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Production Of Cucumbers For Pickles

ıe cucumber is one of the most ortant vegetable crops produced in sissippi in terms of acreage and e and is the most important table crop grown for processing. duction in 1972 was approximately 00 acres and yield per acre averaged roximately 3 tons. Growers in at t 74 of the 82 counties in the state luced cucumbers under contract for les in 1972. Cucumbers are grown in ıreas of the state, from north to h, and from east to west.

ickling cucumbers, as currently luced, are uniquely adapted to the ll family farm. When harvest begins, labor requirements of the crop eases markedly and the crop ides a market for young, relatively illed labor as well as a good source dditional income to the farmer.

Types of Cucumbers

ıe cucumber is divided into two er broad types, depending upon the ket for which it is produced. group, known as the fresh market icing type, produces dark green fruit is grown primarily for sale on the ı market. There is little acreage of type in Mississippi. The principle grown in Mississippi is for pickl- in which the fruit are lighter green in r and shorter in length. They are lly grown under contract for pickle panies. The pickling type may be r black spined or white spined. The es on the fruit are not very ceable, but can be detected by close ınination. The black spined cultivars haracterized by the development of pical yellow color as the fruit ıres. The white spine varieties do turn yellow with maturation. The mber is further sub-divided nding upon the flowering habit of ıarticular cultivar. Some are known onoecious and others are known as ıecious. The monoecious cultivars uce both male and female flowers he same plant, but in separate ers with the male flower occurring test and by far the greatest in ber. Tte gynoecious type produces primarily female flowers. In planting the gynoecious types the seeds should be mixed with a pollinator type to insure sufficient male flowers to effect pollination. These will be discussed more fully under cultivars.

Size of Plantings

The cucumber is frequently referred to as an intensive labor crop, that is it requires a relatively large amount of labor, particularly at harvest time. Most of the cucumbers in Mississippi are grown on small farms and harvested by the farm family. Due to the frequency of harvests required, it is necessary that plantings be limited in size to 5 acres or less. In some areas of the state where mechanization of harvest is more complete, larger acreages are common. A planting should not exceed that which the labor force can harvest twice a week. If plantings are harvested less than twice a week, yields will be considerably below maximum, the fruit grade will be reduced and returns will be well below the crop potential.

Climatic Requirements

The cucumber is generally referred to as a warm season crop, that is it does best in the warmer season of the year. The best average temperature range for cucumber production is between 60 and 75°F. At temperatures below 60°F, growth is poor. At temperatures above 90 to 95°F growth is also poor and the activity of bees is low and pollination is hampered resulting in misshapen fruit. The cucumber is very susceptible to frost injury and should not be planted before the danger of frost has passed.

Soils

The cucumbers can be grown quite successfully on a wide range of Mississippi soils. The two most important requirements to consider in selecting a soil or field for the production of cucumbers are: (1) drainage, the field must be well drained, and (2) herbicide residues, if there is a likelihood of a chemical residue having persisted from a previous crop usage, that field should be avoided for cucumbers. Figure 1 is a photograph of a portion of a field 2 weeks after planting. The field was part of a corn herbicide test the preceding year. Note the variation in plant stand. Figure 2 is another view of the same field two weeks later. A plant stand of this type would be disastrous for a grower.

The cucumber does best on a sandy loam to loam soil; however, it will do quite satisfactorily on other soil types. If the soil tends to crust this may be a problem in getting a good stand; however, corrective measures can be taken to enhance the stand. If the soil is excessively sandy, the use of irrigation water will become more important, particularly if rainfall is deficient. For best crop uniformity and production, soil should be relatively uniform throughout the field and it should be free, as much as possible, of debris such as stones and organic residue from previous crops. The soil should be throughly broken, well pulverized, and the beds formed several days prior to planting. The soil should be allowed to settle before planting as this will improve contact with the seed and facilitate germination. It also makes a uniform planting depth easier to attain.

Fertilization

Mississippi crop and fertilizer recommendations have for several years suggested a preplant application of 40 pounds of nitrogen and 80 pounds each of phosphorus and potassium plus 30 pounds of nitrogen as a sidedress application for cucumber production. As cucumber production became more widely spread over the state, interest developed in the adequacy of cultural recommendations.

In 1966 a study was initiated at the North Mississippi Branch Station at Holly Springs to determine the best rate of fertilization and number of plants per acre. Two basic preplant fertilizers rates were used: (1) 60 pounds of nitrogen and 90 pounds each of phosphorus and potassium per acre and, (2) 90 pounds of nitrogen and 120 pounds each of

phosphorus and potassium per acre.

The fertilizer was applied in the row approximately 7 to 10 days prior to planting. Plots were side dressed with either 30 or 60 pounds of nitrogen when the plants reached the 4 to 6 leaf stage. Plant spacings used were based on 40-inch rows and plants were spaced 6, 12 or 18 inches in the row. Plots, 1 row 20 feet long, were over seeded and thinned to the desired stand when the first leaf began to expand. Supplementary irrigation was supplied as needed to maintain favorable moisture conditions. When the plants reached t 4 to 6 leaf stage, DCPA (Dacthal) at pounds per acre was applied broadca to control weeds. The plots we sprayed as needed to control insects.

