KEYS TO PROFITABLE PRODUCTION

10-6-83
L-2091
10m new

KEYS TO PROFITABLE BROCCOLI PRODUCTION

Tim Hartz and Tom Longbrake*

Commercial broccoli production in Texas has increased from 2,550 acres in 1979 to 7,600 acres in 1982. The 1982 crop yielded an average of 90 hundredweight per acre for a total value of $25 million. Texas ranks second behind California in broccoli production, accounting for approximately 5 percent of U.S. production.

Climatic Requirements

Broccoli is a cool season crop but tolerates wide temperature fluctuations. Optimum conditions are 70° to 80° daytime and 40° to 50° nighttime temperatures. The threshold temperature for significant freeze damage is the mid 20's. Temperature greatly influences maturity rate. The growing season ranges from approximately 60 days for early fall and spring crops to more than 90 days for a late fall or winter crop.

Broccoli requires adequate soil moisture for good quality and high yields. Virtually all of the commercial crop is irrigated.

Production Areas

Nearly all commercial broccoli production in Texas is located in the Rio Grande Valley, with some acreage in the Coastal Bend, Winter Garden and High Plains areas. Seeding begins in August and September and continues into January. The harvest season begins in late October and continues into March, with the heaviest volume in December and January (figure 1).

Broccoli can be produced in most Texas areas, provided the grower selects the proper season. Table 1 lists the appropriate dates for seeding and transplanting in various regions of the state.

Crop Rotation

In the Rio Grande Valley, broccoli is grown most often following cotton, grain sorghum, corn or cantaloupe. Use caution when following any crop in which triazine herbicides were used, particularly on light textured soil. Broccoli is a member of the mustard family, which includes cabbage, cauliflower, turnip and kale. It is not advisable to precede or follow broccoli with any of these related crops because diseases common to all increase and carry over in the soil when grown in succession on the same land.

Land Selection and Preparation

Broccoli can be grown successfully on soil textures ranging from sandy loam to heavy clay. In fact, a shallow, fibrous root system and moderate tolerance to soil salinity make broccoli a good choice for the fine textured, alluvial soils of the Rio Grande Valley. A level, well-prepared seedbed is essential. Deep plowing to break up hardpans aids drainage and aeration. Disking to break up clods improves accuracy of seeding depth. After disking, the land is listed into rows 40 inches apart. The final bed shaping is done just before or at planting.

Fertilization

Nitrogen and phosphorus are the nutrients most often deficient for broccoli production in Texas. Soil potassium level is adequate in most of the mineral

*Extension vegetable specialist and Extension horticulturist-vegetables, The Texas A&M University System.

