

**Eggplant: An Economic Assessment of the Feasibility
of Providing Multiple-Peril Crop Insurance**

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Executive Summary

Eggplant, *Solanum melongena*, is a very tender, bushy, erect plant that belongs to the Solanaceae family, which also includes potatoes, tomatoes, and sweet peppers. Eggplant is grown commercially as a fresh-market vegetable crop in the United States, with the fruit being the edible portion. Botanically, eggplant may live for more than a year, although it is mainly grown as an annual. It requires a long, warm growing season to produce optimum yields and is very susceptible to injury due to frosts and long periods of cold temperatures.

An eggplant bush usually attains a height of 2 to 4 feet. The fruit is pendant and is considered to be a fleshy berry. Depending on the eggplant variety, the fruit may vary in color (from purple to purple-black, to white, red, or variegated), shape (oval, round, long, oblong or egg-shaped), and size. The seeds are born on a fleshy placenta and are distributed throughout the fruit. Eggplant flowers are self-pollinating.

About 20 to 30 eggplant varieties are available in the United States. Traditional varieties such as 'Black Beauty' are oval to elongated-oval in shape, and average 5 to 6 inches long. In contrast, Oriental varieties tend to be long and slender, reaching about 6 to 12 inches in length and 1½ to 2 inches in diameter.

According to the Census of Agriculture, 2,203 U.S. farms harvested eggplant from 8,097 acres in 1992. The Census indicates that the number of farms in 1992 had increased 35 percent since 1987, and harvested acreage had increased about 54 percent. Florida, New Jersey, California, Georgia, and Oregon accounted for 72 percent of U.S. harvested acreage.

Fifty-one percent of all farms with eggplant production in 1992 used irrigation, and 81 percent of total harvested acres were irrigated. The number of irrigated farms and the harvested area under irrigation increased 41 percent and 61 percent, respectively, from 1987. The five leading eggplant-producing states (in terms of harvested area) accounted for 79 percent of U.S. irrigated acreage.

Domestic demand for eggplant has remained fairly flat for the last eight years, with consumption steady at 0.4 pounds per person since 1988. Consumption will likely stay at 0.4 pounds per person in 1996, unchanged from the year before. The introduction of prepared products from eggplant may, however, help strengthen domestic demand in future years.

To attain profitable yields, eggplant requires a long, warm, frost-free growing season of about 14 to 16 weeks. Daytime temperatures of 80EF to 90EF and nighttime temperatures of 70EF to 80EF are considered optimal. Plant growth stops at temperatures below 60EF. If growth is interrupted, the eggplant produces inferior fruit. Therefore, transplants should not be set in the field until the daily mean temperature reaches at least 65EF to 70EF.

Eggplant matures in 100 to 150 days when planted from seed, and in 70 to 85 days when transplants are used. Most commercial eggplant cultivars produce 500 to 700 bushels of marketable product per

acre, with the highest yields attained by harvesting at least five or six times during the season at seven- to ten-day intervals. Large, vigorous plants may yield as many as 4 to 6 fruit at the peak of the season. Some growers in Florida, under ideal conditions, may harvest about 2,000 cartons per acre, which approaches 14 to 15 eggplant per plant. Prompt harvesting of eggplant increases the setting of new fruit and overall yields.

Eggplant are harvested manually with a sharp knife or pruning shears, usually when they are one-third to two-thirds mature. The fruit are clipped from the plant, with the calyx or cap and part of the stem left attached to the fruit. Careful handling of the fruit is necessary to avoid bruising. Mature fruit should not be left unharvested because the fruit's seeds will become bitter. In addition, regular harvesting promotes the production of new fruit.

Eggplant is a warm season crop. However, excessive heat coupled with dry conditions may lead to slow plant growth and bitter-tasting fruit. Under extremely high temperatures, the eggplant fruit are also prone to sunscald. Sunscalding causes brown areas to form on fruit surfaces that are exposed to the sun, consequently diminishing the fruit's marketability.

Eggplant is also very sensitive to cold temperatures. Usually, cold temperatures stop plant and root growth and reduce plant vigor and yields. Young plants, as well as unharvested fruit, are very susceptible to chilling injury caused by long periods of chilly, but frostless, weather. Unharvested fruit may be severely damaged by even light frost.

Disaster assistance payments for all eggplant (including specialty eggplant) losses totaled \$4.5 million over the 1988-94 period. The largest payments were made in 1993, at \$1.08 million, due mainly to drought conditions in the spring and summer and excessive moisture later in the year. Payments were large again in 1994, at nearly \$960,000. Hail and freezing temperatures were other reasons for crop losses during 1988 through 1994.

Our assessment is that eggplant may not be a very strong candidate for crop insurance, except in the Southeast. Industry sources have indicated that growers may not likely be interested in buying insurance solely for their eggplant crop because they usually grow more than one crop and eggplant is usually a minor crop. Further, most of the eggplant acreage in major eggplant-producing states is irrigated, reducing the risk of crop losses due to drought.

Interest in an eggplant insurance policy, however, will likely originate from Florida and Georgia. The Southern region accounts for about one-half of U.S. harvested eggplant acreage, and about three-quarters of total disaster payments for eggplant losses during 1988 through 1994. Of these states, Florida and Georgia accounted for 78 percent of the regions' harvested acreage and 88 percent of the region's share of total disaster payments.

Interest among Florida growers may be somewhat smaller than in Georgia because 87 percent of the disaster payments made to Florida growers were collected by minor producing counties. Georgia

growers might have greater interest in eggplant insurance because disaster payments in the state were collected primarily in major-producing counties.

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Introduction

Eggplant, *Solanum melongena*, is a very tender, bushy, erect plant that belongs to the Solanaceae family, which also includes potatoes, tomatoes, and sweet peppers. Eggplant is sometimes called 'guinea squash' (Andersen). It has been cultivated for many centuries in India, China, and Arabia, and is, therefore, believed to be indigenous to the tropics. It was introduced into Europe during the Moorish invasion of Spain (Ware and McCollum). Purple and white cultivars were introduced into America by the Spanish explorers (Splittstoesser).

Eggplant is grown commercially as a fresh-market vegetable crop in the United States, with the fruit being the edible portion. Botanically, eggplant may live for more than a year, although it is mainly grown as an annual. It requires a long, warm growing season to produce optimum yields and is very susceptible to injury due to frosts and long periods of cold temperatures. It is more susceptible to plant injury due to frost than are either tomato or sweet pepper plants (Andersen).

An eggplant bush usually attains a height of 2 to 4 feet. The fruit is pendant and is considered to be a fleshy berry. Depending on the eggplant variety, the fruit may vary in color (from purple to purple-black, to white, red, or variegated), shape (oval, round, long, oblong or egg-shaped), and size. The seeds are born on a fleshy placenta and are distributed throughout the fruit. Eggplant flowers are self-pollinating (Seelig and Magoon).

This report examines those aspects of the U.S. eggplant industry that relate to the demand for crop insurance and the feasibility of developing a crop insurance policy for eggplant.

U.S. Farms Growing Eggplant

According to the Census of Agriculture, 2,203 U.S. farms harvested eggplant from 8,097 acres in 1992 (Table 1). The Census indicates that the number of farms in 1992 had increased 35 percent since 1987, and harvested acreage had increased about 54 percent. Florida, New Jersey, California, Georgia, and Oregon accounted for 72 percent of U.S. harvested acreage.

Fifty-one percent of all farms with eggplant production in 1992 used irrigation, and 81 percent of total harvested acres were irrigated. The number of irrigated farms and the harvested area under irrigation increased 41 percent and 61 percent, respectively, from 1987. The five leading eggplant-producing states (in terms of harvested area) accounted for 79 percent of U.S. irrigated acreage.

Table 1--Eggplant production, United States, 1992 and 1987

Geographic area	1992				1987			
	Harvested		Irrigated		Harvested		Irrigated	
	Farms	Acres	Farms	Acres	Farms	Acres	Farms	Acres
Alabama	17	12	5	6	18	42	3	(Z)
Arkansas	18	26	6	(D)	21	25	10	9
California	169	1,050	169	1,050	120	503	120	503
Colorado	12	19	12	19	15	12	15	12
Connecticut	108	164	24	27	50	41	11	19
Delaware	4	2	--	--	(NA)	(NA)	(NA)	(NA)
Florida	114	2,544	102	2,368	88	1,860	77	1,778
Georgia	51	717	30	581	28	243	17	210
Hawaii	104	115	81	100	102	97	81	90
Idaho	7	(D)	6	(D)	3	(D)	2	(D)
Illinois	36	41	11	13	44	120	12	(D)
Indiana	31	15	4	4	18	44	4	3
Iowa	29	7	5	2	19	11	5	(D)
Kansas	9	10	7	9	17	14	9	7
Kentucky	25	9	5	(D)	13	10	5	3
Louisiana	45	44	19	26	31	80	11	36
Maine	13	(D)	6	1	(NA)	(NA)	(NA)	(NA)
Maryland	68	70	19	11	45	45	17	10
Massachusetts	107	157	55	63	51	51	19	35
Michigan	58	125	26	86	69	69	22	67
Minnesota	31	29	9	15	31	26	13	15
Mississippi	22	7	6	2	14	5	6	2
Missouri	32	16	18	9	24	31	9	17
Nebraska	4	1	3	1	3	(D)	2	(D)
New Hampshire	19	(D)	13	(D)	9	6	2	(D)
New Jersey	366	1,117	173	843	268	1,076	132	792
New Mexico	8	16	8	16	(NA)	(NA)	(NA)	(NA)
New York	140	171	49	69	121	93	39	42
North Carolina	52	267	30	211	50	300	21	173
Ohio	55	41	18	13	49	44	18	21
Oklahoma	12	15	6	1	8	11	4	8
Oregon	30	386	30	386	9	17	9	17
Pennsylvania	94	59	31	19	101	86	24	10
Rhode Island	19	19	5	3	7	3	--	--
South Carolina	14	34	6	27	6	8	--	--
Tennessee	27	63	7	5	14	26	3	(D)
Texas	104	256	52	208	69	87	43	60
Vermont	14	12	4	1	9	9	4	8
Virginia	47	76	20	64	26	20	7	5
Washington	26	273	23	272	12	22	12	22
West Virginia	3	1	1	(D)	7	1	--	--
Wisconsin	52	41	11	6	32	32	5	3
Other States	7	3	5	3	(NA)	(NA)	(NA)	(NA)
United States	2,203	8,097	1,120	6,580	1,627	5,260	797	4,080

(NA) = Not available.