Figure 1. A view of a cucumber planting 2 weeks after seeding in a field utilized the previous year for a corn herbicide study. Note the dead plants in the row in the foreground.

Figure 2. Another view of the field shown in the preceding figure. This photograph was made 2 wee later or 4 weeks after seeding.

arvest began when the first fruits hed No. 3 size and continued twice ly for 6 weeks. Fruit were separated rades and weighed. The grade basis was: No. 1 - up to 1-1/16 inches in ieter, No. 2 - from 1-1/16 to 1-1/2 es in diameter, No. 3 from 1-1/2 to 2 es in diameter, No. 4 - from 2 to 2- inches in diameter, No. 5 - from 2- o 2-1/2 inches in diameter and No. ver 2-1/2 inches in diameter.

ne data are presented in Table 1. erences in total yield due to the lant fertilizer application or the gen sidedress were not significant; ever, the yield of No. 4 fruit was rally higher in the high nitrogen s. This was probably due to the fact the higher nitrogen application ed a more vigorous vine and foliage vth and made it more difficult to the smaller fruit at harvest time. erally, the 12 inch spacing was rior to either the 6 or 18 inch ing, again due in part at least to ge density.

ased on these tests, preplant lizer applications should supply t 60 pounds of nitrogen and 90 nds each of phosphorus and ssium per acre. The fertilizer may pplied at planting time or at bedd- ime. It should be applied in bands ither side of the row and should be oximately 2 inches to one side and 2 es below the seed depth at planting. ddition, a sidedress application of 30 pounds or more of nitrogen per acre should be made when the plants have 4 to 6 true leaves. This sidedress application should be 4 to 6 inches to the side of the plants with care taken to avoid getting the material on the plants and thus causing foliage burn. If the soil is relatively fertile, the nitrogen application should not exceed 120 pounds per acre on a fairly fertile soil.

Spacing

Cucumbers are grown at various plant spacings for hand harvest; however, the number of plants per acre is an important factor in determining the yield. The cucumber crop should be fitted into the overall farm program rather than attempting to adapt the other crops and practices to cucumbers. Row width may vary from 36 to 44 inches, depending upon the equipment available. Seeds should be sown thickly enough to insure 1 to 2 plants per 12 inches of row, on rows 36 to 44 inches wide. Plant populations greater than this tend to increase the water requirements on a per acre basis and do not yield more on a hand harvested operation. Fewer plants than 1 per 12 inches of row results in decreased yields; therefore, every effort should be made to insure 1 plant per 12 inches of row (a population of 11,000 to 13,000 plants per acre).

Several plant spacing studies have been conducted over the past few years. The data presented in Table 1 is a part of this work. Regardless of the fertilizer rate, the 12 inch spacing between plants was best.

A study was conducted in 1969 and 1970 to measure the influence of spacing on yield in irrigated vs non-irrigated plots. Plots 20 feet long and 40 inches wide were fertilized with 60 pounds of nitrogen and 90 pounds each of phosphorus and potassium, overseeded and thinned to the appropriate stand when the first leaf began expanding. The plots were sidedressed with 45 pounds of nitrogen at the 4 to 6 leaf stage and sprayed with DCPA at 10 pounds per acre broadcast. Yield data are presented in Table 2. Irrespective of irrigation, the 12 inch spacing produced the greatest yield. Regardless of the spacing between plants, supplementary irrigation resulted in a highly significant increase in yield. The more dense the plant population, the greater was the benefit from irrigation. No real benefit was gained from greater populations on a hand harvested basis except when the plots were irrigated. Greater populations require more seed and, if the season should be drier than normal, would require more irrigation water.

Varieties and Seeding Dates

Since most pickling cucumbers are grown under contract in Mississippi the growers must use the cultivar that is specified by the processor. In general the

e 1. Yield by grade of cucumbers (cultivar Ohio MR-17) in hundred weights per acre (cwt/a) as influenced by plant spacing and rate of fertilization. Data represent means for 3 years - 1966, 1967 and 1968 at Holly Springs.

Fertilizer Preplant		*Sidedress*	*Spacing*	*Yield (cwt./a)*				
P	*K*	*N*		*No. 1*	*No. 2*	*No. 3*	*No. 4*	*Total*
90	90	30	6	17.6	59.4	87.2	20.1	184.3
			12	20.6	69.3	104.4	24.6	218.9
			18	18.5	60.1	89.9	25.1	193.6
90	90	60	6	18.4	48.6	87.4	26.7	181.1
			12	21.2	68.3	102.2	32.1	223.8
			18	19.1	62.8	94.5	31.8	208.2
120	120	30	6	20.9	68.5	104.4	29.6	223.4
			12	23.3	76.3	110.6	35.4	245.6
			18	19.5	59.3	89.4	24.9	193.1
120	120	60	6	18.5	61.8	88.9	37.9	207.1
			12	23.6	76.6	113.8	40.4	254.4
			18	17.4	58.3	89.9	31.5	197.1
S at 5% - Fertilizer				2.5	10.1	16.2	4.8	39.7
at 1%				3.4	14.0	22.4	6.1	53.1
S at 5% - Spacing				1.5	4.6	11.4	3.9	27.9
at 1%				2.0	6.2	15.4	5.3	37.3

gynoecious hybrids yield far superior to the monoecious cultivars. A typical gynoecious hybrid is shown in Figure 3. Note the presence of female flowers (as depicted by the small cucumbers) at each leaf axis on the vine. Figure 4 is a photograph of a typical monoecious plant that has not yet produced a female flower as shown by the absence of cucumbers.

