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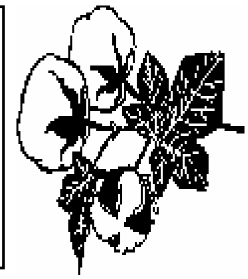

FARM ADVISOR AND SPECIALIST VARIETY TRIALS: APPROVED PIMA TRIALS—2002

Bob Hutmacher, Bruce Roberts, Brian Marsh, Dan Munk, Ron Vargas, Steve Wright, Bill Weir, Mark Keeley, Raul Delgado

In the San Joaquin Valley production area, variety choices continue to represent a broad range of options for growers, including Approved Acalas and Pimas plus a wide range of CA Upland and even a few CA Pima varieties. This issue of the *CA Cotton Review* is the second part of a two-issue series that covers yield summaries for variety trials with University of CA involvement. The first issue (December, 2002) covered "Approved Acala" and "CA Uplands Advanced Strains" trials run by UCCE Farm Advisors, Specialist and staff. This issue includes summaries from the "Approved Pima" and "SJV Cotton Board / University of CA On-Farm Acala and Pima" variety trials.

The information that follows is by no means a comprehensive presentation of available data from these variety trials. Information on HVI lint quality in Farm Advisor/ Specialist trials will be available mid-February on the UCCE cotton web site: (http://cottoninfo.ucdavis.edu), and more detailed information can be obtained on county test sites by contacting your county UCCE Farm Advisor.

The methods used to determine entries in the Approved Pima trials were reviewed in the Jan. 2002 issue of the *CA Cotton Revi*ew (available on the web site), so will not be reviewed here. Six Approved Pima varieties were planted in UCCE variety trials at 6 locations in 2002, 4 of them in large grower fields in Kern, Kings, Fresno, and Merced Counties. At 2 locations at West Side and Shafter Research and Extension Centers, these same six varieties were planted. Planting date, soil type and management practices varied across locations and with grower preferences for specific management practices.

Approved Pima variety trial 2002 yield and gin turnout summaries are shown in Table 1, plus a summary of Pima variety yield averages during the period of 1998 through 2002, using data from both Farm Advisor and SJV Cotton Board trials. This information can be compared with prior year variety trial information by viewing January or February *CA Cotton Review* issues from earlier years on the website. Our recommendation remains that you should consider variety trial results only as a relative indicator of yield performance. Consider planting several varieties to get a better handle on performance and potential problems in your own fields under your management practices.

Note in Table 1 that: (1) yield and gin turnout data for the Merced and Fresno County 2002 trial sites are presented separately; and (2) data from these sites were not used in determining over-location averages for 2002. Although it was deemed worthwhile to present data from Merced and Fresno County trial sites as a relative indicator of varietal performance under difficult conditions, they were not included in the overall average because: (a) plant populations were highly variable at the Merced County site; and (b) soil salinity levels were variable and quite saline for cotton production at the Fresno County site in 2002.

Pima variety trial 2002 data shown in Table 1 indicates that four varieties had 4-location yield averages that were significantly higher than the Approved Pima standard "S-7". Average yields of all six varieties during the years 1998-2002 are also shown in Table 1, and indicate some year-to-year differences in yield performance worth noting in making variety choices for your farm.

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Table 1. APPROVED PIMA VARIETY TRIALS (Farm Advisor/Specialist Trials) - 2002. Lint yields (in lbs/acre) by test location and average gin turnout. Average lint yields across sites are expressed as pounds of lint per acre and as percent of yield average for variety “S-7” (the SJV Cotton Board Approved Pima “standard”). Data from Fresno Co. and Merced Co. sites are not included in 2002 averages for yield or gin turnouts due to plant population (Merced Co.) and soil salinity issues (Fresno Co.). Average yields across locations shown in bold italics and underlined are from SJV Cotton Board tests (Shane Ball, coordinator). *Cooperators: Roberts, Wright, Munk, Marsh,, Vargas, Weir, Keeley, Delgado in grower/cooperator fields; Shane Ball and staff in SJVCB tests; staff at the West Side and Shafter Res. & Ext. Centers).*

