ACALA 4-42

Seed Multiplication

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California's one-variety cotton seed production program begins in the Acala 4-42 breeding blocks at the U. S. Cotton Field Station, Shafter. Many seed stock sources and growing locations are involved during the four years of seed multiplication before the variety is grown commercially. Whether any changes occur in the variety during this period has been a question in the minds of researchers, growers, industry leaders and members of the California Planting Seed Distributors Association. Seed from various steps and locations of multiplication of the 1960 Model of Acala 4-42 were used in this study.

The first (Progeny Increase) and second (Foundation) steps of seed multiplication are small and are grown near the U. S. Cotton Field Station. The seed produced in the Foundation step of multiplication is labeled with a White Tag (W. T.) and the year the seed was produced. This seed is planted in the third White Tag step of seed multiplication on several farms in the San Joaquin Valley south of Shafter. The seed produced in this step of multiplication is labeled with a Purple Tag (P.T.) and the year the seed was produced. It is used to plant the final step of multiplication which is known as the Purple Tag step. The Purple Tag step of seed multiplication takes place on farms scattered throughout the San Joaquin Valley. The seed produced in the Purple Tag step of multiplication is labeled with a Green Tag (G.T.) and the year the seed was produced. This Green Tag seed is used in commercial plantings.

Seed from the second and third steps of seed multiplication together with seed from the last step of multiplication produced on farms located in the northern, southern, eastern, and western parts of the San Joaquin Valley were chosen for use in this study. These six seed stocks and the source of each are:

SEED STOCK	SEED SOURCE
1957 W.T.	Seed from 1957 Foundation fields (2nd step of seed multiplication).
1958 P.T.	Seed from 1958 White Tag fields (3rd step of seed multiplication).
N. 1959 G.T.	Seed from 1959 Purple Tag fields, northern San Joaquin Valley location—4th and final step of seed multiplication.
S. 1959 G.T.	Seed from 1959 Purple Tag fields, southern San Joaquin Valley location—4th and final step of seed multiplication.
E. 1959 G.T.	Seed from 1959 Purple Tag fields, eastern San Joaquin Valley location—4th and final step of seed multiplication.
W. 1959 G.T.	Seed from 1959 Purple Tag fields, western San Joaquin Valley location—4th and final step of seed multiplication.

San Joaquin Valley cotton growers can expect reliable performance with high levels of yield and quality from Acala 4-42 cotton planting seed, regardless of seed stock source and location during the four years of seed multiplication—or the valley location from which the final planting seed comes. These studies involved seed stock from six sources and locations as well as four different test site locations for the final steps of seed multiplication.

Four test sites were used, one in the vicinity of each of the final steps of seed multiplication chosen. The location of the final steps of seed multiplication and the corresponding test sites are: North, Chowchilla; South, Shafter; East, Farmersville; and West, U. C. West Side Field Station, Five Points.

Averages for all measures of performance are listed in the table for each seed stock at each test site, for each seed stock averaged over all test sites and for each test site averaged over all seed stocks. The statistical measure of reliability of an experiment, the coefficient of variation (C. V.), is listed below the site average and grand average over sites for each character.

No differences of consequence were found between the seed stocks for any of the characters measured at the several test sites or when the test sites were analyzed collectively. The test sites differed

MEASURES OF PERFORMANCE FOR DIFFERENT SEED STOCKS OF ACALA 4-42 COTTON AT FOUR TEST SITES

Seed stock	Lint/ acre (lb)	Lint (%)	U.H.M. (inch)	U.R. (%)	T_1 (g./grex)
CHOWCHILLA (Northern Test Site)					
1957 W.T.	967.2	38.1	1.16	88	2.36
1958 P.T.	934.3	37.9	1.15	88	2.28
N. 1959 G.T.	1005.6	38.0	1.16	89	2.36
S. 1959 G.T.	939.8	38.4	1.16	89	2.30
E. 1959 G.T.	1011.1	38.6	1.16	86	2.28
W. 1959 G.T.	997.4	38.0	1.19	89	2.28
Average	979.3	38.2	1.16	89	2.31
C. V. %	5.8	1.9	2.4	1.4	1.9
SHAFTER (Southern Test Site)					
1957 W.T.	1295.5	37.3	1.17	88	2.21
1958 P.T.	1288.7	36.8	1.18	87	2.25
N. 1959 G.T.	1320.8	37.7	1.19	88	2.21
S. 1959 G.T.	1284.1	38.2	1.17	88	2.26
E. 1959 G.T.	1380.4	38.2	1.17	88	2.28
W. 1959 G.T.	1295.5	37.1	1.18	87	2.20
Average	1311.6	37.5	1.18	88	2.23
C. V. %	5.2	1.9	2.2	1.3	3.0
FARMERSVILLE (Eastern Test Site)					
1957 W.T.	1131.6	38.3	1.14	89	2.29
1958 P.T.	1153.9	38.8	1.12	89	2.25
N. 1959 G.T.	1149.0	38.5	1.14	88	2.33
S. 1959 G.T.	1100.6	38.6	1.11	88	2.23
E. 1959 G.T.	1154.8	38.2	1.13	88	2.26
W. 1959 G.T.	1120.0	38.9	1.14	88	2.29
Average	1134.5	38.5	1.13	88	2.28
C. V. %	4.9	0.5	2.0	1.5	2.6
U. C. WEST SIDE FIELD STATION (Western Test Site)					
1957 W.T.	1228.4	37.1	1.17	88	2.32
1958 P.T.	1213.1	37.5	1.16	88	2.41
N. 1959 G.T.	1191.4	36.7	1.18	90	2.30
S. 1959 G.T.	1224.0	37.0	1.20	89	2.32
E. 1959 G.T.	1194.7	36.9	1.18	90	2.32
W. 1959 G.T.	1193.5	36.6	1.15	87	2.32
Average	1207.5	37.0	1.17	89	2.33
C. V. %	4.0	1.1	2.1	0.3	2.3
FOUR TEST SITE AVERAGES					
1957 W.T.	1155.7	37.7	1.16	88	2.30
1958 P.T.	1147.5	37.8	1.15	88	2.30
N. 1959 G.T.	1166.7	37.7	1.17	89	2.30
S. 1959 G.T.	1137.1	38.0	1.16	88	2.28
E. 1959 G.T.	1185.5	38.0	1.16	88	2.28
W. 1959 G.T.	1151.6	37.6	1.16	88	2.27
Average	1157.4	37.8	1.16	88	2.29
C. V. %	2.3	0.9	1.7	0.8	1.6

