

Sodium Leaf Scorch of Apricot

condition causing damage to orchards in Hemet area improved by heavy irrigation treatments with contour basin checks

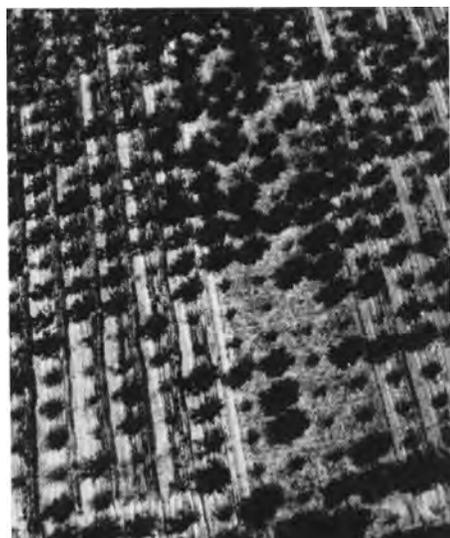
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Salting out, or dieback—sodium scorch—of apricot was improved substantially—in an experimental plot near Hemet—by the heavy application of irrigation water as a corrective treatment.

Symptoms defining the sodium scorch condition in the Hemet apricots—in addition to the general decline in vigor of growth and finally death of the tree—include the curling and burning of the margins of leaves, especially on the spring growth flush. Leaf analyses of burned leaves show abnormally high concentration of sodium and chloride. A heavy set of fruit remains small and matures into a poor quality product. There is a wilting of the trees—especially when holding heavy crops—even though soil moisture to 8' seems adequate and cover crops and replants show no moisture stress. Decline in tree condition—in the beginning—corresponds to that portion of the irrigation run receiving the least water. The trees show little or no response to heavy pruning and replants grow well with none of the symptoms appearing in older trees. A slight salt accumulation in soil is found to a depth of 8'. Below that there is an increase in conductivity and in soluble sodium percentage.

It was evident irrigation was involved

Air view of the plot area, September 1957 looking east. Irrigation flows from east to west. Denser, healthier trees are in area receiving most water at the beginning and end of the irrigation run.



somehow in the problem because Hemet growers reported that sodium scorch was usually worse after a series of dry years, and orchards heavily irrigated seemed less troubled. The location of the poor trees in the orchard seemed related to the area normally receiving the least irrigation water.

Test Orchard

An orchard near Hemet—planted to about 50-year-old Royal apricot trees on apricot root—was selected for experimental irrigation treatment. The planting distance is 22' x 22' with the rows running east to west on an 0.8% grade. Irrigation is by furrows from a flume on the east end of the orchard with irrigation runs of 660'. The soil is a fertile, sandy loam with an infiltration rate of about 12 acre inches per acre per day. It is relatively uniform in depth with few impeding layers and the water table is

well below the root zone. The saturation percentage of the soil down to 12'-15' is around 30%-40%. Below that depth is coarse sand which contains few, if any, roots.

The orchard has a record of good production. It has been irrigated alternately with Lake Hemet water, with less than 200 ppm—parts per million—total salts, and well water, similar to Colorado River water, containing about 800 ppm total salts. Lake Hemet water is classified as a low salinity, low sodium water. The well water is a high salinity, low sodium water. Irrigation practice by the owner includes about 12 or 13 irrigations, amounting to a total application of 3-4 acre feet per year. Rainfall normally contributes about 12" per year.

Trees Graded

A portion of the orchard was selected as the plot area, and each tree was graded for vigor in November of 1955, 1956, and 1957. A normal tree was graded as

Sample depth	Soil Samples					
	Electrical conductivity Millimhos		Sodium adsorption ratio		Soluble sodium percentage	
	Fur-row	Basin	Fur-row	Basin	Fur-row	Basin
0'-2'	1.7	1.4	2.0	3.5	29.0	43.0
2'-4'	2.7	1.5	2.8	2.8	31.5	37.0
4'-6'	3.0	2.1	3.9	3.3	37.7	38.8
6'-8'	3.2	3.0	4.1	4.5	38.9	42.8
8'-10'	3.4	3.3	5.4	4.0	44.9	34.0
10'-12'	3.9	3.8	11.1	7.3	64.8	51.5
12'-15'	3.8	5.5	14.0	13.5	76.1	65.8

Each figure represents an average of 16 samples from four tree locations, taken subsequent to one season's heavy irrigation in the basin area. Trees in the basin area made normal growth the following season, trees in furrow area continued to decline.

