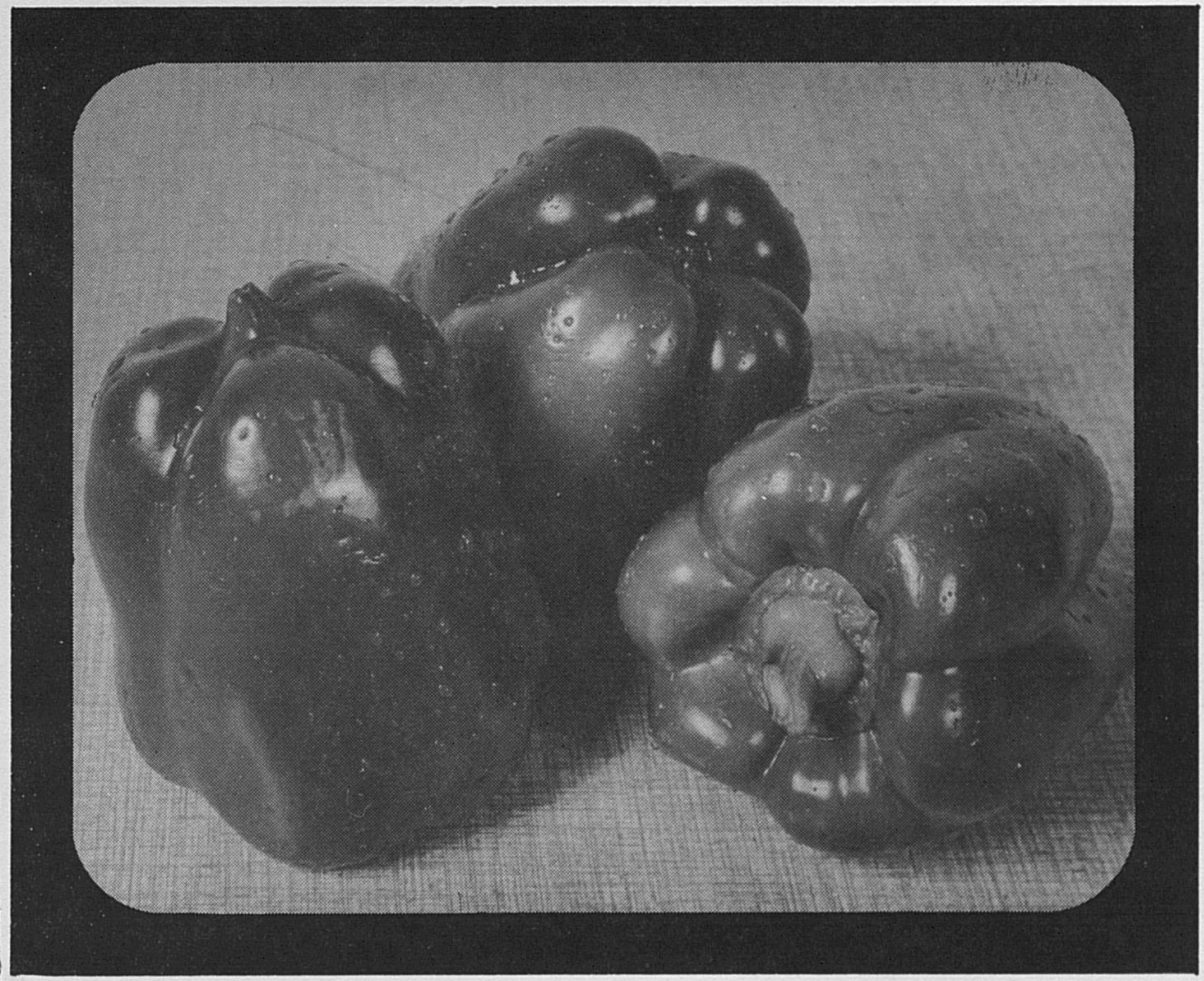


PEPPER PRODUCTION IN KENTUCKY

Circular 620

UNIVERSITY OF KENTUCKY
COOPERATIVE EXTENSION SERVICE
AGRICULTURE AND HOME ECONOMICS

CONTENTS

PEPPER PRODUCTION IN KENTUCKY

By Hubert W. Davis and Max E. Fogleman

Peppers are grown in home gardens throughout the state, and a few have been produced commercially, but not until recently were they considered of much economic importance.

