

Results of Arizona Sugarbeet Summary

Provide Interesting Production Leads

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Arizona sugarbeet growers cooperating in this survey provided information concerning their production practices for the sugarbeet crop harvested in the summer of 1971. Data furnished by 52 growers for 62 fields were carefully monitored. These 62 fields accounted for half of Arizona's 1971 sugar crop. Grower yields per acre ranged from 7.7 tons of roots with 13.3% sucrose, for a sugar yield of 2,050 lbs. per acre, to 32.9 tons of roots with 15.8% sucrose, giving a

sugar yield of 10,400 lbs. per acre.

Early this year representatives of the Arizona Sugarbeet Growers Association, Spreckels Sugar Company, and the University of Arizona planned and later conducted the in-depth study of sugarbeet production practices used by Arizona growers.

Yields, Practices Vary

Practices used to produce beets on the five highest and five lowest yielding fields are reported in Table 1.

The field producing the 3,970 pound per acre yield was established too late and stands in this planting were inadequate. The sorghum that preceded the crop producing the 3,180 pound per acre yield was treated with Atrazine and severe sugarbeet stand problems resulted. The field with plants that produced 3,140 pounds of sugar per acre was used for cotton every year, 1950-1970. While applications of water were heavy, the grower indicated that penetration was

Table 1. Summary of several practices used to produce beets in the five highest and five lowest yielding fields.

Yield lbs. Sugar per Acre	Days of Beet Free Period	Previous Crop	Previous Crop Treated with Herbicide	Texture of Soil	Variety	Systemic Applied at Planting	Date Planting Completed	Type of Row	Herbicide Used
10,400	40	Safflower	No	Medium	USH9	Yes	Sept. 23	Double	Yes
9,800	1970 Beets More Than 2 Miles Away	Fallow	Yes	Medium	S-301 H	Yes	Sept. 18	Double	No
9,450	47	Fallow	Yes	Medium	USH9	No	Sept. 24	Double	No
9,450	60	Fallow	No	Medium	S-301 H	Yes	Sept. 20	Double	No
9,450	58	Safflower	Yes	Medium	USH9	Yes	Sept. 28	Double	No
3,970	45	Fallow	Yes	Fine	USH9	Yes	Oct. 15	Single	No
3,180	30	Sorghum	Yes	Fine	S-301 H	Yes	Oct. 26	Single	No
3,140	60	Fallow	Yes	Medium	S-301 H	No	Sept. 16	Double	No
2,200		Alfalfa	No	Fine	S-301 H	Yes	Sept. 28	Double	No
2,050	0	Barley	No	Medium	USH9	Yes	Sept. 15	Double	Yes
					S-301 H				

Stand Plants left per 100' of row	Length of Water Run (Miles)	Cold Damage in January and February	Feet of Water Applied	Number of Insecticide Applications	Nitrogen Total lbs. Applied	Date of Harvest	Yield Tons Acre	Sucrose per cent
150	1/4	Moderate	8.5	3	217	July 2	32.9	15.8
110	1/4	Moderate	5.2	5	81	June 22	33.8	14.5
140	1/2	Moderate	8.2	2	164	May 28	29.8	15.9
	1/4	Moderate	6.5	4	115	June 18	27.8	17.0
	1/4	Moderate	8.1	1	227	June 11	33.0	14.3
90	1/4	Moderate	6.0	None	280	June 24	12.4	16.0
70	1/4	Severe	4.4	4	62	July 1	9.4	16.9
	1/8	None	11.8	3	108	June 7	9.8	16.0
	1/4	Severe	6.0	5	232	June 17	8.0	13.7
200	1/4		8.0	7	144	July 14	7.7	13.3

poor. A severe weed problem accounted for the 2,200 pound per acre yield while the lowest yielding field the survey had an excessive plant population and was set back by a severe spider mite problem beginning in April. Also, no beet free period was observed.

Many Crops Precede Beets

Grower experience indicated beets may successfully follow several different crops in central Arizona, Table 1. Steps must be taken to avoid chemical residues and to control weeds in the crop or fallow before beets.

*Agronomist, Arizona Cooperative Extension Service; Agricultural Statistician, University of Arizona; and Agronomist, Amstar Corporation, Spreckles Sugar Division; respectively. Others who assisted with the planning and conduct of the survey were: Charles Farr, James Little, Norbert Abel, Russell Schlittenhart, Gary Allen, George Campbell, Charles Carlson, Bud Gardiner, Allan Halderman, Scott Hathorn, Jr., Stan Heathman, Walter Hinz, Ralph Lambdin, Al Lane, Judson May, Martin Openshaw, Charles Robertson and Norm Shelton.

