. However, this survey suggests that about one-third of Kansas on-farm stored wheat was often stored without chemical treatment.

Economic Analysis

Economic Thresholds:

Establishing economic thresholds and the need to use an insecticide or to intervene in any way is of foremost importance. The economic threshold is not a fixed level, but a dynamic concept, the density level satisfying the concept depends upon a variety of circumstances which may vary markedly with the location and time during the season.

Palti and Ausher (1986) suggested two types of thresholds: (1) the economic damage threshold is the point at which any factor whether biotic or abiotic begins to reduce the value (quantity or quality) of the yield, and (2) the treatment (control) threshold is the point at which the value preventable by farmers' operations exceeds the cost of control operations; the extra yield obtainable by such operations promises an income higher than control expenses.

According to Sill (1982), to develop a realistic economic threshold, a constant monitoring of population is required and then

control decisions must be made. Furthermore, if farmers are highly averse to risk, they want to avoid even the slightest reduction in yield or price, especially those having high value crops. Therefore, there is a tendency for "insurance" treatments often applied very protectively.

Barak and Harein (1981) surveyed Minnesota producers who stored grain on their farm in order to gain insight into purchasing policies regarding infested grain bought out of farm storage and to learn how this influences integrated pest management decisions. Information acquired from the questionnaire regarded: (1) discounts for infestation, (2) insect threshold numbers, (3) grain inspection and sampling methods, (4) estimated rates of infestation, and (5) estimates of pesticide treatments required.

Insect counts can be utilized as threshold action levels. For example, if corn and wheat are detected to have 15 and 5 live adult "bran bugs," respectively, in a sample, then officially the lot would be considered "special grade" weevily. In the case of the Barak and Harein survey, the economic threshold level was 2.7 live adult insects per sample. When threshold levels were stated in units of insect density, the mean was 5.3 live adult insects per kilogram of grain with a range of 0.5 to 22.0 per kilogram. Without an estimate of the pest density that can be tolerated without significant crop loss (or penalty) there can be no reasonable safeguard against over treatment with insecticides or unacceptable crop damage. Furthermore, the use of insecticides when they are not needed is contrary to the principles of an integrated pest management program.

Decision Matrix Method:

Newton and Leuschner (1974) illustrated the potential of applying formal decision making under risk to major pest management decisions. Using a hypothetical pest management problem of the southern pine beetle, they developed decision matrices and expected values to account for risk and provide a useful decision guideline. The southern pine beetle was detected on corporate-owned land. The regional manager felt that an appropriate strategy should be used to reflect prognosis of infestation, the prevailing managerial philosophy, and financial position of the firm.

The only control methods employed by the firm were to salvage the infested spots, or to fell the infested trees and cut the limbs and tops from the central stem. The problem was broken down to two states of nature. The first state was a condition that limited the spread of infection and little forest damage was expected. The second state of nature was an outbreak condition where the spots was centers of infestation. The manager develops a formal decision matrix of outcomes to facilitate decision making.

By using a decision matrix, the analysis of decisions under risk can be more readily understood. The matrix has n rows which are the alternatives under consideration and the m columns are the states of nature which are the decision maker's control and are thought to determine the outcome associated with each alternative.

The frequency with which the different states of nature occur is described by a discrete probability distribution. In this example,

historical data was used as the most frequent source of probability distributions.

The values of the outcomes were placed on the pest management problem by quantifying the control cost and damage outcomes for each alternative and state of nature. This procedure provided a value for each outcome which was weighted by the probabilities to obtain an expected value.

However, this procedure may not be usable because outcomes concerning upper management feelings and public interest are not considered. Secondly, data to estimate the amount of damage may be unavailable. In these cases, a utility schedule may be of assistance.

Utility theory was founded on the concept that an individual's preference for some consequence reflects the utility of that consequence. In other words, utility represents the measure of satisfaction derived by an individual from a situation. Thus, a preferred consequence has a greater utility value than a less preferred consequence.

In examining risky alternatives, utility analysis provides a means whereby subjective preferences can be quantified and the decision process simplified. Since the utility schedule is useful in assigning values to the individual's preferences, the decision maker is then able to maximize expected utility consistent with the expressed preferences.

The utility schedule can be developed for the outcomes because the utility function is unique to a particular problem, manager, time, and place. Thus, the matrix will be different every time the place, time, or manager changes.

Finally, in this analysis, decisions about complex pest management problems must be made regularly, and these decisions are usually being made under risk and commonly without complete knowledge. Therefore, utility functions have a place in the decision-making process where dollar values cannot be satisfactorily estimated, and expected utility should be used until a more sophisticated method is developed to make more accurate pest management decisions.

Expected Utility Model:

The expected utility model provides a single-valued index that orders action choices according to the preferences or attitudes of the decision maker. Anderson et al. (1977) outlined the components of a decision problem that included a set of action choices, a set of monetary outcomes, and a probability density function.

A decision maker's attitude toward risk is related to the slope of his utility function. A linear utility function implies a risk neutral individual, a concave function implies a risk averse person, and a convex function implies a risk preferring attitude. Anderson et al. (1977) noted that empirical evidence suggests that most decision makers are risk averse.

A concave utility function has a non-negative first derivative, $[U' \geq 0]$, and a negative second derivative, $[U'' < 0]$. This implies that as the producers wealth increases, his marginal utility declines. Therefore, a risk averse individual would prefer an action that would assure him a certain return rather than an equal, but uncertain, expected return.

Most comparisons of risk aversion among decision makers are valid

only at specific monetary outcomes. Since one decision maker may be more risk averse than another at different monetary outcomes, it is very difficult to compare decision makers over a wide range of wealth positions. In addition, problems of inaccuracy may exist in formulating utility functions. Shortcomings in interview procedures, problems in statistical estimation, and an individual's lack of knowledge about their preferences may hinder the estimation process (King and Robison, 1981).

Musser et. al (1984) described the formulation of risk programming models that incorporate activities for production, marketing, input acquisition, investment, credit consumption, and taxation. These models may be applied as risk efficiency criteria without estimating the decision maker's risk preferences.

Concepts of Stochastic Efficiency

Newton et al. (1974) explained the difference between a decision made under certainty and one made under uncertainty. When the manager knows the exact outcome of each alternative, then the decision is made under certainty. On the other hand, decisions made under uncertainty are those for which each alternative has a series of possible outcomes and there is little reason to assume one outcome will dominate another. This situation exemplifies most management decisions.

In particular, pest management decisions are usually probabilistic and therefore are decisions made under risk. The use of a stochastic dominance criterion provides a useful decision-making framework. The stochastic dominance analysis uses pair-wise comparisons to evaluate strategies and to derive the most efficient set of strategies. Given

specified restrictions on the decisions maker's preferences, an efficiency criterion provides a partial ordering of these strategies.

The greater the number of restrictions placed on preferences, the greater the discriminatory power of the criterion. However, this requires more specific information about the preferences which may not be available. Fewer restrictions, which are easier to apply as a criterion, may reduce the ability of the criterion to eliminate choices from consideration, making it of little use as a decision making tool.

Different stochastic dominance rules depend on different assumptions regarding the utility function of the decision maker. First degree stochastic dominance (FSD) holds for all decision makers who prefer more to less, ie. their marginal utility of income is positive. No assumptions are made regarding risk preferences. This decision criteria holds for most decision makers. However, the usefulness of FSD is somewhat limited because in some applications, few of the choices are eliminated for consideration using FSD rules.

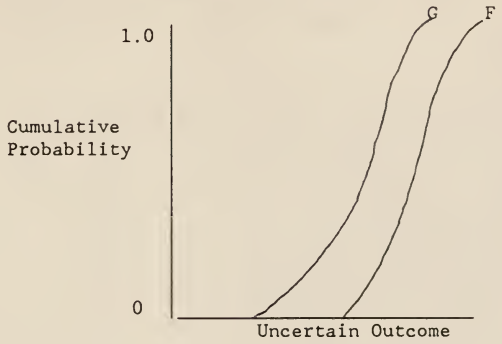
The selection process can be done either mathematically or graphically. Cumulative distribution functions (CDF) are used to do pair-wise comparisons. Mathematically, the criterion for FSD efficiency can be stated in the following:

> Given two CDF's, F(y) and G(y), strategy F can be said to dominate strategy G, if $F(y) \leq G(y)$ for all y and if the inequality is strict for some value of y.

Graphically, strategy 'F' dominates strategy 'G' if the cumulative distribution function for 'F' is never above and is below that of 'G'

for at least one point. This is illustrated in Figure 2.1, where strategy F dominates strategy G.

Figure 2.1: Illustration of First Degree Stochastic Dominance



Second degree stochastic dominance (SSD) is more discriminating than FSD and holds for all decision makers whose utility functions have positive, decreasing slopes at all outcome levels. In other words, individuals receive more satisfaction from equivalent increases in income at a lower level of base income, than at higher levels of base income. This implies that the individual is risk averse. Second degree stochastic dominance is particularly useful to rank alternative choices given that risk aversion is believed to be the general form of behavior.

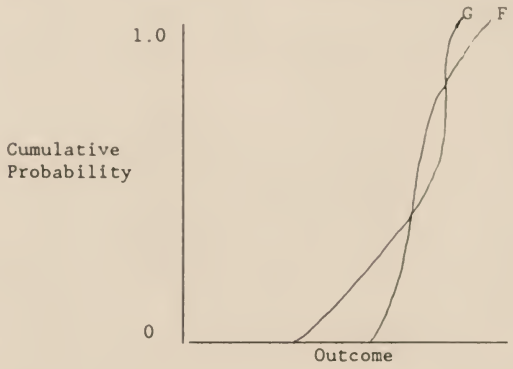
Given two cumulative distribution functions, F(y) and G(y), strategy F dominates strategy G for all who are risk averse if:

$$\int_{-\infty}^{y} F(y)dy \leq \int_{-\infty}^{y} G(y)dy, \text{ for all values of } y,$$

and if the inequality is strict for some value of y.

Graphically, strategy 'F' dominates strategy 'G' if the area under the cumulative distribution function of 'F' never exceeds and is at some point less than the area under the cumulative distribution function of 'G'. This is shown in Figure 2.2, where F dominates G under SSD, but there would be no dominance under FSD criteria because F is above G in one area.

Figure 2.2 Illustration of Second Degree Stochastic Dominance



Overview

Biological studies show that insect infestation is still a major problem in stored grain. Because of the importance of good quality grain in the export market and the large amount of grain in storage in recent years, the issue of storage management has become very important. In particular, the decisions regarding on farm use of techniques to control insects in farm stored grain have become very important. This study uses stochastic dominance as the framework for studying the decisions regarding the selection of a strategy to control insects.

CHAPTER 3

METHODOLOGY

This chapter includes a description of the methods used to calculate the probabilities and outcomes required to apply the stochastic dominance criterion. It explains in detail how three different data sets were combined to derive the cumulative distribution functions for the various quality conditions and time periods. Finally, it discusses the procedures used to select which strategies would remain in the efficient set.

Variables Used in the Analysis:

Basically, this study's objective was to analyze the decision a wheat producer must make regarding the type of treatment to use on his stored grain. The strategy selected should consider the probability of receiving a discount as well as the size of the discount. Both probabilities and size of discounts affect the distribution of net income received by the producer. These distributions must be estimated for each treatment for each time period when samples were taken and for different wheat quality conditions, if possible. In order to obtain these distributions, three data sets were combined.

Essentially, the farm analysis data set contained information about the type of treatment used by the producer during four separate sample times. In this analysis, time was a very important factor because the length of storage may affect the choice of pest control

measures (Reed and Pederson, 1987). It was also found that approximately three-quarters of the respondents stored wheat for at least six months, and nearly half usually intended to store for up to nine months. A significant ($p < 0.05$) association was observed between intended length of storage and the choice of pest control measure. As would be expected, those who intended to store for a short period of time usually opted for the least expensive measures.

The farm data included the number of insects found in each sample taken. The number of insects found per 1000 gram sample was categorized as follows: 0 insects, $0 <$ insects ≤ 1, $1 <$ insects ≤ 5, and insects > 5. The probability of having the number of insects in one of these categories was calculated for each treatment strategy in each sample time.

Table 3.1 shows the probabilities calculated from the farm data for three treatment strategies during the September sample period. Each probability can be expressed as the following:

P(number of insects|time of sampling and treatment strategy applied).

In other words, each number in the table is a representation of the probability of falling in one of the four categories of insects given the sample time and the treatment strategy applied. The probabilities sum to one across the table for each treatment strategy.

The elevator study contained information on the size of the discounts given by various elevators. The study also provided information on the reasons why the wheat was discounted. When the samples from the elevators were analyzed, insect counts were recorded.

Table 3.1: Probabilities of Getting Insects Using Different Treatment strategies during the September Sample Time.

Treatment Strategies	Insect Categories			
	$I^1 = 0$	$0 < I \leq 1$	$1 < I \leq 5$	$I > 5$
No Treatment	15.79	34.21	26.32	23.68
Protectant	37.50	25.00	25.00	12.50
Fumigation	9.09	36.36	36.36	18.18

1 I = Number of Insects

The same insect categories were used in this study as were used in the farm analysis. However, insects were not the only factor contributing to the marketed wheat receiving a discount. Many of the discounts were given for reasons other than insect infestation. Furthermore, it was found by using a step-wise model that moisture content and test weight were significant at an $\alpha = .15$ in determining the likelihood of receiving a discount. Therefore, in order to consider these characteristics, the probabilities of discounts were calculated using different wheat quality groups. Test weight was divided into three separate groups: $TW \leq 56$, $56 < TW \leq 58$, and $TW > 58$. Moisture content was also separated into four different groups: $MC \leq 10$, $10 < MC \leq 11$, $11 < MC \leq 12$, and $MC > 12$. Thus, there was a probability for each discount for a certain category of insect infestation within a specific wheat quality group.

Table 3.2 shows a set of probabilities calculated when test weight was greater than 58. Each number in the table is the probability of

receiving a certain discount given the number of insects and the wheat quality. This is expressed as the following:

P(discount|wheat quality and number of insects).

These probabilities sum to one down the column for each category of insects.

Table 3.2: Probabilities of Receiving a Discount for Certain Insect Categories When Test Weight was Greater Than 58.

	Insect Categories			
Discounts	$I^1 = 0$	$0 < I \leq 1$	$1 < I \leq 5$	$I > 5$
$0.000	67.27	63.64	45.45	40.00
0.005	13.94	18.18	18.18	13.33
0.010	10.30	4.55	0.00	0.00
0.020	1.82	0.00	0.00	0.00
0.030	1.21	0.00	0.00	6.67
0.050	2.42	0.00	9.09	0.00
0.060	0.61	0.00	0.00	0.00
0.070	2.42	0.00	18.18	6.67
0.080	0.00	4.55	0.00	6.67
0.090	0.00	0.00	9.09	0.00
0.100	0.00	4.55	0.00	20.00
0.185	0.00	0.00	0.00	6.67
0.190	0.00	4.55	0.00	0.00

1 I = Number of Insects

It needs to be noted that the discounts in Table 3.2 are all the possible discounts charged to producers within that particular category. Therefore, there is a separate set of discounts for each category.

The third data set included the costs of the treatment strategies used in this analysis. An average cost for each treatment strategy was calculated.

In the following sections, an example will be used to better illustrate the procedure used to calculate a cumulative distribution function associated with a group of outcomes for a particular category. Each category consisted of one of eight wheat quality conditions for one of four treatment strategies within one of four sample times. The category selected for this example was minimum/no treatment strategy, wheat at a test weight greater than 58, and the September sample period.

Combination of Data Sets:

The farm data with information on treatments and insect numbers were combined with the elevator data which had information on insect numbers, wheat quality, and discounts. In order to combine data sets, a common variable was used. In this case, the common variable used was insect categories because the same insect categories were used in both data sets.

The first step in combining the data sets was to multiply the probabilities of receiving the different discounts given 0 insects and test weight greater than 58 by the probability of getting 0 insects given the September sample time and using minimum/no treatment strategy. Table 3.3 illustrates this procedure where the final product is the probability of receiving different discounts given 0 insects, using minimum/no treatment strategy and test weight greater than 58 during the September sample time. This procedure was used to calculate probabilities for each category of insects for each treatment strategy, wheat quality condition, and sample time.

Table 3.3: Combination of Data When Minimum/No Treatment Strategy was Used, Test Weight was Greater Than 58 and 0 Insects were Found.

Discounts	Probabilities from Elevator Data		Combined Probabilities	Discounts
$0.000	67.27		6.40	$0.000
0.005	13.94		1.33	0.005
0.010	10.30		0.98	0.010
0.020	1.82		0.17	0.020
0.030	1.21		0.12	0.030
0.050	2.42		0.23	0.050
0.060	0.61	* 15.79/100	0.06	0.060
0.070	2.42		0.23	0.070
0.080	0.00	Probability of 0	0.00	0.080
0.090	0.00	insects from	0.00	0.090
0.100	0.00	farm data	0.00	0.100
0.185	0.00		0.00	0.185
0.190	0.00		0.00	0.190

The probabilities for each column of insect categories were then cumulated and sorted from small to large according to the net incomes. The net incomes were calculated by taking the November cash price of $2.48 and subtracting the discount. If costs were incurred for using a particular treatment strategy, then they were subtracted from the cash price.

The probabilities were then added across the rows to get a total probability for a given discount size. The total probabilities column is better known as the cumulative distribution function for a given set of outcomes within a certain category. This is basically the probability of receiving a discount given the minimum/no treatment strategy when test weight was greater than 58 for the September sample time. Table 3.4 illustrates the calculations discussed above.

Table 3.4: Probabilities Calculated for a Given Set of Criterions: Test Weight was Greater Than 58 and Using Minimum/No Treatment Strategy During the September Sample Period.

Disc.[1]	I[2] = 0	0 < I ≤ 1	1 < I ≤ 5	I > 5	Total Prob.[3]	Inc.[4] & Disc.	Net Inc. & Chem.[5] Costs
$0.190	0.00	1.56	0.00	0.00	1.56	2.29	$2.29
$0.185	0.00	1.56	0.00	1.58	3.14	2.295	$2.30
$0.100	0.00	3.12	0.00	6.32	9.44	2.38	$2.38
$0.090	0.00	3.12	2.39	6.32	11.83	2.39	$2.39
$0.080	0.00	4.68	2.39	7.90	14.97	2.40	$2.40
$0.070	0.38	4.68	7.17	9.48	21.71	2.41	$2.41
$0.060	0.48	4.68	7.17	9.48	21.81	2.42	$2.42
$0.050	0.86	4.68	9.56	9.48	24.58	2.43	$2.43
$0.030	1.05	4.68	9.56	11.06	26.35	2.45	$2.45
$0.020	1.34	4.68	9.56	11.06	26.64	2.46	$2.46
$0.010	2.97	6.24	9.56	11.06	29.83	2.47	$2.47
$0.005	5.17	12.46	14.34	14.22	46.19	2.475	$2.48
$0.000	15.79	34.22	26.30	23.69	100.00	2.48	$2.48

1 Disc. = Discounts
2 I = Number of Insects
3 Prob. = Probabilities
4 Inc. = Income
5 Chem. = Chemical

In this analysis for each of the sample periods analyzed, the same cash price of $2.48 was used. Since this analysis compared discounts received by the producers for different treatments at a given marketing point (i.e., September, November, January, or March), the cash price was really immaterial. The number used as the cash price had no influence on the selection of treatment strategy. Basically, the cash price could be higher or lower than $2.48 and the treatment decision would be the same because it depends on the discounts received for each treatment.

Table 3.5 shows the cumulative distribution functions calculated using the above procedure associated with a set of outcomes for each treatment strategy within a specific category.

Table 3.5: Probabilities of Receiving a Discount for Different Treatment Strategies During the September Sample Period when Test Weight was Greater than 58.

Net Income	No Treatment	Protectant - Malathion	Protectant - Methyl[1]	Fumigation
$2.27			1.14	
$2.28			1.97	1.65
$2.29	1.56	1.14		2.86
$2.30	3.14			
$2.36			5.61	
$2.37			7.88	8.15
$2.38	9.44	5.61	9.85	11.46
$2.39	11.83	7.88	16.14	14.32
$2.40	14.97	9.85	16.37	22.36
$2.41	21.71	16.14	19.55	22.42
$2.42	21.81	16.37		25.95
$2.43	24.58	19.55	20.83	
$2.44			21.51	27.27
$2.45	26.35	20.83	26.51	27.44
$2.46	26.64	21.51	100.00	30.03
$2.47	29.83	26.51		100.00
$2.48	100.00	100.00		

1 Methyl = Chlorpyrifos-methyl

Overall, a total of 128 data sets were calculated for this study. These data sets were combined into 32 data sets which included the probabilities of receiving a discount within a given category. These probabilities and outcomes were used for the pair-wise comparisons between treatments necessary for selection by stochastic dominance criteria.

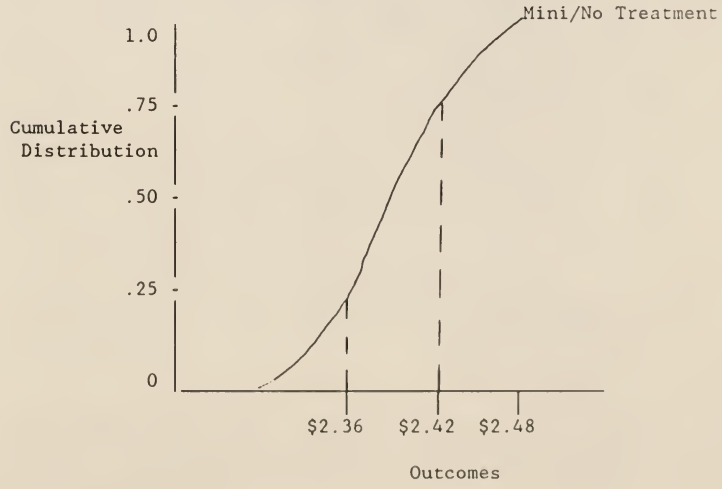
Stochastic Dominance Criterion:

In chapter 2, it was shown that second degree stochastic dominance criterion (SSD) is one method used in determining which strategy or practice is most efficient or, at least, included in the most efficient set of strategies. A common method used to examine the cumulative

distribution functions and to select the dominant treatment strategy is graphical analysis.

This method essentially takes the cumulative distribution functions (CDFs) calculated previously and plots them on a graph with probabilities designated along the y-axis and outcomes designated along the x-axis. This enables the analyst to examine the CDFs regarding the probability of receiving a discount from the $2.48 quoted cash price. Figure 3.1 illustrates a 0.75 probability of receiving a net income that is less than $2.42 when using minimum/no treatment during September when the test weight was greater than 58. Also, there is a 0.25 probability of receiving a net income below $2.36 under the same category. Even though these are hypothetical figures, the same conclusions are achieved when the actual data is used.

Figure 3.1: Graphical Analysis of Cumulative Distribution Functions



By plotting two cumulative distribution functions on a graph a decision can be made based upon the area under the CDF. The strategy with the smaller area along the entire function is considered dominant and remains in the efficient set.

However, the graphical analysis is somewhat limited in its accuracy, especially when two cumulative distribution functions being compared have probabilities that are very close. In other words, it is very difficult to select the strategy that would remain in the efficient set when the areas under the CDFs are indistinguishable.

A more precise procedure to more accurately select the strategy that follows the guidelines of stochastic dominance criterion is a mathematical method. Given the formula below, a pair-wise comparison was made for each treatment strategy under each wheat quality category for each sample time.

$$\int_{-\infty}^{y} F(y)dy \leq \int_{-\infty}^{y} G(y)dy, \text{ for all values of } y.$$

This formula provided a means to measure the area under each cumulative distribution function. Basically, at each point the area under strategy F was compared to the area under strategy G. If the area under strategy F was less than or equal to the area under strategy G, then strategy G was eliminated from the efficient set. However, many times the area changed at one or more points along the CDF, where the area under strategy F was larger than the area under strategy G. In this case, neither strategy dominated the other. Therefore, both strategy F and strategy G remained in the efficient set as long as one

or the other was not dominated by any other strategy being compared under different comparisons within a particular category.

The following example will help explain how the areas were calculated and analyzed in order to determine which strategy dominated for the particular analysis. Table 3.6 shows the results from the stochastic dominance criterion pair-wise comparison of two treatment strategies during the September sample period when test weight was greater than 58.

Table 3.6: Stochastic Dominance Criterion Pair-Wise Comparison Between Minimum/No Treatment and Grain Protectant - Malathion

Given: The Sample Period of September and Test Weight was Greater than 58

OUTCOMES	Prob. of No Trt[1]	Prob. of Mala[2]	No Trt. AREA = A	Mala AREA = B	A-B
$2.27	0.00	0.00	0	0	0
$2.28	0.00	0.00	0	0	0
$2.29	1.56	1.14	0	0	0
$2.30	3.14	1.14	0.003	0.002	0.001
$2.36	3.14	1.14	0.218	0.080	0.138
$2.37	3.14	1.14	0.249	0.091	0.158
$2.38	9.44	5.61	0.280	0.103	0.178
$2.39	11.83	7.88	0.375	0.159	0.216
$2.40	14.97	9.85	0.493	0.238	0.255
$2.41	21.71	16.14	0.643	0.336	0.307
$2.42	21.81	16.37	0.806	0.457	0.348
$2.43	24.58	19.55	1.078	0.662	0.416
$2.44	24.58	19.55	1.324	0.857	0.467
$2.45	26.35	20.83	1.570	1.053	0.517
$2.46	26.64	21.51	1.833	1.261	0.572
$2.47	29.83	26.51	2.095	1.472	0.623
$2.48	100.00	100.00	2.145	1.517	0.628

1 No Trt = Minimum/No Treatment strategy
2 Mala = Grain Protectant - Malathion Treatment strategy

The outcomes or net incomes the producer receives for his stored grain is shown in column 1. At several points along the set of outcomes, the probabilities were constant. In order for the pair-wise comparison to be done when each category has its own set of outcomes, the outcomes must be combined. In several cases the same outcome did not exist for both treatment strategies. Therefore, the probability remained constant over those outcomes until the probability changed within the treatment strategy.

Column 2 and column 3 show the cumulative distribution functions for minimum/no treatment and grain protectant - malathion treatment, respectively. The fourth and fifth columns are the measurement of the areas under the CDFs. The area is calculated as the width times the height, that is, the change in outcome times the probability. This area was added to the previous area calculated. This was done for each treatment strategy and wheat quality condition within a specific sample time.

The final column is the area calculated in column four minus the area calculated in column five. If this column contains all positive numbers, then the treatment strategy in column five is dominant and remains in the efficient set. On the other hand, if the final column contains all negative numbers, then the treatment strategy in column four is dominant, and therefore remains in the efficient set. However, if the column contains both positive and negative numbers, then both treatment strategies remain in the efficient set. In this example, the final column contains all positive numbers. Therefore, the grain protectant - malathion treatment strategy is dominant and remains in

the efficient set. This procedure was conducted for every treatment strategy within each category.

Overall, this decision making tool compares and evaluates each treatment strategy in order to select the strategies that are efficient or dominant assuming that the producer was risk averse.

CHAPTER 4

RESULTS AND IMPLICATIONS

This chapter describes different pest control strategies and then analyzes the outcomes of grain management strategies using a stochastic dominance criteria. It identifies the efficient set of treatment strategy(s) that would be preferred for a risk averse individual. The analysis is also applied to different wheat qualities so that an appropriate treatment strategy can be identified when the stored grain is of a certain quality.

The next section describes the different pest control practices used by producers in Kansas and the risks involved if a certain pesticide is used.

Pest Control Practices

Today, many varieties of pesticides are on the market. However, the selection of pesticides for use in grain bins and elevators has been fairly limited because of the Environmental Protection Agency (EPA) and Food and Drug Administration (FDA) regulations. Only a few different chemicals are available to control stored grain insects. Since grain protectants (malathion and chlorpyrifos-methyl) and fumigants were the most commonly used, this study focused upon the wheat producer's decision to use one or all of the these products.

Nearly all respondents from the initial survey indicated that they accomplished the less expensive, general sanitation practices such as

cleaning the storage structure, spraying with insecticide before adding new wheat and removing spills from around the bin and in the auger. Table 4.1 shows the different methods used to keep the infestation level down and the percentage of producers who used these methods.

Table 4.1: Percentage of Producers that Used Different Pest Management Techniques.

Method	Percent
Empty and sweep bins before filling	96.5
Treat bins with insecticide before filling	78.8
Use grain spreader when filling	10.0
Clean wheat before storing	2.4
Apply protectant to wheat when filling	53.5
Apply protectant to wheat surface after filling	27.6
Level wheat after filling	53.5
Remove spills around bin and debris from auger	75.9
Use insecticide strips above grain or in door	28.8
Fumigate wheat as a precautionary measure	27.1

Four simplified pest control practices were identified from the above results:

(1) Minimum Treatment - may consist of bin cleaning and surface spraying, but does not include a chemical treatment to the grain.

(2) Grain Protectant Treatment - consists of the minimum treatment plus the application of a grain protectant during bin filling.

(3) Fumigation Treatment - consists of the minimum treatment and a preventive fumigation even if no significant insect infestation is observed.

(4) Grain Protectant and Fumigation Treatments - a combination of all treatments.

From the actual sampling of the bins, the percentage of producers using the four pest control practices are shown in Table 4.2. Since

only one producer used strategy 4, the grain protectant and fumigation strategy, this strategy was not included in the analysis.

Table 4.2: Percentage of Producers Using the Four Basic Pest Control Practices Identified By On-Farm Sampling.

Pest Control Practices	Percentage
Minimum Treatment	46.4
Grain Protectant	15.6
Fumigation	37.4
Protectant and Fumigation	0.6

Grain protectants are products designed to be admixed with insect free grain entering storage. Most labels advocate application of grain protectants to the grain as it is entering the auger. Some grain protectants may also be used as bin wall sprays.

Grain protectants are designed to retain insect-toxic properties for extended intervals. They are most appropriately used where new summer harvested grains are stored or where fall-harvested grains are stored through the warmer portion of the next summer. They should not be applied before high temperature drying or to hot grain, if long term protection is desired. Overall, the use of grain protectants should not be considered a substitute for continued thorough and frequent inspection of grain.

Fumigation is reserved for stopping infestations that are known to exist and appear to be capable of causing economic loss. Once infestation is detected, a fumigant should be applied. Fumigants penetrate into infested kernels and should eliminate all life stages if applied properly. However, fumigants do not provide residual

protection, so reinfestation can occur immediately after gas concentrations drop below lethal levels. All legal fumigants are "restricted use" products requiring state certification of the user.

Results and Discussion

This section discusses results from the elevator study, farm analysis survey, and from analysis of the decision problem using stochastic dominance.

Elevator Study:

In the elevator study, six terminal elevators and five country elevators participated in the sampling. From the 465 samples taken, 271 (58.3%) received a discount and 194 (41.7%) did not receive a discount. The mean discount was 4.5 cents per bushel over the entire sample period.

The Federal Grain Inspection Service (FGIS) sets official grading standards. For wheat to be graded U.S. number one, hard red winter wheat, it must meet the following criteria:

> Test weight should not be less than 58
> Damaged kernels should not be greater than 2.0%
> Dockage or non-grain substances should not be greater than 0.5%
> Shrunken and broken should not be greater than 3.0%

Depending upon the type of insects identified when the wheat sample was examined, the official grade could have been affected when two or more live weevils were found in the sample or when more than one live weevil and more than five other live insects (OLI) are identified. For this analysis, insect counts from the samples were combined (weevils and OLI). Data indicated that, even though a sample did not

have insects, the producer had a 56.8% chance of receiving a discount. However, if two or more insects were found in the sample, then the producer had at least a 65.3% chance of receiving a discount. Table 4.3 shows the probability of receiving a discount under the four different insect categories.

Table 4.3: Probability of Receiving or Not Receiving a Discount Depending Upon the Insect Number

Insect Number	Discount	No Discount
0 insects	56.8	43.2
0 < insects ≤ 1	56.8	43.2
1 < insects ≤ 5	65.2	34.8
insects > 5	75.7	24.3

As can be expected, when the insect counts increased, the probability of receiving a discount increased and the probability of not receiving a discount decreased.

This trend can also be seen when wheat quality factors are examined. As the quality of wheat diminishes, discounts are more likely to be given (Table 4.4).

Even though in the elevator study, lot size was not significantly associated ($p < 0.05$) with the probability of receiving a discount, Reed (1986) reported that the lot size did appear to influence whether price was discounted because of quality factors. In this study, the probability of receiving a discount for a lot size less than 250 bushels was 55% while it was 57.4% when the lot size was 750 bushels or greater. If the lot size was between 250 and 750 bushels the likelihood of receiving a discount was higher (61.5%).

Table 4.4: Probability of Receiving a Discount Based on Wheat Quality Factors - Test Weight, Moisture Content, Dockage, and Damaged Kernels.

Wheat Quality Factor	Percent
Test Weight:	
less than or equal to 56	79.5
greater than 56 and less than or equal to 58	76.6
greater than 58	41.4
Moisture Content:	
less than or equal to 10	44.9
greater than 10 and less than or equal to 11	59.4
greater than 11 and less than or equal to 12	58.5
greater than 12	74.4
Dockage:	
0 to 0.5	55.0
0.6 to 0.9	63.0
greater than or equal to 1.0	76.0
Damaged Kernels:	
0 damaged kernels	58.2
1 to 2	51.3
3 to 10	53.5
greater than 10	75.0

This tendency is consistent with the information supplied by the elevator operators relative to how deteriorated wheat is handled. Small quantities of deteriorated wheat may be blended with wheat of higher quality in such a way that the elevator suffers no price reduction when the wheat is resold. On the other hand, larger lots of wheat would be more difficult to blend for resale and additional cost to the elevator for fumigation and cleaning would be assumed.

Farm Analysis Results:

In the farm analysis, treatment strategies associated with insect counts were used. When looking at different time periods, the

likelihood of infestation using three general treatment strategies are shown in Table 4.5.

Table 4.5: Probability of Having Insects Using Different Treatment Strategies during Four Time Periods.

September Sample Time:	Probability
No Treatment	51.6
Grain Protectant	16.1
Fumigation	32.3
November Sample Time:	
No Treatment	48.7
Grain Protectant	12.8
Fumigation	38.5
January Sample Time:	
No Treatment	38.89
Grain Protectant	22.22
Fumigation	38.89
March Sample Time:	
No Treatment	50.0
Grain Protectant	0.0
Fumigation	50.0

Insect development and reproduction is adversely affected when grain temperatures decline. Many insects die from starvation because they are unable to remain active and feed at low temperatures. When the outside air becomes cooler, the grain inside the bin becomes cooler. So, as the colder months approach, insect activity lessens. Also, if aeration equipment is used, grain can be cooled by circulating the cool outside air into the bin and removing the heat from the grain.

Throughout the sample period (July through March), grain was moved out of farm storage. At the beginning of this study, 79 bins were regularly sampled. By March, only 18 bins were sampled from the original sample set. In fact, from September to November, the number

of bins sampled dropped by almost 30 (37%), because producers needed the on-farm storage space for fall harvested grain.

Finally, in order to make the analysis complete, an income figure was calculated. This income figure was used to determine the amount of risk the wheat producer was willing to take to reduce the likelihood of receiving a lower income because of discounts in cash price. Ideally, economic profit for net returns should have been used. In this analysis, the income figure (net income) was calculated for each probability by taking the November cash price per bushel of $2.48 minus the discount, minus the cost of the treatment strategy used. Of course, for the minimum treatment/no treatment strategy, chemical cost was not incurred. This is illustrated in the following equation:

$2.48 - $/bu. discount - $/bu. treatment strategy used.

Various costs for the chemical treatments were gathered by interviewing several elevator operators, cooperatives, and agricultural services in the grain sampling area, who either used or sold the stored grain chemicals. Application costs were then computed based on mean chemical costs and mean recommended dosage per 1000 bushels. For grain protectants, a dilution rate of 3.5 gallons of water per 1000 bushels were assumed. The cost of the application was reduced to reflect the value of the water added, assuming that all was absorbed. The costs of each chemical were then calculated into costs per bushel. These costs are the following:

Malathion grain protectant - 0.17 cents per bushel
Chlorpyrifos-methyl grain protectant - 1.65 cents per bushel
Fumigation - 0.9 cents per bushel.

These costs, however, do not reflect custom application costs.

Use of the Stochastic Dominance Criteria:

Stochastic dominance involves pair-wise comparisons. In order to do pair-wise comparisons, cumulative distribution functions (CDF) were calculated for each treatment.

Two main stochastic dominance criterions can be used to determine the best or most efficient strategy. First degree stochastic dominance (FSD) is the easiest criteria to use and holds for most decision makers. However, its usefulness is somewhat limited, since few of the choices are eliminated from the efficient set. In fact, none of the treatments would be eliminated from the efficient set, (one strategy would not dominate), if FDS was used in this analysis. Therefore, second degree stochastic dominance was used.

Second degree stochastic dominance (SSD), is widely used as an efficiency criterion. It holds for all decision makers whose utility functions have a positive non-increasing slope at all outcome levels. In other words, decision makers are assumed to be risk averse.

Risk averse individuals are generally characterized as more cautious individuals who prefer less risky sources of income and investment. Anderson et al. (1977) noted that empirical evidence suggest that most decision makers are risk averse.

When deciding upon which strategy should remain in the efficient set, the areas under the CDFs were analyzed. Basically, when the area under strategy A was less than or equal to the area under strategy B for the entire range, strategy A would dominate strategy B and strategy B would be eliminated from the efficient set. On the other hand, if at any point the area under strategy A was greater than the area under

strategy B, then neither strategy dominates the other and therefore, both strategies remain in the efficient set. But, if more than two strategies are being compared and strategy A becomes dominated by strategy C, then strategy A is eliminated from the efficient set.

Also, two necessary but not sufficient conditions must hold for a strategy to be selected in the efficient set using second degree stochastic dominance. They are as follows:

1. the lowest must not be lower
2. the average must not be lower

The efficient set consists of all the strategies that will reduce the wheat producers likelihood of receiving a very low cash price for his grain when brought to market. Several strategies may fall into an efficient set. This indicates that more than one strategy could be used to maintain the quality of grain affected by infestation and at the same time protect the producer against a lower cash price when the grain is marketed.

Results from Stochastic Dominance Analysis:

Since a producer prefers a treatment strategy that would limit the risk but at the same time control the problem without decreasing his income, the chlorpyrifos-methyl grain protectant would not be the best choice. Not only did it not appear in the efficient sets, but it was the most costly to use. Therefore, grain protectant - malathion will be the general grain protectant used in this analysis.

By using the sample times as a criteria for selection, a more accurate decision can be made regarding when to apply treatments for best results and reduction in the probability of receiving a discount because of infestation. Furthermore, depending upon how long the wheat

producer decides to store his grain, time may influence his decision regarding the type of treatment strategy to use. As indicated before, some producers move their grain between September and November to make room for the fall harvested grains.

Also, most producers store their grain under loan. This loan could either be a nine-month storage loan or a three year loan called the "farmer owned reserve" (FOR). The major objectives of the FOR are to assure adequate supplies of farm commodities and to reduce the variability of market price and income.

If the producer acquires a loan in July, the nine-month loan will mature in March. However, the producer has the option to either sell the grain at that time or request to have his grain put into the farmer owned reserve. If the producer decides to put his grain in the FOR and the grain is not substituted by newly harvested grain, then this commodity could be in storage for an estimated three or more years. With this in mind, maintaining the quality of the grain, which is one of the criterions for keeping the loan, could be a challenge. If the quality starts to deteriorate, then the producer has the option to either rotate or substitute the grain.

Time is an important factor in deciding what treatment strategy would reduce the risk of receiving a lower net income when using the loan program or moving the grain to make room for other seasonal grain.

Summarization of results from the Stochastic Dominance Analysis is shown in Table 4.6. The "x" under each treatment strategy denotes the strategy that was dominant for a certain wheat quality category and during a specific period of time.

Table 4.6: Second Degree Stochastic Dominance Criterion Efficient Sets for Different Time Periods

Time Period	Treatment Strategy Used		
	No Treatment	Grain Protectant - Malathion	Fumigation
September			
No Quality		x	
TW ≤ 56		x	
56 < TW ≤ 58		x	
TW > 58		x	
MC ≤ 10	x		
10 < MC ≤ 11	x		x
11 < MC ≤ 12		x	
MC > 12		x	
November			
No Quality	x	x	x
TW ≤ 56	x	x	x
56 < TW ≤ 58	x	x	x
TW > 58	x	x	x
MC ≤ 10	x		
10 < MC ≤ 11	x	x	x
11 < MC ≤ 12	x	x	x
MC > 12	x		
January			
No Quality	x	x	x
TW ≤ 56	x	x	x
56 < TW ≤ 58	x	x	
TW > 58	x	x	
MC ≤ 10		x	
10 < MC ≤ 11	x	x	x
11 < MC ≤ 12	x	x	
MC > 12	x		
March			
No Quality		x	
TW ≤ 56	x	x	
56 < TW ≤ 58		x	
TW > 58		x	
MC ≤ 10	x		
10 < MC ≤ 11	x	x	
11 < MC ≤ 12	x	x	x
MC > 12		x	

Since the July sample period did not include questions regarding the type of treatment used on the producer's stored grain, the analysis started with the September sample period.
treatment, 21.1% used a grain protectant on the grain, and 28.9% used a fumigant.

Grain protectant - malathion was the only treatment strategy considered to be in the efficient set in every category except when the wheat had a moisture content less than or equal to 10 percent. Minimum treatment strategy remained in the efficient set when wheat had a moisture content of less than or equal to 10 percent. When moisture content was between 10 and 11 percent, no treatment, grain protectant - malathion, and fumigation, were considered to be non-determinant and therefore, all three strategies remained in the efficient set. In other words, one strategy did not dominant another strategy in the comparisons.

It needs to be noted that fumigation is not recommended for application until later in the storage period which may explain why this strategy did not remain in the efficient set in more categories during the September sample period. Producers may have used a fumigant after the sampling took place in September, thus the treatment may not have effectively controlled insects in the stored grain since it had not yet been applied.

The November sample period had 48 bins in the sample; where 43.8% of the producers used no treatment, 14.6% used some type of grain protectant, and 41.6% used fumigation. The increase in fumigation use is possibly due to the awareness of insect activity.

From the analysis, it was found that the no treatment strategy remained in the efficient set when moisture content was less than or equal to 10 percent and when moisture content was greater than 12 percent. In fact, no treatment, grain protectant - malathion and fumigation were all in the efficient set in all other categories including no quality specifications.

Only 36 bins were sampled during January. It was found that 44.5% of the producers used no treatment, 11.0% of the producers used a type of grain protectant, and 44.5% of the producers used fumigation.