In recent years, some Kentucky farmers have grown peppers for processing, and based on this limited grower experience, it appears this crop can be very profitable. About 1,000 acres are now contracted in Kentucky and as farmers gain experience in production practices this acreage should increase.

SOILS

Peppers grow best on well-drained, fertile upland. However, they will grow satisfactorily on a wide range of soil types. Tight, poorly-drained hardpan soils, shale soils, and eroded soils are least suitable to the crop. A soil which will produce high yields of tobacco or tomatoes should also produce a good pepper yield, since these crops belong to the same family. Peppers grown on bottomland are more likely to have disease problems because of poor air drainage. This is particularly true during periods of hot, rainy weather.

An excellent crop of healthy pepper plants

Manure, or green manure and fertilizer, should be used on infertile soils. Ten to 15 tons per acre of stable manure, green manure, or compost need to be applied annually to maintain good soil organic matter content.

The pepper plant is not especially sensitive to soil acidity; however, it will produce better with a soil pH of 6.0 to 6.5. Soils moderately to strongly acid encourage blossom end rot and may cause southern blight to be more of a problem. Have a soil test made and apply lime and fertilizers based on the results of the soil test.

SELECTING PLANTING DATES

Set your peppers in the field according to the time set by your buyer's contract. Peppers should not be set earlier than May 10-15 in Kentucky. Peppers will be killed by a very light frost. They will also fail to thrive during cool periods when temperatures are consistently between 40° and 60° over a period of one to three weeks. A daily average temperature of about 75°F is excellent for peppers; they require more heat than tomatoes do.

Despite the pepper's need for a warm temperature, extreme heat may prevent fruit set. When temperatures reach 90°F or above, the blossoms seldom set fruit. Fruit set at mean temperatures above 80°F are likely to be small or poorly shaped because of heat injury to the blossoms. The pepper will begin to set fruit again with the return of cooler temperatures.

SOIL PREPARATION

Good soil preparation should begin three to four weeks before the pepper transplants are to be set in the field. The soil should be plowed 8-10 inches deep, then disked each week to assure a firm, fine seedbed. Pepper transplants survive better, start growth quicker, and have fewer insect problems when set in a well-prepared soil.

FERTILIZER

A good supply of fertilizer in the early life of the pepper plant is a "must" for top yield. Plants set in soil with a good supply of fertilizer get off to a good start and grow rapidly. They develop to a good size before they start blooming and setting fruit. Plants

set in soil with low fertility grow slowly and set fruit before the plants reach a good size. This tends to stunt the plant and thus reduces the total yield.

A soil test is the best guide in determining the amount and analysis of fertilizer to use. However, when soil tests are not made, 400 to 600 pounds of 10-20-20 fertilizer per acre should be applied on a soil of medium fertility. Fertile soils should receive 100 to 200 pounds of 10-20-20 or 5-20-20 fertilizer per acre.

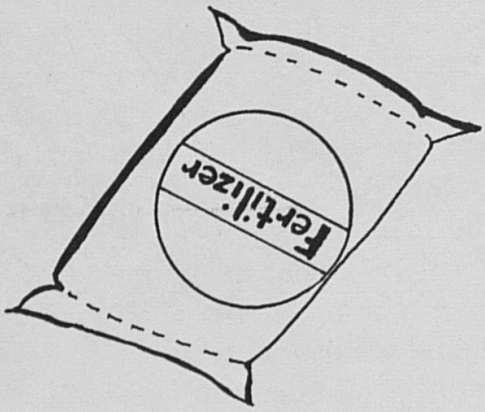
You can make the best use of fertilizer by banding or drilling it in the row, but be careful to keep it from coming in direct contact with the roots. The pepper plant develops roots slowly; therefore, it does not make the best use of broadcast fertilizer.

Nitrogen is essential for good yields, but excessive nitrogen in the early life of the plant may prevent or delay fruit set. A shortage of nitrogen results in poor plant growth and poor fruit set. Applying the correct amount at the correct time is the answer to good plant growth and good fruit set.

Most soils should be supplied with 30 to 50 pounds of nitrogen per acre before the transplants are set in the field. Soils which receive a heavy application of manure, or those which are known to have a good supply of nitrogen, may not need an application of nitrogen until fruit has set on the plants.

Normal plant development 3 weeks after transplanting (left) and 18 weeks after transplanting (right), when good cultural practices are used with good fertility.

