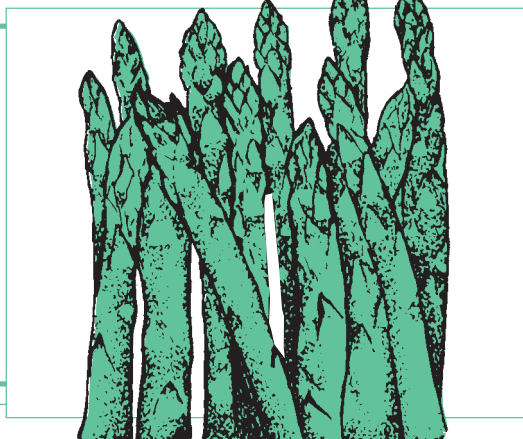


ASPARAGUS



BY
CHARLES W. MARR
NED TISSERAT

A valuable vegetable crop, asparagus is becoming increasingly popular with consumers. Most commercial asparagus is grown in California, Washington and Michigan. Commercial asparagus has been grown in the Arkansas River Valley and the Kansas River Valley of Kansas, but the crop is adapted statewide.

Asparagus is a perennial crop that should produce actively for 15 to 20 years, but with a gradual reduction in spear size in older plantings unless good care is provided. An average yield of 3,000 pounds per acre per year is an attainable goal over most of the life of a planting. Yield depends on “food” reserves stored in the crown from the previous year’s growth. Maintaining a strong, healthy fern and providing adequate weed control, fertility, and water are necessary to assure high yields. Too long a harvest period reduces fern growth and various types of environmental and biological stresses reduce yields the next year.

Careful handling, refrigeration, and rapid transportation to market are required to maintain quality in this highly perishable vegetable. Potential markets should be explored prior to planting. These include wholesale or retail grocers, produce companies, farmers markets or similar outlets. Information regarding quantities, packaging or bunching requirements and delivery schedules should be obtained before planting.

Asparagus can be part of a “pick-your-own” operation. A constant supply from late April to mid-June, with a daily harvest (less frequent if temperatures are cool) will overlap spring strawberry

harvest. The harvest labor cost for asparagus is high and “pick-your-own” reduces these costs.

Soils and Locations

Asparagus grows in a wide variety of locations or soil types, but deep, well-drained soils are best. The 8- to 10-foot rooting depth of asparagus plants makes shallow soils or soils with a high water table particularly unsuitable. In southeastern Kansas, lime should be applied prior to planting, as soil pH below 6.0 is too low for asparagus. When correcting soil pH, aim for a level of 6.5 to 6.8. There is probably little advantage in lowering pH unless levels above pH 8.5 are observed.

Asparagus will grow on either upland or “bottom” soils. Very sandy areas (where shifting sand at the soil surface may occur in windy spring periods) may cause problems from damage to spears. “Sand blasted” spears will develop a curved shape with scarred surfaces.

Also critical is choosing a location relatively free of serious weed problems. Bermudagrass, bindweed, Johnsongrass, or other perennial problem weeds should be controlled prior to planting asparagus.

Fertilization and Soil Improvement

As with many perennial crops that occupy a site for several years, soil preparation and fertilization are especially important. A soil test will indicate if lime and other macronutrients are needed. For best results, rely on a soil test and treat accordingly.

Before planting crowns, supply 40 to 50 pounds per acre (lbs/ A) of a high phosphate fertilizer in planting furrows and mix into the soil, if possible, before setting crowns.

Varieties

There are only a few varieties of asparagus, and the differences among them are not clearly defined. Mary Washington and an improved strain, Waltham Washington, have been standard varieties for many years. However, uniformity is sometimes a problem in these older strains.

New strains with a tolerance for fusarium crown rot and improved rust tolerance have been developed in recent years. Hybrid and F_2 seed from some of these offer possibilities. California “800 series” (F_2) and UC 157 (F_1 or F_2) are the most common newer strains suggested for Midwest plantings. Additional hybrids with increased vigor and yield potential are currently being evaluated. All male varieties including Jersey Giant, Jersey Gem, Jersey Knight and Jersey General are productive and vigorous. Newer strains of crosses of New Jersey and California hybrids, Atlas and Apollo, show good promise.