Pruning Weights in January, 1958
Following season in which basin irrigated trees made normal growth, furrow irrigated trees continued to decline. Trees were all graded as in Class 2 and paired in November of 1956.

Tree number	Pruning weight in pounds	
	Furrow	Basin
4-11	17.0	
7-14		55.0
13-9	28.0	
9-9		60.5
12-4	11.0	
10-4		70.0
6-17*	44.7*	
7-11		49.0
Average	25.2	58.6

* 6-17 bordered on the basin irrigated trees and was benefited by the additional water.

Record of Analyses of Apricot Leaves Collected by H. D. Chapman* and B. M. Laurance**
(In each instance burned and healthy leaves taken from different trees)

Orchard	Leaf condition	% of dry weight					
		Chloride	Sodium	Potassium	Calcium	Magnesium	Sulfur
1	Burned	0.11	0.56	1.96	2.33	0.509	0.240
	Normal	0.04	0.017	2.60	2.49	0.647	0.187
2	Injury just beginning	0.10	0.12	2.32	2.32	0.617	0.222
	Normal	0.07	0.03	1.84	2.86	0.693	0.166
3	Some injury	0.10	0.304	3.30	2.38	0.437	0.225
	Healthy	0.06	0.02	4.32	2.88	0.632	0.169
4	Injury	0.17	0.52	2.44	2.68	0.500	0.229
	Healthy	0.06	0.02	3.56	2.28	0.520	0.181

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Tree grade according to vigor. Class 1 is normal, Class 2 shows loss in vigor and probably some leaf scorch; Class 3 shows very little shoot growth, some leaf burn, and dieback of twigs and branches.

Class 1. Class 2 trees showed some loss in vigor and generally some leaf scorch. Class 3 included trees showing very little shoot growth, some leaf burn and dieback of twigs and branches.

Four tree rows adjacent to each other in a severely damaged portion of the orchard were selected for heavy irrigation by flooding. On both sides of the test plot rows of similar trees were used as controls and irrigated as usual by the owner. Contour border checks were built around the four test rows and they were flood irrigated in 1956 and 1957 from April through October. Irrigation was heavy in 1956, amounting to 122 acre inches per acre. Only 48" were applied in 1957 by the same method, because the trees were making satisfactory growth.

Four pairs of trees were selected for detailed comparison in November of 1956. Each pair was considered to be in Class 2 at that time. One tree of each pair was in the basin check area and one in the grower irrigated area along-

side. In November of 1956 and again in November of 1957 soil samples were taken by 2' increments to 15', using four holes for each tree and compositing the four samples from each depth. Saturation pastes were prepared and extracted. The extract was analyzed for conductivity, calcium plus magnesium, and sodium and the sodium adsorption ratio was calculated.

Pruning weights were taken from each of the eight trees in January of 1958.

Trees Improved

The condition of the trees suffering from sodium scorch was substantially improved by heavy irrigation, which thoroughly wet the soil to a depth of 20'. Improvement did not occur concurrent with the heavy irrigation but was observed as soon as the shoot growth began the following spring.

Application of 122" of water per acre in one season did not materially alter

the salinity and soluble sodium status of the soil as compared with the area irrigated as usual by the owner.

Timing of irrigation by means of examining the soil with an auger, observation of weeds, and so forth was not satisfactory. Affected trees apparently begin to suffer long before the wilting percentage for normal trees is reached.

The remedy for sodium scorch seems to be heavy irrigation in winter or spring to thoroughly wet the soil to the extreme depth of the roots before shoot growth begins. Complete leaching of the soil—where a large quantity of water is available at reasonable cost and infiltration rate and drainage are satisfactory—would probably be even more successful as a corrective treatment.

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Tree recovery as a result of heavy irrigation. Tree 4-11 received normal irrigation by furrows, Tree 7-14 was heavily irrigated by flooding in contour border checks. Recovery occurred the growing season after the heavy water application.

