Strawberry Fertilizer Trial

tests in new strawberry planting on old potassium deficient apricot land indicated no response to potash or phosphate

E. L. Proebsting and Lee C. Benson

Lassen variety strawberries replacing an Alameda County apricot orchard—pulled because of severe potassium deficiency symptoms—provided an opportunity to work with low potassium strawberries on Dublin clay soil.

Duplicate test plots of single beds 147′ long were established in two areas of the field. Three treatments were used: *1*, nitrogen, applied as ammonium nitrate at 100 pounds per acre; *2*, nitrogen and potassium, as 100 pounds of ammonium nitrate and 200 pounds potassium as potassium sulfate per acre; and *3*, nitrogen, potassium and phosphorus, as 100 pounds of ammonium nitrate and 200 pounds of potassium sulfate plus 200 pounds phosphorus as treble superphosphate per acre. The grower's treatment of 16-20-20 was sampled for comparison. No manure was applied before planting.

The plants were set in December 1953 and January 1954. The fertilizer was applied April 2, 1954. Leaf sampling started March 23, 1954, and continued to October. Leaf samples of 100 fully expanded but not overmature leaflets were taken for analysis at approximately monthly intervals throughout the summer. Yield records were kept of each picking. The treatments and procedures were followed again in 1955.

Yields were quite uniform. One area was slightly better than the other, but there were no differences between treatments.

Leaf analyses for the two years—1954 and 1955—were very similar. The values for 1955 are given in the large table on this page. Both years showed a marked drop in nitrogen from spring to July, followed by recovery at the season's end to near the spring level. There were only minor fluctuations in the potassium content from time to time or from plot to plot. There was no evidence of absorption of potassium or phosphorus from the added fertilizer. There were fluctuations, probably sampling errors, but no evidence of increased concentration in the rows receiving phosphorus.

Calcium tended to increase throughout the year, though less sharply than in most tree fruits. Magnesium maintained a fairly constant level. Manganese showed a rise at the end of the season, although progression was not steady throughout the season.

This experiment—designed primarily to compare plants receiving no potassium and those which did—failed to develop differences. The failure to develop deficiency symptoms may be related to the

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Strawberry Yields in Pounds Per Bed

	Field I		Field IV	
	1954	1955	1954	1955
N[1]	248	714	129	825
NK[2]	227	696	123	816
NPK[3]	211	609	154	858
16–20–20	233	720	180	807

[1] Nitrogen. [2] Nitrogen potassium. [3] Nitrogen phosphorus potassium.

Amounts of Nitrogen, Phosphorus, Potassium, Calcium, Magnesium and Manganese Present in Strawberry Leaves in Per Cent Dry Weight, 1955

Field	Treatment	Date 4/14	5/17	6/20	7/21	8/22	9/20	10/19
				Nitrogen				
I	N[1]	2.89	2.24	1.92	1.68	2.14	2.52	2.74
	NK[2]	2.85	2.27	1.79	1.96	2.08	2.52	2.58
	NPK[3]	2.88	2.26	1.89	1.96	2.07	2.44	2.60
	16–20–20[4]	2.87	2.35	1.99	2.15	2.38	2.58	2.64
II	N	2.75	2.43		2.01	2.25	2.43	2.74
	NK	2.92	2.51		1.71	2.25	2.66	2.73
	NPK	2.94	2.53		1.81	2.63	2.67	2.69
	16–20–20	2.77	2.26		1.94	2.36	2.65	2.70
				Potassium				
I	N	.97	.93	1.07	1.15	1.22	1.06	1.21
	NK	.99	.96	1.07	1.32	1.17	1.03	1.11
	NPK	1.11	1.02	1.19	1.32	1.09	1.15	1.21
	16–20–20	1.21	1.13	1.14	1.30	.90	1.10	1.19
II	N	1.11	1.05		1.27	1.17	1.12	1.25
	NK	1.21	1.26		1.17	1.10	1.11	1.13
	NPK	1.21	1.21		1.16	1.15	1.03	1.07
	16–20–20	.88	1.20		1.20	.87	1.06	1.01
				Phosphorus				
I	N	.301	.292	.268	.285	.370	.329	.318
	NK	.290	.289	.289	.318	.329	.307	.292
	NPK	.329	.297	.301	.392	.318	.312	.312
	16–20–20	.318	.329	.299	.346	.279	.301	.296
II	N	.323	.308		.315	.240	.296	.335
	NK	.346	.313		.286	.301	.266	.303
	NPK	.364	.316		.292	.307	.239	.272
	16–20–20	.370	.321		.324	.266	.281	.296
				Calcium				
I	N	1.03	1.16	1.46	1.29	1.29	1.66	1.43
	NK	.98	1.05	1.46	.97	1.09	1.46	1.25
	NPK	1.00	1.10	1.25	.96	1.20	1.14	1.31
	16–20–20	1.09	1.00	1.35	.99	1.35	1.60	1.32
II	N	1.14	.98		.83	1.29	1.57	1.48
	NK	.98	1.17		.93	1.35	1.63	1.54
	NPK	.90	1.10		.92	1.26	1.75	1.56
	16–20–20	.98	1.11		.92	1.53	1.42	1.56
				Magnesium				
I	N	.31	.36	.34	.31	.33	.42	.43
	NK	.31	.31	.34	.25	.32	.39	.40
	NPK	.31	.30	.31	.22	.31	.34	.44
	16–20–20	.35	.31	.33	.28	.34	.38	.42
II	N	.38	.31		.22	.32	.36	.39
	NK	.33	.39		.25	.54	.39	.43
	NPK	.39	.36		.25	.33	.43	.42
	16–20–20	.33	.34		.25	.38	.40	.44
				Manganese (p.p.m.)				
I	N	42	62	62	123	82	110	190
	NK	32	100	107	98	82	120	185
	NPK	78	62	128	83	57	125	185
	16–20–20	87	48	100	108	77	120	200
II	N	105	150		64	77	105	170
	NK	105	155		80	109	125	185
	NPK	90	120		75	91	135	155
	16–20–20	95	202		90	85	105	175