Date of Planting Important

Past research has shown September to be the best time to plant beets in central Arizona and especially that planting should be early if harvest is to be early. The planting date averaged eight days later for those fields having yields in the lowest 1/3 of fields surveyed, Table 2. However, this difference was not statistically significant at the .05 level.

There appeared to be a trend favoring planting during September 21-30. The 16 fields established during this time interval produced an average of 7,008 pounds of sugar per acre. Average yields for later plantings were less in each instance. The two fields established October 21-30 produced only 4,249 pounds of sugar per acre. Since temperature and other factors affecting growth vary from year to year, optimum planting dates may be expected to vary for sugarbeets as for other crops. Elevation and air drainage may play important roles.

When air temperatures were unusually high, it was easier to obtain a stand in mid-to-late September as opposed to early September. Also, weed problems usually were somewhat less

for plantings established at this time. All of the top five fields surveyed were planted in dry soil and during the period September 20-28, 1970.

Effect of Harvest Date on Yield

Fields included in the survey were harvested during a period of several weeks. Harvest date influenced yield, with yield from early harvests usually lower. There was no significant difference between beet growing areas or between low and high yielding fields in average date of harvest.

Other Factors

Varieties S-301 H and US H9 performed well. Growers felt US H9 was best suited for later planting. Bolting in this variety was not a serious problem this year. However, early planting of this variety in central Arizona increased bolting. US H9 was more tolerant to certain virus diseases than S-301 H. When virus diseases are a problem, US H9 performs better than S-301 H.

Most growers used a systemic at planting time in 1970. This may have

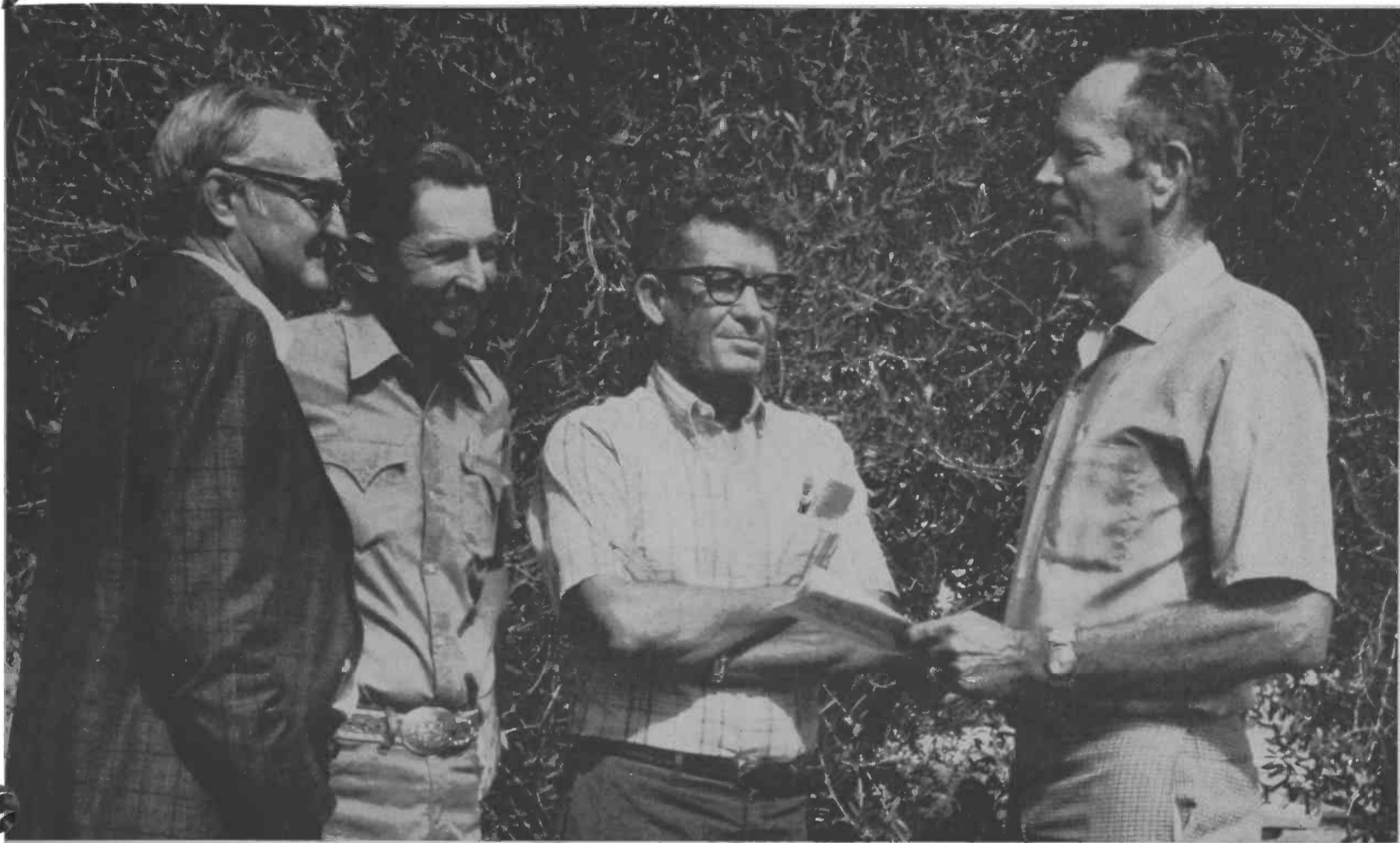
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Table 2. Summary of information concerning several factors with averages for area and yield rank.

