DOUBLE-ROW COTTON PLANTINGS ON 30 INCH, 40 INCH BEDS: COMPARISONS WITH SINGLE ROW COTTON PLANTINGS

Bob Hutmacher (UCCE Extension Agronomist, UC Shafter REC and Plant Sci. Dept., UC Davis); Phone: (661) 746-8020; e-mail: rbhutmacher@ucdavis.edu;
Cooperators: Steve Wright (UCCE Farm Advisor-Tulare Co.); Ron Vargas (UCCE Farm Advisor – Madera and Merced Counties); Brian Marsh (UCCE Farm Advisor-Kern Co. and UC Shafter REC Supt.); Dan Munk (UCCE Farm Advisor-Fresno Co.); Mark Keeley, Raul Delgado (Shafter REC and UC Davis Plant Sci. Dept.), Gerardo Banuelos (UCCE-Tulare Co.); Tome Martin-Duval (UCCE – Madera Co.); Staff of Shafter and West Side REC

Project Summary. This project at Shafter REC is part of a multi-location trial that has been conducted for over five years to evaluate the potential of a change in cotton planting configurations on growth, yield potential and quality. The bulk of the field evaluations in years prior to 2002 were done by two main groups: (1) Dr. Bill Weir of UCCE – Farm Advisor Emeritus from Merced County in cooperation with San Juan Ranch and Bowles Farms in western Merced County, and (2) trials conducted by Hutmacher, Keeley and Delgado with cooperation from staff for multiple years at Shafter and West Side REC locations. In 2002 through 2004 we conducted additional trials in other grower fields in different parts of the SJV. Goals were to provide field evaluations across a broad range of soil types and production conditions. Some of the multi-year information will be summarized in an article to be prepared for an issue of the California Cotton Review to be published this winter.

In an attempt to further decrease production costs of cotton, a unique variation of ultra narrow row production was initiated in Merced County in 1998. These efforts have been variously called the "California version of ultra narrow row" or "Double-Row 30 inch cotton". The planting configuration used has been two seed lines of cotton, seven to ten inches apart, on a 30 inch bed. Yield information is available for multiple years of study and will briefly be reviewed here. In looking at the potential for cost savings, it is worthwhile to consider what the crop and weed growth expectations and management principles are with the double-row 30 inch cotton planted at a fairly high population density. The management approach used assumes that with the double-row, high density planting:

- Cotton should more effectively compete with weeds and achieve earlier row closure and shading of beds and furrows than with single-row plantings, resulting in less need for cultivation and perhaps herbicides
- Higher plant densities mean that fewer bolls are required per plant to achieve the same yield, as long as average boll size is not significantly affected

At the sites near Dos Palos represented by the lint yields summarized in Table 1, grower records of expenses and changes in production costs with the single versus double-row 30 inch production methods were carefully recorded. The records indicated that an average of $43.00 per acre was saved using the double-row 30 inch bed configuration in place of the single-row 30 inch configuration. Cost savings in the field studies ranged from about $25.00 to over $70.00 per acre.

Savings Potential versus Increased Costs. Savings were generally found in reduced number of field tractor operations, including fewer cultivations with higher density double-row beds, and fewer openings and closings of irrigation ditches under furrow irrigation at the study sites. With the management approaches used with the double-row 30 inch cotton to date, there does not appear to be any increased costs or additional savings in fertilizer requirements, defoliation or

harvesting costs. Additional costs incurred with switching to the double-row system as described here can include costs of additional seed needed for high density planting, initial costs and operating costs for a planter suitable for this configuration, and technology fees (if the grower decides to use a transgenic herbicide tolerant variety). Although data is not conclusive at this point, more applications and higher rates of Mepiquat chloride growth regulator may be useful to help manage growth and earliness of double-row 30 inch cotton and keep defoliation and harvesting problems to a minimum.

Table 1. Average lint yields and percent yield increase with double-row 30 inch planting configuration in replicated grower field studies near Dos Palos, CA from 1998 through 2002.