(D) = Data are not published to avoid disclosure, but are included in U.S. totals.

Source: 1992 Census of Agriculture.

Eggplant is grown in the late spring, summer, and fall in most of the growing states in the North and in the upper South. In the extreme South, eggplant can be grown in the winter. It grows poorly in many parts of the Pacific Northwest (Splittstoesser). U.S. eggplant production accounts for less than 1 percent of total fresh-market vegetable and melon production.

Many of the farms growing eggplant also produce other vegetable crops, either as rotation crops or on a regular basis as part of their farm acreage. Even farms in California that tend to be somewhat specialized in eggplant production also produce other high-value crops, such as tomatoes. Crop diversification reduces the price and yield risks associated with the production of just one crop.

The Eggplant Market

Supply

The Census indicates that most states produced eggplant commercially in 1992 (Table 1). Even so, USDA's National Agricultural Statistics Service (NASS) reports U.S. eggplant production for only two states, Florida and New Jersey, and reports U.S. production as the sum of these two state's output (Table 2). In the 1992 Census, these two states accounted for 45 percent of total U.S. harvested acreage.

NASS data indicate that eggplant output increased in 15 of the last 26 years (Table 3). Production reached 63.3 million pounds during the 1995 crop year, down 19 percent and 12 percent from 1994 and 1980, respectively, but up 36 percent from production in 1970 (Table 3). The decline in 1995 production from the year before was due to smaller planted acreage and a reduction in the average yield per acre. The value of the 1995 crop totaled \$16.2 million, down 22 percent from a year earlier.

According to NASS, Florida on average produced 73 percent of U.S. eggplant output over the three-year period from 1993 to 1995, accounting for 78 percent of the value of the U.S. eggplant crop. Sales of Florida-grown eggplant are typically heaviest during the months of November and December, and again during April and May (Table 4). Eggplant harvested area is usually largest during the spring and fall seasons (Table 5).

On average, more than one-third of the U.S. eggplant supply is imported from other countries, with U.S. eggplant imports increasing in 14 of the last 26 years (Table 3). The U.S. imported about 55 million pounds of eggplant in 1995, mainly from Mexico. Over the three-year period from 1991 to 1993, Mexico accounted for almost all U.S. eggplant imports. In 1994, however, a majority of all eggplant shipments into the U.S. originated in Canada.

Table 2--Eggplants for fresh market: Area planted and harvested, yield per acre, production, and value of production

1995					
State	Area planted	Area harvested	Yield per acre	Production	Value
	----- Acres -----		Cwt	1,000 Cwt	1,000 Dollars
Florida	2,500	2,500	205	513	14,005
New Jersey	800	800	150	120	2,220
United States	3,300	3,300	192	633	16,225

1994					
State	Area planted	Area harvested	Yield per acre	Production	Value
	----- Acres -----		Cwt	1,000 Cwt	1,000 Dollars
Florida	2,500	2,400	225	540	15,606
New Jersey	1,000	1,000	240	240	5,280
United States	3,500	3,400	229	780	20,886

1993					
State	Area planted	Area harvested	Yield per acre	Production	Value
	----- Acres -----		Cwt	1,000 Cwt	1,000 Dollars
Florida	2,100	1,900	275	523	13,075
New Jersey	1,000	1,000	230	230	4,646
United States	3,100	2,900	260	753	17,721

Source: USDA, National Agricultural Statistics Service.

Table 3--U.S. eggplant, all uses: Supply, utilization, and price, 1970-95

Year	Supply			Utilization			Season average price	
	Production	Imports 2/	Total	Exports 2/	Total	Per capita use	Current dollars 1/	Constant 1987 dollars
----- Million pounds -----			----- Pounds -----			----- \$/cwt -----		
1970	46.7	21.7	68.4	--	68.4	0.3	8.03	22.88
1971	43.7	23.3	67.0	--	67.0	0.3	9.18	24.81
1972	52.2	29.0	81.2	--	81.2	0.4	8.68	22.31
1973	52.7	39.2	91.9	--	91.9	0.4	9.80	23.73
1974	60.5	26.4	86.9	--	86.9	0.4	11.60	25.84
1975	70.1	26.1	96.2	--	96.2	0.4	10.40	21.14
1976	70.2	29.9	100.1	--	100.1	0.5	10.40	19.89
1977	64.1	32.3	96.4	--	96.4	0.4	11.00	19.68
1978	66.9	41.9	108.8	--	108.8	0.5	12.70	21.06
1979	67.1	40.0	107.1	--	107.1	0.5	14.70	22.41
1980	71.9	36.8	108.7	--	108.7	0.5	14.20	19.80
1981	70.7	34.7	105.4	--	105.4	0.5	17.20	21.80
1982	85.0	34.3	119.3	--	119.3	0.5	17.45	20.83
1983	80.8	39.3	120.1	--	120.1	0.5	15.33	17.58
1984	71.2	39.6	110.8	--	110.8	0.5	17.70	19.45
1985	77.2	32.0	109.2	--	109.2	0.5	13.03	13.80
1986	76.6	35.7	112.3	--	112.3	0.5	17.36	17.92
1987	80.3	34.5	114.8	--	114.8	0.5	18.42	18.42
1988	72.7	37.1	109.8	14.2	95.6	0.4	22.15	21.32
1989	74.0	37.9	111.9	13.2	98.6	0.4	21.36	19.96
1990	79.0	35.9	114.9	15.0	99.9	0.4	25.82	22.79
1991	76.2	43.8	120.0	15.7	104.2	0.4	25.03	21.28
1992	88.2	37.2	125.4	19.7	105.7	0.4	23.40	19.35
1993	75.3	40.1	115.4	19.0	96.4	0.4	23.50	19.03
1994	78.0	47.0	125.0	18.4	106.5	0.4	26.80	21.35
1995	63.3	55.0	118.3	20.0	98.3	0.4	22.60	19.92
1996f	70.0	48.0	118.0	21.0	97.0	0.4	--	--

- = **Not available.** f = ERS forecast.

1/ Sources: National Agricultural Statistics Service, USDA (1970-81, and 1992). From 1982-91, production was estimated by ERS based on available

State data. 2/ Source: Bureau of the Census, U.S. Department of Commerce. Exports for 1988-89 are Canadian imports from the U.S. as reported

by Statistics Canada. 3/ Deflated by the GDP implicit price deflator, 1987=100. Prices for 1982-91 are for Florida only.

Table 4--Eggplant: Production sold, monthly, Florida, crop years 1989-90 through 1993-94

Crop year	Oct1/ Total	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	
1,000 33-lb bushels											
1989-90	168	229	142	36	40	221	250	339	157	7	1,589
1990-91	141	221	214	202	109	130	177	250	127	^{2/}	1,571
1991-92	180	281	287	234	207	209	294	317	165	^{2/}	2,174
1992-93	119	313	183	168	121	111	131	228	100	--	1,474
1993-94	142	301	269	180	163	212	310	326	98	--	2,001
Percent											
1989-90	10.6	14.4	8.9	2.3	2.5	13.9	15.7	21.4	9.9	0.4	100.0
1990-91	9.0	14.0	13.6	12.9	6.9	8.3	11.3	15.9	8.1	^{2/}	100.0
1991-92	8.3	12.9	13.2	10.8	9.5	9.6	13.5	14.6	7.6	^{2/}	100.0
1992-93	8.1	21.2	12.4	11.4	8.2	7.5	8.9	15.5	6.8	--	100.0
1993-94	7.1	15.0	13.4	9.0	8.2	10.6	15.5	16.3	4.9	--	100.0

^{1/} September included. ^{2/} July included with June.
 Source: Florida Agricultural Statistics Service.

Table 5--Area harvested to eggplant, by season, selected states

Year and state	Winter (January-March)	Spring (April-June)	Summer (July-September)	Fall (October-December)
----- Acres -----				
1995:				
Florida	800	700		1,000
New Jersey ^{1/}			800	
Total	800	700	800	1,000
1994:				
Florida	500	1,100		800
New Jersey ^{1/}			1,000	
Total	500	1,100	1,000	800
1993:				
Florida	500	600		800
New Jersey ^{1/}			1,000	
Total	500	600	1,000	800

^{1/} Usual harvest period for the summer season is July to November.
Source: National Agricultural Statistics Service.

Demand

Domestic demand for eggplant has remained fairly flat for the last eight years, with consumption steady at 0.4 pounds per person since 1988 (Table 3). Consumption will likely stay at 0.4 pounds per person in 1996, unchanged from the year before. The introduction of prepared products from eggplant may, however, help strengthen domestic demand in future years.

The number of eggplant varieties produced in the U.S. has declined over time, due to selection by growers and changes in the eating preferences of consumers. Currently, a few large, round, cylindrical, and bell-shaped types are produced (Seelig and Magoon). These varieties are usually purple to dark purple in color and weigh from one to five pounds each. Oriental varieties, such as Japanese eggplant, have also become more widely available as the U.S. Asian population has increased, and consumers have become more familiar with exotic vegetables. Oriental types are longer and narrower than the other types produced in the United States.