Growing Versus Purchasing Crowns

For small plantings, purchasing 1-year-old crowns from a nursery or crown dealer is probably the best alternative. Most commercial plantings use 1-year-old crowns. Approximately 4,000 to 5,000 crowns per acre will be needed.

For larger plantings, growing your own crowns (which takes one additional year) is suggested. A 1-acre asparagus nursery should produce about 45,000 crowns, or enough to plant 8 to 10 acres the following year.

Plant the crown nursery in an area where asparagus has never been grown. Sandy sites are best, so crowns can be dug easily. Recent Kansas research has shown that March to April is a good time to plant. Fertilize the soil according to a soil test with 30 to 40 lbs/ A of nitrogen (N) at planting and an additional 50 to 60 lbs/ A of N side-dressed in late June or early July. Plan for one plant every 4 to 6 inches, in rows 3 feet apart. Because asparagus is rather poor in germination, a seeding rate of one

seed every 2 to 3 inches in the row should allow for poor germination and occasional skips that may occur. One to 1½ pounds of seed should produce crowns to set 1 acre of asparagus. Asparagus seed is very slow to germinate, requiring three to four weeks to emerge. Cultivate between rows and hoe in-row weeds as necessary.

Digging and Setting Crowns

Crowns can be dug in early to mid-March, just prior to field setting and before buds start to grow. They can be dug by hand or mechanically with a moldboard plow or potato digger. Don’t allow crowns to dry out and avoid large piles, which may “heat” in the center. Store at 35° to 40°F in moist sawdust or peat moss if planting can’t be done immediately. Be sure to grade or select uniformity in crowns and discard excessively small or damaged plants.

Mid-March to mid-April is ideal for setting asparagus crowns. Place crowns in the bottom of a trench or wide-bottomed furrow 8 to 10 inches deep. Apply a band of phosphate fertilizer in the furrow. Space rows 5 to 6 feet apart, with crowns set 18 to 24 inches apart in the row. Row distance will depend on equipment used.

Handle the crowns carefully and avoid stepping on them after they are placed in the rows. Cover immediately with 2 to 3 inches of soil and gradually fill the trenches through the first growing season, so the furrows are completely filled to ground level.

Fertilization

First year or newly planted crowns. Apply 30 to 40 lbs/ A of nitrogen in late spring as a side dressing along the row. No more fertilizer will be needed.

Established or older plantings. Fertilization is necessary on all established beds, but is especially important during the second and third year when it sets the pattern of production for many years. Broadcast 200 to 250 lbs/ A of 18-46-0 fertilizer and disc lightly into the soil in early spring of the second year before any spears emerge. Side-dress with 20 to 30 lbs/ A of 18-46-0 in early spring and 40 to 50 lbs/ A of N at the end of the harvest period or, 75 to 80 lbs/ A of N at the end of the harvest period if a soil test indicates that phosphate and potash levels are high.

Weed Control

No single practice increases success with asparagus more than a good weed control program. A combination of cultivation and herbicide is necessary, with “spot” treatment of weedy areas that may develop in future years.

On established plantings (after the first year) recommended weed control measures are:

Diuron (Karmex)—apply in early spring or use “split” application in early spring and immediately after the harvest period on light or sandy soils.

Metribuzin (Sencor or Lexone)—apply split application 14 days before harvest in early spring and then after harvest (follow label directions for split application).

Napropamide (Devrinol)—may be more effective for grass control. Lightly incorporate or water in for best results. Follow label directions.

2,4-D amine (several)—for broadleaf weed control after harvest.

Sethoxydim (Poast)—apply for grass control as the crop is growing. Follow label directions. (Use with crop oil concentrate.)

Tillage after the harvest period should be avoided, if possible, as it interferes with the rapid growth of asparagus fern during the summer. When discing, take care not to damage crowns. Wheels on discs can be partially held down to prevent deep discing and damage. As long as the herbicide program is effectively controlling weed growth, little cultivation should be used. Fern residue will serve as a good mulch.

Summer Care

Summer fern growth builds carbohydrate reserves in the root system. Vigorous, long periods of fern growth are essential. Water is important in dry periods, especially in the first three years following planting. The large root system of asparagus makes it a fairly drought-tolerant crop. In stress seasons, a thorough, deep watering may be needed, but not as often as for many other vegetable crops. However, it is necessary to apply enough water so that it moves deep into the soil reserve.