Cultivar tests have been conducted at the North Mississippi Branch Experiment Station, the Coastal Plains Branch Experiment Station and at Mississippi State University since 1965 with tests at 2 or more of the above locations each year. Single row plots 20 feet long were replicated 4 times for each cultivar. Plots were over seeded in early May each year and thinned to 1 plant per linear foot of row when the first leaf began expanding. Fertilizer at the rate of 500 pounds per acre of 12-16-16 was applied in the row prior to seeding. An additional 30 pounds of nitrogen per acre was applied as a sidedress at the 4 to 6 leaf stage. Weeds were controlled by cultivation up to the 6 leaf stage of crop development and then by applying 10 pounds DCPA per acre, broadcast.

Harvest was twice weekly beginning when the first fruit reached No. 3 size (Figure 5). Data, showing typical average yields for both monoecious cultivars and gynoecious hybrids, are presented in Table 3. Although the data are averages for several years, not all cultivars were grown at any one location any given year. Explorer, Ranger, Galaxy, Pioneer and Southern Cross are gynoecious hybrids. In general they did not continue to produce well in the late part of the season, but produced a far larger part of their total yield in the earlier part of the season.

Not one of the cultivars tested was best at all locations any test year. No cultivar was best at one location over all the years of the tests. Regardless of the cultivar a grower plants, he should be certain that it is one the processor will accept.

A number of the newer cultivars have good to excellent resistance to some of the diseases that are likely to occur in the crop. When disease resistance is available, it would be used.

The cucumber may be grown as both a spring and a fall crop throughout Mississippi. As a spring crop, planting may take place beginning in South Mississippi around March 20 and going through until about May 15 in North Mississippi. As a fall crop it may be planted in north Mississippi beginning about July 15 and planted through about August 30 in south Mississippi. Seeds should be planted from approximately ¾ inch to 1-1/2 inches in depth, depending on the time of year and soil moisture conditions. As soon as germination is complete and the young plants have become established, the stand should be thinned to the desired population. Approximately 2 to 3 pounds of seed are required to plant 1 acre.

Cultivation

The root system of the cucumber is relatively shallow, rarely penetrating depths exceeding 18 inches; however, it is quite extensive throughout the rows and middle of the field. Any cultivation must be shallow. The field should be cultivated only as is necessary to control weeds and grasses and provide for adequate aeration of the soil. If crusts form they should be broken. More frequent cultivations and deep cultivations would cause more damage than benefit in that they would tend to destroy the root system of the crop. After vine growth becomes evident the field should not be cultivated since it only damages the root system and the vines.

Weed Control

The cucumber is very sensitive to most herbicides. Best plant growth will be obtained if weeds are controlled by cultivation until the plant reaches the 4 to 6 leaf stage. When the plant reaches this stage of development cultivation becomes difficult and weeds may be controlled using one of several recommended herbicides. Recommended materials include: DCPA (Dacthal) and CDEC (Vegedex) and NPA (Alanap). The grower is referred to the Mississippi Weed Control Handbook (obtainable from County Agents and District Extension personnel) for rates and methods of application of these materials. The grower is cautioned not to exceed the recommended rate for any of the above materials. Even at this stage of plant development severe stunting will result if excess amounts of herbicides are supplied.

Irrigation

For profitable yields, the cucun crop requires a rather constant supp moisture. This is especially true du the period of flowering and f development. During most produc seasons in Mississippi, there are per when the grower would ben markedly from the use of irrigatio shown in Table 2. This is particul true on the sandier soils. The he soils, the silts and clays, have relati high moisture holding capacity normal rainfall often will be fa adequate for these; however, there periods when even these soils ben from supplementary water. Source water for irrigation purposes inc such things as farm ponds, flow streams, and wells. The cucumber should have available from 1 to 1 inches of water per week depen upon the soil type, the stage of p development and climatic condition normal rainfall is below this l supplementary water would pro marked benefits. Water should nc applied during the late forenoon or e afternoon. Water droplets on the p leaves magnify the sun rays and c "burning" of the foliage.

Harvesting

About 6 weeks after the yo seedling emerges from the soil, the p begins to produce flowers. The male female flower parts are in sepa flowers on the monoecious varieties are for the most part on separate p in the gynoecious hybrids (Figures 3 4). A good bee population in the vic of the planting is necessary for adeq pollination and fruit set. The rat development of the cucumber fruit studied at Mississippi State Univer Two hundred female flowers were c and tagged on the day the flower op and the diameter and length of young fruit was measured. approximately the same hour on next 18 days the length and diamet each fruit were again measured. average growth rate of the cucumber fruit is presented in Figu The curves show that the cucu developed very rapidly in both le and diameter. Once the fruit reache number 1 size, it passed from one s the next very rapidly. This particularly true in the number 2, 3 4 size range. Seven days from the

Figure 3. A typical gynoecious plant. Note the small cucumbers at each leaf axis on the vine.

