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**SWEET CORN TESTS IN THE LOWER  
RIO GRANDE VALLEY**

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Maximum total yields in this test were obtained with Ioana when about 27,000 plants per acre were grown. Size of ear was, however, too small under such crowding for good commercial production. It is recommended that planting rate and spacing be adjusted so that there are between 11,000 and 13,000 plants per acre. This will allow good-sized ears to develop and will not seriously cut total production.

Five degrees of resistance to ear worm could be determined. The most outstanding resistant varieties were Bantam Hybrid 57, Golden Hybrid 54, Magnagold, and Silvercross Evergreen. Ioana and Erie were somewhat inferior to these varieties but are still good resistant varieties. The most susceptible varieties were Gold Rush Hybrid, Golden Cross Bantam, and North Star.

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## SWEET CORN TESTS IN THE LOWER RIO GRANDE VALLEY

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Sweet corn as a commercial crop in the Lower Rio Grande Valley of Texas dates from 1938 when F. H. Vahlsing Company planted 400 acres of the hybrid variety Ioana. Since that time the acreage of sweet corn planted has increased until it is probably the second most important spring vegetable crop.

Because of the increasing importance of sweet corn to the vegetable growers, the findings of the Lower Rio Grande Valley Experiment Station (Substation No. 15) are here presented.

### SPACING AND ITS EFFECT ON YIELD

Spacing is very important in the production of sweet corn, both from the standpoint of yield and the size of ear. A study of sweet corn spacing, begun in 1943 and completed in 1944, gave satisfactory answers to this question (1).

#### Methods

The experiment was laid out with four replications. Spacings were started at 12 inches and increased at 8-inch intervals up to 36 inches. Seeds were planted at the rate of one, two, three and four seed per hill. Plats were 3 rows, 3 feet apart by 30 feet long, and only the middle row was harvested as a test row. The variety of corn used was Ioana produced by the Associated Seed Growers of New Haven, Connecticut. This is mentioned because there appears to be some slight difference in the performance of Ioana from different sources.

#### Results

The effect of planting rate on yield is not directly concerned with final stand. For this reason, stand is not considered in this part of the report. Table 1 gives the results as obtained from the field notes.

Analysis indicated very little effect of number of seeds planted per hill on yield. The maximum yield for Ioana sweet corn was calculated to result from a stand of 27,000 plants per acre. However, it is not always desirable to produce a maximum yield because there may be too many ears that are too small for market purposes.

1. Pickett, B. S. The effect of spacing and number of kernels per hill on sweet corn yields. Proc. Amer. Soc. Hort. Sci. 45:421-424. 1944.

Table 1. Yield per plat of green corn (pounds)

	Number of kernels per hill			
	1	2	3	4
	12-inch spacing			
	19.12	14.88	15.25	11.50
	14.25	10.18	15.51	17.50
	5.44	8.62	11.00	10.88
	11.00	18.00	15.25	10.75
Total.....	49.81	51.68	57.01	50.63
	20-inch spacing			
	8.00	14.50	11.31	9.88
	11.25	12.50	19.31	12.50
	5.50	10.25	15.00	15.75
	10.50	9.31	12.50	8.75
Total.....	35.25	46.56	58.12	46.88
	28-inch spacing			
	9.88	13.50	15.75	10.50
	2.12	5.44	13.06	12.75
	4.00	7.69	5.75	5.25
	5.69	8.06	9.25	5.25
Total.....	21.69	34.69	43.81	33.75
	36-inch spacing			
	7.31	9.06	7.00	4.62
	5.00	4.62	16.62	10.25
	4.50	7.12	11.25	7.25
	7.00	9.25	13.75	6.94
Total.....	23.81	30.05	48.62	29.06

Table 2. Average yield at different spacings and seeding rates

Spacing between hills (inches)	Pounds per plat	No. kernels per hill	Pounds per plat
12	13.07	1	8.16
20	11.68	2	10.19
28	8.37	3	12.98
36	8.22	4	10.01

Table 3. Number of mature stalks per plat expressed as percent of the number of seeds planted

Spacing (inches)	Kernels per hill				
	1	2	3	4	Average
12	71	56	55	57	60
20	89	67	59	47	66
28	100	72	62	51	71
36	100	78	66	45	72
Average.....	90	68	60	50	67

Highest calculated yields are obtained when seed are planted at the rate of three kernels per hill, and when the 1x3-foot spacing is used. Maximum ear size was obtained with a stand of some 13,200 plants per acre.