Seed Company	**Variety**	**Location of Trial—2002 Lint Yield (lbs lint per acre)**				**Average Across 4 Sites**		**Average Yield by Year of Trial (as a % of S-7 variety yields) - all locations**					Fresno Co. site—2002 30” rows		Merced Co. Site—2002 30” rows	
		Shafter REC 40” rows	West Side REC 40” rows	Kern Co. 38” rows	Kings Co. 30” rows	**Lint Yield (lbs / acre)**	**Gin Turn out (%)**	2002	2001	2000	1999	1998	Lint Yield (lbs/ Acre)	Gin Turn -Out (%)	Lint Yield (lbs/ Acre)	Gin Turn -Out (%)
Public variety	**S-7**	1226	1868	882	1882	**1465**	**32.2**	100	100	100	100	100	340	30.1	1093	31.6
Phytogen	**PSC-57**	1248	2043	1296	1963	**1638**	**31.6**	112	91	100	97	96	620	30.9	645	30.0
Phytogen	**Phy-76**	1451	2104	1425	2080	**1765**	**31.8**	121	102	***98***	***99***	***97***	773	31.7	623	29.3
Delta & Pine	**DP-HTO**	1144	1872	963	1873	**1463**	**35.3**	100	96	104	95	102	577	33.5	960	32.6
Delta & Pine	**DP-340**	1289	2069	1317	2032	**1677**	**33.2**	114	106	***104***	***111***	***107***	706	32.1	925	29.8
Delta & Pine	**DP-744**	1370	2115	1188	2098	**1693**	**33.6**	116	104	110	92	***110***	629	31.8	859	30.6
Mean		1288	2012	1179	1988	**1617**	**32.9**						608	31.7	851	30.7
LSD 0.05			81	117	168	64	0.5						130	1.7	271	1.5
LSD 0.10		169														
C.V.(%)		10.6	2.7	6.6	4.7	5.2	2.1						14.2	3.6	21.1	3.1
P		0.074	0.000	0.000	0.050	0.000	0.000						0.000	0.02	0.014	0.002

C.V. = coefficient of variation; P = probability at 5% level of significance; LSD = least significant difference (if means differ by this amount or more, they are significantly different. VARIETY BY LOCATION interaction (for yields): LSD0.05 = 133; C.V. = 5.8%; P = 0.006 VARIETY BY LOCATION interaction (for gin turnout): LSD 0.05 = NS; C.V. = 1.9%; P = 0.165

SPECIAL THANKS to the many growers, seed companies and their representatives, and others who helped with these variety trials and other field studies again in 2002, and to the Supima Association for partial support of the Pima variety trials. These trials take up considerable space and require cooperators to change field operations and provide equipment to accommodate these studies. Your help and patience assist in providing information to the CA cotton industry, and your extra efforts are very much appreciated !

SAN JOAQUIN VALLEY COTTON BOARD ON-FARM VARIETY TESTING PROGRAM

Shane T. Ball, Jim Bergman, Scott Perkins, and Debra Andreotti

On March 5, 2002, three Acala varieties were approved by the San Joaquin Valley Cotton Board (SJVCB) and released for commercial production in 2002:

- C-192 (marketed as "Acala Summit") from California Planting Cotton Seed Distributors
- DP-6100RR (marketed as "DP-6100RR") from Delta and Pine Land Company
- PHY-78 (marketed as "Phytogen-78") from Phytogen Seed Company

Phytogen-78 was the highest yielder in the Board's three-year testing program. It averaged 1,425 pounds of lint per acre, 110 pounds more than the standard, Maxxa. Acala Summit out-yielded Maxxa by more than 50 pounds lint per acre, and has improved quality characteristics. Although DP-6100RR® was lower in yields than Maxxa, its key beneficial trait is resistance to the herbicide glyphosate. These results show that advances in lint yields and quality traits continue in our Acala cottons.

In 2002, 14 on-farm variety trials (seven Acala, four Pima, three screening) totaling about 551 acres were planted in the San Joaquin Valley. A total of 16 Acala and 16 Pima varieties, as well as 20 advanced-generation lines were planted on commercial fields in Randomized Complete Block (RCB) designs with four replicates.

Acala Tests - 2002 The Acala lint yields for the 2002 growing season were from 16 varieties grown at seven locations (Table 1). Generally, the yields ranged from

Table 1. Acala lint yields (lbs per acre) in the SJV Cotton Board (SJVCB) on-farm variety trials by location in 2002. Also shown are mean lint yield and gin turnout values calculated across all locations.