Harvest

If spring discing is done, a harrow or “drag” should be used to level any roughness in the field. A level, smooth field will provide an easier and more uniform harvest.

A newly planted crop should not be harvested the first season. In the second year, harvest until spears get spindly (about two weeks). By the third year, an eight-week harvest can be started and continued for the life of the planting. When spears become smaller in diameter, harvest should be stopped. Newer hybrid varieties can be harvested longer the second year, increasing grower income before spear size becomes too small (less than $\frac{3}{8}$ inch diameter).

Spear emergence depends on soil temperatures in the spring, with a slightly earlier emergence in sandy soils. In most years, some spears will begin to develop by mid-April. Most (over two-thirds) of the crop will be harvested in the first four weeks or until mid-May. An additional four weeks (until mid-June) can be harvested safely in a healthy planting. Harvest should stop by mid-June.

Cut spears with a “fish tail” knife 1 or 2 inches below the soil level or snap off spears 6 to 10 inches long. Most producers snap asparagus, as the harvesting operation can be done faster. A daily or alternate-day harvest may be necessary in warm periods. In cooler weather, two or three harvests per week may be all that is needed. Harvest spears while the tips are still tight and before they begin to open. About two hours of labor is required to hand harvest 1 acre of asparagus at each cutting. One person could handle a 2- to 4-acre planting with little assistance. Probably most Kansas plantings are best kept in the 1- to 5-acre range.

Asparagus is a highly perishable crop. It must be removed from the field, washed (if necessary), and placed in refrigerated storage with high humidity until ready for sale. For market asparagus, sort, place on a cutting board, and trim to a uniform length. For fresh market sales, it is helpful to lay the spears in one direction while harvesting to simplify bunching later. Trimmed bunches may vary from 7 to 10½ inches in length and weigh from ½ to 2 pounds. A 1- or ½-pound bunch size is most common. Bunches are usually wrapped with rubber

bands. Asparagus can be kept in refrigerated storage up to two weeks until sold.

Harvest Aids

Several types of harvest “aids” can be helpful. A low slung harvest cart allows pickers to harvest without stooping. A low, flat “sled” with a sharp blade on the front pulled across the soil (allowing the spears to fall onto the sled) is used in some areas. However, it requires a smooth, clean field. Large-scale mechanical harvesters are used in asparagus growing areas. They are expensive to buy unless a 25- to 30-acre operation is considered. This is not feasible for most small plantings.

Estimating spear growth

Asparagus spears grow more rapidly as the temperature increases. Also, taller spears grow more rapidly than shorter ones. Spear growth per day can be estimated by a formula:

$$\text{Spear growth / day} = .137 \times \text{average temp. F} + .31 \times \text{spear height (inches)} - 7.44$$

Example: most spears in a field are 6 inches tall; forecast is 80° day / 60° night temperatures:
80° / 60° = 70°F average temperature.

$$\begin{aligned} \text{Spear growth} &= .137 \times 69 + .31 \times 6 - 7.44 \\ &= 9.59 + 1.86 = 7.44 = \text{approx. 4 inches growth} \\ & \text{(6" spears will be 10" tomorrow)} \end{aligned}$$

Another example: most spears are 6 inches tall; forecast is 70° day / 50° night, or average temperature of 60°F:

$$\begin{aligned} \text{Spear growth} &= .137 \times 60 + .31 \times 6 - 7.44 = \\ & 8.22 + 1.86 - 7.44 = 2\frac{1}{2} \text{ inches (6" spears will be } \\ & 8\frac{1}{2} \text{ by tomorrow)} \end{aligned}$$

Obviously, not all spears in a field will be a uniform height, and it may be difficult to predict weather. However, this formula may be useful in management decisions on cutting asparagus or determining the consequences for waiting.

U-Pick Asparagus

Labor costs can be reduced by allowing customers to “pick their own.” However, pickers must be encouraged to harvest carefully, without damaging the crowns with cutting knives. Any spears not harvested must be removed to keep the bed producing. Careful supervision and perhaps a cutting or snapping “demonstration” may be necessary with each customer. Pick-your-own asparagus should be sold by the pound.

