DRAFT

Crop Profile for Eggplant in New Jersey

Commodity Production Facts

New Jersey's production season runs from July to early October with largest supply available in August and September. Between 2000 and 2001 New Jersey ranked either third or fourth in United States eggplant production with 800 harvested acres supplying 12 to14% of the commodity. Yields averaged 20,000 to 25,000 pounds per acre with a total production of between 16,000,000 and 20,000,000 pounds. Even though New Jersey ranked third or fourth in production, prices received by growers ranked sixth and seventh in the United States with growers receiving between $0.11 and $0.23 per pound. Total crop value has varied between $3.02 million (2001) to $4.68 million (2002) (1). Production and value has changed little since at least 1995 with acreage varying between 800 and 1000 acres and crop value between $2.22 million (1995) and $4.68 million (2002) (2).

During 1998-99 production season in Southern New Jersey the fixed and variable costs per acre were estimated at $3,934 and total cost including harvesting varied from $3.19 to $4.06 per box depending on yield (3).

Production Practices

The largest production area for eggplant is centered in southern New Jersey in the counties of Gloucester, Cumberland, Salem and Atlantic. There are smaller production areas in Monmouth and Burlington Counties. This production is mainly for the wholesale fresh market trade with the commodity being shipped over the eastern United States and Canada depending on the time of year. There is some production in the northern part of the state for roadside and green markets.

Types Grown

Eggplant is a member of the nightshade family and is related to tomato, pepper, and white potato. Among this group eggplant is more sensitive to cold. The majority of the varieties grown in New Jersey are the large dark purple skin with a light to dark green calyx, teardrop to oblong shape "American or Harris type." There is some production of white teardrop shape eggplant; Italian slender, purple skin with a dark green calyx types; Japanese slender with a dark purple to black tender skin; and Chinese long cylindrical purple to green with a green calyx eggplants. All four types are grown in New Jersey, but the American and Italian are the most common. Research is underway to evaluate other types from Africa, the Caribbean, Southeast Asia and Europe for commercial production. With the increased ethnic population, there is a growing demand for 'non-traditional types.'

Transplant production

Eggplants are a warm season crop that does not tolerate frost. All eggplant is transplanted from plants grown locally. Plants are started in greenhouses in January through March for transplanting in May through early July depending on the variety. Growers like sturdy plants and will start seeds in large trays such as 72 cell trays and move them to 18, 24 or 36 cell trays as they grow. Plants are grown using a standard soil less mix (i.e. Promix) and the fertility level is supplemented with two to three applications of a complete liquid fertilizer. Plants are hardened off by withholding water before setting in the field. Some transplants are still produced by planting directly in the soil in greenhouses and set out bare root. Height control is a problem with many growers because plants are started early. Since there are no chemicals for controlling plant height, transplants may be two feet tall when set in the field.

Field Planting

Most eggplant is set into black plastic with drip irrigation for early production. Late plantings are set into white plastic for better temperature control. Eggplants are planted one row per bed at either 5 or 6 ft interrow spacing with most plantings at 6 ft. Within row spacing varies between 30 and 36 inches. Some growers plant on flat ground without plastic or drip irrigation. These plants are irrigated with solid set irrigation or cannon type equipment.

Transplants are set with a water wheel, mechanical transplanter or by hand depending on the size of the plants. Growers take care when transplanting to set the plants straight in the transplant plant hole to avoid stem burn when the plastic becomes too hot. Also, some growers fill the hole around the plastic with soil to reduce the chance of water collecting around the plant leading to disease. Early varieties are ready to harvest in 45 to 50 days and harvest continues until frost (early October). Late varieties are ready to harvest in 70 to 80 days.

Some of the eggplant grown on plastic is also staked to increase yields and fruit quality. Eggplant are staked using a modified Florida Weave system. Stakes are placed at every or every other plant and strings are weaved around them. Four or five strings are needed to support the fruit load throughout the season.

Land preparation

Eggplant does best on well-drained sandy-loam and loamy sand soils with a pH of 6.0-6.5. Some fields will be fumigated in the fall before planting a cover crop. The main fumigant used in New Jersey is Metam-sodium at the rate of 45 to 70 gal/A. The fumigant is applied using a shank applicator and the soil is sealed behind. If the fumigant is not applied in the fall, it is injected just before laying plastic in the spring or through the drip system after laying plastic. A cover crop (wheat or rye) is planted the year before for the early eggplants. Growers prefer wheat since it does not seem to

hold as much moisture plus grain rye may get tall making it difficult to incorporate. In the spring, the cover crop is plowed down using either a moldboard or chisel plow. Beds are made; irrigation tape applied and plastic laid using either Kennco or Rain-Flo equipment.

Some growers apply herbicides prior to bed making and laying plastic as a broadcast application. Others will lay the plastic without any herbicide then band apply between the rows before transplanting.

Harvesting

Eggplants are hand harvested as they approach marketable size, but before the seeds start to turn color by cutting the fruit from the plant above the calyx. Fruit that are allowed to stay on the plant too long will reduce total yield. Fruit are picked in plastic bushel containers and transported to packing sheds where they are washed, graded into No.1, No.2 and field run and packed in 11/9 bushel waxed cardboard cartons.

Pests

Chemical Control

Most pesticides are applied with ground air blast sprayers. Growers do not have high boy sprays for eggplant. Herbicides are applied with boom sprayers.

Insects

The major eggplant insect pests include aphids, Colorado potato beetle, flea beetles, and twospotted spider mites (4). Eggplant lacebug (*Gargaphia solani*), corn borer (*Ostrinia nubilalis* (Hubner)) and corn earworm ((*Helicoverpa* zea) (Boddie)are minor pests.