Entry #	Variety	Mean Lint Yield (lbs/ac)	Location of Trial—2002 Lint Yields (lbs per acre)							Mean Gin Turnout (%)
			Five Points	Lemoore	Los Banos	Madera	Mendota	Tipton	Waukena	
1	C-401	**1764**	1877	1679	2077	1432	1762	1225	2300	**.343**
2	C-201	**1723**	1686	1614	2078	1433	1753	1300	2196	**.348**
3	C-104	**1716**	1766	1647	2095	1429	1737	1247	2094	**.347**
4	OA-270	**1712**	1901	1610	1970	1388	1666	1201	2251	**.318**
5	C-105	**1710**	1767	1701	2079	1416	1634	1255	2119	**.339**
6	OA-265	**1710**	1831	1554	1942	1375	1670	1276	2318	**.319**
7	STX-9M002	**1698**	1772	1790	2119	1316	1540	1229	2122	**.340**
8	PHX-A102	**1698**	1811	1636	2041	1408	1668	1077	2248	**.372**
9	OA-263	**1666**	1765	1570	2044	1422	1578	1220	2064	**.334**
10	OA-261	**1654**	1788	1496	1992	1399	1603	1216	2081	**.337**
11	C-101	**1652**	1680	1517	1976	1308	1763	1184	2136	**.322**
12	Maxxa	**1635**	1692	1498	1981	1419	1640	1183	2030	**.341**
13	PHX-A101	**1629**	1726	1580	2000	1357	1589	1034	2115	**.362**
14	OA-271	**1616**	1847	1492	1785	1256	1671	1211	2053	**.315**
15	OA-262	**1582**	1766	1426	1756	1233	1617	1206	2069	**.314**
16	BRB-303	**1529**	1615	1738	1776	1123	1536	985	1930	**.301**
Mean		**1668**	**1768**	**1597**	**1982**	**1357**	**1652**	**1191**	**2133**	**.334**
Std. Deviation		341	99	157	123	185	102	206	152	0.021
Coefficient of Variation (C.V.) %		5	4	6	3	5	4	5	6	1.629

Table 2. Pima trial lint yields (lbs per acre) and gin turnout (%) in the SJV Cotton Board (SJVCB) on-farm variety trials by location in 2002. Also shown are mean lint yield and gin turnout values calculated across all locations.

Entry #	Variety	Mean Lint Yield (lbs/ac)	Location of Trial—2002 Lint Yields (lbs per acre)				Mean Gin Turnout (%)	Location of Trial—2002 Gin Turnout (%)			
			Buena Vista	Corcoran south	Cor-coran west	Huron		Buena Vista	Corcoran south	Corcoran west	Huron
1	HA-195	**2069**	1751	2158	1734	2631	**.317**	.315	.317	.333	.301
2	PH00P-601	**1536**	1622	1437	1200	1887	**.312**	.311	.318	.324	.296
3	PH00P-600	**1526**	1605	1431	1208	1859	**.308**	.312	.309	.323	.288
4	OA-353	**1450**	1352	1400	972	2076	**.321**	.317	.322	.338	.306
5	OA-345	**1433**	1398	1316	1095	1922	**.317**	.309	.324	.335	.299
6	PHX-P101	**1423**	1431	1420	1114	1725	**.302**	.301	.313	.323	.271
7	E-601	**1418**	1283	1316	1080	1995	**.307**	.303	.311	.317	.296
8	BR-007	**1405**	1465	1349	1028	1780	**.299**	.293	.305	.316	.283
9	OA-354	**1392**	1316	1419	965	1868	**.316**	.307	.323	.331	.301
10	OA-355	**1336**	1381	1275	791	1898	**.336**	.328	.342	.355	.318
11	E-104	**1333**	1270	1271	839	1951	**.322**	.319	.326	.341	.303
12	E-202	**1318**	1260	1237	945	1829	**.318**	.314	.324	.337	.300
13	OA-351	**1310**	1110	1413	929	1790	**.307**	.300	.327	.318	.284
14	S-7	**1300**	1093	1351	836	1920	**.315**	.314	.318	.334	.295
15	E-501	**1286**	1230	1241	886	1786	**.315**	.306	.323	.335	.297
16	E-101	**1166**	1091	1093	734	1747	**.301**	.288	.307	.320	.289
Mean		**1419**	**1354**	**1383**	**1022**	**1917**	**.313**	**.309**	**.319**	**.330**	**.295**
Std. Deviation		391	205	232	241	215	.017	.011	.011	.011	.012
Coefficient of Varia-tion (C.V.) %		5	4	6	8	3	1.904	1.843	1.939	1.662	2.183