There is less insect activity during the colder months of December, January and February. This is due to the fact that insects thrive in a warm, moist environment favorable to their activities, i.e., 70 to 90^{o}F and greater than 12 percent moisture content.

Based upon the stochastic dominance criterion, it was concluded that the no treatment strategy would remain in the efficient set when moisture content was greater than 12 percent. On the other hand, grain protectant - malathion was dominant over the other treatment strategies when the moisture content was less than or equal to 10 percent. No treatment, grain protectant - malathion, and fumigation were considered to be efficient in three areas: No quality considered, test weight less than or equal to 56 and moisture content between 10 and 11 percent. However, no treatment and grain protectant - malathion were efficient when wheat quality was the following: test weight between 56 and 58, test weight greater than 58, and moisture content between 11 and 12 percent.

By March, only 18 bins out of the original 79 bins still had wheat

stored to be sampled. Forty-four percent of the producers used no treatment, 5.6% used a type of grain protectant, and 50% used fumigation to treat their grain. This sample period was quite different from the others because fewer than five insects were found during the sampling. In fact, there was a 77.8% chance of having no insects from January to March, 16.6% chance of getting less than or equal to one insect, and only a 5.5% chance of getting greater than 1 and less than or equal to 5 insects when sampling.

In this case, grain protectant - malathion treatment strategy was in the efficient set when the producer was not aware of the quality of his wheat. However, if the quality of the stored wheat had a possible test weight of 56 to 58 or greater than 58, or the moisture content was greater than 12 percent, then grain protectant - malathion treatment strategy remained in the efficient set. It was also found that no treatment strategy remained in the efficient set when the moisture content was less than or equal to 10 percent. Again, no treatment and grain protectant - malathion were in the efficient set in two areas: test weight greater than 56 and moisture content between 10 and 11 percent. Fumigation, no treatment and grain protectant - malathion were in the efficient set when moisture content was between 11 and 12 percent.

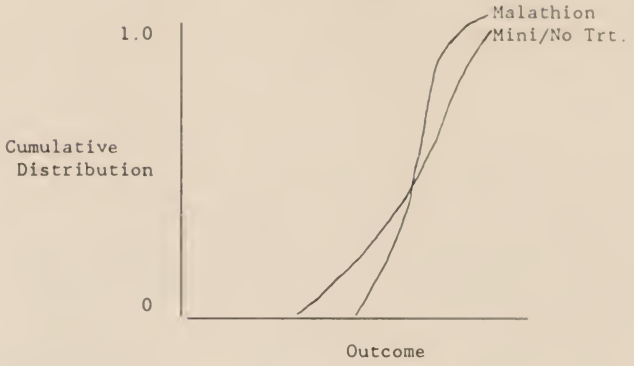
Basically, producers can choose from three general treatment strategies that will enable them to maintain the quality of the grain and at the same time reduce the probability of receiving a lower cash price due to either some quality discount or insect infestation

discount. However, producers' decision may be influenced by the amount of risk they are willing to take.

In this analysis, several treatment strategies remained in the efficient set for a specific category because one strategy did not dominant another when a pair-wise comparison was done. Therefore, both strategies remained in the efficient set. In over half of the cases, there was more than one strategy in the efficient set. In fact, during November and January sample periods, more than one strategy (primarily minimum/no treatment and grain protectant - malathion) remained in the efficient set six out of eight (75%) times for each month. In this case, second degree stochastic dominance criteria gave no guidance in selection between the two strategies. In other words, the decision on the specific treatment strategy to apply on the stored grain for a certain quality of wheat and time of year, may have to be based on more than just the assumption that the producer is risk averse.

For instance, during the month of January, the grain protectant - malathion treatment strategy dominates at the lower end of the CDF while the minimum/no treatment strategy dominates at the upper end of the CDF. This seems reasonable because when no discount occurs, a cost will still need to be included from applying the grain protectant - malathion and therefore, the grain protectant strategy would be slightly to the left of the minimum/no treatment strategy at the upper end of the CDF. Furthermore, grain protectant - malathion should have more of an effect on controlling insects than "doing nothing" and thus, reduces the probability of receiving large discounts due to insect infestation. This is illustrated in Figure 4.1.

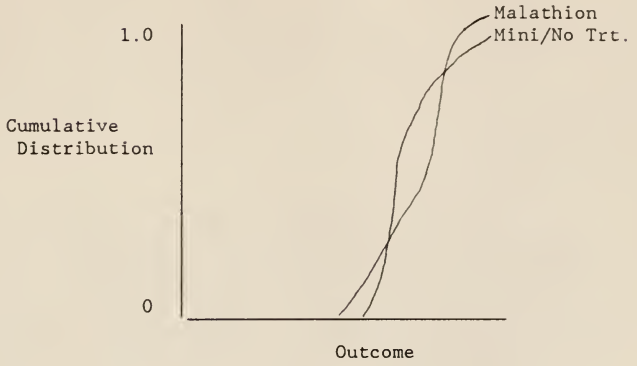
Figure 4.1: Cumulative Distribution Functions for Grain Protectant - Malathion Treatment and Minimum/No Treatment Strategies in January



On the other hand, an interesting result occurred during the November sample period. In this case, the minimum/no treatment strategy dominates at the lower end of the CDF. However, grain protectant - malathion treatment strategy dominates through the middle of the CDF. The only explanation that could be found for this phenomena is that when the producer used the grain protectant - malathion, the grain was heavily discounted and/or a small number of samples are causing grain protectant - malathion to be slightly to the left of the minimum/no treatment at the lower end of the CDF. This situation is illustrated in Figure 4.2.

Overall, it must be noted that grain protectant - malathion and minimum/no treatment strategies have fairly identical probabilities associated with the outcomes. This makes it relatively difficult to separate the two strategies and choose the appropriate treatment

Figure 4.2: Cumulative Distribution Functions for Grain Protectant - Malathion Treatment and Minimum/No Treatment Strategies in November



strategy to be applied to stored grain under various quality conditions.

Finally, fumigation was never selected as a part of the efficient set unless the efficient set also included minimum/no treatment and grain protectant - malathion treatment strategies. In other words, fumigation was not a dominant strategy, even though it was the most widely used treatment strategy by the wheat producers. This could be attributed to the cost of the chemical and the fact that producers may use fumigation only after infestation has started rather than as a prevention strategy, i.e., the grain had already become infested, so it was fumigated. This may explain why fumigation had a greater probability of receiving a discount for insects than the other strategies used in this analysis.

CHAPTER 5

SUMMARY AND CONCLUSIONS

This study focused on the producers' dilemma of attempting to make correct pest management decisions based upon their risk preferences and the probabilities of receiving discounts. A stochastic dominance criterion was used as an analysis tool. This criterion addressed the producer's problem of selecting a treatment strategy that would be economical in terms of treatment costs, control of insects in the grain, and potential discounts for damaged grain.

Review of Data Sets and Decision Making Tools Used

Three data sets were used in this analysis in order to study the selection of treatment strategies. The first data set was from a study of on-farm storage where 79 bins were monitored. The farm study provided data on four different treatments used by the producers, insect counts, and the date samples were collected.

The second data set included samples collected by elevator operators. A total of 465 samples were collected from wheat marketed by producers in the area. The samples were analyzed for wheat quality conditions and insect counts. Test weight and moisture content were found to be significant in determining discounts and therefore, were the two major wheat quality factors used in this study. Also, elevator operators provided information on the discounts charged to the

producers and reasons for discounting. Essentially, this data provided information needed to calculate the discounts likely for insect damage.

The third data set included the costs of the treatment strategies used for this analysis. The costs were gathered by interviewing several elevator operators, cooperatives, and agricultural services in the grain sampling area, who either used or sold the stored grain chemical. An average price per bushel was calculated for each chemical. The net income (outcome) was calculated by subtracting the discounts and the treatment strategy costs from the quoted November cash price of $2.48.

After probabilities were calculated for the farm analysis and elevator study, these data sets were combined by multiplying the probabilities that corresponded with each insect category. The probabilities were then cumulated. Thus, a cumulative distribution function was generated which was associated with a group of outcomes for a specific wheat category.

The stochastic dominance criterion was used to eliminate pest management strategies. This procedure was accomplished by using the cumulative distribution functions (CDFs) and outcomes to calculate the area under each CDF in order to do pair-wise comparisons between treatment strategies. Basically, if the area under strategy F's CDF was less than or equal to the area under strategy G's CDF, then strategy F is dominant and remains in the efficient set. Those strategies remaining in the efficient set are strategies that a risk averse individual would prefer to use on his stored grain.

Summary of Results

In this study, grain protectant - malathion and minimum/no treatment strategies were the most widely selected strategies. Since grain protectant - malathion is a very inexpensive treatment strategy to use, the area under the cumulative distribution functions for both the grain protectant - malathion and minimum/no treatment strategies were very similar. In this case, both treatment strategies remained in the efficient set and would be preferred by a risk averse decision maker. Consequently, in most of the comparisons, there was not one particular strategy that could be suggested for use during a certain time period for a specific wheat quality.

Another interesting result was that during the month of November, in all categories except when moisture content was less than or equal to 10 and when moisture content was greater than 12, fumigation remained in the efficient set. However, minimum/no treatment and grain protectant - malathion treatment strategies also remained in the efficient set for those categories mentioned. This suggests that a risk averse producer could use any one of the possible treatment strategies analyzed. In this situation, the analysis suggests that several treatment strategies could be used by the producers since they are not greatly different in terms of controlling insects in the grain, potential discounts for damaged grain, and costs.

Limitations

Several key assumptions were made in evaluating which treatment strategy the producers should select for use on their stored grain. First, decision makers were assumed to be risk averse. Second degree

stochastic dominance only selects those strategies preferred by risk averse individuals. However, producers may not be risk averse, depending upon their preferences and financial situation. These individuals may find the other strategies more appealing.

Secondly, even though the grain is out of the field and weather should not be a factor in determining the quality of the wheat, weather patterns throughout the year can have some impact on the rate of wheat deterioration. In fact, during the past two years, the weather has been abnormally warm during February which is somewhat unusual for the state of Kansas. This increase in temperature on the outside of the bin could cause adverse affects to the stored grain by increasing the temperature in the bin and possibly encouraging insect activity. This factor could be added into the analysis, if there was some way to measure this effect.

In addition, it seems that many producers treat their stored grain because of a history of insect infestation on their particular farm. In this case, producers would apply a particular type of treatment just because they expect to have problems from past experiences. On the other hand, producers that do not have a history of insect problems in their stored grain may not apply a treatment. Essentially, without gathering historical data on each bin sampled or carefully monitoring bins with similar conditions, this factor could not be appropriately added into this analysis.

Furthermore, it was assumed that consistent discounts were charged to different producers by county elevators, terminal elevators, and even within itself according to a grading standard. It was discovered

by interviews and the data sample available, that this assumption may not be entirely appropriate. With this in mind, producers may have other decisions to be made besides what treatment to use to reduce the probability of receiving a lower net income. These decisions may include which elevator they should deliver their grain to and is transportation costs an important factor in selecting where to market their grain.

Also, fixed costs for equipment used in treatments were not considered, nor was the labor associated with application of chemicals. This tends to be an advantage for chemical treatments in the analysis. However these costs are relatively small in most instances, so the biases for using chemical treatments would also be fairly small.

Finally, the conceptual framework of this analysis was that producers make a choice regarding the treatment strategy to use when the grain goes into storage. This analysis did not consider a sequential framework on a flexible strategy where fumigation could be used only if needed. In other words, producers could decide not to apply a treatment to their stored grain when it enters the bin and later decide to use a fumigation treatment. This flexible strategy cannot be analyzed in this stochastic dominance approach, yet it may be an alternative strategy for producers.

Future Research

Future research might address the incentives needed in order to encourage producers to become more aware of the affects of insect activity on stored grain. First, what kind of a discount schedule or premium schedule for high quality grain would be needed to give

producers an incentive to control insect infestation and be more concerned about the quality of wheat they market? Another approach would be to subsidize the cost of certain chemicals for use in controlling insects in stored grain, thus reducing the cost to producers. This would reduce the disincentives to producers to use a chemical to control insect infestation.

Finally, an analysis of costs of insect damage farther into the marketing chain could be very valuable. A social trap problem might exist where producers and elevators continue to do something to their advantage that is collectively damaging to the group as a whole. Without investigating the entire marketing chain, problems regarding incentives may not be recognized. Who bears the cost as insect damaged grain moves through the system and what are the incentives for controlling insects in stored grain further into the marketing chain? Answers to these questions could provide valuable information for the whole grain industry.

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APPENDIX A

Appendix A shows the probabilities calculated for the farm analysis data. These probabilities are grouped in sets specified by sample period. In each sample period group, a probability is calculated for each treatment method under each of the four insect categories.

Appendix A: Probabilities Calculated from the Farm Analysis

Probabilitilies Calculated for Each Treatment Method During September

Treatment	Insects = 0	0 (Insects (1	1 (Insects (5	Insects) 5
No Treatment	15.79	34.21	26.32	23.68
Protectant	37.5	25	25	12.5
Fumigant	9.09	36.36	36.36	18.18

Probabilitilies Calculated for Each Treatment Method During November

Treatment	Insects = 0	0 (Insects (1	1 (Insects (5	Insects) 5
No Treatment	9.52	14.29	23.81	52.38
Protectant	28.57	28.57	28.57	14.29
Fumigant	25	40	30	5

Probabilitilies Calculated for Each Treatment Method During January

Treatment	Insects = 0	0 (Insects (1	1 (Insects (5	Insects) 5
No Treatment	56.25	18.75	18.75	6.25
Protectant	0	25	0	75
Fumigant	56.25	25	6.25	12.5

Probabilitilies Calculated for Each Treatment Method During March

Treatment	Insects = 0	0 (Insects (1	1 (Insects (5	Insects) 5
No Treatment	75	25	0	0
Protectant	100	0	0	0
Fumigant	77.78	11.11	11.11	0

APPENDIX B

Appendix B shows the probabilities calculated for the elevator study. These probabilities were calculated for each wheat quality condition within a specified insect category. Two wheat quality conditions included test weight and moisture content. Also, probabilities were calculated when no wheat quality condition was specified.

Appendix B-1: Probabilities Calculated for Receiving a Certain Discount When Wheat Quality Is Not Specified

Discount	Probability Insects = 0	Probability 0 (Insects (1	Probability 1 (Insects (5	Probability Insects) 5
$0.000	43.23	42.86	34.88	24.24
$0.005	7.49	9.52	6.98	9.09
$0.010	9.80	2.38	4.65	0.00
$0.015	0.29	0.00	0.00	0.00
$0.020	9.80	11.90	4.65	0.00
$0.029	0.00	0.00	0.00	3.03
$0.030	7.49	2.38	9.30	9.09
$0.040	4.32	2.38	2.33	3.03
$0.050	8.07	7.14	6.98	3.03
$0.055	0.29	0.00	0.00	0.00
$0.060	2.31	0.00	6.98	0.00
$0.070	3.75	7.14	4.65	9.09
$0.080	0.58	2.38	0.00	3.03
$0.090	0.29	0.00	4.65	0.00
$0.100	0.29	2.38	6.98	15.15
$0.110	0.58	2.38	0.00	3.03
$0.120	0.00	0.00	4.65	3.03
$0.130	0.58	0.00	0.00	6.06
$0.150	0.00	0.00	0.00	3.03
$0.160	0.00	2.38	0.00	0.00
$0.185	0.00	0.00	0.00	3.03
$0.190	0.00	2.38	0.00	0.00
$0.200	0.58	0.00	0.00	0.00
$0.220	0.29	0.00	0.00	0.00
$0.230	0.00	0.00	0.00	3.03
$0.380	0.00	2.38	0.00	0.00
$0.600	0.00	0.00	2.33	0.00

Appendix B-2: Probabilities Calculated For Receiving a Certain Discount when Test Weight is Specified

******* Test weight less than or equal to 56 *******

Discount	Probability Insects = 0	Probability 0 < Insects < 1	Probability 1 < Insects < 5	Probability Insects > 5
$0.000	21.35	12.50	31.58	0.00
$0.010	1.37	0.00	5.26	0.00
$0.020	6.74	0.00	5.26	0.00
$0.025	0.00	0.00	0.00	9.09
$0.030	11.24	12.50	10.53	9.09
$0.040	16.85	12.50	5.26	9.09
$0.050	25.84	37.50	10.53	9.09
$0.060	1.37	0.00	15.79	0.00
$0.070	5.62	12.50	0.00	9.09
$0.080	1.12	0.00	0.00	0.00
$0.090	1.12	0.00	5.26	0.00
$0.100	1.12	0.00	5.26	0.00
$0.110	0.00	0.00	0.00	9.09
$0.120	0.00	0.00	0.00	9.09
$0.130	1.12	0.00	0.00	18.18
$0.150	0.00	0.00	0.00	9.09
$0.160	0.00	12.50	0.00	0.00
$0.220	1.12	0.00	0.00	0.00
$0.230	0.00	0.00	0.00	9.09
$0.600	0.00	0.00	5.26	0.00

******* Test weight more than 56 and less or equal to 58 *******

Discount	Probability Insects = 0	Probability 0 < Insects < 1	Probability 1 < Insects < 5	Probability Insects > 5
$0.000	21.51	25.00	38.77	28.57
$0.005	3.23	0.00	7.69	14.29
$0.010	15.05	0.00	7.69	0.00
$0.015	1.08	0.00	0.00	0.00
$0.020	26.88	41.67	7.69	0.00
$0.030	15.05	0.00	15.38	14.29
$0.050	1.08	0.00	0.00	0.00
$0.055	1.08	0.00	0.00	0.00
$0.060	4.30	0.00	0.00	0.00
$0.070	4.30	16.67	0.00	14.29
$0.080	1.08	0.00	0.00	0.00
$0.100	0.00	0.00	15.38	28.57
$0.110	2.15	8.33	0.00	0.00
$0.120	0.00	0.00	15.38	0.00
$0.130	1.08	0.00	0.00	0.00
$0.200	2.15	0.00	0.00	0.00
$0.360	0.00	8.33	0.00	0.00

******* Test weight more than 58 *******

Discount	Probability Insects = 0	Probability 0 < Insects < 1	Probability 1 < Insects < 5	Probability Insects > 5
$0.000	67.27	63.64	45.45	40.00
$0.005	13.94	18.18	18.18	13.33
$0.010	10.30	4.55	0.00	0.00
$0.020	1.82	0.00	0.00	0.00
$0.030	1.21	0.00	0.00	6.67
$0.050	2.42	0.00	9.09	0.00
$0.060	0.61	0.00	0.00	0.00
$0.070	2.42	0.00	18.18	6.67
$0.080	0.00	4.55	0.00	6.67
$0.090	0.00	0.00	9.09	0.00
$0.100	0.00	4.55	0.00	20.00
$0.185	0.00	0.00	0.00	6.67
$0.190	0.00	4.55	0.00	0.00

Appendix B-3: Probabilities Calculated for Receiving A Certain Discount when Moisture Content is Specified

******* Moisture Content less than or equal to 10 *******

Discount	Probability Insects = 0	Probability 0 (Insects (1	Probability 1 (Insects (5	Probability Insects) 5
$0.000	51.35	75.00	57.14	100.00
$0.005	13.51	25.00	14.29	0.00
$0.010	2.70	0.00	0.00	0.00
$0.020	10.81	0.00	0.00	0.00
$0.030	5.41	0.00	14.29	0.00
$0.040	2.70	0.00	0.00	0.00
$0.050	8.11	0.00	0.00	0.00
$0.060	2.70	0.00	14.29	0.00
$0.070	2.70	0.00	0.00	0.00

******* Moisture Content is greater than 10 and less than or equal to 11 *******

Discount	Probability Insects = 0	Probability 0 (Insects (1	Probability 1 (Insects (5	Probability Insects) 5
$0.000	41.36	50.00	31.25	25.00
$0.005	8.82	8.33	6.25	8.33
$0.010	13.58	0.00	0.00	0.00
$0.020	8.82	12.50	6.25	0.00
$0.030	8.64	4.17	6.25	8.33
$0.040	4.32	4.17	6.25	0.00
$0.050	6.17	4.17	6.25	8.33
$0.060	3.70	0.00	12.50	0.00
$0.070	3.70	8.33	6.25	0.00
$0.100	0.00	0.00	6.25	25.00
$0.110	0.62	4.17	0.00	8.33
$0.120	0.00	0.00	12.50	0.00
$0.130	1.23	0.00	0.00	8.33
$0.150	0.00	0.00	0.00	8.33
$0.160	0.00	4.17	0.00	0.00
$0.200	0.62	0.00	0.00	0.00

******* Moisture Content is greater than 11 and less than or equal to 12 *******

Discount	Probability Insects = 0	Probability 0 (Insects (1	Probability 1 (Insects (5	Probability Insects) 5
$0.000	45.90	30.00	29.41	20.00
$0.005	5.74	10.00	5.88	10.00
$0.010	8.20	0.00	11.76	0.00
$0.015	0.82	0.00	0.00	0.00
$0.020	11.48	20.00	5.88	0.00
$0.029	0.00	0.00	0.00	10.00
$0.030	6.56	0.00	5.88	10.00
$0.040	3.28	0.00	0.00	0.00
$0.050	9.02	20.00	11.76	0.00
$0.055	0.82	0.00	0.00	0.00
$0.060	0.82	0.00	0.00	0.00
$0.070	4.10	10.00	5.88	20.00
$0.080	1.64	10.00	0.00	10.00
$0.090	0.00	0.00	11.76	0.00
$0.100	0.00	0.00	5.88	0.00
$0.110	0.82	0.00	0.00	0.00
$0.130	0.00	0.00	0.00	10.00
$0.220	0.82	0.00	0.00	0.00
$0.230	0.00	0.00	0.00	10.00
$0.600	0.00	0.00	5.88	0.00

******* Moisture Content greater than 12 *******

Discount	Probability Insects = 0	Probability 0 (Insects (1	Probability 1 (Insects (5	Probability Insects) 5
$0.000	38.77	0.00	33.33	20.00
$0.005	3.85	0.00	0.00	10.00
$0.010	3.85	25.00	0.00	0.00
$0.020	11.54	0.00	0.00	0.00
$0.030	7.69	0.00	33.33	10.00
$0.040	11.54	0.00	0.00	10.00
$0.050	15.38	0.00	0.00	0.00
$0.070	3.85	0.00	0.00	10.00
$0.090	3.85	0.00	0.00	0.00
$0.100	3.85	25.00	11.33	20.00
$0.120	0.00	0.00	0.00	10.00
$0.185	0.00	0.00	0.00	10.00
$0.190	0.00	25.00	0.00	0.00
$0.200	3.85	0.00	0.00	0.00
$0.380	0.00	25.00	0.00	0.00

APPENDIX C

After the probabilities were calculated for each data set, the probabilities were combined by multiplying each probability corresponding to an insect category. The probabilities were then cumulated and sorted by outcome from small to large. Appendix C shows how the stochastic dominance criterion was used to select which strategies remained in the efficient set. For each strategy, there is a cumulative distribution function associated with a group of outcomes. Pair-wise comparisons are shown for each set of factors specified in the analysis. The areas under the strategy's CDFs are shown along with the difference between the areas compared.

Appendix C-11 Second Degree Stochastic Dominance Criterion for the Septemper Sample Period When Wheat Quality Is Not Specified

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prop. of %o Trt	Prop. of Mala	%o Trt. AREA = A	Mala AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	0.61	0.58	0	0	0
$2.04	0.61	0.58	0.097	0.092	0.005
$2.08	0.61	0.58	0.125	0.118	0.006
$2.09	0.61	0.58	0.129	0.123	0.006
$2.10	1.43	1.18	0.135	0.128	0.007
$2.19	1.43	1.18	0.260	0.231	0.029
$2.20	1.43	1.18	0.274	0.243	0.031
$2.22	1.43	1.18	0.303	0.266	0.036
$2.23	1.43	1.18	0.325	0.285	0.040
$2.24	1.43	1.18	0.340	0.297	0.043
$2.25	2.14	1.56	0.350	0.306	0.044
$2.26	2.19	1.67	0.377	0.325	0.052
$2.27	2.19	1.67	0.399	0.342	0.057
$2.28	2.28	1.89	0.415	0.355	0.061
$2.29	3.89	2.49	0.444	0.378	0.066
$2.30	3.81	2.49	0.475	0.403	0.072
$2.31	3.81	2.49	0.513	0.428	0.085
$2.32	4.62	3.47	0.542	0.447	0.095
$2.33	5.34	3.85	0.600	0.490	0.109
$2.34	5.34	3.85	0.653	0.529	0.124
$2.35	6.87	4.83	0.706	0.567	0.139
$2.36	8.81	6.37	0.775	0.616	0.160
$2.37	10.43	7.57	0.863	0.679	0.184
$2.38	16.72	11.92	0.968	0.755	0.213
$2.39	17.99	13.19	1.135	0.874	0.261
$2.40	19.61	14.39	1.315	1.006	0.309
$2.41	26.01	19.88	1.511	1.150	0.361
$2.42	28.21	21.50	1.771	1.349	0.422
$2.43	28.26	28.56	2.081	1.585	0.496
$2.44	37.35	31.74	2.336	1.842	0.493
$2.45	43.94	38.62	2.709	2.160	0.549
$2.46	51.50	46.82	3.148	2.546	0.602
$2.47	55.13	51.37	3.653	3.005	0.648
$2.48	100.00	100.00	3.747	3.092	0.655

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prop. of %o Trt	Prop. of Methyl	%o Trt. AREA = A	Methyl AREA = B	A-B
$1.86	0.00	0.58	0	0	0
$1.87	0.00	0.58	0.000	0.004	-0.004
$1.88	0.61	0.58	0.000	0.010	-0.010
$2.04	0.61	0.58	0.097	0.101	-0.004
$2.08	0.61	1.18	0.125	0.128	-0.003
$2.09	0.61	1.18	0.129	0.136	-0.007
$2.10	1.43	1.18	0.135	0.147	-0.012
$2.19	1.43	1.18	0.260	0.250	0.009
$2.20	1.43	1.18	0.274	0.262	0.012
$2.22	1.43	1.18	0.303	0.286	0.017
$2.23	1.43	1.56	0.325	0.305	0.021
$2.24	1.43	1.67	0.340	0.320	0.019
$2.25	2.14	1.67	0.350	0.333	0.018
$2.26	2.19	1.89	0.377	0.354	0.024
$2.27	2.19	2.49	0.399	0.372	0.027
$2.28	2.28	2.87	0.415	0.391	0.024
$2.29	3.89	2.87	0.444	0.426	0.017
$2.30	3.81	3.47	0.475	0.456	0.019
$2.31	3.81	3.85	0.513	0.490	0.023
$2.32	4.62	3.85	0.542	0.519	0.022
$2.33	5.34	4.83	0.600	0.567	0.032
$2.34	5.34	6.37	0.653	0.616	0.037
$2.35	6.87	7.57	0.706	0.679	0.027
$2.36	8.81	11.92	0.775	0.755	0.020
$2.37	10.43	13.19	0.863	0.874	-0.011
$2.38	16.72	14.39	0.968	1.006	-0.039
$2.39	17.99	19.88	1.135	1.150	-0.015
$2.40	19.61	21.50	1.315	1.349	-0.034
$2.41	26.01	21.61	1.511	1.564	-0.053
$2.42	28.21	31.74	1.771	1.780	-0.009
$2.43	28.26	38.62	2.081	2.129	-0.048
$2.44	37.35	39.00	2.336	2.477	-0.141
$2.45	43.94	46.93	2.709	2.867	-0.158
$2.46	51.50	100.00	3.148	3.336	-0.188
$2.47	55.13	100.00	3.653	4.316	-0.663
$2.48	100.00	100.00	3.747	4.486	-0.739

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prop. of Mala	Prop. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$1.86	0.00	0.58	0	0	0
$1.87	0.00	0.58	0.000	0.004	-0.004
$1.88	0.58	0.58	0.000	0.010	-0.010
$2.04	0.58	0.58	0.092	0.101	-0.009
$2.08	0.58	1.18	0.118	0.128	-0.009
$2.09	0.58	1.18	0.123	0.136	-0.014
$2.10	1.18	1.18	0.128	0.147	-0.019
$2.19	1.18	1.18	0.231	0.250	-0.019
$2.20	1.18	1.18	0.243	0.262	-0.019
$2.22	1.18	1.18	0.266	0.286	-0.019
$2.23	1.18	1.56	0.285	0.305	-0.019
$2.24	1.18	1.67	0.297	0.320	-0.023
$2.25	1.56	1.67	0.306	0.333	-0.027
$2.26	1.67	1.89	0.325	0.354	-0.028
$2.27	1.67	2.49	0.342	0.372	-0.030
$2.28	1.89	2.87	0.355	0.391	-0.036
$2.29	2.49	2.87	0.378	0.426	-0.049
$2.30	2.49	3.47	0.403	0.456	-0.052
$2.31	2.49	3.85	0.428	0.490	-0.062
$2.32	3.47	3.85	0.447	0.519	-0.072
$2.33	3.85	4.83	0.490	0.567	-0.077
$2.34	3.85	6.37	0.529	0.616	-0.087
$2.35	4.83	7.57	0.567	0.679	-0.112
$2.36	6.37	11.92	0.616	0.755	-0.140
$2.37	7.57	13.19	0.679	0.874	-0.195
$2.38	11.92	14.39	0.755	1.006	-0.251
$2.39	13.19	19.88	0.874	1.150	-0.276
$2.40	14.39	21.50	1.006	1.349	-0.343
$2.41	19.88	21.61	1.150	1.564	-0.414
$2.42	21.50	31.74	1.349	1.780	-0.431
$2.43	28.56	38.62	1.585	2.129	-0.544
$2.44	31.74	39.00	1.842	2.477	-0.634
$2.45	38.62	46.93	2.160	2.867	-0.707
$2.46	46.82	100.00	2.546	3.336	-0.790
$2.47	51.37	100.00	3.005	4.316	-1.311
$2.48	100.00	100.00	3.092	4.486	-1.394

Appendix C-1: Second Degree Stochastic Dominance Criterion for the Easterner
Example Period when wheat Quality is not Specified

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prop. of Prop. of No Trt.	No Trt.	Fumigant	Fumigant AREA + B	AREA + B	B-A
$1.86	0.00	0.00		0	0	0
$1.87	0.00	0.05		0	0	0
$1.88	0.61	0.05		0.000	0.044	-0.044
$2.04	0.61	0.05		0.097	0.141	-0.044
$2.08	0.61	0.05		0.125	0.184	-0.055
$2.09	0.61	1.71		0.129	0.186	-0.057
$2.10	1.43	1.71		0.135	0.202	-0.067
$2.19	1.43	1.71		0.260	0.352	-0.092
$2.20	1.43	1.71		0.274	0.369	-0.095
$2.22	1.43	1.71		0.343	0.443	-0.101
$2.23	1.43	1.71		0.325	0.430	-0.105
$2.24	1.43	2.27		0.348	0.448	-0.100
$2.25	2.14	2.29		0.350	0.465	-0.114
$2.26	2.19	2.29		0.377	0.493	-0.116
$2.27	2.19	2.35		0.399	0.516	-0.117
$2.28	2.20	3.22		0.415	0.534	-0.118
$2.29	3.09	3.77		0.444	0.573	-0.130
$2.30	3.01	3.77		0.475	0.612	-0.137
$2.31	3.01	4.64		0.513	0.649	-0.136
$2.32	4.62	5.19		0.542	0.684	-0.142
$2.33	5.34	5.19		0.600	0.749	-0.149
$2.34	5.34	6.34		0.653	0.801	-0.148
$2.35	6.87	8.58		0.796	0.864	-0.150
$2.36	8.01	9.05		0.775	0.950	-0.175
$2.37	10.43	15.24		0.863	1.041	-0.177
$2.38	16.72	16.96		0.968	1.193	-0.225
$2.39	17.99	18.43		1.135	1.363	-0.228
$2.40	19.61	24.71		1.315	1.547	-0.232
$2.41	26.01	27.46		1.511	1.794	-0.283
$2.42	28.21	27.49		1.771	2.069	-0.298
$2.43	28.26	36.57		2.041	2.371	-0.290
$2.44	37.35	44.15		2.336	2.700	-0.365
$2.45	43.94	51.61		2.709	3.142	-0.433
$2.46	51.58	51.64		3.148	3.658	-0.509
$2.47	55.13	100.00		3.653	4.164	-0.511
$2.48	100.00	100.00		3.747	4.334	-0.587

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prop. of Prop. of Malx	Malx	Fumigant	Fumigant AREA + B	AREA + B	B-A
$1.86	0.00	0.00		0	0	0
$1.87	0.00	0.05		0	0	0
$1.88	0.58	0.05		0.000	0.044	-0.044
$2.04	0.58	0.05		0.092	0.141	-0.049
$2.08	0.58	0.05		0.118	0.184	-0.062
$2.09	0.58	1.71		0.123	0.186	-0.064
$2.10	1.18	1.71		0.128	0.202	-0.074
$2.19	1.18	1.71		0.231	0.352	-0.121
$2.20	1.18	1.71		0.243	0.369	-0.126
$2.22	1.18	1.71		0.266	0.403	-0.137
$2.23	1.18	1.71		0.285	0.430	-0.145
$2.24	1.18	2.27		0.297	0.448	-0.150
$2.25	1.56	2.29		0.306	0.465	-0.159
$2.26	1.67	2.29		0.325	0.493	-0.168
$2.27	1.67	2.35		0.342	0.516	-0.174
$2.28	1.69	3.22		0.355	0.534	-0.179
$2.29	2.49	3.77		0.378	0.573	-0.195
$2.30	2.49	3.77		0.403	0.612	-0.208
$2.31	2.49	4.64		0.428	0.649	-0.221
$2.32	3.47	5.19		0.447	0.684	-0.237
$2.33	3.85	5.19		0.490	0.749	-0.259
$2.34	3.85	6.34		0.529	0.801	-0.272
$2.35	4.83	8.58		0.567	0.864	-0.297
$2.36	6.37	9.05		0.616	0.950	-0.334
$2.37	7.57	15.24		0.679	1.041	-0.361
$2.38	11.92	16.96		0.755	1.193	-0.438
$2.39	13.19	18.43		0.874	1.363	-0.488
$2.40	14.39	24.71		1.006	1.547	-0.541
$2.41	19.88	27.46		1.150	1.794	-0.644
$2.42	21.50	27.49		1.349	2.069	-0.720
$2.43	28.56	36.57		1.585	2.371	-0.786
$2.44	31.74	44.15		1.842	2.700	-0.858
$2.45	38.62	51.61		2.160	3.142	-0.982
$2.46	46.82	51.64		2.546	3.658	-1.112
$2.47	51.37	100.00		3.005	4.164	-1.159
$2.48	100.00	100.00		3.092	4.334	-1.242

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prop. of Prop. of Methyl	Methyl	Fumigant	Fumigant AREA + B	AREA + B	B-A
$1.86	0.58	0.00		0	0	0
$1.87	0.58	0.05		0.044	0.000	0.044
$1.88	0.58	0.05		0.088	0.000	0.042
$2.04	0.58	0.05		0.101	0.141	-0.040
$2.08	1.18	0.05		0.128	0.184	-0.052
$2.09	1.18	1.71		0.136	0.186	-0.050
$2.10	1.18	1.71		0.147	0.202	-0.055
$2.19	1.18	1.71		0.250	0.352	-0.101
$2.20	1.18	1.71		0.262	0.369	-0.107
$2.22	1.18	1.71		0.286	0.403	-0.117
$2.23	1.56	1.71		0.305	0.430	-0.126
$2.24	1.67	2.27		0.320	0.448	-0.127
$2.25	1.67	2.29		0.333	0.465	-0.132
$2.26	1.89	2.29		0.354	0.493	-0.140
$2.27	2.49	2.35		0.372	0.516	-0.144
$2.28	2.87	3.22		0.391	0.534	-0.143
$2.29	2.87	3.77		0.426	0.573	-0.147
$2.30	3.47	3.77		0.456	0.612	-0.156
$2.31	3.85	4.64		0.490	0.649	-0.159
$2.32	3.85	5.19		0.519	0.684	-0.165
$2.33	4.83	5.19		0.567	0.749	-0.182
$2.34	6.37	6.34		0.616	0.801	-0.185
$2.35	7.57	8.58		0.679	0.864	-0.185
$2.36	11.92	9.05		0.755	0.950	-0.195
$2.37	13.19	15.24		0.874	1.041	-0.166
$2.38	14.39	16.96		1.006	1.193	-0.187
$2.39	19.88	18.43		1.150	1.363	-0.212
$2.40	21.50	24.71		1.349	1.547	-0.198
$2.41	21.61	27.46		1.564	1.794	-0.230
$2.42	31.74	27.49		1.780	2.069	-0.289
$2.43	38.62	36.57		2.129	2.371	-0.242
$2.44	39.00	44.15		2.477	2.700	-0.223
$2.45	46.82	51.61		2.867	3.142	-0.275
$2.46	100.00	51.64		3.336	3.658	-0.322
$2.47	100.00	100.00		4.316	4.164	0.152
$2.48	100.00	100.00		4.486	4.334	0.152

Appendix C-2: Second Degree Stochastic Dominance Criterion for the September Sample Period when Test Weight is less than or equal to 56

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	1.38	1.32	0	0	0
$2.23	1.38	1.32	0.489	0.465	0.025
$2.24	1.38	1.32	0.503	0.478	0.025
$2.25	3.54	2.45	0.514	0.488	0.026
$2.26	3.71	2.88	0.545	0.519	0.025
$2.30	3.71	2.88	0.707	0.635	0.072
$2.31	3.71	2.88	0.744	0.664	0.080
$2.32	7.99	6.00	0.772	0.685	0.086
$2.33	10.14	7.14	0.872	0.760	0.111
$2.34	10.14	7.14	0.973	0.832	0.141
$2.35	14.63	9.83	1.074	0.903	0.171
$2.36	16.78	10.97	1.221	1.002	0.219
$2.37	18.93	12.11	1.389	1.111	0.277
$2.38	20.49	13.86	1.578	1.232	0.345
$2.39	22.05	15.60	1.783	1.371	0.412
$2.40	22.23	16.02	2.003	1.527	0.476
$2.41	29.55	22.40	2.225	1.687	0.538
$2.42	34.24	27.61	2.521	1.911	0.610
$2.43	54.07	49.45	2.898	2.215	0.683
$2.44	64.54	61.36	3.384	2.660	0.724
$2.45	75.51	72.48	4.030	3.273	0.756
$2.46	88.10	77.47	4.785	3.998	0.787
$2.47	82.01	88.05	5.385	4.579	0.806
$2.48	100.00	100.00	5.984	5.164	0.821

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$1.86	0.00	1.32	0	0	0
$1.87	0.00	1.32	0.000	0.010	-0.010
$1.88	1.38	1.32	0.000	0.022	-0.022
$2.23	1.38	2.45	0.489	0.488	0.001
$2.24	1.38	2.88	0.503	0.513	-0.010
$2.25	3.54	2.88	0.514	0.534	-0.021
$2.26	3.71	2.88	0.545	0.560	-0.015
$2.30	3.71	6.00	0.707	0.686	0.021
$2.31	3.71	7.14	0.744	0.746	-0.002
$2.32	7.99	7.14	0.772	0.799	-0.027
$2.33	10.14	9.83	0.872	0.888	-0.017
$2.34	10.14	10.97	0.973	0.987	-0.014
$2.35	14.63	12.11	1.074	1.096	-0.022
$2.36	16.78	13.86	1.221	1.218	0.003
$2.37	18.93	15.60	1.389	1.356	0.032
$2.38	20.49	16.02	1.578	1.512	0.066
$2.39	22.05	22.40	1.783	1.672	0.111
$2.40	22.23	27.61	2.003	1.896	0.107
$2.41	29.55	49.45	2.225	2.172	0.053
$2.42	34.24	61.36	2.521	2.667	-0.146
$2.43	54.07	72.48	2.898	3.342	-0.444
$2.44	64.54	73.62	3.384	3.994	-0.610
$2.45	75.51	88.05	4.030	4.730	-0.701
$2.46	88.10	100.00	4.785	5.531	-0.746
$2.47	82.01	100.00	5.385	6.281	-0.895
$2.48	100.00	100.00	5.984	7.011	-1.027

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$1.86	0.00	1.32	0	0	0
$1.87	0.00	1.32	0.000	0.010	-0.010
$1.88	1.32	1.32	0.000	0.022	-0.022
$2.23	1.32	2.45	0.465	0.488	-0.024
$2.24	1.32	2.88	0.478	0.513	-0.035
$2.25	2.45	2.88	0.488	0.534	-0.046
$2.26	2.88	2.88	0.519	0.560	-0.050
$2.30	2.88	6.00	0.635	0.686	-0.051
$2.31	2.88	7.14	0.664	0.746	-0.082
$2.32	6.00	7.14	0.685	0.799	-0.114
$2.33	7.14	9.83	0.760	0.888	-0.128
$2.34	7.14	10.97	0.832	0.987	-0.155
$2.35	9.83	12.11	0.903	1.096	-0.193
$2.36	10.97	13.86	1.002	1.218	-0.216
$2.37	12.11	15.60	1.111	1.356	-0.245
$2.38	13.86	16.02	1.232	1.512	-0.280
$2.39	15.60	22.40	1.371	1.672	-0.301
$2.40	16.02	27.61	1.527	1.896	-0.369
$2.41	22.40	49.45	1.687	2.172	-0.485
$2.42	27.61	61.36	1.911	2.667	-0.756
$2.43	49.45	72.48	2.215	3.342	-1.127
$2.44	61.36	73.62	2.660	3.994	-1.334
$2.45	72.48	88.05	3.273	4.730	-1.457
$2.46	77.47	100.00	3.998	5.531	-1.533
$2.47	88.05	100.00	4.579	6.281	-1.702
$2.48	100.00	100.00	5.164	7.011	-1.847

Appendix C-21 Second Degree Stochastic Dominance Criterion for the September Sample Period when Test weight is less than or equal to 56

