University of California Cooperative Extension

California Cotton Review

The Newsletter of the UC Cooperative Extension Cotton Advisors
Volume 63 June 2002

In This Issue

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2002 GROWING SEASON: A "MIXED" START

Bob Hutmacher

As we finish off June, development of cotton in the San Joaquin Valley is quite variable across fields, ranging from plants with as few as 9 or 10 nodes to as many as 18 or more nodes. If heat units were the only factor important in determining if cotton plants get off to a good start, you could say that the 2002 cotton growing season started out pretty well in many parts of the San Joaquin Valley (see 5-day heat unit charts for Shafter and Los Banos in Figures 1 and 2).

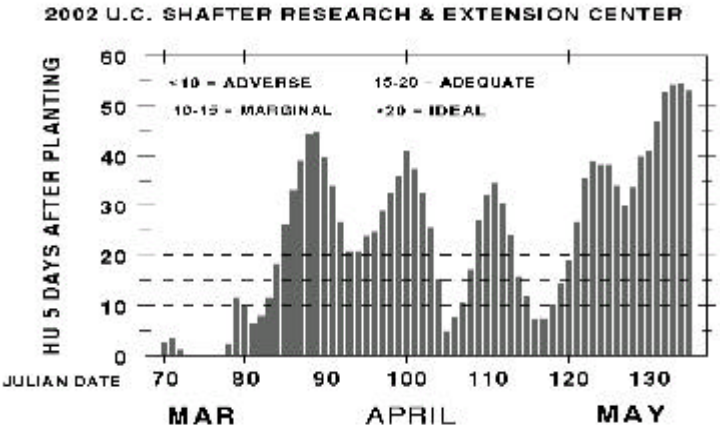

Figure 1. Five Day actual heat unit accumulations as a function of day of year based upon weather station data from the UC Shafter Research and Extension Center during March 10 to May 10, 2002.

(continued on page 3)

STICKY COTTON CAUSED BY APHIDS AND WHITEFLIES—A THREAT TO SAN JOAQUIN VALLEY COTTON

Peter B. Goodell

The 2001 growing season was recorded as one with some of the lightest insect pressure in years. The annual crop loss estimates recorded very little spider mite, lygus or worm pressure. Silverleaf whitefly and aphids were recorded as mid-season pests and carried into the late season. As the cotton worked its way into the commercial channels and into the spinning mills, many complaints were recorded from mills about sticky cotton problems from the San Joaquin Valley, in both Upland/Acala and Pima cotton.

It is not entirely clear what happened in the latter part of the growing season to cause such a widespread problem. However, it is perfectly clear that the SJV must demonstrate good faith in managing honeydew-causing insect pests and to prevent insect honeydew as a source of sticky cotton. Sticky cotton threatens the reputation for quality cotton that San Joaquin Valley growers and industry have tirelessly built over their long history. Developing a sticky cotton reputation has real economic consequences as seen with the experience of the Arizona cotton industry during the 1990's. A reputation, once compromised, is difficult to restore.

Honeydew-contaminated lint is preventable but it requires the resolve of the industry to take steps necessary to ensure the quality of the SJV cotton crop. The effort will require commitment from Pest Control Advisors, growers, ginners and merchants. A successful

(*continued on page 2)*

Support for this publication is provided by California Cotton Growers through their Cotton Incorporated State Support Program.

Sticky Cotton Caused by Aphids and Whiteflies: A Threat to San Joaquin Valley Cotton *(continued from page 1)*

outcome will require cooperation between neighbors as well as all industry segments. We have the science and insect control products to manage the insect problems and we will need the focus and discipline to conduct IPM-based management programs to prevent sticky cotton created by insects.

The University of CA Cooperative Extension is committed to providing educational outreach in a variety of forms: meetings, publications, consultations, and field training. Before the cotton reaches first cracked boll, we will provide educational support on how to sample fields for silverleaf whitefly and aphids, and how to make treatment decisions and manage these pests to keep their populations below damaging levels. New control products are available this year to support this effort and more information on these products will be available within the next month.