very good to excellent, averaging 120 lbs lint per acre (1668 lbs/acre) higher than those obtained in the 2001 season. The highest yielding Acala variety was California Planting Cotton Seed Distributor's (CPCSD's) C-401 with 1764 lbs per acre. At the highest yielding location near Waukena in Fresno County, 15 varieties yielded more than 2000 lbs per acre, or more than four bales per acre. Seven of the varieties have completed the third year of testing (BRB-303, C-104, C-105, OA-261, OA-262, OA-263, OA-265) and will be eligible for approval by the SJVCB on March 5. Some top-yielding varieties include CPCSD's C-104 (81 lbs/acre > Maxxa) and C-105 (75 lbs/acre > Maxxa) and Olvey and Associates' OA-265 (75 lbs/acre > Maxxa). The Acala gin turnouts ranged from 0.301% (BRB-303) to 0.372% (PHX-A102) (Table 1). Of the seven varieties up for approval, only CPCSD's C-104 (0.347%) had a significantly higher gin turnout ($P \geq 0.05$) compared to the standard, Maxxa (0.341%).

Pima Tests - 2002 Pima lint yields for the 2002 growing season were from 16 varieties grown at four locations (Table 2). Generally, the yields were exceptional, averaging 291 lbs lint per acre (1419 lbs/acre) higher than those in the 2001 season. The highest yielding Pima (hybrid) variety was Hazera Quality Seed's HA-195 with 2,069 lbs per acre. At the highest yielding location near Huron in Kings County, six varieties yielded more than 1,900 lbs per acre, or almost four bales per acre. Five varieties have completed the third year of testing (BR-007, E-101, E-104, OA-345, OA-351) and will be eligible for approval by SJVCB on March 5. Some top-yielding varieties include Buttonwillow Research Co.'s BR-007 (105 lbs/ac > S-7) and Olvey and Associates'

Table 3. Screening trial lint yields (lbs per acre) and gin turnouts (%) in the SJVCB on-farm screening trials for Acala entries by location in 2002. Also shown are mean lint yield and gin turnout values calculated across all locations.

Entry #	Variety	Mean Lint Yield (lbs/ac)	Location of Trial—2002 Lint Yields (lbs per acre)			Mean Gin Turnout (percent)	Location of Trial—2002 Gin Turnout (%)		
			Button-willow	Chow-chilla	Five Points		Button-Willow	Chow-chilla	Five Points
1	C-402	**2119**	2150	1990	2218	**.395**	.394	.397	.394
2	C-702	**1992**	2060	1780	2137	**.375**	.379	.377	.369
3	PH00A-309	**1956**	2021	1809	2037	**.361**	.357	.369	.357
4	C-602	**1950**	2013	1852	1984	**.380**	.372	.386	.383
5	C-502	**1906**	1872	1843	2004	**.381**	.374	.389	.381
6	PH00A-946	**1904**	1877	1762	2072	**.378**	.370	.384	.382
7	Maxxa	**1899**	1827	1878	1991	**.359**	.348	.370	.359
8	C-302	**1889**	2012	1688	1967	**.369**	.364	.376	.368
9	PH00A-944	**1887**	1960	1697	2004	**.380**	.371	.387	.382
10	PH00A-928	**1829**	1824	1628	2035	**.370**	.353	.388	.370
11	C-202	**1820**	1861	1640	1958	**.334**	.319	.349	.333
12	PH00A-303	**1808**	1901	1522	2000	**.345**	.334	.357	.344
13	OA-279	**1807**	1807	1658	1955	**.346**	.343	.353	.343
14	STX-9M006	**1733**	1730	1543	1926	**.359**	.350	.369	.359
15	OA-278	**1732**	1769	1570	1856	**.340**	.331	.349	.342
16	OA-276	**1690**	1810	1598	1663	**.342**	.343	.344	.338
17	OA-274	**1664**	1721	1582	1690	**.341**	.329	.357	.335
18	OA-275	**1663**	1804	1387	1798	**.348**	.341	.357	.346
19	OA-277	**1651**	1754	1468	1730	**.333**	.333	.342	.324
20	OA-273	**1631**	1843	1436	1613	**.339**	.330	.350	.336
Mean		**1826**	**1881**	**1667**	**1932**	**.359**	**.352**	**.368**	**.357**
Std. Deviation		219	144	197	213	.021	.02	.018	.021
Coefficient of Variation (C.V.) %		7	5	8	8	1.563	1.171	1.926	1.461