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prop. of No Trt.	Prop. of Fumigant	AREA + A	AREA + B	A-B
51.86	0.00	0.00	0	0	0
51.87	0.00	1.91	0	0	0
51.88	1.38	1.91	0.000	0.017	-0.017
52.23	1.38	1.91	0.489	0.692	-0.203
52.24	1.38	3.57	0.543	0.711	-0.208
52.25	3.54	3.66	0.514	0.738	-0.225
52.26	3.71	3.66	0.545	0.771	-0.226
52.30	3.71	3.66	0.707	0.930	-0.224
52.31	3.71	8.21	0.744	0.967	-0.223
52.32	7.99	9.86	0.772	1.029	-0.257
52.33	10.14	9.86	0.872	1.152	-0.280
52.34	10.14	13.27	0.973	1.250	-0.277
52.35	14.63	14.92	1.074	1.383	-0.309
52.36	16.78	16.57	1.221	1.532	-0.312
52.37	18.93	17.58	1.389	1.698	-0.309
52.38	20.49	19.59	1.578	1.874	-0.296
52.39	22.05	19.69	1.703	2.070	-0.367
52.40	22.23	26.48	2.003	2.266	-0.263
52.41	29.55	32.45	2.225	2.530	-0.305
52.42	34.24	52.92	2.521	2.855	-0.334
52.43	54.07	62.56	2.898	3.437	-0.539
52.44	64.54	73.61	3.384	4.000	-0.616
52.45	75.51	77.78	4.030	4.736	-0.707
52.46	84.10	88.88	4.785	5.514	-0.729
52.47	92.91	100.00	5.585	6.114	-0.728
52.48	100.00	100.00	5.984	6.844	-0.860

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prop. of Malathion	Prop. of Fumigant	AREA + A	AREA + B	A-B
51.86	0.00	0.00	0	0	0
51.87	0.00	1.91	0	0	0
51.88	1.32	1.91	0.000	0.017	-0.017
52.23	1.32	1.91	0.465	0.692	-0.226
52.24	1.32	3.57	0.478	0.711	-0.233
52.25	2.45	3.66	0.488	0.738	-0.250
52.26	2.88	3.66	0.510	0.771	-0.261
52.30	2.88	3.66	0.635	0.930	-0.295
52.31	2.88	8.21	0.664	0.967	-0.303
52.32	6.00	9.86	0.685	1.029	-0.343
52.33	7.14	9.86	0.760	1.152	-0.391
52.34	7.14	13.27	0.832	1.250	-0.419
52.35	9.83	14.92	0.903	1.383	-0.480
52.36	10.97	16.57	1.002	1.532	-0.531
52.37	12.11	17.58	1.111	1.698	-0.587
52.38	13.86	19.59	1.232	1.874	-0.641
52.39	15.60	19.69	1.371	2.070	-0.699
52.40	16.02	26.48	1.527	2.266	-0.740
52.41	22.40	32.45	1.687	2.530	-0.843
52.42	27.61	52.92	1.911	2.855	-0.944
52.43	49.45	62.56	2.215	3.437	-1.222
52.44	61.36	73.61	2.660	4.000	-1.340
52.45	72.48	77.78	3.273	4.736	-1.463
52.46	77.47	88.88	3.958	5.514	-1.556
52.47	88.85	100.00	4.579	6.114	-1.535
52.48	100.00	100.00	5.164	6.844	-1.680

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prop. of Methyl	Prop. of Fumigant	AREA + A	AREA + B	A-B
51.86	1.32	0.00	0	0	0
51.87	1.32	1.91	0.010	0.000	0.010
51.88	1.32	1.91	0.022	0.017	0.005
52.23	2.45	1.91	0.488	0.692	-0.204
52.24	2.88	3.57	0.513	0.711	-0.199
52.25	2.88	3.66	0.534	0.738	-0.204
52.26	2.88	3.66	0.560	0.771	-0.211
52.30	6.00	3.66	0.686	0.930	-0.245
52.31	7.14	8.21	0.746	0.967	-0.221
52.32	7.14	9.86	0.799	1.029	-0.229
52.33	9.83	9.86	0.888	1.152	-0.263
52.34	10.97	13.27	0.987	1.250	-0.264
52.35	12.11	14.92	1.096	1.383	-0.287
52.36	13.86	16.57	1.210	1.532	-0.315
52.37	15.60	17.58	1.356	1.698	-0.342
52.38	16.02	19.59	1.512	1.874	-0.362
52.39	22.40	19.69	1.672	2.070	-0.397
52.40	27.61	26.48	1.896	2.266	-0.370
52.41	49.45	32.45	2.172	2.530	-0.358
52.42	61.36	52.92	2.667	2.855	-0.188
52.43	72.48	62.56	3.342	3.437	-0.095
52.44	73.62	73.61	3.994	4.000	-0.006
52.45	88.85	77.78	4.730	4.736	-0.006
52.46	100.00	88.88	5.531	5.514	0.017
52.47	100.00	100.00	6.281	6.114	0.167
52.48	100.00	100.00	7.011	6.844	0.167

Appendix C-3: Second Degree Stochastic Dominance Criterion for the September Sample Period When Test Weight is greater than 56 and less than or equal to 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$2.00	0.00	0.00	0	0	0
$2.09	0.00	0.00	0	0	0
$2.10	2.85	2.08	0	0	0
$2.26	2.85	2.08	0.466	0.340	0.125
$2.27	2.85	2.08	0.487	0.356	0.131
$2.28	3.19	2.89	0.513	0.375	0.138
$2.33	3.19	2.89	0.684	0.529	0.154
$2.34	3.19	2.89	0.715	0.558	0.157
$2.35	3.36	3.38	0.747	0.587	0.160
$2.36	7.41	7.15	0.781	0.620	0.161
$2.37	10.60	10.04	0.837	0.674	0.163
$2.38	21.42	17.46	0.969	0.799	0.170
$2.39	21.42	17.46	1.183	0.974	0.209
$2.40	21.59	17.87	1.397	1.148	0.249
$2.41	31.35	25.44	1.613	1.327	0.286
$2.42	32.03	27.05	1.921	1.576	0.344
$2.43	32.20	27.87	2.247	1.852	0.395
$2.44	32.20	27.87	2.569	2.131	0.438
$2.45	42.18	39.15	2.891	2.410	0.482
$2.46	62.70	61.57	3.313	2.801	0.512
$2.47	62.87	69.54	3.927	3.405	0.523
$2.48	100.00	100.00	4.034	3.523	0.512

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$2.00	0.00	2.08	0	0	0
$2.09	0.00	2.08	0.000	0.016	-0.016
$2.10	2.85	2.08	0.000	0.034	-0.034
$2.26	2.85	2.89	0.466	0.374	0.092
$2.27	2.85	2.89	0.487	0.396	0.091
$2.28	3.19	2.89	0.513	0.422	0.091
$2.33	3.19	3.38	0.684	0.577	0.107
$2.34	3.19	7.15	0.715	0.610	0.106
$2.35	3.36	10.04	0.747	0.681	0.066
$2.36	7.41	17.46	0.781	0.782	-0.001
$2.37	10.60	17.46	0.837	0.913	-0.076
$2.38	21.42	17.87	0.969	1.131	-0.162
$2.39	21.42	25.44	1.183	1.309	-0.126
$2.40	21.59	27.05	1.397	1.564	-0.166
$2.41	31.35	27.46	1.613	1.834	-0.221
$2.42	32.03	27.46	1.921	2.103	-0.183
$2.43	32.20	39.15	2.247	2.384	-0.136
$2.44	32.20	61.57	2.569	2.775	-0.206
$2.45	42.18	61.98	2.891	3.391	-0.500
$2.46	62.70	100.00	3.313	4.011	-0.698
$2.47	62.87	100.00	3.927	4.991	-1.063
$2.48	100.00	100.00	4.034	5.161	-1.126

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$2.00	0.00	2.08	0	0	0
$2.09	0.00	2.08	0.000	0.016	-0.016
$2.10	2.08	2.08	0.000	0.034	-0.034
$2.26	2.08	2.89	0.340	0.374	-0.034
$2.27	2.08	2.89	0.356	0.396	-0.040
$2.28	2.89	2.89	0.375	0.422	-0.047
$2.33	2.89	3.38	0.529	0.577	-0.047
$2.34	2.89	7.15	0.558	0.610	-0.052
$2.35	3.38	10.04	0.587	0.681	-0.094
$2.36	7.15	17.46	0.620	0.782	-0.162
$2.37	10.04	17.46	0.674	0.913	-0.239
$2.38	17.46	17.87	0.799	1.131	-0.332
$2.39	17.46	25.44	0.974	1.309	-0.336
$2.40	17.87	27.05	1.148	1.564	-0.416
$2.41	25.44	27.46	1.327	1.834	-0.507
$2.42	27.05	27.46	1.576	2.103	-0.527
$2.43	27.87	39.15	1.852	2.384	-0.531
$2.44	27.87	61.57	2.131	2.775	-0.644
$2.45	39.15	61.98	2.410	3.391	-0.981
$2.46	61.57	100.00	2.801	4.011	-1.209
$2.47	69.54	100.00	3.405	4.991	-1.586
$2.48	100.00	100.00	3.523	5.161	-1.638

Appendix C-3: Second Degree Stochastic Dominance Criterion for the Seatreater
Sample Period when Test weight is greater than 56
and less than or equal to 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	AREA = A	AREA = B	A-B
42.00	0.00	0.00	0	0	0
42.09	0.00	3.03	0	0	0
42.10	2.85	3.03	0.000	0.027	-0.027
42.26	2.85	3.03	0.466	0.523	-0.057
42.27	2.85	3.23	0.487	0.545	-0.058
42.28	3.19	3.23	0.513	0.574	-0.061
42.33	3.19	3.23	0.684	0.747	-0.064
42.34	3.19	3.33	0.715	0.780	-0.064
42.35	3.36	8.92	0.747	0.813	-0.065
42.36	7.41	12.15	0.781	0.902	-0.121
42.37	10.60	22.93	0.837	0.993	-0.157
42.38	21.42	22.93	0.969	1.280	-0.311
42.39	21.42	23.83	1.163	1.509	-0.326
42.40	21.59	32.00	1.397	1.739	-0.342
42.41	31.35	32.47	1.613	2.060	-0.447
42.42	32.03	32.57	1.921	2.378	-0.458
42.43	32.20	32.57	2.247	2.711	-0.463
42.44	32.20	42.23	2.569	3.036	-0.467
42.45	42.18	62.62	2.891	3.459	-0.567
42.46	62.70	62.72	3.313	4.085	-0.772
42.47	62.87	100.00	3.927	4.700	-0.772
42.48	100.00	100.00	4.834	4.870	-0.035

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malx	Prob. of Fumigant	AREA = A	AREA = B	A-B
42.00	0.00	0.00	0	0	0
42.09	0.00	3.03	0	0	0
42.10	2.84	3.03	0.000	0.027	-0.027
42.26	2.00	3.03	0.348	0.523	-0.182
42.27	2.00	3.23	0.356	0.545	-0.189
42.28	2.09	3.23	0.375	0.574	-0.200
42.33	2.09	3.23	0.529	0.747	-0.218
42.34	2.09	3.33	0.558	0.780	-0.221
42.35	3.38	8.92	0.587	0.813	-0.226
42.36	7.15	12.15	0.620	0.902	-0.282
42.37	10.04	22.93	0.674	0.993	-0.320
42.38	17.46	22.93	0.799	1.280	-0.481
42.39	17.46	23.83	0.974	1.509	-0.535
42.40	17.87	32.00	1.148	1.739	-0.591
42.41	25.44	32.47	1.327	2.060	-0.733
42.42	27.85	32.57	1.576	2.378	-0.802
42.43	27.87	32.57	1.852	2.711	-0.858
42.44	27.87	42.23	2.131	3.036	-0.905
42.45	39.15	62.62	2.410	3.459	-1.049
42.46	61.57	62.72	2.881	4.085	-1.204
42.47	69.54	100.00	3.485	4.700	-1.215
42.48	100.00	100.00	3.523	4.870	-1.347

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	AREA = A	AREA = B	A-B
42.00	0.00	0.00	0	0	0
42.09	2.84	3.03	0.016	0.000	0.016
42.10	2.84	3.03	0.034	0.027	0.007
42.26	2.89	3.03	0.374	0.523	-0.148
42.27	2.89	3.23	0.396	0.545	-0.149
42.28	2.89	3.23	0.422	0.574	-0.152
42.33	3.38	3.23	0.577	0.747	-0.171
42.34	7.15	3.33	0.610	0.780	-0.170
42.35	10.04	8.92	0.681	0.813	-0.132
42.36	17.46	12.15	0.782	0.902	-0.121
42.37	17.46	22.93	0.913	0.993	-0.081
42.38	17.87	22.93	1.131	1.280	-0.149
42.39	25.44	23.83	1.309	1.509	-0.200
42.40	27.85	32.00	1.564	1.739	-0.176
42.41	27.46	32.47	1.834	2.060	-0.226
42.42	27.46	32.57	2.103	2.378	-0.275
42.43	39.15	32.57	2.384	2.711	-0.327
42.44	61.57	42.23	2.775	3.036	-0.261
42.45	61.98	62.62	3.391	3.459	-0.068
42.46	100.00	62.72	4.011	4.085	-0.074
42.47	100.00	100.00	4.991	4.700	0.291
42.48	100.00	100.00	5.161	4.870	0.291

Appendix C-4: Second Degree Stochastic Dominance Criterion for the September Sample Period When Test Weight is greater than 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of %o Trt	Prob. of Mala	%o Trt. AREA = A	Mala AREA = B	A-B
$2.27	0.00	0.00	0	0	0
$2.28	0.00	0.00	0	0	0
$2.29	1.56	1.14	0	0	0
$2.30	3.14	1.14	0.003	0.002	0.001
$2.36	3.14	1.14	0.218	0.080	0.138
$2.37	3.14	1.14	0.249	0.091	0.158
$2.38	9.44	5.61	0.280	0.103	0.178
$2.39	11.83	7.88	0.375	0.159	0.216
$2.40	14.97	9.85	0.493	0.238	0.255
$2.41	21.71	16.14	0.643	0.336	0.307
$2.42	21.81	16.37	0.806	0.457	0.348
$2.43	24.58	19.55	1.078	0.662	0.416
$2.44	24.58	19.55	1.324	0.857	0.467
$2.45	26.35	20.83	1.570	1.053	0.517
$2.46	26.64	21.51	1.833	1.261	0.572
$2.47	29.83	26.51	2.095	1.472	0.623
$2.48	100.00	100.00	2.145	1.517	0.628

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of %o Trt	Prob. of Methyl	%o Trt. AREA = A	Methyl AREA = B	A-B
$2.27	0.00	1.14	0	0	0
$2.28	0.00	1.97	0.000	0.009	-0.009
$2.29	1.56	1.97	0.000	0.033	-0.033
$2.30	3.14	1.97	0.003	0.036	-0.034
$2.36	3.14	5.61	0.218	0.171	0.047
$2.37	3.14	7.88	0.249	0.227	0.022
$2.38	9.44	9.85	0.280	0.306	-0.026
$2.39	11.83	16.14	0.375	0.405	-0.030
$2.40	14.97	16.37	0.493	0.566	-0.073
$2.41	21.71	19.55	0.643	0.730	-0.087
$2.42	21.81	19.55	0.806	0.876	-0.070
$2.43	24.58	20.83	1.078	1.121	-0.042
$2.44	24.58	21.51	1.324	1.329	-0.005
$2.45	26.35	26.51	1.570	1.544	0.026
$2.46	26.64	100.00	1.833	1.809	0.024
$2.47	29.83	100.00	2.095	2.789	-0.695
$2.48	100.00	100.00	2.145	2.959	-0.814

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of %o Trt.	Prob. of Fumigant	%o Trt. AREA = A	Fumigant AREA = B	A-B
$2.27	0.00	0.00	0	0	0
$2.28	0.00	1.65	0	0	0
$2.29	1.56	2.86	0.000	0.020	-0.020
$2.30	3.14	2.86	0.003	0.025	-0.023
$2.36	3.14	2.86	0.218	0.221	-0.003
$2.37	3.14	8.15	0.249	0.250	-0.001
$2.38	9.44	11.46	0.280	0.331	-0.051
$2.39	11.83	14.32	0.375	0.446	-0.071
$2.40	14.97	22.36	0.493	0.589	-0.096
$2.41	21.71	22.42	0.643	0.813	-0.170
$2.42	21.81	25.95	0.806	0.981	-0.175
$2.43	24.58	25.95	1.078	1.305	-0.227
$2.44	24.58	27.27	1.324	1.565	-0.240
$2.45	26.35	27.44	1.570	1.837	-0.267
$2.46	26.64	38.83	1.833	2.112	-0.278
$2.47	29.83	100.00	2.095	2.406	-0.311
$2.48	100.00	100.00	2.145	2.576	-0.431

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	Mala AREA = A	Fumigant AREA = B	A-B
$2.27	0.00	0.00	0	0	0
$2.28	0.00	1.65	0	0	0
$2.29	1.14	2.86	0.000	0.020	-0.020
$2.30	1.14	2.86	0.002	0.025	-0.023
$2.36	1.14	2.86	0.080	0.221	-0.141
$2.37	1.14	8.15	0.091	0.250	-0.158
$2.38	5.61	11.46	0.103	0.331	-0.228
$2.39	7.88	14.32	0.159	0.446	-0.287
$2.40	9.85	22.36	0.238	0.589	-0.351
$2.41	16.14	22.42	0.336	0.813	-0.476
$2.42	16.37	25.95	0.457	0.981	-0.523
$2.43	19.55	25.95	0.662	1.305	-0.643
$2.44	19.55	27.27	0.857	1.565	-0.707
$2.45	20.83	27.44	1.053	1.837	-0.784
$2.46	21.51	38.83	1.261	2.112	-0.850
$2.47	26.51	100.00	1.472	2.406	-0.934
$2.48	100.00	100.00	1.517	2.576	-1.059

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl AREA = A	Fumigant AREA = B	A-B
$2.27	1.14	0.00	0	0	0
$2.28	1.97	1.65	0.009	0.000	0.009
$2.29	1.97	2.86	0.033	0.020	0.012
$2.30	1.97	2.86	0.036	0.025	0.011
$2.36	5.61	2.86	0.171	0.221	-0.050
$2.37	7.88	8.15	0.227	0.250	-0.023
$2.38	9.85	11.46	0.306	0.331	-0.025
$2.39	16.14	14.32	0.405	0.446	-0.041
$2.40	16.37	22.36	0.566	0.589	-0.023
$2.41	19.55	22.42	0.730	0.813	-0.083
$2.42	19.55	25.95	0.876	0.981	-0.104
$2.43	20.83	25.95	1.121	1.305	-0.184
$2.44	21.51	27.27	1.329	1.565	-0.236
$2.45	26.51	27.44	1.544	1.837	-0.293
$2.46	100.00	38.83	1.809	2.112	-0.303
$2.47	100.00	100.00	2.789	2.406	0.383
$2.48	100.00	100.00	2.959	2.576	0.383

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$2.27	0.00	1.14	0	0	0
$2.28	0.00	1.97	0.000	0.009	-0.009
$2.29	1.14	1.97	0.000	0.033	-0.033
$2.30	1.14	1.97	0.002	0.036	-0.034
$2.36	1.14	5.61	0.080	0.171	-0.091
$2.37	1.14	7.88	0.091	0.227	-0.136
$2.38	5.61	9.85	0.103	0.306	-0.203
$2.39	7.88	16.14	0.159	0.405	-0.246
$2.40	9.85	16.37	0.238	0.566	-0.328
$2.41	16.14	19.55	0.336	0.730	-0.393
$2.42	16.37	19.55	0.457	0.876	-0.419
$2.43	19.55	20.83	0.662	1.121	-0.459
$2.44	19.55	21.51	0.857	1.329	-0.471
$2.45	20.83	26.51	1.053	1.544	-0.491
$2.46	21.51	100.00	1.261	1.809	-0.548
$2.47	26.51	100.00	1.472	2.789	-1.317
$2.48	100.00	100.00	1.517	2.959	-1.442

Appendix C-5: Second Degree Stochastic Dominance Criterion for the September Sample Period when Moisture Content is Less Than or Equal to 18

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Malathion	No Trt. AREA + A	Malathion AREA + B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	0.00	0	0	0
$2.41	0.43	1.01	0	0	0
$2.42	4.62	5.59	0.004	0.010	-0.006
$2.43	5.90	8.63	0.050	0.066	-0.016
$2.44	6.33	9.64	0.109	0.152	-0.043
$2.45	10.94	15.24	0.173	0.249	-0.076
$2.46	12.65	19.29	0.282	0.401	-0.119
$2.47	13.00	20.30	0.406	0.590	-0.184
$2.48	100.00	100.00	0.420	0.625	-0.196

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA + A	Methyl AREA + B	A-B
$2.39	0.00	1.01	0	0	0
$2.40	0.00	5.59	0.000	0.010	-0.010
$2.41	0.43	8.63	0.000	0.066	-0.066
$2.42	4.62	9.64	0.004	0.152	-0.148
$2.43	5.90	15.24	0.050	0.249	-0.198
$2.44	6.33	19.29	0.109	0.401	-0.292
$2.45	10.94	20.30	0.173	0.594	-0.421
$2.46	12.65	100.00	0.282	0.797	-0.515
$2.47	13.00	100.00	0.406	1.777	-1.371
$2.48	100.00	100.00	0.420	1.947	-1.519

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. AREA + A	Fumigant AREA + B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	0.25	0	0	0
$2.41	0.43	5.78	0.000	0.002	-0.002
$2.42	4.62	6.44	0.004	0.059	-0.055
$2.43	5.90	6.69	0.050	0.124	-0.073
$2.44	6.33	12.38	0.109	0.191	-0.081
$2.45	10.94	13.36	0.173	0.315	-0.142
$2.46	12.65	13.61	0.282	0.448	-0.166
$2.47	13.00	100.00	0.406	0.581	-0.175
$2.48	100.00	100.00	0.420	0.751	-0.323

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	Malathion AREA + A	Fumigant AREA + B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	0.25	0	0	0
$2.41	1.01	5.78	0.000	0.002	-0.002
$2.42	5.59	6.44	0.010	0.059	-0.049
$2.43	8.63	6.69	0.066	0.124	-0.058
$2.44	9.64	12.38	0.152	0.191	-0.038
$2.45	15.24	13.36	0.249	0.315	-0.066
$2.46	19.29	13.61	0.401	0.448	-0.047
$2.47	20.30	100.00	0.590	0.581	0.009
$2.48	100.00	100.00	0.625	0.751	-0.127

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl AREA + A	Fumigant AREA + B	A-B
$2.39	1.01	0.00	0	0	0
$2.40	5.59	0.25	0.010	0.000	0.010
$2.41	8.63	5.78	0.066	0.002	0.064
$2.42	9.64	6.44	0.152	0.059	0.093
$2.43	15.24	6.69	0.249	0.124	0.125
$2.44	19.29	12.38	0.401	0.191	0.210
$2.45	20.30	13.36	0.594	0.315	0.280
$2.46	100.00	13.61	0.797	0.448	0.349
$2.47	100.00	100.00	1.777	0.581	1.196
$2.48	100.00	100.00	1.947	0.751	1.196

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Malathion	Prob. of Methyl	Malathion AREA + A	Methyl AREA + B	A-B
$2.39	0.00	1.01	0	0	0
$2.40	0.00	5.59	0.000	0.010	-0.010
$2.41	1.01	8.63	0.000	0.066	-0.066
$2.42	5.59	9.64	0.010	0.152	-0.142
$2.43	8.63	15.24	0.066	0.249	-0.183
$2.44	9.64	19.29	0.152	0.401	-0.249
$2.45	15.24	20.30	0.249	0.594	-0.345
$2.46	19.29	100.00	0.401	0.797	-0.396
$2.47	20.30	100.00	0.590	1.777	-1.187
$2.48	100.00	100.00	0.625	1.947	-1.322

Appendix C-6: Second Degree Stochastic Dominance Criterion for the Sesbexbar
Sample Period When Moisture Content is greater than 10
and less than or equal to 11

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$2.26	0.00	0.00	0	0	0
$2.27	0.00	0.00	0	0	0
$2.28	0.10	0.23	0	0	0
$2.30	0.10	0.23	0.002	0.005	-0.003
$2.31	0.10	0.23	0.003	0.008	-0.004
$2.32	1.53	1.27	0.004	0.009	-0.005
$2.33	3.50	2.31	0.023	0.025	-0.002
$2.34	3.50	2.31	0.050	0.049	0.010
$2.35	5.66	3.81	0.093	0.072	0.022
$2.36	8.95	6.94	0.150	0.110	0.040
$2.37	12.45	9.25	0.217	0.162	0.055
$2.38	20.02	13.94	0.329	0.245	0.084
$2.39	20.02	13.94	0.599	0.433	0.166
$2.40	20.02	13.94	0.799	0.573	0.227
$2.41	25.10	18.97	1.000	0.712	0.288
$2.42	28.97	23.47	1.251	0.902	0.349
$2.43	33.99	29.42	1.548	1.136	0.404
$2.44	37.76	33.64	1.688	1.431	0.458
$2.45	44.17	48.52	2.258	1.767	0.491
$2.46	51.37	48.22	2.700	2.172	0.527
$2.47	53.51	53.31	3.203	2.645	0.558
$2.48	100.00	100.00	3.294	2.735	0.559

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$2.26	0.00	0.23	0	0	0
$2.27	0.00	0.23	0	0.002	-0.002
$2.28	0.10	0.23	0.000	0.004	-0.004
$2.30	0.10	1.27	0.002	0.009	-0.007
$2.31	0.10	2.31	0.003	0.022	-0.019
$2.32	1.53	2.31	0.004	0.039	-0.035
$2.33	3.50	3.81	0.023	0.068	-0.045
$2.34	3.50	6.94	0.050	0.106	-0.056
$2.35	5.66	9.25	0.093	0.176	-0.082
$2.36	8.95	13.94	0.150	0.268	-0.118
$2.37	12.45	13.94	0.217	0.373	-0.156
$2.38	20.02	13.94	0.329	0.498	-0.169
$2.39	20.02	18.97	0.599	0.686	-0.087
$2.40	20.02	23.47	0.799	0.876	-0.077
$2.41	25.10	29.42	1.000	1.111	-0.111
$2.42	28.97	33.64	1.251	1.405	-0.154
$2.43	33.99	48.52	1.548	1.741	-0.201
$2.44	37.76	48.22	1.688	2.147	-0.266
$2.45	44.17	53.31	2.258	2.629	-0.371
$2.46	51.37	100.00	2.700	3.162	-0.462
$2.47	53.51	100.00	3.203	4.142	-0.939
$2.48	100.00	100.00	3.294	4.312	-1.018

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$2.26	0.00	0.23	0	0	0
$2.27	0.00	0.23	0	0.002	-0.002
$2.28	0.23	0.23	0.000	0.004	-0.004
$2.30	0.23	1.27	0.005	0.009	-0.004
$2.31	0.23	2.31	0.008	0.022	-0.014
$2.32	1.27	2.31	0.009	0.039	-0.030
$2.33	2.31	3.81	0.025	0.068	-0.043
$2.34	2.31	6.94	0.049	0.106	-0.058
$2.35	3.81	9.25	0.072	0.176	-0.104
$2.36	6.94	13.94	0.110	0.268	-0.158
$2.37	9.25	13.94	0.162	0.373	-0.211
$2.38	13.94	13.94	0.245	0.498	-0.253
$2.39	13.94	18.97	0.433	0.686	-0.253
$2.40	13.94	23.47	0.573	0.876	-0.303
$2.41	18.97	29.42	0.712	1.111	-0.399
$2.42	23.47	33.64	0.902	1.405	-0.503
$2.43	29.42	48.52	1.136	1.741	-0.605
$2.44	33.64	48.22	1.431	2.147	-0.716
$2.45	48.52	53.31	1.767	2.629	-0.862
$2.46	48.22	100.00	2.172	3.162	-0.990
$2.47	53.31	100.00	2.645	4.142	-1.497
$2.48	100.00	100.00	2.735	4.312	-1.576

Appendix C-6: Second Degree Stochastic Dominance Criterion for the September Sample Period when Moisture Content is greater than 18 and less than or equal to 11

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. AREA = A	Fumigant AREA = B	A-B
42.26	0.00	0.00	0	0	0
42.27	0.00	0.06	0	0	0
42.28	0.10	0.06	0.000	0.001	-0.001
42.30	0.10	0.06	0.002	0.002	0.000
42.31	0.10	1.58	0.003	0.003	0.001
42.32	1.53	3.09	0.004	0.014	-0.010
42.33	3.50	3.09	0.023	0.053	-0.030
42.34	3.50	4.71	0.058	0.084	-0.026
42.35	5.66	9.26	0.093	0.131	-0.038
42.36	8.95	12.35	0.150	0.224	-0.074
42.37	12.45	19.17	0.217	0.316	-0.099
42.38	20.82	19.17	0.329	0.489	-0.160
42.39	20.82	19.17	0.599	0.748	-0.148
42.40	20.82	24.81	0.799	0.939	-0.140
42.41	25.10	29.78	1.000	1.187	-0.188
42.42	28.97	35.56	1.251	1.484	-0.234
42.43	33.99	39.74	1.548	1.848	-0.300
42.44	37.76	45.83	1.860	2.237	-0.357
42.45	44.17	53.38	2.258	2.696	-0.438
42.46	51.37	54.61	2.700	3.229	-0.530
42.47	53.51	100.00	3.203	3.765	-0.562
42.48	100.00	100.00	3.294	3.935	-0.641

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	Malathion AREA = A	Fumigant AREA = B	A-B
42.26	0.00	0.00	0	0	0
42.27	0.00	0.06	0	0	0
42.28	0.23	0.06	0.000	0.001	-0.001
42.30	0.23	0.06	0.005	0.002	0.004
42.31	0.23	1.58	0.008	0.003	0.005
42.32	1.27	3.09	0.009	0.014	-0.005
42.33	2.31	3.09	0.025	0.053	-0.028
42.34	2.31	4.71	0.049	0.084	-0.035
42.35	3.81	9.26	0.072	0.131	-0.059
42.36	6.94	12.35	0.110	0.224	-0.114
42.37	9.25	19.17	0.162	0.316	-0.154
42.38	13.94	19.17	0.245	0.489	-0.244
42.39	13.94	19.17	0.433	0.748	-0.314
42.40	13.94	24.81	0.573	0.939	-0.367
42.41	18.97	29.78	0.712	1.187	-0.475
42.42	23.47	35.56	0.902	1.484	-0.583
42.43	29.42	39.74	1.136	1.848	-0.704
42.44	33.64	45.83	1.431	2.237	-0.807
42.45	40.52	53.38	1.767	2.696	-0.929
42.46	48.22	54.61	2.172	3.229	-1.057
42.47	53.31	100.00	2.645	3.765	-1.120
42.48	100.00	100.00	2.735	3.935	-1.199

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl AREA = A	Fumigant AREA = B	A-B
42.26	0.23	0.00	0	0	0
42.27	0.23	0.06	0.528	0.000	0.528
42.28	0.23	0.06	0.530	0.001	0.530
42.30	1.27	0.06	0.535	0.002	0.534
42.31	2.31	1.58	0.548	0.003	0.546
42.32	2.31	3.09	0.566	0.014	0.551
42.33	1.81	3.09	0.594	0.053	0.541
42.34	6.94	4.71	0.633	0.084	0.549
42.35	9.25	9.26	0.702	0.131	0.571
42.36	13.94	12.35	0.794	0.224	0.571
42.37	13.94	19.17	0.899	0.316	0.583
42.38	13.94	19.17	1.024	0.489	0.536
42.39	18.97	19.17	1.213	0.748	0.465
42.40	23.47	24.81	1.482	0.939	0.463
42.41	29.42	29.78	1.637	1.187	0.450
42.42	33.64	35.56	1.931	1.484	0.447
42.43	40.52	39.74	2.268	1.848	0.420
42.44	48.22	45.83	2.673	2.237	0.435
42.45	53.31	53.38	3.155	2.696	0.459
42.46	100.00	54.61	3.668	3.229	0.439
42.47	100.00	100.00	4.668	3.765	0.903
42.48	100.00	100.00	4.838	3.935	0.903

Appendix C-7: Second Degree Stochastic Dominance Criterion for the September Sample Period When Moisture Content is greater than 11 and less than or equal to 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	1.55	1.47	0	0	0
$2.23	1.55	1.47	0.547	0.520	0.027
$2.24	1.55	1.47	0.563	0.534	0.028
$2.25	3.92	2.72	0.574	0.545	0.029
$2.26	4.05	3.03	0.609	0.570	0.040
$2.33	4.05	3.03	0.907	0.792	0.115
$2.34	4.05	3.03	0.937	0.815	0.122
$2.35	6.42	4.28	0.988	0.853	0.135
$2.36	6.42	4.28	1.052	0.896	0.157
$2.37	6.55	4.59	1.117	0.939	0.178
$2.38	8.10	6.06	1.182	0.984	0.198
$2.39	11.20	9.00	1.263	1.045	0.218
$2.40	17.25	13.37	1.375	1.135	0.240
$2.41	27.61	21.38	1.548	1.269	0.279
$2.42	27.74	21.69	1.624	1.483	0.341
$2.43	27.87	33.32	2.129	1.721	0.408
$2.44	39.75	34.55	2.380	2.021	0.359
$2.45	44.71	39.73	2.777	2.367	0.411
$2.46	57.28	51.76	3.224	2.764	0.460
$2.47	57.41	58.09	3.786	3.271	0.514
$2.48	100.00	100.00	3.883	3.370	0.513

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$1.86	0.00	1.47	0	0	0
$1.87	0.00	1.47	0.000	0.011	-0.011
$1.88	1.55	1.47	0.000	0.024	-0.024
$2.23	1.55	2.72	0.547	0.544	0.003
$2.24	1.55	3.03	0.563	0.571	-0.009
$2.25	3.92	3.03	0.574	0.594	-0.020
$2.26	4.05	3.03	0.609	0.621	-0.012
$2.33	4.05	4.28	0.907	0.844	0.063
$2.34	4.05	4.28	0.937	0.876	0.062
$2.35	6.42	4.59	0.988	0.929	0.059
$2.36	6.42	6.06	1.052	0.975	0.077
$2.37	6.55	9.00	1.117	1.036	0.081
$2.38	8.10	13.37	1.182	1.126	0.056
$2.39	11.20	21.38	1.263	1.260	0.003
$2.40	17.25	21.69	1.375	1.473	-0.098
$2.41	27.61	22.00	1.548	1.690	-0.143
$2.42	27.74	34.55	1.624	1.910	-0.287
$2.43	27.87	39.73	2.129	2.290	-0.162
$2.44	39.75	40.98	2.380	2.648	-0.268
$2.45	44.71	52.07	2.777	3.058	-0.281
$2.46	57.28	100.00	3.224	3.578	-0.354
$2.47	57.41	100.00	3.786	4.558	-0.773
$2.48	100.00	100.00	3.883	4.728	-0.845

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$1.86	0.00	1.47	0	0	0
$1.87	0.00	1.47	0.000	0.011	-0.011
$1.88	1.47	1.47	0.000	0.024	-0.024
$2.23	1.47	2.72	0.520	0.544	-0.024
$2.24	1.47	3.03	0.534	0.571	-0.037
$2.25	2.72	3.03	0.545	0.594	-0.048
$2.26	3.03	3.03	0.570	0.621	-0.051
$2.33	3.03	4.28	0.792	0.844	-0.051
$2.34	3.03	4.28	0.815	0.876	-0.061
$2.35	4.28	4.59	0.853	0.929	-0.076
$2.36	4.28	6.06	0.896	0.975	-0.080
$2.37	4.59	9.00	0.939	1.036	-0.097
$2.38	6.06	13.37	0.984	1.126	-0.141
$2.39	9.00	21.38	1.045	1.260	-0.215
$2.40	13.37	21.69	1.135	1.473	-0.338
$2.41	21.38	22.00	1.269	1.690	-0.422
$2.42	21.69	34.55	1.483	1.910	-0.428
$2.43	33.32	39.73	1.721	2.290	-0.569
$2.44	34.55	40.98	2.021	2.648	-0.627
$2.45	39.73	52.07	2.367	3.058	-0.691
$2.46	51.76	100.00	2.764	3.578	-0.815
$2.47	58.09	100.00	3.271	4.558	-1.287
$2.48	100.00	100.00	3.370	4.728	-1.359

Appendix C-7: Second Degree Stochastic Dominance Criterion for the Septewber Sample Period when Moisture Content is greater than 11 and less than or equal to 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	2.14	0	0	0
$1.88	1.55	2.14	0.000	0.019	-0.019
$2.23	1.55	2.14	0.547	0.776	-0.229
$2.24	1.55	3.96	0.563	0.797	-0.235
$2.25	3.92	4.03	0.574	0.827	-0.253
$2.26	4.05	4.03	0.609	0.863	-0.254
$2.33	4.05	4.03	0.907	1.159	-0.252
$2.34	4.05	5.05	0.937	1.190	-0.252
$2.35	6.42	5.05	0.988	1.263	-0.275
$2.36	6.42	5.92	1.052	1.321	-0.269
$2.37	6.55	8.06	1.117	1.380	-0.264
$2.38	8.18	12.34	1.182	1.461	-0.279
$2.39	11.20	17.95	1.263	1.584	-0.321
$2.40	17.25	27.74	1.375	1.764	-0.389
$2.41	27.61	27.81	1.548	2.041	-0.494
$2.42	27.74	27.88	1.824	2.319	-0.496
$2.43	27.87	40.55	2.129	2.626	-0.497
$2.44	39.75	45.11	2.380	2.991	-0.611
$2.45	44.71	57.38	2.777	3.442	-0.665
$2.46	57.28	57.45	3.224	4.016	-0.792
$2.47	57.41	100.00	3.786	4.579	-0.793
$2.48	100.00	100.00	3.883	4.749	-0.866

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	Malathion AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	2.14	0	0	0
$1.88	1.47	2.14	0.000	0.019	-0.019
$2.23	1.47	2.14	0.520	0.776	-0.256
$2.24	1.47	3.96	0.534	0.797	-0.263
$2.25	2.72	4.03	0.545	0.827	-0.281
$2.26	3.03	4.03	0.578	0.863	-0.293
$2.33	3.03	4.03	0.792	1.159	-0.367
$2.34	3.03	5.05	0.815	1.190	-0.374
$2.35	4.28	5.05	0.853	1.263	-0.410
$2.36	4.28	5.92	0.896	1.321	-0.425
$2.37	4.59	8.06	0.939	1.380	-0.442
$2.38	6.06	12.34	0.984	1.461	-0.477
$2.39	9.00	17.95	1.045	1.584	-0.539
$2.40	13.37	27.74	1.135	1.764	-0.629
$2.41	21.38	27.81	1.269	2.041	-0.772
$2.42	21.69	27.88	1.483	2.319	-0.837
$2.43	33.32	40.55	1.721	2.626	-0.905
$2.44	34.55	45.11	2.021	2.991	-0.970
$2.45	39.73	57.38	2.367	3.442	-1.076
$2.46	51.76	57.45	2.764	4.016	-1.252
$2.47	58.09	100.00	3.271	4.579	-1.308
$2.48	100.00	100.00	3.370	4.749	-1.379

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl AREA = A	Fumigant AREA = B	A-B
$1.86	1.47	0.00	0	0	0
$1.87	1.47	2.14	0.011	0.000	0.011
$1.88	1.47	2.14	0.024	0.019	0.005
$2.23	2.72	2.14	0.544	0.776	-0.232
$2.24	3.03	3.96	0.571	0.797	-0.226
$2.25	3.03	4.03	0.594	0.827	-0.233
$2.26	3.03	4.03	0.621	0.863	-0.242
$2.33	4.28	4.03	0.844	1.159	-0.316
$2.34	4.28	5.05	0.876	1.190	-0.314
$2.35	4.59	5.05	0.929	1.263	-0.333
$2.36	6.06	5.92	0.975	1.321	-0.346
$2.37	9.00	8.06	1.036	1.380	-0.345
$2.38	13.37	12.34	1.126	1.461	-0.335
$2.39	21.38	17.95	1.260	1.584	-0.325
$2.40	21.69	27.74	1.473	1.764	-0.290
$2.41	22.00	27.81	1.690	2.041	-0.351
$2.42	34.55	27.88	1.910	2.319	-0.409
$2.43	39.73	40.55	2.290	2.626	-0.336
$2.44	48.98	45.11	2.648	2.991	-0.343
$2.45	52.07	57.38	3.058	3.442	-0.384
$2.46	100.00	57.45	3.570	4.016	-0.447
$2.47	100.00	100.00	4.558	4.579	-0.020
$2.48	100.00	100.00	4.728	4.749	-0.020

Appendix C-8: Second Degree Stochastic Dominance Criterion for the September Sample Period When Moisture Content is greater than 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	0.00	0	0	0
$2.10	8.55	6.25	0	0	0
$2.26	8.55	6.25	1.398	1.022	0.376
$2.27	8.55	6.25	1.462	1.069	0.394
$2.28	9.16	7.69	1.539	1.125	0.414
$2.29	9.16	8.94	1.661	1.227	0.434
$2.30	11.53	8.94	1.677	1.243	0.434
$2.34	11.53	8.94	2.236	1.676	0.560
$2.35	11.53	8.94	2.322	1.743	0.579
$2.36	13.90	10.19	2.466	1.855	0.612
$2.37	13.90	10.19	2.605	1.957	0.649
$2.38	36.57	28.71	2.710	2.033	0.676
$2.39	37.18	30.15	3.167	2.392	0.775
$2.40	37.18	30.15	3.446	2.618	0.827
$2.41	40.16	32.84	3.918	2.995	0.915
$2.42	40.16	32.84	4.312	3.324	0.989
$2.43	42.59	38.61	4.714	3.652	1.062
$2.44	46.78	44.19	5.182	4.077	1.106
$2.45	59.13	56.65	5.603	4.474	1.129
$2.46	60.95	60.98	6.195	5.041	1.154
$2.47	78.66	74.92	6.792	5.638	1.153
$2.48	100.00	100.00	6.926	5.766	1.160

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$2.08	0.00	6.25	0	0	0
$2.09	0.00	6.25	0.000	0.047	-0.047
$2.10	8.55	6.25	0.000	0.103	-0.103
$2.26	8.55	7.69	1.398	1.125	0.273
$2.27	8.55	7.69	1.462	1.183	0.280
$2.28	9.16	8.94	1.539	1.252	0.287
$2.29	9.16	8.94	1.661	1.371	0.290
$2.30	11.53	8.94	1.677	1.386	0.291
$2.34	11.53	10.19	2.236	1.820	0.416
$2.35	11.53	10.19	2.322	1.896	0.426
$2.36	13.90	28.71	2.466	2.023	0.443
$2.37	13.90	30.15	2.605	2.311	0.295
$2.38	36.57	30.15	2.710	2.537	0.173
$2.39	37.18	32.84	3.167	2.914	0.253
$2.40	37.18	32.84	3.446	3.160	0.286
$2.41	40.16	38.61	3.918	3.570	0.348
$2.42	40.16	44.19	4.312	3.956	0.356
$2.43	42.59	56.65	4.714	4.398	0.315
$2.44	46.78	60.98	5.182	5.021	0.161
$2.45	59.13	67.23	5.603	5.570	0.033
$2.46	60.95	100.00	6.195	6.243	-0.048
$2.47	78.66	100.00	6.792	7.223	-0.431
$2.48	100.00	100.00	6.926	7.393	-0.467