Over the past eight years, U.S. eggplant exports have gradually increased as a share of domestic output. In 1988, U.S. eggplant exports, mainly to Canada, were nearly 20 percent of domestic production, increasing to about 24 percent in 1994. U.S. eggplant exports are projected to increase to a record 21 million pounds in 1996, 30 percent of domestic production (Table 3). In value terms, 99 percent of U.S. eggplant exports were destined to Canada in 1994. The U.S. also exports eggplant to Mexico, the United Kingdom, Switzerland, and other countries.

Prices

Because eggplant is a minor vegetable in the U.S., there are only three sources of eggplant price data. First, NASS reports a season-average price for eggplant, available on an annual basis for the United States, Florida, and New Jersey. Second, USDA's Agricultural Marketing Service (Fruit and Vegetable Division) collects representative f.o.b. prices for eggplant in south Florida. However, these weekly f.o.b. prices are not always available consistently. Third, the Florida Agricultural Statistics Service publishes a monthly average value per bushel for fresh-market eggplant sales (Table 6). This series indicates that eggplant prices typically rise seasonally during the winter (January-March), when production is at its lowest, and decline during the spring and fall when production is heaviest.

Table 6--Eggplant: Average value per bushel for fresh market sales, monthly, Florida, crop years 1989-90 through 1993-94

Crop year	Oct ^{1/}	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Average
Dollars											
1989-90	6.70	7.50	13.5	25.70	23.50	12.20	6.35	5.25	5.30	5.40	8.52
1990-91	4.55	4.10	6.9	5.80	9.40	13.00	10.20	11.60	10.70	^{2/}	8.26
1991-92	5.94	3.8	6.04	7.43	10.86	11.55	9.57	10.43	4.82	^{2/}	7.91
1992-93	4.98	6.53	5.21	6.30	5.91	9.31	13.53	9.17	9.01	--	7.57
1993-94	7.89	7.46	7.36	8.75	14.49	11.58	11.42	8.71	6.11	--	9.35

^{1/} September included. ^{2/} July included with June.

Source: Florida Agricultural Statistics Service.

Cultivation and Management Practices

Site Selection

Sites that have a southern exposure are recommended for early production of eggplant because they tend to receive the most sunlight. Such locations are particularly beneficial for early plantings in the spring because the soil warms more quickly in sunlight (Granberry).

In windy areas, a location that has woods or windbreaks to the north and west is desirable. These locations help protect the newly-set transplants, which are very susceptible to wind injury (Ware and McCollum).

Land Preparation

The soil should be thoroughly prepared prior to planting for optimal eggplant production. Fields with large amounts of plant debris should be disked and plowed several weeks before transplanting. Adequate soil preparation will aid in the growth and development of the plant's extensive root system (Granberry).

Climate

To attain profitable yields, eggplant requires a long, warm, frost-free growing season of about 14 to 16 weeks (Harrison, et al.). Daytime temperatures of 80EF to 90EF and nighttime temperatures of 70EF to 80EF are considered optimal (Seelig and Magoon). Plant growth stops at temperatures below 60EF. If growth is interrupted, the eggplant produces inferior fruit (Splittstoesser). Therefore, transplants should not be set in the field until the daily mean temperature reaches at least 65EF to 70EF.

Soil Requirements

Eggplant thrives on well-drained, fertile, sandy-loam soils having a pH of 6.0 to 6.5. Plantings on poorly drained soils usually result in a reduced root system, poor plant growth, and low yields (Granberry).

Eggplant seeds germinate best at soil temperatures of 75EF to 90EF (Harrison, et al.). Seeds will likely fail to germinate at soil temperatures below 60EF.

Varieties

About 20 to 30 eggplant varieties are available in the United States, varying in color, shape, and size. Most varieties have purple to purple-black skin, although some are white, green, or mottled green in

color. Traditional varieties such as ‘Black Beauty’ are oval to elongated-oval in shape, and average 5 to 6 inches long. In contrast, Oriental varieties tend to be long and slender, reaching about 6 to 12 inches in length and 1½ to 2 inches in diameter (Granberry).

Eggplant varieties may be classified as hybrids or open-pollinated varieties. Although they are more expensive, hybrid seeds tend to produce plants that grow more uniformly and produce higher yields (Granberry).

The characteristics of the major eggplant varieties grown in the U.S. vary widely. ‘Black Beauty’ is a large-fruited, late-bearing, purple cultivar. Hybrids that produce earlier, somewhat smaller, more elongated purple fruit include ‘Dusky,’ ‘Ichiban,’ ‘Satin Beauty,’ ‘Long Tom,’ and ‘Black Magic.’ ‘Applegreen’ produces early, green, oval-shaped fruit, while ‘Slim Jim’ produces clusters of small fruit and is good for both container and garden use (Harrison, et al.). ‘Albino’ produces a medium white fruit, while ‘White Italian’ has a large white fruit. ‘Burpee Hybrid’ produces a large purple fruit (Splittstoesser). ‘Classic’ is a very productive hybrid producing long, slim, tapered fruit that is glossy black in color (Andersen). Appendix A provides detailed characteristics of different eggplant varieties.

Planting

Eggplant can be direct seeded or transplanted, although transplanting is often the preferred method. The transplanting method generally uses land more efficiently and typically results in a uniform, complete stand. In contrast, when direct seeding is used, weed control practices are usually more difficult to implement, and spring harvest dates are at least three to four weeks later. Further, specialized planting equipment is required to control the depth of planting and row spacing (Granberry).

Because eggplant is very tender, transplants, if used, should be set in the field after all danger of frost has passed and the weather is warm. Plants are usually set 2 to 3 feet apart in rows that are 3 to 4 feet wide. For small-growing varieties, the recommended planting distance is 1½ to 2 feet within a row and 2½ to 3 feet between rows (Seelig and Magoon).

When direct seeding is used, eggplant seeds are planted about one-half inch deep on fairly level soil. Level soil is needed to prevent the seeds from being washed away or buried by water-transported soil (Granberry). Transplants, on the other hand, are usually planted on raised beds. Raised beds help improve soil drainage, particularly for eggplant that is planted on heavy soils or in low-lying areas.

Transplants are usually started in greenhouses or in plant beds about 8 to 10 weeks before they are set out in the field. Transplants are also slightly hardened prior to planting to help the young plants develop tolerance to unfavorable conditions. Over-hardened transplants will, however, grow slowly and take longer to become established. Active growth upon transplanting will help assure a well-established plant before fruit development (Granberry).

For maximum yields, the ideal transplant should be young and 8 to 12 inches in height. It should not exhibit rapid vegetative growth, and should be free of any fruits, flowers, or flower buds before transplanting (Granberry).

Many growers opt to keep the growing media on the roots of young container-grown transplants as they are set in the field. By doing so, the young seedlings are less subject to transplant shock and usually require little, if any, replanting. They resume growth more quickly after set in the field, and grow and produce more uniformly (Granberry).

Eggplant also produces higher yields when staked. Staked plants are also easier to harvest and are less prone to rotting because the fruit does not touch the ground (Chaplin).

Fertilization

Like many vegetables, eggplant requires high rates of nitrogen, phosphorus, and potassium for maximum yields. Fertilizer application rates should be based on soil test results. Commercial fertilizer mixtures of nitrogen, phosphorus, and potassium are usually broadcast both before and after planting (Seelig and Magoon). Nitrogen is side dressed when the plants are half of their mature size and again immediately after harvest of the first fruit (Andersen).

Irrigation

Eggplant requires abundant moisture at all times to maintain active, uniform growth. Generous moisture is particularly important from the time of transplanting until the plants become established. Since eggplant thrives during the summer, it can tolerate dry weather after becoming well established, although irrigation is needed during extended dry periods (Andersen).

Crop Rotation

As for many vegetables, crop rotation is an important practice in eggplant production because it helps protect the land from serious weed problems. Eggplant should not be planted consecutively on the same land, nor should it follow other solanaceous crops, such as tomatoes and peppers (Granberry). In addition, eggplant should not be used as a rotation crop on land that has been treated with herbicides to which eggplant may be sensitive. Many of the herbicides applied to agronomic crops have not been thoroughly tested for eggplant sensitivity (Granberry).

Harvesting Practices

Eggplant matures in 100 to 150 days when planted from seed, and in 70 to 85 days when transplants are used (Andersen). Most commercial eggplant cultivars produce 500 to 700 bushels of marketable

product per acre, with the highest yields attained by harvesting at least five or six times during the season at seven- to ten-day intervals (Granberry). Large, vigorous plants may yield as many as 4 to 6 fruit at the peak of the season (Andersen). Some growers in Florida, under ideal conditions, may harvest about 2,000 cartons per acre, which approaches 14 to 15 eggplant per plant (Shuler). Prompt harvesting of eggplant increases the setting of new fruit and overall yields (Harrison, et al.).

Eggplant are harvested manually with a sharp knife or pruning shears. The fruit are clipped from the plant, with the calyx or cap and part of the stem left attached to the fruit. Careful handling of the fruit is necessary to avoid bruising the skin (Seelig and Magoon). Mature fruit should not be left unharvested because the fruit's seeds will become bitter (Lee). In addition, regular harvesting promotes the production of new fruit (Chaplin).

Eggplant are usually harvested when they are one-third to two-thirds mature. At this stage, the fruit are large, shiny, have a uniform bright color (deep purple for purple varieties), and are firm to the touch. The seeds will be young, white, and tender, and the flesh will be firm and white (Lee). Large cultivars are six to eight inches long, while the long, slender Japanese eggplant is harvested when it is finger- to hotdog-size (Splittstoesser, Lee).