OA-345 (133 lbs/acre > S-7). The Pima gin turnouts ranged from 0.299% (BRB-007) to 0.336% (OA-355) (Table 2). Of the five varieties up for approval, only CPCSD's E-104 had a significantly higher gin turnout ($P \geq 0.05$) compared to the standard, S-7 (0.315%).

Screening Tests - 2002 The screening lint yields for the 2002 growing season were from 20 varieties grown at three locations (Table 3). The lint yields were very good, generally, averaging 331 lbs lint per acre (1826 lbs/acre) more than those obtained in the 2001 season. At the Buttonwillow location, five varieties yields were estimated to be more than 2000 lbs per acre, or more than four bales per acre. The screening gin turnouts ranged from 0.333% (OA-277) to 0.395% (C-402) (Table 3). The top eight varieties were significantly ($P \leq 0.05$) higher for gin turnout values compared to Maxxa (standard). Based on the lint yield results, there is great potential for new varieties to out perform the current standard. The new varieties offer great promise for SJV cotton producers.

Special Thanks. We wish to express our gratitude to the San Joaquin Valley Cotton Board, cooperator ranchers and their staff, cotton seed companies and their plant breeders, and SJV cotton growers for support of this program. Particular thanks is also extended to UCCE Farm Advisors Bruce Roberts (Kings Co.) and Steve Wright (Tulare Co.) for generous use of harvest equipment , and to the Shafter Research and Extension Center and Gin Crew, and staff of the University of California, Davis.

** For more information on the testing program associated with the San Joaquin Valley Cotton Board, or with questions regarding the information on these pages, please contact Shane Ball at:*

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COMPARISON OF SACRAMENTO VALLEY & SAN JOAQUIN VALLEY COTTON PRODUCTION PRACTICES

Doug Munier and Bob Hutmacher

Sacramento Valley cotton production has evolved to be different in a number of ways from production in the San Joaquin Valley (SJV). Generally, many practices are similar, but observations and field experiments conducted over the past 7 years have identified differences worth noting. Following are some observations highlighting similarities and differences based on University of CA Cooperative Extension trials, plus grower and industry experiences in the Sacramento Valley.

Variety Selection: This is clearly the most important difference between San Joaquin Valley and Sacramento Valley cotton production. Half a dozen or more of the best-performing CA Upland varieties in Sacramento Valley UCCE tests routinely have yielded 25 to 35 percent more than the SJV Acala standard variety "Maxxa". In contrast, in the SJV, non-Acala CA Upland varieties have shown a wide range of yields, with the best-performing non-Acala CA Upland varieties out yielding the Acala "Maxxa" more in the range of 10 to 15 percent. In addition, in UCCE tests in the SJV, some of the best-performing of the recently-approved Acala varieties have yields similar to the best non-Acala Uplands. These test results over the past 7 or 8 years make a strong case for why separate cotton variety testing is needed in the Sacramento and San Joaquin valleys.

Yield and fiber quality data from Sacramento Valley variety trials over multiple sites and years has been summarized and is available from Doug Munier (Glenn County UCCE Farm Advisor) by calling (530) 865-1107. The same type of data for SJV tests is available from any UCCE Farm Advisor in the SJV, or can be accessed on the UC cotton web site: http://cottoninfo.ucdavis.edu

Cotton Planting Degree-Day Forecasts: Variable spring weather makes it necessary to plant as early as possible, but in a period of warm sunny weather with adequate soil temperatures. After six years of experience, the planting weather forecasts based on five day degree-day forecasts specific to the Sacramento Valley are as effective here as they are in the San Joaquin Valley. Getting a good uniform stand of cotton as early as possible, without replanting, is very important for low cost, but high yielding cotton production. The heat units for planting forecasts are provided on the University of CA IPM website each year from mid-March through early May at: http://www.ipm.ucdavis.edu

A healthy, uniform stand of cotton, able to establish effective leaf area in the early season, can be an important part of cost-effective weed control. Although cotton can compensate in part for non-uniform stands of plants, more uniform populations ranging from 25,000 to 60,000 plants per acre have produced maximum yields in most Sacramento and San Joaquin Valley tests. Populations much out of this range can be dealt with, but present their own management challenges.