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$2.08	0.00	6.25	0	0	0
$2.09	0.00	6.25	0.000	0.047	-0.047
$2.10	6.25	6.25	0.000	0.103	-0.103
$2.26	6.25	7.69	1.022	1.125	-0.103
$2.27	6.25	7.69	1.069	1.183	-0.114
$2.28	7.69	8.94	1.125	1.252	-0.127
$2.29	8.94	8.94	1.227	1.371	-0.143
$2.30	8.94	8.94	1.243	1.386	-0.143
$2.34	8.94	10.19	1.676	1.820	-0.143
$2.35	8.94	10.19	1.743	1.896	-0.153
$2.36	10.19	28.71	1.855	2.023	-0.168
$2.37	10.19	30.15	1.957	2.311	-0.354
$2.38	28.71	30.15	2.033	2.537	-0.503
$2.39	30.15	32.84	2.392	2.914	-0.521
$2.40	30.15	32.84	2.618	3.160	-0.542
$2.41	32.84	38.61	2.995	3.570	-0.575
$2.42	32.84	44.19	3.324	3.956	-0.633
$2.43	38.61	56.65	3.652	4.398	-0.746
$2.44	44.19	60.98	4.077	5.021	-0.945
$2.45	56.65	67.23	4.474	5.570	-1.096
$2.46	60.98	100.00	5.041	6.243	-1.202
$2.47	74.92	100.00	5.638	7.223	-1.584
$2.48	100.00	100.00	5.766	7.393	-1.627

Appendix C-8: Second Degree Stochastic Dominance Criterion for the September Seedle Period when Moisture Content is greater than 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. AREA = A	Fumigant AREA = B	A-B
42.08	0.00	0.00	0	0	0
42.09	0.00	9.09	0	0	0
42.10	0.55	9.09	0.000	0.842	-0.842
42.26	0.55	9.09	1.378	1.568	-0.178
42.27	0.55	9.44	1.462	1.636	-0.174
42.28	9.16	9.44	1.539	1.721	-0.182
42.29	9.16	11.26	1.661	1.847	-0.186
42.30	11.53	11.26	1.677	1.866	-0.189
42.34	11.53	11.26	2.236	2.412	-0.176
42.35	11.53	13.00	2.322	2.496	-0.174
42.36	13.90	13.00	2.466	2.660	-0.193
42.37	13.90	18.20	2.605	2.791	-0.185
42.38	36.57	38.63	2.710	3.078	-0.368
42.39	37.18	38.63	3.167	3.561	-0.394
42.40	37.18	40.80	3.446	3.850	-0.405
42.41	40.16	40.80	3.910	4.360	-0.450
42.42	40.16	42.29	4.312	4.768	-0.456
42.43	42.59	45.87	4.714	5.190	-0.477
42.44	46.78	59.71	5.182	5.686	-0.504
42.45	59.13	68.76	5.683	6.224	-0.620
42.46	68.95	79.29	6.195	6.831	-0.637
42.47	78.66	100.00	6.792	7.608	-0.816
42.48	100.00	100.00	6.926	7.778	-0.853

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	Mala AREA = A	Fumigant AREA = B	A-B
42.08	0.00	0.00	0	0	0
42.09	0.00	9.09	0	0	0
42.10	6.25	9.09	0.000	0.842	-0.842
42.26	6.25	9.09	1.022	1.568	-0.546
42.27	6.25	9.44	1.069	1.636	-0.567
42.28	7.69	9.44	1.125	1.721	-0.596
42.29	8.94	11.26	1.227	1.847	-0.619
42.30	8.94	11.26	1.243	1.866	-0.623
42.34	8.94	11.26	1.676	2.412	-0.736
42.35	8.94	13.00	1.743	2.496	-0.753
42.36	10.19	13.00	1.855	2.660	-0.805
42.37	10.19	18.20	1.957	2.791	-0.834
42.38	28.71	38.63	2.033	3.078	-1.045
42.39	38.15	38.63	2.392	3.561	-1.169
42.40	38.15	40.80	2.618	3.850	-1.232
42.41	32.84	40.80	2.995	4.360	-1.365
42.42	32.84	42.29	3.324	4.768	-1.445
42.43	38.61	45.87	3.652	5.190	-1.538
42.44	44.19	59.71	4.077	5.686	-1.610
42.45	56.65	68.76	4.474	6.224	-1.749
42.46	68.98	79.29	5.041	6.831	-1.790
42.47	74.92	100.00	5.638	7.608	-1.970
42.48	100.00	100.00	5.766	7.778	-2.012

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl AREA = A	Fumigant AREA = B	A-B
42.08	6.25	0.00	0	0	0
42.09	6.25	9.09	0.047	0.000	0.047
42.10	6.25	9.09	0.103	0.842	0.821
42.26	7.69	9.09	1.125	1.568	-0.443
42.27	7.69	9.44	1.183	1.636	-0.453
42.28	8.94	9.44	1.252	1.721	-0.469
42.29	8.94	11.26	1.371	1.847	-0.476
42.30	8.94	11.26	1.386	1.866	-0.480
42.34	10.19	11.26	1.820	2.412	-0.592
42.35	10.19	13.00	1.896	2.496	-0.600
42.36	28.71	13.00	2.023	2.660	-0.637
42.37	30.15	18.20	2.311	2.791	-0.480
42.38	30.15	38.63	2.537	3.078	-0.541
42.39	32.84	38.63	2.914	3.561	-0.647
42.40	32.84	40.80	3.160	3.850	-0.691
42.41	38.61	40.80	3.570	4.360	-0.790
42.42	44.19	42.29	3.956	4.768	-0.812
42.43	56.65	45.87	4.398	5.190	-0.792
42.44	68.98	59.71	5.021	5.686	-0.665
42.45	67.23	68.76	5.578	6.224	-0.653
42.46	100.00	79.29	6.243	6.831	-0.589
42.47	100.00	100.00	7.223	7.608	-0.386
42.48	100.00	100.00	7.393	7.778	-0.386

Appendix C-9: Second Degree Stochastic Dominance Criterion for the November Sample Period when wheat Quality Is Not Specified

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	0.55	0.67	0	0	0
$2.08	0.55	0.67	0.113	0.135	-0.023
$2.09	0.55	0.67	0.117	0.140	-0.023
$2.10	0.89	1.35	0.122	0.147	-0.025
$2.23	0.89	1.35	0.241	0.326	-0.085
$2.24	0.89	1.35	0.250	0.340	-0.089
$2.25	2.48	1.78	0.257	0.350	-0.093
$2.26	2.51	1.86	0.268	0.372	-0.104
$2.27	2.51	1.86	0.313	0.391	-0.077
$2.28	2.57	2.03	0.332	0.405	-0.073
$2.29	2.91	2.71	0.364	0.429	-0.066
$2.30	4.50	3.14	0.393	0.457	-0.064
$2.31	4.50	3.14	0.438	0.488	-0.050
$2.32	4.84	3.82	0.472	0.512	-0.040
$2.33	6.43	4.25	0.533	0.560	-0.027
$2.34	6.43	4.25	0.597	0.602	-0.005
$2.35	9.66	5.29	0.661	0.645	0.017
$2.36	12.36	7.05	0.758	0.697	0.061
$2.37	14.36	8.33	0.882	0.768	0.114
$2.38	24.33	13.24	1.025	0.851	0.174
$2.39	25.47	14.65	1.269	0.984	0.285
$2.40	27.46	15.93	1.523	1.130	0.393
$2.41	34.71	21.67	1.798	1.289	0.508
$2.42	36.59	24.32	2.145	1.506	0.639
$2.43	36.62	33.17	2.547	1.774	0.774
$2.44	44.55	36.18	2.877	2.072	0.805
$2.45	52.57	42.96	3.323	2.434	0.888
$2.46	57.90	50.92	3.848	2.864	0.985
$2.47	57.93	55.81	4.416	3.363	1.053
$2.48	100.00	100.00	4.804	3.737	1.067

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$1.86	0.00	0.67	0	0	0
$1.87	0.00	0.67	0.000	0.005	-0.005
$1.88	0.55	0.67	0.000	0.011	-0.011
$2.08	0.55	1.35	0.113	0.147	-0.034
$2.09	0.55	1.35	0.117	0.157	-0.040
$2.10	0.89	1.35	0.122	0.170	-0.048
$2.23	0.89	1.78	0.241	0.350	-0.108
$2.24	0.89	1.86	0.250	0.368	-0.117
$2.25	2.48	1.86	0.257	0.382	-0.125
$2.26	2.51	2.03	0.284	0.445	-0.117
$2.27	2.51	2.71	0.313	0.425	-0.112
$2.28	2.57	3.14	0.332	0.445	-0.113
$2.29	2.91	3.14	0.364	0.484	-0.120
$2.30	4.50	3.82	0.393	0.516	-0.123
$2.31	4.50	4.25	0.438	0.554	-0.116
$2.32	4.84	4.25	0.472	0.586	-0.114
$2.33	6.43	5.29	0.533	0.639	-0.106
$2.34	6.43	7.05	0.597	0.692	-0.095
$2.35	9.66	8.33	0.661	0.762	-0.101
$2.36	12.36	13.24	0.758	0.846	-0.088
$2.37	14.36	14.65	0.882	0.978	-0.097
$2.38	24.33	15.93	1.025	1.125	-0.099
$2.39	25.47	21.67	1.269	1.284	-0.015
$2.40	27.46	24.32	1.523	1.501	0.023
$2.41	34.71	26.48	1.798	1.744	0.054
$2.42	36.59	36.18	2.145	2.008	0.137
$2.43	36.62	42.96	2.547	2.406	0.142
$2.44	44.55	43.39	2.877	2.792	0.085
$2.45	52.57	51.00	3.323	3.226	0.096
$2.46	57.90	100.00	3.848	3.736	0.112
$2.47	57.93	100.00	4.416	4.716	-0.301
$2.48	100.00	100.00	4.514	4.886	-0.372

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$1.86	0.00	0.67	0	0	0
$1.87	0.00	0.67	0.000	0.005	-0.005
$1.88	0.67	0.67	0.000	0.011	-0.011
$2.08	0.67	1.35	0.135	0.147	-0.012
$2.09	0.67	1.35	0.140	0.157	-0.017
$2.10	1.35	1.35	0.147	0.170	-0.023
$2.23	1.35	1.78	0.326	0.350	-0.024
$2.24	1.35	1.86	0.340	0.368	-0.028
$2.25	1.78	1.86	0.350	0.382	-0.032
$2.26	1.86	2.03	0.372	0.405	-0.033
$2.27	1.86	2.71	0.391	0.425	-0.034
$2.28	2.03	3.14	0.405	0.445	-0.041
$2.29	2.71	3.14	0.429	0.484	-0.054
$2.30	3.14	3.82	0.457	0.516	-0.059
$2.31	3.14	4.25	0.488	0.554	-0.066
$2.32	3.82	4.25	0.512	0.586	-0.074
$2.33	4.25	5.29	0.560	0.639	-0.079
$2.34	4.25	7.05	0.602	0.692	-0.090
$2.35	5.29	8.33	0.645	0.762	-0.118
$2.36	7.05	13.24	0.697	0.846	-0.148
$2.37	8.33	14.65	0.768	0.978	-0.210
$2.38	13.24	15.93	0.851	1.125	-0.273
$2.39	14.65	21.67	0.984	1.284	-0.300
$2.40	15.93	24.32	1.130	1.501	-0.370
$2.41	21.67	26.48	1.289	1.744	-0.454
$2.42	24.32	36.18	1.506	2.008	-0.502
$2.43	33.17	42.96	1.774	2.406	-0.632
$2.44	36.18	43.39	2.072	2.792	-0.720
$2.45	42.96	51.00	2.434	3.226	-0.792
$2.46	50.92	100.00	2.864	3.736	-0.873
$2.47	55.81	100.00	3.363	4.716	-1.354
$2.48	100.00	100.00	3.737	5.386	-1.650

Appendix C-9: Second Degree Stochastic Dominance Criterion for the November Sample Period when wheat Quality is Not Specified

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prop. of No Trt.	Prop. of Fumigant	No Trt. AREA = A	Fumigant AREA = B	A-B
41.86	0.00	0.00	0	0	0
41.87	0.00	0.70	0	0	0
41.88	0.55	0.70	0.004	0.006	-0.006
42.00	0.55	0.70	0.113	0.149	-0.036
42.09	0.55	1.65	0.117	0.154	-0.037
42.10	0.89	1.65	0.122	0.169	-0.047
42.23	0.89	1.65	0.241	0.389	-0.148
42.24	0.89	1.88	0.250	0.406	-0.155
42.25	2.48	1.87	0.257	0.419	-0.162
42.26	2.51	1.87	0.284	0.443	-0.154
42.27	2.51	2.82	0.313	0.461	-0.148
42.28	2.57	2.97	0.322	0.476	-0.144
42.29	2.91	3.12	0.364	0.513	-0.149
42.30	4.50	3.12	0.393	0.545	-0.151
42.31	4.50	4.07	0.438	0.576	-0.137
42.32	4.84	4.22	0.472	0.606	-0.134
42.33	6.43	4.22	0.533	0.659	-0.126
42.34	6.43	4.67	0.597	0.701	-0.104
42.35	9.66	6.22	0.661	0.748	-0.087
42.36	12.36	7.47	0.758	0.810	-0.052
42.37	14.36	11.34	0.862	0.865	-0.003
42.38	24.33	12.81	1.025	0.998	0.027
42.39	25.47	14.86	1.269	1.126	0.142
42.40	27.46	19.72	1.523	1.267	0.256
42.41	34.71	22.39	1.758	1.464	0.334
42.42	36.59	22.46	2.145	1.688	0.457
42.43	36.62	32.46	2.547	1.935	0.612
42.44	44.55	37.52	2.877	2.227	0.650
42.45	52.57	46.28	3.323	2.603	0.720
42.46	57.90	46.35	3.848	3.065	0.783
42.47	57.93	100.00	4.416	3.520	0.896
42.48	100.00	100.00	4.884	4.190	0.614

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prop. of Mala	Prop. of Fumigant	Mala AREA = A	Fumigant AREA = B	A-B
41.86	0.00	0.00	0	0	0
41.87	0.00	0.70	0	0	0
41.88	0.67	0.70	0.000	0.006	-0.006
42.00	0.67	0.70	0.135	0.149	-0.013
42.09	0.67	1.65	0.140	0.154	-0.013
42.10	1.35	1.65	0.147	0.169	-0.022
42.23	1.35	1.65	0.326	0.389	-0.063
42.24	1.35	1.88	0.340	0.406	-0.066
42.25	1.70	1.87	0.350	0.419	-0.069
42.26	1.86	1.87	0.372	0.443	-0.070
42.27	1.86	2.82	0.391	0.461	-0.071
42.28	2.03	2.97	0.405	0.476	-0.072
42.29	2.71	3.12	0.429	0.513	-0.083
42.30	3.14	3.12	0.457	0.545	-0.088
42.31	3.14	4.07	0.488	0.576	-0.087
42.32	3.82	4.22	0.512	0.606	-0.094
42.33	4.25	4.22	0.560	0.659	-0.099
42.34	4.25	4.67	0.602	0.701	-0.099
42.35	5.29	6.22	0.645	0.748	-0.103
42.36	7.05	7.47	0.697	0.810	-0.113
42.37	8.33	11.34	0.768	0.885	-0.117
42.38	13.24	12.81	0.851	0.998	-0.147
42.39	14.65	14.86	0.984	1.126	-0.143
42.40	15.93	19.72	1.130	1.267	-0.137
42.41	21.67	22.39	1.289	1.464	-0.175
42.42	24.32	22.46	1.586	1.688	-0.102
42.43	33.17	32.46	1.774	1.935	-0.161
42.44	36.18	37.52	2.072	2.227	-0.155
42.45	42.96	46.28	2.434	2.603	-0.169
42.46	50.92	46.35	2.864	3.065	-0.202
42.47	55.81	100.00	3.363	3.520	-0.157
42.48	100.00	100.00	3.737	4.190	-0.453

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prop. of Methyl	Prop. of Fumigant	Methyl AREA = A	Fumigant AREA = B	A-B
41.86	0.67	0.00	0	0	0
41.87	0.67	0.70	0.005	0.000	0.005
41.88	0.67	0.70	0.011	0.006	0.005
42.00	1.35	0.70	0.147	0.149	-0.001
42.09	1.35	1.65	0.157	0.154	0.003
42.10	1.35	1.65	0.170	0.169	0.001
42.23	1.70	1.65	0.350	0.389	-0.039
42.24	1.86	1.88	0.368	0.406	-0.038
42.25	1.86	1.87	0.382	0.419	-0.038
42.26	2.03	1.87	0.405	0.443	-0.038
42.27	2.71	2.82	0.425	0.461	-0.036
42.28	3.14	2.97	0.445	0.476	-0.031
42.29	3.14	3.12	0.484	0.513	-0.029
42.30	3.82	3.12	0.516	0.545	-0.029
42.31	4.25	4.07	0.554	0.576	-0.022
42.32	4.25	4.22	0.586	0.606	-0.020
42.33	5.29	4.22	0.639	0.659	-0.020
42.34	7.05	4.67	0.692	0.701	-0.009
42.35	8.33	6.22	0.762	0.748	0.014
42.36	13.24	7.47	0.846	0.810	0.035
42.37	14.65	11.34	0.970	0.885	0.093
42.38	15.93	12.81	1.125	0.998	0.126
42.39	21.67	14.86	1.284	1.126	0.157
42.40	24.32	19.72	1.501	1.267	0.234
42.41	26.48	22.39	1.744	1.464	0.280
42.42	36.18	22.46	2.088	1.688	0.328
42.43	42.96	32.46	2.486	1.935	0.471
42.44	43.39	37.52	2.792	2.227	0.565
42.45	51.00	46.28	3.226	2.603	0.624
42.46	100.00	46.35	3.736	3.065	0.671
42.47	100.00	100.00	4.716	3.520	1.197
42.48	100.00	100.00	5.386	4.190	1.197

Appendix C-18: Second Degree Stochastic Dominance Criterion for the November Sample Period When Test Weight is less than or equal to 56

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	1.25	1.50	0	0	0
$2.23	1.25	1.50	0.443	0.531	-0.089
$2.24	1.25	1.50	0.455	0.546	-0.091
$2.25	6.01	2.80	0.465	0.557	-0.093
$2.26	6.12	3.12	0.519	0.583	-0.064
$2.30	6.12	3.12	0.785	0.719	0.066
$2.31	6.12	3.12	0.846	0.750	0.096
$2.32	7.91	6.69	0.892	0.773	0.119
$2.33	11.67	7.99	0.991	0.857	0.134
$2.34	11.67	7.99	1.108	0.937	0.171
$2.35	21.30	10.91	1.224	1.017	0.208
$2.36	26.86	12.21	1.437	1.126	0.311
$2.37	30.82	13.51	1.698	1.248	0.450
$2.38	32.18	15.33	2.006	1.383	0.623
$2.39	33.54	17.15	2.328	1.536	0.791
$2.40	33.65	17.47	2.663	1.708	0.955
$2.41	40.74	23.95	3.000	1.883	1.117
$2.42	44.82	29.42	3.407	2.122	1.285
$2.43	59.91	51.82	3.900	2.446	1.454
$2.44	69.31	63.00	4.439	2.912	1.527
$2.45	79.44	74.09	5.132	3.542	1.590
$2.46	86.09	78.82	5.927	4.283	1.644
$2.47	87.66	81.28	6.572	4.874	1.698
$2.48	100.00	100.00	7.212	5.468	1.745

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$1.86	0.00	1.50	0	0	0
$1.87	0.00	1.50	0.000	0.011	-0.011
$1.88	1.25	1.50	0.000	0.025	-0.025
$2.23	1.25	2.80	0.443	0.555	-0.112
$2.24	1.25	3.12	0.455	0.583	-0.128
$2.25	6.01	3.12	0.465	0.606	-0.142
$2.26	6.12	3.12	0.519	0.635	-0.116
$2.30	6.12	6.69	0.785	0.770	0.015
$2.31	6.12	7.99	0.846	0.837	0.009
$2.32	7.91	7.99	0.892	0.897	-0.005
$2.33	11.67	10.91	0.991	0.997	-0.006
$2.34	11.67	12.21	1.108	1.106	0.001
$2.35	21.30	13.51	1.224	1.228	-0.004
$2.36	26.86	15.33	1.437	1.363	0.074
$2.37	30.82	17.15	1.698	1.517	0.181
$2.38	32.18	17.47	2.006	1.688	0.318
$2.39	33.54	23.95	2.328	1.863	0.465
$2.40	33.65	29.42	2.663	2.102	0.561
$2.41	40.74	51.82	3.000	2.397	0.603
$2.42	44.82	63.00	3.407	2.915	0.492
$2.43	59.91	74.09	3.900	3.608	0.292
$2.44	69.31	75.39	4.439	4.275	0.165
$2.45	79.44	81.28	5.132	5.029	0.104
$2.46	86.09	100.00	5.927	5.841	0.085
$2.47	87.66	100.00	6.572	6.591	-0.019
$2.48	100.00	100.00	7.212	7.321	-0.109

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$1.86	0.00	1.50	0	0	0
$1.87	0.00	1.50	0.000	0.011	-0.011
$1.88	1.50	1.50	0.000	0.025	-0.025
$2.23	1.50	2.80	0.531	0.555	-0.024
$2.24	1.50	3.12	0.546	0.583	-0.037
$2.25	2.80	3.12	0.557	0.606	-0.049
$2.26	3.12	3.12	0.583	0.635	-0.052
$2.30	3.12	6.69	0.719	0.770	-0.052
$2.31	3.12	7.99	0.750	0.837	-0.087
$2.32	6.69	7.99	0.773	0.897	-0.124
$2.33	7.99	10.91	0.857	0.997	-0.140
$2.34	7.99	12.21	0.937	1.106	-0.169
$2.35	10.91	13.51	1.017	1.228	-0.212
$2.36	12.21	15.33	1.126	1.363	-0.238
$2.37	13.51	17.15	1.248	1.517	-0.269
$2.38	15.33	17.47	1.383	1.688	-0.305
$2.39	17.15	23.95	1.536	1.863	-0.327
$2.40	17.47	29.42	1.708	2.102	-0.395
$2.41	23.95	51.82	1.883	2.397	-0.514
$2.42	29.42	63.00	2.122	2.915	-0.793
$2.43	51.82	74.09	2.446	3.608	-1.162
$2.44	63.00	75.39	2.912	4.275	-1.363
$2.45	74.09	81.28	3.542	5.029	-1.486
$2.46	78.82	100.00	4.283	5.841	-1.558
$2.47	81.28	100.00	4.874	6.591	-1.717
$2.48	100.00	100.00	5.468	7.321	-1.854

Appendix C-18: Second Degree Stochastic Dominance Criterion for the November Sample Period when Test Weight is less than or equal to 56

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. Fumigant AREA + A	AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	1.58	0	0	0
$1.88	1.25	1.58	0.000	0.014	-0.014
$2.23	1.25	1.58	0.443	0.573	-0.130
$2.24	1.25	2.83	0.455	0.589	-0.133
$2.25	6.01	2.31	0.465	0.644	-0.179
$2.26	6.12	2.31	0.519	0.625	-0.106
$2.30	6.12	2.31	0.785	0.725	0.060
$2.31	6.12	7.31	0.846	0.748	0.098
$2.32	7.91	7.76	0.892	0.843	0.049
$2.33	11.67	7.76	0.991	0.900	0.091
$2.34	11.67	8.95	1.104	0.978	0.130
$2.35	21.30	9.48	1.224	1.067	0.157
$2.36	26.86	9.85	4.437	1.161	0.276
$2.37	30.82	11.71	1.698	1.259	0.438
$2.38	32.18	13.47	2.006	1.377	0.629
$2.39	33.54	13.75	2.328	1.511	0.817
$2.40	33.65	20.61	2.663	1.649	1.014
$2.41	40.74	26.19	3.008	1.855	1.145
$2.42	44.82	51.26	3.407	2.117	1.290
$2.43	59.91	62.50	3.900	2.681	1.219
$2.44	69.31	73.92	4.439	3.243	1.196
$2.45	79.44	77.64	5.132	3.982	1.150
$2.46	86.09	88.86	5.927	4.759	1.168
$2.47	87.66	100.00	6.572	5.359	1.213
$2.48	100.00	100.00	7.212	6.089	1.123

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	Malathion Fumigant AREA + A	AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	1.58	0	0	0
$1.88	1.58	1.58	0.000	0.014	-0.014
$2.23	1.58	1.58	0.531	0.573	-0.041
$2.24	1.58	2.83	0.546	0.589	-0.042
$2.25	2.88	2.31	0.557	0.644	-0.046
$2.26	3.12	2.31	0.583	0.625	-0.042
$2.30	3.12	2.31	0.719	0.725	-0.006
$2.31	3.12	7.31	0.758	0.748	0.002
$2.32	6.69	7.76	0.773	0.843	-0.070
$2.33	7.99	7.76	0.857	0.900	-0.043
$2.34	7.99	8.95	0.937	0.978	-0.041
$2.35	10.91	9.48	1.017	1.067	-0.050
$2.36	12.21	9.85	1.126	1.161	-0.035
$2.37	13.51	11.71	1.248	1.259	-0.012
$2.38	15.33	13.47	1.382	1.377	0.005
$2.39	17.15	13.75	1.536	1.511	0.025
$2.40	17.47	20.61	1.700	1.649	0.050
$2.41	23.95	26.19	1.883	1.855	0.028
$2.42	29.42	51.26	2.122	2.117	0.005
$2.43	51.82	62.50	2.446	2.681	-0.235
$2.44	63.00	73.92	2.912	3.243	-0.331
$2.45	74.09	77.64	3.542	3.982	-0.440
$2.46	78.82	88.86	4.283	4.759	-0.476
$2.47	81.28	100.00	4.874	5.359	-0.485
$2.48	100.00	100.00	5.468	6.089	-0.622

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl Fumigant AREA + A	AREA + B	A-B
$1.86	1.58	0.00	0	0	0
$1.87	1.58	1.58	0.011	0.000	0.011
$1.88	1.58	1.58	0.025	0.014	0.011
$2.23	2.88	1.58	0.555	0.573	-0.018
$2.24	3.12	2.83	0.583	0.589	-0.005
$2.25	3.12	2.31	0.606	0.644	0.003
$2.26	3.12	2.31	0.635	0.625	0.010
$2.30	6.69	2.31	0.770	0.725	0.045
$2.31	7.99	7.31	0.837	0.748	0.089
$2.32	7.99	7.76	0.897	0.843	0.054
$2.33	10.91	7.76	0.997	0.900	0.097
$2.34	12.21	8.95	1.106	0.978	0.129
$2.35	13.51	9.48	1.220	1.067	0.161
$2.36	15.33	9.85	1.363	1.161	0.202
$2.37	17.15	11.71	1.517	1.259	0.257
$2.38	17.47	13.47	1.688	1.377	0.312
$2.39	23.95	13.75	1.863	1.511	0.352
$2.40	29.42	20.61	2.102	1.649	0.454
$2.41	51.82	26.19	2.397	1.855	0.542
$2.42	63.00	51.26	2.915	2.117	0.798
$2.43	74.09	62.50	3.608	2.681	0.927
$2.44	75.39	73.92	4.275	3.243	1.032
$2.45	81.28	77.64	5.029	3.982	1.046
$2.46	100.00	88.86	5.841	4.759	1.083
$2.47	100.00	100.00	6.591	5.359	1.232
$2.48	100.00	100.00	7.321	6.089	1.232

Appendix C-11: Second Degree Stochastic Dominance Criterion for the November Sample Period When Test Weight is greater than 56 and less than or equal to 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	0.00	0	0	0
$2.10	1.19	2.38	0	0	0
$2.26	1.19	2.38	0.195	0.389	-0.194
$2.27	1.19	2.38	0.204	0.407	-0.203
$2.28	1.39	2.99	0.214	0.428	-0.214
$2.33	1.39	2.99	0.289	0.589	-0.300
$2.34	1.39	2.99	0.303	0.618	-0.316
$2.35	1.49	3.30	0.317	0.648	-0.332
$2.36	5.15	7.69	0.332	0.681	-0.350
$2.37	6.54	10.68	0.370	0.739	-0.369
$2.38	25.16	19.15	0.452	0.873	-0.421
$2.39	25.16	19.15	0.704	1.064	-0.360
$2.40	25.26	19.46	0.955	1.256	-0.300
$2.41	36.54	27.49	1.208	1.450	-0.242
$2.42	36.95	28.72	1.566	1.720	-0.154
$2.43	37.05	29.34	1.943	2.013	-0.070
$2.44	37.05	29.34	2.313	2.386	0.007
$2.45	49.73	40.07	2.684	2.599	0.084
$2.46	68.07	61.86	3.181	3.000	0.181
$2.47	68.17	68.67	3.770	3.606	0.164
$2.48	100.00	100.00	3.872	3.723	0.149

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$2.08	0.00	2.38	0	0	0
$2.09	0.00	2.38	0.000	0.018	-0.018
$2.10	1.19	2.38	0.000	0.039	-0.039
$2.26	1.19	2.99	0.195	0.428	-0.234
$2.27	1.19	2.99	0.204	0.451	-0.247
$2.28	1.39	2.99	0.214	0.478	-0.264
$2.33	1.39	3.30	0.289	0.638	-0.349
$2.34	1.39	7.69	0.303	0.671	-0.368
$2.35	1.49	10.68	0.317	0.748	-0.431
$2.36	5.15	19.15	0.332	0.854	-0.523
$2.37	6.54	19.15	0.370	0.998	-0.628
$2.38	25.16	19.46	0.452	1.237	-0.786
$2.39	25.16	27.49	0.704	1.432	-0.728
$2.40	25.26	28.72	0.955	1.707	-0.752
$2.41	36.54	29.03	1.208	1.994	-0.786
$2.42	36.95	29.03	1.566	2.279	-0.713
$2.43	37.05	40.07	1.943	2.575	-0.632
$2.44	37.05	61.86	2.313	2.975	-0.662
$2.45	49.73	62.17	2.684	3.594	-0.910
$2.46	68.07	100.00	3.181	4.216	-1.035
$2.47	68.17	100.00	3.770	5.196	-1.426
$2.48	100.00	100.00	3.872	5.366	-1.494

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$2.08	0.00	2.38	0	0	0
$2.09	0.00	2.38	0.000	0.018	-0.018
$2.10	2.38	2.38	0.000	0.039	-0.039
$2.26	2.38	2.99	0.389	0.428	-0.039
$2.27	2.38	2.99	0.407	0.451	-0.044
$2.28	2.99	2.99	0.428	0.478	-0.049
$2.33	2.99	3.30	0.589	0.638	-0.049
$2.34	2.99	7.69	0.618	0.671	-0.052
$2.35	3.30	10.68	0.648	0.748	-0.099
$2.36	7.69	19.15	0.681	0.854	-0.173
$2.37	10.68	19.15	0.739	0.998	-0.259
$2.38	19.15	19.46	0.873	1.237	-0.365
$2.39	19.15	27.49	1.064	1.432	-0.368
$2.40	19.46	28.72	1.256	1.707	-0.451
$2.41	27.49	29.03	1.450	1.994	-0.544
$2.42	28.72	29.03	1.720	2.279	-0.559
$2.43	29.34	40.07	2.013	2.575	-0.562
$2.44	29.34	61.86	2.386	2.975	-0.670
$2.45	40.07	62.17	2.599	3.594	-0.995
$2.46	61.86	100.00	3.000	4.216	-1.216
$2.47	68.67	100.00	3.606	5.196	-1.590
$2.48	100.00	100.00	3.723	5.366	-1.643

Appendix C-III Second Degree Stochastic Dominance Criterion for the November Sample Period when Test Weight is greater than 56 and less than or equal to 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	AREA = A	AREA = B	A-B
42.04	0.00	0.00	0	0	0
42.09	0.00	1.33	0	0	0
42.10	1.19	1.33	0.000	0.038	-0.038
42.26	1.19	1.33	0.195	0.574	-0.380
42.27	1.19	1.87	0.204	0.599	-0.396
42.28	1.39	1.87	0.214	0.634	-0.420
42.33	1.39	1.87	0.289	0.841	-0.552
42.34	1.39	4.14	0.303	0.880	-0.577
42.35	1.49	8.75	0.317	0.921	-0.605
42.36	5.15	15.95	0.332	1.009	-0.677
42.37	6.54	21.99	0.370	1.129	-0.758
42.38	25.16	21.99	0.452	1.403	-0.951
42.39	25.16	22.26	0.704	1.623	-0.920
42.40	25.26	30.72	0.955	1.846	-0.891
42.41	36.54	31.80	1.208	2.153	-0.945
42.42	36.95	32.07	1.566	2.465	-0.899
42.43	37.05	32.07	1.943	2.792	-0.849
42.44	37.05	41.42	2.313	3.113	-0.799
42.45	49.73	67.12	2.684	3.527	-0.843
42.46	60.07	67.39	3.101	4.198	-1.017
42.47	60.17	100.00	3.770	4.858	-1.089
42.48	100.00	100.00	3.872	5.028	-1.156

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	AREA = A	AREA = B	A-B
42.04	0.00	0.00	0	0	0
42.09	0.00	1.33	0	0	0
42.10	2.38	1.33	0.000	0.038	-0.038
42.26	2.38	1.33	0.389	0.574	-0.185
42.27	2.38	1.87	0.407	0.599	-0.192
42.28	2.99	1.87	0.428	0.634	-0.206
42.33	2.99	1.87	0.589	0.841	-0.253
42.34	2.99	4.14	0.618	0.880	-0.261
42.35	3.38	8.75	0.648	0.921	-0.273
42.36	7.69	15.95	0.681	1.009	-0.328
42.37	10.68	21.99	0.739	1.129	-0.389
42.38	19.15	21.99	0.873	1.403	-0.531
42.39	19.15	22.26	1.064	1.623	-0.559
42.40	19.46	30.72	1.256	1.846	-0.590
42.41	27.49	31.80	1.458	2.153	-0.703
42.42	28.72	32.07	1.720	2.465	-0.745
42.43	29.34	32.07	2.013	2.792	-0.779
42.44	29.34	41.42	2.306	3.113	-0.807
42.45	40.07	67.12	2.599	3.527	-0.927
42.46	61.86	67.39	3.000	4.198	-1.198
42.47	60.67	100.00	3.686	4.858	-1.252
42.48	100.00	100.00	3.723	5.028	-1.305

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	AREA = A	AREA = B	A-B
42.04	2.38	0.00	0	0	0
42.09	2.38	1.33	0.018	0.000	0.018
42.10	2.38	1.33	0.021	0.038	-0.049
42.26	2.99	1.33	0.411	0.574	-0.164
42.27	2.99	1.87	0.433	0.599	-0.166
42.28	2.99	1.87	0.460	0.634	-0.174
42.33	3.38	1.87	0.620	0.841	-0.221
42.34	7.69	4.14	0.653	0.880	-0.227
42.35	10.68	8.75	0.738	0.921	-0.192
42.36	19.15	15.95	0.837	1.009	-0.172
42.37	19.15	21.99	0.980	1.129	-0.148
42.38	19.46	21.99	1.220	1.403	-0.184
42.39	27.49	22.26	1.414	1.623	-0.209
42.40	28.72	30.72	1.669	1.846	-0.177
42.41	29.03	31.80	1.976	2.153	-0.177
42.42	29.03	32.07	2.261	2.465	-0.204
42.43	40.07	32.07	2.557	2.792	-0.235
42.44	61.86	41.42	2.958	3.113	-0.155
42.45	62.17	67.12	3.576	3.527	0.049
42.46	100.00	67.39	4.198	4.198	0.000
42.47	100.00	100.00	5.178	4.858	0.320
42.48	100.00	100.00	5.348	5.028	0.320

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prop. of No Trt	Prop. of Malathion	AREA = A	AREA = B	A-B
$2.27	0.00	0.00	0	0	0
$2.28	0.00	0.00	0	0	0
$2.29	0.65	1.30	0	0	0
$2.30	4.14	1.30	0.001	0.002	-0.001
$2.36	4.14	1.30	0.285	0.091	0.194
$2.37	4.14	1.30	0.326	0.104	0.222
$2.38	15.27	6.41	0.368	0.117	0.250
$2.39	17.43	9.01	0.520	0.181	0.339
$2.40	21.57	11.26	0.695	0.271	0.423
$2.41	29.62	17.09	0.910	0.384	0.526
$2.42	29.68	17.26	1.133	0.512	0.620
$2.43	32.07	20.55	1.504	0.728	0.776
$2.44	32.07	20.55	1.824	0.933	0.891
$2.45	35.68	21.85	2.145	1.139	1.006
$2.46	35.85	22.37	2.502	1.357	1.144
$2.47	37.48	26.61	2.853	1.577	1.276
$2.48	100.00	100.00	2.917	1.622	1.295

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prop. of No Trt	Prop. of Methyl	AREA = A	AREA = B	A-B
$2.27	0.00	1.30	0	0	0
$2.28	0.00	2.25	0.000	0.010	-0.010
$2.29	0.65	2.25	0.000	0.037	-0.037
$2.30	4.14	2.25	0.001	0.041	-0.040
$2.36	4.14	6.41	0.285	0.195	0.090
$2.37	4.14	9.01	0.326	0.260	0.067
$2.38	15.27	11.26	0.368	0.350	0.018
$2.39	17.43	17.09	0.520	0.462	0.058
$2.40	21.57	17.26	0.695	0.633	0.062
$2.41	29.62	20.55	0.910	0.806	0.105
$2.42	29.68	20.55	1.133	0.960	0.173
$2.43	32.07	21.85	1.504	1.217	0.287
$2.44	32.07	22.37	1.824	1.435	0.389
$2.45	35.68	25.61	2.145	1.659	0.486
$2.46	35.85	100.00	2.502	1.925	0.577
$2.47	37.48	100.00	2.853	2.905	-0.052
$2.48	100.00	100.00	2.917	3.075	-0.158

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prop. of No Trt.	Prop. of Fumigant	AREA = A	AREA = B	A-B
$2.27	0.00	0.00	0	0	0
$2.28	0.00	1.82	0	0	0
$2.29	0.65	2.15	0.000	0.022	-0.022
$2.30	4.14	2.15	0.001	0.026	-0.025
$2.36	4.14	2.15	0.285	0.173	0.112
$2.37	4.14	4.97	0.326	0.195	0.132
$2.38	15.27	7.70	0.368	0.245	0.123
$2.39	17.43	9.85	0.520	0.321	0.199
$2.40	21.57	16.24	0.695	0.420	0.275
$2.41	29.62	16.39	0.910	0.582	0.328
$2.42	29.68	19.73	1.133	0.705	0.427
$2.43	32.07	19.73	1.504	0.952	0.552
$2.44	32.07	20.36	1.824	1.149	0.675
$2.45	35.68	20.82	2.145	1.353	0.792
$2.46	35.85	25.22	2.502	1.561	0.941
$2.47	37.48	100.00	2.853	1.808	1.045
$2.48	100.00	100.00	2.917	1.978	0.939

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prop. of Malathion	Prop. of Fumigant	AREA = A	AREA = B	A-B
$2.27	0.00	0.00	0	0	0
$2.28	0.00	1.82	0	0	0
$2.29	1.30	2.15	0.000	0.022	-0.022
$2.30	1.30	2.15	0.002	0.026	-0.024
$2.36	1.30	2.15	0.091	0.173	-0.082
$2.37	1.30	4.97	0.104	0.195	-0.091
$2.38	6.41	7.70	0.117	0.245	-0.127
$2.39	9.01	9.85	0.181	0.321	-0.140
$2.40	11.26	16.24	0.271	0.420	-0.149
$2.41	17.09	16.39	0.384	0.582	-0.198
$2.42	17.26	19.73	0.512	0.705	-0.193
$2.43	20.55	19.73	0.728	0.952	-0.224
$2.44	20.55	20.36	0.933	1.149	-0.216
$2.45	21.85	20.82	1.139	1.353	-0.214
$2.46	22.37	25.22	1.357	1.561	-0.204
$2.47	26.61	100.00	1.577	1.808	-0.231
$2.48	100.00	100.00	1.622	1.978	-0.356

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prop. of Methyl	Prop. of Fumigant	AREA = A	AREA = B	A-B
$2.27	1.30	0.00	0	0	0
$2.28	2.25	1.82	0.010	0.000	0.010
$2.29	2.25	2.15	0.037	0.022	0.015
$2.30	2.25	2.15	0.041	0.026	0.015
$2.36	6.41	2.15	0.195	0.173	0.022
$2.37	9.01	4.97	0.260	0.195	0.065
$2.38	11.26	7.70	0.350	0.245	0.105
$2.39	17.09	9.85	0.462	0.321	0.141
$2.40	17.26	16.24	0.633	0.420	0.213
$2.41	20.55	16.39	0.806	0.582	0.223
$2.42	20.55	19.73	0.960	0.705	0.255
$2.43	21.85	19.73	1.217	0.952	0.265
$2.44	22.37	20.36	1.435	1.149	0.286
$2.45	26.61	20.82	1.659	1.353	0.306
$2.46	100.00	25.22	1.925	1.561	0.364
$2.47	100.00	100.00	2.905	1.808	1.097
$2.48	100.00	100.00	3.075	1.978	1.097

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prop. of Malathion	Prop. of Methyl	AREA = A	AREA = B	A-B
$2.27	0.00	1.30	0	0	0
$2.28	0.00	2.25	0.000	0.010	-0.010
$2.29	1.30	2.25	0.000	0.037	-0.037
$2.30	1.30	2.25	0.002	0.041	-0.039
$2.36	1.30	6.41	0.091	0.195	-0.104
$2.37	1.30	9.01	0.104	0.260	-0.155
$2.38	6.41	11.26	0.117	0.350	-0.232
$2.39	9.01	17.09	0.181	0.462	-0.281
$2.40	11.26	17.26	0.271	0.633	-0.362
$2.41	17.09	20.55	0.384	0.806	-0.422
$2.42	17.26	20.55	0.512	0.960	-0.448
$2.43	20.55	21.85	0.728	1.217	-0.489
$2.44	20.55	22.37	0.933	1.435	-0.502
$2.45	21.85	26.61	1.139	1.659	-0.520
$2.46	22.37	100.00	1.357	1.925	-0.568
$2.47	26.61	100.00	1.577	2.905	-1.328
$2.48	100.00	100.00	1.622	3.075	-1.453