significantly, however, for all production measurements except fiber length, U. R. (uniformity ratio).

Lint yield per acre at the test sites varied significantly with production at Chowchilla, 979.3 lb; Shafter 1311.6 lb; Farmersville, 1134.5 lb; and U. C. West Side Field Station, 1207.5 pounds per acre. These yields follow the established trend, namely, that the southern and western parts of the San Joaquin Valley generally yield more than the northern or eastern sections. Lint percentages at Chowchilla (38.2) and Farmersville (38.5) were not significantly different, but they were both significantly higher than either Shafter (37.5) or U. C. West Side Field Station (37.0). The fact that these data show highest lint yield is not associated with highest lint per cent is a relationship that has frequently been noted by breeders in attempting to improve cotton yields.

For fiber length, upper half mean (U.H.M.), Chowchilla at 1.16 inches; Shafter, 1.18; and U. C. West Side Field Station, 1.17 were not significantly different, but all three differed significantly from Farmersville, 1.13 inches. For fiber strength index (T_1) Chowchilla at 2.31, U. C. West Side Field Station (2.33), and Farmersville (2.28) were not significantly different and Farmersville and Shafter (2.23) were not significantly different, but Chowchilla and U. C. West Side Field Station were significantly different from Shafter.

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ORANGE LEAF ANALYSIS

LEAF ANALYSIS STANDARDS for macroelements of orange trees in California can be expected to differ when 4- to 6-month-old leaves are taken from nonfruiting or fruiting terminals. These conclusions are based on a recent study of 22 representative orange orchards extending from the Mexican border to Ivanhoe, California.

In 16 orchards there was a difference of 0.2 per cent or more K, and in 10 orchards, a difference of 0.3 per cent or more K in dry matter of leaves from nonfruiting than from fruiting terminals, while in 15 of the 22 orchards there was a difference of 0.02 per cent or more P in dry matter of leaves from nonfruiting than from fruiting terminals. In 17 orchards there was a difference of 0.3 per cent or more N, and in 11 orchards, a difference of 0.4 per cent or more N in dry matter of leaves from nonfruiting than from fruiting terminals. Without exception, higher amounts of the three elements noted above were found in leaves of nonfruiting terminals.

Highly significant differences were obtained for all the macroelements except Na. Significantly higher amounts of N, K, P, and S were found in leaves from nonfruiting terminals, while significantly higher amounts of Ca, Mg, and Cl were found in leaves from fruiting terminals.

The results of this study indicate that selection of leaves from nonfruiting or fruiting terminals is an important factor to consider when using leaf analysis as a diagnostic guide for the nutrient status of orange trees.—*R. B. Harding, Associate Chemist; T. M. Ryan, Laboratory Technician II; and G. R. Bradford, Associate Specialist, Department of Soils and Plant Nutrition, University of California Citrus Research Center and Agricultural Experiment Station, Riverside.*

FRESH-SEED DORMANCY IN ANNUAL GRASSES

MANY ANNUAL GRASSES of the California range produce seed, which upon maturity, exhibits pronounced dormancy resulting in delayed germination. If the seed is stored from three to six months, this dormancy gradually disappears. The intensity of the seed dormancy in a given species has been observed to vary considerably from year to year and among locations of seed production. Investigators have considered that some environmental condition is related to this behavior.

Recent studies on the effect of high temperature stress at critical stages of development have provided some promising leads. When red brome is subjected, at the 2-leaf stage, to a heat stress at 130°F air temperature for 3 to 5 hours, increased dormancy is obtained in the seed later matured on these plants. Increased duration of stress increases the magnitude of this dormancy. Likewise, red brome seedlings subjected to periods of 1 to 3 weeks at 90°F in a growth chamber yield dormant seed upon maturity. This dormancy subsides during seed storage at about the same rate as that dormancy found in seed lots collected from native stands.

These findings suggest that temperature conditions prevailing during early seedling growth may influence the degree of dormancy obtained in the seed later matured on the plant.—*Horton M. Laude, Department of Agronomy, University of California, Davis.*