Figure 4. A typical monoecious plant. Compare to figure 3 and note the absence of cucumbers.

Table 2. The effect of plant spacing and supplementary irrigation on yield of pickling cucumbers. Data are means for two year 1969 and 1970 at Holly Springs and are in hundred weights per acre.

Grade	*Non-irrigated*				*Irrigated*			
	6"	12"	18"	Average	6"	12"	18"	Average
No. 1	19.7	19.2	17.2	18.7	39.6	42.6	29.3	37.2
No. 2	61.4	62.2	52.6	58.7	138.6	149.3	102.8	130.2
No. 3	102.0	108.2	98.0	102.7	178.2	191.8	132.2	167.4
Average total yield	203.8	285.4	233.1	240.8	396.5	426.4	293.7	372.2
LSD at 5%	Spacing = 35.3 Irrigation = 20.9							

Figure 5. Cucumber grades as suggested by the Pickling Cucumber Improvement Committee. Range in size by grade is: No. 1 - up to 1-1/16 inches in diameter, No. 2 - 1-1/16 to 1-1/2 inches in diameter, No. 3 - 1-1/2 to 2 inches in diameter, No. 4 - 2 to 2-1/4 inches in diameter, No. 5 - 2-1/4 to 2-1/2 inches in diameter and No. 6 - over 2-1/2 inches in diameter.

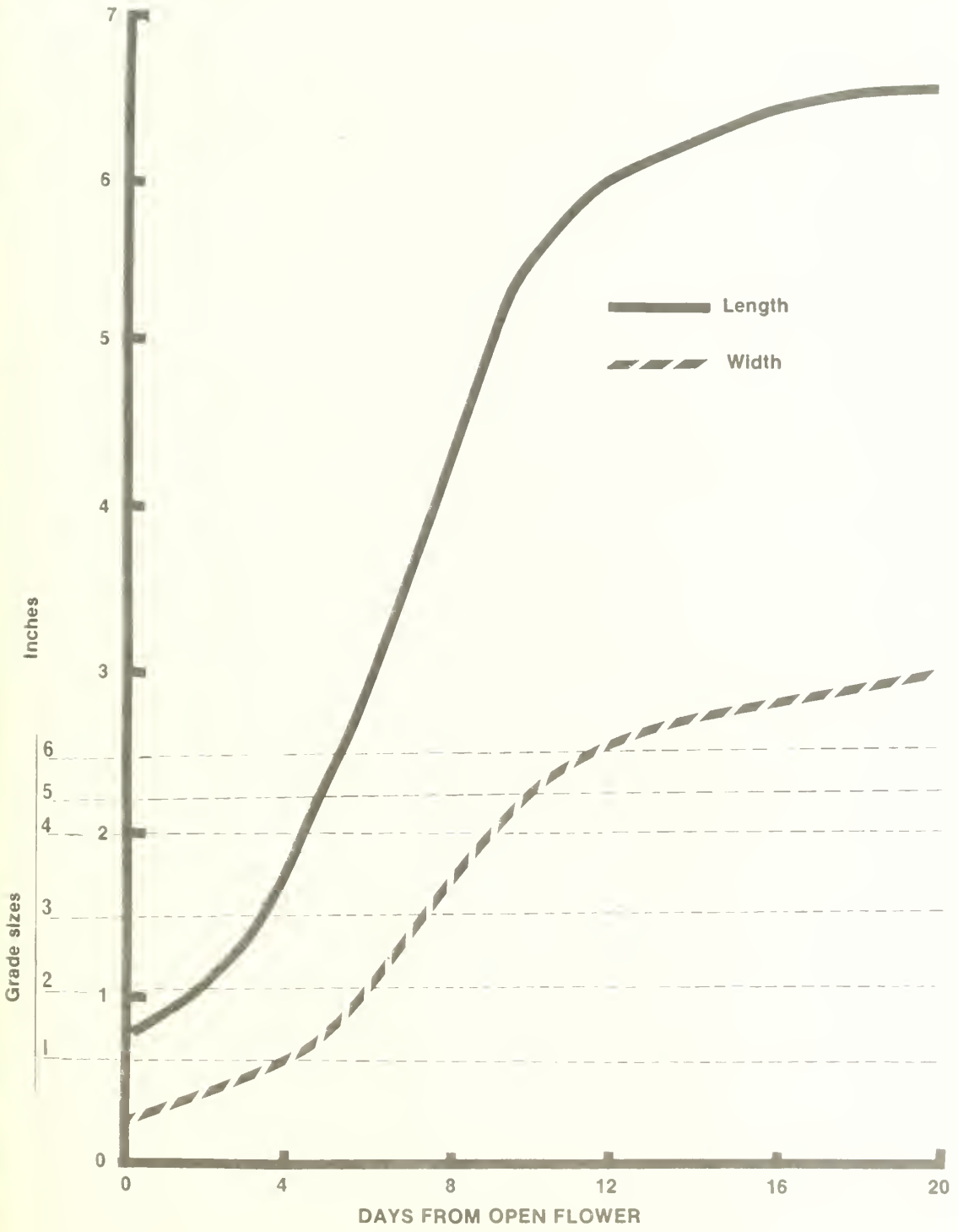

Figure 6. Rate of growth and development of the cucumber fruit.