An experiment to check the data obtained in the first study was set up the following year. This experiment was also used as a study of machine planting. A 16-hole plate seeder operated at tractor speed (1-1) calculated to result in a spacing of 5 inches was used for one set of three plats. Another set was planted with a 12-hole plate seeder at the same speed to give a spacing of 6.5 inches and, at two-thirds tractor speed, to give a spacing 9.5 inches. Actually these stands were not attained. The closest spacing was approximately 10 inches; the next was 16 inches, and the greatest spacing was 26.5 inches.

Table 4. Results obtained by machine spacing

Average spacing (inches)	Hills per acre	Ear weight (lbs.)	Yield per acre (lbs.)
10	17,750	.31	5572
16	11,083	.60	6488
26.5	6,685	.82	5342

Greater ear size was obtained in this experiment than in the previous one, and ear size was more directly affected by stand density. As a result the conclusion must be drawn that, in general, a spacing of less than 12 to 15 inches should be used only on fertile land provided with adequate and timely irrigation.

### VARIETIES OF SWEET CORN

During the past three years more than 100 varieties of sweet corn have been tested in a limited way to determine their adaptability to this area. Of these, 42 can be obtained from commercial sources. Only the best of these will be described and discussed.

*Ioana*: At present this is the major variety grown in the Lower Rio Grande Valley. It is the first of the hybrid sweet corn varieties carrying true earworm resistance; for this reason it was the first to make commercial production possible in this area. As compared with a number of newer varieties *Ioana* is only fairly resistant to the insect. *Ioana* was originated by Dr. E. S. Haber of the Iowa Agricultural Experiment Station. The ear is 7½ to 8 inches in length, almost cylindrical and well filled to the tip. Husk cover is heavy enough to prevent serious damage by birds up to harvest time. Color of kernels is a rather light golden yellow. The variety is very attractive when cooked. It ships and handles well through the retail markets.

*Golden Hybrid 2439*: This variety was first tried at the Weslaco station in 1944. It proved to be somewhat heavier in yield than *Ioana* that year and

also the year following. It is not as resistant to earworm as Ioana, and is little if any better from the standpoint of quality. It is a 12- to 14-rowed variety under Lower Rio Grande Valley conditions, and is from  $7\frac{1}{2}$  to  $8\frac{1}{2}$  inches in ear length. The plants sucker strongly and the ear size tends to

be somewhat reduced by this habit at normal plant spacings. It is apparently more attractive to birds than Ioana, but on the whole the variety is well adapted to commercial production in this area.

*Erie (Bantam Hybrid 51)*: This variety, and Bantam Hybrid 57, appear to be the finest of the new varieties for this region. Erie has more earworm resistance than either Ioana or Golden Hybrid 2439. It is less subject to bird damage than 2439, and suckers less. The plant is taller and more vigorous than most of the sweet corn varieties studied. It is slightly later than Ioana but not later than 2439. The ear is clear, light golden yellow, 12- to 14-rowed, and an inch longer than Ioana. Quality is good, rather better than 2439.

*Bantam Hybrid 57*: This variety is in many respects similar to Erie. However, the shuck cover is very short. As a result, birds and insect predators are apparently able to destroy many young earworms before they have done much damage. The

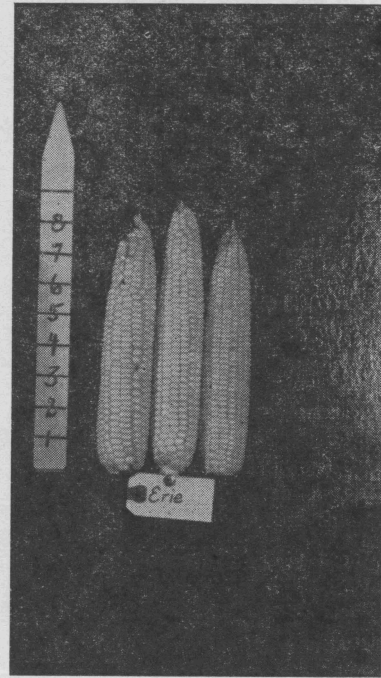


Figure 1. Typical ears of variety Erie.

The ears appear remarkably clean and free from injury at harvest time.

Yields of both Erie and Bantam Hybrid 57 are considerably above yields for Ioana or Golden Hybrid 2439.

