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PEPPER PRODUCTION IN CALIFORNIA



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Paul G. Smith* and P. A. Minges**

INTRODUCTION

The peppers consist of several groups with similar cultural requirements but with a variety of uses. Approximately 7,000 acres of peppers are grown in California annually. About one-third of the crop moves into west coast fresh markets, one-half is dried and the remainder canned or pickled. Certain of the small fruited types are grown for ornamental purposes. It is a moderately expensive crop to grow with costs ranging from \$150 to \$500 per acre on crops for processing and \$200 to \$800 for the market crop.

GROUPS, VARIETIES AND USES

Fruit and Plant Characters. The principal differences between the types and varieties lie in the fruits. The calyx may be either cup-shaped enclosing part of the fruit, or flat and attached only at the end. Fruit position on the plant varies from upright to pendent. The degree of pungency (which is determined by the amount and location of the compound capsaicin) varies from sweet to hot and to very hot. Other differences occur in fruit shape, size, color, thickness of flesh and number of locules. The plants of all types are quite similar with minor variations in plant size and shape and size of leaves.

Bell Group. This group of sweet peppers includes the important fresh market varieties. The fruits are large, blocky, 3 to 4 lobed, have a flat calyx and moderately thick flesh. California Wonder is the leading and most desirable variety. Chinese Giant, Ruby King and Bull Nose are grown occasionally. Harris' Early Giant is an early variety suitable for home gardens. Golden Queen is a yellow fruited pepper.

Chili Group. The fruits are commonly pendent, in most cases distinctly pungent and the flesh is rather thin. The California (or Anaheim) Chili and the Mexican Chili are the two principal varieties in California. Hungarian Wax and Paprika are planted to a limited extent. California Chili, Paprika and Hungarian Wax have slender pods, 4 to 8 inches long with a cup-shaped calyx. The Mexican Chili has conical, shorter fruits with a flat calyx. The bulk of the Chili crop is sold as whole dried peppers or as Chili powder. The California Chili is used somewhat

* Assistant Professor of Truck Crops
** Extension Specialist in Truck Crops

AREAS OF PRODUCTION

Commercial. The Bell pepper acreage is well distributed over the state with Santa Clara County having the largest acreage followed by San Diego, Riverside, Los Angeles, Santa Barbara, Merced and Orange counties. Minor acreages occur in the other counties of the San Joaquin Valley and southern California. Chili pepper production centers in the south coastal area with the major share of the acreage in Ventura and Orange counties. Most of the pimiento peppers are grown in Ventura County.

Home Garden. Peppers can be grown in most areas of the state where the frost-free period is longer than 3 months. Fruit set may be poor in the cool north coast section and during hot weather in the interior valleys.

CLIMATIC AND SOIL REQUIREMENTS

Climate. Peppers are a warm season vegetable which requires a relatively long growing period for high production. The plants are injured or killed by light frosts. Optimum temperatures for seed germination and plant growth are from 65° to 85° F. Fruit set is usually poor when day temperatures are above 90° F or nights are below 60° F. A water deficit within the plant may also cause flowers to drop. This could be caused by excessive loss of moisture from the leaves due to low humidity, hot drying winds, or by a shortage of soil moisture within the root zone. Pepper flowers are open only 24 to 30 hours; so short periods of adverse conditions may influence set of individual flowers. Bell pepper fruits are subject to sunburn when grown in the interior valleys during late summer.

Temperature governs the rate of development and the quality of the red pigment in pepper fruits. After the fruits have reached the mature green stage, the red color develops best at 65° to 75° F whether the fruits are on the plants or in storage. If the temperature of the pepper fruits is above 80° F much of the time during the period of coloring, a yellowish cast develops in the red color. As the temperature falls below 65° the rate of color development decreases and it stops completely at about 55° F. Consequently, peppers color poorly during the late fall months. Sunlight and darkness have no effect on coloring except for the indirect effect on the temperature of the fruits.

Soils. Peppers will grow on a wide range of soils that are fairly deep, well drained and reasonably fertile. For early market production a sandy loam is preferred.

PROPAGATION

Methods. Bell peppers generally are transplanted, whereas the usual practice is to seed the other types directly in the field. There are exceptions: the Bells are field seeded in the Coachella Valley, and some growers transplant the other types, usually, if a winter crop has delayed planting.

