California Avocado Society 1958 Yearbook 42: 111-113

A PROGRESS REPORT ON COOPERATIVE AVOCADO NITROGEN FERTILIZER EXPERIMENTS

T. W. Embleton, W. W. Jones, J. A. Beutel, S. B. Boswell, C. C. Delphey, C. D. Gustafson, B. W. Lee, and R. G. Platt
T. W. Embleton, Assoc. Horticulturist and W. W. Jones, Horticulturist, both Citrus Experiment Station, University of California, Riverside; S. B. Boswell, Assistant Specialist, Horticulture, at Santa Paula, representing the University of California; and J. A. Beutel, Farm Advisor in Los Angeles County, C. C. Delphey, Farm Advisor in Ventura County, C. D. Gustafson, Farm Advisor in San Diego County, B. W. Lee, Farm Advisor in Ventura County, all Farm Advisors representing the University of California; and R. G. Platt, Extension Subtropical Horticulturist, University of California at Riverside.

Talk given at the annual meeting of the California Avocado Society at Fallbrook, June 7, 1958.

In 1955 a report on avocado fertilizer experiments in two locations indicated that too much nitrogen applied to avocado trees resulted in excessive vegetative growth and less fruit production. Withholding nitrogen for several years resulted in a deficiency of nitrogen and a reduction in yield. Highest yields were obtained with a medium level of nitrogen in the leaves (1). In 1956 additional experiments were established in the avocado growing districts of California to determine if the above nitrogen-yield relationships existed in other locations and with other varieties. This is a progress report on six experiments established in 1956.

In each experiment there were four rates of nitrogen applications, each rate being replicated at least four times with four-tree plots.

A summary of the locations, varieties, and amounts of actual nitrogen applied in the various treatments appears in Table 1. The first applications of nitrogen were the same rates for all experiments. Thereafter, the rates were determined from results of leaf analysis and tree condition.

The summary of the nitrogen percentages found in the leaves appears in Table 2. In February and March, 1956, leaf samples were taken from all plots just prior to the first application of differential rates of nitrogen.

Table 1—Summary of location, variety, and pounds of actual nitrogen applied per tree annually in the form of ammonium nitrate.

Orchard	Location	Variety	Date of Application	Rate Nitrogen Application Low	Medium	High	Extra High
				Lbs. N Per Tree			
Red Mountain	Fallbrook	Fuerte	2/56	0	0.5	1	2
			2/57	0	0.5	1	2
			2/58	0	0.5	1	2
Yarnell	Fallbrook	Fuerte	2/56	0	0.5	1	2
			2/57	0.5	1	2	4
			2/58	0.5	1	2	4
Walker	Ventura	MacArthur	2/56	0	0.5	1	2
			3/57	0	0.75	1.5	3
			3/58	0	0.75	1.5	3
Sudden	Ventura	MacArthur	2/56	0	0.5	1	2
			3/57	0	0.5	1	2
			3/58	0	0.5	1	2
Beck	Fallbrook	Hass	3/56	0	0.5	1	2
			2/57	0	0.75	1.5	3
			3/58	0	0.75	1.5	3
Montgomery	San Dimas	Zutano	2/56	0	0.5	1	2
			2/57	0	0.5	1	2
			2/58	0	0.5	1	2

Table 2—Summary of the percentage of nitrogen in the leaves.

Orchard	Date of Sample	Rate Nitrogen Application Low	Medium	High	Extra High
		Per Cent N in Leaves			
Red Mountain	2/56*	1.82	1.96	1.95	1.79
	8/56	1.88	1.76	2.19	2.16
	1/57	1.85	1.66	1.96	1.85
	9/57	1.78	1.86	1.86	1.92
Yarnell	2/56*	1.99	2.01	2.08	2.18
	8/56	1.55	1.63	1.73	1.98
	1/57	1.40	1.63	1.62	1.73
	9/57	1.42	1.64	1.77	1.94
Walker	2/56*	1.76	1.83	1.77	1.83
	8/56	1.75	1.75	1.82	1.81
	1/57	1.51	1.48	1.49	1.60
	9/57	1.54	1.58	1.67	1.75
Sudden	2/56*	1.86	1.88	1.83	1.79
	8/56	1.61	1.68	1.90	1.94
	1/57	1.27	1.33	1.52	1.63
	9/57	1.46	1.56	1.71	1.76
Beck	3/56*	2.50	2.44	2.25	2.42
	8/56	2.25	2.46	2.43	2.48
	1/57	2.10	2.14	2.28	2.35
	9/57	1.76	1.79	1.91	2.18
Montgomery	2/56*	2.10	2.20	2.14	2.13
	8/56	2.07	2.20	2.20	2.20
	1/57	2.00	2.06	2.20	2.12
	10/57	1.79	1.90	2.02	1.97

**At start of experiment.*

In the Yarnell Fuerte orchard which is non-tilled and has a heavy grass sod, withholding nitrogen in February, 1956, resulted in a drastic reduction in the nitrogen in the leaves by August, 1956. This reduction in nitrogen in the leaves was accompanied by the

visual appearance of nitrogen deficiency in the trees—pale leaves and a reduction in the amount of vegetative growth. Therefore, nitrogen was applied to the low rate of nitrogen plots in the Yarnell orchard in 1957 and 1958 (Table 1). This points out that a heavy sod competes very effectively with the trees for the applied nitrogen.