*Other Varieties*: There are a number of other excellent varieties of corn that do not meet market requirements for one reason or another. Tristate, Goldenrain and Goldenlast are all very high-yielding varieties. They have good ear length, but they are 16- to 18-rowed varieties. Such thick ears do not produce the pack-out count required by shippers.

Golden Hybrid No. 10, produced by W. A. Huelson of the University of Illinois, is an excellent variety with only the fault of folding the husk leaves in between the kernel rows. It sometimes does not fill well at the tip but this is not a serious fault.



Table 5. Variety results with yellow sweet corn

Variety	Pounds per acre			Average	Average yield corrected according to stand	Rank
	1944	1945	1946			
Allegheny	2,744			2,744	2,880	
Burpee Cross	64			32	33	
Early Bancross	577			606		
Golden Cross Bantam	1,465	1,000		1,238	1,280	
*Golden Hybrid 2439	3,373	4,160		3,766	3,880	9
Ioana	2,175	3,360		2,768	2,860	
Lincoln	2,367	160		1,264	1,302	
North Star	78			78	82	
Northern Cross	84			84	88	
Ohiogold 1	3,506			3,506	3,680	10
Top Flight Bantam	1,829	8	1,431	1,089	1,089	
Carmel Cross	46			46	48	
*Golden Hybrid No. 10	5,533	3,180		4,356	4,500	3
Gold Rush Hybrid	113			113	118	
Aristogold 1	2,875	3,740		3,308	3,410	
Aristogold 2	3,500	2,140	3,332	2,991	2,991	
Dependogold	3,125	4,180	3,046	3,450	3,450	
Evergold	2,375			2,375	2,490	
Goldenlast	3,375	5,700		4,538	4,675	4
June Gold	3,060			3,060	3,210	
Tristate	3,940	6,600	5,845	5,462	5,462	2
Tendermost	1,000			1,000	1,050	
Magnagold	3,875	6,640		3,505	3,620	
Kiawak		1,000	491	746	720	
Wappoo		700	263	482	466	
Alameda		1,700		1,700	1,700	
Tenderdeep		4,360	2,351	3,356	3,240	
Goldengrain		8,920	4,980	6,950	6,720	1
*Bantam Hybrid 51 (Erie)		2,140	6,295	4,218	4,075	6
*Bantam Hybrid 56		2,960	4,715	3,838	3,700	8
*Bantam Hybrid 57		4,080	4,990	4,535	4,370	5
Golden Hybrid 50		1,740		1,740	1,740	
*Golden Hybrid 54		4,000		4,000	4,000	7
Carowa			197	197	186	
Drouth Resistant Golden Cross Bantam			1,291	1,291	1,218	
Suncross			3,558	3,558	3,378	
Tenderbest			2,016	2,016	2,020	

\*Excellent types, worth field trial.

Up to this time there has been no interest in varieties of white sweet corn for shipping. Nevertheless, the Lower Rio Grande Valley station has carried on a number of tests with white sweet corn. Of the 17 commercial white hybrids tried, only Stowell's Evergreen Hybrid No. 14 x 15 and Silvercross Evergreen have given good enough performance and general characteristics to make them especially desirable for either canning or fresh market varieties.

*Silvercross Evergreen*: This variety is a 14- to 16-rowed variety about 7 to 8 inches in ear length. The variety has a heavy husk cover, is quite resistant to earworm, and of good quality. The plants are extremely vigorous and moderately resistant to corn rust.

\* *Stowell's Evergreen Hybrid 14 x 15*: This is a variety introduced by the University of Illinois. It is quite similar in habit and character to Silvercross Evergreen.

Table 6. Variety test results with white sweet corn

Variety	Pounds per acre			Average	Average yield corrected according to stand
	1944	1945	1946		
Keystone Evergreen	3,880	624		2,252	2,300
Sachem	4,890			4,890	5,870
Winnabago	2,620			2,620	3,150
Country Gentlemen 5 x 10	1,560			1,560	1,875
Country Gentlemen 8 x 6	3,500	2,654		3,077	2,420
Narrow Grain 17x11	2,880			2,880	3,460
Narrow Grain 14x13	3,100	911		2,006	1,835
Narrow Grain 26x15	4,550			4,550	5,460
Shoeped Hybrid	2,500			2,500	3,000
Stowell's Evergreen Hybrid 14x15	3,760	5,755	3,314	4,276	4,276
Stowell's Evergreen Hybrid (Burpee)	1,790	243		1,016	926
Aristogreen	250			250	300
Silvercross Bantam	2,500			2,500	3,000
Silvercross Evergreen	4,375	7,482	4,556	5,471	5,471
Silvercross Narrowgrain		7,408	4,218	5,813	5,400
Oregon Evergreen		3,020		3,020	2,240
Narrowgrain 5x22			5,943	5,943	7,350