the flower opened, the fruit had reached the maximum diameter for No. 1 fruit. One day later, it was slightly larger than the maximum size for No. 2 fruit (1-1 2 inches in diameter), and continued to increase at the rate of one grade size per day through grade 4. It required 3 days to go from grade 4 to maximum limit for grade 5. For this reason it is imperative that harvest occur at least twice weekly and preferably 3 times a week. All fruit that are of number 1 size or larger should be removed each harvest. The vines should be handled carefully to prevent excessive damage. It is better to harvest when the vines are dry, if at all possible, to reduce the spreading of foliage diseases.

An often asked question is what size should the cucumber be at harvest to produce the greatest return to the farmer. Most cucumbers produced in Mississippi are grown under contract; therefore, every effort should be made to harvest cucumbers in the size range that the processor wants. Most processors will pay a premium price for the smaller size fruit. However, labor requirements for harvest will be greater and pounds of fruit per plant will be smaller when harvest is in the No. 1 size. If the fruit were permitted to develop to size 2 or 3, the increased pounds per plant and reduced harvest cost will more than off-set the lower value per pound of fruit.

The relationship between fruit size at harvest and the value of the production per unit area was studied at Mississippi State University. All fruit were harvested while within a specific size range, for example: in Plot 1, no fruit was permitted to get larger than 1-1/16 inches in diameter—the maximum for No. 1 fruit; in Plot 2, no fruit smaller than 1-1/16 inches in diameter were harvested and all fruit in the plot were harvested before they exceeded 1-1/2 inches in diameter, the size range for No. 2 fruit; in Plot 3, the fruit were harvested when they attained a size of 1-1/2 to 2 inches in diameter, the size range for No. 3 fruit; in Plot 4, when they were 2 to 2-1/4 inches in diameter, the size range for No. 4 fruit; in plot 5 when they were between 2-1/4 and 2-1/2 inches in diameter, the size range for No. 5 fruit; and in plot 6 the fruit were harvested after they exceeded 2-1/2 inches in diameter. The fruits in each plot were they had attained the proper size. The number of fruit per plot and the weight per plot were recorded at each harvest. The effect of fruit size at harvest on the total number of fruit produced per plant is shown in Figure 7. The number of fruit produced per plant was greatly affected by size that the fruit were allowed to attain. The longer a fruit remained on a plant, the fewer fruit that plant subsequently produced up to and including size 4.

The effect of fruit size at harvest the number of fruit per plant and on t pounds produced per plant is shown Figures 7 and 8. The weight of fr harvested per plant increased rapi through size 3. When fruit size exceec No. 3, the increase in weight per fr was not sufficient to compensate for t fewer fruit per plant hence the pour produced per plant was not as great when the fruit was harvested in size

Table 3. Yield of cucumber cultivars and hybrids in Mississippi. Data are averages 3 locations and 2 or more seasons.

Cultivar or Hybrid	*Yield in cwt./acre*			
	No. 1	*No. 2*	*No. 3*	*Total*
Explorer	24.9	56.8	72.8	209.6***
Ranger	24.6	54.3	72.8	201.7*
Galaxy	15.2	36.3	44.2	135.4*
Pioneer	35.1	602.	68.7	204.7
Southern Cross	30.4	65.6	93.3	234.9*
Chipper	29.1	57.6	76.0	191.8*
Piccadilly	19.6	51.8	96.7	221.2*
Model	17.4	40.1	64.8	201.7*
Ohio MR 17	22.1	68.0	80.1	219.6**
SMR 58	25.1	62.0	71.0	276.0**

***** - Average for 5 seasons and 3 locations**
*** - Average for 2 seasons and 3 locations**
**** - Average for 3 seasons and 3 locations**

Table 4. The effect of fruit size at harvest on the cumulative yield and va per acre of pickling cucumbers.

All fruit harvested at size:	*Three year average:*		
	fruit/plant (number)	*Yield per acre (pounds)*	*Va ac (doll*
1	47.9	2,435	1,94
2	31.8	2,024	1,66
3	25.7	4,169	1,66
4	13.3	3,044	60
5	10.4	2,909	29
6	10.1	3,610	18
LSD at 5%		290	
LSD at 1%		410	

*** Value per acre calculated assuming No. 1 at 8.00/cwt, No. 2 5.50/cwt, No. 3 at 4.00/cwt, No. 4 at 2.00/cwt, No. 5 at 1 cwt and No. 6. at .50/cwt.**