Appendix C-13: Second Degree Stochastic Dominance Criterion for the November Sample Period when Moisture Content is Less Than or Equal to 10

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA + 0	Mala AREA + 0	A-B
42.39	0.00	0.00	0	0	0
42.40	0.00	0.00	0	0	0
42.41	0.26	0.77	0	0	0
42.42	3.92	5.62	0.003	0.000	-0.005
42.43	4.69	7.94	0.042	0.064	-0.022
42.44	4.95	8.71	0.089	0.143	-0.055
42.45	8.87	14.34	0.138	0.230	-0.092
42.46	9.90	17.43	0.227	0.374	-0.147
42.47	18.16	18.20	0.324	0.545	-0.221
42.48	100.00	100.00	0.341	0.576	-0.234

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA + 0	Methyl AREA + 0	A-B
42.39	0.00	0.77	0	0	0
42.40	0.00	5.62	0.000	0.000	-0.000
42.41	0.26	7.94	0.000	0.064	-0.064
42.42	3.92	8.71	0.003	0.143	-0.141
42.43	4.69	14.34	0.042	0.230	-0.189
42.44	4.95	17.43	0.089	0.374	-0.285
42.45	8.87	18.20	0.138	0.548	-0.410
42.46	9.90	100.00	0.227	0.730	-0.503
42.47	18.16	100.00	0.324	1.710	-1.386
42.48	100.00	100.00	0.341	1.860	-1.519

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. AREA + 0	Fumigant AREA + 0	A-B
42.39	0.00	0.00	0	0	0
42.40	0.00	0.68	0	0	0
42.41	0.26	5.65	0.000	0.007	-0.007
42.42	3.92	8.00	0.003	0.063	-0.061
42.43	4.69	8.68	0.042	0.143	-0.101
42.44	4.95	15.32	0.089	0.230	-0.141
42.45	8.87	18.02	0.138	0.383	-0.245
42.46	9.90	18.78	0.227	0.563	-0.337
42.47	18.16	100.00	0.324	0.747	-0.423
42.48	100.00	100.00	0.341	0.917	-0.576

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	Mala AREA + 0	Fumigant AREA + 0	A-B
42.39	0.00	0.00	0	0	0
42.40	0.00	0.68	0	0	0
42.41	0.77	5.65	0.000	0.007	-0.007
42.42	5.62	8.00	0.000	0.063	-0.056
42.43	7.94	8.68	0.064	0.143	-0.079
42.44	8.71	15.32	0.143	0.230	-0.087
42.45	14.34	18.02	0.230	0.383	-0.153
42.46	17.43	18.78	0.374	0.563	-0.190
42.47	18.20	100.00	0.545	0.747	-0.202
42.48	100.00	100.00	0.576	0.917	-0.341

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl AREA + 0	Fumigant AREA + 0	A-B
42.39	0.77	0.00	0	0	0
42.40	5.62	0.68	0.000	0.000	0.000
42.41	7.94	5.65	0.064	0.007	0.057
42.42	8.71	8.00	0.143	0.063	0.080
42.43	14.34	8.68	0.230	0.143	0.087
42.44	17.43	15.32	0.374	0.230	0.144
42.45	18.20	18.02	0.548	0.383	0.165
42.46	100.00	18.78	0.730	0.563	0.167
42.47	100.00	100.00	1.710	0.747	0.963
42.48	100.00	100.00	1.860	0.917	0.943

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA + 0	Methyl AREA + 0	A-B
42.39	0.00	0.77	0	0	0
42.40	0.00	5.62	0.000	0.000	-0.000
42.41	0.77	7.94	0.000	0.064	-0.064
42.42	5.62	8.71	0.000	0.143	-0.136
42.43	7.94	14.34	0.064	0.230	-0.167
42.44	8.71	17.43	0.143	0.374	-0.230
42.45	14.34	18.20	0.230	0.548	-0.318
42.46	17.43	100.00	0.374	0.730	-0.356
42.47	18.20	100.00	0.545	1.710	-1.165
42.48	100.00	100.00	0.576	1.860	-1.345

Appendix C-14: Second Degree Stochastic Dominance Criterion for the November Sample Period when Moisture Content is greater than 10 and less than or equal to 11

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$2.26	0.00	0.00	0	0	0
$2.27	0.00	0.00	0	0	0
$2.28	0.06	0.18	0	0	0
$2.30	0.06	0.18	0.001	0.004	-0.003
$2.31	0.06	0.18	0.002	0.006	-0.004
$2.32	0.66	1.37	0.002	0.007	-0.005
$2.33	5.02	2.56	0.011	0.024	-0.014
$2.34	5.02	2.56	0.061	0.050	0.011
$2.35	9.50	4.10	0.111	0.076	0.035
$2.36	12.48	7.67	0.206	0.117	0.089
$2.37	17.50	10.23	0.300	0.174	0.125
$2.38	31.99	15.59	0.457	0.266	0.191
$2.39	31.99	15.59	0.889	0.477	0.412
$2.40	31.99	15.59	1.209	0.633	0.576
$2.41	35.02	20.82	1.529	0.789	0.740
$2.42	38.35	25.45	1.879	0.997	0.882
$2.43	45.39	31.38	2.263	1.251	1.011
$2.44	47.89	35.49	2.716	1.565	1.151
$2.45	55.16	42.13	3.195	1.920	1.275
$2.46	59.20	50.78	3.747	2.341	1.406
$2.47	60.49	54.66	4.327	2.839	1.488
$2.48	100.00	100.00	4.430	2.932	1.498

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$2.26	0.00	0.18	0	0	0
$2.27	0.00	0.18	0	0.001	-0.001
$2.28	0.06	0.18	0.000	0.003	-0.003
$2.30	0.06	1.37	0.001	0.007	-0.006
$2.31	0.06	2.56	0.002	0.021	-0.019
$2.32	0.66	2.56	0.002	0.040	-0.038
$2.33	5.02	4.10	0.011	0.072	-0.061
$2.34	5.02	7.67	0.061	0.113	-0.052
$2.35	9.50	10.23	0.111	0.190	-0.079
$2.36	12.48	15.59	0.206	0.292	-0.086
$2.37	17.50	15.59	0.300	0.409	-0.109
$2.38	31.99	15.59	0.457	0.549	-0.092
$2.39	31.99	20.82	0.889	0.760	0.129
$2.40	31.99	25.45	1.209	0.968	0.241
$2.41	35.02	31.38	1.529	1.223	0.306
$2.42	38.35	35.49	1.879	1.536	0.343
$2.43	45.39	42.13	2.263	1.891	0.371
$2.44	47.89	50.78	2.716	2.313	0.404
$2.45	55.16	54.66	3.195	2.820	0.375
$2.46	59.20	100.00	3.747	3.367	0.380
$2.47	60.49	100.00	4.327	4.347	-0.020
$2.48	100.00	100.00	4.430	4.517	-0.087

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$2.26	0.00	0.18	0	0	0
$2.27	0.00	0.18	0	0.001	-0.001
$2.28	0.18	0.18	0.000	0.003	-0.003
$2.30	0.18	1.37	0.004	0.007	-0.003
$2.31	0.18	2.56	0.006	0.021	-0.015
$2.32	1.37	2.56	0.007	0.040	-0.033
$2.33	2.56	4.10	0.024	0.072	-0.048
$2.34	2.56	7.67	0.050	0.113	-0.063
$2.35	4.10	10.23	0.076	0.190	-0.114
$2.36	7.67	15.59	0.117	0.292	-0.175
$2.37	10.23	15.59	0.174	0.409	-0.235
$2.38	15.59	15.59	0.266	0.549	-0.283
$2.39	15.59	20.82	0.477	0.760	-0.283
$2.40	15.59	25.45	0.633	0.968	-0.335
$2.41	20.82	31.38	0.789	1.223	-0.434
$2.42	25.45	35.49	0.997	1.536	-0.540
$2.43	31.38	42.13	1.251	1.891	-0.640
$2.44	35.49	50.78	1.565	2.313	-0.747
$2.45	42.13	54.66	1.920	2.820	-0.900
$2.46	50.78	100.00	2.341	3.367	-1.026
$2.47	54.66	100.00	2.839	4.347	-1.508
$2.48	100.00	100.00	2.932	4.517	-1.585

Appendix C-14: Second Degree Stochastic Dominance Criterion for the Nonpesticide Sample Period when Moisture Content is greater than 10 and less than or equal to 11

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prop. of No Trt.	Prop. of Fumigant	AREA = A	AREA = B	A-B
¢2.26	0.00	0.00	0	0	0
¢2.27	0.00	0.16	0	0	0
¢2.28	0.06	0.16	0.000	0.001	-0.001
¢2.30	0.06	0.16	0.001	0.005	-0.004
¢2.31	0.06	1.63	0.002	0.007	-0.005
¢2.32	0.66	2.25	0.002	0.020	-0.018
¢2.33	5.02	2.25	0.031	0.049	-0.038
¢2.34	5.02	2.98	0.061	0.071	-0.010
¢2.35	9.50	6.73	0.111	0.101	0.010
¢2.36	12.48	8.98	0.206	0.168	0.038
¢2.37	17.50	12.11	0.300	0.235	0.064
¢2.38	31.99	12.11	0.457	0.344	0.113
¢2.39	31.99	12.11	0.689	0.508	0.181
¢2.40	31.99	18.25	1.209	0.629	0.580
¢2.41	35.82	22.93	1.529	0.812	0.717
¢2.42	38.35	28.44	1.879	1.041	0.838
¢2.43	45.39	33.07	2.263	1.325	0.937
¢2.44	47.89	39.20	2.716	1.656	1.060
¢2.45	55.16	48.09	3.195	2.048	1.147
¢2.46	59.20	51.49	3.747	2.529	1.218
¢2.47	68.49	100.00	4.327	3.033	1.294
¢2.48	100.00	100.00	5.430	3.203	1.226

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prop. of Mala	Prop. of Fumigant	AREA = A	AREA = B	A-B
¢2.26	0.00	0.00	0	0	0
¢2.27	0.00	0.16	0	0	0
¢2.28	0.10	0.16	0.000	0.001	-0.001
¢2.30	0.10	0.16	0.004	0.005	-0.001
¢2.31	0.10	1.63	0.006	0.007	-0.001
¢2.32	1.37	2.25	0.007	0.020	-0.013
¢2.33	2.56	2.25	0.024	0.049	-0.024
¢2.34	2.56	2.98	0.050	0.071	-0.021
¢2.35	4.10	6.73	0.076	0.101	-0.025
¢2.36	7.67	8.98	0.117	0.168	-0.051
¢2.37	10.23	12.11	0.174	0.235	-0.061
¢2.38	15.59	12.11	0.266	0.344	-0.078
¢2.39	15.59	12.11	0.477	0.508	-0.031
¢2.40	15.59	18.25	0.633	0.629	0.004
¢2.41	20.82	22.93	0.789	0.812	-0.023
¢2.42	25.45	28.44	0.997	1.041	-0.044
¢2.43	31.38	33.07	1.251	1.325	-0.076
¢2.44	35.49	39.20	1.565	1.656	-0.091
¢2.45	42.13	48.09	1.920	2.048	-0.128
¢2.46	50.78	51.49	2.341	2.529	-0.188
¢2.47	54.66	100.00	2.839	3.033	-0.195
¢2.48	100.00	100.00	2.932	3.203	-0.272

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prop. of Methyl	Prop. of Fumigant	AREA = A	AREA = B	A-B
¢2.26	0.10	0.00	0	0	0
¢2.27	0.10	0.16	0.001	0.000	0.001
¢2.28	0.10	0.16	0.001	0.001	0.002
¢2.30	1.37	0.16	0.007	0.005	0.002
¢2.31	2.56	1.63	0.021	0.007	0.014
¢2.32	2.56	2.25	0.040	0.020	0.020
¢2.33	4.10	2.25	0.072	0.049	0.024
¢2.34	7.67	2.98	0.113	0.071	0.042
¢2.35	10.23	6.73	0.190	0.101	0.089
¢2.36	15.59	8.98	0.292	0.168	0.124
¢2.37	15.59	12.11	0.499	0.235	0.174
¢2.38	15.59	12.11	0.549	0.344	0.205
¢2.39	20.82	12.11	0.760	0.508	0.252
¢2.40	25.45	18.25	0.968	0.629	0.339
¢2.41	31.38	22.93	1.223	0.812	0.411
¢2.42	35.49	28.44	1.536	1.041	0.495
¢2.43	42.13	33.07	1.891	1.325	0.566
¢2.44	50.78	39.20	2.313	1.656	0.657
¢2.45	54.66	48.09	2.820	2.048	0.772
¢2.46	100.00	51.49	3.367	2.529	0.838
¢2.47	100.00	100.00	4.347	3.033	1.313
¢2.48	100.00	100.00	4.517	3.203	1.313

Appendix C-15: Second Degree Stochastic Dominance Criterion for the November Sample Period When Moisture Content is greater than 11 and less than or equal to 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of %o Trt	Prob. of %ala	%o Trt. AREA = A	%ala AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	1.40	1.68	0	0	0
$2.23	1.40	1.68	0.495	0.594	-0.099
$2.24	1.40	1.68	0.509	0.611	-0.102
$2.25	6.64	3.11	0.519	0.623	-0.104
$2.26	6.72	3.34	0.579	0.651	-0.072
$2.33	6.72	3.34	1.073	0.897	0.176
$2.34	6.72	3.34	1.123	0.922	0.201
$2.35	11.96	4.77	1.207	0.964	0.243
$2.36	11.96	4.77	1.327	1.012	0.315
$2.37	12.84	5.00	1.447	1.059	0.387
$2.38	13.44	6.69	1.567	1.109	0.458
$2.39	16.24	10.05	1.701	1.176	0.525
$2.40	23.07	14.81	1.864	1.277	0.587
$2.41	36.77	23.38	2.094	1.425	0.670
$2.42	36.85	23.61	2.462	1.659	0.804
$2.43	36.93	35.39	2.867	1.918	0.949
$2.44	43.76	36.33	3.200	2.237	0.963
$2.45	51.82	41.31	3.637	2.600	1.037
$2.46	61.61	53.41	4.148	3.013	1.135
$2.47	61.69	56.34	4.751	3.537	1.215
$2.48	100.00	100.00	4.856	3.632	1.224

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of %o Trt	Prob. of Methyl	%o Trt. AREA = A	Methyl AREA = B	A-B
$1.86	0.00	1.68	0	0	0
$1.87	0.00	1.68	0.000	0.013	-0.013
$1.88	1.40	1.68	0.000	0.028	-0.028
$2.23	1.40	3.11	0.495	0.622	-0.127
$2.24	1.40	3.34	0.509	0.653	-0.144
$2.25	6.64	3.34	0.519	0.678	-0.158
$2.26	6.72	3.34	0.579	0.708	-0.129
$2.33	6.72	4.77	1.073	0.953	0.120
$2.34	6.72	4.77	1.123	0.989	0.134
$2.35	11.96	5.00	1.207	1.049	0.159
$2.36	11.96	6.69	1.327	1.099	0.228
$2.37	12.84	10.05	1.447	1.166	0.281
$2.38	13.44	14.81	1.567	1.266	0.301
$2.39	16.24	23.38	1.701	1.414	0.287
$2.40	23.07	23.61	1.864	1.648	0.216
$2.41	36.77	23.84	2.094	1.884	0.210
$2.42	36.85	36.33	2.462	2.122	0.340
$2.43	36.93	41.31	2.867	2.522	0.345
$2.44	43.76	42.74	3.200	2.894	0.306
$2.45	51.82	53.64	3.637	3.321	0.316
$2.46	61.61	100.00	4.148	3.858	0.290
$2.47	61.69	100.00	4.751	4.838	-0.086
$2.48	100.00	100.00	4.856	5.008	-0.151

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of %ala	Prob. of Methyl	%ala AREA = A	Methyl AREA = B	A-B
$1.86	0.00	1.68	0	0	0
$1.87	0.00	1.68	0.000	0.013	-0.013
$1.88	1.68	1.68	0.000	0.028	-0.028
$2.23	1.68	3.11	0.594	0.622	-0.028
$2.24	1.68	3.34	0.611	0.653	-0.042
$2.25	3.11	3.34	0.623	0.678	-0.055
$2.26	3.34	3.34	0.651	0.708	-0.057
$2.33	3.34	4.77	0.897	0.953	-0.056
$2.34	3.34	4.77	0.922	0.989	-0.067
$2.35	4.77	5.00	0.964	1.049	-0.085
$2.36	4.77	6.69	1.012	1.099	-0.087
$2.37	5.00	10.05	1.059	1.166	-0.106
$2.38	6.69	14.81	1.109	1.266	-0.157
$2.39	10.05	23.38	1.176	1.414	-0.238
$2.40	14.81	23.61	1.277	1.648	-0.371
$2.41	23.38	23.84	1.425	1.884	-0.459
$2.42	23.61	36.33	1.659	2.122	-0.464
$2.43	35.39	41.31	1.918	2.522	-0.604
$2.44	36.33	42.74	2.237	2.894	-0.657
$2.45	41.31	53.64	2.600	3.321	-0.721
$2.46	53.41	100.00	3.013	3.858	-0.845
$2.47	56.34	100.00	3.537	4.838	-1.301
$2.48	100.00	100.00	3.632	5.008	-1.375

Appendix C-15: Second Degree Stochastic Dominance Criterion for the November Sample Period when Moisture Content is greater than 11 and less than or equal to 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. Fumigant AREA + A	AREA + B	A-B
41.86	0.00	0.00	0	0	0
41.87	0.00	1.76	0	0	0
41.88	1.40	1.76	0.000	0.016	-0.016
42.23	1.40	1.76	0.495	0.638	-0.143
42.24	1.40	2.26	0.509	0.656	-0.147
42.25	6.64	2.47	0.519	0.673	-0.153
42.26	6.72	2.47	0.579	0.695	-0.116
42.33	6.72	2.47	1.073	0.876	0.197
42.34	6.72	2.97	1.123	0.895	0.228
42.35	11.96	2.97	1.207	0.932	0.275
42.36	11.96	3.10	1.327	0.962	0.365
42.37	12.84	4.94	1.447	0.993	0.453
42.38	13.44	8.47	1.567	1.043	0.524
42.39	16.24	13.38	1.781	1.128	0.574
42.40	23.87	21.17	1.864	1.261	0.602
42.41	36.77	21.38	2.094	1.473	0.621
42.42	36.85	21.59	2.462	1.687	0.775
42.43	36.93	37.20	2.867	1.924	0.943
42.44	42.76	41.10	3.200	2.259	0.941
42.45	51.82	53.73	3.637	2.670	0.967
42.46	61.61	53.94	4.148	3.207	0.940
42.47	61.69	100.00	4.751	3.736	1.015
42.48	100.00	100.00	4.656	3.906	0.950

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	Mala Fumigant AREA + A	AREA + B	A-B
41.86	0.00	0.00	0	0	0
41.87	0.00	1.76	0	0	0
41.88	1.68	1.76	0.000	0.016	-0.016
42.23	1.68	1.76	0.594	0.638	-0.044
42.24	1.68	2.26	0.611	0.656	-0.045
42.25	3.11	2.47	0.623	0.673	-0.049
42.26	3.34	2.47	0.651	0.695	-0.044
42.33	3.34	2.47	0.897	0.876	0.021
42.34	3.34	2.97	0.922	0.895	0.027
42.35	4.77	2.97	0.964	0.932	0.032
42.36	4.77	3.10	1.012	0.962	0.050
42.37	5.00	4.94	1.059	0.993	0.066
42.38	6.69	8.47	1.109	1.043	0.066
42.39	10.05	13.38	1.176	1.128	0.049
42.40	14.01	21.17	1.277	1.261	0.015
42.41	21.38	21.38	1.425	1.473	-0.048
42.42	23.61	21.59	1.659	1.687	-0.028
42.43	35.39	37.20	1.918	1.924	-0.006
42.44	36.33	41.10	2.237	2.259	-0.022
42.45	42.31	53.73	2.604	2.670	-0.070
42.46	53.41	53.94	3.013	3.207	-0.194
42.47	56.34	100.00	3.537	3.736	-0.200
42.48	100.00	100.00	3.632	3.906	-0.274

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl Fumigant AREA + A	AREA + B	A-B
41.86	1.68	0.00	0	0	0
41.87	1.68	1.76	0.013	0.000	0.013
41.88	1.68	1.76	0.028	0.016	0.012
42.23	3.11	1.76	0.622	0.638	-0.016
42.24	3.34	2.26	0.653	0.656	-0.003
42.25	3.34	2.47	0.678	0.673	0.005
42.26	3.34	2.47	0.708	0.695	0.013
42.33	4.77	2.47	0.953	0.876	0.077
42.34	4.77	2.97	0.989	0.895	0.094
42.35	5.00	2.97	1.049	0.932	0.117
42.36	6.69	3.10	1.099	0.962	0.137
42.37	10.05	4.94	1.166	0.993	0.172
42.38	14.01	8.47	1.266	1.043	0.223
42.39	23.38	13.38	1.414	1.128	0.287
42.40	23.61	21.17	1.648	1.261	0.387
42.41	23.84	21.38	1.884	1.473	0.411
42.42	36.33	21.59	2.122	1.687	0.436
42.43	41.31	37.20	2.522	1.924	0.598
42.44	42.74	41.10	2.894	2.259	0.635
42.45	53.64	53.73	3.321	2.670	0.651
42.46	100.00	53.94	3.858	3.207	0.650
42.47	100.00	100.00	4.838	3.736	1.102
42.48	100.00	100.00	5.008	3.906	1.102

Appendix C-16: Second Degree Stochastic Dominance Criterion for the November Sample Period When Moisture Content is greater than 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	0.00	0	0	0
$2.10	3.57	7.14	0	0	0
$2.26	3.57	7.14	0.584	1.168	-0.584
$2.27	3.57	7.14	0.611	1.221	-0.610
$2.28	3.94	8.24	0.643	1.286	-0.643
$2.29	7.51	15.38	0.695	1.395	-0.700
$2.30	12.75	15.38	0.708	1.421	-0.713
$2.34	12.75	15.38	1.327	2.167	-0.841
$2.35	12.75	15.38	1.422	2.283	-0.860
$2.36	17.99	18.24	1.582	2.475	-0.893
$2.37	17.99	18.24	1.761	2.657	-0.896
$2.38	40.35	38.86	1.896	2.794	-0.898
$2.39	40.72	39.96	2.401	3.280	-0.879
$2.40	40.72	39.96	2.706	3.580	-0.873
$2.41	46.33	42.49	3.215	4.079	-0.864
$2.42	46.33	42.49	3.678	4.504	-0.826
$2.43	47.79	46.88	4.142	4.929	-0.787
$2.44	54.13	51.61	4.667	5.445	-0.777
$2.45	68.04	64.76	5.155	5.909	-0.754
$2.46	69.14	68.86	5.835	6.557	-0.722
$2.47	73.04	76.30	6.513	7.224	-0.711
$2.48	100.00	100.00	6.637	7.353	-0.717

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$2.08	0.00	7.14	0	0	0
$2.09	0.00	7.14	0.000	0.054	-0.054
$2.10	3.57	7.14	0.000	0.118	-0.118
$2.26	3.57	8.24	0.584	1.285	-0.701
$2.27	3.57	15.38	0.611	1.347	-0.736
$2.28	3.94	16.81	0.643	1.485	-0.842
$2.29	7.51	16.81	0.695	1.709	-1.014
$2.30	12.75	16.81	0.708	1.738	-1.029
$2.34	12.75	18.24	1.327	2.553	-1.226
$2.35	12.75	18.24	1.422	2.690	-1.268
$2.36	17.99	38.86	1.582	2.918	-1.336
$2.37	17.99	39.96	1.761	3.306	-1.545
$2.38	40.35	39.96	1.896	3.686	-1.710
$2.39	40.72	42.49	2.401	4.105	-1.705
$2.40	40.72	42.49	2.706	4.424	-1.718
$2.41	46.33	46.88	3.215	4.955	-1.740
$2.42	46.33	51.61	3.678	5.424	-1.746
$2.43	47.79	64.76	4.142	5.940	-1.798
$2.44	54.13	68.86	4.667	6.653	-1.985
$2.45	68.04	76.30	5.155	7.265	-2.111
$2.46	69.14	100.00	5.835	8.028	-2.193
$2.47	73.04	100.00	6.513	9.008	-2.496
$2.48	100.00	100.00	6.637	9.178	-2.541

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$2.08	0.00	7.14	0	0	0
$2.09	0.00	7.14	0.000	0.054	-0.054
$2.10	7.14	7.14	0.000	0.118	-0.118
$2.26	7.14	8.24	1.168	1.285	-0.117
$2.27	7.14	15.38	1.221	1.347	-0.126
$2.28	8.24	16.81	1.286	1.485	-0.200
$2.29	15.38	16.81	1.395	1.709	-0.314
$2.30	15.38	16.81	1.421	1.738	-0.316
$2.34	15.38	18.24	2.167	2.553	-0.386
$2.35	15.38	18.24	2.283	2.690	-0.407
$2.36	18.24	38.86	2.475	2.918	-0.443
$2.37	18.24	39.96	2.657	3.306	-0.649
$2.38	38.86	39.96	2.794	3.686	-0.812
$2.39	39.96	42.49	3.280	4.105	-0.826
$2.40	39.96	42.49	3.580	4.424	-0.845
$2.41	42.49	46.88	4.079	4.955	-0.876
$2.42	42.49	51.61	4.504	5.424	-0.920
$2.43	46.88	64.76	4.929	5.940	-1.011
$2.44	51.61	68.86	5.445	6.653	-1.208
$2.45	64.76	76.30	5.909	7.265	-1.356
$2.46	68.86	100.00	6.557	8.028	-1.471
$2.47	76.30	100.00	7.224	9.008	-1.784
$2.48	100.00	100.00	7.353	9.178	-1.825

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. Fumigant AREA = A	AREA = B	A-B
42.08	0.00	0.00	0	0	0
42.09	0.00	10.00	0	0	0
42.10	3.57	10.00	0.000	0.890	-0.890
42.26	3.57	10.00	0.504	1.725	-1.141
42.27	3.57	10.96	0.611	1.800	-1.189
42.28	3.94	20.96	0.643	1.899	-1.256
42.29	7.51	21.46	0.695	2.177	-1.482
42.30	12.75	21.46	0.700	2.214	-1.506
42.34	12.75	21.46	1.327	3.255	-1.928
42.35	12.75	21.96	1.422	3.416	-1.994
42.36	17.99	21.96	1.582	3.690	-2.109
42.37	17.99	43.92	1.761	3.910	-2.148
42.38	40.35	44.88	1.896	4.239	-2.343
42.39	40.72	44.88	2.401	4.800	-2.399
42.40	40.72	46.34	2.706	5.137	-2.431
42.41	46.33	46.34	3.215	5.716	-2.501
42.42	46.33	50.19	3.678	6.179	-2.501
42.43	47.79	53.58	4.142	6.681	-2.540
42.44	54.13	66.00	4.667	7.271	-2.603
42.45	68.84	68.89	5.155	7.865	-2.710
42.46	69.14	79.85	5.835	8.554	-2.719
42.47	73.04	100.00	6.513	9.336	-2.824
42.48	100.00	100.00	6.637	9.506	-2.869

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	Malathion Fumigant AREA = A	AREA = B	A-B
42.08	0.00	0.00	0	0	0
42.09	0.00	10.00	0	0	0
42.10	7.14	10.00	0.000	0.890	-0.890
42.26	7.14	10.00	1.160	1.725	-0.557
42.27	7.14	10.96	1.221	1.800	-0.579
42.28	8.24	20.96	1.286	1.899	-0.613
42.29	15.38	21.46	1.395	2.177	-0.782
42.30	15.38	21.46	1.421	2.214	-0.793
42.34	15.38	21.46	2.167	3.255	-1.087
42.35	15.38	21.96	2.283	3.416	-1.133
42.36	18.24	21.96	2.475	3.690	-1.215
42.37	18.24	43.92	2.657	3.910	-1.252
42.38	38.86	44.88	2.794	4.239	-1.445
42.39	39.96	44.88	3.284	4.800	-1.520
42.40	39.96	46.34	3.588	5.137	-1.557
42.41	42.49	46.34	4.079	5.716	-1.637
42.42	42.49	50.19	4.584	6.179	-1.675
42.43	44.88	53.58	4.929	6.681	-1.752
42.44	51.61	66.00	5.445	7.271	-1.826
42.45	64.76	68.89	5.999	7.865	-1.956
42.46	68.86	79.85	6.557	8.554	-1.997
42.47	76.38	100.00	7.224	9.336	-2.113
42.48	100.00	100.00	7.353	9.506	-2.153

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl Fumigant AREA = A	AREA = B	A-B
42.08	7.14	0.00	0	0	0
42.09	7.14	10.00	0.054	0.000	0.054
42.10	7.14	10.00	0.110	0.890	0.020
42.26	8.24	10.00	1.285	1.725	-0.440
42.27	15.38	10.96	1.347	1.800	-0.453
42.28	16.81	20.96	1.485	1.899	-0.413
42.29	16.81	21.46	1.709	2.177	-0.468
42.30	16.81	21.46	1.738	2.214	-0.476
42.34	18.24	21.46	2.553	3.255	-0.702
42.35	18.24	21.96	2.690	3.416	-0.726
42.36	38.86	21.96	2.918	3.690	-0.772
42.37	39.96	43.92	3.306	3.910	-0.603
42.38	39.96	44.88	3.606	4.239	-0.633
42.39	42.49	44.88	4.105	4.800	-0.695
42.40	42.49	46.34	4.424	5.137	-0.713
42.41	46.88	46.34	4.955	5.716	-0.761
42.42	51.61	50.19	5.424	6.179	-0.755
42.43	64.76	53.58	5.940	6.681	-0.741
42.44	68.86	66.00	6.653	7.271	-0.618
42.45	76.38	68.89	7.265	7.865	-0.600
42.46	100.00	79.85	8.828	8.554	-0.526
42.47	100.00	100.00	9.008	9.336	-0.328
42.48	100.00	100.00	9.178	9.506	-0.328

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	0.44	0.00	0	0	0
$2.08	0.44	0.00	0.089	0.000	0.089
$2.09	0.44	0.00	0.092	0.000	0.092
$2.10	0.88	0.60	0.096	0.000	0.096
$2.23	0.88	0.60	0.214	0.079	0.135
$2.24	0.88	0.60	0.223	0.085	0.137
$2.25	0.67	2.87	0.229	0.090	0.140
$2.26	1.24	2.87	0.238	0.126	0.112
$2.27	1.24	2.87	0.250	0.155	0.096
$2.28	1.57	2.87	0.260	0.176	0.083
$2.29	2.02	3.47	0.279	0.211	0.067
$2.30	2.21	3.47	0.299	0.247	0.053
$2.31	2.21	3.47	0.321	0.281	0.040
$2.32	2.66	6.34	0.338	0.307	0.031
$2.33	2.85	8.61	0.371	0.387	-0.015
$2.34	2.85	8.61	0.400	0.473	-0.073
$2.35	3.56	13.16	0.428	0.559	-0.131
$2.36	4.62	15.43	0.464	0.691	-0.227
$2.37	5.59	18.38	0.510	0.845	-0.335
$2.38	8.38	30.26	0.566	1.028	-0.462
$2.39	9.41	30.26	0.650	1.330	-0.681
$2.40	10.38	33.13	0.744	1.633	-0.889
$2.41	15.17	42.74	0.848	1.964	-1.117
$2.42	17.78	42.74	0.999	2.392	-1.392
$2.43	17.94	46.80	1.195	2.862	-1.667
$2.44	28.83	49.67	1.356	3.283	-1.927
$2.45	35.80	57.09	1.645	3.780	-2.135
$2.46	35.99	62.34	2.003	4.351	-2.348
$2.47	44.76	62.94	2.355	4.962	-2.606
$2.48	100.00	100.00	2.655	5.383	-2.728

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.44	0.00	0.000	0.000	0.000
$2.08	0.44	0.60	0.089	0.000	0.089
$2.09	0.44	0.60	0.092	0.004	0.088
$2.10	0.88	0.60	0.096	0.010	0.086
$2.23	0.88	2.87	0.214	0.090	0.124
$2.24	0.88	2.87	0.223	0.119	0.104
$2.25	0.67	2.87	0.229	0.140	0.089
$2.26	1.24	2.87	0.238	0.176	0.062
$2.27	1.24	3.47	0.250	0.205	0.045
$2.28	1.57	5.74	0.260	0.231	0.029
$2.29	2.02	5.74	0.279	0.301	-0.023
$2.30	2.21	6.34	0.299	0.360	-0.061
$2.31	2.21	8.61	0.321	0.423	-0.102
$2.32	2.66	8.61	0.338	0.488	-0.150
$2.33	2.85	13.16	0.371	0.596	-0.224
$2.34	2.85	15.43	0.400	0.727	-0.327
$2.35	3.56	18.38	0.428	0.881	-0.453
$2.36	4.62	30.26	0.464	1.064	-0.601
$2.37	5.59	30.26	0.510	1.367	-0.857
$2.38	8.38	33.13	0.566	1.670	-1.104
$2.39	9.41	42.74	0.650	2.001	-1.351
$2.40	10.38	42.74	0.744	2.428	-1.685
$2.41	15.17	42.74	0.848	2.856	-2.008
$2.42	17.78	49.67	0.999	3.283	-2.284
$2.43	17.94	57.09	1.195	3.838	-2.635
$2.44	28.83	59.36	1.356	4.343	-2.987
$2.45	35.80	62.34	1.645	4.937	-3.292
$2.46	35.99	100.00	2.003	5.560	-3.558
$2.47	44.76	100.00	2.355	6.540	-4.185
$2.48	100.00	100.00	2.431	6.710	-4.279

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.00	0.00	0.000	0.000	0.000
$2.08	0.00	0.60	0.000	0.000	0.000
$2.09	0.00	0.60	0.000	0.004	-0.004
$2.10	0.60	0.60	0.000	0.010	-0.010
$2.23	0.60	2.87	0.079	0.090	-0.011
$2.24	0.60	2.87	0.085	0.119	-0.033
$2.25	2.87	2.87	0.090	0.140	-0.050
$2.26	2.87	2.87	0.126	0.176	-0.050
$2.27	2.87	3.47	0.155	0.205	-0.050
$2.28	2.87	5.74	0.176	0.231	-0.055
$2.29	3.47	5.74	0.211	0.301	-0.090
$2.30	3.47	6.34	0.247	0.360	-0.113
$2.31	3.47	8.61	0.281	0.423	-0.142
$2.32	6.34	8.61	0.307	0.488	-0.180
$2.33	8.61	13.16	0.387	0.596	-0.209
$2.34	8.61	15.43	0.473	0.727	-0.254
$2.35	13.16	18.38	0.559	0.881	-0.323
$2.36	15.43	30.26	0.691	1.064	-0.374
$2.37	18.38	30.26	0.845	1.367	-0.522
$2.38	30.26	33.13	1.028	1.670	-0.642
$2.39	30.26	42.74	1.330	2.001	-0.671
$2.40	33.13	42.74	1.633	2.428	-0.795
$2.41	42.74	42.74	1.964	2.856	-0.891
$2.42	42.74	49.67	2.392	3.283	-0.891
$2.43	46.80	57.09	2.862	3.830	-0.968
$2.44	49.67	59.36	3.283	4.343	-1.060
$2.45	57.09	62.34	3.780	4.937	-1.157
$2.46	62.34	100.00	4.351	5.560	-1.210
$2.47	62.94	100.00	4.962	6.540	-1.579
$2.48	100.00	100.00	5.383	7.210	-1.827

Appendix C-17: Second Degree Stochastic Dominance Criterion for the January Sample Period when Wheat Quality is Not Specified

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prop. of No Trt.	Prop. of Fumigant	No Trt. Fumigant AREA = A	AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.15	0	0	0
$1.88	0.44	0.15	0.000	0.001	-0.001
$2.00	0.44	0.15	0.009	0.032	0.057
$2.09	0.44	0.74	0.052	0.033	0.059
$2.10	0.88	0.74	0.056	0.040	0.057
$2.23	0.88	0.74	0.214	0.138	0.076
$2.24	0.88	1.12	0.223	0.146	0.077
$2.25	0.67	1.29	0.229	0.154	0.075
$2.26	1.24	1.29	0.238	0.170	0.067
$2.27	1.24	1.62	0.250	0.183	0.067
$2.28	1.57	2.22	0.260	0.195	0.064
$2.29	2.02	2.68	0.279	0.223	0.056
$2.30	2.21	2.68	0.299	0.249	0.050
$2.31	2.21	3.20	0.321	0.275	0.046
$2.32	2.66	3.58	0.338	0.299	0.039
$2.33	2.85	3.58	0.371	0.344	0.027
$2.34	2.85	4.67	0.400	0.380	0.020
$2.35	3.56	5.34	0.428	0.426	0.002
$2.36	4.62	6.65	0.464	0.480	-0.016
$2.37	5.59	9.64	0.510	0.546	-0.036
$2.38	8.38	10.09	0.566	0.643	-0.077
$2.39	9.41	11.48	0.650	0.743	-0.094
$2.40	10.38	16.73	0.744	0.857	-0.114
$2.41	15.17	18.47	0.848	1.025	-0.177
$2.42	17.78	18.63	0.999	1.209	-0.210
$2.43	17.94	29.34	1.195	1.414	-0.219
$2.44	28.83	35.87	1.356	1.678	-0.322
$2.45	35.00	45.83	1.645	2.037	-0.392
$2.46	35.99	45.19	2.003	2.447	-0.445
$2.47	44.76	100.00	2.355	2.930	-0.575
$2.48	100.00	100.00	2.655	3.600	-0.945

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prop. of Malx	Prop. of Fumigant	Malx Fumigant AREA = A	AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.15	0	0	0
$1.88	0.00	0.15	0.000	0.001	-0.001
$2.00	0.00	0.15	0.000	0.032	-0.032
$2.09	0.00	0.74	0.000	0.033	-0.033
$2.10	0.60	0.74	0.000	0.040	-0.040
$2.23	0.60	0.74	0.079	0.138	-0.059
$2.24	0.60	1.12	0.085	0.146	-0.060
$2.25	2.07	1.29	0.090	0.154	-0.064
$2.26	2.07	1.29	0.126	0.170	-0.045
$2.27	2.07	1.62	0.155	0.183	-0.029
$2.28	2.07	2.22	0.176	0.195	-0.019
$2.29	3.47	2.68	0.211	0.223	-0.011
$2.30	3.47	2.68	0.247	0.249	-0.002
$2.31	3.47	3.20	0.281	0.275	0.006
$2.32	6.34	3.58	0.307	0.299	0.008
$2.33	8.61	3.58	0.307	0.344	0.043
$2.34	8.61	4.67	0.473	0.380	0.093
$2.35	13.16	5.34	0.559	0.426	0.133
$2.36	15.43	6.65	0.691	0.480	0.211
$2.37	18.38	9.64	0.845	0.546	0.299
$2.38	30.26	10.09	1.028	0.643	0.385
$2.39	30.26	11.48	1.330	0.743	0.587
$2.40	33.13	16.73	1.633	0.857	0.776
$2.41	42.74	18.47	1.964	1.025	0.940
$2.42	42.74	18.63	2.392	1.209	1.182
$2.43	46.88	29.34	2.862	1.414	1.448
$2.44	49.67	35.87	3.283	1.678	1.605
$2.45	57.89	45.83	3.780	2.037	1.743
$2.46	62.34	45.19	4.351	2.447	1.863
$2.47	62.94	100.00	4.962	2.930	2.031
$2.48	100.00	100.00	5.383	3.600	1.783

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prop. of Methyl	Prop. of Fumigant	Methyl Fumigant AREA = A	AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.15	0.000	0.000	0.000
$1.88	0.00	0.15	0.000	0.001	-0.001
$2.00	0.60	0.15	0.000	0.032	-0.032
$2.09	0.60	0.74	0.004	0.033	-0.028
$2.10	0.60	0.74	0.010	0.040	-0.030
$2.23	2.07	0.74	0.090	0.138	-0.048
$2.24	2.07	1.12	0.119	0.146	-0.027
$2.25	2.07	1.29	0.140	0.154	-0.014
$2.26	2.07	1.29	0.176	0.170	0.006
$2.27	3.47	1.62	0.205	0.183	0.022
$2.28	5.74	2.22	0.231	0.195	0.035
$2.29	5.74	2.68	0.301	0.223	0.079
$2.30	6.34	2.68	0.360	0.249	0.111
$2.31	8.61	3.20	0.423	0.275	0.148
$2.32	8.61	3.58	0.488	0.299	0.189
$2.33	13.16	3.58	0.596	0.344	0.252
$2.34	15.43	4.67	0.727	0.380	0.348
$2.35	18.38	5.34	0.841	0.426	0.455
$2.36	30.26	6.65	1.064	0.480	0.585
$2.37	30.26	9.64	1.367	0.546	0.821
$2.38	33.13	10.09	1.670	0.643	1.027
$2.39	42.74	11.48	2.001	0.743	1.258
$2.40	42.74	16.73	2.428	0.857	1.571
$2.41	42.74	18.47	2.856	1.025	1.831
$2.42	49.67	18.63	3.283	1.209	2.074
$2.43	57.89	29.34	3.830	1.414	2.415
$2.44	59.36	35.87	4.343	1.678	2.665
$2.45	62.34	45.83	4.937	2.037	2.900
$2.46	100.00	45.19	5.560	2.447	3.073
$2.47	100.00	100.00	6.540	2.930	3.610
$2.48	100.00	100.00	7.210	3.600	3.610

Appendix C-18: Second Degree Stochastic Dominance Criterion for the January Sample Period When Test Weight is less than or equal to 56

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA = A	Mala AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	0.99	0.00	0	0	0
$2.23	0.99	0.00	0.349	0.000	0.349
$2.24	0.99	0.00	0.359	0.000	0.359
$2.25	1.55	6.82	0.366	0.000	0.366
$2.26	2.19	6.82	0.380	0.061	0.319
$2.30	2.19	6.82	0.475	0.358	0.117
$2.31	2.19	6.82	0.497	0.426	0.071
$2.32	4.53	9.95	0.513	0.477	0.036
$2.33	5.10	16.77	0.570	0.602	-0.032
$2.34	5.10	16.77	0.621	0.769	-0.148
$2.35	6.87	30.41	0.672	0.937	-0.265
$2.36	7.44	37.23	0.741	1.241	-0.500
$2.37	8.81	44.05	0.815	1.613	-0.798
$2.38	9.63	44.05	0.895	2.054	-1.159
$2.39	11.25	44.05	0.992	2.494	-1.503
$2.40	11.88	44.05	1.104	2.935	-1.831
$2.41	17.95	54.00	1.223	3.375	-2.152
$2.42	22.81	54.00	1.402	3.915	-2.513
$2.43	46.92	70.20	1.653	4.509	-2.856
$2.44	60.30	80.15	2.076	5.141	-3.065
$2.45	71.50	90.10	2.679	5.942	-3.264
$2.46	76.85	96.90	3.394	6.843	-3.450
$2.47	79.74	96.90	3.970	7.570	-3.600
$2.48	100.00	100.00	4.552	8.270	-3.725