Other varieties of white sweet corn of merit are the Narrowgrain Hybrids 5 x 22 and 26 x 15. Neither of these two varieties seems to have adequate earworm resistance to make it a satisfactory canning corn variety. Each could be properly trimmed for shipment as fresh ears, however.

### STUDIES ON EARWORM RESISTANCE

It has been generally stated that husk extension and tightness are important factors in earworm resistance. Barber (2) reports that when the varieties Golden Cross Bantam and Marcross 6-13 have short husks due to drouth they are more severely attacked than when they have normal husk cover. Dicke and Jenkins (3) state that earworm resistance in field corn is increased by good husk cover folding tightly about the tip of the ear. Richey (4), however, was unable to state that any observable characteristics were concerned in earworm resistance in a study of some susceptible varieties of field corn.

The corn earworm (*Heliothis armigera* (Hbn.)) is the most serious insect pest of corn in the Lower Rio Grande Valley. A careful record of earworm infestation of the various varieties on trial has been maintained.

To determine the earworm index, two grades of infestation were recorded. Ears not invaded by the insect were scored 0; ears invaded but not commercially damaged were given a rating of 1; ears commercially damaged were given a rating of 10. For example, Ioana in one test

2. Barber, G. W. Husk development of sweet corn as affected by moisture supply, an important factor in corn earworm control. Jour. of Agr. Res. 68:73-77. 1944.

3. Dicke, F. F., and M. T. Jenkins: Susceptibility of certain strains of field corn in hybrid combinations to damage by corn ear worms. U.S.D.A. Tech. Bul. 898. 1945.

4. Richey, F. D. Maize hybrids susceptible to earworm: Heritable differences in susceptibility of corn hybrids to early attack. Jour. of Hered. 35:327-328. 1944.

showed 5 percent of the ears commercially damaged, giving a score of 50. An additional 75 percent were invaded but not damaged seriously, which adds 75, the total score in this case being 125.

Five varieties that have been included in the trials each of the years discussed and which were fairly representative of the whole, were used as a standard of comparison. These varieties—Ioana, Golden Hybrid No. 10, Golden Hybrid 2439, Tristate and Goldenrain — have been considered fairly earworm resistant, but actually they vary considerably among themselves in this respect. Golden Hybrid No. 10 is the most resistant of the group, Golden Hybrid 2439 the least resistant, and Ioana, Tristate and Goldenrain, which have almost the same degree of resistance, are intermediate.

Judging from these studies there seem to be about five groups each carrying more or less resistance. Gold Rush Hybrid, Golden Cross Bantam and North Star seem to be most susceptible. Northern Cross, Evergold and June Gold may carry some resistance; Golden Hybrid 2439, Aristogold Bantam, Goldenlast and Silvercross Bantam seem to have slightly more resistance. The first group carrying really marked resistance includes Ioana, Tristate, Goldenrain, Erie, Bantam Hybrid 56, Dependgold and Topflight Bantam.

The most resistant varieties so far tested are Aristogold Bantam Evergreen, Bantam Hybrid 57, Golden Hybrid 50, Golden Hybrid 54, Magnagold and Silvercross Evergreen.

What the genetic factors may be in resistance are not to be obtained from the data collected up to this time. It is apparent, however, that husk and silk characteristics are not the sole causes of resistance. In the group carrying the most resistance are to be found varieties with relatively tight and relatively loose husks. The extension of the husk beyond the tip is not itself an important characteristic in these varieties since Bantam Hybrid 57 has so little husk cover that ears are frequently exposed at the tip. Golden Hybrid 54, however, is well covered with a husk extension of from two to three inches. In 1945 two plantings of Ioana were made. The first planting matured with normal husk cover and