The flesh of the mature fruit is soft, and a thumb pressed against the fruit leaves an indentation. The fruit are over-mature when the surface is dull, the flesh is tough and spongy, and the seeds are dark and hard. Over-ripe white eggplant turns a yellowish color, while over-ripe green varieties turn khaki (Chaplin). Fully ripe fruit can be used only for seed production (Nothmann).

Grading, Packing, Storing, and Shipping Practices

Prior to packing, eggplant are usually sorted by size and washed, and the grade-outs are removed. A good-quality eggplant is firm and heavy relative to its size. It should be a uniform color (dark, rich purple for purple varieties) and clear of cuts and bruises. Wilted, shriveled, and soft eggplant are discarded because they usually have a bitter or otherwise poor flavor. Eggplant with worm injury and decay (dark brown spots) on the surface should also be discarded.

Individual markets usually prefer (or require) a specific type (or types) of eggplant. As a result, packing, is according to type (Granberry). Eggplant are usually individually-wrapped in paper to prevent their stems from puncturing other fruit. The wrapped fruit are then carefully packed into waxed fiberboard boxes or wirebound crates (McGregor). They are then either forced-air cooled or hydro-cooled at a high temperature.

Eggplant are shipped mostly by highway or piggyback trailers or vans. They generally do not store well for very long, as the fruit quality begins to deteriorate a few days after harvesting. Transit and storage life is about one week.

Because of its susceptibility to chilling and freezing injury, transit and storage temperatures should be kept at 54EF, with a relative humidity of 90 to 95 percent (McGregor). This will help prevent the fruits from weakening and protect them against rot. Since eggplant fruit that develop during cool seasons tend to be less sensitive to chilling injury than those that develop during warmer weather, the former can be stored successfully at a somewhat lower temperature (Nothmann).

U.S. standards for eggplant are U.S. Fancy, U.S. No. 1, and U.S. No. 2. The grade of eggplant most frequently shipped is U.S. No. 1. This grade consists of eggplant of similar varietal characteristics which are fairly well colored, firm, clean, fairly well shaped, and free from decay, worm holes, and damage caused by scars, freezing, disease, insects, or mechanical or other injury (Seelig and Magoon).

Marketing Practices

Eggplant is sold mostly to large grocery chains or to large-city terminal markets. Some are also sold through auctions, particularly those grown in New Jersey. An auction is a market close to a metropolitan area where products are sold sequentially to the highest bidder (Powers). Some eggplant growers directly market their own produce (serving as their own packer-shippers), while others acquire the services of brokers and packer-shippers. A small proportion of U.S. eggplant production is also sold in roadside markets and farmers' markets.

Costs of Production

Because eggplant is very delicate, harvesting depends mainly on manual labor to minimize the risk of physical damage to the fruit. This practice raises harvesting costs above levels that would be realized if the fruit were harvested mechanically. Harvesting costs account for about 40 to 70 percent of total production costs (Table 7 and Appendix B). High harvesting costs may encourage moral hazard when eggplant prices are low and growers have large quantities available for harvest.

Production Perils

Like many vegetable producers, eggplant growers confront unfavorable weather, diseases, insects, weeds, and other pests. Plants that undergo stress, particularly during flowering and fruit development, often exhibit poor growth and realize low yields. Environmental stress to

Table 7--Eggplant: Variable harvesting costs, selected states¹

State	Yield	Variable harvest cost	Total cost	Variable harvest percent of total
	Boxes	----- \$/acre -----	-----	Percent
California:				
Japanese eggplant, fresh market (Fresno County)	1,800	7,020	10,651	66
Florida:				
Palm Beach County	1,200	2,964	7,832	38
Kentucky:				
Trickle Irrigated	800	2,309	3,737	62

¹ Costs may not be comparable among states because budgets may be for different seasons and may not include the same cost items.

Sources: Ilic; Smith and Taylor; Isaacs, et al.

eggplant promotes the dropping of flowers or results in flattened, unmarketable fruit. Types of stress causing these symptoms include lack of moisture, excessive moisture, nutrient deficiency, or sub-optimal temperatures (Granberry).

Excessive Moisture

Excessive rains may flood low-lying areas of eggplant fields. When soils remain waterlogged for a long period, the eggplant roots become suffocated, causing wilting and death of plants. Symptoms of excessive moisture damage to eggplant are yellowing of the bottom leaves and a brown discoloration in the stem interior. Prolonged periods of very wet conditions may also promote rapid growth of rot pathogens. Damage from excessive moisture may be controlled by improving soil drainage (Texas A&M University).

Excessive Heat

Eggplant is a warm season crop. However, excessive heat coupled with dry conditions may lead to slow plant growth and bitter-tasting fruit. Under extremely high temperatures, the eggplant fruit are also prone to sunscald. Sunscalding causes brown areas to form on fruit surfaces that are exposed to the sun, consequently diminishing the fruit's marketability.

Excessive Cold, Frosts, and Freezes

Eggplant is very sensitive to cold temperatures. Usually, cold temperatures stop plant and root growth and reduce plant vigor and yields. Young plants, as well as unharvested fruit, are very susceptible to chilling injury caused by long periods of chilly, but frostless, weather. Unharvested fruit may be severely damaged by even light frost (Nothmann).

Frosts and freezes are particularly destructive during the early stages of plant growth. Young plants or newly-set transplants may be killed by light frosts (Seelig and Magoon). Cool weather during the early stages of growth may also cause misshapened fruit (Nothmann). Light frosts may kill the leaves of more mature plants, although these plants often still produce fruit. Regardless of the age of the plant, low soil- and air- temperatures cause slower fruit growth and color formation (Nothmann).

Drought

Long periods of dry, hot weather may result in poor-quality eggplant. The fruit may be misshapened and poorly colored, or it may taste bitter (Andersen). Further, the plants may wilt and the bottom leaves may turn yellow. Drought can typically be mitigated by irrigation.

Wind

Wind-blown sand can wound eggplant leaves, buds, flowers, and fruit, reducing yields due to increased grade-outs. Further, the wounds and scars caused by wind damage may serve as entry points for disease pathogens. Very strong winds and heavy rains (due to hurricanes, for example) may completely destroy the crop.

Hail

Hail can lacerate the leaves of eggplant, and wounds on the fruit may serve as entry points for disease pathogens. Serious leaf damage may impair the plant's ability to produce flowers and fruits, and fruit that develops from these plants may be deformed or yields may be reduced. Fruits punctured by hail are of lower quality and, in cases of severe damage, may be discarded.

Diseases

Fruit rot and verticillium wilt, both caused by soil inhabitants, are two serious diseases of eggplant. Proper implementation of basic cultural practices, such as planting resistant varieties, crop rotation, good sanitation, proper plant spacings, appropriate field selection, and good fertilizer and irrigation practices, along with chemical application, help control disease problems.

Phomopsis Fruit Rot

This common and destructive disease of eggplant is caused by a fungus which may attack all above-ground parts of the plant, leaving brown spots on the leaves and light-brown blotches on the fruit (Harrison, et al.). The brown blotches, which frequently originate under the calyx, develop into soft rot on the fruit, affecting the fruit tissue and resulting in a spongy texture.

Phomopsis usually occurs prior to harvesting, particularly during warm (80EF to 86EF), wet weather. It can be controlled by planting disease-free seeds and resistant varieties and by crop rotation and discarding diseased plants. When shipping fruit with undetected infections, prompt cooling to 50EF will substantially reduce the incidence of decay. Examples of varieties resistant to Phomopsis fruit rot are 'Florida Market' and 'Florida Beauty' (Harrison, et al.).

Verticillium Wilt

This disease is caused by a fungus, *Verticillium dahliae*, that lives in the soil indefinitely and thrives in cool areas (Splittstoesser). The disease is seedborne in eggplant. The fungus enters through the root system and moves via the plant's vascular system. Infected plants become stunted, the bottom leaves often turn yellow, wilt, and drop off, and the plant stops producing fruit. Plants may die prematurely

(Harrison, et al.). Verticillium wilt can be controlled through crop rotation with unrelated crops, proper sanitation and weed control, and good soil drainage.

Phytophthora Root Rot

This disease is caused by a fungus, *Phytophthora capsici*, which lives in the soil and is most active during moist, warm weather. Infection is signaled by the appearance of dark-green, water-soaked spots around the stem at soil level, which causes the plant to wilt and die (Oregon State University). Spots that are water-soaked and irregularly-shaped also appear on the foliage and fruit. The spots occurring on the fruit enlarge until they completely cover the fruit, and later the infected fruit becomes dried. Control measures include: planting in clean soil with no history of root rot, providing light irrigation, practicing crop rotation, using disease-free seeds or transplants, and applying fungicides.

Yellow Spot

Yellow spot is caused by the tomato spotted wilt virus, which is transmitted by thrips. In the initial stages of infection, small, round, yellow spots form on the upper surfaces of young leaves. The infected leaves later turn brown and die. Because the virus may spread from the leaves to the fruit, it is very important to prevent the spread of the disease before fruit initiation. In severe cases, infection may kill the plant. To help prevent the virus, thrip populations should be controlled by maintaining a clean and weed-free field and/or by spraying with insecticides.

Southern Stem Blight

Southern stem blight is a fungal disease which impairs the growth of the plant and causes wilting. The primary symptom signaling the presence of this disease is a white fungal growth at the top of the plant. Control measures include crop rotation and the removal of old plant debris (Texas A&M University).