A general rule to follow in supplying the plant nitrogen is to start with 30 to 50 pounds of actual nitrogen per acre, then add 30 to 40 pounds of nitrogen sidedressed after fruits have set. A second sidedressing may be applied if needed about the time of the first harvest. Apply 30 to 35 pounds of nitrogen at second sidedressing. One hundred pounds of 33% ammonium nitrate will supply the nitrogen recommended for each of the two sidedressings.



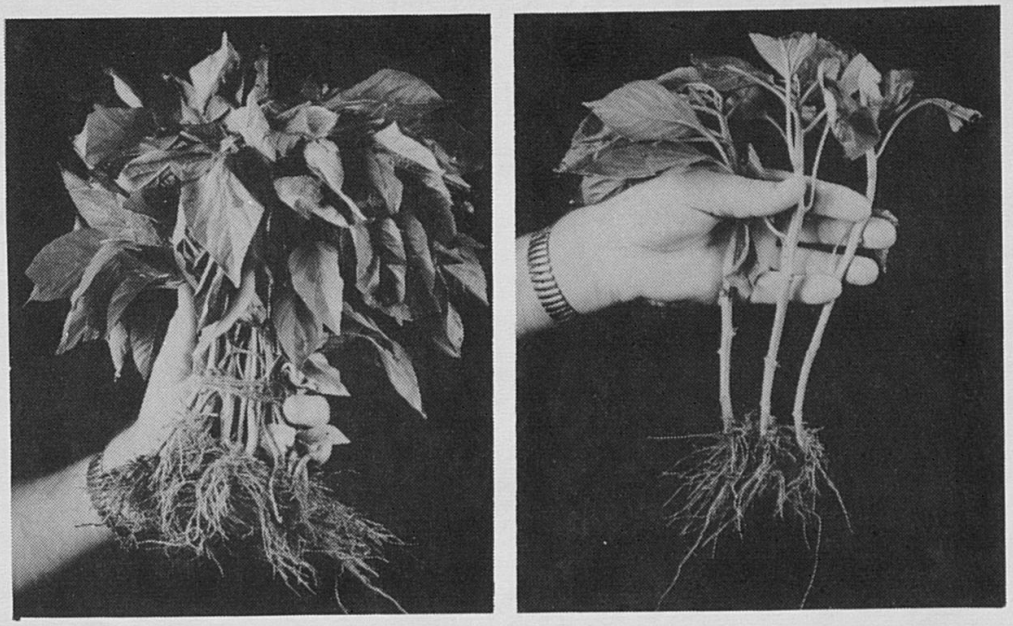
PREPARING FOR TRANSPLANTING

Plants are supplied by the contracting processor in bundles of 50 or more. They are unsorted and are packed in wire-bound crates containing 20 to 30 bundles. The plants should be separated and sorted before setting in the field. This is especially important if a tobacco setter is used. They should be graded according to size and the smaller plants saved for resetting if some of the transplants die. After grading, retie the bundles and place them back in the crates.

A wilted plant is difficult to set. Wilted plants may be revived by placing the crates in 2-3 inches of water, 10 to 12 hours before setting. If weather conditions delay setting, plants can be held 10 to 14 days by keeping the roots moist. Care should be taken to avoid wetting the tops, since this may cause decay and loss of the plants.

TRANSPLANTING—STARTER SOLUTION

Transplants are set in rows three feet apart with plants spaced 14-16 inches apart in the row. Plant spacing of 14 inches in the



(LEFT) A bundle of field-run Southern-grown transplants. Bundles should be untied and sorted before transplanting. Select plants of uniform size (AS SHOWN AT RIGHT) for field setting.

row requires about 12,000 plants per acre; 16 inches apart requires about 10,000 plants to set an acre.