Irrigating Cotton Up: In the San Joaquin Valley cotton is rarely irrigated up. In the Sacramento Valley over the past few years a number of cotton fields have been irrigated up, with few apparent problems noted prior to 2002. Last year, some relatively severe weed control problems were observed in fields that were irrigated up. Good economical weed control, except with Roundup-Ready cotton, typically requires the cotton to be taller than and in a position to out-compete the weeds. Planting to available soil moisture with some dry soil mulch over the seed row results in far fewer weeds and weeds that are behind the cotton in development. This situation becomes less likely when cotton is irrigated up.

In prior years in the Sacramento Valley, observations were that there were fewer difficult-to-control weeds than in SJV cotton. Now with a few years history of Sacramento Valley cotton production, particularly when rotated with tomatoes, more weed seeds of certain species are accumulating in the soil. Unless herbicide-resistant cotton is being planted and treated, these rotations have increased the chances of severe weed problems when cotton is irrigated up.

Proper timing of planting coupled with correct planting depth, good soil moisture and nutrient availability help ensure rapid, uniform seedling emergence and growth. Under good conditions, seedlings will typically compete more effectively with weeds than plants established under adverse conditions.

Various types of plant mapping (evaluations of growth stage, vigor, and fruit retention) can be used to make crop management decisions. Some of these were reviewed in a prior issue of the *CA Cotton Review* (Vol. 56, August 2000) available on the UC cotton web site.

Timing the Last Irrigation: To better schedule the final irrigation of the growing season, growers can collect data in each field to determine "vegetative cutout". Cutout in Upland cotton corresponds with the time during late boll development when the crop has about five main stem nodes above the first position, currently-blooming flower. This serves as a useful measure of crop maturity and signals a slowdown or stopping of additional vegetative nodes and most new fruit development. The last irrigation should be timed to provide enough water to fully develop most harvestable bolls, but still result in mild to moderate water stress at defoliation.

In addition to observing the date of cutout, the date of the last irrigation should be recorded along with the depth of irrigation water penetration, which can be determined by use of a hand soil probe as soon as possible after the last irrigation. The final observation is the degree of plant water stress occurring at first harvest aid application. Over a several year period, a little record keeping with these plant and soil observations can be a big help in learning how to fine tune last irrigation timing to avoid irrigation water waste and bring in the crop in a timely manner. Several years of these simple observations by each grower for his or her soil and growing conditions can yield some significant improvements in late-season crop management.

A higher probability of fall rains makes final irrigation decisions and timely preparation for harvest (moderate water stress, moderate to low crop nitrogen levels after cutout, timely harvest aid applications) even more important in the Sacramento Valley than in the San Joaquin Valley. Potential for more and earlier fall rain brings with it potential negative impacts on fiber quality and harvest delays. Earlier harvests that avoid high module moisture contents and fiber weathering generally have a positive impact on fiber quality and price. The ability to continue harvest through difficult weather conditions can also be improved through better irrigation management and harvest preparation. A healthy, deep root system can dry down the soil to a depth of several feet in the month before harvest. Dry soil will absorb more rain, allowing a quicker return to cotton harvesting after a rain than when wetter soil conditions exist.

Sticky Cotton: Sticky cotton lint can be caused by a number of factors, but in the SJV has usually been related to honeydew deposits on exposed lint from late-season aphids or silverleaf whiteflies. Some areas of the SJV had serious problems with sticky cotton in the 2001 crop, including areas where it was not a problem in the early and mid-1990's. It is important to be vigilant in recognizing any developing problems with sticky cotton, as any area's reputation and ability to command good prices can be hurt by occurrences of sticky cotton.

Most years the Sacramento Valley crop has had some mid- and late-season aphid problems which have been well controlled, avoiding sticky cotton. When it comes to whiteflies, being on the northern edge of CA cotton production, with fewer heat units, may be a distinct advantage. The type of whitefly associated with stickiness problems in the SJV and desert southwest is the Silverleaf whitefly. Potential for stickiness problems with other types of whiteflies are not as well understood, as research has been limited. Silverleaf whiteflies need many generations during the season to develop into problems, and speed in producing new generations is strongly influenced by available heat units, among other factors.