Here are some important points to remember:

- The primary insect pests that threaten lint quality are cotton aphid and silverleaf whitefly
- Both pests are found in cotton fields throughout the growing season and can reach levels that require treatment well before bolls crack open, exposing lint to honeydew
- Sampling procedures are well-established and are based on the number of insects on the 5th leaf below the plant terminal
- Sampling whiteflies takes some special knowledge to locate nymphs as well as adults. This has been discussed at the June Cotton Production meetings run by UCCE Farm Advisors and will also be repeated at July and August meetings
- It is important to maintain insecticide resistance plans in order to extend the useful life of both older and newer control products

It is suggested that you **attend informational meetings provided by University of CA Cooperative Extension and your Cotton Industry.** The meetings have great value in learning about the most recent updates on the situation, sharing with other growers and PCA's your successful approaches to managing these pests, and discussing with crop protection experts how best to use available control products.

For those of you wanting to start with a "refresher" on management guidelines and insecticide resistance management guidelines, you can start by looking at UC Publication # 8033 (*Insecticide and Miticide Resistance Management Guidelines for San Joaquin Valley Cotton—2001).* This publication is available at the following web site, but it should be noted that as a 2001 publication, it does not include some of the changes in registered insecticides,for 2002:

http://www.uckac.edu/cottonipm/

Other useful resources you might consider reviewing include:

- *UC Pest Management Guidelines* - www.ipm.ucdavis.edu)
- *General whitefly information* - www.uckac.edu/whitefly
- *Silverleaf Whitefly Sampling plans in Cotton* - www.uckac.edu/whitefly
- *Whiteflies in California—UC Statewide IPM Program, Publication 19*—contact Peter B. Goodell (Regional IPM Advisor) or your county UCCE Farm Advisor (phone numbers shown on address page of this newsletter)
- *Sticky Cotton: Sources and Solutions*— http://ag.arizona.edu/crops/cotton/insects/wf/stickycss.pdf
- *Management of Silverleaf Whitefly—A Comprehensive Manual on the Biology, Economic Impact and Control Tactics*.— contact Peter B. Goodell or your county UCCE Farm Advisor
- *Arizona Information on Managing Silverleaf Whitefly* - http://ag.arizona.edu/crops/cotton/insects

NOTE: As mentioned in article, additional meetings will likely be added this summer season to address concerns and management strategies for pest management and sticky cotton prevention—watch future issues of this newsletter or contact your UCCE Farm Advisor for updates on meeting dates

2002 Growing Season Progress *(continued from page 1)*

The range in stages of crop development seen across different fields and different parts of the valley reflects: a) a wide range of planting dates that resulted from growers needing to work around a few cool periods as well as uncertainty regarding the Farm Bill and financing; b) delays in planting in some soils while late pre-irrigations were made and the soil dried adequately for planting; and c).uneven and slowed growth associated with seedling disease and worse than average injury from pests such as thrips and spider mites in some limited areas.

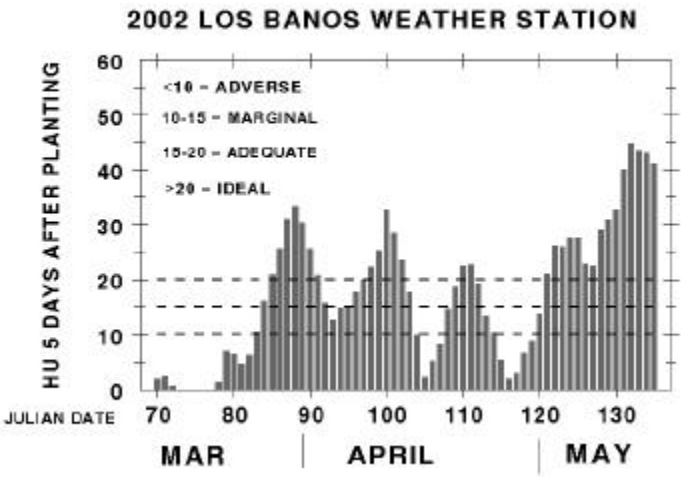

Figure 2. Five Day actual heat unit accumulations as a function of day of year based upon weather station data from the Los Banos CIMIS stations from March 10 to May 10, 2002.