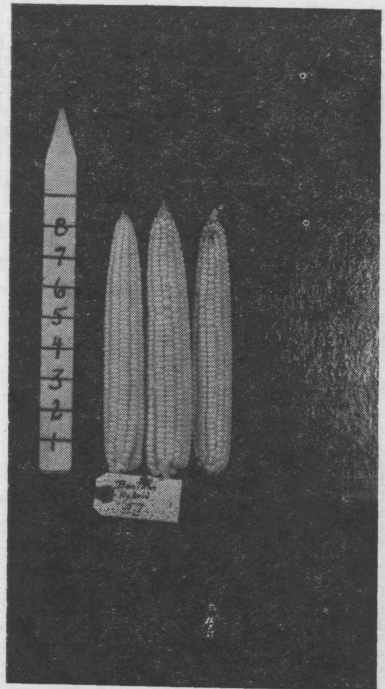


Figure 2. Typical ears of Bantam Hybrid 57.

showed an earworm index of 195. The second planting, because of climatic and water conditions, had almost no husk extension beyond the ear, and had an earworm index of only 67. Additional varieties which appeared in both tests were somewhat more free of worms in the latter planting than they were in the earlier test, but not to the same extent, the average reduction being almost 30 points. It is suggested in these particular cases that the young earworm larvae were exposed longer to attacks by predacious insects and possibly by birds. Many of the ears of both varieties showed evidence of the presence of young ear worms at one time.

Table 7. Comparative ear worm resistance\*

Variety	Index of infestation			Average
	1944	1945	1946	
Ioana.....	195	195	388	259
Golden Hybrid 10.....	81	97	300	159
2439.....	450	356	320	375
Tristate.....	160	206	350	239
Goldengrain.....	253	197	390	247
Average.....	228	208	350	256
Aristogold Bantam.....	371	238	.....	304
Aristogold Bantam Evergreen.....	69	70	430	190
Bantam Hybrid 51.....	.....	238	260	249
Bantam Hybrid 56.....	.....	240	310	275
Bantam Hybrid 57.....	.....	98	290	194
Dependogold.....	407	98	250	252
Evergold.....	410	.....	.....	410
Golden Grain.....	253	197	390	280
Golden Hybrid 50.....	.....	107	.....	107
Golden Hybrid 54.....	.....	100	.....	100
Goldenlast.....	540	250	.....	395
Junegold.....	590	.....	.....	590
Magnagold.....	113	101	.....	107
Silvercross Bantam.....	314	.....	400	357
Silvercross Evergreen.....	61	141	.....	101
Top Flight.....	150	.....	400	275
Gold Rush Hybrid.....	500	1000	.....	750
Golden Cross Bantam.....	600	960	.....	780
North Star.....	920	.....	.....	920
Northern Cross.....	640	.....	.....	640

\*No infestation is 0.  
Complete commercial infestation 1000.

None of the most severely infested varieties has especially tight husks; yet many of the least susceptible varieties have husks no tighter. Another interesting observation is that many of the varieties having high earworm resistance were frequently least affected by bud worm early in the growing season.

From the data, it is suggested that there may be as many as 5 degrees of earworm resistance in sweet corn varieties. Within the 5 groups there appears to be enough variation to suggest that hereditary characteristics alone may not account for all apparent resistance. For example, as many ears of Bantam Hybrid 57 showed the presence of earworms as in the case of Bantam Hybrid 51. The important difference was not number of ears infested, but the damage done by the earworms. Extremely long

husk extension, which with the accompanying length of silk, provides food for the earworm until the corn is ready for harvest, may also reduce damage from the pest.

### SUMMARY

1. Spacing for sweet corn is as important from the standpoint of ear size as from the standpoint of yield. A spacing of 11,000 to 13,000 plants per acre appears best. This allows a possible yield of from 125 to 170 half-bushel bags of corn per acre, including cull-out.

2. New varieties of yellow sweet corn well adapted to the Valley are Erie and Bantam Hybrids 56 and 57. Other varieties that may have value as shipping varieties are Golden Hybrid 10 and Golden Hybrid 54. Some excellent varieties needing trial in large acreages for both shipment and possible canning are the 16- to 18-rowed varieties Tristate, Goldenlast and Goldenrain.

3. White sweet corn varieties worthy of trial as canning varieties are Narrowgrain 26 x 15 and 5 x 22; and the Evergreen hybrids Silvercross and 14 x 15.

4. Resistance to ear worm apparently varies in about five steps, from susceptible to highly resistant. Within these groups there is some variation which may be ascribed to exposure of the insect to attack by predators, or as in the case of extremely long husk extensions simply supplying food to the insect in sufficient quantity that damage to the ear does not occur.