Anthrachnose

Anthrachnose is caused by a fungus known as *Gloeosporium* that survives for several years in crop refuse. Symptoms appear as round, sunken spots on both green and ripe fruits, and masses of pink spores may develop later in infected areas. The disease may be unnoticed on seedlings. Symptoms often appear when the fruits start to develop, at which time the damage may already be serious (Oregon State University). Control measures include the use of disease-free seeds or transplants, crop rotation, fungicides, and the burning or deep plowing of crop refuse.

Cercospora Leaf Spot

This disease is caused by the fungus *Cercospora melongenae*, which thrives during the winter on crop refuse. Symptoms appear as small, chlorotic, leaf spots. These spots are initially gray, turning brown with time, and have tiny dark specks containing spores arranged in a circular fashion (Oregon State University). The eggplant fruit are not affected. Control measures are similar to those that are used in the control of anthracnose.

Insects and Other Pests

Insects common to eggplant include leaf-footed bugs, flea beetles, aphids, Colorado potato beetles, red spider mites, and thrips. In commercial areas, spraying with insecticides before the fruit has started to develop is necessary for control (Seelig and Magoon).

Leaf-footed Bugs

Leaf-footed bugs are most common in the southern portion of the United States. Their populations peak during warm months. The feeding activities of both the adults and the nymphs often result in blemishes, undersized fruit, and premature fruit drop (Johnson and Lyon). Insecticides can be used for control.

Tarnished Plant Bugs

Tarnished plant bugs, or *Lygus lineolaris*, usually feed on opening buds, causing them to drop from the plant. Their feeding also distorts the foliage (Johnson and Lyon). Eggs are laid on the stems and flowers. There may be two to five generations each year, with heavy populations usually building up by late summer (Johnson and Lyon). Insecticides may be used for control.

Lace Bugs

Lace bugs feed on the undersides of the leaves, causing brown patches or black droplets of excrement to appear (Johnson and Lyon). They thrive in sunny areas. Insecticides may be used for control.

Thrips

Thrips are small insects that feed on leaf surfaces by rasping away small areas and causing white streaks to appear on the leaves (Splittstoesser). Later, the damaged leaves wither, turn brown, and drop off. Thrips may also attack the flowers, causing them to drop off, and are known to be vectors of viral diseases (Stall). Heavy thrip populations may be a serious problem, particularly during drought conditions (Splittstoesser). Control measures include the use of insecticides and keeping fields free of weeds.

Aphids

Aphids are yellowish-pink to pale green plant lice that suck plant juices from leaves, flowers, and stems. They also excrete a sticky substance that may reduce fruit quality, and their feeding activities can result in dwarfed plants (Splittstoesser). Symptoms of aphid attacks are wilting of the plant, yellowing of the bottom leaves, and a brown discoloration inside the stem (Texas A&M University). Aphids multiply rapidly, and many generations may occur over the summer. Insecticides may be used for control.

Flea Beetles

Flea beetles are small black beetles that have enlarged hind legs and jump readily when disturbed. The adults overwinter, appearing on plants in the late spring (Splittstoesser). Their feeding produces many tiny holes on leaf surfaces, which can impair growth when a severe infestation is present. Flea beetles are particularly destructive to seedlings, although older plants may outgrow damage (Chaplin). Insecticides may be used for control (Texas A&M University).

Colorado Potato Beetles

The adult Colorado potato beetle, *Leptinotarsa decemlineata*, overwinters in the soil and emerges in the spring to lay orange-yellow eggs on the lower surfaces of the leaves (Splittstoesser). The eggs hatch and the adults feed on the leaves. Similar to flea beetles, their feeding produces many tiny holes on the leaves. If many leaves are damaged, fruit may fail to develop. Insecticides may be used for control.

Red Spider Mites

Red spider mites feed on the undersides of leaves, causing the leaves to turn yellow and drop, and the eggplant to quit producing fruits (Andersen). Tiny white spots also appear on the leaves as a result of their feeding. Heavy populations can occur in the spring, early summer, and sometimes in the fall (Johnson and Lyon). During hot, dry weather, their feeding activities tend to slow down. Miticides may be used for control.

Wireworms

Wireworms, *Limoniusspp.*, are the brown, jointed larvae of click beetles. Their feeding activities can kill young plants and weaken older ones. Insecticides may be used for control.

Sweet Potato White Flies

Sweet potato white flies cause damage by sucking on the plant's sap, and flowers may drop because of their feeding. White flies also inject a toxic substance into the plant, which may result in off-flavored fruit (Stall).

Nematodes

Nematodes are microscopic worms that live in the soil. Several species of nematodes cause injury to eggplant (Seelig and Magoon). The most common is the root knot nematode, which thrives in well-drained areas. This nematode species attacks the roots of eggplant and produces irregularly-shaped galls, which affect normal plant development by constraining the plant's ability to absorb water and nutrients from the soil. Above-ground symptoms of nematode attack are stunting, yellowing, and wilting. Under very severe cases, nematode damage can kill the plant. Soil tests for the presence of nematodes prior to planting are often beneficial. Nematodes can be controlled through crop rotation, discarding crop refuse, and soil fumigation (Texas A&M University).

Weeds

Weed control is a serious concern in commercial eggplant production. Heavily-weeded fields are likely to produce a crop with low yields and reduced quality because weeds compete with the crop for water, nutrients, and light. Weeds also serve as a host environment for pests. It is important to have a cost-effective weed control program before establishing an eggplant bed or transplanting in the field (Granberry).

Weed control methods differ depending on whether the eggplant is grown in seedbeds or in the field. For transplants grown in seedbeds, a sterilized soil mixture or land area should be selected that does not have a history of troublesome weeds or weeds that will be resistant to chemical control methods. For eggplant transplanted to the field, the best land possible should be selected in terms of weed history and crop rotation (Granberry).

Black plastic and other mulches are at times used to control weeds. Frequent cultivation, especially when weeds are still small, provides control for production areas that are not mulched.

State Analyses

California

According to the Census of Agriculture, California ranked third in U.S. eggplant harvested acreage in 1992. In that year, the state harvested 1,050 acres of eggplant, about 13 percent of the U.S. total.

While production is scattered throughout the state, over one-third of the harvested acreage in 1992 was in Fresno County (23 percent) and Riverside County (14 percent) (Table 8).

Grower Practices

The two main eggplant-growing areas in California are the Coachella Valley in Riverside County and Fresno County (Hartz). Growers in Coachella Valley produce a spring crop. They usually begin transplanting in February for harvest between late April through June. Growers in eastern Fresno County produce a summer crop, transplanting in March for harvest in June through August. Growers in the San Joaquin Valley, which includes the western portion of Fresno County, usually plant between late winter and early spring for a summer harvest (Jimenez).

Eggplant is grown as an annual, with the crop replaced with new plantings the following season. Growers transplant only once per season, and harvest from a given field generally occurs between 3 to 4 times (Hartz). Transplanting is done with the use of a mechanical device, although growers still use manual labor to operate the machines and in loading transplanting materials. Harvesting depends mainly on manual labor. Some growers use plastic mulch and stakes for their eggplant crop (Jimenez).

Both traditional and specialty varieties of eggplant are grown in substantial quantities in California. The traditional varieties bear as many as 8 to 10 fruits per plant, while the specialty varieties (for example, Japanese eggplant) may produce more fruits per plant because the average fruit size is smaller.

The Census of Agriculture reports that all of California's harvested eggplant acreage was irrigated in 1992. Drip irrigation is the most common irrigation method (Hartz).

Although considered to be a minor vegetable crop in California, eggplant is a major money-making crop for its producers. Most eggplant farms are somewhat specialized and engage in labor-intensive farming. The farms growing eggplant tend to specialize in the production of at least one other high-value specialty crop, such as cherry tomatoes (Hartz). One of the largest farms growing eggplant in the San Joaquin Valley also produces tree fruits (Jimenez).

Most harvested eggplant are packed in the field. The eggplant are collected in bulk bins in the field and are later moved to a central location (also in the field) where the eggplant are packed. Wiping the harvested eggplant, rather than washing, is a common practice. Eggplant are only washed when needed.

Most California-grown eggplant are exported to the East Coast and Canada (Jimenez). Eggplant are usually sold to shippers who arrange sales to brokers, large terminal markets, and large grocery chains. Eggplant are also shipped to large city terminal markets within the state,

Table 8--Eggplant production by county, selected states, 1992

Geographic area	Harvested		Irrigated	
	Farms	Acres	Farms	Acres
California	169	1,050	169	1,050
Contra Costa	3	1	3	1
Fresno	48	243	48	243
Kern	3	(Z)	3	(Z)
Kings	3	15	3	15
Mendocino	5	2	5	2
Merced	3	35	3	35
Riverside	8	144	8	144
Sacramento	6	(D)	6	(D)
San Bernardino	4	(D)	4	(D)
San Diego	5	2	5	2
San Joaquin	16	42	16	42
Sonoma	15	4	15	4
Stanislaus	3	(D)	3	(D)
Tulare	14	34	14	34
Yolo	8	6	8	6
All other counties	25	477	25	477
Florida	114	2,544	102	2,368
Alachua	9	74	3	(D)
Broward	4	185	4	185
Collier	5	114	5	114
Columbia	3	11	3	11
Dade	12	221	12	221
Hamilton	5	43	5	43
Hillsborough	19	78	16	55
Lee	5	413	4	338
Manatee	4	20	4	20
Marion	3	80	3	80
Palm Beach	14	932	14	932
Pasco	7	107	7	107
Sumter	6	80	5	68
All other counties	18	186	17	(D)
New Jersey	366	1,117	173	843
Atlantic	21	105	18	103
Burlington	31	38	13	16
Cumberland	33	307	32	305
Gloucester	59	354	42	301
Hunterdon	21	18	7	1
Mercer	12	33	4	(D)
Middlesex	20	17	7	2
Monmouth	69	91	12	20
Ocean	13	26	4	(D)
Passaic	1	(D)	1	(D)
Salem	15	66	8	59
Somerset	9	2	2	(D)

Sussex	10	(D)	4	1
All other counties	52	47	19	(D)

(D)=Data are not published to avoid disclosure, but are included in State totals.

