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IN THIS ISSUE

COTTON INSECTS

Like the recent activity by the stock market, much of our cotton crop has been making adjustments to its fruit load once physiological cutout was reached. Much of the area's irrigated crop has achieved cutout as defined as 5 or fewer Nodes Above the uppermost mainstem White Flower (NAWF). Most of the dryland fields and marginally irrigated fields reached cutout several days ago.

Remember that the COTMAN expert cotton system recommends that insecticide treatments can be terminated for fruit-feeding caterpillars once 450 heat units (HU) have accumulated since cutout. The same is true for Lygus bugs except their safety point is 350 HUs past cutout for protection from boll penetration and only 250 HUs for protection from bug-induced shedding. Also, producers can consider applying harvest aids once cotton has accumulated 850 HUs after cutout. There is no sense in waiting any longer unless you enjoy watching your open bolls "weather" on the stalk.

Are Bolls Safe Yet?

HU's after flower, bolls begin to resist:

Bollworm (450 HU) Lygus & Stinkbug (350 HU)

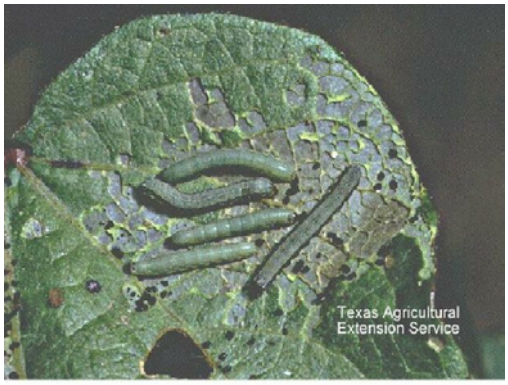
I have seen a lot of blue plastic pipe in fields over the last several days. Obviously, many growers are now rushing to put out their last watering on furrow-irrigated fields. Unfortunately, I have noticed where some growers are running late in getting this water on their fields. Plants have responded by shedding squares, blooms, and bolls the size of nickels. Some of this shed was going to take place eventually anyway. But in some instances, shed has been excessive. Some of this shed has consisted of insect-damaged fruit, while the rest has been unblemished fruit. If you count what remains after this episode of shedding you should soon realize that there is still a lot of potential harvestable bolls left.

Where larger bolls are prevalent, I would expect that an average of 5 bolls per plant would yield about 1-½ bales per acre with a

plant population of 50,000 per acre. In fields with smaller bolls, you could expect a little over a bale per acre. Unfortunately, no one has figured out how to make a cotton plant hold on to all fruit it produces until harvest. Just think, five bale cotton. Now wouldn't that be something!

If you have a field or two that is still exhibiting a lot of horsepower, physiological cutout may occur late enough that you will have to follow the weather-based rules of COTMAN. We call this seasonal cutout. Repeating from last week-- these dates for a 50% probability level are close to August 5 for Dimmitt, August 10 for Plainview, August 15 for Lubbock and August 20 for Lamesa. Elevation differences between these locations are the primary causes for these differences. So it is pretty much over for the Plainview and north area by this weekend. White blooms and squares for this area have become meaningless.

Beet armyworm (BAW) infestations have persisted in the area as more egg masses are found every day. The problem area is also expanding into Hockley, the rest of Lubbock, and Hale County. Fields that have already been treated remain protected for 7-10 days when Denim, Steward of Tracer are used and up to two weeks when Intrepid is used. When selecting a beet armyworm material you must take into account several factors including: 1) level of aphids present, 2) natural enemies present, 3) residual activity needed, and 4) whether or not bollworms are a factor.



Larger beet armyworm

If aphids are a concern and lady beetles are present in good numbers, you wouldn't want to use Steward. Denim too is hard on lady beetles but also on many of the other important predators as well. Intrepid and Tracer would have little direct effect on predators.

WEST TEXAS AGRICULTURAL CHEMICALS CONFERENCE

The 50th Annual West Texas Agricultural Chemicals Conference is scheduled for Wednesday, August 28, 2002 at the Lubbock Memorial Civic Center, 1501 6th Street. Registration begins at 7:00 a.m. and the program starts at 8:00 a.m. There are 5 CEU credits for private, commercial and noncommercial applicators and 6.75 CEU credits for Certified Crop Advisors.