In recent years, however, Silverleaf whiteflies have become progressively worse even in the central San Joaquin Valley, so it has been a dynamic situation requiring attention from PCA's and growers. In the Sacramento Valley whiteflies haven't been significantly present until this year. In Colusa, Glenn and Butte Counties, the few fields with late season whiteflies this year didn't develop to high numbers, but it is an important late season pest to be monitoring in order to avoid any possibility of a sticky cotton reputation in the Sacramento Valley.

Crop Rotation: A good rotation, with cotton probably one or two years out of five, may retain one of the real advantages of Sacramento Valley cotton over SJV cotton. This advantage is more consistent, vigorous cotton growth, with good root system establishment in most locations tried so far and fewer soil-borne disease problems. Some diseases which can be reduced in incidence with good crop rotation practices, if not avoided, include many seedling diseases and Verticillium wilt.

Good crop rotation also helps with weed control. If difficult to control weeds in cotton like groundcherry, velvetleaf, nutsedge, nightshade, and cocklebur are present in a field, they will likely increase each year cotton is grown in that field. Rotating to other crops, like wheat and corn, allows for better control of these difficult weeds.

Summary: Identifying some potential differences between successful cotton production practices in Sacramento Valley in comparison with the San Joaquin Valley has been a challenge for area cotton growers, researchers and industry representatives. The growth in cotton acreage in recent years, and a good record in achieving good (and hopefully profitable) cotton yields in the Sacramento Valley are evidence of their success, in spite of some of the lowest cotton prices in many years.

SOIL AND PLANT SAMPLING: KEY TO POTASSIUM MANAGEMENT

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The following is a review of University of CA potassium fertility research and guidelines for cotton:

Basis for Plant Potassium Requirements. Soil and plant sampling is the key to long-term potassium (K) management and profitable cotton production. Potassium is an essential plant nutrient necessary for root, stem and leaf vegetative growth. It is taken up by the roots as a K+ ion and remains in that form in the plant. Root uptake of K is mostly from the soil solution through diffusion. Plants with a taproot, like cotton, are less efficient in K uptake than plants with fibrous roots. The rate of root growth, root radius and length effect K uptake.

Plant functions for which K is critical include enzyme activation, osmotic regulation, energy relations, sugar translocation, nitrogen uptake, and protein and starch synthesis. As the cotton plant moves into reproductive growth, there is an in increased demand for K as it is essential for optimum boll set. Mature boll walls contain the highest K concentration of any plant part. This requires daily plant uptake of as much as three pounds of K per acre. A three-bale crop will need about 180 pounds of K per acre. About 25 % of that amount will be removed annually with the lint and seed. Potassium also has an effect on lint quality, with moderate to severe K deficits having a negative impact on several fiber quality parameters.

Soil Sampling Recommendations. Proper soil sampling is the first step in K management. Soil samples may be taken any time between harvest and planting for the following season. Samples should be taken from the 6 to 18 inch soil depth. Take approximately 15 cores for each 40-acre section of the field and combine them for a composite sample. Sampling depth is important because of the rooting patterns of cotton and the type of clay in the soil. Cotton has a taproot with little root growth near the surface and it is sensitive to soil drying. Fertilizer K can also be rendered non-exchangeable or "fixed" after being applied to the soil. Vermiculite clay, which has the capacity to fix fertilizer K to a slowly-available from, is a common component of soils throughout the San Joaquin Valley. The amount of vermiculite clay content varies among soils and thus the fixing capacity varies. Differences in soil types across fields or differences in cropping practices within a field should be taken into account when soil sampling. Additional samples may be needed to properly characterize parts of the field, and may impact the desirability of variable rate fertilizer applications. As with all soil sampling, good records should be kept concerning sample location and date.

Recent Research. An objective of a current research project is to identify potential high K- fixation soils using information from soil surveys. Soils derived from sedimentary rock from the Coast Range or from granitic rock from the Sierra Nevada have different mineralogy.

Forty-four sites in the southern SJV were sampled. Lab analysis has been completed for only some of the sites. Preliminary results show that coarse and fine-textured soils from Sierra Nevada parent material have high K fixation capacity and it increases with depth. Very limited sampling from soils derived from Coast Range sediments shows low K fixation potential.