After a relatively short period of low temperatures in early through mid-March, heat units for planting improved in the last ten days of March, and remained acceptable for planting through almost mid-April (Figs. 1, 2). However, two periods with five to six days of relatively cool temperatures occurred in mid– and late-April. Although temperatures during these cool periods in most cases were not low enough to cause chilling or cold-temperature injury, these days were often also cloudy and in some cases rainy, slowing plant growth.

Figure 3 and Table 1 show accumulated heat units (degree days 60F) for specific periods of about 10 to 15 days during March through May. Figure 3 shows heat unit data for 2002 and other years at Shafter REC (Kern County). 2002 heat unit accumulations were generally above the long-term average for late March and the first half of April, but much below average for the second half of April and first half of May (Fig. 3).

Data shown in Figure 3 is from Shafter REC, but similar patterns were seen in other cotton-growing locations throughout the San Joaquin Valley. Table 1 gives an indication of the range of heat unit accumulations across locations from Kern County to Merced County experienced to date in 2002.

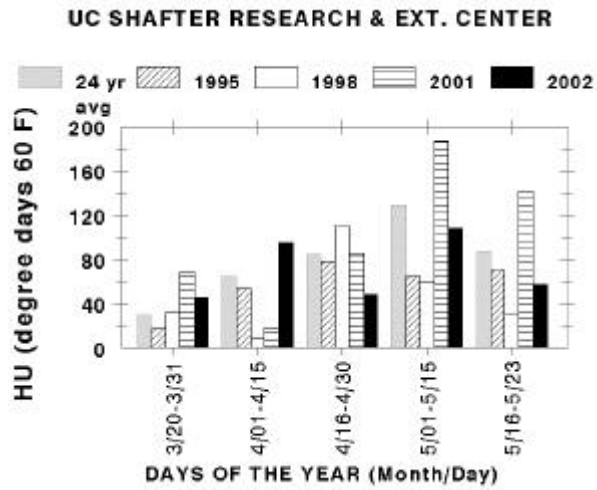

Figure 3.. Accumulated heat units (degree days base 60 degrees F) at University of CA Shafter Research and Extension Center (Kern County, CA) during specific periods between March 20 and May 23. Values shown are for 2002 in comparison with select other years.

If you are interested in following heat unit calculations during the rest of the growing season, heat unit accumulations during the main part of the growing season for different parts of the San Joaquin Valley are calculated weekly by Dr. Pete Goodell of the UC-IPM program, and provided to interested parties through MITEFAX. You can also contact your Farm Advisor for periodic updates on heat unit accumulations in your area, or calculate them yourself by going to the "WEATHER" section in the UC Integrated Pest Management website, at **http:// www.ipm.ucdavis.edu** *(follow instructions for determining degree day / heat units for specific station).*

Impacts on Some Management Decisions

Much of the SJV cotton crop can be categorized into three major groupings: a) March and early April plantings which made it through cold weather conditions in good shape and were not subjected to leaf or terminal damage; b) early plantings which were subjected to

seedling disease and/or serious leaf and possibly terminal damage from thrips and other early season pests; and c) plantings in late April through early May which began development in cool May conditions but progressed well as the weather warmed. Typical good management practices should work well for the many well-established plantings this year that are progressing nicely, but some modifications may be called for under the conditions mentioned below.

Table 1. Accumulated heat units (degree days base 60 degrees F) at three locations in 2002 for the same specific periods of the year as shown in Figure 3.

Days of the Year	Shafter REC (northern Kern Co.)	West Side REC (west Fresno County)	Los Banos (western Merced County)
3/20-3/31	45	46	36
4/01-4/15	95	103	67
4/16-4/30	48	51	30
5/01-5/15	108	118	84
5/16-5/23	58	54	43
TOTAL	**353**	**372**	**261**

Weak Early Plantings. After observing many problems in early-planted fields with severe early leaf damage, some UCCE staff agreed with many consultants that earlier irrigations were called for since tap roots were damaged and secondary root development was hindered by drying surface soils and lack of carbohydrates to support new root growth. In some of these fields, weak root system development will impact water and nutrient uptake. Field observation of root system development, lighter but more frequent irrigations, and tailoring input costs for likely lower yield potentials should be considered, particularly if the plants remain weak or monitoring information indicates they are low in vigor. Monitoring plants for signs of low vigor and early cutout, avoidance of water stress and avoidance of high growth regulator rates where low vigor prevails will also be management approaches to consider in these fields.