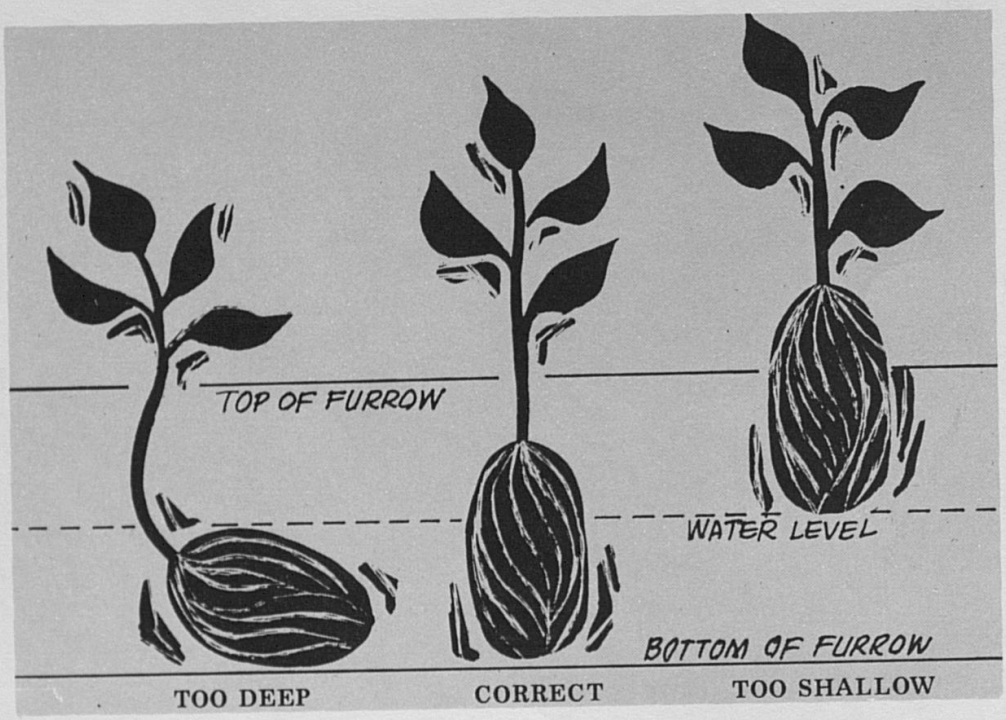
Plants may be set by hand or machine. Machine setting is preferred, though, since it saves labor and affords the most practical method of adding water and a starter fertilizer. Three men with a one-row transplanter can set 2,500 to 3,500 plants per hour.

Hand-setting is best done by a team of two. One person jabs a

The same equipment may be used to set peppers that is used in setting tobacco.

round-pointed, long-handled shovel into the soil and pulls back on the handle while the other member of the team places the plant in the hole. About 600 plants per hour can be set with this method.

Whether setting by hand or machine, plants should be set 4 to 5 inches deep if plant size permits. Adding starter fertilizer to the transplanting water has proven to be a good practice. Tests have shown that addition of starter fertilizer has increased yields as much as three tons per acre. A 3-pound package should be added to each 50 gallons of transplanting water.



Care should be taken to set the transplants at the proper depth.

WEED CONTROL

Pepper plants do not compete well with weeds. They grow slowly and do not shade much soil when mature. This makes the job of weed control a major one. The grower has the choice of controlling weeds chemically or by cultivating as needed.

University of Kentucky Cooperative Extension Leaflet 299, "Chemical Weed Control for Vegetable Crops," lists the chemicals which may be used for controlling weeds in peppers. This leaflet is available in all county agricultural extension offices. You should obtain a copy for information on what chemical to use, how to use

it, and when it should be used. Chemicals which had been cleared for use on peppers at the time this circular was prepared were Dymid, Enide, Amiben, and Treflan. Complete instructions for their use are given in Leaflet 299.

If weeds are to be controlled by cultivation rather than with chemicals, cultivation should begin about a week after transplanting. Cultivation should be frequent enough to control the weeds, and continued as long as possible without damage to the brittle plants. A cultivator may leave weeds in the row which should be removed with a hoe, since they compete for plant nutrients and water and interfere with harvesting.

INSECT CONTROL

Failure to control insects may mean the difference in profit or loss in pepper production. Insects which cause the greatest problems are the European corn borer, cutworms, pepper maggots, and flea beetles.

Flea Beetle

Flea beetles usually cause problems immediately after the pepper plants are set in the field. They may be controlled by dipping the tops of the peppers in a DDT solution just before they are set in the field. A solution containing two tablespoons of 50% DDT per gallon of water should be prepared for dipping the plants. The plants should be sprayed with DDT about one week to 10 days after field setting. This spray is particularly important if cool, wet weather follows field setting.

