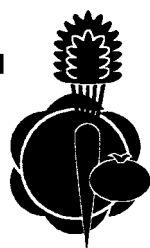


CABBAGE PRODUCTION IN CALIFORNIA

VEGETABLE RESEARCH
AND
INFORMATION CENTER

Vegetable Production
Series



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PRODUCTION AREAS AND SEASONS

The main growing regions for cabbage (*Brassica oleracea* L. var. *capitata* L.) in California are the central coast (Monterey, San Benito, and Santa Clara Counties); the southern coast (Santa Barbara, Ventura, San Luis Obispo, Los Angeles, Orange, and San Diego Counties); and the southern desert (Imperial and Riverside Counties).

In the Imperial Valley, cabbage is planted from mid-September through October. Harvesting begins in December and continues through February. Many coastal counties plant and harvest cabbage year-round. Cabbage is planted in the southern San Joaquin Valley in August for harvest in October and November. In Chula Vista, near San Diego, cabbage is planted from September to March for harvest from November to June.

The average yield, which varies according to market price, can be more than 1,000 cartons per acre. Harvested yields normally reflect market demand rather than actual crop yield—if prices are too low, much of the harvestable crop remains in the field.

Cabbage is a high-risk crop: oversupply from competing markets can depress prices rapidly, and a shortage in the cabbage supply can create windfall profits. Some cabbage is grown under contract with fast-food outlets and coleslaw manufacturers at a fixed volume and price.

FRESH MARKET CABBAGE ACREAGE AND VALUE

Year	Acreage	Average yield (tons/acre)	Gross value/acre
1994	10,500	19.3	\$5,313
1993	12,000	18.0	\$4,932
1992	11,500	16.8	\$3,230

Source: *California Agricultural Statistics 1994* (Sacramento: California Department of Food and Agriculture, 1995).

CLIMATIC REQUIREMENTS

Cabbage is a cool-season biennial that is grown as an annual vegetable. It has a moderately high frost tolerance. While cabbage will grow at 45°F (7°C), it does best from 60° to 65°F (15.5° to 18°C). Above 80°F (27°C), the plants may bolt, causing the heads to split open. Cabbage seed germinate in about 2 weeks in soils with temperatures as low as 50°F (10°C), which allows for early plantings in cooler regions. Cabbage is moderately salt-tolerant: yields near 80 percent of maximum are possible with salinities as high as EC_e 4 mmhos/cm (dS/m).

VARIETIES AND PLANTING

The standard green hybrids are Headstart, Pacifica, Discovery, Grenadier, Charmant, and Grandslam. Red hybrids frequently used are Rubyball, Primero, Sombrero, and Red Rookie. Open-pollinated Red Meteor is also used.

Cabbage is grown in two seed lines on 42-inch (105-cm) beds. Growers plant seed using a precision planter with an in-row spacing of 2 to 3 inches (5–7.5 cm) at a depth of 0.25 inch (0.6 cm) or less, with seed lines 13 inches (33 cm) apart. At this spacing, about 156,000 seed are planted per acre. Seedlings are thinned to 12 to 14 inches (30–35.5 cm) apart when they develop 2 to 3 true leaves. Some cabbage grown in the central coast is transplanted from nursery-grown plugs with two lines on 40-inch (1-m) beds, with rows spaced 12 to 14 inches (30–35.5 cm) apart.

SOILS

Cabbage may be grown on many soil types. Silty clay soils unsuitable for lettuce, carrots, or onions, will produce excellent cabbage crops. Cabbage grows well on medium and moderately heavy soil and is not sensitive to poor drainage. Some problems may occur late in the

season on sandy soil if wind causes sand damage (callus tissue) on the outer leaves on the heads.

IRRIGATION

Most growers use sprinkler irrigation to germinate the seed or establish the transplants; it may be necessary to sprinkle-irrigate for up to 2 weeks. Once the seedlings have emerged or the transplants have started to grow, growers furrow-irrigate the fields for the remainder of the season. If cabbage is stressed for water during the growing season, the stop-start growth may cause the heads to split.