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.99	0.00	0.000	0.000	0.000
$2.23	0.99	6.82	0.349	0.000	0.349
$2.24	0.99	6.82	0.359	0.068	0.290
$2.25	1.55	6.82	0.366	0.119	0.247
$2.26	2.19	6.82	0.380	0.181	0.199
$2.30	2.19	9.95	0.475	0.477	-0.002
$2.31	2.19	16.77	0.497	0.577	-0.080
$2.32	4.53	16.77	0.513	0.703	-0.189
$2.33	5.10	30.41	0.570	0.912	-0.342
$2.34	5.10	37.23	0.621	1.216	-0.595
$2.35	6.87	44.05	0.672	1.588	-0.916
$2.36	7.44	44.05	0.741	2.029	-1.288
$2.37	8.81	44.05	0.815	2.469	-1.654
$2.38	9.63	44.05	0.895	2.910	-2.015
$2.39	11.25	54.00	0.992	3.350	-2.359
$2.40	11.88	54.00	1.104	3.890	-2.786
$2.41	17.95	70.20	1.223	4.430	-3.207
$2.42	22.81	80.15	1.402	5.132	-3.730
$2.43	46.92	90.10	1.653	6.014	-4.361
$2.44	60.30	96.90	2.076	6.825	-4.749
$2.45	71.50	96.90	2.679	7.794	-5.115
$2.46	76.85	100.00	3.394	8.763	-5.369
$2.47	79.74	100.00	3.970	9.513	-5.543
$2.48	100.00	100.00	4.552	10.243	-5.691

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA = A	Methyl AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.00	0.00	0.000	0.000	0.000
$2.23	0.00	6.82	0.000	0.000	0.000
$2.24	0.00	6.82	0.000	0.068	-0.068
$2.25	6.82	6.82	0.000	0.119	-0.119
$2.26	6.82	6.82	0.061	0.181	-0.119
$2.30	6.82	9.95	0.358	0.477	-0.119
$2.31	6.82	16.77	0.426	0.577	-0.151
$2.32	9.95	16.77	0.477	0.703	-0.225
$2.33	16.77	30.41	0.602	0.912	-0.310
$2.34	16.77	37.23	0.769	1.216	-0.447
$2.35	30.41	44.05	0.937	1.588	-0.651
$2.36	37.23	44.05	1.241	2.029	-0.788
$2.37	44.05	44.05	1.613	2.469	-0.856
$2.38	44.05	44.05	2.054	2.910	-0.856
$2.39	44.05	54.00	2.494	3.350	-0.856
$2.40	44.05	54.00	2.935	3.890	-0.956
$2.41	54.00	70.20	3.375	4.430	-1.055
$2.42	54.00	80.15	3.915	5.132	-1.217
$2.43	70.20	90.10	4.509	6.014	-1.505
$2.44	80.15	96.90	5.141	6.825	-1.684
$2.45	90.10	96.90	5.942	7.794	-1.851
$2.46	96.90	100.00	6.843	8.763	-1.919
$2.47	96.90	100.00	7.570	9.513	-1.943
$2.48	100.00	100.00	8.270	10.243	-1.965

Appendix C-18: Second Degree Stochastic Dominance Criterion for the January Sample Period when Test weight is less than or equal to 56

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prop. of No Trt.	Prop. of Fumigant	No Trt. Fumigant AREA + B	AREA + B	A-B
41.86	0.00	0.00	0	0	0
41.87	0.00	0.33	0	0	0
41.88	0.99	0.33	0.000	0.003	-0.003
42.23	0.99	0.33	0.349	0.128	0.229
42.24	0.99	1.47	0.359	0.123	0.236
42.25	1.55	2.10	0.366	0.134	0.232
42.26	2.19	2.10	0.380	0.153	0.227
42.30	2.19	2.10	0.475	0.244	0.231
42.31	2.19	5.22	0.497	0.265	0.232
42.32	4.53	6.36	0.513	0.384	0.299
42.33	5.10	6.36	0.570	0.384	0.186
42.34	5.10	9.26	0.621	0.447	0.174
42.35	6.07	10.48	0.672	0.540	0.132
42.36	7.44	11.54	0.741	0.644	0.097
42.37	8.01	12.51	0.815	0.760	0.056
42.38	9.63	13.37	0.895	0.845	0.051
42.39	11.25	14.00	0.992	1.018	-0.027
42.40	11.88	21.33	1.104	1.158	-0.054
42.41	17.95	24.22	1.223	1.372	-0.149
42.42	22.01	49.94	1.402	1.614	-0.211
42.43	46.92	64.82	1.653	2.163	-0.510
42.44	60.38	75.27	2.076	2.739	-0.664
42.45	71.58	88.53	2.679	3.492	-0.813
42.46	76.85	82.76	3.394	4.297	-0.904
42.47	79.74	100.00	3.978	4.918	-0.940
42.48	100.00	100.00	4.552	5.648	-1.096

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prop. of Malathion	Prop. of Fumigant	Malathion Fumigant AREA + B	AREA + B	A-B
41.86	0.00	0.00	0	0	0
41.87	0.00	0.33	0	0	0
41.88	0.00	0.33	0.000	0.003	-0.003
42.23	0.00	0.33	0.000	0.128	-0.128
42.24	0.00	1.47	0.000	0.123	-0.123
42.25	6.82	2.10	0.000	0.134	-0.134
42.26	6.82	2.10	0.061	0.153	-0.091
42.30	6.82	2.10	0.358	0.244	0.114
42.31	6.82	5.22	0.426	0.265	0.161
42.32	9.95	6.36	0.477	0.304	0.173
42.33	16.77	6.36	0.682	0.384	0.298
42.34	16.77	9.26	0.769	0.447	0.322
42.35	30.41	10.48	0.937	0.540	0.397
42.36	37.23	11.54	1.241	0.644	0.597
42.37	44.05	12.51	1.613	0.760	0.854
42.38	44.05	13.37	2.054	0.845	1.169
42.39	44.05	14.00	2.494	1.018	1.476
42.40	44.05	21.33	2.935	1.158	1.776
42.41	54.00	24.22	3.375	1.372	2.004
42.42	54.00	49.94	3.915	1.614	2.301
42.43	78.28	64.82	4.589	2.163	2.346
42.44	88.15	75.27	5.141	2.739	2.402
42.45	98.10	88.53	5.942	3.492	2.450
42.46	96.90	82.76	6.843	4.297	2.546
42.47	96.90	100.00	7.570	4.918	2.652
42.48	100.00	100.00	8.278	5.648	2.630

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prop. of Malathion	Prop. of Methyl	Malathion Methyl AREA + B	AREA + B	A-B
41.86	0.00	0.00	0	0	0
41.87	0.00	0.00	0.000	0.000	0.000
41.88	0.00	0.00	0.000	0.000	0.000
42.23	0.00	6.82	0.000	0.000	0.000
42.24	0.00	6.82	0.000	0.068	-0.068
42.25	6.82	6.82	0.000	0.119	-0.119
42.26	6.82	6.82	0.061	0.181	-0.119
42.30	6.82	9.95	0.358	0.477	-0.119
42.31	6.82	16.77	0.426	0.577	-0.151
42.32	9.95	16.77	0.477	0.703	-0.225
42.33	16.77	30.41	0.682	0.912	-0.310
42.34	16.77	37.23	0.769	1.216	-0.447
42.35	30.41	44.05	0.937	1.588	-0.651
42.36	37.23	44.05	1.241	2.029	-0.788
42.37	44.05	44.05	1.613	2.469	-0.856
42.38	44.05	44.05	2.054	2.910	-0.856
42.39	44.05	54.00	2.494	3.350	-0.856
42.40	44.05	54.00	2.935	3.890	-0.956
42.41	54.00	78.28	3.375	4.430	-1.055
42.42	54.00	88.15	3.915	5.132	-1.217
42.43	78.28	98.10	4.589	6.014	-1.505
42.44	88.15	96.90	5.141	6.825	-1.684
42.45	98.10	96.90	5.942	7.794	-1.851
42.46	96.90	100.00	6.843	8.763	-1.919
42.47	96.90	100.00	7.570	9.513	-1.943
42.48	100.00	100.00	8.278	10.243	-1.965

Appendix C-18: Second Degree Stochastic Dominance Criterion for the January Sample Period When Test Weight is less than or equal to 56

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prop. of No Trt.	Prop. of Fumigant	No Trt. AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.33	0	0	0
$1.88	0.99	0.33	0.000	0.003	-0.003
$2.23	0.99	0.33	0.349	0.120	0.229
$2.24	0.99	1.47	0.359	0.123	0.236
$2.25	1.55	2.10	0.366	0.134	0.232
$2.26	2.19	2.10	0.360	0.153	0.227
$2.30	2.19	2.10	0.475	0.244	0.231
$2.31	2.19	5.22	0.497	0.265	0.232
$2.32	4.53	6.36	0.513	0.384	0.209
$2.33	5.10	6.36	0.570	0.384	0.186
$2.34	5.10	9.26	0.621	0.447	0.174
$2.35	6.87	10.40	0.672	0.540	0.132
$2.36	7.44	11.54	0.741	0.644	0.097
$2.37	8.01	12.51	0.815	0.760	0.056
$2.38	9.63	13.37	0.895	0.885	0.011
$2.39	11.25	14.00	0.992	1.018	-0.027
$2.40	11.88	21.33	1.104	1.158	-0.054
$2.41	17.95	24.22	1.223	1.372	-0.149
$2.42	22.81	49.94	1.402	1.614	-0.211
$2.43	46.92	64.82	1.653	2.163	-0.510
$2.44	60.30	75.27	2.076	2.739	-0.664
$2.45	71.50	88.53	2.679	3.492	-0.813
$2.46	76.85	82.76	3.394	4.297	-0.904
$2.47	79.74	100.00	3.970	4.918	-0.948
$2.48	100.00	100.00	4.552	5.648	-1.096

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prop. of Mala	Prop. of Fumigant	Mala AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.33	0	0	0
$1.88	0.00	0.33	0.000	0.003	-0.003
$2.23	0.00	0.33	0.000	0.120	-0.120
$2.24	0.00	1.47	0.000	0.123	-0.123
$2.25	6.82	2.10	0.000	0.134	-0.134
$2.26	6.82	2.10	0.061	0.153	-0.091
$2.30	6.82	2.10	0.358	0.244	0.114
$2.31	6.82	5.22	0.426	0.265	0.161
$2.32	9.95	6.36	0.477	0.304	0.173
$2.33	16.77	6.36	0.682	0.384	0.218
$2.34	16.77	9.26	0.769	0.447	0.322
$2.35	30.41	10.40	0.937	0.540	0.397
$2.36	37.23	11.54	1.241	0.644	0.597
$2.37	44.05	12.51	1.613	0.760	0.854
$2.38	44.05	13.37	2.054	0.885	1.169
$2.39	44.05	14.00	2.494	1.018	1.476
$2.40	44.05	21.33	2.935	1.158	1.776
$2.41	54.00	24.22	3.375	1.372	2.004
$2.42	54.00	49.94	3.915	1.614	2.301
$2.43	70.20	64.82	4.509	2.163	2.346
$2.44	80.15	75.27	5.141	2.739	2.402
$2.45	90.10	88.53	5.942	3.492	2.450
$2.46	96.90	82.76	6.843	4.297	2.546
$2.47	96.90	100.00	7.570	4.918	2.652
$2.48	100.00	100.00	8.278	5.648	2.630

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - DICHLORVOS METHYL AND FUMIGANT

OUTCOMES	Prop. of Methyl	Prop. of Fumigant	Methyl AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.33	0.000	0.000	0.000
$1.88	0.00	0.33	0.000	0.003	-0.003
$2.23	6.82	0.33	0.000	0.120	-0.120
$2.24	6.82	1.47	0.068	0.123	-0.055
$2.25	6.82	2.10	0.119	0.134	-0.015
$2.26	6.82	2.10	0.181	0.153	0.028
$2.30	9.95	2.10	0.477	0.244	0.233
$2.31	16.77	5.22	0.577	0.265	0.312
$2.32	16.77	6.36	0.703	0.384	0.358
$2.33	30.41	6.36	0.912	0.384	0.528
$2.34	37.23	9.26	1.216	0.447	0.769
$2.35	44.05	10.40	1.588	0.540	1.048
$2.36	44.05	11.54	2.029	0.644	1.385
$2.37	44.05	12.51	2.469	0.760	1.710
$2.38	44.05	13.37	2.910	0.885	2.025
$2.39	54.00	14.00	3.350	1.018	2.332
$2.40	54.00	21.33	3.890	1.158	2.732
$2.41	70.20	24.22	4.430	1.372	3.059
$2.42	80.15	49.94	5.132	1.614	3.519
$2.43	90.10	64.82	6.014	2.163	3.851
$2.44	96.90	75.27	6.825	2.739	4.086
$2.45	96.90	88.53	7.794	3.492	4.302
$2.46	100.00	82.76	8.763	4.297	4.466
$2.47	100.00	100.00	9.513	4.918	4.595
$2.48	100.00	100.00	10.243	5.648	4.595

Appendix C-9: Second Degree Stochastic Dominance Criterion for the January Sample Period when Test weight is greater than 56 and less than or equal to 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prop. of No Trt.	Prop. of Malathion	AREA + A	AREA + B	A-B
¢2.00	0.00	0.00	0	0	0
¢2.09	0.00	0.00	0	0	0
¢2.10	1.56	2.08	0	0	0
¢2.26	1.56	2.08	0.255	0.340	-0.085
¢2.27	1.56	2.08	0.267	0.356	-0.089
¢2.28	2.77	2.08	0.281	0.375	-0.094
¢2.33	2.77	2.08	0.429	0.486	-0.057
¢2.34	2.77	2.08	0.457	0.507	-0.050
¢2.35	3.38	2.08	0.484	0.528	-0.043
¢2.36	6.26	2.08	0.518	0.548	-0.030
¢2.37	9.03	4.16	0.565	0.564	0.001
¢2.38	13.70	25.59	0.678	0.616	0.062
¢2.39	13.70	25.59	0.815	0.872	-0.057
¢2.40	14.31	25.59	0.952	1.128	-0.176
¢2.41	19.75	48.48	1.095	1.384	-0.289
¢2.42	22.17	48.48	1.289	1.780	-0.492
¢2.43	22.78	48.48	1.515	2.193	-0.679
¢2.44	22.78	48.48	1.743	2.598	-0.856
¢2.45	35.63	51.28	1.970	3.003	-1.033
¢2.46	50.28	61.62	2.327	3.515	-1.188
¢2.47	50.81	61.62	2.819	4.119	-1.300
¢2.48	100.00	100.00	2.995	4.224	-1.319

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - C-LORPYRIFOS METHYL

OUTCOMES	Prop. of No Trt.	Prop. of Methyl	AREA + A	AREA + B	A-B
¢2.00	0.00	2.08	0	0	0
¢2.09	0.00	2.08	0.000	0.016	-0.016
¢2.10	1.56	2.08	0.000	0.034	-0.034
¢2.26	1.56	2.08	0.255	0.374	-0.119
¢2.27	1.56	2.08	0.267	0.390	-0.123
¢2.28	2.77	2.08	0.281	0.409	-0.128
¢2.33	2.77	2.08	0.429	0.520	-0.091
¢2.34	2.77	2.08	0.457	0.541	-0.084
¢2.35	3.38	4.16	0.484	0.562	-0.077
¢2.36	6.26	25.59	0.518	0.643	-0.085
¢2.37	9.03	25.59	0.565	0.795	-0.230
¢2.38	13.70	25.59	0.678	1.115	-0.437
¢2.39	13.70	48.48	0.815	1.371	-0.556
¢2.40	14.31	48.48	0.952	1.776	-0.824
¢2.41	19.75	48.48	1.095	2.181	-1.085
¢2.42	22.17	48.48	1.289	2.577	-1.289
¢2.43	22.78	51.28	1.515	2.990	-1.475
¢2.44	22.78	61.62	1.743	3.502	-1.760
¢2.45	35.63	61.62	1.970	4.110	-2.140
¢2.46	50.28	100.00	2.327	4.734	-2.408
¢2.47	50.81	100.00	2.819	5.715	-2.896
¢2.48	100.00	100.00	2.995	5.885	-2.960

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - C-LORPYRIFOS METHYL

OUTCOMES	Prop. of Malathion	Prop. of Methyl	AREA + A	AREA + B	A-B
¢2.00	0.00	2.08	0	0	0
¢2.09	0.00	2.08	0.000	0.016	-0.016
¢2.10	2.08	2.08	0.000	0.034	-0.034
¢2.26	2.08	2.08	0.340	0.374	-0.034
¢2.27	2.08	2.08	0.356	0.390	-0.034
¢2.28	2.08	2.08	0.375	0.409	-0.034
¢2.33	2.08	2.08	0.486	0.520	-0.034
¢2.34	2.08	2.08	0.507	0.541	-0.034
¢2.35	2.08	4.16	0.528	0.562	-0.034
¢2.36	2.08	25.59	0.548	0.643	-0.095
¢2.37	4.16	25.59	0.564	0.795	-0.231
¢2.38	25.59	25.59	0.616	1.115	-0.499
¢2.39	25.59	48.48	0.872	1.371	-0.499
¢2.40	25.59	48.48	1.128	1.776	-0.648
¢2.41	48.48	48.48	1.384	2.181	-0.797
¢2.42	48.48	48.48	1.780	2.577	-0.797
¢2.43	48.48	51.28	2.193	2.990	-0.797
¢2.44	48.48	61.62	2.598	3.502	-0.904
¢2.45	51.28	61.62	3.003	4.110	-1.115
¢2.46	61.62	100.00	3.515	4.734	-1.220
¢2.47	61.62	100.00	4.119	5.715	-1.596
¢2.48	100.00	100.00	4.224	5.885	-1.661

Appendix C-19: Second Degree Stochastic Dominance Criterion for the January Sample Period when Test Weight is greater than 56 and less than or equal to 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. Fumigant AREA = A	AREA = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	2.08	0	0	0
$2.10	1.56	2.08	0.000	0.019	-0.019
$2.26	1.56	2.08	0.255	0.359	-0.104
$2.27	1.56	3.29	0.267	0.375	-0.108
$2.28	2.77	3.29	0.281	0.404	-0.124
$2.33	2.77	3.29	0.429	0.580	-0.151
$2.34	2.77	3.90	0.457	0.613	-0.157
$2.35	3.38	4.86	0.484	0.652	-0.168
$2.36	6.26	8.15	0.518	0.701	-0.183
$2.37	9.83	12.68	0.565	0.762	-0.197
$2.38	13.70	12.68	0.678	0.921	-0.243
$2.39	13.70	13.29	0.815	1.047	-0.232
$2.40	14.31	21.67	0.952	1.180	-0.228
$2.41	19.75	24.09	1.095	1.397	-0.302
$2.42	22.17	24.70	1.289	1.633	-0.344
$2.43	22.78	24.70	1.515	1.885	-0.370
$2.44	22.78	36.53	1.743	2.132	-0.389
$2.45	35.63	62.55	1.970	2.497	-0.527
$2.46	58.28	63.16	2.327	3.123	-0.796
$2.47	58.81	100.00	2.819	3.742	-0.923
$2.48	100.00	100.00	2.905	3.912	-1.007

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	Mala Fumigant AREA = A	AREA = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	2.08	0	0	0
$2.10	2.08	2.08	0.000	0.019	-0.019
$2.26	2.08	2.08	0.340	0.359	-0.019
$2.27	2.08	3.29	0.356	0.375	-0.019
$2.28	2.08	3.29	0.375	0.404	-0.030
$2.33	2.08	3.29	0.486	0.580	-0.094
$2.34	2.08	3.90	0.507	0.613	-0.106
$2.35	2.08	4.86	0.528	0.652	-0.125
$2.36	2.08	8.15	0.548	0.701	-0.152
$2.37	4.16	12.68	0.564	0.762	-0.198
$2.38	25.59	12.68	0.616	0.921	-0.304
$2.39	25.59	13.29	0.872	1.047	-0.175
$2.40	25.59	21.67	1.128	1.180	-0.052
$2.41	40.48	24.09	1.384	1.397	-0.013
$2.42	40.48	24.70	1.780	1.633	0.147
$2.43	40.48	24.70	2.193	1.885	0.308
$2.44	40.48	36.53	2.598	2.132	0.466
$2.45	51.20	62.55	3.003	2.497	0.506
$2.46	61.62	63.16	3.515	3.123	0.392
$2.47	61.62	100.00	4.119	3.742	0.377
$2.48	100.00	100.00	4.224	3.912	0.312

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl Fumigant AREA = A	AREA = B	A-B
$2.08	2.08	0.00	0	0	0
$2.09	2.08	2.08	0.016	0.000	0.016
$2.10	2.08	2.08	0.034	0.019	0.016
$2.26	2.08	2.08	0.374	0.359	0.015
$2.27	2.08	3.29	0.390	0.375	0.015
$2.28	2.08	3.29	0.409	0.404	0.004
$2.33	2.08	3.29	0.520	0.580	-0.060
$2.34	2.08	3.90	0.541	0.613	-0.073
$2.35	4.16	4.86	0.562	0.652	-0.091
$2.36	25.59	8.15	0.603	0.701	-0.098
$2.37	25.59	12.68	0.795	0.762	0.033
$2.38	25.59	12.68	1.115	0.921	0.194
$2.39	40.48	13.29	1.371	1.047	0.324
$2.40	40.48	21.67	1.776	1.180	0.595
$2.41	40.48	24.09	2.181	1.397	0.784
$2.42	40.48	24.70	2.577	1.633	0.944
$2.43	51.20	24.70	2.990	1.885	1.105
$2.44	61.62	36.53	3.582	2.132	1.370
$2.45	61.62	62.55	4.110	2.497	1.621
$2.46	100.00	63.16	4.734	3.123	1.612
$2.47	100.00	100.00	5.715	3.742	1.973
$2.48	100.00	100.00	5.885	3.912	1.973

Appendix C-201 Second Degree Stochastic Dominance Criterion for the January Sample Period when Test weight is greater than 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Malathion	No Trt. Malathion AREA + A	AREA + B	A-B
42.27	0.00	0.00	0	0	0
42.28	0.00	0.00	0	0	0
42.29	0.85	1.14	0	0	0
42.30	1.27	1.14	0.001	0.002	-0.000
42.36	1.27	1.14	0.008	0.008	0.000
42.37	1.27	1.14	0.101	0.091	0.010
42.38	3.37	22.28	0.114	0.103	0.011
42.39	5.07	22.28	0.147	0.326	-0.178
42.40	6.34	28.42	0.198	0.548	-0.350
42.41	11.53	33.42	0.261	0.833	-0.571
42.42	11.07	33.42	0.348	1.083	-0.735
42.43	14.93	33.42	0.496	1.581	-1.085
42.44	14.93	33.42	0.646	1.835	-1.190
42.45	16.03	38.42	0.795	2.169	-1.374
42.46	17.05	38.42	0.955	2.554	-1.598
42.47	23.69	39.56	1.122	2.930	-1.808
42.48	100.00	100.00	1.163	2.997	-1.835

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. Methyl AREA + A	AREA + B	A-B
42.27	0.00	1.14	0	0	0
42.28	0.00	6.14	0.000	0.009	-0.009
42.29	0.85	6.14	0.000	0.004	-0.004
42.30	1.27	6.14	0.001	0.095	-0.093
42.36	1.27	22.28	0.008	0.515	-0.427
42.37	1.27	22.28	0.101	0.738	-0.637
42.38	3.37	28.42	0.114	0.961	-0.847
42.39	5.07	33.42	0.147	1.245	-1.098
42.40	6.34	33.42	0.198	1.579	-1.381
42.41	11.53	33.42	0.261	1.913	-1.652
42.42	11.07	33.42	0.348	2.164	-1.816
42.43	14.93	38.42	0.496	2.582	-2.085
42.44	14.93	38.42	0.646	2.966	-2.320
42.45	16.03	39.56	0.795	3.350	-2.555
42.46	17.05	100.00	0.955	3.746	-2.790
42.47	23.69	100.00	1.122	4.726	-3.603
42.48	100.00	100.00	1.163	4.896	-3.733

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. Fumigant AREA + A	AREA + B	A-B
42.27	0.00	0.00	0	0	0
42.28	0.00	1.14	0	0	0
42.29	0.85	1.97	0.000	0.014	-0.014
42.30	1.27	1.97	0.001	0.017	-0.016
42.36	1.27	1.97	0.008	0.152	-0.064
42.37	1.27	5.61	0.101	0.172	-0.071
42.38	3.37	6.10	0.114	0.228	-0.114
42.39	5.07	8.15	0.147	0.290	-0.143
42.40	6.34	11.48	0.198	0.371	-0.173
42.41	11.53	11.82	0.261	0.486	-0.225
42.42	11.07	13.75	0.348	0.575	-0.227
42.43	14.93	13.75	0.496	0.747	-0.250
42.44	14.93	15.26	0.646	0.884	-0.239
42.45	16.03	16.28	0.795	1.037	-0.242
42.46	17.05	23.21	0.955	1.200	-0.244
42.47	23.69	100.00	1.122	1.427	-0.305
42.48	100.00	100.00	1.163	1.597	-0.434

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	Malathion Fumigant AREA + A	AREA + B	A-B
42.27	0.00	0.00	0	0	0
42.28	0.00	1.14	0	0	0
42.29	1.14	1.97	0.000	0.014	-0.014
42.30	1.14	1.97	0.002	0.017	-0.015
42.36	1.14	1.97	0.008	0.152	-0.072
42.37	1.14	5.61	0.091	0.172	-0.081
42.38	22.28	6.10	0.103	0.228	-0.125
42.39	22.28	8.15	0.326	0.290	0.036
42.40	28.42	11.48	0.548	0.371	0.177
42.41	33.42	11.82	0.833	0.486	0.346
42.42	33.42	13.75	1.083	0.575	0.508
42.43	33.42	13.75	1.581	0.747	0.754
42.44	33.42	15.26	1.835	0.884	0.951
42.45	38.42	16.28	2.169	1.037	1.133
42.46	38.42	23.21	2.554	1.200	1.354
42.47	39.56	100.00	2.930	1.427	1.503
42.48	100.00	100.00	2.997	1.597	1.400

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl Fumigant AREA + A	AREA + B	A-B
42.27	1.14	0.00	0	0	0
42.28	6.14	1.14	0.009	0.000	0.009
42.29	6.14	1.97	0.004	0.014	0.070
42.30	6.14	1.97	0.095	0.017	0.077
42.36	22.28	1.97	0.515	0.152	0.363
42.37	22.28	5.61	0.738	0.172	0.566
42.38	28.42	6.10	0.961	0.228	0.733
42.39	33.42	8.15	1.245	0.290	0.955
42.40	33.42	11.48	1.579	0.371	1.208
42.41	33.42	11.82	1.913	0.486	1.427
42.42	33.42	13.75	2.164	0.575	1.589
42.43	38.42	13.75	2.582	0.747	1.835
42.44	38.42	15.26	2.966	0.884	2.082
42.45	39.56	16.28	3.350	1.037	2.313
42.46	100.00	23.21	3.746	1.200	2.546
42.47	100.00	100.00	4.726	1.427	3.299
42.48	100.00	100.00	4.896	1.597	3.299

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Malathion	Prob. of Methyl	Malathion Methyl AREA + A	AREA + B	A-B
42.27	0.00	1.14	0	0	0
42.28	0.00	6.14	0.000	0.009	-0.009
42.29	1.14	6.14	0.000	0.004	-0.004
42.30	1.14	6.14	0.002	0.095	-0.093
42.36	1.14	22.28	0.008	0.515	-0.435
42.37	1.14	22.28	0.091	0.738	-0.646
42.38	22.28	28.42	0.103	0.961	-0.858
42.39	22.28	33.42	0.326	1.245	-0.919
42.40	28.42	33.42	0.548	1.579	-1.031
42.41	33.42	33.42	0.833	1.913	-1.081
42.42	33.42	33.42	1.083	2.164	-1.081
42.43	33.42	38.42	1.581	2.582	-1.001
42.44	33.42	38.42	1.835	2.966	-1.131
42.45	38.42	39.56	2.169	3.350	-1.181
42.46	38.42	100.00	2.554	3.746	-1.192
42.47	39.56	100.00	2.930	4.726	-1.796
42.48	100.00	100.00	2.997	4.896	-1.898

Appendix C-21: Second Degree Stochastic Dominance Criterion for the January Sample Period When Moisture Content is Less Than or Equal to 10

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	AREA = A	AREA = B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	0.00	0	0	0
$2.41	1.52	0.00	0	0	0
$2.42	5.72	0.00	0.015	0.000	0.015
$2.43	10.28	0.00	0.072	0.000	0.072
$2.44	11.80	0.00	0.175	0.000	0.175
$2.45	17.52	0.00	0.293	0.000	0.293
$2.46	23.60	0.00	0.468	0.000	0.468
$2.47	25.12	0.00	0.700	0.000	0.700
$2.48	100.00	100.00	0.742	0.000	0.742

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	AREA = A	AREA = B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	0.00	0.000	0.000	0.000
$2.41	1.52	0.00	0.000	0.000	0.000
$2.42	5.72	0.00	0.015	0.000	0.015
$2.43	10.28	0.00	0.072	0.000	0.072
$2.44	11.80	0.00	0.175	0.000	0.175
$2.45	17.52	0.00	0.293	0.000	0.293
$2.46	23.60	100.00	0.468	0.000	0.468
$2.47	25.12	100.00	0.700	0.980	-0.280
$2.48	100.00	100.00	0.742	1.150	-0.408

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	AREA = A	AREA = B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	1.52	0	0	0
$2.41	1.52	3.93	0.000	0.015	-0.015
$2.42	5.72	8.49	0.015	0.055	-0.039
$2.43	10.28	9.01	0.072	0.139	-0.067
$2.44	11.80	12.94	0.175	0.230	-0.054
$2.45	17.52	19.02	0.293	0.359	-0.066
$2.46	23.60	28.54	0.468	0.549	-0.081
$2.47	25.12	100.00	0.700	0.750	-0.051
$2.48	100.00	100.00	0.742	0.920	-0.178

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	AREA = A	AREA = B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	1.52	0	0	0
$2.41	0.00	3.93	0.000	0.015	-0.015
$2.42	0.00	8.49	0.000	0.055	-0.055
$2.43	0.00	9.01	0.000	0.139	-0.139
$2.44	0.00	12.94	0.000	0.230	-0.230
$2.45	0.00	19.02	0.000	0.359	-0.359
$2.46	0.00	28.54	0.000	0.549	-0.549
$2.47	0.00	100.00	0.000	0.750	-0.750
$2.48	100.00	100.00	0.000	0.920	-0.920

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	AREA = A	AREA = B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	1.52	0.000	0.000	0.000
$2.41	0.00	3.93	0.000	0.015	-0.015
$2.42	0.00	8.49	0.000	0.055	-0.055
$2.43	0.00	9.01	0.000	0.139	-0.139
$2.44	0.00	12.94	0.000	0.230	-0.230
$2.45	0.00	19.02	0.000	0.359	-0.359
$2.46	100.00	28.54	0.000	0.549	-0.549
$2.47	100.00	100.00	0.980	0.750	0.230
$2.48	100.00	100.00	1.150	0.920	0.230

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	AREA = A	AREA = B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	0.00	0.000	0.000	0.000
$2.41	0.00	0.00	0.000	0.000	0.000
$2.42	0.00	0.00	0.000	0.000	0.000
$2.43	0.00	0.00	0.000	0.000	0.000
$2.44	0.00	0.00	0.000	0.000	0.000
$2.45	0.00	0.00	0.000	0.000	0.000
$2.46	0.00	100.00	0.000	0.000	0.000
$2.47	0.00	100.00	0.000	0.980	-0.980
$2.48	100.00	100.00	0.000	1.150	-1.150

Appendix C-22: Second Degree Stochastic Dominance Criterion for the January Seeding Period when Moisture Content is greater than 10 and less than or equal to 11

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prop. of % Trt	Prop. of %ala	% Trt. AREA + A	%ala AREA + B	A-B
42.26	0.00	0.00	0	0	0
42.27	0.00	0.00	0	0	0
42.28	0.35	0.00	0	0	0
42.30	0.35	0.00	0.000	0.000	0.000
42.31	0.35	0.00	0.012	0.000	0.012
42.32	1.13	1.04	0.014	0.000	0.014
42.33	1.65	7.29	0.028	0.013	0.015
42.34	1.65	7.29	0.045	0.086	-0.041
42.35	2.86	13.54	0.061	0.159	-0.097
42.36	5.20	13.54	0.090	0.294	-0.204
42.37	6.85	20.83	0.129	0.396	-0.267
42.38	9.58	39.58	0.191	0.583	-0.392
42.39	9.58	39.58	0.329	1.110	-0.797
42.40	9.58	39.58	0.416	1.513	-1.097
42.41	14.39	41.66	0.512	1.909	-1.397
42.42	18.01	41.66	0.656	2.326	-1.670
42.43	24.75	48.95	0.844	2.742	-1.899
42.44	29.13	49.99	1.091	3.232	-2.141
42.45	36.46	57.28	1.382	3.732	-2.349
42.46	44.48	68.41	1.747	4.305	-2.557
42.47	52.12	68.41	2.183	4.897	-2.714
42.48	100.00	100.00	2.272	4.999	-2.728

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prop. of % Trt	Prop. of %ethyl	% Trt. AREA + A	%ethyl AREA + B	A-B
42.26	0.00	0.00	0	0	0
42.27	0.00	0.00	0	0.000	0.000
42.28	0.35	0.00	0.000	0.000	0.000
42.30	0.35	1.04	0.000	0.000	0.000
42.31	0.35	7.29	0.012	0.010	0.001
42.32	1.13	7.29	0.014	0.065	-0.051
42.33	1.65	13.54	0.028	0.156	-0.128
42.34	1.65	13.54	0.045	0.292	-0.247
42.35	2.86	20.83	0.061	0.427	-0.366
42.36	5.20	39.58	0.090	0.635	-0.545
42.37	6.85	39.58	0.129	0.932	-0.803
42.38	9.58	39.58	0.191	1.284	-1.094
42.39	9.58	41.66	0.329	1.823	-1.503
42.40	9.58	41.66	0.416	2.239	-1.823
42.41	14.39	48.95	0.512	2.656	-2.144
42.42	18.01	49.99	0.656	3.145	-2.490
42.43	24.75	57.28	0.844	3.645	-2.802
42.44	29.13	68.41	1.091	4.218	-3.127
42.45	36.46	68.41	1.382	4.822	-3.440
42.46	44.48	100.00	1.747	5.426	-3.679
42.47	52.12	100.00	2.183	6.486	-4.223
42.48	100.00	100.00	2.272	6.576	-4.305

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prop. of %ala	Prop. of %ethyl	%ala AREA + A	%ethyl AREA + B	A-B
42.26	0.00	0.00	0	0	0
42.27	0.00	0.00	0	0.000	0.000
42.28	0.00	0.00	0.000	0.000	0.000
42.30	0.00	1.04	0.000	0.000	0.000
42.31	0.00	7.29	0.000	0.010	-0.010
42.32	1.04	7.29	0.000	0.065	-0.065
42.33	7.29	13.54	0.013	0.156	-0.143
42.34	7.29	13.54	0.086	0.292	-0.206
42.35	13.54	20.83	0.159	0.427	-0.268
42.36	13.54	39.58	0.294	0.635	-0.341
42.37	20.83	39.58	0.396	0.932	-0.536
42.38	39.58	39.58	0.583	1.284	-0.705
42.39	39.58	41.66	1.110	1.823	-0.705
42.40	39.58	41.66	1.513	2.239	-0.726
42.41	41.66	48.95	1.909	2.656	-0.747
42.42	41.66	49.99	2.326	3.145	-0.820
42.43	48.95	57.28	2.742	3.645	-0.903
42.44	49.99	68.41	3.232	4.218	-0.986
42.45	57.28	68.41	3.732	4.822	-1.090
42.46	68.41	100.00	4.305	5.426	-1.122
42.47	68.41	100.00	4.897	6.486	-1.510
42.48	100.00	100.00	4.999	6.576	-1.577

Appendix C-22: Second Degree Stochastic Dominance Criterion for the January Sample Period when Moisture Content is greater than 10 and less than or equal to 11

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. AREA = A	Fumigant AREA = B	A-B
$2.26	0.00	0.00	0	0	0
$2.27	0.00	0.35	0	0	0
$2.28	0.35	0.35	0.000	0.003	-0.003
$2.30	0.35	0.35	0.000	0.011	-0.003
$2.31	0.35	1.39	0.012	0.015	-0.003
$2.32	1.13	2.43	0.014	0.025	-0.011
$2.33	1.65	2.43	0.028	0.056	-0.027
$2.34	1.65	4.16	0.045	0.080	-0.035
$2.35	2.86	4.94	0.061	0.122	-0.060
$2.36	5.28	7.37	0.090	0.171	-0.081
$2.37	6.85	10.89	0.129	0.226	-0.097
$2.38	9.58	10.49	0.191	0.324	-0.134
$2.39	9.58	10.49	0.320	0.466	-0.146
$2.40	9.58	15.44	0.416	0.571	-0.155
$2.41	14.39	18.38	0.512	0.725	-0.214
$2.42	18.81	24.24	0.656	0.908	-0.253
$2.43	24.75	28.10	0.844	1.151	-0.307
$2.44	29.13	35.43	1.091	1.432	-0.340
$2.45	36.46	43.46	1.382	1.786	-0.403
$2.46	44.48	51.10	1.747	2.221	-0.473
$2.47	52.12	100.00	2.183	2.721	-0.538
$2.48	100.00	100.00	2.272	2.891	-0.620

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	Mala AREA = A	Fumigant AREA = B	A-B
$2.26	0.00	0.00	0	0	0
$2.27	0.00	0.35	0	0	0
$2.28	0.00	0.35	0.000	0.003	-0.003
$2.30	0.00	0.35	0.000	0.011	-0.011
$2.31	0.00	1.39	0.000	0.015	-0.015
$2.32	1.04	2.43	0.000	0.025	-0.025
$2.33	7.29	2.43	0.013	0.056	-0.043
$2.34	7.29	4.16	0.086	0.080	0.006
$2.35	13.54	4.94	0.159	0.122	0.037
$2.36	13.54	7.37	0.294	0.171	0.123
$2.37	20.83	10.89	0.396	0.226	0.169
$2.38	39.58	10.49	0.583	0.324	0.259
$2.39	39.58	10.49	1.118	0.466	0.652
$2.40	39.58	15.44	1.513	0.571	0.943
$2.41	41.66	18.38	1.909	0.725	1.184
$2.42	41.66	24.24	2.326	0.908	1.418
$2.43	48.95	28.10	2.742	1.151	1.592
$2.44	49.99	35.43	3.232	1.432	1.800
$2.45	57.28	43.46	3.732	1.786	1.946
$2.46	68.41	51.10	4.305	2.221	2.084
$2.47	68.41	100.00	4.897	2.721	2.175
$2.48	100.00	100.00	4.999	2.891	2.108

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl AREA = A	Fumigant AREA = B	A-B
$2.26	0.00	0.00	0	0	0
$2.27	0.00	0.35	0.000	0.000	0.000
$2.28	0.00	0.35	0.000	0.003	-0.003
$2.30	1.04	0.35	0.000	0.011	-0.011
$2.31	7.29	1.39	0.010	0.015	-0.004
$2.32	7.29	2.43	0.065	0.025	0.040
$2.33	13.54	2.43	0.156	0.056	0.101
$2.34	13.54	4.16	0.292	0.080	0.212
$2.35	20.83	4.94	0.427	0.122	0.305
$2.36	39.58	7.37	0.635	0.171	0.464
$2.37	39.58	10.89	0.932	0.226	0.706
$2.38	39.58	10.49	1.288	0.324	0.964
$2.39	41.66	10.49	1.823	0.466	1.357
$2.40	41.66	15.44	2.239	0.571	1.668
$2.41	48.95	18.38	2.656	0.725	1.931
$2.42	49.99	24.24	3.145	0.908	2.237
$2.43	57.28	28.10	3.645	1.151	2.495
$2.44	68.41	35.43	4.218	1.432	2.786
$2.45	68.41	43.46	4.822	1.786	3.036
$2.46	100.00	51.10	5.426	2.221	3.206
$2.47	100.00	100.00	6.406	2.721	3.685
$2.48	100.00	100.00	6.576	2.891	3.685

Appendix C-23: Second Degree Stochastic Dominance Criterion for the January Sample Period when Moisture Content is greater than 11 and less than or equal to 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Malathion	No Trt. AREA + B	Malathion AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	1.10	0.00	0	0	0
$2.23	1.10	0.00	0.390	0.000	0.390
$2.24	1.10	0.00	0.401	0.000	0.401
$2.25	1.73	7.50	0.409	0.000	0.409
$2.26	2.19	7.50	0.425	0.067	0.357
$2.33	2.19	7.50	0.586	0.619	-0.033
$2.34	2.19	7.50	0.682	0.675	-0.073
$2.35	2.82	15.00	0.629	0.769	-0.139
$2.36	2.82	15.00	0.658	0.919	-0.261
$2.37	3.28	15.00	0.686	1.069	-0.383
$2.38	4.38	15.00	0.719	1.219	-0.500
$2.39	6.59	15.00	0.762	1.369	-0.606
$2.40	10.82	25.00	0.828	1.519	-0.690
$2.41	16.46	42.50	0.928	1.769	-0.840
$2.42	16.92	42.50	1.093	2.194	-1.101
$2.43	17.38	47.50	1.279	2.661	-1.382
$2.44	30.26	47.50	1.436	3.089	-1.653
$2.45	35.64	55.00	1.738	3.564	-1.826
$2.46	47.62	67.50	2.095	4.114	-2.019
$2.47	48.08	67.50	2.562	4.775	-2.214
$2.48	100.00	100.00	2.643	4.890	-2.247