Cutworms

Four to eight pounds per acre of actual chlordane should be incorporated in the soil for cutworm control before peppers are set in the field. Other materials which may be used as a dust or spray are DDT and toxaphene. Neither of these materials should be applied to the plant, but directed to the soil around the plant. Apply 2 pounds of actual DDT or 1.2 pounds of actual toxaphene per acre. Two or more applications may be needed.

European Corn Borer

The adult of the European corn borer is a light-brown moth about ½-inch long which lays eggs during June, July, and August.

As these eggs hatch, the small borer enters the pepper pods and destroys them. The pepper pod may be small or fully developed at the time the borer enters, but the end result is a reduction in yield because of rotting. The materials recommended for control are Sevin or DDT. Apply 1.0 to 1.5 pounds of actual Sevin or 1 pound of actual DDT per acre. Weekly applications are recommended beginning with early bloom and continuing through mid-August. Burning old vines is also helpful by destroying borers which overwinter in the stalks.

Pepper Maggots

Adult pepper maggots are two-winged, yellow flies, 3/10 of an inch long. The wings are clear with brown bands. A full-grown maggot is yellowish white and about ½-inch long. The maggot enters the peppers when they are small, but its presence may not be detected for some time. As the pepper reaches maturity, it may be destroyed by soft rot.

It is difficult to predict when maggots may cause damage, but it is known that wet weather favors their development. These insects can be controlled by spraying or dusting with one of the following: Thiodane at the rate of ½ pound active ingredient per acre; Dylox at a rate of ½ to ¾ pound active ingredient per acre, or malathion at rate of 1½ pounds active ingredient per acre. Start spraying or dusting when peppers begin to bloom and repeat at weekly intervals until four to six applications have been made.

DISEASE CONTROL[1]

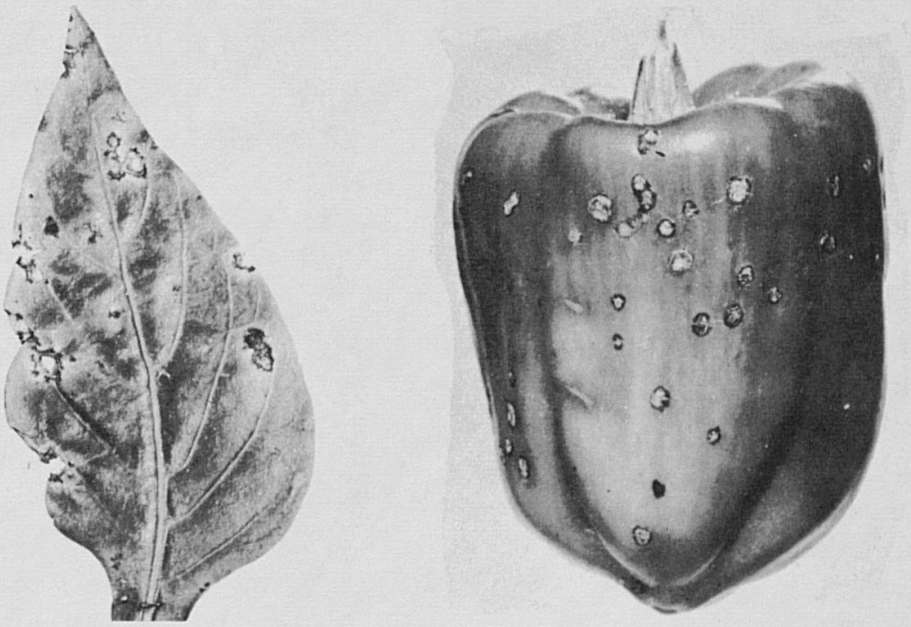
Bacterial Spot

Bacterial spot disease first appears as small, yellowish-green, and slightly raised spots on the underside of young leaves. On older leaves, the spots are dark, water-soaked, and not noticeably raised. The spots may enlarge to 1¼-inch in diameter. Such spots have dead, straw-colored centers with dark margins. Severely spotted leaves turn yellow and drop. Plants severely affected may loose all of their leaves except those at the top. The fruit may have blister-like spots about ¼-inch in diameter. These spots turn

[1] Additional information on disease control is listed in USDA Farmers' Bulletin No. 2051, "Pepper Production Disease and Insect Control."

brown and develop a cracked, roughened, and warty appearance. In damp weather, various decay-producing organisms can enter through these spots and cause the fruit to rot.