By September, 1957, the differential rates of nitrogen had resulted in levels of nitrogen in the trees that were distinctly different and correlated with the differential rates of application in all but the Montgomery experiment.

The effects of the differential rates of nitrogen applications upon production are summarized in Table 3. In four cases the highest yields were associated with the medium rate of nitrogen. In the Sudden orchard the greater the amount of nitrogen that was applied, the lower was the yield. In the Walker experiment the yield in all treatments was extremely low due to some factor other than nutritional. Thus far, differential rates of nitrogen have not resulted in distinct yield differences nor distinct nitrogen levels in the leaves in the Montgomery experiment on the Zutano variety.

In Figure 1 the yields are arranged on a relative basis with the yields from the low rate of nitrogen in each experiment taken as 100. The curve for the Yarnell experiment represents two years' data. Because of the extremely low yield the Walker data was not used.

Results thus far support the previous findings that too little or too much nitrogen results in a reduction in yield, and highest production is obtained with a moderate level of nitrogen in the trees.

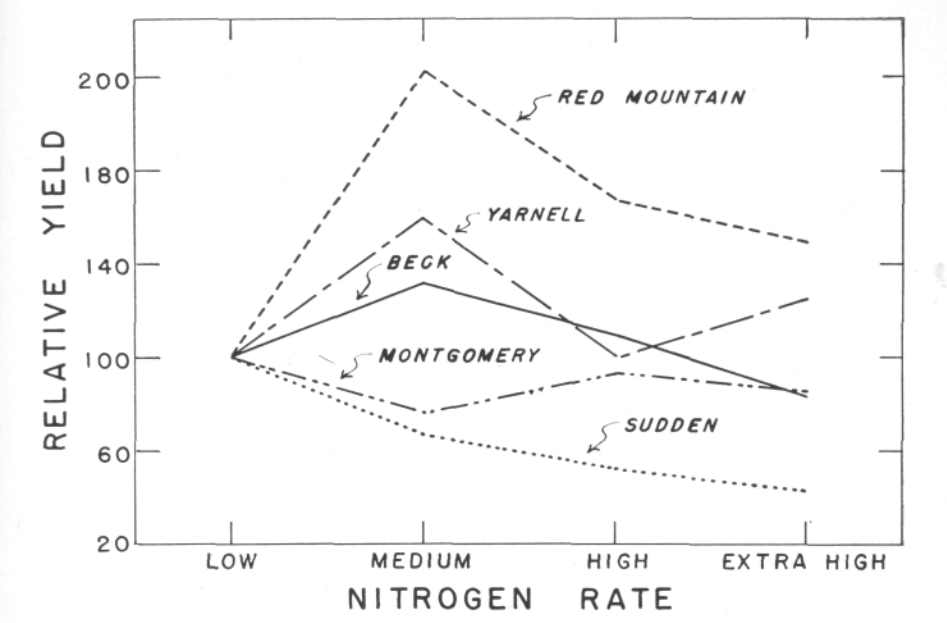

Figure 1. Relative avocado yields as influenced by rate of nitrogen application. From each orchard the average yield for the low nitrogen rate was taken as 100.

TABLE 3—Summary of yields in pounds of fruit per tree.

Orchard	Date of Harvest	Rate Nitrogen Application			
		Low	Medium	High	Extra High
		Pounds of Fruit Per Tree			
Red Mountain	1958	124	274	207	186
Yarnell	1957	14	22	13	10
	1958	37	60	39	54
Walker	1957	4	3	4	4
Sudden	1957	30	20	16	13
Beck	1957	62	82	68	52
Montgomery	1957	35	27	33	30

LITERATURE CITED

1. Embleton, T. W., W. W. Jones, and J. D. Kirkpatrick. 1955. Avocado fertilizer experiments. Calif. Avocado Soc. Yearbook 39:62-66.

The authors wish to express their appreciation to Walter Beck, Harold Burchett, Frank Capra, H. W. Montgomery, C. E. Sudden, Percy Vaughn, M. R. Walter, James Warner, and Richard Yarnell for their continuing cooperation in this study.