In general, soil survey maps have been found to not be in fine enough detail to identify all potential high K-fixing soils. For example, Kimberlina fine sandy loam is mapped in Kern, Kings and Fresno counties. It is described as alluvium derived from both Sierra Nevada and Coast Range (???_____) parent materials. Lab analysis has identified areas where this soil series is distinctively one parent material or the either. Potential K fixation will vary between the parent materials within the same soil series. Additional ongoing work on this project includes soil sampling, lab analysis and landscape location interpretation which may aid in identifying potential high K fixing soils.

Current Management Recommendations. Plant or petiole sampling, used in conjunction with soil sampling provides for a comprehensive cotton K management package. Proper petiole sampling is critical for correct data interpretation. The petiole of the most recent fully expanded leaf should be sampled. This is usually located at the 4th or 5th main stem node from the top of the plant. The upper-most leaf is counted as a node if the leaf is larger than 1 inch diameter. Collect 25 to 30 petioles from 4 locations in the field and deliver these to the laboratory as soon as possible.

Identification of petiole sample timing (crop growth stage) is critical to interpretation of the results, as K concentration in the petiole declines dramatically during the period from first flower to 10 days after cutout. First flower is defined as the date when about one-half of the plants have developed at least one white flower on the first position of the first fruiting branch. Monitor all plants within a 25-foot section of a row from 4 locations in the field to determine date of first flower. Critical petiole K concentrations are listed in Table 1.

Potassium fertilizer is recommended if soil exchangeable K levels (by the Ammonium Acetate or Mehlich 3 methods) are less than 120 ppm. Apply 100 pounds K_2O per acre if the soil test is between 110 and 120 ppm, 200 pounds K_2O per acre if the soil test is between 80 and 110 ppm, and 400 pounds K_2O per acre is the soil test is less than 80 ppm or K fixation is greater than 60%. Potassium fertilizer can be broadcast and incorporated into the soil prior to bed listing or banded on the shoulder of the bed, 6 to 8 inches deep. Supplemental K can be added by water run or foliar application after first bloom, if petiole samples are less than the critical threshold levels. If K is needed, two foliar applications of 10 pounds K_2O per acre each at 7 and 14 days after first flower are recommended. Generally water run applications are less effective than foliar applications.

Additional Considerations. Soil-fixation of applied potassium is not the only limit to plant access to potassium. Even when soil potassium levels test marginally greater than 120 ppm, a combination of conditions can still result in low plant K. These conditions include poor or limited root development resulting from seedling disease, later-developing wilt diseases, root damage associated with physical root pruning or other damage, or limited rooting depth due to factors such as compaction. If you have knowledge of such problems, consider them when making decisions on soil and foliar applications. In addition, crops with very high fruit loads may respond to supplemental K even if soil test values are near the 120 ppm threshold, particularly if the root system is weak.

Long term evaluation of soil and petiole sample data and lint yield will help growers further refine K fertility recommendations for each field. The K fertilizer application and removal of other crops grown in rotation should also be considered. Further information is available through your local UC Cooperative Extension office or in “Potassium Fertility Guidelines for San Joaquin Valley Cotton” (UC Agriculture and Natural Resources Publication 21562.)

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Table 1. Critical ranges for petiole potassium at three growth stages for the variety “Maxxa” in the San Joaquin Valley (from UC Publication 21562).

Growth Stage	Cotton Petiole K (%)				
	Very low	Low	Medium	High	Very High
First Flower	< 2.5	2.5 to 3.0	3.0 to 3.5	3.5 to 4.0	> 4.0
2 weeks after first flower	< 1.8	1.8 to 2.4	2.4 to 2.8	2.8 to 3.2	> 3.2
10 days after vegetative cutout	< 1.0	1.0 to 1.4	1.4 to 1.8	1.8 to 2.4	> 2.4

Table 2. Recommended fertilizer K rates as a function of soil exchangeable-K test results (from UC Publication 21562).

	Soil Test Exchangeable-K			
	< 80 ppm or K fixation > 60%	80-110 ppm	110-120 ppm	> 120 ppm
Fertilizer Recommendation (lbs K_20 to apply)	400 lbs	200 lbs	100 lbs	none