Different situations prevail in some high vigor fields where there was significant early-season leaf and even terminal damage. A typical plant response to this early damage is development of more vegetative branches low on the plant. This can delay development of fruiting branches, and change growth patterns to favor vegetative growth. Growth should be carefully monitored in these plants to assess needs for changes in irrigation and growth regulator management

Later-Planted Fields. If early fruit set is good in these fields, the warm weather of mid to late-June may help these fields develop and make up for lost time. However, the possible threat of problems and high control costs for late-season insect pests is added incentive to monitor these fields for high vigor and retention problems. The earlier the fruit are set, the more likely the chance to wrap up the season and avoid extra late-season costs.

HEAT UNIT AVERAGES AND TIME TO MATURE BOLLS

Bob Hutmacher

Research in CA and elsewhere has established some good relationships between heat units or degree days and developmental stages of cotton. Long-term observations of Acala varieties and shorter-term measurements on CA Upland and Pima varieties have yielded some generalized relationships between heat units (or average number of days) and attainment of specific developmental stages (Table 1). Values in this table can be compared with accumulated heat units to see if your crop is progressing much faster or slower than “typical”. In general, Upland varieties managed for relative earliness will reach these growth stages at the lower end of each range of time or heat units. To reach the same growth stages, longer-season Pima cotton varieties will generally require closer to the upper range of days or heat units shown, or for the most indeterminate varieties, as much as 10 percent more.

The values shown in Table 1 can only be considered guidelines, since the number of heat units required to take a fruiting site from flower to open boll can be influenced by position on the plant, timing and intensity of any environmental stresses such as water or nutrient or high temperature stress, relative boll load, and type of cotton and corresponding boll characteristics (size, carpel wall thickness). In addition, prevailing conditions during flower and fruit development (such as temperature extremes that greatly increase heat unit totals, but that are not necessarily beneficial to total plant or boll retention and development can also impact the relationship between degree days and crop developmental stage.

Table 1. Approximate number of days and heat units (degree days 60F) from emergence to specific phenological (growth) stages in San Joaquin Valley cotton.

	Range in Number of Days To Reach Each Growth Stage			Heat Units (60F)
Growth Period	**Lower**	**Upper**	**Average**	**Heat Units**
Emerge to 1st square	35	55	45	425-500
Emerge to 1st bloom	60	82	68	750-900
Emerge to peak bloom	82	95	88	1350-1500
Emerge to 1st Open Boll	120	145	130	1650-1850
Emerge to 60% Open Boll	155	185	165	2200-2350

Some of the cotton varieties now available in the SJV have been described as "early-maturing" or "short-season". Experience to date has indicated that while there are some differences in the duration of fruiting and even the number of heat units required to mature a boll from a flower, we have seen few varieties which consistently are earlier to first square or first bloom. What has been apparent is that varieties can differ in the duration of effective bloom, the rate of development and relative importance of 2nd and 3rd position bolls, and to a limited degree, in the number of heat units required to mature (open) a boll from a flower.

Differences seen have been associated with both varietal characteristics and sensitivity to some management factors. For example, during the 1998 and 1999 growing seasons, with cool springs and early summer, some grower practices (including delayed irrigations, more aggressive growth regulator use and timing) impacted crop "earliness", particularly the timing of first open boll and readiness for harvest. Many of these management practices or varietal characteristics that can produce earliness can reduce, rather than improve yield potential if a long growing season and good fall conditions prevail. However, a season like 1998 demonstrated that with late plantings, these factors producing "earliness" can be very important in allowing a timely harvest of good-quality cotton.

There is evidence of some differences across varieties in the degree days associated with bringing a fruiting site from an open bloom to a mature (open) boll. Harvest aid chemicals can alter the time required to open bolls by as much as several days, but generally do not dramatically influence the timing, since certain physiological practices must occur to mature out fibers and open bolls.