The bacteria causing bacterial spot are seed-borne and can overwinter on remains of old diseased plants. The most practical control is to plant only disease-free plants and rotate pepper plantings. Peppers should not be grown on the same land more often than once every four years. Recent tests have shown some control can be obtained with streptomycin sulfate and with fixed coppers.



Bacterial spot

Cercospora Leaf Spot

Cercospora leaf spot, sometimes called frog-eye spot, is a common disease of peppers. It is caused by a fungus which may cause serious leaf drop. The spots are large, circular or oblong shaped and are dark brown at the margins with light-grey centers. They range from ¼- to ½-inch in size. Control measures are essentially the same as given for bacterial leaf spot, except for the use of streptomycin sulfate which is not recommended as a control for cercospora leaf spot.

Southern Blight

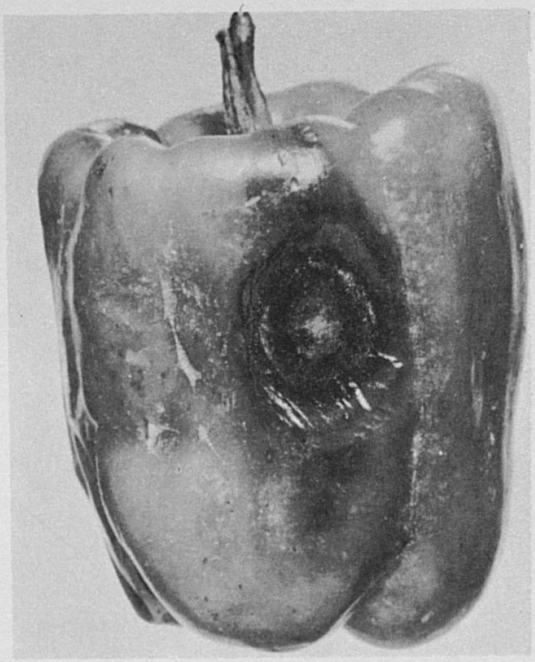
Southern blight attacks the stem of a pepper plant near the ground during warm, rainy weather when soil temperatures are

above 70°F. The disease girdles the stem just above the ground causing leaves to wilt, yellow, and eventually die. When an affected plant is pulled up, a white mat of the fungus can be seen on the stem.

The disease is best controlled by rotation. Do not use land where this disease has been a problem before. Do not use unproductive eroded land, especially if it faces south or southwest.

Anthracnose

Anthracnose infected fruit develop dark, circular sunken spots which vary in size, but are often greater than one inch in diameter. Spots occur on either green or ripe fruits and they may become covered with dark raised specks. The disease is more serious during rainy weather because it can be spread by spores washing or splashing onto healthy fruit.



Anthracnose

Control the disease by using disease-free plants and by spraying with a fungicide such as zineb nabam with zinc sulfate, ziram, or maneb if the disease starts. Cultivating or harvesting when plants are wet helps to spread this disease, so avoid doing this if possible.

Virus Diseases

Three different mosaic viruses, tobacco mosaic, tobacco etch, and cucumber mosaic, may cause problems in peppers. The

symptom is green-yellow mottling of the leaf which may also be slightly curled and irregular in shape. These viruses rarely cause the plant to die, but may cause considerable reduction in yield.

The following things are recommended to aid in virus disease control:

1. Destroy all perennial weeds near seedbeds and fields.
2. Do not use tobacco while handling plants.
3. Thoroughly wash hands before handling plants, especially if you are a tobacco user.
4. Avoid handling tomato, cucumber, tobacco, or muskmelon plants immediately before handling peppers.
5. Control aphids; they may transmit the virus.
6. Avoid planting peppers close to tomatoes, tobacco, cucumbers, or muskmelons. One or more of the viruses affecting peppers occurs on all of these crops, too.

Blossom End Rot

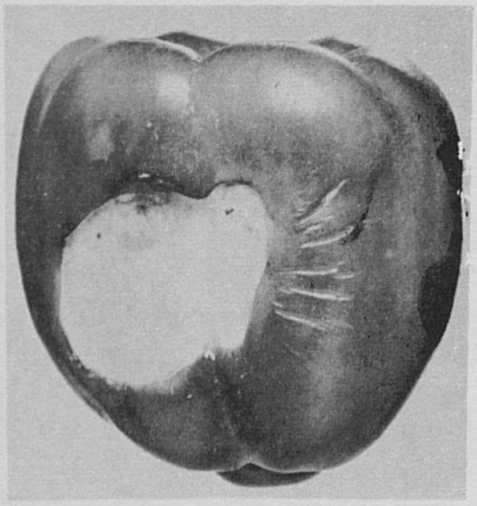
Blossom end rot is a common problem with peppers. It is not caused by fungus or bacteria. The rot occurs when the soil moisture becomes low after a period of plentiful moisture during which time the plants have made rapid growth. Excessive amounts of nitrogen increase the chance of blossom end rot. Close, deep cultivation just before or during hot, dry weather will also increase this disorder.