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - C-LORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA + B	Methyl AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	1.10	0.00	0.000	0.000	0.000
$2.23	1.10	7.50	0.390	0.000	0.390
$2.24	1.10	7.50	0.401	0.075	0.326
$2.25	1.73	7.50	0.409	0.131	0.278
$2.26	2.19	7.50	0.425	0.199	0.226
$2.33	2.19	15.00	0.586	0.750	-0.164
$2.34	2.19	15.00	0.682	0.863	-0.261
$2.35	2.82	15.00	0.629	1.050	-0.421
$2.36	2.82	15.00	0.658	1.200	-0.542
$2.37	3.28	15.00	0.686	1.350	-0.664
$2.38	4.38	25.00	0.719	1.500	-0.781
$2.39	6.59	42.50	0.762	1.750	-0.988
$2.40	10.82	42.50	0.828	2.175	-1.347
$2.41	16.46	42.50	0.928	2.600	-1.672
$2.42	16.92	47.50	1.093	3.025	-1.932
$2.43	17.38	55.00	1.279	3.548	-2.268
$2.44	30.26	62.50	1.436	4.042	-2.607
$2.45	35.64	67.50	1.738	4.668	-2.929
$2.46	47.62	100.00	2.095	5.342	-3.248
$2.47	48.08	100.00	2.562	6.323	-3.761
$2.48	100.00	100.00	2.643	6.493	-3.849

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - C-LORPYRIFOS METHYL

OUTCOMES	Prob. of Malathion	Prob. of Methyl	Malathion AREA + B	Methyl AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.00	0.00	0.000	0.000	0.000
$2.23	0.00	7.50	0.000	0.000	0.000
$2.24	0.00	7.50	0.000	0.075	-0.075
$2.25	7.50	7.50	0.000	0.131	-0.131
$2.26	7.50	7.50	0.067	0.199	-0.131
$2.33	7.50	15.00	0.619	0.750	-0.131
$2.34	7.50	15.00	0.675	0.863	-0.188
$2.35	15.00	15.00	0.769	1.050	-0.281
$2.36	15.00	15.00	0.919	1.200	-0.281
$2.37	15.00	15.00	1.069	1.350	-0.281
$2.38	15.00	25.00	1.219	1.500	-0.281
$2.39	15.00	42.50	1.369	1.750	-0.381
$2.40	25.00	42.50	1.519	2.175	-0.656
$2.41	42.50	42.50	1.769	2.600	-0.831
$2.42	42.50	47.50	2.194	3.025	-0.831
$2.43	47.50	55.00	2.661	3.548	-0.886
$2.44	47.50	62.50	3.089	4.042	-0.954
$2.45	55.00	67.50	3.564	4.668	-1.104
$2.46	67.50	100.00	4.114	5.342	-1.229
$2.47	67.50	100.00	4.775	6.323	-1.547
$2.48	100.00	100.00	4.890	6.493	-1.603

Appendix C-23: Second Degree Stochastic Dominance Criterion for the January Sample Period When Moisture Content is greater than 11 and less than or equal to 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. Fumigant AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.37	0	0	0
$1.88	1.10	0.37	0.000	0.003	0.000
$2.23	1.10	0.37	0.398	0.133	0.257
$2.24	1.10	1.62	0.401	0.137	0.264
$2.25	1.73	2.08	0.409	0.149	0.260
$2.26	2.19	2.08	0.425	0.168	0.257
$2.33	2.19	2.08	0.586	0.321	0.265
$2.34	2.19	3.33	0.602	0.336	0.266
$2.35	2.82	3.33	0.629	0.378	0.251
$2.36	2.82	3.79	0.658	0.411	0.246
$2.37	3.28	5.16	0.686	0.449	0.237
$2.38	4.38	5.90	0.719	0.501	0.218
$2.39	6.59	10.57	0.762	0.560	0.203
$2.40	10.02	18.25	0.828	0.665	0.163
$2.41	16.46	18.74	0.928	0.848	0.080
$2.42	16.92	19.17	1.093	1.035	0.058
$2.43	17.38	31.83	1.279	1.246	0.033
$2.44	30.26	37.14	1.436	1.533	-0.097
$2.45	35.68	50.22	1.738	1.904	-0.166
$2.46	47.62	50.68	2.095	2.406	-0.311
$2.47	48.08	100.00	2.562	2.903	-0.341
$2.48	100.00	100.00	2.643	3.073	-0.430

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of %ala	Prob. of Fumigant	%ala Fumigant AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.37	0	0	0
$1.88	0.00	0.37	0.000	0.003	-0.003
$2.23	0.00	0.37	0.000	0.133	-0.133
$2.24	0.00	1.62	0.000	0.137	-0.137
$2.25	7.50	2.08	0.000	0.149	-0.149
$2.26	7.50	2.08	0.067	0.168	-0.100
$2.33	7.50	2.08	0.619	0.321	0.298
$2.34	7.50	3.33	0.675	0.336	0.339
$2.35	15.00	3.33	0.769	0.378	0.391
$2.36	15.00	3.79	0.919	0.411	0.507
$2.37	15.00	5.16	1.069	0.449	0.620
$2.38	15.00	5.90	1.219	0.501	0.718
$2.39	15.00	10.57	1.369	0.560	0.809
$2.40	25.00	18.25	1.519	0.665	0.853
$2.41	42.50	18.74	1.769	0.848	0.921
$2.42	42.50	19.17	2.194	1.035	1.158
$2.43	47.50	31.83	2.661	1.246	1.415
$2.44	47.50	37.14	3.089	1.533	1.556
$2.45	55.00	50.22	3.564	1.904	1.660
$2.46	67.50	50.68	4.114	2.406	1.707
$2.47	67.50	100.00	4.775	2.903	1.872
$2.48	100.00	100.00	4.890	3.073	1.817

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl Fumigant AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.37	0.000	0.000	0.000
$1.88	0.00	0.37	0.000	0.003	-0.003
$2.23	7.50	0.37	0.000	0.133	-0.133
$2.24	7.50	1.62	0.075	0.137	-0.062
$2.25	7.50	2.08	0.131	0.149	-0.018
$2.26	7.50	2.08	0.199	0.168	0.031
$2.33	15.00	2.08	0.750	0.321	0.429
$2.34	15.00	3.33	0.863	0.336	0.526
$2.35	15.00	3.33	1.050	0.378	0.672
$2.36	15.00	3.79	1.200	0.411	0.789
$2.37	15.00	5.16	1.350	0.449	0.901
$2.38	25.00	5.90	1.500	0.501	0.999
$2.39	42.50	10.57	1.750	0.560	1.190
$2.40	42.50	18.25	2.175	0.665	1.510
$2.41	42.50	18.74	2.600	0.848	1.752
$2.42	47.50	19.17	3.025	1.035	1.990
$2.43	55.00	31.83	3.548	1.246	2.301
$2.44	62.50	37.14	4.042	1.533	2.510
$2.45	67.50	50.22	4.668	1.904	2.763
$2.46	100.00	50.68	5.342	2.406	2.936
$2.47	100.00	100.00	6.323	2.903	3.420
$2.48	100.00	100.00	6.493	3.073	3.420

Appendix C-24: Second Degree Stochastic Dominance Criterion for the January Seeding Period when Moisture Content is greater than 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt.	Prob. of Malathion	AREA + A	AREA + B	A-B
≤2.04	0.00	0.00	0	0	0
≤2.09	0.00	0.00	0	0	0
≤2.10	4.69	6.25	0	0	0
≤2.26	4.69	6.25	0.766	1.022	-0.255
≤2.27	4.69	6.25	0.842	1.069	-0.267
≤2.28	6.86	6.25	0.844	1.125	-0.281
≤2.29	11.55	12.50	0.935	1.208	-0.273
≤2.30	12.10	12.50	0.955	1.229	-0.275
≤2.34	12.10	12.50	1.545	1.836	-0.290
≤2.35	12.10	12.50	1.637	1.929	-0.293
≤2.36	12.01	27.50	1.749	2.046	-0.297
≤2.37	12.01	27.50	1.917	2.361	-0.444
≤2.38	27.17	48.75	2.013	2.567	-0.554
≤2.39	29.34	48.75	2.353	3.176	-0.824
≤2.40	29.34	48.75	2.573	3.542	-0.969
≤2.41	32.14	56.25	2.939	4.151	-1.212
≤2.42	32.14	56.25	3.261	4.714	-1.453
≤2.43	40.79	56.25	3.582	5.276	-1.694
≤2.44	48.01	63.75	4.031	5.895	-1.864
≤2.45	59.22	71.25	4.463	6.469	-2.006
≤2.46	65.71	71.25	5.055	7.181	-2.126
≤2.47	75.27	77.50	5.699	7.868	-2.168
≤2.48	100.00	100.00	5.827	8.011	-2.184

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - C-LORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt.	Prob. of Methyl	AREA + A	AREA + B	A-B
≤2.04	0.00	6.25	0	0	0
≤2.09	0.00	6.25	0.000	0.047	-0.047
≤2.10	4.69	6.25	0.000	0.103	-0.103
≤2.26	4.69	6.25	0.766	1.125	-0.359
≤2.27	4.69	12.50	0.842	1.172	-0.330
≤2.28	6.86	20.00	0.844	1.284	-0.441
≤2.29	11.55	20.00	0.935	1.550	-0.615
≤2.30	12.10	20.00	0.955	1.584	-0.630
≤2.34	12.10	27.50	1.545	2.554	-1.009
≤2.35	12.10	27.50	1.637	2.761	-1.124
≤2.36	12.01	48.75	1.749	3.104	-1.315
≤2.37	12.01	48.75	1.917	3.592	-1.675
≤2.38	27.17	48.75	2.013	3.958	-1.944
≤2.39	29.34	56.25	2.353	4.567	-2.214
≤2.40	29.34	56.25	2.573	4.989	-2.416
≤2.41	32.14	56.25	2.939	5.692	-2.752
≤2.42	32.14	63.75	3.261	6.254	-2.993
≤2.43	40.79	71.25	3.582	6.892	-3.310
≤2.44	48.01	71.25	4.031	7.676	-3.645
≤2.45	59.22	77.50	4.463	8.317	-3.854
≤2.46	65.71	100.00	5.055	9.092	-4.037
≤2.47	75.27	100.00	5.699	10.072	-4.373
≤2.48	100.00	100.00	5.827	10.242	-4.415

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - C-LORPYRIFOS METHYL

OUTCOMES	Prob. of Malathion	Prob. of Methyl	AREA + A	AREA + B	A-B
≤2.04	0.00	6.25	0	0	0
≤2.09	0.00	6.25	0.000	0.047	-0.047
≤2.10	6.25	6.25	0.000	0.103	-0.103
≤2.26	6.25	6.25	1.022	1.125	-0.103
≤2.27	6.25	12.50	1.069	1.172	-0.103
≤2.28	6.25	20.00	1.125	1.284	-0.159
≤2.29	12.50	20.00	1.208	1.550	-0.342
≤2.30	12.50	20.00	1.229	1.584	-0.355
≤2.34	12.50	27.50	1.836	2.554	-0.719
≤2.35	12.50	27.50	1.929	2.761	-0.831
≤2.36	27.50	48.75	2.046	3.104	-1.059
≤2.37	27.50	48.75	2.361	3.592	-1.231
≤2.38	48.75	48.75	2.567	3.958	-1.391
≤2.39	48.75	56.25	3.176	4.567	-1.391
≤2.40	48.75	56.25	3.542	4.989	-1.447
≤2.41	56.25	56.25	4.151	5.692	-1.541
≤2.42	56.25	63.75	4.714	6.254	-1.541
≤2.43	56.25	71.25	5.276	6.892	-1.616
≤2.44	63.75	71.25	5.895	7.676	-1.781
≤2.45	71.25	77.50	6.469	8.317	-1.848
≤2.46	71.25	100.00	7.181	9.092	-1.911
≤2.47	77.50	100.00	7.868	10.072	-2.192
≤2.48	100.00	100.00	8.011	10.242	-2.231

Appendix C-24: Second Degree Stochastic Dominance Criterion for the January Sample Period when Moisture Content is greater than 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	AREA = A	AREA = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	6.25	0	0	0
$2.10	4.69	6.25	0.000	0.056	-0.056
$2.26	4.69	6.25	0.766	1.078	-0.312
$2.27	4.69	8.42	0.802	1.125	-0.323
$2.28	6.86	14.67	0.844	1.201	-0.357
$2.29	11.55	15.92	0.935	1.396	-0.461
$2.30	12.18	15.92	0.955	1.423	-0.468
$2.34	12.18	15.92	1.545	2.195	-0.650
$2.35	12.18	17.17	1.637	2.314	-0.678
$2.36	12.81	17.17	1.789	2.529	-0.740
$2.37	12.81	30.17	1.917	2.701	-0.784
$2.38	27.17	32.34	2.813	2.927	-0.914
$2.39	29.34	32.34	2.353	3.331	-0.979
$2.40	29.34	36.76	2.573	3.574	-1.001
$2.41	32.14	36.76	2.939	4.033	-1.094
$2.42	32.14	45.41	3.261	4.401	-1.140
$2.43	40.79	53.15	3.582	4.855	-1.273
$2.44	48.81	60.81	4.031	5.448	-1.409
$2.45	59.22	67.30	4.463	5.987	-1.524
$2.46	65.71	75.72	5.055	6.660	-1.605
$2.47	75.27	100.00	5.699	7.402	-1.703
$2.48	100.00	100.00	5.827	7.572	-1.745

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	AREA = A	AREA = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	6.25	0	0	0
$2.10	6.25	6.25	0.000	0.056	-0.056
$2.26	6.25	6.25	1.022	1.078	-0.056
$2.27	6.25	8.42	1.069	1.125	-0.056
$2.28	6.25	14.67	1.125	1.201	-0.076
$2.29	12.50	15.92	1.208	1.396	-0.188
$2.30	12.50	15.92	1.229	1.423	-0.194
$2.34	12.50	15.92	1.836	2.195	-0.359
$2.35	12.50	17.17	1.929	2.314	-0.385
$2.36	27.50	17.17	2.086	2.529	-0.443
$2.37	27.50	30.17	2.361	2.701	-0.340
$2.38	48.75	32.34	2.567	2.927	-0.360
$2.39	48.75	32.34	3.176	3.331	-0.155
$2.40	48.75	36.76	3.542	3.574	-0.032
$2.41	56.25	36.76	4.151	4.033	0.118
$2.42	56.25	45.41	4.714	4.401	0.313
$2.43	56.25	53.15	5.276	4.855	0.421
$2.44	63.75	60.81	5.895	5.448	0.455
$2.45	71.25	67.30	6.469	5.987	0.482
$2.46	71.25	75.72	7.181	6.660	0.521
$2.47	77.50	100.00	7.880	7.402	0.477
$2.48	100.00	100.00	8.011	7.572	0.439

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	AREA = A	AREA = B	A-B
$2.08	6.25	0.00	0	0	0
$2.09	6.25	6.25	0.047	0.000	0.047
$2.10	6.25	6.25	0.103	0.056	0.047
$2.26	6.25	6.25	1.125	1.078	0.047
$2.27	12.50	8.42	1.172	1.125	0.047
$2.28	20.00	14.67	1.284	1.201	0.084
$2.29	20.00	15.92	1.550	1.396	0.155
$2.30	20.00	15.92	1.584	1.423	0.161
$2.34	27.50	15.92	2.554	2.195	0.359
$2.35	27.50	17.17	2.761	2.314	0.446
$2.36	48.75	17.17	3.104	2.529	0.575
$2.37	48.75	30.17	3.592	2.701	0.891
$2.38	48.75	32.34	3.958	2.927	1.030
$2.39	56.25	32.34	4.567	3.331	1.236
$2.40	56.25	36.76	4.989	3.574	1.415
$2.41	56.25	36.76	5.692	4.033	1.659
$2.42	63.75	45.41	6.254	4.401	1.853
$2.43	71.25	53.15	6.892	4.855	2.037
$2.44	71.25	60.81	7.676	5.440	2.236
$2.45	77.50	67.30	8.317	5.987	2.330
$2.46	100.00	75.72	9.892	6.660	2.432
$2.47	100.00	100.00	10.072	7.402	2.670
$2.48	100.00	100.00	10.242	7.572	2.670

Appendix C-25: Second Degree Stochastic Dominance Criterion for the March Sample Period when Wheat Quality is Not Specified

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA - A	Mala AREA - B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	0.00	0.00	0	0	0
$2.08	0.00	0.00	0.000	0.000	0.000
$2.09	0.00	0.00	0.000	0.000	0.000
$2.10	0.60	0.00	0.000	0.000	0.000
$2.23	0.60	0.00	0.079	0.000	0.079
$2.24	0.60	0.00	0.085	0.000	0.085
$2.25	0.60	0.00	0.090	0.000	0.090
$2.26	0.82	0.29	0.097	0.000	0.097
$2.27	0.82	0.29	0.106	0.003	0.103
$2.28	1.26	0.87	0.112	0.005	0.107
$2.29	1.86	0.87	0.127	0.016	0.111
$2.30	1.86	0.87	0.146	0.025	0.122
$2.31	1.86	0.87	0.165	0.033	0.131
$2.32	2.46	0.87	0.179	0.040	0.139
$2.33	2.46	0.87	0.210	0.051	0.159
$2.34	2.46	0.87	0.234	0.059	0.175
$2.35	2.90	1.45	0.259	0.068	0.191
$2.36	2.90	1.45	0.284	0.083	0.205
$2.37	3.94	2.03	0.317	0.097	0.220
$2.38	4.76	2.32	0.356	0.117	0.239
$2.39	4.98	2.61	0.404	0.141	0.263
$2.40	6.82	3.19	0.454	0.167	0.287
$2.41	10.62	6.94	0.514	0.199	0.315
$2.42	12.35	9.25	0.620	0.268	0.352
$2.43	12.57	17.61	0.756	0.370	0.386
$2.44	34.25	21.93	0.869	0.528	0.341
$2.45	48.57	29.42	1.211	0.748	0.464
$2.46	58.98	39.22	1.617	1.042	0.575
$2.47	51.12	49.31	2.116	1.426	0.690
$2.48	100.00	100.00	2.458	1.757	0.702

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA - A	Methyl AREA - B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.00	0.00	0.000	0.000	0.000
$2.08	0.00	0.00	0.000	0.000	0.000
$2.09	0.00	0.00	0.000	0.000	0.000
$2.10	0.60	0.00	0.000	0.000	0.000
$2.23	0.60	0.00	0.079	0.000	0.079
$2.24	0.60	0.29	0.085	0.000	0.085
$2.25	0.60	0.29	0.090	0.002	0.088
$2.26	0.82	0.87	0.097	0.006	0.092
$2.27	0.82	0.87	0.106	0.015	0.091
$2.28	1.26	0.87	0.112	0.021	0.091
$2.29	1.86	0.87	0.127	0.032	0.096
$2.30	1.86	0.87	0.146	0.041	0.106
$2.31	1.86	0.87	0.165	0.049	0.116
$2.32	2.46	0.87	0.179	0.056	0.123
$2.33	2.46	1.45	0.210	0.067	0.143
$2.34	2.46	1.45	0.234	0.081	0.153
$2.35	2.90	2.03	0.259	0.096	0.163
$2.36	2.90	2.32	0.284	0.116	0.172
$2.37	3.94	2.61	0.317	0.139	0.178
$2.38	4.76	3.19	0.356	0.165	0.191
$2.39	4.98	6.94	0.404	0.197	0.207
$2.40	6.82	9.25	0.454	0.267	0.187
$2.41	10.62	9.54	0.514	0.359	0.155
$2.42	12.35	21.93	0.620	0.454	0.165
$2.43	12.57	29.42	0.756	0.696	0.060
$2.44	34.25	29.42	0.869	0.961	-0.092
$2.45	48.57	39.51	1.211	1.255	-0.043
$2.46	58.98	100.00	1.617	1.650	-0.033
$2.47	51.12	100.00	2.116	2.630	-0.514
$2.48	100.00	100.00	2.283	2.880	-0.597

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA - A	Methyl AREA - B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.00	0.00	0.000	0.000	0.000
$2.08	0.00	0.00	0.000	0.000	0.000
$2.09	0.00	0.00	0.000	0.000	0.000
$2.10	0.00	0.00	0.000	0.000	0.000
$2.23	0.00	0.00	0.000	0.000	0.000
$2.24	0.00	0.29	0.000	0.000	0.000
$2.25	0.00	0.29	0.000	0.002	-0.002
$2.26	0.29	0.87	0.000	0.006	-0.006
$2.27	0.29	0.87	0.003	0.015	-0.012
$2.28	0.87	0.87	0.005	0.021	-0.016
$2.29	0.87	0.87	0.016	0.032	-0.016
$2.30	0.87	0.87	0.025	0.041	-0.016
$2.31	0.87	0.87	0.033	0.049	-0.016
$2.32	0.87	0.87	0.040	0.056	-0.016
$2.33	0.87	1.45	0.051	0.067	-0.016
$2.34	0.87	1.45	0.059	0.081	-0.022
$2.35	1.45	2.03	0.068	0.096	-0.028
$2.36	1.45	2.32	0.083	0.116	-0.033
$2.37	2.03	2.61	0.097	0.139	-0.042
$2.38	2.32	3.19	0.117	0.165	-0.048
$2.39	2.61	6.94	0.141	0.197	-0.057
$2.40	3.19	9.25	0.167	0.267	-0.100
$2.41	6.94	9.54	0.199	0.359	-0.160
$2.42	9.25	21.93	0.268	0.454	-0.186
$2.43	17.61	29.42	0.370	0.696	-0.326
$2.44	21.93	29.42	0.528	0.961	-0.432
$2.45	29.42	39.51	0.748	1.255	-0.507
$2.46	39.22	100.00	1.042	1.650	-0.608
$2.47	49.31	100.00	1.426	2.630	-1.204
$2.48	100.00	100.00	1.757	3.300	-1.543

Appendix C-25: Second Degree Stochastic Dominance Criterion for the March Sample Period When Wheat Quality Is Not Specified

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. Fumigant AREA = A	AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.26	0	0	0
$1.88	0.00	0.26	0.000	0.002	-0.002
$2.00	0.00	0.26	0.000	0.055	-0.055
$2.09	0.00	0.52	0.000	0.057	-0.057
$2.10	0.60	0.52	0.000	0.062	-0.062
$2.23	0.60	0.52	0.079	0.132	-0.052
$2.24	0.60	0.52	0.085	0.137	-0.051
$2.25	0.60	0.74	0.090	0.141	-0.051
$2.26	0.82	0.74	0.097	0.150	-0.053
$2.27	0.82	1.20	0.106	0.157	-0.052
$2.28	1.26	1.46	0.112	0.166	-0.055
$2.29	1.86	1.46	0.127	0.184	-0.057
$2.30	1.86	1.46	0.146	0.199	-0.053
$2.31	1.86	1.72	0.165	0.214	-0.049
$2.32	2.46	1.72	0.179	0.227	-0.048
$2.33	2.46	1.72	0.210	0.248	-0.039
$2.34	2.46	2.17	0.234	0.265	-0.031
$2.35	2.98	2.69	0.259	0.287	-0.028
$2.36	2.98	3.48	0.288	0.314	-0.026
$2.37	3.94	4.67	0.317	0.348	-0.031
$2.38	4.76	5.42	0.356	0.395	-0.039
$2.39	4.98	6.13	0.404	0.449	-0.045
$2.40	6.82	10.36	0.454	0.510	-0.057
$2.41	10.62	12.94	0.514	0.614	-0.100
$2.42	12.35	13.17	0.620	0.743	-0.123
$2.43	12.57	24.90	0.756	0.888	-0.132
$2.44	34.25	32.82	0.869	1.112	-0.243
$2.45	40.57	41.48	1.211	1.432	-0.221
$2.46	50.98	41.71	1.617	1.847	-0.230
$2.47	51.12	100.00	2.116	2.256	-0.140
$2.48	100.00	100.00	2.458	2.926	-0.467

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	Mala Fumigant AREA = A	AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.26	0	0	0
$1.88	0.00	0.26	0.000	0.002	-0.002
$2.00	0.00	0.26	0.000	0.055	-0.055
$2.09	0.00	0.52	0.000	0.057	-0.057
$2.10	0.00	0.52	0.000	0.062	-0.062
$2.23	0.00	0.52	0.000	0.132	-0.132
$2.24	0.00	0.52	0.000	0.137	-0.137
$2.25	0.00	0.74	0.000	0.141	-0.141
$2.26	0.29	0.74	0.000	0.150	-0.150
$2.27	0.29	1.20	0.001	0.157	-0.156
$2.28	0.87	1.46	0.005	0.166	-0.161
$2.29	0.87	1.46	0.016	0.184	-0.169
$2.30	0.87	1.46	0.025	0.199	-0.175
$2.31	0.87	1.72	0.033	0.214	-0.180
$2.32	0.87	1.72	0.040	0.227	-0.187
$2.33	0.87	1.72	0.051	0.248	-0.197
$2.34	0.87	2.17	0.059	0.265	-0.206
$2.35	1.45	2.69	0.068	0.287	-0.219
$2.36	1.45	3.48	0.083	0.314	-0.231
$2.37	2.03	4.67	0.097	0.348	-0.251
$2.38	2.32	5.42	0.117	0.395	-0.277
$2.39	2.61	6.13	0.141	0.449	-0.308
$2.40	3.19	10.36	0.167	0.510	-0.343
$2.41	6.94	12.94	0.199	0.614	-0.415
$2.42	9.25	13.17	0.268	0.743	-0.475
$2.43	17.61	24.90	0.370	0.888	-0.518
$2.44	21.93	32.82	0.528	1.112	-0.584
$2.45	29.42	41.48	0.748	1.432	-0.685
$2.46	39.22	41.71	1.042	1.847	-0.805
$2.47	49.31	100.00	1.426	2.256	-0.830
$2.48	100.00	100.00	1.757	2.926	-1.169

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl Fumigant AREA = A	AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.26	0.000	0.000	0.000
$1.88	0.00	0.26	0.000	0.002	-0.002
$2.00	0.00	0.26	0.000	0.055	-0.055
$2.09	0.00	0.52	0.000	0.057	-0.057
$2.10	0.00	0.52	0.000	0.062	-0.062
$2.23	0.00	0.52	0.000	0.132	-0.132
$2.24	0.29	0.52	0.000	0.137	-0.137
$2.25	0.29	0.74	0.002	0.141	-0.138
$2.26	0.87	0.74	0.006	0.150	-0.144
$2.27	0.87	1.20	0.015	0.157	-0.143
$2.28	0.87	1.46	0.021	0.166	-0.145
$2.29	0.87	1.46	0.032	0.184	-0.153
$2.30	0.87	1.46	0.041	0.199	-0.159
$2.31	0.87	1.72	0.049	0.214	-0.164
$2.32	0.87	1.72	0.056	0.227	-0.171
$2.33	1.45	1.72	0.067	0.248	-0.181
$2.34	1.45	2.17	0.081	0.265	-0.184
$2.35	2.03	2.69	0.096	0.287	-0.191
$2.36	2.32	3.48	0.116	0.314	-0.198
$2.37	2.61	4.67	0.139	0.348	-0.209
$2.38	3.19	5.42	0.165	0.395	-0.229
$2.39	6.94	6.13	0.197	0.449	-0.252
$2.40	9.25	10.36	0.267	0.510	-0.244
$2.41	9.54	12.94	0.359	0.614	-0.255
$2.42	21.93	13.17	0.454	0.743	-0.289
$2.43	29.42	24.90	0.696	0.888	-0.192
$2.44	29.42	32.82	0.961	1.112	-0.152
$2.45	39.51	41.48	1.255	1.432	-0.178
$2.46	100.00	41.71	1.650	1.847	-0.197
$2.47	100.00	100.00	2.630	2.256	0.374
$2.48	100.00	100.00	3.300	2.926	0.374

Appendix C-26: Second Degree Stochastic Dominance Criterion for the Farm Sample Period when Test Weight is less than or equal to 56

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt.	Prob. of Mala	Mala AREA - B	Mala AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	0.00	0.00	0	0	0
$2.23	0.00	0.00	0.000	0.000	0.000
$2.24	0.00	0.00	0.000	0.000	0.000
$2.25	0.00	0.00	0.000	0.000	0.000
$2.26	0.84	1.12	0.000	0.000	0.000
$2.30	0.84	1.12	0.037	0.049	-0.012
$2.31	0.84	1.12	0.045	0.060	-0.015
$2.32	3.97	1.12	0.051	0.068	-0.017
$2.33	3.97	1.12	0.101	0.042	0.030
$2.34	3.97	1.12	0.141	0.094	0.047
$2.35	4.91	2.24	0.180	0.105	0.075
$2.36	4.91	2.24	0.229	0.127	0.102
$2.37	4.91	2.24	0.270	0.150	0.120
$2.38	5.75	3.36	0.328	0.172	0.156
$2.39	6.59	4.48	0.385	0.206	0.179
$2.40	7.43	5.60	0.451	0.250	0.201
$2.41	14.78	11.22	0.525	0.306	0.219
$2.42	17.31	14.59	0.673	0.419	0.254
$2.43	45.97	40.43	0.863	0.579	0.284
$2.44	61.74	57.28	1.277	0.943	0.334
$2.45	73.30	68.52	1.895	1.516	0.379
$2.46	76.46	75.26	2.628	2.201	0.427
$2.47	78.99	78.63	3.291	2.765	0.436
$2.48	100.00	100.00	3.778	3.339	0.438

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt.	Prob. of Methyl	Methyl AREA - B	Methyl AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.00	0.00	0.000	0.000	0.000
$2.23	0.00	0.00	0.000	0.000	0.000
$2.24	0.00	1.12	0.000	0.000	0.000
$2.25	0.00	1.12	0.000	0.000	-0.000
$2.26	0.84	1.12	0.000	0.018	-0.018
$2.30	0.84	1.12	0.037	0.067	-0.031
$2.31	0.84	1.12	0.045	0.078	-0.033
$2.32	3.97	1.12	0.051	0.087	-0.036
$2.33	3.97	2.24	0.101	0.101	0.000
$2.34	3.97	2.24	0.141	0.123	0.017
$2.35	4.91	2.24	0.180	0.146	0.035
$2.36	4.91	3.36	0.229	0.168	0.061
$2.37	4.91	4.48	0.270	0.202	0.077
$2.38	5.75	5.60	0.328	0.246	0.081
$2.39	6.59	11.22	0.385	0.382	0.003
$2.40	7.43	14.59	0.451	0.415	0.036
$2.41	14.78	40.43	0.525	0.561	-0.035
$2.42	17.31	57.28	0.673	0.965	-0.292
$2.43	45.97	68.52	0.863	1.595	-0.731
$2.44	61.74	68.52	1.277	2.212	-0.934
$2.45	73.30	78.63	1.895	2.897	-1.002
$2.46	76.46	100.00	2.628	3.683	-1.056
$2.47	78.99	100.00	3.291	4.433	-1.232
$2.48	100.00	100.00	3.778	5.163	-1.385

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA - B	Methyl AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.00	0.00	0.000	0.000	0.000
$2.23	0.00	0.00	0.000	0.000	0.000
$2.24	0.00	1.12	0.000	0.000	0.000
$2.25	0.00	1.12	0.000	0.000	-0.000
$2.26	1.12	1.12	0.000	0.018	-0.018
$2.30	1.12	1.12	0.049	0.067	-0.018
$2.31	1.12	1.12	0.060	0.078	-0.018
$2.32	1.12	1.12	0.068	0.087	-0.018
$2.33	1.12	2.24	0.042	0.101	-0.018
$2.34	1.12	2.24	0.094	0.123	-0.030
$2.35	2.24	2.24	0.105	0.146	-0.041
$2.36	2.24	3.36	0.127	0.168	-0.041
$2.37	2.24	4.48	0.150	0.202	-0.052
$2.38	3.36	5.60	0.172	0.246	-0.074
$2.39	4.48	11.22	0.206	0.302	-0.097
$2.40	5.60	14.59	0.250	0.415	-0.164
$2.41	11.22	40.43	0.306	0.561	-0.254
$2.42	14.59	57.28	0.419	0.965	-0.546
$2.43	40.43	68.52	0.579	1.595	-1.016
$2.44	57.28	68.52	0.943	2.212	-1.269
$2.45	68.52	78.63	1.516	2.897	-1.381
$2.46	75.26	100.00	2.201	3.683	-1.482
$2.47	78.63	100.00	2.765	4.433	-1.668
$2.48	100.00	100.00	3.339	5.163	-1.824

Appendix C-26: Second Degree Stochastic Dominance Criterion for the March Sample Period When Test Weight is less than or equal to 56

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.58	0	0	0
$1.88	0.00	0.58	0.000	0.005	-0.005
$2.23	0.00	0.58	0.000	0.212	-0.212
$2.24	0.00	0.58	0.000	0.218	-0.218
$2.25	0.00	1.46	0.000	0.222	-0.222
$2.26	0.84	1.46	0.000	0.235	-0.235
$2.30	0.84	1.46	0.037	0.298	-0.262
$2.31	0.84	2.84	0.045	0.313	-0.268
$2.32	3.97	2.84	0.051	0.334	-0.283
$2.33	3.97	2.84	0.101	0.370	-0.269
$2.34	3.97	3.71	0.141	0.398	-0.256
$2.35	4.91	3.71	0.180	0.435	-0.255
$2.36	4.91	3.71	0.229	0.473	-0.243
$2.37	4.91	5.16	0.278	0.510	-0.231
$2.38	5.75	6.61	0.328	0.561	-0.234
$2.39	6.59	7.48	0.385	0.627	-0.242
$2.40	7.43	13.24	0.451	0.702	-0.251
$2.41	14.78	17.61	0.525	0.835	-0.309
$2.42	17.31	43.05	0.673	1.011	-0.338
$2.43	45.97	58.12	0.863	1.484	-0.621
$2.44	61.74	69.42	1.277	2.007	-0.730
$2.45	73.30	75.24	1.895	2.782	-0.887
$2.46	76.46	78.44	2.628	3.454	-0.826
$2.47	78.99	100.00	3.201	4.042	-0.841
$2.48	100.00	100.00	3.778	4.772	-0.995

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	Mala AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.58	0	0	0
$1.88	0.00	0.58	0.000	0.005	-0.005
$2.23	0.00	0.58	0.000	0.212	-0.212
$2.24	0.00	0.58	0.000	0.218	-0.218
$2.25	0.00	1.46	0.000	0.222	-0.222
$2.26	1.12	1.46	0.000	0.235	-0.235
$2.30	1.12	1.46	0.049	0.298	-0.250
$2.31	1.12	2.84	0.060	0.313	-0.253
$2.32	1.12	2.84	0.068	0.334	-0.266
$2.33	1.12	2.84	0.082	0.370	-0.288
$2.34	1.12	3.71	0.094	0.398	-0.305
$2.35	2.24	3.71	0.105	0.435	-0.331
$2.36	2.24	3.71	0.127	0.473	-0.345
$2.37	2.24	5.16	0.150	0.510	-0.360
$2.38	3.36	6.61	0.172	0.561	-0.389
$2.39	4.48	7.48	0.206	0.627	-0.422
$2.40	5.60	13.24	0.250	0.702	-0.452
$2.41	11.22	17.61	0.306	0.835	-0.528
$2.42	14.59	43.05	0.419	1.011	-0.592
$2.43	40.43	58.12	0.579	1.484	-0.905
$2.44	57.28	69.42	0.943	2.007	-1.064
$2.45	68.52	75.24	1.516	2.782	-1.186
$2.46	75.26	78.44	2.201	3.454	-1.253
$2.47	78.63	100.00	2.765	4.042	-1.277
$2.48	100.00	100.00	3.339	4.772	-1.433

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.58	0.000	0.000	0.000
$1.88	0.00	0.58	0.000	0.005	-0.005
$2.23	0.00	0.58	0.000	0.212	-0.212
$2.24	1.12	0.58	0.000	0.218	-0.218
$2.25	1.12	1.46	0.008	0.222	-0.214
$2.26	1.12	1.46	0.018	0.235	-0.217
$2.30	1.12	1.46	0.067	0.298	-0.231
$2.31	1.12	2.84	0.078	0.313	-0.235
$2.32	1.12	2.84	0.087	0.334	-0.248
$2.33	2.24	2.84	0.101	0.370	-0.269
$2.34	2.24	3.71	0.123	0.398	-0.275
$2.35	2.24	3.71	0.146	0.435	-0.290
$2.36	3.36	3.71	0.168	0.473	-0.305
$2.37	4.48	5.16	0.202	0.510	-0.308
$2.38	5.60	6.61	0.246	0.561	-0.315
$2.39	11.22	7.48	0.382	0.627	-0.325
$2.40	14.59	13.24	0.415	0.702	-0.288
$2.41	40.43	17.61	0.561	0.835	-0.274
$2.42	57.28	43.05	0.965	1.011	-0.046
$2.43	68.52	58.12	1.595	1.484	0.111
$2.44	68.52	69.42	2.212	2.007	0.204
$2.45	78.63	75.24	2.897	2.782	0.115
$2.46	100.00	78.44	3.683	3.454	0.229
$2.47	100.00	100.00	4.433	4.042	0.391
$2.48	100.00	100.00	5.163	4.772	0.391

Appendix C-27: Second Degree Stochastic Dominance Criterion for the March Sample Period when Test Weight is greater than 56 and less than or equal to 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Malathion	No Trt. AREA = A	Malathion AREA = B	A-B
42.04	0.00	0.00	0	0	0
42.09	0.00	0.00	0	0	0
42.10	2.00	0.00	0	0	0
42.26	2.00	0.00	0.340	0.000	0.340
42.27	2.00	0.00	0.356	0.000	0.356
42.28	3.69	2.15	0.375	0.000	0.375
42.33	3.69	2.15	0.572	0.115	0.457
42.34	3.69	2.15	0.609	0.137	0.473
42.35	4.50	3.23	0.646	0.158	0.488
42.36	4.50	3.23	0.691	0.190	0.501
42.37	8.19	5.48	0.725	0.215	0.510
42.38	8.19	5.48	0.827	0.283	0.544
42.39	8.19	5.48	0.881	0.319	0.562
42.40	9.00	6.56	0.991	0.393	0.599
42.41	16.48	10.86	1.041	0.458	0.623
42.42	19.63	15.16	1.242	0.565	0.677
42.43	20.44	17.32	1.442	0.719	0.723
42.44	20.44	17.32	1.647	0.893	0.754
42.45	32.54	32.37	1.851	1.066	0.785
42.46	63.12	59.25	2.176	1.389	0.787
42.47	63.93	75.38	2.795	1.970	0.825
42.48	100.00	100.00	2.984	2.898	0.085

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
42.04	0.00	0.00	0	0	0
42.09	0.00	0.00	0.000	0.000	0.000
42.10	2.00	0.00	0.000	0.000	0.000
42.26	2.00	2.15	0.340	0.000	0.340
42.27	2.00	2.15	0.356	0.016	0.340
42.28	3.69	2.15	0.375	0.035	0.339
42.33	3.69	3.23	0.572	0.151	0.422
42.34	3.69	3.23	0.609	0.183	0.427
42.35	4.50	5.48	0.646	0.215	0.431
42.36	4.50	5.48	0.691	0.270	0.421
42.37	8.19	5.48	0.725	0.311	0.414
42.38	8.19	6.56	0.827	0.379	0.448
42.39	8.19	10.86	0.909	0.445	0.464
42.40	9.00	15.16	0.991	0.554	0.437
42.41	16.48	16.24	1.041	0.705	0.376
42.42	19.63	16.24	1.242	0.864	0.377
42.43	20.44	32.37	1.442	1.030	0.412
42.44	20.44	59.25	1.647	1.354	0.293
42.45	32.54	68.33	1.851	1.946	-0.095
42.46	63.12	100.00	2.176	2.550	-0.373
42.47	63.93	100.00	2.795	3.530	-0.735
42.48	100.00	100.00	2.984	3.700	-0.716

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Malathion	Prob. of Methyl	Malathion AREA = A	Methyl AREA = B	A-B
42.04	0.00	0.00	0	0	0
42.09	0.00	0.00	0.000	0.000	0.000
42.10	0.00	0.00	0.000	0.000	0.000
42.26	0.00	2.15	0.000	0.000	-0.034
42.27	0.00	2.15	0.000	0.016	-0.034
42.28	2.15	2.15	0.000	0.035	-0.034
42.33	2.15	3.23	0.115	0.151	-0.034
42.34	2.15	3.23	0.137	0.183	-0.034
42.35	3.23	5.48	0.158	0.215	-0.034
42.36	3.23	5.48	0.190	0.270	-0.055
42.37	5.48	5.48	0.215	0.311	-0.231
42.38	5.48	6.56	0.283	0.379	-0.499
42.39	5.48	10.86	0.338	0.445	-0.499
42.40	6.56	15.16	0.393	0.554	-0.648
42.41	10.86	16.24	0.458	0.705	-0.797
42.42	15.16	16.24	0.565	0.864	-0.797
42.43	17.32	32.37	0.719	1.030	-0.797
42.44	17.32	59.25	0.893	1.354	-0.984
42.45	32.37	68.33	1.066	1.946	-1.115
42.46	59.25	100.00	1.389	2.550	-1.220
42.47	75.38	100.00	1.970	3.530	-1.596
42.48	100.00	100.00	2.898	3.704	-1.661

Appendix C-27: Second Degree Stochastic Dominance Criterion for the March Sample Period when Test Weight is greater than 56 and less than or equal to 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	Area = A	Area = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	0.93	0	0	0
$2.10	2.08	0.93	0.000	0.008	-0.008
$2.26	2.08	0.93	0.348	0.160	0.181
$2.27	2.08	2.60	0.356	0.167	0.190
$2.28	3.69	2.60	0.375	0.190	0.185
$2.33	3.69	2.60	0.572	0.329	0.243
$2.34	3.69	3.44	0.609	0.355	0.254
$2.35	4.50	5.15	0.646	0.390	0.257
$2.36	4.50	7.75	0.691	0.441	0.250
$2.37	8.19	9.46	0.725	0.499	0.226
$2.38	8.19	9.46	0.827	0.618	0.210
$2.39	8.19	10.30	0.909	0.712	0.197
$2.40	9.00	15.49	0.991	0.815	0.176
$2.41	16.40	18.83	1.081	0.970	0.111
$2.42	19.63	19.67	1.242	1.155	0.087
$2.43	20.44	19.67	1.442	1.355	0.087
$2.44	20.44	33.93	1.647	1.552	0.095
$2.45	32.54	60.32	1.851	1.891	-0.040
$2.46	63.12	61.16	2.176	2.494	-0.318
$2.47	63.93	100.00	2.795	3.094	-0.299
$2.48	100.00	100.00	2.984	3.264	-0.360