Table 2. Examples of differences in degree-days (base 60F) required to go from open flower to mature, open boll based upon 1998 through 2000 data.

	Degree days required (60F)	
Type of Cotton	Early-season Flowers	Late-season Flowers
Acala varieties (average)	900 to 1025	825 to 875
Pima varieties (average)	960 to 1050	900 to 980
Some CA Uplands with thin boll walls	830 to 950	775 to 860

Table 3 shows long-term daily and "half-month" average degree-days (base 60F) at Shafter REC in Kern County. These can be used in estimating crop progress under "average" expected weather conditions during July through mid-November. Note that average degree-day accumulations differ with location in the SJV, and can be as little as 5% or as much as almost 20% lower in the northern SJV as compared with Shafter REC (Table 3).

Table 3. Long-term average daily heat units (DD60 = degree days base 60F) at Shafter during specific time periods (averages and ranges determined using 1974 to 1999 data).

	Degree days (60F) (in DD60 per day)		26-year average Total for period
TIME PERIOD	AVERAGE DAILY DD60	RANGE	TOTAL DD60 FOR THE PERIOD
July 1-15	18.3	14-21	274
July 16-31	18.6	13-22	297
Aug. 1-15	18.7	15-22	281
Aug. 16-31	16.3	11-19	262
Sept. 1-15	15.1	10-22	227
Sept. 16-30	11.6	5-17	175
Oct. 1-15	8.2	5-15	122
Oct. 16-31	5.6	2-8	90
Nov. 1-15	2.3	1-5	34

Use of this information if you have or are trying to avoid a late crop. In a "late" year, we have recommended that growers / consultants work back from a desired harvest date to use the data of Tables 2 and 3 to determine the likely period available for fruit production. Using the information from Table 2, you can assume about 850 degree-days (Acala) and 950 degree-days (Pima) to mature out a mid-to late-season bloom to an open boll. If you add numbers in the right column of Table 3 starting at your desired time for harvest and work through the earlier periods, you can estimate how long it will take to accumulate degree-days to open that last harvestable flower for which you are "aiming".

As an example, if you select October 31 as a target harvest date, the last fruiting site you should try to mature out (requiring about 850 degree-days for late-season Acala boll) would be expected to flower on about Aug. 16 (using right-hand column of Table 3: 90+122+175+227+262 = 876 degree days). In days, early-season flowers can take 55-60 days to mature from flower to open boll, while late-season blooms can take 70-75 days or more during fall periods of declining degree days. The Table 3 column showing "range" during each period shows that while opportunities for warm temperatures exist even in September and October, so does the chance of lower degree days and harvest delays.

Table 4. Use of this information for planning. Estimate when the last bolls will be open if your crop reaches "vegetative cutout" and you estimate the following dates of the last productive blooms on the plant (use the approach shown in the Table below).

Last date of bloom carried To maturity after cutout	Degree days (DD60F) accumulated between last date of bloom and expected date of opening of that "last" boll	Estimated date of boll opening of last date of bloom
August 1	281 (8/01 to 8/15) + 262 (8/16 to 8/31) + 228 (9/01 to 9/15) + 79 (9/16 to 9/22) = 850 degree days total	9/22
August 8	150 (8/08 to 8/15) + 262 (8/16 to 8/31) + 228 (9/01 to 9/15) + 175 (9/16 to 9/30) + 33 (10/01 to 10/05) = 856 degree-days	10/05
August 16	262 (8/16 to 8/31) + 228 (9/01 to 9/15) + 175 (9/16 to 9/30) + 122 (10/01 to 10/15) + 62 (10/16 to 10/26) = 849 degree days	10/26
August 23	147 (Aug.) + 228 +175 (Sept.) + 122 + 90 (Oct.) + 34 (Nov. 1-15) = 796 degree days (does not reach 850 by mid-November)	total available still does not total 850 degree days

FUSARIUM UPDATE: SCOUTING FOR AREAS WITH NEW FUSARIUM PROBLEMS ?