Colorado Potato Beetle (CPB) *(Leptinotarsa decemlineata)*

This insect has been one of the main insect pests on Eggplant. Both adults and larval attack foliage, flowers and young fruit. The adult has alternate black and yellow to orange stripes running length wise over the body. The beetle is approximately 3/8 by 1/4 inch. The larvae is convex shape light to dark red in color with two rows of black spots down each side. Larvae go through four stages and increases in size with each stage. Larvae generally feed in groups and can defoliate plants if not controlled (80 and 144). CPB occur every year in the state and have at least two generations a year. CPB feed on solanceous crops such as tomato, potato, eggplant and tomatillo and have the potential to defoliate these crops each year unless controlled.

The normal early control measure for CPB is to apply Admire (*Imidacloprid*) prior to transplanting while the plants are still in the transplant tray at the rate of 1.5 – 3.2 fl.oz/1000 plants in sufficient water to saturate the growing media. This practice provides early season control. Additional pesticide applications may be required later in

the growing season depending on insect pressure. Those applications generally can be delayed until late July or early August if insect pressure is not high. Materials commonly applied are SpinTor 2SC (spinosad) 3-6 fl.oz./A, Vydate 2 L (*oxamyl*) 1-2 qt/A and *Bacillus thuringiensis tenebrionis* 1-3 qt/A (292). Two to three applications maybe required depending on insect pressure. By early September CPB are no longer a concern thus applications are stopped. All the above materials have 4 to 48 hour reentry time and 0 to 1 day to harvest except Admire which is 21 days to harvest. No eggplants are harvested in 21 days thus this is not a concern. Eggplants are harvest twice a week during the main production period which does not affect the reentry time.

Fields can be monitored for overwintering adult populations by checking field edges closest to where a host crop was grown the previous year. The insect will move over or through another crop to infest eggplant. Field edges should be checked weekly after planting for the overwinter population. It is recommended to treat hot spots when 15 CPB are found on 10 plants (4).

The parastiod *Edovum puttleri* has been shown to control CPB effectively (292), but it does not overwinter in New Jersey. The New Jersey Department of Agriculture had a program to rear the parastiod and release it into eggplant fields, but the program was eliminated as not being cost effective since new chemical pesticides (i.e. Admire) have come on the market.

Other cultural controls that have not been successful are the use of plastic-lined trenches to trap the overwintering population **(moyer**) and propane flamers (**moyer**). Both methods can be used to reduce the overwintering populations, but not have been adopted by growers.

Potato flea beetle (*Epitrix cucumeris (harris))*
Eggplant flea beetle (*Epitrix fuscula (crotch))*

These pests attack plants right after setting plants in the field. They are not a problem every year or with every planting. Shiny black adults approximately 1/8 long overwinter and feed on young plants in the spring. The larvae feed on the roots, but do little noticeable damage. (**mich**) The beetles are first found on field edges or weedy areas. They are hard to monitor since they are shy, jumping when approached. Shot hole damage is the easily identifiable symptom. Fields should be monitored weekly using the following thresholds: less than 3 inches tall 2/plant, 3-6 inches tall 4/plant and more than 6 inches 8/plant. (**381)** Monitoring is general necessary for the first few weeks, but may be necessary up to flowering.

Flea beetles are controlled when the transplants are drenched in the flats with Admire using the same proceeding and rates as with Colorado Potato Beetle.

Two Spotted Spider Mite (*Tetranychus urticae*)

Two spotted mites are a problem during dry periods. Adult mites have eight legs, white to cream in color with two dark spots of each side of the body.

Infestations generally begin around field margins and grassy areas especially if the field edges are mowed during dry periods. Observe plants near field edges, especially next to dusty roads. A 10X hand lens or shaking leaves over white paper helps in identification. Field should be monitored weekly especially during dry periods. Rate infestations as absent, light, moderate or heavy. Early season thresholds are 10-15% of crown leaves and late season 50% of terminal leaves infested.

Mites can be spread through the field on clothing, but overhead irrigation helps retard outbreaks. Also, beneficial organism help keep populations under control. Continuous use of certain insecticides especially pyrethroids can exacerbate mite problems.

Diseases

Phytophthora Blight attacks plants anytime during production. This disease is prevalent in New Jersey where pepper, eggplant tomatoes and cucurbits are grown. Look for wilted plants in the field, especially in low spots and at ends of rows where water can collect after rain or irrigation. When wilted plants are found remove them from the field. For plastic mulch culture remove at least a 2-foor section of mulch between infected and healthy plants to allow the soil to dry. Planting on ridges or raised domes shaped beds reduce the treat of Phytophthora.

Verticillium Wilt is a sporadic disease where good rotations are observed. Plants are stunted with interveinal yellowing, wilting and drying of leaves. Older leaves are affects first with the symptoms progressing up the plant. Symptoms often appear on one side of the leaf or plant. The presence of root know/root lesion nematodes may increase severity and there are no rescue treatments. Fields should be monitored weekly and plants removed if infected. Good crop rotation and tolerant or resistant varieties are the only controls.

Bacterial Soft Rot is a post harvest problem associated with harvesting during warm, rainy periods and inadequate chlorination when washing fruit after harvest. The bacteria enter fruit through cuts, breaks, insect damage and abrasions. Look for discolored areas on the stem or fruits or a slimy rot on stems and fruit. Avoid harvesting when plants are wet or planting after potatoes and cabbage.

Phomopsis Blight is a sporadic disease that affects all stages of the eggplant. Leaf spots are clearly defined, circular up to 1 inch in diameter, brown to gray with narrow dark brown margin and black specks in lesion centers. Spots generally appear first on seedling stems or leaves. Spots may girdle seedling stems, killing the plant. The disease overwinters on diseased plants. Wet weather and high temperatures promote Phomopsis blight. Good rotation helps reduce the spread.