Insects

Asparagus beetles are the major insect pests. There are two species, both about ¼ inch long.

Common: Adults have blue and red markings; adults and larvae feed on spears and ferns. Eggs are dark colored, usually seen in linear rows on spears.

Spotted: Appear later; larvae feed inside berries. About two generations per year.

Monitoring and action thresholds: Routinely inspect 15 to 20 crowns at four different field locations for the presence of adults, eggs, or larvae.

During harvest, 5 to 10 adults per 100 crowns, or 2 percent of spears infested with eggs, warrants control. The postharvest action threshold is 5 to 10 adult beetles / 10 crowns.

Control during harvest (harvest restrictions):

+carbaryl (Sevin 80% SP, 1¼ lbs / A (1 day)
or 50% WP, 2 lbs / A (1 day) OR

malathion 57% EC, 2 pts / A (1 day) OR

rotenone 1% dust, 25-30 (1 day) OR

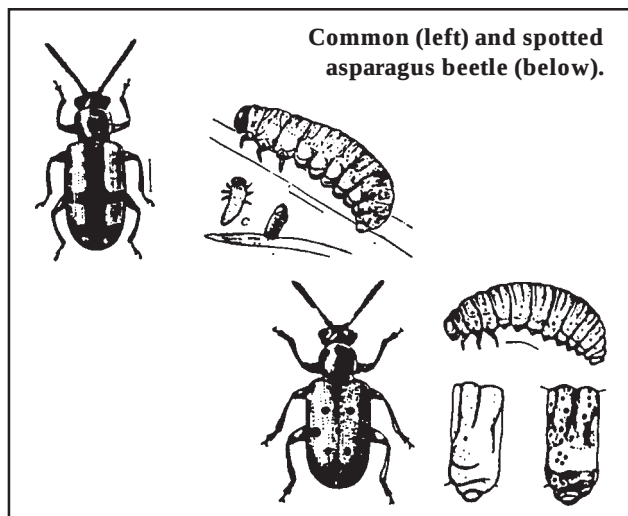
permethrin (Ambush or Pounce) Ambush
(25 WP or 2EC) (1 day), Pounce (3.2 EC)
(3 days)

Control after harvest, during seedling and fern growth (harvest restrictions):

carbaryl (Sevin 80% SP, 2½ to 5 lbs / A; 50% WP,
4 lbs / A) OR

rotenone 1% dust, 25-30 lbs / A OR

permethrin (Ambush or Pounce) Ambush
(25 WP or 2EC) (1 day); Pounce (3.2 EC)
(3 days) OR



*methomyl (Lannate, Nudrin) 1.8 L, 2 – 4 pts / A
90% SP, ½ – 1 lb / A OR

methoxychlor 50% WP, 2 lbs / A

Notes: Use lower rates for seedlings.

* Highly poisonous. Use all safety precautions.
+ Do not repeat carbaryl within 3 days.

The minor insect pests of asparagus—cutworms, aphids and plant bugs—are rarely numerous enough to warrant control. If necessary, most chemicals used for asparagus beetles will control cutworms (except malathion) and plant bugs. Malathion will control aphids. *Read the label for recommended rates and applications.*