Bob Hutmacher, Mike Davis

The Potential Problem. Fusarium wilt is a fungal vascular wilt disease that has been widely investigated in the San Joaquin Valley cotton production area since the late 1950's. At that time, USDA and University of CA researchers identified the primary symptoms as seen in SJV Acala cotton, conditions that favored the disease, and confirmed that there usually, but not always, is an association between the fungal organism (*Fusarium oxysporum vasinfectum)* and root knot nematode *(Meloidogyne incognita)*. Fusarium problems in the past have almost exclusively been in areas where yield and stand losses due to root knot nematodes are a known occurrence.

During the past year, there have been several occurrences of confirmed *Fusarium* or, in other cases, Fusarium-like symptoms in which Fusarium has not been isolated that have occurred under conditions that generate some interest and concern among University of CA and industry staff. These concerns include: (1) *Fusarium* in several Pima fields; and (2) *Fusarium* confirmed in a clay loam site where root knot nematodes are not typically found at damaging population levels; and (3) could this be a new strain of Fusarium that could impact not only Pima but Upland varieties as well?

To date, UC investigations have not firmly identified whether or not these are just new sightings of Fusarium from the same "family" of Fusarium strains present for years in CA or if we might be dealing with a more recently-introduced organism. Part of the concern is related to the possibility that CA production areas could be seeing early signs of an infestation with the strains of Fusarium that have dealt heavy yield losses in parts of Australia in recent years. Genetic "mapping" tools are available to differentiate strains of Fusarium found here in CA from those found in Australia, and are in use in the UC Davis Department of Plant Pathology to evaluate

these fields. It is important to note that none of the strains isolated in the very limited number of fields tested (where there were symptoms of concern) in 2001 were found to be either of the two known Australian strains.

Symptoms and a Little History. It is known that *Fusarium* can infect and produce symptoms and yield reductions in both Upland and Pima. However, most of the recent sightings of Pima with Fusarium symptoms severe enough to cause stand losses and yield reductions have been in areas with known "history" of past root knot nematode / Fusarium problems with Acala varieties.

There are some limited varietal differences in observed susceptibility to *Fusarium* wilt, but this may be more related to varietal differences in susceptibility to root knot nematode among Acala varieties. Little is known about varietal interactions related to root knot nematode or Fusarium susceptibility in Pima.

Our Request to Interested Parties. UC staff in cotton would like to request your assistance in keeping us informed of fields in which you suspect *Fusarium* might be a problem or where you have seen symptoms of interest. We are particularly interested in areas without a consistent prior history of *Fusarium* problems (possibly indicating something new). If you have a field you would like to have us look at, please contact Bob Hutmacher or your local Farm Advisor so we can get a University of CA Plant Pathologist involved in identifying: (1) if sampled plants have been infected with Fusarium; and (2) what strain of Fusarium is involved.

What to Look For? The disease can cause leaf yellowing and necrosis that typically begins on the leaf margins. In some cases, the symptoms can look quite similar to damage associated with *Verticillium* wilt. Because of the similarities, positive identification of *Fusarium* generally should include isolation of the fungus by plant pathologists. General symptoms of *Fusarium* as seen previously in CA cotton include:

- Brown "staining" in the stem water-conducting, vascular tissue
- The vascular staining with known strains of *Fusarium* tends to be darker & more continuous (less "streaky" than seen with *Verticillium),* and is more typically seen lower in the stem and upper tap root
- With prior known strains of *Fusarium*, leaf foliar symptoms (particularly the necrotic, brown areas) are more likely to begin at the leaf margins rather than in interveinal locations (between major leaf veins) as seen with *Verticillium* wilt
- Plants infected early in the growing season with *Fusarium* can be killed and might still be visible later in the year as small groupings of dead plants, or they can survive and be severely stunted as seen with root-knot nematode injury
- In more seriously affected plants, stunting and a reduced boll load can occur, or in more severe cases, visible leaf wilting, leaf loss and death

Fusarium is an organism favored by warm temperatures, so the mid-summer period continues to be a time when symptoms can appear in affected fields. As with *Verticillium* wilt symptoms, *Fusarium* will not usually cause mass wilting of all the plants down a row or in an entire area of the field, but will instead be seen as apparently random plants which can be affected at different times during the season.