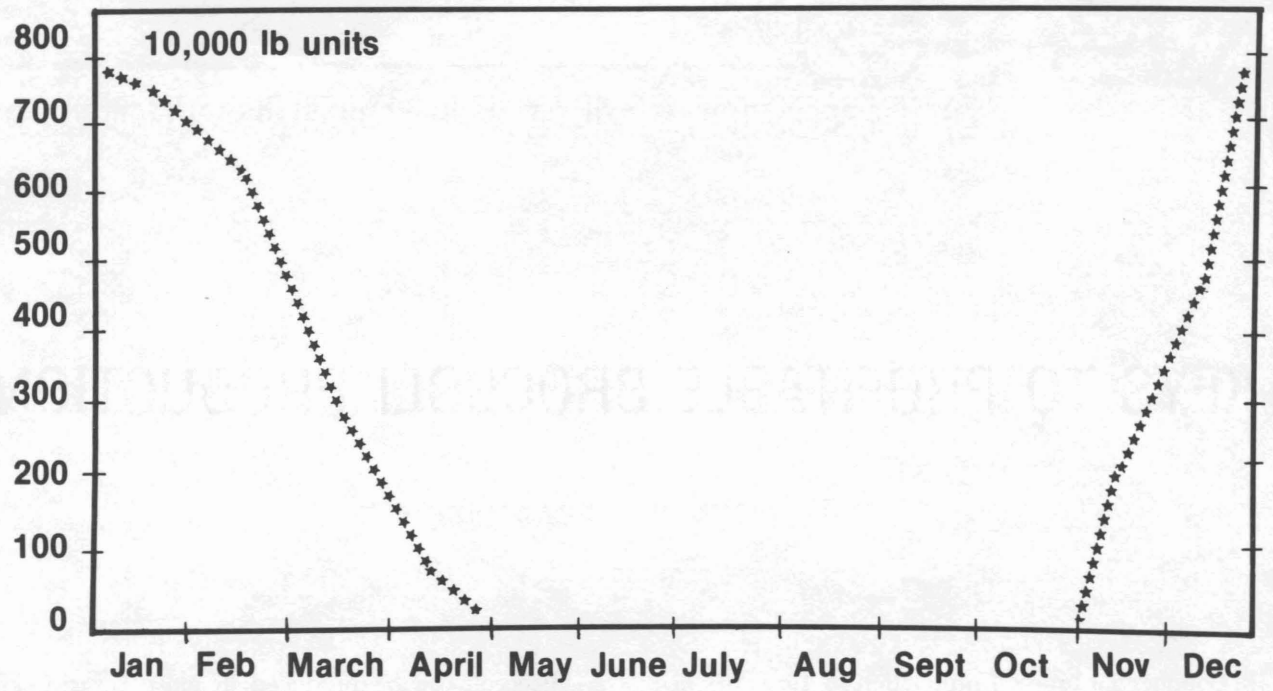

Figure 1. Texas broccoli for fresh market: 1982-83 season movement. (Rail plus truck unloads in 41 cities by months. Source: Market News, USDA.)

Table 1. Broccoli planting periods for different areas of Texas.

	Seeding date		Transplanting date	
Area	Spring	Fall	Spring	Fall
South Texas	Dec 1-Feb 1	Aug 1-Dec 1	Jan 15-Feb 15	Aug 15-Dec 15
Winter Garden	Jan 1-Mar 1	July 15-Nov. 30	Feb 15-Mar 15	Aug 1-Oct 1
East Texas	Feb 1-Mar 1	July 15-Aug 15	Feb 1-Mar 1	Aug 15-Sept 1
High Plains	Feb 15-Mar 1	July 1-Aug 1	Mar 1-Mar 15	July 15-Aug 15
Trans Pecos/El Paso	Feb 1-Mar 1	Aug 1-Sept 15	Feb 15-Mar 15	Aug 15-Sept 15

soils found in South and West Texas but may be limiting in Central and East Texas. In general, 150 to 200 pounds nitrogen, 60 to 100 pounds phosphates and 175 to 200 pounds potassium are required for maximum production. Use preplant soil testing as a guide to fertilizer requirements for a given soil.

Band application of a low N/high P fertilizer below the seed row is the most efficient placement method on alkaline, calcarious soils which readily tie up phosphorus. Broadcast application of a N-P-K fertilizer is appropriate on neutral or acidic soils. One or two side dress applications of nitrogen, beginning at the time of thinning, are required. A light nitrogen application in irrigation water before head formation may be useful.

Minor element deficiencies are most likely to occur on mineral soils with pH above 7.5. The most appropriate remedy is a foliar micronutrient spray.

Varieties

Hybrid varieties account for nearly all commercial broccoli production in Texas. Hybrids are preferred for earliness, uniform maturity and high yields. Recommended hybrids include Green Comet, Southern Comet, Excalibur, Green Beret and Cape Queen. A small acreage of Waltham 29, the standard open pollinated variety, is still grown. Always buy high quality, treated seed from a reputable dealer.

Planting

Virtually all commercial broccoli plantings in Texas are direct seeded. Planting is done in paired rows 12 to 15 inches apart on flattened 40-inch beds. Seeding rate is 1 to 2 pounds per acre depending on season, soil conditions and final spacing desired. Early fall plantings in the Rio Grande Valley require the

Table 2. Broccoli insect pest and controls.