Source: 1992 Census of Agriculture. **Table 8**

such as those in Los Angeles and San Francisco (Hartz). Some are also sold in roadside markets and farmers' markets.

When faced with low market prices, growers typically do not abandon their crop (Jimenez). During mid-summer in the San Joaquin Valley, when production is at its peak, growers prune their eggplant bushes and take care of insect and disease problems for a good fall harvest. In a few cases where growers abandon their crop during a glut period, they usually leave the fruits unharvested, even with the knowledge that this will likely affect the quality and quantity of succeeding yields (Jimenez).

Production Perils

Insects and other pests appear to be the major threat to eggplant production in California, although these perils are generally controllable (Hartz). These pest problems may be due to lygus bugs, mites, worms, nematodes, and aphids that transmit viral diseases. Crop losses due to adverse weather have not been a major problem in the past, although freeze damage is more likely to occur in the Coachella Valley than in other areas.

Demand for Crop Insurance

Even though California ranks third in U.S. eggplant acreage, growers are likely to show little interest in a crop insurance policy for eggplant. Based on previous experiences, weather has not really caused serious losses to California eggplant. During 1988 to 1994, ad hoc disaster payments for California eggplant losses amounted to only \$556, about 0.01 percent of the U.S. total. Drought has not been a problem because all of the state's eggplant acreage is irrigated (Hartz). Insect and disease problems are usually controllable with the adoption of proper cultural practices and the use of chemicals.

Florida

The Census of Agriculture ranks Florida number-one in U.S. eggplant production. In 1992, the state harvested 2,544 acres of eggplant, 31 percent of the U.S. total. Nearly three-fourths of the state's production is located in the southern portion of the state, primarily in the southeast. Some production is also found along the west coast and in northern Florida. Major production counties include Palm Beach County, which accounted for 37 percent of the state's harvested acreage in 1992; Lee County, 16 percent; Dade County, 9 percent; Broward County, 7 percent; and Collier County, 4 percent (Table 8).

During the 1993 marketing year, Florida's eggplant production reached 2.0 million bushels, 36 percent higher than the state's output in 1992 (Table 9). The total value of Florida's eggplant output in 1993 was \$18.7 million, 68 percent above the prior marketing year. The southeast part of the state continually dominates eggplant production, with 71 percent of the crop in 1993 (Table 10).

Table 9--Eggplant: Acreage, production, and value, Florida, crop years 1979-80 through 1993-94

Crop year	Planted acreage	Harvested acreage	Yield per acre	Production	Value per bushel	Total value
	----- Acres	-----	33-lb bushel	1,000 bushels	Dollars	1,000 dollars
1979-80	3,100	2,800	600	1,679	4.36	7,328
1980-81	3,100	2,800	592	1,658	5.67	9,394
1981-82	2,640	2,530	657	1,661	5.76	9,568
1982-83	2,590	2,500	666	1,666	5.06	8,429
1983-84	2,300	2,100	710	1,491	5.84	8,713
1984-85	2,680	2,500	658	1,646	4.30	7,075
1985-86	2,500	2,350	675	1,586	5.73	9,093
1986-87	2,400	2,300	689	1,585	6.08	9,634
1987-88	2,200	2,100	668	1,403	7.31	10,253
1988-89	2,100	2,000	810	1,619	7.05	11,413
1989-90	2,050	1,950	815	1,589	8.52	13,537
1990-91	2,050	1,950	806	1,571	8.26	12,974
1991-92	2,650	2,550	853	2,174	7.91	17,186
1992-93	2,200	2,000	737	1,474	7.57	11,164
1993-94	2,500	2,400	834	2,001	9.35	18,717

Source: Florida Agricultural Statistics Service.

Table 10--Eggplant: Acreage and production by areas, Florida, crop years 1992-93 and 1993-94

Areas	Planted		Harvested		Yield per acre		Production	
	1992-93	1993-94	1992-93	1993-94	1992-93	1993-94	1992-93	1993-94
		Acres			33-lb bushel		1,000 bushels	
Southeast	1,500	1,700	1,400	1,600	754	884	1,056	1,414
Other areas	700	800	600	800	697	734	418	587
State total	2,200	2,500	2,000	2,400	737	834	1,474	2,001

Source: Florida Agricultural Statistics Service.

Grower Practices

Florida-grown eggplant is available throughout most of the year. According to the Florida Agricultural Statistics Service, planting usually occurs over an eight month period, from July 15 through April 1. Harvesting begin on October 1, is most active from November 15 through July 1, and ends around August 1. In south Florida, growers usually begin planting in late July and early August, with continuous plantings until March. The crop is then harvested in early- to mid-October through June (Shuler). In north Florida, plantings begin in March for harvest in July.

The planting operation is semi-mechanical, with migrant laborers hired to run the machines. Machines are used to dig holes in fields where transplants are to be set, while laborers then carry and set the transplants in the holes (Shuler). In Palm Beach County, some growers use stakes to support the plants.

Growers generally use white plastic mulch during warm months and black plastic mulch in mid-winter (Stall). In Palm Beach County, more growers use row covers than plastic mulch (Shuler). Row covers protect against frosts, freezes, drought, and weeds. Row covers contain small holes and, therefore, are not as completely impermeable as plastic mulch.

Growers usually harvest a crop 4 to 5 times during the season (Stall). Some growers, however, harvest as many as 8 to 10 times, especially in Palm Beach County (Shuler). They generally harvest 1 to 2 fruits per plant during a single harvest period (Stall). The late spring crop is not picked as often as earlier crops, although late spring yields are usually good because the weather is relatively frost-free and favorable. Harvesting is done manually.

Florida-grown eggplant consist primarily of the traditional purple varieties that are round to oval in shape. In Palm Beach County, however, some growers also produce Italian, Puerto Rican, and Sicilian eggplant (Shuler). Italian eggplant are somewhat smaller than the traditional purple varieties, while Puerto Rican eggplant are round to oval in shape and purple with white stripes. Sicilian eggplant are round and purple with white stripes. Some specialty eggplant are also grown in Dade County.

According to the Census of Agriculture, 89 percent of the farms growing eggplant in Florida in 1992 had irrigation, and 93 percent of the eggplant harvested acreage was irrigated. In Palm Beach County, most of the irrigation is subsurface seepage (Shuler).

Growers usually do not specialize in eggplant production, typically also planting peppers, tomatoes, and cucumbers (Stall). Some growers rotate eggplant with these other crops, while some devote a portion of their acreage to specific crops in each season. In Palm Beach County, eggplant is usually a minor crop and does not encompass a majority of growers' total farm acreage (Shuler).

Most of the growers pack their own produce in a packing house outside the field. In Palm Beach County, for example, picked eggplant are placed in bin boxes found in various locations in the field. They are then moved to a central location where the produce is sorted and packed (Shuler).

Eggplant is generally a fresh-market commodity. However, one operation in north Florida sells sliced, buttered, and frozen eggplant (Shuler).

Florida's eggplant is shipped mostly to the Northeast, mainly to markets in New York, Philadelphia, and New Jersey. Some are also shipped to Cleveland, Atlanta, and Canada. They are sold directly to large grocery chains or large-city wholesale terminal markets. Eggplant are transported in refrigerated trucks, with temperatures maintained at 50EF to 60EF to prevent transport losses.

Growers do not generally abandon their crop if prices drop below production costs. Rather, growers clip off the fruits and leave them on the ground, or dump them, rather than sell at a loss. Since growers can harvest several times from a single crop, they prefer to remove the harvest-ready fruit, even if it is not to be sold. When the fruit is left unharvested, the plant will not produce good yields in future weeks, when prices may be higher. Even so, situations also exist where growers harvest the next set of fruits along with the over-mature fruits that ripened during times of low prices.

Production Perils

Insects are a more serious problem for Florida-grown eggplant than are diseases (Stall). The most serious insect pests are sweet potato white flies and thrips, which may be controlled through prudent management practices. Growers have also experienced crop losses due to frosts, freezes, hurricanes, hail, drought, and floods (Stall).

Florida received the largest ad hoc disaster payments for eggplant losses among any state over the 1988 to 1994 period, collecting more than \$2.0 million, about 45 percent of the U.S. total. In 1993 and 1994, for example, Alachua County and Pasco County received large payments due to drought in the spring and excessive moisture later in the year. In Pasco County, diseases were also a problem, with heat and drought stress promoting the development of a fungal disease on eggplant, which spread rapidly through the crop (Farm Service Agency).

Other problems have also been reported. According to the Florida Agricultural Statistics Service, wind-blown sand scarred fruit and caused foliage to burn in a few unprotected fields in December 1993, while cooler temperatures in January 1994 slowed fruit set and sizing. In addition, high winds in southwest Florida in March 1994 caused bloom loss and scarring, resulting in losses due to grade-outs in some fields.

Demand for Crop Insurance

Florida is the number-one state in eggplant production and is prone to various weather-related production perils. During 1988 to 1994, ad hoc disaster payments for eggplant losses in the state accounted for 45 percent of the U.S. total (over \$2 million), the largest percentage received by any one state.

Despite these large payments, an industry source indicated that the demand for eggplant insurance may not be strong. Growers generally do not specialize in eggplant production, but rather, diversify among a variety of vegetable crops. Among the crops that they grow, eggplant is usually considered a minor crop, especially in terms of acreage allocation. Growers are more likely to buy insurance for their major crops.