Water-soaked spots first occur on the blossom end of the fruit. They soon become light-brown in color and papery feeling as they dry out. The spots may be small or cover as much as half of the fruit.

Since the disorder is associated with soil moisture, care should be taken in selecting a soil that is not droughty. A soil well supplied with organic matter, and one which contains some clay, maintains a more even moisture supply. Calcium is believed to be associated with the disorder. Therefore, it is recommended that the soil be limed if soil tests indicate this is desirable.

Sunscald

Sunscald occurs when the fruit is exposed to direct sunlight. The first evidence of the disease consists of a light-colored area that is soft and may become slightly wrinkled. As the injured area dries, it becomes slightly sunken and has a white papery appear-



Sunscald

ance. These spots are frequently infected by various fungi which grow on dead plant tissue and may cause decay of the fruit. Any bacterial or fungal disease which causes defoliation of the plant is often followed by considerable loss of fruit from sunscald.

Plants kept in a healthy, vigorous condition are not likely to be injured by sunscald. They will have sufficient leaves to prevent direct sunlight on most of the fruit.

HARVESTING

Peppers for processing are usually harvested when red-ripe. They are picked 7 to 14 days apart for a 10- to 12-week period. It is considered a waste of time to harvest when only an occasional fruit is ripe, since the pepper will remain in excellent condition for 10 days to two weeks after becoming fully ripe. There will also be enough peppers ripe to make harvesting and hauling to market worthwhile if you wait.

Methods of Harvest

Bushel baskets or hampers are commonly used in pepper harvest. Many small-acreage crops are hauled to market in the containers used for harvest, or the peppers may be put in sacks or dumped in a truck for delivery to market.

In large fields where several tons of peppers are to be picked and loaded, serious consideration should be given to laying out the field for maximum harvesting efficiency. A long field lends

Harvesting

itself best for efficient harvesting methods. Where possible, peppers should be planted in blocks with 300-foot long rows. A haul road should cross the rows every 300 feet.

Before harvesting begins, a truck should deliver two 1-bushel baskets or hampers for each 300-foot row. When the pickers begin to harvest, they should pick up both baskets left for the row and carry them to the center of the 300-foot block. One basket is left at this point and the other basket is used to pick half of the row (150 feet) beginning at the center and picking toward the crossroad. Under average conditions, 150 feet of row should yield one bushel of peppers. Once half of the row is harvested, the pickers go back to the center of the block and use the other basket to pick the other end of the row. By using this method, when picking is complete, all baskets are at the crossroad ready to be loaded.

A truck moves along each crossroad and should be fitted with with a rack that permits the entire length of the load to be side-dumped. Hinged gates about two feet high can be opened for unloading when the peppers reach the receiving station.

A removable scaffold attached to the rack on each side of the truck will assist in loading in the field. A worker stands on the scaffold while another on the ground lifts the basket of peppers

to him, he then lifts them above the rack and dumps them. Six-ton loads can be hauled out of the field in about 45 minutes with this method. If the truck is not equipped with hinged racks for unloading, peppers can be unloaded with a grain scoop.

Labor

If the pepper crop is being grown with family labor, they should be able to handle one acre per each working family member. Total labor requirement per acre is about 80 to 100 hours, with about 50 to 70 hours of this being spent in harvesting.

This crop fits well into small family-operated farms. The majority of labor comes at a time of the year when it can be worked around other jobs. A family wanting weekly cash income from late June until mid-October can provide it by growing cucumbers and peppers. The cucumbers will supply income from late June until early August and the peppers from mid-August until mid-October, and they do not compete with each other for labor.

Agricultural and Home Economics Extension Service of the University of Kentucky, the United States Department of Agriculture cooperating. W. A. Seay, Director. Issued in furtherance of the Acts of May 8 and June 30, 1914.

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