Insect	Chemical
Aphid	Systox, Guthion, Diazinon, Dibrom, Parathion (Ethyl or Methyl) Cygon or Defend, Di-Syston as banded soil treatment, Monitor
Cabbage looper	*Bacillus thuringiensis,* Lannate or Nudrin, Phosdrin, Monitor, Pydrin, Ambush, Pounce
Other caterpillars	Sevin, Guthion, Thiodan, Dibrom, Lannate, Nudrin, Monitor or *Bacillus thuringiensis,* Dylox, Diazinon, Parathion (Ethyl or Methyl), Pydrin, Ambush, Pounce
Cutworm	Dylox, Sevin, Diazinon, Lorsban
Flea beetle	Sevin, Thiodan, Methoxychlor, Di-Syston (banded soil application), Methyl Parathion, Guthion
Harlequin bug, stink bug	Thiodan, Dibrom, Methyl Parathion
Root aphid	Di-Syston as banded soil treatment
Root maggot	Diazinon as preplant soil treatment, Lorsban

higher seeding rate because of high soil temperatures and salinity levels. Plant broccoli either with a row seeder like the Planet Jr or a precision planter such as the Stanhay belt seeder. Place seed ¼ to ½ inch deep. Since broccoli seed is round, the coating has very little advantage; consequently almost no coated seed is used. Final in-row spacing varies from 3 to 8 inches. Manipulating spacing allows one to control head size. Thinning is done mostly by hand.

Weed Control

Incorporate Prefar 2 or 3 inches deep in preshaped rows before planting as the most efficient method for controlling weeds in broccoli. Treflan can be used as a preplant incorporated herbicide but is only marginally selective; for crop safety, use the lower label rate. Dacthal can be used as a preemergent or post-transplant herbicide. Always read the label and follow directions carefully when using any herbicide. Cultivation, when necessary, should be shallow to avoid root pruning.

Irrigation

Broccoli requires 15 to 30 inches of water depending on the season.

Broccoli seeded in hot weather usually requires two irrigations to establish a stand. Since the effective rooting depth is less than 2 feet, the moisture content of that portion of the soil profile is critical. Always maintain high soil moisture levels before and during head formation.

Insects and Diseases

Table 2 lists the major insect pests of broccoli and the approved chemical controls. Use insect scouting to identify economically significant insect infestations and properly time insecticide applications.

Broccoli diseases pose a serious threat to production. To prevent diseases, use a combination of practices before planting time. Probably the most important consideration is the use of disease-free seed. Black-leg, a fungus disease, and black rot, a bacterial disease, can be seedborne. Infected seed result in affected plants. Use seed grown in disease-free areas and request seed treated to reduce black rot and seedling diseases. Different varieties react differently to these diseases, and some new hybrids have shown resistance.

Practice crop rotation because many disease organisms overwinter in the soil, particularly when repeated cropping with the same kind or related plants occurs. Where yellows is a problem, use only resistant varieties because the causal organism persists in the soil for several years. Downy mildew is almost always present, being favored by cool, damp weather. Use repeated applications of an approved fungicide such as Bravo® and Maneb®. Powdery mildew is sometimes found on broccoli although rarely is the damage serious. Hollow heart affects broccoli when boron is lacking in the plant. In highly alkaline soils with a pH of 7.5 or above, spray 5 to 10 pounds per acre solubor over the plants before heads form. Soft rot bacteria can damage broccoli during transit. Careful handling during harvesting and packaging to avoid injuries, along with rapid cooling to 40° F. reduces losses from this and other transit diseases and prolongs quality.

Harvesting

Broccoli fields are usually harvested several times since not all heads mature at the same time. Commercial broccoli in Texas is hand harvested in one of two ways. Workers following a tractor-drawn conveyor belt cut heads with 6 to 9 inches of stem, remove subtending leaves and load them on a conveyor which empties into a bulk bin. The broccoli is taken in bulk to a packing shed where it is trimmed and bunched. Alternatively, workers cut and load backpacks and carry them to the edge of the field where other workers trim, bunch and pack on site. The majority of Texas broccoli is grown for fresh market distribution. The remainder is processed as frozen spears or a chopped product.

ACKNOWLEDGMENTS

The authors wish to thank Charles Cole, Extension entomologist, and Jerral Johnson, Extension plant pathologist, for contributions to the insect and disease control sections, respectively.

Cooperative Extension Work in Agriculture and Home Economics, The Texas A&M University System and the United States Department of Agriculture cooperating. Distributed in furtherance of the Acts of Congress of May 8, 1914, as amended, and June 30, 1914.

10M—8-83 HORT 6-3