For more information contrasting *Fusarium* symptoms and situations with those of *Verticillium*, you can look at Table 13.10 in the Cotton Production Manual (p. 170, Publication # 3352). More information and illustrations of leaf and stem symptoms of the type of *Fusarium* predominant in past research on CA cotton can also be located in the Cotton IPM manual and on the "IPM Pest Management Guidelines" section of the University of CA Integrated Pest Management website:

http://www.ipm.ucdavis.edu

(then go to section on "Pests of agricultural crops, floriculture and nursery ornamentals", follow that to "Pest Management and Identification" and then to "Cotton Pests and Diseasese—Fusarium".

Reason to Keep Our Eyes Open on This Subject. With all of the other current "challenges" to production and profitability in CA cotton, we are not looking for or looking forward to another major problem. However, past known strains of *Fusarium* have been partially controllable only through crop rotation, field equipment sanitation practices, and judicious use of very limited Acala germplasm with resistance to root knot nematode.

For cotton production, there are no affordable and completely effective soil fumigant materials useful on strains of *Fusarium* previously known in CA, and that has also been the experience to date with the strains of *Fusarium* they are dealing with in Australia. Early identification of whether or not we have new strains of *Fusarium* in San Joaquin Valley cotton will be useful in assessing possible needs for control strategies.

BILL WEIR
UCCE Cotton Farm Advisor
Merced County

Retiring June of 2002!

Dr. Bill Weir, long-time Farm Advisor serving out of the Merced County office of UC Cooperative Extension, has announced his retirement effective June 22, 2002. His UCCE cotton colleagues want to share a little "history" as we wish him well at the start of his retirement.

Bill started out in Texas, raised on a vegetable farm near San Antonio. His education then continued with a Bachelor's degree in Chemistry from Texas A&M University, followed by a Master's degree in Vegetable Crops and a Ph.D. in Soil Science, both from UC Davis. In addition to those student years, Bill has been with UC since 1966, beginning as a Staff Research Associate in the UC Davis Vegetable Crops Department.

Dr. Weir's association with UCCE in Merced County started in 1974 when he was appointed to the Field Crops Farm Advisor position at the Merced County UCCE office. Over the years, his efforts have included responsibilities in many aspects of field crop management, including work in cotton, sugar beets, rice, barley, wheat, corn, dry beans, rye and oats.

During the past five years, Bill also had responsibilities in vegetable crops extension education and research for Merced County. It has been a busy career, but one that Bill has told many friends and colleagues that he really enjoyed.

In addition to his work and accomplishments in other field crops, Dr. Weir has been a "key player" in research important in improving cost savings and yield improvements for the CA cotton industry. He was one of the initiators heavily involved in early work on 30-inch cotton in the San Joaquin Valley, identification of potential uses of what were then "new" growth regulators that revolutionized management approaches for CA cotton, and in nutrient management involving evaluations of potassium deficiency and impacts of foliar fertilizer timing and rates on cotton yields.

More recently, he and his grower cooperators have been broadly recognized for work on the potential of double-row 30 inch cotton in CA and elsewhere in the U.S. Dr. Weir has also been a crucial member in many "team efforts" with research and extension colleagues over the years, participating in efforts ranging from ongoing variety trials to the evaluation of plant mapping approaches and their introduction through extension efforts.

Bill has authored or co-authored almost 200 peer-reviewed or scientific papers during his career, and has received numerous awards for his extension and research activities. Just during the 1990's, for instance, he received two *Certificate of Excellence* awards from the American Society of Agronomy, a *Distinguished Service Award for Outstanding Researcher* from the UC Division of Agriculture and Natural Resources Assembly Council, and an *Outstanding Individual in Agriculture* award from the Agribusiness Committee in Merced County. Pursuit of excellence in research while keeping in mind the needs of growers and industry for useful information have been hallmarks of Dr. Weir's career.

We wish Bill, his wife Carol, and family good luck and the best of times, and thank his family for sharing him during those many hours of field research and extension work. We appreciate the years of good work and friendship, and hope to still see Bill participating at future cotton industry and UCCE occasions.