Diseases

Asparagus rust

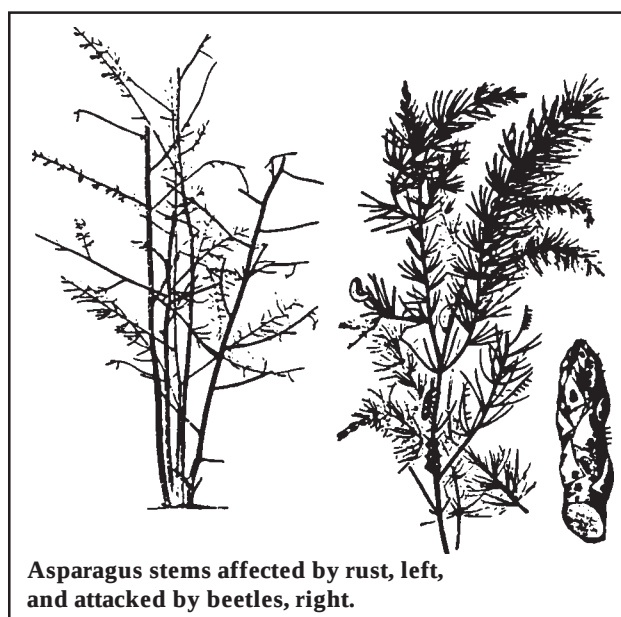
Incitant: Fungus *Puccinia asparagi*

Symptoms: Asparagus rust can be a problem in Kansas, although the widespread use of tolerant or resistant cultivars has decreased the severity of this disease. Rust can cause premature defoliation and death of the ferns, reduced yields, and increased incidence of root and crown diseases. Symptoms generally occur after the cutting season. Small yellow spots first appear on the needle-like foliage, but, because of their site, they often are overlooked. Later, erumpent, elliptical pustules form on both shoots and needles. The pustules first appear brick red and dusty; later in the season they turn black. The disease is most severe during periods of abun-

dant rainfall or conditions of high relative humidity and heavy dew formation.

Control: The most effective way to control asparagus rust is to plant resistant varieties. Older cultivars, such as Mary Washington and Waltham, show tolerance to rust. Many of the newer asparagus hybrids are reported to have field resistance to this disease, although extensive screening to rust in the Midwest has not been done. Field trials in Wichita, Kansas, during 1984 indicated variation in the susceptibility of the newer hybrids to rust. New Jersey and Maryland hybrids were very resistant, whereas those from Washington were susceptible. California hybrids (including UC 157) were intermediate. Some blocks of the California hybrids had unacceptable levels of rust. Similar trends in rust resistance have been reported from Washington state. All hybrids should be carefully monitored for rust during the growing season regardless of their reported disease reaction.

If rust-susceptible cultivars are planted, consider increasing the spacing between rows and align rows toward the prevailing winds. Do not allow any fern growth until after harvest and destroy volunteer asparagus plants in the vicinity. Begin fungicide applications on susceptible varieties soon after harvest or at the first signs of the disease and continue on a seven- to 10-day interval until the disease is brought under control. Fungicide protection is critical for susceptible varieties during wet,



humid weather. The following fungicides are labeled for the control of asparagus rust.

Fungicides to control asparagus rust (rate/acre):

Maneb (Manzate, Dithane M-22, Kocide Maneb)
(2–3 lbs / A)

Maneb plus zinc ion (Manzate D, Dithane, M-22
Special) (2–3 lbs / A)

Maneb plus zinc ion flowable (1.6–2.4 qts / A)

Mancozeb (Manzate 200, Dithane M-45) (2 lbs / A)

Mancozeb flowable (Manzate 200 F, Dithane
M-45 F) (1.7 qts / A)

Metiram (Polyram) (2–3 lbs / A)

Crown and stem rot

Incitants: Fungi *Fusarium moniliforme* *Fusarium oxysporum* f. sp. *asparagi*

Symptoms: Crown rot is one of the most important diseases of asparagus. Plants affected with crown rot produce weak, spindly spears in the spring. Shoot growth during summer is limited, and shoots that do grow commonly wilt or turn yellow during hot weather. The crowns of diseased plants are discolored (often red or brown) and have a low number of shoot buds. Feeder roots frequently are rotted and become hollow and limp. Eventually, the entire crown is killed. Crown rot is a major factor in the decline of old asparagus.

Crown rot often is associated with already weakened plants. Factors that may favor crown rot include overharvesting, planting on poor soils, repeated defoliation by asparagus rust, and infection by asparagus viruses. Recent work in New Jersey indicates that crown rot often is associated with damage caused by asparagus minor larvae.

Control: Crown and root rot fungi are introduced into fields on infected crowns or contaminated seed. Once present, these fungi can survive indefinitely in the soil. Discard any discolored crowns before planting, and plant only in well-drained soils. Asparagus should not be replanted where previous asparagus crops have been grown. Maintaining plant vigor through proper cultural practices and controlling fern disease also will help prevent development of crown rot.