Further, in Palm Beach County, some growers are more likely to invest in row covers to prevent against frosts, freezes, drought, and weeds than to buy insurance (Shuler). Most of the farms also have irrigation, reducing the risks of yield losses due to drought.

Most of the payments made for eggplant losses during the 1988-94 period were collected by growers in counties that, except for Dade County and Lee County, had relatively small shares of production. More than one-third of the disaster payments made during 1988 to 1994 were collected by growers in Alachua and Manatee counties, whose combined harvested acreage accounted for less than 4 percent of the state total. The largest eggplant-producing county, Palm Beach County, received only 0.35 percent of the total disaster payments made to Florida growers during 1988-94.

New Jersey

According to the Census of Agriculture, New Jersey harvested 1,117 acres of eggplant in 1992, 14 percent of the U.S. total. New Jersey is the second-largest producing state in the U.S., with 19 counties reporting production. Although producing counties are scattered throughout the state, production is concentrated in the southern portion. Major production areas in 1992 included: Gloucester County, with 32 percent of New Jersey's harvested acres; Cumberland County, with 27 percent; Atlantic County, with 9 percent; Monmouth County, with 8 percent; and Salem County, with 6 percent (Table 8).

Grower Practices

Eggplant is grown as an annual in New Jersey, and is considered to be a minor vegetable crop. The planting season is usually during April and May, when all danger of frost has past. Harvesting begins in July, is most active during late July through mid-October, and ends in early November (New Jersey Department of Agriculture).

Some growers replace the first crop with a second eggplant crop immediately after the first harvest, so that they can take advantage of the highest-quality fruit (Infante). The best-quality fruit are usually the first three to four fruits produced per plant. Each plant bears an average of three fruit, although production per bush may reach as high as eight to ten fruit (Infante).

Planting and harvesting rely mainly on manual labor. Most growers use transplants (Infante). The traditional black or deep purple varieties are the most commonly planted, and are usually hybrids. Examples of varieties planted include “Classic,” “Onyx,” “Cascade,” and “Dusky.” There are also some plantings of Oriental, white, and Italian varieties.

According to the Census of Agriculture, 47 percent of the farms growing eggplant in New Jersey had irrigation in 1992, and about 75 percent of the state’s eggplant acreage was irrigated. Since that time, irrigation is believed to be present in all eggplant-growing areas (Infante).

Crop rotation is a common practice among growers. They usually produce other vegetable crops, such as spinach and cabbage. Even though it is not a recommended practice to rotate with other solanaceous crops, the availability of fungicides encourages some growers to also produce peppers and tomatoes soon after eggplant is grown in a field.

After harvesting, eggplant are generally moved to a packing shed. Here, the produce are washed, packed, and if not immediately transported to market, kept in cold storage. Eggplant are transported in refrigerated trucks.

Most of the state’s eggplant production is destined for the Vineland Auction, the state’s largest market, and to wholesale markets in New York, Philadelphia, and Baltimore (Infante). A small proportion is also sold in roadside markets.

Crop abandonment due to low market prices rarely occurs in eggplant production because eggplant prices have generally been relatively steady (Infante). The few cases of crop abandonment that have occurred have been mostly due to crop losses brought about by adverse weather, insects, or diseases.

Production Perils

Insects and diseases can be a peril to eggplant production in New Jersey. The most common insect pest is the Colorado potato beetle, and the most common disease is root rot. Most of the insect and disease problems, however, are managed through proper cultural practices. For example, growers may plant in raised beds to improve soil drainage (Infante). Other practices include the application of biological controls as well as fungicides and insecticides.

Weather-related perils are more of a problem to eggplant growers than are insects and diseases. Hail, excessive moisture, and drought are the most common causes of crop loss (Infante). For example, the

disaster payments made for eggplant losses in Cumberland County in 1988, 1993, and 1994 were due to extremely dry and hot conditions (Farm Service Agency, Cumberland County). A severe drought also affected crops in 1995, while a freeze in 1991 was the main cause of eggplant losses in Cumberland County in that year (Infante).

Demand for Crop Insurance

A moderate number of eggplant growers will likely have an interest in crop insurance because of their previous experience with crop losses. New Jersey collected the third-largest ad hoc disaster payments of any state for eggplant losses during the 1988-94 period, amounting to about \$297,000, or 7 percent of the U.S. total. Even though many New Jersey eggplant farms have irrigation, water is often restricted during long periods of drought as ponds and other water sources dry up. In addition, as a minor crop, eggplant competes with other higher-valued crops for irrigation when water supplies become restricted (Infante).

Ad Hoc Disaster Assistance for Eggplant

Ad hoc disaster payments were made available to eggplant growers for losses due to natural causes in each of the years 1988 to 1994. Since commercially-grown eggplant was not eligible for crop insurance in those years, eggplant producers were required to realize a yield loss of at least 40 percent in order to be eligible for ad hoc disaster payments.

Data on ad hoc disaster payments provide an indication of potential high-loss areas. The states and counties with large ad hoc payments from 1988 to 1994 are most likely to face a relatively high risk of loss under a potential FCIC policy for eggplant, and would likely have a relatively high demand for crop insurance for eggplant.

Disaster assistance payments for all eggplant (including specialty eggplant) losses totaled \$4.5 million over the 1988-94 period (Table 11). The largest payments were made in 1993, at \$1.08 million, due mainly to drought conditions in the spring and summer and excessive moisture later in the year (Farm Service Agency, various counties). Payments were large again in 1994, at nearly \$960,000. Major weather-related production perils in 1994 were similar to those experienced in 1993. Hail storms and freezing temperatures were other reasons for crop losses during 1988 through 1994.

Total disaster payments during the seven-year period were scattered across the United States, with 40 states receiving payments in at least one of the six years. Florida, Georgia, North Carolina, Tennessee, Texas, and Virginia in the South, Michigan and Ohio in the North Central states, and New Jersey and New York in the Northeast received payments in each of the seven years. These three regions accounted for 96 percent of the total disaster payments made for eggplant losses during the seven-year period.

Table 11--Ad hoc disaster assistance payments for eggplant, individual years

State	1988	1989	1990	1991	1992	1993	1994	Total 1988-94	Percent share of total
----- Dollars -----									
Alabama	0	21,321	8,220	8,256	281	4,199	0	42,277	0.94
Arkansas	5,731	129	1,929	102	0	1,328	0	9,219	0.20
California	0	0	0	556	0	0	0	556	0.01
Colorado	0	0	0	0	0	3,246	1,585	4,831	0.11
Connecticut	0	2,518	737	7,853	22,321	45,718	22,323	101,470	0.11
Florida	66,694	125,472	146,346	110,226	158,847	640,241	792,731	2,040,557	45.20
Georgia	200,609	394,182	97,698	70,565	70,244	96,455	28,342	958,095	21.22
Hawaii	0	0	1,635	2,646	3,773	0	0	8,054	0.18
Illinois	11,644	8,476	0	3,094	1,763	10,786	0	35,763	0.79
Indiana	12,447	1,436	0	816	0	60	236	14,995	0.33
Iowa	4,439	0	0	390	210	7,594	0	12,633	0.28
Kansas	1,160	0	0	0	272	2,461	0	3,893	0.09
Kentucky	4,918	20	0	0	0	0	0	4,938	0.11
Louisiana	594	7,104	4,428	13,172	7,728	89	0	33,115	0.73
Maine	0	0	0	53	0	0	0	53	0.00
Maryland	4,531	647	798	1,464	172	2,219	0	9,831	0.22
Massachusetts	0	13,457	2,463	11,899	14,098	21,515	0	63,432	1.41
Michigan	66,122	46,478	10,884	31,181	43,050	41,117	21,444	260,276	5.77
Minnesota	4,572	88	0	814	533	8,951	0	14,958	0.33
Mississippi	1,290	1,204	0	953	440	145	23	4,055	0.09
Missouri	0	0	254	125	0	8,841	834	10,054	0.22
Nebraska	0	0	0	0	185	2,600	0	2,785	0.06
Nevada	0	0	0	249	0	0	0	249	0.01
New Hampshire	0	0	0	0	0	1,560	0	1,560	0.03
New Jersey	156,000	46,043	6,470	28,993	11,631	34,842	12,863	296,842	6.58
New Mexico	0	0	0	361	408	504	280	1,553	0.03
New York	2,458	6,620	2,209	7,498	20,185	4,411	814	44,195	0.98
North Carolina	3,806	31,277	9,146	10,889	22,009	84,129	4,502	165,758	3.67
North Dakota	19	11	0	0	0	0	0	30	0.00
Ohio	14,268	8,643	842	9,383	11,214	4,255	1,543	50,148	1.11
Oklahoma	27	0	0	0	675	0	0	702	0.02
Oregon	0	0	0	0	0	395	0	395	0.01
Pennsylvania	7,667	2,859	0	2,493	232	9,796	1,340	24,387	0.54
South Carolina	708	115	0	1,626	98	329	19,679	22,555	0.50
Tennessee	12,036	1,714	1,881	2,305	7,273	17,748	844	43,801	0.97
Texas	14,945	7,413	138	832	4,446	7,773	401	35,948	0.80
Virginia	875	435	57	1,055	1,027	13,512	3,064	20,025	0.44
Washington	0	0	0	0	74	0	0	74	0.00
West Virginia	0	78	39	68	94	95	0	374	0.01
Wisconsin	8,183	2,103	0	2,422	3,614	1,277	0	17,599	0.39
Other 1/	0	0	14,464	24,473	66,868	0	46,731	152,536	3.38
Total	605,743	729,843	310,638	356,812	473,765	1,078,191	959,579	4,514,571	100.00

1/Includes disaster payments collected by U.S. territories.

Source: Farm Service Agency data files compiled by the General Accounting Office.