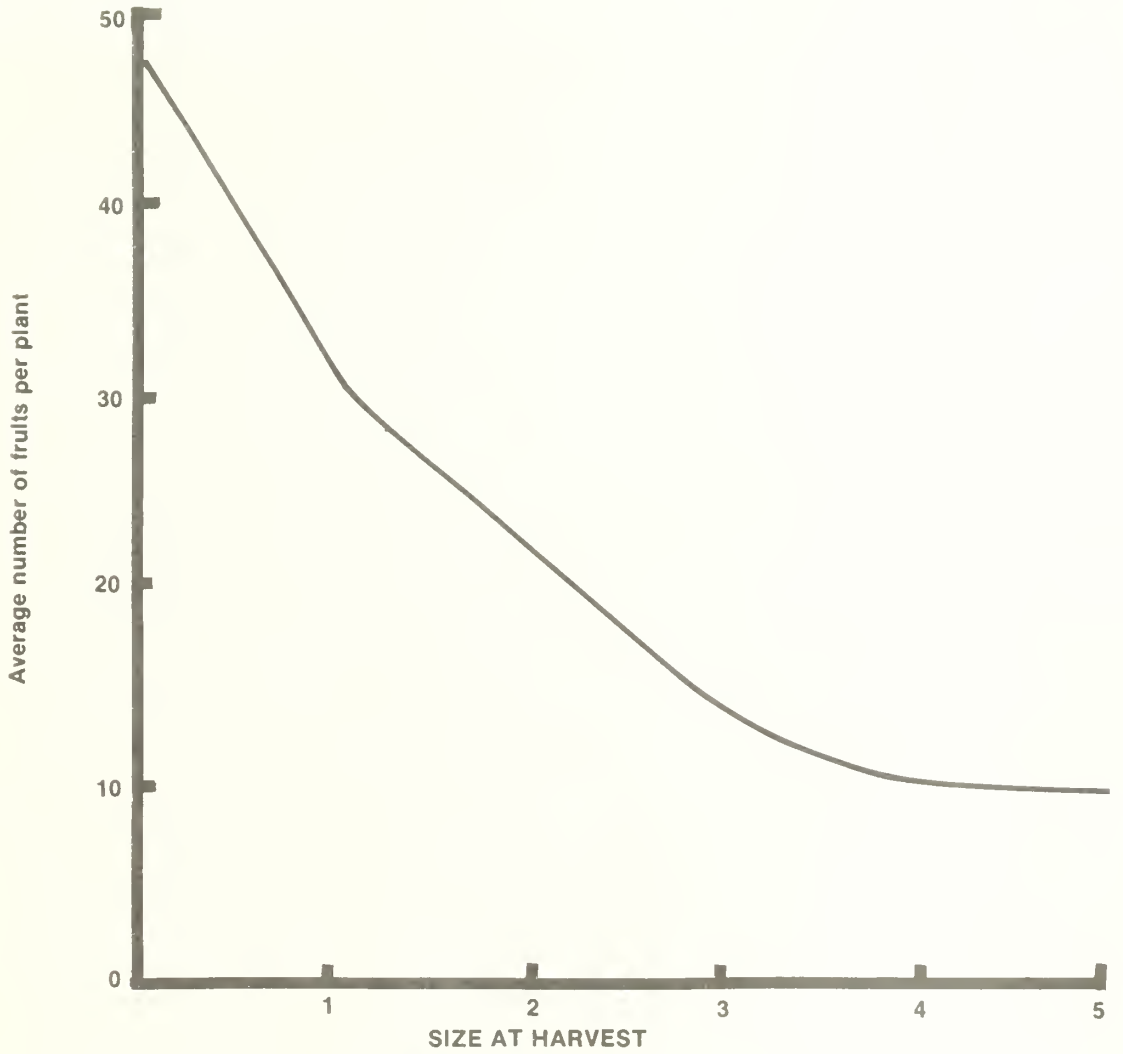

Figure 7. Effect of fruit size at harvest on the number of fruit per plant.