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	Malathion Area = A	Fumigant Area = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	0.93	0	0	0
$2.10	0.00	0.93	0.000	0.008	-0.008
$2.26	0.00	0.93	0.000	0.160	-0.160
$2.27	0.00	2.60	0.000	0.167	-0.167
$2.28	2.15	2.60	0.000	0.190	-0.190
$2.33	2.15	2.60	0.115	0.329	-0.214
$2.34	2.15	3.44	0.137	0.355	-0.219
$2.35	3.23	5.15	0.158	0.390	-0.232
$2.36	3.23	7.75	0.190	0.441	-0.251
$2.37	5.48	9.46	0.215	0.499	-0.285
$2.38	5.48	9.46	0.283	0.618	-0.334
$2.39	5.48	10.30	0.338	0.712	-0.374
$2.40	6.56	15.49	0.393	0.815	-0.422
$2.41	10.86	18.83	0.458	0.970	-0.512
$2.42	15.16	19.67	0.565	1.155	-0.590
$2.43	17.32	19.67	0.719	1.355	-0.636
$2.44	17.32	33.93	0.893	1.552	-0.659
$2.45	32.37	60.32	1.066	1.891	-0.825
$2.46	59.25	61.16	1.389	2.494	-1.105
$2.47	75.38	100.00	1.970	3.094	-1.124
$2.48	100.00	100.00	2.098	3.264	-1.166

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl Area = A	Fumigant Area = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	0.93	0.000	0.000	0.000
$2.10	0.00	0.93	0.000	0.008	-0.008
$2.26	2.15	0.93	0.000	0.160	-0.160
$2.27	2.15	2.60	0.016	0.167	-0.150
$2.28	2.15	2.60	0.035	0.190	-0.155
$2.33	3.23	2.60	0.151	0.329	-0.179
$2.34	3.23	3.44	0.183	0.355	-0.172
$2.35	5.48	5.15	0.215	0.390	-0.175
$2.36	5.48	7.75	0.270	0.441	-0.171
$2.37	5.48	9.46	0.311	0.499	-0.188
$2.38	6.56	9.46	0.379	0.618	-0.238
$2.39	10.86	10.30	0.445	0.712	-0.267
$2.40	15.16	15.49	0.554	0.815	-0.261
$2.41	16.24	18.83	0.705	0.970	-0.265
$2.42	16.24	19.67	0.864	1.155	-0.290
$2.43	32.37	19.67	1.030	1.355	-0.325
$2.44	59.25	33.93	1.354	1.552	-0.198
$2.45	60.33	60.32	1.946	1.891	0.055
$2.46	100.00	61.16	2.550	2.494	0.055
$2.47	100.00	100.00	3.530	3.094	0.436
$2.48	100.00	100.00	3.700	3.264	0.436

Appendix C-28: Second Degree Stochastic Dominance Criterion for the March Sample Period when Test weight is greater than 58

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt.	Prob. of Malathion	AREA + A	AREA + B	A-B
42.27	0.00	0.00	0	0	0
42.28	0.00	0.00	0	0	0
42.29	1.14	0.00	0	0	0
42.30	1.14	0.00	0.042	0.000	0.042
42.36	1.14	0.00	0.000	0.000	0.000
42.37	1.14	0.00	0.091	0.000	0.091
42.38	2.28	0.00	0.103	0.000	0.103
42.39	2.28	0.00	0.126	0.000	0.126
42.40	3.42	0.00	0.148	0.000	0.148
42.41	5.24	2.42	0.183	0.000	0.183
42.42	5.70	3.03	0.222	0.018	0.204
42.43	7.52	5.45	0.293	0.056	0.237
42.44	7.52	5.45	0.368	0.111	0.258
42.45	8.43	6.66	0.444	0.165	0.279
42.46	9.80	8.48	0.528	0.232	0.296
42.47	10.67	10.78	0.624	0.315	0.309
42.48	100.00	100.00	0.656	0.347	0.309

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt.	Prob. of Methyl	AREA + A	AREA + B	A-B
42.27	0.00	0.00	0	0	0
42.28	0.00	0.00	0.000	0.000	0.000
42.29	1.14	0.00	0.000	0.000	0.000
42.30	1.14	0.00	0.042	0.000	0.042
42.36	1.14	0.00	0.000	0.000	0.000
42.37	1.14	0.00	0.091	0.000	0.091
42.38	2.28	0.00	0.103	0.000	0.103
42.39	2.28	2.42	0.126	0.000	0.126
42.40	3.42	3.03	0.148	0.024	0.124
42.41	5.24	5.45	0.183	0.055	0.128
42.42	5.70	5.45	0.222	0.095	0.127
42.43	7.52	6.66	0.293	0.164	0.130
42.44	7.52	8.48	0.368	0.238	0.130
42.45	8.43	10.78	0.444	0.315	0.129
42.46	9.80	100.00	0.528	0.583	0.055
42.47	10.67	100.00	0.624	1.483	-0.859
42.48	100.00	100.00	0.656	1.653	-0.997

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	AREA + A	AREA + B	A-B
42.27	0.00	0.00	0	0	0
42.28	0.00	0.51	0	0	0
42.29	1.14	0.51	0.000	0.006	-0.006
42.30	1.14	0.51	0.042	0.007	-0.005
42.36	1.14	0.51	0.000	0.042	-0.042
42.37	1.14	1.82	0.091	0.047	0.044
42.38	2.28	2.83	0.103	0.057	0.046
42.39	2.28	2.54	0.126	0.078	0.048
42.40	3.42	6.44	0.148	0.103	0.045
42.41	5.24	6.91	0.183	0.167	0.015
42.42	5.70	9.80	0.222	0.219	0.003
42.43	7.52	9.80	0.293	0.342	-0.049
42.44	7.52	10.74	0.368	0.440	-0.071
42.45	8.43	12.16	0.444	0.547	-0.104
42.46	9.80	20.68	0.528	0.669	-0.141
42.47	10.67	100.00	0.624	0.871	-0.248
42.48	100.00	100.00	0.656	1.041	-0.386

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	AREA + A	AREA + B	A-B
42.27	0.00	0.00	0	0	0
42.28	0.00	0.51	0	0	0
42.29	0.00	0.51	0.000	0.006	-0.006
42.30	0.00	0.51	0.000	0.007	-0.007
42.36	0.00	0.51	0.000	0.042	-0.042
42.37	0.00	1.82	0.000	0.047	-0.047
42.38	0.00	2.83	0.000	0.057	-0.057
42.39	0.00	2.54	0.000	0.078	-0.078
42.40	0.00	6.44	0.000	0.103	-0.103
42.41	2.42	6.91	0.000	0.167	-0.167
42.42	3.03	9.80	0.018	0.219	-0.201
42.43	5.45	9.80	0.056	0.342	-0.286
42.44	5.45	10.74	0.111	0.440	-0.329
42.45	6.66	12.16	0.165	0.547	-0.382
42.46	8.48	20.68	0.232	0.669	-0.437
42.47	10.78	100.00	0.315	0.871	-0.557
42.48	100.00	100.00	0.347	1.041	-0.695

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	AREA + A	AREA + B	A-B
42.27	0.00	0.00	0	0	0
42.28	0.00	0.51	0.000	0.000	0.000
42.29	0.00	0.51	0.000	0.006	-0.006
42.30	0.00	0.51	0.000	0.007	-0.007
42.36	0.00	0.51	0.000	0.042	-0.042
42.37	0.00	1.82	0.000	0.047	-0.047
42.38	0.00	2.83	0.000	0.057	-0.057
42.39	2.42	2.54	0.000	0.078	-0.078
42.40	3.03	6.44	0.026	0.103	-0.079
42.41	5.45	6.91	0.055	0.167	-0.113
42.42	5.45	9.80	0.095	0.219	-0.124
42.43	6.66	9.80	0.164	0.342	-0.178
42.44	8.48	10.74	0.238	0.440	-0.201
42.45	10.78	12.16	0.315	0.547	-0.232
42.46	100.00	20.68	0.583	0.669	-0.166
42.47	100.00	100.00	1.483	0.871	0.611
42.48	100.00	100.00	1.653	1.041	0.611

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Malathion	Prob. of Methyl	AREA + A	AREA + B	A-B
42.27	0.00	0.00	0	0	0
42.28	0.00	0.00	0.000	0.000	0.000
42.29	0.00	0.00	0.000	0.000	0.000
42.30	0.00	0.00	0.000	0.000	0.000
42.36	0.00	0.00	0.000	0.000	0.000
42.37	0.00	0.00	0.000	0.000	0.000
42.38	0.00	0.00	0.000	0.000	0.000
42.39	0.00	2.42	0.000	0.000	0.000
42.40	0.00	3.03	0.000	0.024	-0.024
42.41	2.42	5.45	0.000	0.055	-0.055
42.42	3.03	5.45	0.018	0.095	-0.077
42.43	5.45	6.66	0.056	0.164	-0.107
42.44	5.45	8.48	0.111	0.238	-0.128
42.45	6.66	10.78	0.165	0.315	-0.150
42.46	8.48	100.00	0.232	0.503	-0.271
42.47	10.78	100.00	0.315	1.483	-1.168
42.48	100.00	100.00	0.347	1.653	-1.306

Appendix C-29: Second Degree Stochastic Dominance Criterion for the March Sample Period when Moisture Content is Less Than or Equal to 18

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prop. of No Trt	Prop. of Mala	AREA = A	AREA = B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	0.00	0	0	0
$2.41	2.03	2.70	0	0	0
$2.42	4.06	5.40	0.020	0.027	-0.007
$2.43	10.14	14.51	0.061	0.081	-0.020
$2.44	12.17	17.21	0.162	0.226	-0.064
$2.45	16.23	22.62	0.284	0.398	-0.114
$2.46	24.34	33.43	0.446	0.624	-0.178
$2.47	26.37	36.13	0.685	0.952	-0.267
$2.48	100.00	100.00	0.730	1.013	-0.284

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prop. of No Trt	Prop. of Methyl	AREA = A	AREA = B	A-B
$2.39	0.00	2.70	0	0	0
$2.40	0.00	5.40	0.000	0.027	-0.027
$2.41	2.03	14.51	0.000	0.081	-0.081
$2.42	4.06	17.21	0.020	17.190	-17.170
$2.43	10.14	22.62	0.041	22.579	-22.539
$2.44	12.17	33.43	0.101	33.329	-33.227
$2.45	16.23	36.13	0.122	36.008	-35.887
$2.46	24.34	100.00	0.162	99.838	-99.675
$2.47	26.37	100.00	0.239	99.761	-99.523
$2.48	100.00	100.00	0.045	99.955	-99.910

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prop. of No Trt	Prop. of Fumigant	AREA = A	AREA = B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	2.10	0	0	0
$2.41	2.03	5.79	0.000	0.021	-0.021
$2.42	4.06	12.10	0.020	0.079	-0.059
$2.43	10.14	14.20	0.061	0.200	-0.139
$2.44	12.17	28.00	0.162	0.342	-0.180
$2.45	16.23	28.41	0.284	0.542	-0.258
$2.46	24.34	38.51	0.446	0.826	-0.380
$2.47	26.37	100.00	0.685	1.125	-0.440
$2.48	100.00	100.00	0.730	1.295	-0.565

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prop. of Mala	Prop. of Fumigant	AREA = A	AREA = B	A-B
$2.39	0.00	0.00	0	0	0
$2.40	0.00	2.10	0	0	0
$2.41	2.70	5.79	0.000	0.021	-0.021
$2.42	5.40	12.10	0.027	0.079	-0.052
$2.43	14.51	14.20	0.081	0.200	-0.119
$2.44	17.21	28.00	0.226	0.342	-0.116
$2.45	22.62	28.41	0.398	0.542	-0.144
$2.46	33.43	38.51	0.624	0.826	-0.202
$2.47	36.13	100.00	0.952	1.125	-0.173
$2.48	100.00	100.00	1.013	1.295	-0.282

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prop. of Methyl	Prop. of Fumigant	AREA = A	AREA = B	A-B
$2.39	2.70	0.00	0	0	0
$2.40	5.40	2.10	0.027	0.000	0.027
$2.41	14.51	5.79	0.081	0.021	0.060
$2.42	17.21	12.10	0.226	0.079	0.147
$2.43	22.62	14.20	0.398	0.200	0.198
$2.44	33.43	28.00	0.624	0.342	0.283
$2.45	36.13	28.41	0.959	0.542	0.417
$2.46	100.00	38.51	1.320	0.826	0.494
$2.47	100.00	100.00	2.380	1.125	1.175
$2.48	100.00	100.00	2.470	1.295	1.175

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prop. of Mala	Prop. of Methyl	AREA = A	AREA = B	A-B
$2.39	0.00	2.70	0	0	0
$2.40	0.00	5.40	0.000	0.027	-0.027
$2.41	2.70	14.51	0.000	0.081	-0.081
$2.42	5.40	17.21	0.027	0.226	-0.199
$2.43	14.51	22.62	0.081	0.398	-0.317
$2.44	17.21	33.43	0.226	0.624	-0.398
$2.45	22.62	36.13	0.398	0.959	-0.561
$2.46	33.43	100.00	0.624	1.320	-0.696
$2.47	36.13	100.00	0.952	2.300	-1.348
$2.48	100.00	100.00	1.013	2.470	-1.457

Appendix C-30. Second Degree Stochastic Dominance Criterion for the March Sample Period when Moisture Content is greater than 10 and less than or equal to 11

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Malathion	No Trt. AREA = A	Malathion AREA = B	A-B
$2.26	0.00	0.00	0	0	0
$2.27	0.00	0.00	0	0	0
$2.28	0.47	0.62	0.000	0.000	0.000
$2.30	0.47	0.62	0.011	0.015	-0.004
$2.31	0.47	0.62	0.016	0.021	-0.005
$2.32	1.51	0.62	0.019	0.025	-0.006
$2.33	1.51	0.62	0.038	0.033	0.005
$2.34	1.51	0.62	0.053	0.039	0.014
$2.35	2.43	1.85	0.068	0.046	0.023
$2.36	2.43	1.85	0.092	0.064	0.028
$2.37	3.94	2.47	0.111	0.078	0.033
$2.38	3.94	2.47	0.146	0.100	0.046
$2.39	3.94	2.47	0.199	0.134	0.066
$2.40	3.94	2.47	0.239	0.158	0.081
$2.41	8.84	6.17	0.270	0.183	0.095
$2.42	11.58	9.87	0.366	0.245	0.122
$2.43	17.25	16.04	0.482	0.343	0.139
$2.44	21.53	28.36	0.654	0.504	0.151
$2.45	39.85	29.00	0.870	0.707	0.162
$2.46	48.29	37.82	1.260	0.997	0.263
$2.47	58.39	58.60	1.733	1.360	0.372
$2.48	100.00	100.00	1.832	1.446	0.386

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA = A	Methyl AREA = B	A-B
$2.26	0.00	0.62	0	0	0
$2.27	0.00	0.62	0	0.005	-0.005
$2.28	0.47	0.62	0.000	0.010	-0.010
$2.30	0.47	0.62	0.011	0.025	-0.014
$2.31	0.47	0.62	0.016	0.031	-0.015
$2.32	1.51	0.62	0.019	0.036	-0.017
$2.33	1.51	1.85	0.038	0.043	-0.005
$2.34	1.51	1.85	0.053	0.062	-0.009
$2.35	2.43	2.47	0.068	0.080	-0.012
$2.36	2.43	2.47	0.092	0.105	-0.013
$2.37	3.94	2.47	0.111	0.124	-0.013
$2.38	3.94	2.47	0.146	0.146	0.000
$2.39	3.94	6.17	0.199	0.179	0.020
$2.40	3.94	9.87	0.239	0.241	-0.002
$2.41	8.84	16.04	0.270	0.340	-0.061
$2.42	11.58	20.36	0.366	0.500	-0.134
$2.43	17.25	29.00	0.482	0.704	-0.222
$2.44	21.53	37.82	0.654	0.994	-0.339
$2.45	39.85	58.60	0.870	1.364	-0.494
$2.46	48.29	100.00	1.260	1.878	-0.618
$2.47	58.39	100.00	1.733	2.850	-1.117
$2.48	100.00	100.00	1.832	3.020	-1.188

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Malathion	Prob. of Methyl	Malathion AREA = A	Methyl AREA = B	A-B
$2.26	0.00	0.62	0	0	0
$2.27	0.00	0.62	0	0.005	-0.005
$2.28	0.62	0.62	0.000	0.010	-0.010
$2.30	0.62	0.62	0.015	0.025	-0.010
$2.31	0.62	0.62	0.021	0.031	-0.010
$2.32	0.62	0.62	0.025	0.036	-0.010
$2.33	0.62	1.85	0.033	0.043	-0.010
$2.34	0.62	1.85	0.039	0.062	-0.023
$2.35	1.85	2.47	0.046	0.080	-0.035
$2.36	1.85	2.47	0.064	0.105	-0.041
$2.37	2.47	2.47	0.078	0.124	-0.046
$2.38	2.47	2.47	0.100	0.146	-0.046
$2.39	2.47	6.17	0.134	0.179	-0.046
$2.40	2.47	9.87	0.158	0.241	-0.083
$2.41	6.17	16.04	0.183	0.340	-0.157
$2.42	9.87	20.36	0.245	0.500	-0.255
$2.43	16.04	29.00	0.343	0.704	-0.360
$2.44	28.36	37.82	0.504	0.994	-0.490
$2.45	29.00	58.60	0.707	1.364	-0.656
$2.46	37.82	100.00	0.997	1.870	-0.872
$2.47	58.60	100.00	1.360	2.850	-1.490
$2.48	100.00	100.00	1.446	3.020	-1.574

Appendix C-38: Second Degree Stochastic Dominance Criterion for the March Sample Period When Moisture Content is greater than 10 and less than or equal to 11

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. Fumigant AREA = A	AREA = B	A-B
$2.26	0.00	0.00	0	0	0
$2.27	0.00	0.48	0	0	0
$2.28	0.47	0.48	0.000	0.004	-0.004
$2.30	0.47	0.48	0.011	0.016	-0.005
$2.31	0.47	0.94	0.016	0.020	-0.005
$2.32	1.51	0.94	0.019	0.028	-0.009
$2.33	1.51	0.94	0.038	0.039	-0.001
$2.34	1.51	1.90	0.053	0.049	0.004
$2.35	2.43	3.29	0.068	0.068	0.000
$2.36	2.43	4.23	0.092	0.101	-0.008
$2.37	3.94	4.92	0.111	0.132	-0.022
$2.38	3.94	4.92	0.146	0.177	-0.030
$2.39	3.94	4.92	0.199	0.243	-0.044
$2.40	3.94	9.42	0.239	0.292	-0.053
$2.41	8.80	13.69	0.278	0.386	-0.108
$2.42	11.58	20.64	0.366	0.523	-0.157
$2.43	17.25	25.15	0.482	0.730	-0.248
$2.44	21.53	33.82	0.654	0.981	-0.327
$2.45	39.85	41.34	0.870	1.311	-0.442
$2.46	48.20	51.90	1.260	1.725	-0.465
$2.47	58.39	100.00	1.733	2.233	-0.501
$2.48	100.00	100.00	1.832	2.403	-0.572

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	Malathion Fumigant AREA = A	AREA = B	A-B
$2.26	0.00	0.00	0	0	0
$2.27	0.00	0.48	0	0	0
$2.28	0.62	0.48	0.000	0.004	-0.004
$2.30	0.62	0.48	0.015	0.016	-0.001
$2.31	0.62	0.94	0.021	0.020	0.000
$2.32	0.62	0.94	0.025	0.028	-0.002
$2.33	0.62	0.94	0.033	0.039	-0.006
$2.34	0.62	1.90	0.039	0.049	-0.009
$2.35	1.85	3.29	0.046	0.068	-0.022
$2.36	1.85	4.23	0.064	0.101	-0.037
$2.37	2.47	4.92	0.078	0.132	-0.054
$2.38	2.47	4.92	0.100	0.177	-0.076
$2.39	2.47	4.92	0.134	0.243	-0.110
$2.40	2.47	9.42	0.158	0.292	-0.134
$2.41	6.17	13.69	0.183	0.386	-0.204
$2.42	9.87	20.64	0.245	0.523	-0.279
$2.43	16.04	25.15	0.343	0.730	-0.386
$2.44	20.36	33.82	0.504	0.981	-0.478
$2.45	29.00	41.34	0.707	1.311	-0.604
$2.46	37.82	51.90	0.997	1.725	-0.728
$2.47	50.60	100.00	1.360	2.233	-0.873
$2.48	100.00	100.00	1.446	2.403	-0.957

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl Fumigant AREA = A	AREA = B	A-B
$2.26	0.62	0.00	0	0	0
$2.27	0.62	0.48	0.005	0.000	0.005
$2.28	0.62	0.48	0.010	0.004	0.006
$2.30	0.62	0.48	0.025	0.016	0.009
$2.31	0.62	0.94	0.031	0.020	0.011
$2.32	0.62	0.94	0.036	0.028	0.008
$2.33	1.85	0.94	0.043	0.039	0.004
$2.34	1.85	1.90	0.062	0.049	0.013
$2.35	2.47	3.29	0.080	0.068	0.013
$2.36	2.47	4.23	0.105	0.101	0.004
$2.37	2.47	4.92	0.124	0.132	-0.009
$2.38	2.47	4.92	0.146	0.177	-0.031
$2.39	6.17	4.92	0.179	0.243	-0.064
$2.40	9.87	9.42	0.241	0.292	-0.051
$2.41	16.04	13.69	0.340	0.386	-0.047
$2.42	20.36	20.64	0.500	0.523	-0.023
$2.43	29.00	25.15	0.704	0.730	-0.026
$2.44	37.82	33.82	0.994	0.981	0.012
$2.45	50.60	41.34	1.364	1.311	0.052
$2.46	100.00	51.90	1.870	1.725	0.145
$2.47	100.00	100.00	2.850	2.233	0.616
$2.48	100.00	100.00	3.020	2.403	0.616

Appendix C-3: Second Degree Stochastic Dominance Criterion for the March Sample Period when Moisture Content is greater than 11 and less than or equal to 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Mala	No Trt. AREA + B	Mala AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0	0	0
$1.88	0.00	0.00	0	0	0
$2.23	0.00	0.00	0	0	0
$2.24	0.00	0.00	0	0	0
$2.25	0.00	0.00	0	0	0
$2.26	0.62	0.82	0	0	0
$2.33	0.62	0.82	0.045	0.060	-0.015
$2.34	0.62	0.82	0.050	0.066	-0.017
$2.35	0.62	0.82	0.058	0.077	-0.019
$2.36	0.62	0.82	0.064	0.085	-0.021
$2.37	1.24	1.64	0.070	0.093	-0.023
$2.38	1.24	1.64	0.082	0.109	-0.027
$2.39	1.24	1.64	0.095	0.126	-0.031
$2.40	3.97	3.28	0.107	0.142	-0.035
$2.41	9.55	7.38	0.147	0.175	-0.028
$2.42	10.17	8.20	0.242	0.249	-0.007
$2.43	10.79	10.04	0.354	0.339	0.015
$2.44	25.82	21.32	0.451	0.501	-0.050
$2.45	29.94	27.88	0.701	0.715	-0.013
$2.46	43.55	39.36	1.001	0.993	0.007
$2.47	44.17	48.38	1.428	1.379	0.049
$2.48	100.00	100.00	1.503	1.461	0.041

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA + B	Methyl AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.00	0.00	0.000	0.000	0.000
$2.23	0.00	0.00	0.000	0.000	0.000
$2.24	0.00	0.82	0.000	0.000	0.000
$2.25	0.00	0.82	0.000	0.006	-0.006
$2.26	0.62	0.82	0.000	0.014	-0.014
$2.33	0.62	0.82	0.045	0.074	-0.029
$2.34	0.62	0.82	0.050	0.080	-0.030
$2.35	0.62	1.64	0.058	0.090	-0.033
$2.36	0.62	1.64	0.064	0.107	-0.043
$2.37	1.24	1.64	0.070	0.123	-0.053
$2.38	1.24	3.28	0.082	0.139	-0.057
$2.39	1.24	7.38	0.095	0.172	-0.077
$2.40	3.97	8.20	0.107	0.246	-0.139
$2.41	9.55	9.02	0.147	0.328	-0.181
$2.42	10.17	21.32	0.242	0.418	-0.176
$2.43	10.79	27.88	0.354	0.653	-0.299
$2.44	25.82	27.88	0.451	0.904	-0.452
$2.45	29.94	48.18	0.701	1.182	-0.481
$2.46	43.55	100.00	1.001	1.584	-0.583
$2.47	44.17	100.00	1.428	2.564	-1.137
$2.48	100.00	100.00	1.503	2.734	-1.231

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Mala	Prob. of Methyl	Mala AREA + B	Methyl AREA + B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.00	0.000	0.000	0.000
$1.88	0.00	0.00	0.000	0.000	0.000
$2.23	0.00	0.00	0.000	0.000	0.000
$2.24	0.00	0.82	0.000	0.000	0.000
$2.25	0.00	0.82	0.000	0.006	-0.006
$2.26	0.82	0.82	0.000	0.014	-0.014
$2.33	0.82	0.82	0.060	0.074	-0.014
$2.34	0.82	0.82	0.066	0.080	-0.014
$2.35	0.82	1.64	0.077	0.090	-0.014
$2.36	0.82	1.64	0.085	0.107	-0.022
$2.37	1.64	1.64	0.093	0.123	-0.030
$2.38	1.64	3.28	0.109	0.139	-0.030
$2.39	1.64	7.38	0.126	0.172	-0.046
$2.40	3.28	8.20	0.142	0.246	-0.104
$2.41	7.38	9.02	0.175	0.328	-0.153
$2.42	8.20	21.32	0.249	0.418	-0.169
$2.43	10.04	27.88	0.339	0.653	-0.314
$2.44	21.32	27.88	0.501	0.904	-0.402
$2.45	27.88	48.18	0.715	1.182	-0.468
$2.46	39.36	100.00	0.993	1.584	-0.591
$2.47	48.38	100.00	1.379	2.564	-1.185
$2.48	100.00	100.00	1.461	2.734	-1.273

Appendix C-31: Second Degree Stochastic Dominance Criterion for the March Sample Period when Moisture Content is greater than 11 and less than or equal to 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.65	0	0	0
$1.88	0.00	0.65	0.000	0.006	-0.006
$2.23	0.00	0.65	0.000	0.237	-0.237
$2.24	0.00	0.65	0.000	0.243	-0.243
$2.25	0.00	1.29	0.000	0.248	-0.248
$2.26	0.62	1.29	0.000	0.260	-0.260
$2.33	0.62	1.29	0.045	0.354	-0.309
$2.34	0.62	1.29	0.050	0.364	-0.314
$2.35	0.62	1.29	0.058	0.380	-0.323
$2.36	0.62	1.93	0.064	0.393	-0.329
$2.37	1.24	2.58	0.078	0.412	-0.343
$2.38	1.24	3.89	0.082	0.438	-0.356
$2.39	1.24	6.28	0.095	0.477	-0.382
$2.40	3.97	11.24	0.107	0.540	-0.433
$2.41	9.55	11.88	0.147	0.652	-0.506
$2.42	10.17	12.52	0.242	0.771	-0.529
$2.43	10.79	25.62	0.354	0.909	-0.555
$2.44	25.82	31.37	0.451	1.139	-0.688
$2.45	29.94	43.17	0.701	1.453	-0.752
$2.46	43.55	43.81	1.001	1.885	-0.884
$2.47	44.17	100.00	1.428	2.314	-0.887
$2.48	100.00	100.00	1.503	2.484	-0.981

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Malathion	Prob. of Fumigant	Malathion AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.65	0	0	0
$1.88	0.00	0.65	0.000	0.006	-0.006
$2.23	0.00	0.65	0.000	0.237	-0.237
$2.24	0.00	0.65	0.000	0.243	-0.243
$2.25	0.00	1.29	0.000	0.248	-0.248
$2.26	0.82	1.29	0.000	0.260	-0.260
$2.33	0.82	1.29	0.060	0.354	-0.294
$2.34	0.82	1.29	0.066	0.364	-0.298
$2.35	0.82	1.29	0.077	0.380	-0.304
$2.36	0.82	1.93	0.085	0.393	-0.308
$2.37	1.64	2.58	0.093	0.412	-0.319
$2.38	1.64	3.89	0.109	0.438	-0.329
$2.39	1.64	6.28	0.126	0.477	-0.351
$2.40	3.28	11.24	0.142	0.540	-0.398
$2.41	7.38	11.88	0.175	0.652	-0.477
$2.42	8.20	12.52	0.249	0.771	-0.522
$2.43	18.04	25.62	0.339	0.909	-0.570
$2.44	21.32	31.37	0.501	1.139	-0.638
$2.45	27.88	43.17	0.715	1.453	-0.739
$2.46	39.36	43.81	0.993	1.885	-0.891
$2.47	48.38	100.00	1.379	2.314	-0.935
$2.48	100.00	100.00	1.461	2.484	-1.023

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl AREA = A	Fumigant AREA = B	A-B
$1.86	0.00	0.00	0	0	0
$1.87	0.00	0.65	0.000	0.000	0.000
$1.88	0.00	0.65	0.000	0.006	-0.006
$2.23	0.00	0.65	0.000	0.237	-0.237
$2.24	0.82	0.65	0.000	0.243	-0.243
$2.25	0.82	1.29	0.006	0.248	-0.242
$2.26	0.82	1.29	0.014	0.260	-0.246
$2.33	0.82	1.29	0.074	0.354	-0.281
$2.34	0.82	1.29	0.080	0.364	-0.284
$2.35	1.64	1.29	0.090	0.380	-0.290
$2.36	1.64	1.93	0.107	0.393	-0.287
$2.37	1.64	2.58	0.123	0.412	-0.289
$2.38	3.28	3.89	0.139	0.438	-0.299
$2.39	7.38	6.28	0.172	0.477	-0.305
$2.40	8.20	11.24	0.246	0.540	-0.294
$2.41	9.02	11.88	0.328	0.652	-0.324
$2.42	21.32	12.52	0.418	0.771	-0.353
$2.43	27.88	25.62	0.653	0.909	-0.256
$2.44	27.88	31.37	0.904	1.139	-0.236
$2.45	40.18	43.17	1.182	1.453	-0.271
$2.46	100.00	43.81	1.584	1.885	-0.301
$2.47	100.00	100.00	2.564	2.314	0.250
$2.48	100.00	100.00	2.734	2.484	0.250

Appendix C-12: Second Degree Stochastic Dominance Criterion for the Harsh Sample Period when Moisture Content is greater than 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - MALATHION

OUTCOMES	Prob. of No Trt	Prob. of Malathion	No Trt. AREA + Δ	Malathion AREA + Δ	Δ-Δ
$2.04	0.00	0.00	0	0	0
$2.09	0.00	0.00	0	0	0
$2.10	6.25	0.00	0	0	0
$2.26	6.25	0.00	1.022	0.000	1.022
$2.27	6.25	0.00	1.069	0.000	1.069
$2.28	9.14	3.85	1.125	0.000	1.125
$2.29	15.39	3.85	1.247	0.051	1.195
$2.30	15.39	3.85	1.273	0.058	1.215
$2.34	15.39	3.85	2.019	0.244	1.775
$2.35	15.39	3.85	2.135	0.273	1.861
$2.36	15.39	3.85	2.327	0.321	2.005
$2.37	15.39	3.85	2.481	0.360	2.121
$2.38	24.53	7.70	2.596	0.389	2.207
$2.39	27.42	11.55	2.903	0.485	2.418
$2.40	27.42	11.55	3.109	0.572	2.537
$2.41	30.31	15.40	3.451	0.716	2.735
$2.42	30.31	15.40	3.754	0.870	2.884
$2.43	41.85	30.78	4.057	1.024	3.033
$2.44	50.51	42.32	4.518	1.363	3.155
$2.45	56.28	50.01	4.972	1.744	3.229
$2.46	64.94	61.56	5.535	2.244	3.292
$2.47	74.08	65.41	6.172	2.847	3.325
$2.48	100.00	100.00	6.298	2.958	3.339

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of No Trt	Prob. of Methyl	No Trt. AREA + Δ	Methyl AREA + Δ	Δ-Δ
$2.04	0.00	0.00	0	0	0
$2.09	0.00	0.00	0.000	0.000	0.000
$2.10	6.25	0.00	0.000	0.000	0.000
$2.26	6.25	3.85	1.022	0.000	1.022
$2.27	6.25	3.85	1.069	0.029	1.040
$2.28	9.14	3.85	1.125	0.064	1.061
$2.29	15.39	3.85	1.247	0.115	1.132
$2.30	15.39	3.85	1.273	0.121	1.151
$2.34	15.39	3.85	2.019	0.308	1.711
$2.35	15.39	3.85	2.135	0.337	1.798
$2.36	15.39	7.70	2.327	0.385	1.942
$2.37	15.39	11.55	2.481	0.462	2.019
$2.38	24.53	11.55	2.596	0.549	2.048
$2.39	27.42	15.40	2.903	0.693	2.210
$2.40	27.42	15.40	3.109	0.809	2.300
$2.41	30.31	30.78	3.451	1.001	2.450
$2.42	30.31	42.32	3.754	1.309	2.446
$2.43	41.85	50.01	4.057	1.732	2.325
$2.44	50.51	61.56	4.518	2.282	2.236
$2.45	56.28	65.41	4.972	2.836	2.136
$2.46	64.94	100.00	5.535	3.490	2.045
$2.47	74.08	100.00	6.172	4.470	1.701
$2.48	100.00	100.00	6.298	4.640	1.657

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND PROTECTANT - CHLORPYRIFOS METHYL

OUTCOMES	Prob. of Malathion	Prob. of Methyl	Malathion AREA + Δ	Methyl AREA + Δ	Δ-Δ
$2.04	0.00	0.00	0	0	0
$2.09	0.00	0.00	0.000	0.000	0.000
$2.10	0.00	0.00	0.000	0.000	0.000
$2.26	0.00	3.85	0.000	0.000	0.000
$2.27	0.00	3.85	0.000	0.029	-0.029
$2.28	3.85	3.85	0.000	0.064	-0.064
$2.29	3.85	3.85	0.051	0.115	-0.064
$2.30	3.85	3.85	0.058	0.121	-0.064
$2.34	3.85	3.85	0.244	0.308	-0.064
$2.35	3.85	3.85	0.273	0.337	-0.064
$2.36	3.85	7.70	0.321	0.385	-0.064
$2.37	3.85	11.55	0.360	0.462	-0.102
$2.38	7.70	11.55	0.389	0.549	-0.160
$2.39	11.55	15.40	0.485	0.693	-0.208
$2.40	11.55	15.40	0.572	0.809	-0.237
$2.41	15.40	30.78	0.716	1.001	-0.285
$2.42	15.40	42.32	0.870	1.309	-0.439
$2.43	30.78	50.01	1.024	1.732	-0.708
$2.44	42.32	61.56	1.363	2.282	-0.919
$2.45	50.01	65.41	1.744	2.836	-1.093
$2.46	61.56	100.00	2.244	3.490	-1.247
$2.47	65.41	100.00	2.847	4.470	-1.623
$2.48	100.00	100.00	2.958	4.640	-1.682

Appendix C-32: Second Degree Stochastic Dominance Criterion for the March Sample Period when Moisture Content is greater than 12

STOCHASTIC DOMINANCE COMPARISON
BETWEEN NO TREATMENT AND FUMIGANT

OUTCOMES	Prob. of No Trt.	Prob. of Fumigant	No Trt. AREA = A	Fumigant AREA = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	2.78	0	0	0
$2.10	6.25	2.78	0.000	0.025	-0.025
$2.26	6.25	2.78	1.022	0.479	0.543
$2.27	6.25	5.77	1.069	0.500	0.569
$2.28	9.14	8.55	1.125	0.552	0.573
$2.29	15.39	8.55	1.247	0.666	0.581
$2.30	15.39	8.55	1.273	0.680	0.593
$2.34	15.39	8.55	2.019	1.095	0.924
$2.35	15.39	8.55	2.135	1.159	0.976
$2.36	15.39	8.55	2.327	1.266	1.061
$2.37	15.39	18.02	2.481	1.351	1.129
$2.38	24.53	21.01	2.596	1.487	1.110
$2.39	27.42	21.01	2.903	1.749	1.154
$2.40	27.42	24.00	3.109	1.907	1.202
$2.41	30.31	24.00	3.451	2.207	1.245
$2.42	30.31	35.96	3.754	2.447	1.308
$2.43	41.85	44.94	4.057	2.806	1.251
$2.44	50.51	54.62	4.518	3.301	1.217
$2.45	56.28	63.60	4.972	3.792	1.180
$2.46	64.94	69.37	5.535	4.428	1.107
$2.47	74.88	100.00	6.172	5.108	1.064
$2.48	100.00	100.00	6.298	5.278	1.019

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - MALATHION AND FUMIGANT

OUTCOMES	Prob. of Mala	Prob. of Fumigant	Mala AREA = A	Fumigant AREA = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	2.78	0	0	0
$2.10	0.00	2.78	0.000	0.025	-0.025
$2.26	0.00	2.78	0.000	0.479	-0.479
$2.27	0.00	5.77	0.000	0.500	-0.500
$2.28	3.85	8.55	0.000	0.552	-0.552
$2.29	3.85	8.55	0.051	0.666	-0.614
$2.30	3.85	8.55	0.058	0.680	-0.622
$2.34	3.85	8.55	0.244	1.095	-0.850
$2.35	3.85	8.55	0.273	1.159	-0.886
$2.36	3.85	8.55	0.321	1.266	-0.944
$2.37	3.85	18.02	0.360	1.351	-0.991
$2.38	7.70	21.01	0.389	1.487	-1.098
$2.39	11.55	21.01	0.485	1.749	-1.264
$2.40	11.55	24.00	0.572	1.907	-1.335
$2.41	15.40	24.00	0.716	2.207	-1.491
$2.42	15.40	35.96	0.870	2.447	-1.577
$2.43	30.78	44.94	1.024	2.806	-1.782
$2.44	42.32	54.62	1.363	3.301	-1.938
$2.45	50.01	63.60	1.744	3.792	-2.049
$2.46	61.56	69.37	2.244	4.428	-2.185
$2.47	65.41	100.00	2.847	5.108	-2.261
$2.48	100.00	100.00	2.958	5.278	-2.320

STOCHASTIC DOMINANCE COMPARISON
BETWEEN PROTECTANT - CHLORPYRIFOS METHYL AND FUMIGANT

OUTCOMES	Prob. of Methyl	Prob. of Fumigant	Methyl AREA = A	Fumigant AREA = B	A-B
$2.08	0.00	0.00	0	0	0
$2.09	0.00	2.78	0.000	0.000	0.000
$2.10	0.00	2.78	0.000	0.025	-0.025
$2.26	3.85	2.78	0.000	0.479	-0.479
$2.27	3.85	5.77	0.029	0.500	-0.471
$2.28	3.85	8.55	0.064	0.552	-0.488
$2.29	3.85	8.55	0.115	0.666	-0.551
$2.30	3.85	8.55	0.121	0.680	-0.559
$2.34	3.85	8.55	0.308	1.095	-0.787
$2.35	3.85	8.55	0.337	1.159	-0.822
$2.36	7.70	8.55	0.385	1.266	-0.881
$2.37	11.55	18.02	0.462	1.351	-0.889
$2.38	11.55	21.01	0.549	1.487	-0.938
$2.39	15.40	21.01	0.693	1.749	-1.056
$2.40	15.40	24.00	0.849	1.907	-1.058
$2.41	30.78	24.00	1.001	2.207	-1.206
$2.42	42.32	35.96	1.309	2.447	-1.138
$2.43	50.01	44.94	1.732	2.806	-1.074
$2.44	61.56	54.62	2.282	3.301	-1.019
$2.45	65.41	63.60	2.836	3.792	-0.956
$2.46	100.00	69.37	3.490	4.428	-0.938
$2.47	100.00	100.00	4.478	5.108	-0.638
$2.48	100.00	100.00	4.640	5.278	-0.638

AN ECONOMIC ANALYSIS OF PRODUCER DECISIONS REGARDING INSECT CONTROL IN STORED GRAIN - A STOCHASTIC DOMINANCE APPROACH

by

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ABSTRACT

As of December 1987, Kansas producers held over 75 million bushels of wheat in farm storage while 342 million bushels were stored in elevators. The quantity of grain in storage has increased over the past several years, primarily because production has increased more than demand in the market. Because of this, concern about the maintenance of the quality in stored grain has grown. In particular, the affect of insect activity on grain quality when grain is stored for long periods of time has become a major concern. Therefore, the purpose of this study is to analyze the decisions the producer must make regarding control of insects in stored grain. The decision made must be one that will be economical in terms of treatment cost, control of insects in grain, and potential discounts for damaged grain.

Basically, three data sets were combined in order to study the selection of treatment strategies. The first data set was from a study of on-farm storage where 79 bins were monitored. Samples were taken from bins every two months. Over time, the number of bins sampled decreased because of grain movement. The samples were analyzed for wheat quality, insect infestation and types of treatments used. The farmers strategies were grouped into four types of treatment methods. Essentially, the farm samples provided data on treatment methods used by the producers, insect counts, and the dates the samples were collected.

The second data set included samples collected by elevator operators from wheat that was marketed by producers in the area. These samples were analyzed for wheat quality conditions and insect counts.

It was found that test weight and moisture content were a significant contributor to the producer receiving a discount. This data provided the information needed to calculate the discounts likely for insect damage.

The third data set included the cost of the treatments used in this analysis. The costs were gathered from interviewing 49 grain elevators, cooperatives and agricultural services.

A second degree stochastic dominance criterion was used to compare different treatment strategies. Strategies were compared for four different marketing points and several different wheat qualities. Minimum/No treatment and malathion methods were most frequently found to remain in the efficient set for each of the four sample periods examined in this study. In more than half of the comparisons, both minimum/no treatment and malathion methods were in the efficient set which means they would be selected by risk averse individuals. In addition, even though fumigation was used by more producers in the field, it was selected to remain in the efficient set only 25 percent of the time.

Several limitations were discussed when evaluating which treatment method the producer would select to use on his stored grain. First, producers may treat stored grain because of a history of insect infestation on their particular farm. In this case, producers would apply a treatment because they expect to have problems from past experiences. On the other hand, producers that do not have a history of insect problems in their stored grain may not apply a treatment. Essentially, without gathering historical data on each bin sampled or carefully monitoring bins with similar conditions, this factor could

not be appropriately added into this analysis.

Secondly, it was assumed that consistent discounts were charged to different producers by country elevators, terminal elevators, and even within the elevators themselves. It was discovered by interviews and the data sample available, that this assumption may not be entirely appropriate. Because of this, the producer may have other decisions to make in addition to his selection of a treatment to use to reduce the probability of receiving a lower net income. These decisions may include the choice of an elevator for delivery of his grain and comparison of transportation costs to possible discounts when selecting a market for his grain.