	Average Lint Yield (lbs/acre) * across all sites for the year in Merced Co. trials		
Year	Single Row 30-Inch Beds	Double Row 30-inch beds	Average Percent Yield Increase in Double-Row
1998	1123	1256	8.4
1999	1300	1475	8.8
2000	1976	2114	7.3
2001	1548	1837	15.7
2002	1849 estimate	1940 (estimate)	4.9

Yields in Other Test Locations – including Shafter REC

More than 1000 acres of double row 30 inch cotton were planted in 2001 through 2003 at various location in the San Joaquin Valley (mostly in the northern San Joaquin Valley) using either a "Monosem" brand planter designed to precisely place seeds in two lines as close as 7 inches apart, or variations on the sled planter used in the earlier years of field trials. Sites have been initiated at several other locations in other areas of the San Joaquin Valley in recent years also to investigate the potential utility of the double-row planting concepts. Two of these locations have been small plot studies done since 1999 at the University of CA West Side and Shafter Research and Extension Centers. The Shafter trials have been single versus double-row 30 inch studies, while those at the West Side site have been single versus double-row 40 inch studies. Yield results from most of these trial sites are shown in Table 2.

Additional Considerations—Double-Row 30 Inch. Many, but not all of the test locations to date have been with herbicide-resistant transgenic cotton (Roundup-Ready). However, the comparison tests done to date with conventional varieties and a more traditional weed management program have shown similar potential for favorable yield responses and some cost savings, so a herbicide-resistant transgenic cotton may be a good choice, but does not appear to be a requirement, for this system. It is important to note that all field trials and Merced County grower fields monitored to date have been harvested using conventional spindle pickers. During the initial year of tests (1998), some double picking was required due to picker adjustment and bed height problems, but otherwise most harvest operations have been single picks. No significant, consistent differences in fiber quality, leaf trash or other quality issues have been identified in HVI analyses conducted to date on single-row 30 versus double-row 30 comparisons in replicated trials or grower fields. Yield improvements at other test sites shown in Table 2 have not always been as consistent as those achieved in the Dos Palos area of Merced County. At the West Side REC site, it should be noted that these were 40 inch single versus double row comparisons, and plant populations in the double row plantings averaged 52,000 (1999), 61,000 (2000) and 53,000 plants per acre (2001), while the Merced County studies averaged over 75,000

plants per acre in double-row plantings. The ability to deal with concerns for retaining adequate soil moisture in the bed edges where seed will be planted should be considered one of the key criteria to factor in when deciding if the double-row 30 inch concept could work out for individual growers and field sites.

Table 2. Average lint yields and percent yield increase with double-row 30 inch planting configuration in other field studies (various locations and years).

	Average Lint Yield (lbs/acre)		
Location	Single Row 30" average	Double Row 30" average	Yield increase (+) or Yield decrease (-) with double row plantings
Merced Co.			
Fld #2 2001	1329	1504	12
Fld #3 2001	1056	1132	7
Other Merced sites shown other table			
Madera Co.			
Fld #1 2001	(4280) *	(4320)	1
Fld #2 2001	(4423) *	(4540)	3
2003	1511	1524	< 1
West Side REC			
1999 (40")	1104	1083	- 2
2000 (40")	1654	1709	3
2001 (40")	1553	1485	- 4
2002 (Riata RR)	1733	1801	4.0
2002 (DP 6100RR)	1633	1668	2.1
2002 (Phy-78)	2085	1951	-6.4
2003	1307**	1368**	5
Shafter REC			
1999	1520	1652	9
2000	1428	1355	- 5
2001	test incomplete due to poor stand		
2002 (Riata RR)	1527	1712	12.1
2002 (DP6100 RR)	997	1073	7.6
2002 (Phy-78)	1913	1991	4.1
2003	1189	1162	- 2
Tulare County			
2002 (one farm site)	1730 **	1825 **	5
2003 (one farm site)	1560 **	1540 **	- 1.5

* yields shown in parentheses are seedcotton yields / ** = estimated yields (analysis not finalized)

2004 Efforts. Tests were again planted for comparison studies in Madera, Merced, Fresno County grower sites plus the sites at the West Side and Shafter REC locations. We worked with Monosem planting equipment as well as growers in trying to get additional field sites for replicated comparisons of single versus double-row 30 inch cotton in multiple sites from Merced County down through Kern County. There were numerous discussions with growers and some complications with the equipment being set up for 30 inch double rows while some growers were interested also in double row plantings on a 38 or 40 inch bed configurations. All 2004 field trials were set up on 30 inch beds. Some of these alternative bed spacings may be evaluated in future years depending upon equipment availability and grower interest. These wider beds will be of interest for future evaluations, since wider beds may help with a recurring problem in assurance of adequate soil moisture in some 30 inch beds planted to the 30 inch configuration.