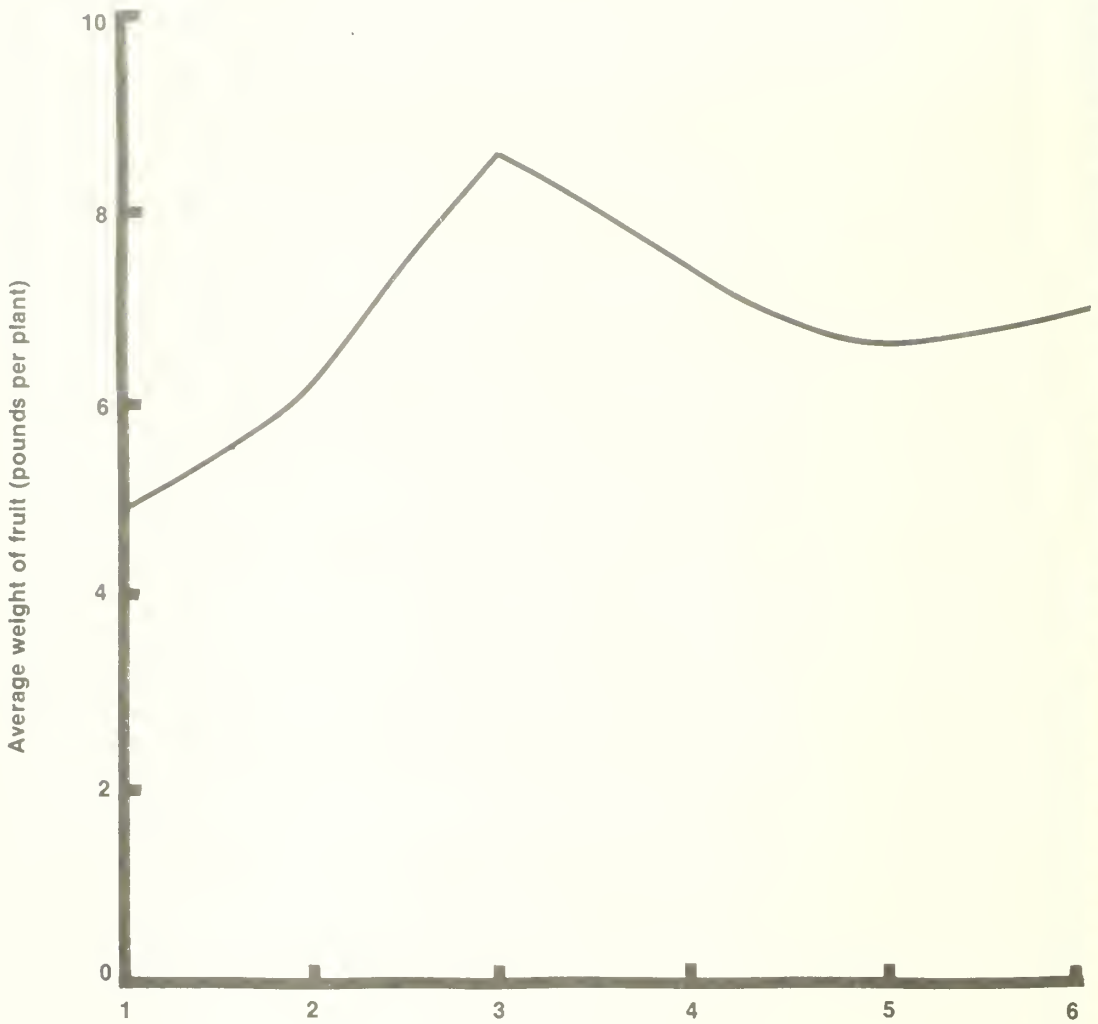

Figure 8. Effect of fruit size at harvest on the production (pounds) per plant.

this basis, permitting a fruit to re-in on the plant until it exceeded size 3 ulted in a lower yield per plant. The ta presented in Table 4 shows what uld be expected in terms of yield and lue per acre when the fruit are har-sted at a given size; however, it does t show what would be involved in ms of labor to harvest.

A study was conducted at Mis-sippi State University to determine e effect of harvest frequency on yield d value per acre. A harvest frequency every 2nd day was compared to a quency of every 4th day. Plants were amined carefully at each harvest and fruit of No. 1 size or larger were moved. The fruits were separated by ade and weighed. The percent of each ade in the total yield was determined r both harvest frequencies. The value the production per acre was termined assuming the following lues per hundred pounds of fruit of e: No. 1 - $8.00, No. 2 - $5.50, No. 3 - .00, No. 4 - $2.00 and No. 5 - $1.00. The data are presented in Table 5. here was no difference in yield of No. 1 uit, however there was a highly gnificant reduction in No. 2 fruit when e harvest was on a 4 day interval. The eld of No. 3 fruit was much greater hen harvest was on a 4 day interval. he yield of No. 4 and No. 5 fruit counted for less than 10 percent of the roduction indicating that oroughness of harvest was very satis-ctory. There was no difference in value the total yield on a 2 day or 4 day rvest frequency under the conditions this test; however, there was approximately twice as much investment in harvest labor for the 2 day interval compared to the 4 day interval.

Questions frequently asked by growers include: "Must I harvest every day?" "Every other day?" Twice a week?" "At what size do I harvest to realize the greatest return?" Regardless of the frequency of harvest, it must be thorough. Equally important, oversize fruits must be removed from the vine when they are discovered. Failure to do so will reduce flowering and yeild of subsequent harvest.

To determine harvest size and frequency the grower must first determine the availability and cost of labor, the potential value of the crop and how carefully he can control fruit size. Changes in value of the different fruit size grades will make corresponding changes in the value of the crop compared to that shown in Table 5. For best results the crop must be harvested at least twice weekly.

When the cucumber is harvested, it must be protected from direct sunlight and high temperatures until it is delivered to the processor. The cucumber is living plant tissue and as such respires—"burns" manufactured foods and releases water and carbon dioxide—therefore losing weight. Water is also lost through pores and breaks in the fruit skin. Exposure to sunlight and/or high temperatures increases both water loss and respiration rates and reduces the fruit weight. If it is necessary to hold the fruit for a short period, they should be placed in a cool, shaded area. They should not be refrigerated. The harvested fruit should be promptly delivered to the processor.