[1] Nitrogen as ammonium nitrate at 100 pounds per acre.
[2] Nitrogen potassium as ammonium nitrate at 100 pounds per acre and potassium sulfate at 200 pounds per acre.
[3] Nitrogen potassium phosphorus. Treble superphosphate at 200 pounds per acre added to the NK treatment.
[4] Grower's treatment.

mined by local economic conditions reflecting the relationship between price of hogs and price of feeds including garbage. The results in all trials indicate the palatability and suitability of cooked residential garbage as a swine feed.

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LETTUCE APHID

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deeply and allowed to dry thoroughly before being replanted to lettuce. Often lettuce can produce a satisfactory crop—even with a heavy infestation of aphids—if it can be made to grow rapidly. Even, adequate irrigation and the elimination of cracks through which winged aphids can enter the soil often assist in averting damage.

Some varietal differences in susceptibility to the lettuce root aphid have been observed. Imperial strain E-4—currently not an acceptable commercial variety—is the most resistant variety found to date, and attempts are being made to incorporate that resistance in the commercial variety Great Lakes.

Based on the results of the investigations in 1956, it is possible to control the European lettuce root aphid by a preplanting soil treatment with parathion at five pounds of actual chemical per acre. However, parathion is a highly toxic organic phosphate insecticide and all precautions and rules on the label should be followed and permits from the County Agricultural Commissioner are required before it can be purchased or used. Parathion should only be used for summer and fall harvested acreages and ordinarily only where there is a history of aphid attacks. Protection will probably last for only a single crop.

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The analyses for the presence of parathion were made by Professor W. M. Hoskins and the Insect Toxicology Laboratory, University of California, Berkeley.

CUTTINGS

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alcohol can be used satisfactorily. This solution will keep indefinitely without losing its effectiveness, but should be tightly sealed and stored in the dark.

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California Agriculture, *May 1956, page 7, published a description of mist equipment.*

STRAWBERRY

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rooting habit of the strawberry, because most of its feeder roots are rather shallow. When the strawberry beds were formed the top soil—which had a good potassium content—was piled together. Therefore, most of the strawberry roots were in soil with an adequate potassium supplying potential. This contrasts with the apricot trees, which had no roots in the cultivated surface and were unable to obtain adequate supplies from the deeper layers of soil. The fact that the apricot requires large amounts of potassium as shown by leaf analyses may also be pertinent.

The reason for the failure of the strawberry plants to absorb potassium from the added fertilizer is not so clear. The large amount applied to the beds should have encouraged luxury consumption.

This trial does not provide any basis for considering the use of a complete fertilizer for strawberries under similar conditions. Further trials are in progress in other districts to determine what may be expected on other soil types and under different climatic conditions.

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WALNUT

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maturity. Thorough application is most essential, and special care must be exercised when trees are in full leaf.

Although OMPA is the most effective aphicide for the control of the walnut aphid, it can not be used commercially because it has not been nationally registered by the United States Department of Agriculture for use on walnuts, nor has a tolerance been established by the Food and Drug Administration as authorized by the Miller Amendment.

However, satisfactory control can be expected where Systox is applied twice at a dosage of 0.25–0.37 pound—1–1½ pints of two pounds per gallon emulsion—per acre for each treatment if applications are made with an air carrier sprayer. The first application should be made in the spring and the second in July or August, when the aphid population begins to increase. To avoid injury from Systox it should not be applied until after the leaves are fully expanded. Further, applications should not exceed a total of 0.75 pound—three pints—in a single treatment or during a season, and no treatment should be made closer than three weeks before harvest.

An effective treatment is to use BHC or nicotine in the first treatment, followed by a 0.25–0.37 pound application of Systox when needed in June or July.

Walnut Aphid Control Treatments

Where air carrier sprayers are used, the aphicides listed below have given adequate aphid control when incorporated with the codling moth spray. If used alone, the aphicide should be applied in from 50–150 gallons of water per acre, depending on the air capacity of the sprayer.

Aphicide	Amount per acre
Parathion, 25% wettable powder	1.0–1.5 lbs.
or	
Malathion, 25% wettable powder	3–4 lbs.
or	
TEPP, 40%	¾–1 pt.
or	
Nicotine, 25% dry concentrate	5–6 lbs.
or	
BHC—12% gamma isomer	3.75–4.00 lbs.
or	
Systox	0.25–0.37 lb.

Where conventional sprayers were used, the aphicides gave good control when applied as full coverage sprays. The amounts used per 100 gallons of spray were:

Aphicide	Amounts per 100 gallons
Parathion, 25% wettable powder	3 oz.
or	
Malathion, 25% wettable powder	8 oz.
or	
Nicotine, 25% dry concentrate	10 oz.
or	
BHC—12% gamma isomer	8 oz.
or	
Systox—two pounds per gallon concentrate	¼ pt.

Because of the danger of BHC imparting an off-flavor to the harvested nuts, it should not be used more than once in a season, or later than May, and never at a concentration greater than that recommended by the manufacturer.

In areas where the walnut aphid is resistant to phosphate aphicides, other treatments than parathion, malathion or TEPP should be utilized.

Control of the walnut aphid can be obtained with dusts, where they are thoroughly applied. A 4% malathion dust or a 1% TEPP dust or a 2% nicotine dust applied at the rate of 40–60 pounds per acre have resulted in satisfactory control.

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