FERTILIZATION

In the southern desert growing areas, before listing the beds growers usually broadcast ammonium phosphate (11-52-0) at 200 pounds per acre (224 kg/ha) P₂O₅. Sidedress applications of nitrogen (N) at 60 to 80 pounds per acre (67–90 kg/ha) are standard. Solutions of AN-20 (ammonium nitrate, 20-0-0) or UAN-32 (urea-ammonium nitrate, 32-0-0) may be used instead of dry N fertilizers.

In coastal growing regions, growers apply 500 pounds per acre (560 kg/ha) of a complete fertilizer (15-15-15) before planting. When the plants have five to six true leaves, they direct-spray N at 130 pounds per acre (145 kg/ha) as ammonium nitrate solution (20-0-0) to fertilize the crop and burn down weeds. At midseason they apply 60 pounds of N per acre (67 kg/ha) as liquid ammonium nitrate or calcium nitrate solution (17-0-0) to carry the crop to maturity.

INTEGRATED PEST MANAGEMENT

Detailed information on IPM for lettuce is available in *Integrated Pest Management for Cole Crops and Lettuce* (UC Division of Agriculture and Natural Resources Publication 3307) and *UC IPM Pest Management Guidelines for Lettuce* (UC Pest Management Group Publication 33). Or, contact the UC IPM World Wide Web site at <http://www.ipm.ucdavis.edu>. Herbicides, insecticides, and fungicides should always be used in compliance with label instructions.

Weed management. Pre-emergence herbicides are fairly effective at controlling weeds in cabbage with the exception of London rocket and shepherd's purse. Hand-weeding is often necessary to remove weeds that develop during the winter.

Insect identification and control. Insect pests of cabbage include crickets, cutworms, flea beetles, saltmarsh caterpillars, aphids, thrips, and cabbage looper. Once an insect burrows into a cabbage head, chemical control

is nearly impossible.

Disease identification and management. There are very few troublesome diseases of cabbage. Downy mildew (*Peronospora parasitica*) may require control if moist, cool conditions persist. *Rhizoctonia* wirestem may cause seedling losses at times in wetter growing regions.

Other pests and problems. Cabbage should not be planted after sugar beets if cyst nematode infection (*Heterodera schachtii*) is present. Oedema is a physiological disorder of cabbage that causes blisters and callus eruptions on the epidermis of the leaves. It is caused by overwatering, especially during cloudy, humid weather. Tipburn, a physiological disorder caused by low calcium in the tissues, may cause substantial loss of marketable heads. Plants without a growing point (normal meristem) are called "blind." Blindness may be caused by mechanical damage, bird and insect feeding, or genetic defects. Blind plants have abnormal older leaves and never form a marketable head.

HARVEST AND HANDLING

Cabbage is harvested by hand. From 18 to 24 heads are bulge-packed per carton, which weighs a minimum of 45 pounds (20 kg). Because head counts can vary, many sales are made on the basis of net weight. Cabbage is normally sold by the pound at retail stores. Limited amounts of cabbage may be packed in bins for reprocessing into coleslaw or shredded salad mixes or contracted to fast-food chains. Cone-shaped cabbage heads are not acceptable in markets on the West Coast and in the Pacific Northwest but are accepted in some Eastern and Midwest markets.

POSTHARVEST HANDLING

Cabbage may be cooled by hydrovac, vacuum-cooling, or placed in non-forced-air cooling rooms. Cabbage should be refrigerated after cooling and stored at 32°F (0°C) at 98 percent relative humidity. Storing at low humidity causes wilting and senescence. Cabbage is sensitive to ethylene gas—if it is stored near ripening fruits, loss of green color and abscission of leaves will result.

MARKETING

California ships cabbage every month of the year. Shipments are highest in March. During the winter, California cabbage competes with production from Texas, Georgia, and New York. A dozen or more states ship cabbage in the late spring, summer, and early fall.

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