Nearly 82 percent of the total disaster payments made for eggplant losses between 1988 and 1994 were made to growers in Florida, Georgia, New Jersey, Michigan, and North Carolina. Florida received over \$2 million in disaster assistance during the seven-year period, 45 percent of the U.S. total, and the largest amount received by any state. Georgia received over \$958,000, 21 percent of the U.S. total and the second largest amount. New Jersey received about \$297,000, about 7 percent of the U.S. total, while California, a major producing state, received \$556, only 0.1 percent of the U.S. total.

A total of 354 U.S. counties received ad hoc disaster payments for eggplant losses in at least one of the seven years between 1988 and 1994. Thirty-one counties in Florida received payments, 30 counties in Georgia, 13 counties in New Jersey, 11 counties in Michigan, and 12 counties in North Carolina.

Alachua County in Florida received the largest ad hoc disaster payments for eggplant losses during the seven-year period, collecting about \$534,000, nearly 12 percent of the U.S. total. The next counties in the series are Colquitt County in Georgia, with \$353,000; Berrien County in Michigan, with \$175,000; Manatee County in Florida, with \$158,000; and Cook County in Georgia with \$152,759. These top five counties represented 30 percent of the total disaster payments made for eggplant losses.

Ad hoc disaster data can also be used to indicate which eggplant-producing areas received large payments relative to their share of acreage (Table 12). Of the top ten eggplant-producing states in terms of harvested acreage, Florida, Georgia, and Connecticut had shares of disaster payments that were relatively larger than their estimated shares of U.S. harvested eggplant acreage. Minor producing states in this situation include Michigan, Iowa, Ohio, Alabama, South Carolina, and Tennessee. In contrast, California's share of total disaster payments was insignificant compared to its large acreage.

Eggplant Insurance Implementation Issues

Adverse Selection

Adverse selection occurs when growers are better informed about the likelihood of crop losses than is FCIC, and use that knowledge to buy insurance when the premium rate charged does not adequately reflect the risk of loss. In eggplant production, this situation may occur when growers have asymmetric information regarding soil-borne pests and diseases.

Pest and disease problems may cause serious losses in eggplant production if not controlled properly. Some of the pests (for example, Colorado potato beetle, nematodes) and diseases (such as verticillium wilt, Phytophthora root rot, and anthracnose) are soil-borne and sometimes thrive in the soil for several years. Growers may plant eggplant in a field with a

Table 12 --Disaster assistance payments for eggplant, 1988-94

Region/State	Estimated average eggplant harvested acreage, 1988-92	Share of U.S. acreage	Total eggplant disaster payments, 1988-94	Share of U.S. eggplant disaster payments
	----- Acres -----	----- Percent -----	----- Dollars -----	----- Percent -----
Northeast				
Connecticut	115	1.65	101,470	2.25
Maine	--	--	53	0.00
Massachusetts	115	1.65	63,432	1.41
New Hampshire	--	--	1,560	0.03
New Jersey	1101	15.81	296,842	6.58
New York	140	2.01	44,195	0.98
Pennsylvania	70	1.00	24,387	0.54
North Central				
Illinois	73	1.04	35,763	0.79
Indiana	27	0.38	14,995	0.33
Iowa	9	0.12	12,633	0.28
Kansas	12	0.17	3,893	0.09
Michigan	103	1.47	260,276	5.77
Mnnesota	28	0.40	14,958	0.33
Missouri	22	0.32	10,054	0.22
Nebraska	--	--	2,785	0.06
North Dakota	--	--	30	0.00
Ohio	42	0.61	50,148	1.11
Wisconsin	37	0.54	17,599	0.39
South				
Alabama	24	0.34	42,277	0.94
Arkansas	26	0.37	9,219	0.20
Florida	2270	32.61	2,040,557	45.20
Georgia	527	7.58	958,095	21.22
Kentucky	9	0.14	4,938	0.11
Louisiana	58	0.84	33,115	0.73
Maryland	60	0.86	9,831	0.22
Mississippi	6	0.09	4,055	0.09
North Carolina	280	4.02	165,758	3.67
Oklahoma	13	0.19	702	0.02
South Carolina	24	0.34	22,555	0.50
Tennessee	48	0.69	43,801	0.97
Texas	188	2.71	35,948	0.80
Virginia	54	0.77	20,025	0.44
West Virginia	1	0.01	374	0.01
West				
California	831	11.94	556	0.01
Colorado	16	0.23	4,831	0.11
Hawaii	108	1.55	8,054	0.18
Nevada	--	--	249	0.01
New Mexico	--	--	1,553	0.03
Oregon	238	3.42	395	0.01
Washington	173	2.48	74	0.00
Other 1/	--	--	152,536	3.38

United States	6962	98.68	4,514,571	100.00
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--=Not reported. Note: A linear trend was used to estimate eggplant acreage for the years 1988 to 1991 with 1987 and 1992 census data. Disaster assistance data are averaged over the 1988-94 period. Source: 1992 Census of Agriculture.

history of problems with soil-borne pathogens if sufficient underwriting and rating precautions are not taken.

Growers are also likely to be better informed about the likelihood of flooding in their fields than the insurer and may increase their risk-taking by continuing to plant in flood-prone areas such as low-lying areas of the field, flood plains, or fields or portions of the field with poor drainage. Again, underwriting and rating may be used in such situations to preserve the actuarial soundness of the program.

Setting Reference Prices

A reference price for eggplant should be represented by an in-field value rather than an average market value because growers do not incur harvesting and marketing expenses on the portion of production that was lost.

Harvesting and marketing expenses account for about 40 to 70 percent of the total cost of producing eggplant, as harvesting is done mostly using manual labor. Because of the large share attributed to harvesting and marketing expenses, the use of an average market value price to estimate the value of a grower's pre-harvest losses may provide undue incentive for moral hazard since the market price covers the costs of harvesting and marketing.

The in-field value may be represented by an estimated cost of production, excluding harvesting and marketing expenses. An average grower price, if available, may also be used when adjustments based on an estimated harvest cost are included.

Estimating "Appraised Production"

An eggplant bush may produce 3-10 fruits per cropping season. The average yield per acre is usually reported in terms of the number of boxes filled at harvest-time. A box is normally filled until it weighs about 33 pounds. Boxes filled with Japanese eggplant may average less, at about 28 pounds per box. To estimate appraised production (harvestable, but unharvested yield), an appraiser could count the number of boxes (33-pounds or 28-pounds depending on variety) filled from a sample plot and expand the plot yields to a per-acre basis.

For young eggplant bushes, appraised production may be estimated by counting the number of plants from a sample plot and expanding this estimate on a per-acre basis. The estimated number of plants per acre could be multiplied by an average number of fruits per plant, based on previous cropping seasons, then multiplied by an average weight per fruit (also based on past performance). The total weight per acre may be divided by a standard unit weight per packing container (for example, 33 pounds for a box).

Market Prices and APH Distortions

Eggplant yields are measured in terms of quantity (the number of 33-lb boxes) harvested rather than the quantity produced and potentially available for harvest. Industry sources have indicated that crop abandonment is possible if growers are faced with low market prices. Hence, it will be difficult to ascertain whether a grower's actual production history reflects his or her actual farming ability.

Market Prices and Moral Hazard

Moral hazard may be a potential problem under a crop insurance policy for eggplant since almost all eggplant are sold to the fresh market. Hence, growers have no alternative markets for their fresh produce during periods of fresh-market oversupply, unlike many other vegetable growers, who can divert their crop for processing. In addition, eggplant stores for only a short period of time.

Because of these marketing limitations, growers may be encouraged to adopt a practice that increases their chances of receiving an indemnity, particularly if the insurance indemnity is expected to be higher than the grower's market returns. Such situations may arise due to plant stress during flower and fruit development, which has a direct negative impact on eggplant yields. Further, growers may intentionally fail to provide adequate moisture or insect, disease, and weed control practices to promote a crop failure.

Availability of Individual Yield Data

Individual grower yield data for eggplant does not appear to be available. This information is likely only available from the growers themselves.

Demand for Crop Insurance

Eggplant may not be a very strong candidate for crop insurance, except in the Southeast. Industry sources have indicated that growers may not likely be interested in buying insurance solely for their eggplant crop because they usually grow more than one crop and eggplant is usually a minor crop. Most of the eggplant acreage in major eggplant-producing states is irrigated, reducing the risk of crop losses due to drought.

Interest in an eggplant insurance policy, however, will likely originate from Florida and Georgia. The Southern region accounts for about one-half of U.S. harvested eggplant acreage, and about three-quarters of total disaster payments for eggplant losses during 1988 through 1994. Of these states, Florida and Georgia accounted for 78 percent of the regions' harvested acreage and 88 percent of the region's share of total disaster payments. Interest among Florida growers may be somewhat smaller than in Georgia because 87 percent of the disaster payments made to Florida growers were collected

by minor producing counties. Georgia growers might have greater interest in eggplant insurance because disaster payments in the state were collected primarily in major-producing counties.

Other southern states that may indicate interest in crop insurance for eggplant are Alabama, North Carolina, South Carolina, and Tennessee. Except for North Carolina, each of these states accounted for less than one percent both of total U.S. harvested acreage and total disaster payments, but their respective shares of disaster payments are large relative to their shares of harvested acreage. Using the same criteria, Connecticut, New Jersey, Iowa, Michigan, and Ohio will also likely indicate interest in crop insurance for eggplant. There likely will be very little interest in crop insurance in California and other western states.

Other Implementation Issues

To help reduce the likelihood of adverse selection, FCIC may investigate mandating prerequisites for eggplant producers who apply for eggplant insurance coverage. These prerequisites may include soil testing for nematodes and other soil-borne pathogens, soil fumigation, and use of disease-free seeds and resistant varieties.

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