Growing transplants. Transplants are grown in greenhouses, hot beds, cold frames and sometimes in open fields. In the greenhouse seed

Planting and Harvest Chart for Market Bell Peppers

District	Planting Period	Harvest Period
San Francisco Bay	Late April and May	Late July through November
San Joaquin Valley	Late March and April	Late June to August
South Coast	March to May	July to December
Santa Barbara	March to May*	September to December
Coachella, Imperial Valleys	Late September*	Mid April to early July

Planting and Harvest Period for Processing Peppers

Field seeding normally takes place from March 1 to April 15. If transplants are used they are set in the field during April and early May. Harvest of red mature fruit begins in October and may continue until frost damages the fruit. Often, if fresh market prices are good, California Chilis will be harvested in the green stage during late August and September.

Yields. Bell and Pimiento peppers produce from 2 to 6 tons per acre with 4 tons considered a good commercial yield. The yield from Chilis is usually between 1/2 and 1-1/2 tons of dried peppers.

CULTURAL METHODS

Field Seeding. The soil should be worked to give good tilth for seeding and if the ground is dry an irrigation should be given to supply moisture for germination. The seed is drilled usually on the flat using single or multiple row planters. If desired, raised beds may be used. Row spacings vary from 3 to 4 feet, depending on the grower's equipment and the type of pepper. Chili types usually are given a wider row spacing than the sweet types. From 3 to 5 pounds of seed are required per acre. Normal planting depth is 1 to 1-1/2 inches.

When 3 to 5 inches high the plants should be thinned to about 18 inches in the row.

Transplanting. Stocky, well hardened, disease-free transplants should be used. Others should be discarded. With a row spacing of 3 feet and a plant spacing of 18 inches in the row, 9,680 plants are required per acre. Transplanting machines which supply some water with each plant, are quite efficient on large acreages. In hand planting, the plants usually are set on the side of a furrow into which water is run immediately afterwards. With either method, good compaction of the soil around the roots is important for quick recovery of the plant.

Cultivation. Cultivation is necessary to control weeds and to establish furrows for irrigation. Further cultivation is normally of little value and late in the season may prove detrimental by bruising the plants and fruits.

Fertilizers. Fertilizer requirements vary with the soil type and previous soil management. On some fertile, deep heavy soils no fertilizer is needed to give good yields of high quality. Peppers grown on the sand-

* Field seeded

tunnel type dehydrator. The temperature must be carefully watched, for too high temperatures will produce an undesirable dark condition of the dried product.

Grinding may be done by any standard grinder. The hammer-mill type is the most common. Fineness of grind is regulated by the size screen used. The entire pepper fruit is ground for the common grades, but the seeds and stems are removed before grinding for the better grades.

SEED PRODUCTION

Pepper seed is produced in California using the cultural methods given above. The fruit is harvested in the mature red stage and chopped. The seed is washed out and spread to dry on screens placed in a shady, well ventilated location. Pods that have lain on the ground should not be saved because seed in these may be infected with *Rhizoctonia*.

Some growers who prefer to save their own seed should take especial care that varieties do not become mixed. Peppers cross-pollinate very readily and for this reason seed should be saved only from plants growing at least a hundred yards from any other variety. Saving of seed from the best plants is necessary if a good strain is to be maintained. The plants may be staked for identification before picking commences and should be selected for freedom of disease, time of maturity, heavy yield and fruit and plant type. Saving seed from fruit of unknown origin is dangerous.

CONTROL OF INSECTS

Pepper Weevil. The weevil is a serious pest in southern California. The small white grubs feed inside the buds and young pods, causing them to drop. The fields should be watched carefully for the first appearance of the weevils and then a weekly dusting program should be started using 50 per cent cryolite at the rate of 15 to 20 pounds per acre at each dusting. DDT and calcium arsenate also give control but aphids may build up rapidly after these materials are used.

Aphids. The Spinach or Green Peach aphid on peppers can be controlled by a 10 per cent nicotine dust or a 3 per cent tetraethyl pyrophosphate dust applied at the rate of 15 to 20 pounds per acre.

Wireworms. When present in soils, wireworms feed on the roots and in the stems of young plants during the spring. If infested soil must be used, the wireworm population can be reduced by fumigating the soil with ethylene dibromide or dichloropropene mixtures at least two weeks before planting. The planting of a trap crop between the rows of peppers sometimes gives partial protection against wireworms.

Darkling Ground Beetles. These small dark brown beetles girdle the stems near the ground level immediately following transplanting. To protect the plants, dust the ground around the stem with hydrated lime or 10 per cent DDT. The DDT will also give protection against cut worms.

Nematodes. Peppers appear to be fairly tolerant of nematodes but injury sometimes occurs if peppers have been grown for several years on