Cercospora needle blight

Incitant: Fungus *Cercospora asparagi*

This foliar disease of asparagus has been observed in Kansas, particularly on the newer hybrid varieties. In Kansas, it has been found only in the Lawrence area, but could potentially be a problem throughout the eastern part of the state. Symptoms of needle blight first appear in late June, when affected ferns develop elliptical, tan to gray-colored spots. The lesions are encircled by a dark purple margin. Unlike asparagus rust, *Cercospora* lesions do not turn brick red, nor are erumpent pustules produced. Heavy infection causes premature defoliation in later summer or early fall, and can result in decreased yields the following year.

Disease development is favored by periods of high relative humidity or abundant rainfall and relatively warm temperatures. The robust fern growth of the new hybrids tends to increase the relative humidity within the plant canopy, creating favorable conditions for fungal infection.

Control: Promotion of good air circulation within the canopy by wider row spacing and alignment of rows with the prevailing winds should help reduce the severity of this disease. Research indicates that applications of mancozeb (used for control of asparagus rust) and chlorothalonil (Bravo 500) may control *Cercospora* needle blight, although *these chemicals are not yet labeled for the control of this disease*. Research is underway to determine the best control measures.

Cost and Returns

As with other perennial crops, initial costs for the first year are significant, with little return, but costs in later years are minimal (except harvest labor). Asparagus is a valuable vegetable crop, usually returning 80¢ to \$1.00 per pound. Wholesale or bulk sales will yield less return, whereas direct or retail sales increase returns to the grower.

Although asparagus is often termed a luxury crop, there has been a recent increase in fresh vegetable consumption and the demand for this crop is strong in most areas. Several small asparagus plantings could be supported by most Kansas communities and large plantings around major metropolitan areas could be marketed.

The table below illustrates cost-return projections for an asparagus planting. In the figures used, fuel consumption is estimated at 1.5 gallons per hour of tractor time, and oil and lubrication at 15 percent of fuel cost. Repairs are estimated at \$2.25 per hour of tractor time and \$17 per acre for irrigation equipment. Fuel, repairs and taxes for a truck are not included as costs, but depreciation, interest on investment and insurance are included.

Cost-return projections for asparagus, 1 to 15 years..

	Year			
Variable Costs/Acre	1	2	3	4
1. Fertilizer	\$44.00	\$21.50	\$10.50	\$10.50
2. Crowns	360.00	—	—	—
3. Herbicide	19.95	20.10	15.00	15.00
4. Insecticide	4.48	3.70	3.70	3.70
5. Fungicide	0.00	5.00	4.50	4.50
6. Labor	135.00	182.00	615.00	700.00
7. Fuel / Oil	16.13	7.33	24.93	29.33
8. Repairs	41.75	28.25	55.25	62.00
9. Water	6.00	6.00	6.00	6.00
10. Cartons	—	8.00	66.00	93.00
11. Marketing	—	—	—	—
Total Variable Costs	627.31	282.38	800.00	924.03
Fixed Costs / Acre				
12. Interest on Land / Bldg	60.00	60.00	60.00	60.00
13. Taxes	10.00	20.00	20.00	10.00
14. Deprec / Mach	75.00	75.00	75.00	75.00
15. Deprec / Bldg	12.50	12.50	12.50	12.50
16. Deprec / Irrigat	165.00	165.00	165.00	165.00
17. Interest / Irrigat	99.00	99.00	99.00	99.00
18. Insurance	6.63	6.63	6.63	6.63
Total Fixed Costs/Acre	473.13	473.13	473.13	473.13
Total Costs/Acre	1100.43	755.51	1274.00	1397.00
Yield / Acre	0	500	2000	3000
Price / Lb	—	1.00	1.00	1.00
Returns/Acre	0.00	500.00	2000.00	3000.00
Returns Over Variable	-627.31	217.62	1199.12	2075.98
Returns Over Total Costs	-1100.43	-255.51	726.00	1602.85
Variable Costs/Unit	—	0.56	0.40	0.31
Total Costs/Unit	—	1.51	0.65	0.47

About the authors:

Charles W. Marr is Extension horticulturist, vegetable crops;
Ned Tisserat is Extension specialist, plant pathology

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended,
nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles
W. Marr, Asparagus, Kansas State University, December 1997.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

MF-1093

December 1997

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

File code: Horticulture and Landscaping-11