MERCED COUNTY UCCE COTTON RESEARCH AND EXTENSION RESPONSIBILITES

With the retirement of Bill Weir, a long-time colleague, Ron Vargas (UCCE—Madera County) has been asked to handle research and extension education activities for cotton as well as other agronomic crops and weed control in Merced County in addition to his many Madera County duties. As in past assignments, we are grateful to have Ron's expertise available to us and to the cotton industry. Ron Vargas is located at the Madera Coutny UCCE office (phone number shown on the address page of this newsletter).

ANNOUNCEMENTS AND ACTIVITIES:

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sUMMER (JULY / AUGUST) FARM ADVISOR COTTON PRODUCTION MEETINGS - 2002

- TULARE / KINGS CO. MEETING Friday, **July 26, 2002**
  Time and Location: see below (Field Day Ag 20/20 project)
  (contact Bruce Roberts or Steve Wright for more information : phone numbers back page of newsletter)
- KERN COUNTY MEETING Wednesday, **July 31, 2002**
  Time and Location: Shafter REC—time to be announced
  (contact Brian Marsh for more information— phone number on back page of this newsletter)
- MADERA / MERCED CO. MEETING Thursday**, August 1, 2002**
  Time and Location: San Juan Ranch Headquarters Area,
  Dos Palos—starts with lunch, then afternoon meeting
  (contact Ron Vargas for more information—phone number on back page of this newsletter)
- FRESNO COUNTY MEETING Thursday, **August 1, 2002**
  Time and Location: Location to be announced—morning meeting
  (contact Dan Munk for more information—phone number on back page of this newsletter)

COTTON FIELD DAYS / CONSERVATION TILLAGE FIELD DAY—2002

(more information on these activities will be included in the next newsletter)

- **September 17** SHAFTER REC FIELD DAY *(contact Brian Marsh for details)*
- **September 19** WEST SIDE REC COTTON FIELD DAY / held this year in combination with CONSERVATION TILLAGE FIELD DAY *(contact Dan Munk or Jeff Mitchell for details)*

PRECISION AGRICULTURE FIELD DAY - *A TOUR OF AG 20/20 PROJECTS* - July 26, 2002

Location: Ted Sheely Farms, Stratford, CA **Time:** 8:00 to 11:30 AM

Precision Agriculture techniques are gaining a foothold in California. This field day and tour provides an opportunity to see precision agriculture equipment, guidance systems and yield monitors currently in use in the San Joaquin Valley. Field trials of variable seeding rates, soil amendments, fertilizers and growth regulator treatments will be on display. Tour discussions will include economics of variable rate technologies, research objectives and future opportunities.

Participants

BeeLine Technologies
CSTARS
NASA
Bill Son Harvesting
Blair Air Service and Blair Ground Services
Nick Groenenberg, Consulting
OKSI
UC Cooperative Extension, Kings & Tulare Counties
Britz Fertilizer
Jim Hill, Consulting
Resource 21
USDA-ARS—Shafter

Tentative Agenda

8:00 to 9:00 AM	*View Equipment and opportunity to talk with representatives*
9:15 to 10:30 AM (First Stop)	*Precision Ag Tools and Technology—Dr. John Ojala, USDA-ARS Shafter*
	Remote Sensing / Images—Nahum Gat, OKSI Corporation
	Variable Rate Soil Amendments—Dr. Richard Plant, UC Davis Agronomy
	Variable Seeding Rates / Variable Rate Fertilizers—Bruce Roberts, UCCE and Brock Taylor, BeeLine Technologies
10:45 to 11:30 AM (Second Stop)	*Technology Applications and Opportunities—Dr. Susan Ustin, UC Davis*
	Pest Management Trials—Dr. Larry Godfrey, UC Davis Entomology
	Variable Rate Growth Regulator Trials—Matt Bethel, NASA Stennis Res. Ctr.
	A Grower's Experience with Variable Rate Technologies—Ted Sheely, Ted Sheely Farms

For More Information and Maps to the Field Site:

Contact Bruce Roberts (UCCE Kings County) or Steve Wright (UCCE, Tulare County) - phone #'s on address page of newsletter