Factors	Area				Yield Rank (62 fields)		
	Chandler	Pinal County	West Phoenix	Buckeye	Lowest 1/3	Middle 1/3	Top 1/3
Harvest date (Days from January 1, 1971)	175	177	183	174	177	176	179
Acres	48 ^a	78 ^b	39 ^a	45 ^a	59	62	45
Beets (Tons/acre)	18.9 ^a	18.1 ^a	25.2 ^b	26.6 ^b	14.9 ^a	21.9 ^b	27.5 ^c
Sucrose (%)	14.7	15.4	14.8	15.5	15.0	14.9	15.4
Sugar (lbs./acre)	5564 ^a	5533 ^a	7465 ^b	8253 ^b	4426 ^a	6488 ^b	8510 ^c
Planting Date (Days from January 1, 1970)	263 ^a	271 ^b	250 ^a	271 ^a	270	262	262
Seed (lbs./acre)	3.8	2.9	3.0	3.2	3.5	3.2	3.0
Plants per 100 feet	166 ^b	134 ^a	118 ^a	177 ^b	144	144	160
Nitrogen (lbs. for beet crop)	113	174	122	168	132	140	167
P ₂ O ₅ (lbs. for beet crop)	46	56	44	67	42 ^a	47 ^a	71 ^b
Date last application nitrogen (Days from January 1, 1970)	352	386	363	367	393	352	360
Water (Acre feet applied)	6.8	6.4	6.2	7.9	6.7	6.9	6.8
Final irrigation date (Days from January 1, 1971)	152	145	154	154	151	146	153
Number of irrigations	17.6 ^{ab}	14.5 ^a	15.2 ^{ab}	18.9 ^b	16	15.7	17.0
Number insecticide applications	3.5	2.6	3.2	2.5	2.7	2.9	3.2

Within each section of the table row means with different letters differ significantly by the Student Newman Keuls test for $\alpha = 0.05$. Where no letters appear, means do not differ significantly.

Results of Arizona Sugarbeet Survey



Three sugarbeet growers having highest yielding fields in the survey from left are: Charles Youngker of Buckeye, Bruce Heiden from Buckeye, and

Archie Hardeman, foreman for Good-year Farms at Litchfield Park. They are being congratulated for their pro-

duction efficiency by the President of the Arizona Sugarbeet Growers Association, Norbert Abel.

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been an important factor in keeping leafhopper and aphid populations at low levels early.

Several growers experimented with single rows in 1970. They indicated that irrigation of single rows and weed control by cultivation were less difficult. However, of the 62 fields surveyed, only 9 were planted using single rows. Of these, 7 were in the bottom third when rated on the basis of pounds of sugar produced per acre.

Fertilization May Be Key

The possible relationship of phosphate fertilization rates to sugar yield may have been the most important finding in the survey. Higher rates of phosphate fertilization were positively and significantly correlated

with percent of sugar in beets and with the yield of sugar. Beets receiving higher rates of phosphate fertilizer were harvested earlier, possibly indicating an important maturity relationship.

A larger number of insecticide applications was used when higher rates of nitrogen fertilization were applied.

Averages Concerning Important Factors

Data in Table 2 show that in 1971, yields averaged higher for the West Phoenix and Buckeye areas than for Chandler and Pinal County. The percent of sugar in beets did not vary significantly from area to area. The final irrigation date was later for stands having higher plant populations.

Plant population was lowest in the

West Phoenix and Pinal County areas. Growers whose fields were in the top $\frac{1}{3}$ used significantly more P_2O_5 per acre than growers in other groups. Water use for beets was much higher than expected.

Plans for 1972 Survey

The Arizona Sugarbeet Growers Association, Spreckels Sugar Company, and the University of Arizona will conduct a similar sugarbeet production practices survey by mail in 1972. Leads from the 1971 summary will provide the basis for survey items. Special appreciation is expressed to each of the growers, Directors of the Sugarbeet Growers Association, personnel of Spreckels Sugar Company and staff members of the University of Arizona, who gave of their time so that this information could be obtained.