Insect Control

A thorough insect control program is essential for successful production of cucumbers. As soon as the seedlings begin to emerge they should be observed frequently and carefully for any indication of insect damage. At the first evidence of insects a control program should be initiated. Thorough coverage of the plant foliage is essential. Insects likely to present problems in the production of cucumbers in Mississippi include Aphids, Cucumber Beetles, Mites and Pickle Worms. The following control procedures are recommended:

Aphids—Thiodan at the rate of 1 to 1-1/2 pounds per acre, is recommended for the control of Aphids. This material may be applied as a dust or as a spray using an emulsifiable concentrate. Repeat in 5 to 6 days as needed. **Do not apply within 24 hours of harvest.**

Cucumber Beetles—Both the Striped and the Spotted Cucumber Beetles attack the plants in Mississippi. The most critical period is when the plants are emerging. The insect control program should start as soon as the plants begin to emerge. Thiodan as recommended for aphids is a good control measure. A second measure that is sometimes used is Carbaryl (Sevin) at the rate of 1 pound of active material per acre in either a dust or spray. **Do not apply within one day of harvest, do not apply Sevin any time the plants are flowering. Sevin will reduce bee**

ble 5. The effect of frequency of harvest on the yield, grade distribution and value of cucumbers for pickles.

	Harvest Frequency					
	Every 2nd day			*Every 4th day*		
ade size	*Pounds per acre*	*Value per acre**	*Percent of total*	*Pounds per acre**	*Value per acre*	*Percent of total*
	547.3	437.84	19.2	516.7	413.36	18.6
	1923.7	961.85	38.1	1329.7	664.85	30.0
	1882.3	752.92	37.3	2332.0	932.80	42.1
	570.2	114.04	5.0	814.9	162.98	7.4
	125.8	12.58	0.5	420.6	42.06	1.9
tal	5048.6	2279.23	100.0	5452.5	2216.05	100.0
S.D. at 5% - Harvest frequency				288.6		
S.D. at 1% - Harvest frequency				394.2		

Value per acre calculated assuming values of No. 1 at 8.00/cwt, No. 2 at 5.50/cwt, No. 3 at 4.00/cwt, o. 4 at 2.00/cwt, and No. 5 at 1.00/cwt.

populations which are essential for good pollination.

Mites—Kelthane is the recommended material for the control of mites in cucumbers. Apply at the rate of one pound per acre of active material either as a spray or a dust to the plants.

Pickle Worm—The Pickle Worm is likely to be a major insect problem in fall planted cucumbers. Eggs are deposited on the young fruit and the larvae or worms bore into the developing fruits. Small holes, frequently filled with jelly-like substance, may be observed on the cucumber fruit. If the cucumber fruit is sliced open, the larva or worm will be found. Thiodan—at the same rates as suggested for Aphid control, is a good control measure for the pickle worm. **The material should not be applied within 24 hours of harvest.** The best time of application would be immediately following a harvest.

Diseases and Disease Control

The use of good seed and crop rotation are two of the most important steps in disease control. Seeds as supplied by the major seed companies are grown in the arid sections of the west and should be relatively free of disease. In addition most companies treat their seeds with protectants to reduce seedling diseases. Crop rotation is important and in planning the crop rotation such crops as watermelon, cantaloupes, and squash should not be included in the rotation because they are close relatives of the cucumber and many of the insects and diseases are common to all of the crops. These crops should not be planted on the same soil more often than once every three years. A five year rotation is better. The major diseases attacking cucumbers in Mississippi are Anthracnose, Bacterial Wilt, Downey Mildew, Angular Leaf Spot, Gummy Stem Blight, Powdery Mildew and Mosaic. The diseases are more likely to be problems in fall crops than in spring crops; however, occasionally they can be quite severe and costly even in spring crops.

Anthracnose appears as irregular, circular, brown spots, more of a rusty brown spot, on leaves and fruit. Anthracnose is controlled by the use of Maneb.

Bacterial Wilt will first become evident as segments of a vine will wilt and eventually the entire vine and plant will die. Once a vine segment wilts it is not long until the entire plant dies. The control of insects, particularly the cucumber beetles, is about the only thing that can be done to control Bacterial Wilt.

Downey Mildew first becomes evident as pale yellow spots on the leaves of the plants. These spots may enlarge and merge and the leaves eventually die. Downey Mildew is controlled by the use of Maneb.

Gummy Stem Blight appears as tan to brown spots, on the leaves, that enlarge quite rapidly. The disease is commonly accompanied by a gummy exudate, giving the term Gummy Stem Blight to the disease.

Angular Leaf Spot appears as small, irregular water soaked spots, on leav that later turn whitish grey to brown a drop out, leaving a shot hole appeara on the leaves. It is most prevalent dur and immediately following warm ra periods. The disease usually disappe with warm dry weather and the use fungicides to control it is not justifie

Powdery Mildew appears as a whi powdery mass on the leaves and touched or brushed, it will be brush off. It occurs during and immediate following periods of warm, rai weather. Maneb is the recommend control measure.

Mosaic is a virus disease that attac the cucumber. Leaves take on a ve crinkled, crushed type of appearan and there may be some intervein chlorosis. It is a virus disease and spread by insects, principally the aphi Control of the aphid is the prima method of control of Mosaic.

Maneb (Dithane M-22 or Manza D) is the recommended fungicide for t control of most cucumber diseases. should be applied at the rate of 1-1/2 2 pounds of active material per acre enough water to obtain good coverag This would be from 30 to 40 gallons water per acre. The use of a spreader sticker is recommended to facilita coverage. Coverage should be thorou and applications should be repeated a day intervals as long as needed.