Intrepid would have the longest residual activity which would pay big dividends under conditions of a continuous egg lay. On the other hand, Intrepid at the rates labeled has little activity against bollworms. Tracer, Denim, and Steward are all fair for bollworm control but fit better when bollworm numbers are not high and their size is small. Under conditions of mixed species where both bollworms and beet armyworms are present at damaging levels, I would have to recommend a combination of a pyrethroid and one of the above beet armyworm materials be used. Remember that these beet armyworm materials perform best when targeting smaller worms, 3/8" or smaller.

Bollworm infestations are on the increase again. We did not get much of a breather between cycles because of the long length of time of the first wave of activity. These infestations are across the region ranging from below threshold levels of 500 to 8,000 larvae per acre in infested fields to problem fields with 9,000 to 22,000 per acre. The egg lay continues with counts as high as 70,000 to 100,000 per acre. So don't expect this cycle to go away any time soon.

While there has been somewhat of an increase in caterpillar predators this last week, their

Lady beetle larva

numbers are still low. These would be your minute pirate bugs, damsel bugs, lacewings, big-eyed bugs, assassin bugs and spiders. I wouldn't count on these to hold the line in most situations where there is considerable bollworm egg-laying pressure. If a problem field develops now, you probably are going to use one of the pyrethroids---probably the cheapest you can get. If for whatever reason you elect to use one of the newer beet armyworm materials such as Tracer, Denim or Steward, you can expect the need for two applications to match the results of a pyrethroid application.

Several kinds of lady beetles

I want to emphasize again how we arrive at our thresholds for treating bollworms. We scout fields picking plants at random to monitor for worm activity. We do not hunt for bollworm–infested plants by walking down the row looking for flared squares and "snakes" in flowers. This will significantly skew you counts upwards. We also don't just check the taller plants as these have a higher probability of being infested than an average-sized plant. Treatment levels are expressed as worms per acre, hopefully only small worms per acre. You get this number by dividing the worms you find by the plants checked and multiply this by the number of plants per acre in that field. If most worms are less than ¼" long and you are a neophyte at checking for bollworms or just can't seem to see these small critters, then use 5,000 to 6,000 per acre as your trigger. If on the other hand you are good at finding these small worms, then use 10,000 to 12,000 per acre as your trigger. Remember, it is not the infestations at or around threshold that will get you into serious trouble, it is the 20,000 plus situations that will clean your plow. Don't miss these.

This looks like it could be a good year for those that planted Bollgard cottons. If you have two cycles of bollworm activity and don't end up needing to treat, you will be well ahead of the game. You also won't have used a pyrethroid and taken a chance at flaring aphids---an additional expense. As cotton leaves age and infestations target blooms and bolls instead of squares, you can expect lesser levels of control from Bollgard varieties. Treat Bollgard fields for bollworms only if you meet threshold criteria and larvae are 3/8" and longer---signifying they are surviving the Bt toxin expressed by the plants.

Aphid numbers have continued to increase and move out of the terminal. Many fields have been sprayed for this pest over the last week. Many more treatments will follow. While aphid problems can be found in many situations, it is clear that the earlier pyrethroid applications for bollworms "spiked" their activity. Fields that received multiple applications of malathion for weevil eradication also have their share of aphids. I would expect that we have yet to see the peak for aphid numbers in our region.

We did initiate our aphid control test earlier this week. Unfortunately, we received a brief, light rain on the test plots almost immediately following the application of insecticides. While this will provide an opportunity to evaluate rainfastness, it may reduce efficacy and/or residual activity of the insecticides. Preliminary results from the 3 day post treatment counts indicate that the three Intruder rates ranging from 0.6 to 1.1 ounces/acre provided 96-98% control. The two Centric rates provided 89-90% control indicating that a reduced rate of 2 ounces per acre of the 25WG formulation would provide as good a knock down as the suggested 3 ounce rate. Eight ounces of Bidrin provided 83% control while

the 5.3 ounce rate only 75% control. Trimax control ranged from 80-87% and Furadan at 8 ounces provided 97% control.

Aphids controlled **Aphids untreated**

I'm still recommending several products for aphid control including: Bidrin and Furadan representing the older materials and Centric and Intruder representing the newer materials. Bidrin is still exhibiting erratic control making it difficult to sell this product over Furadan or some of the newer materials. Use only the 8-ounce/acre rate. Higher rates of Trimax look fairly good too. Furadan no longer earns 5 stars for consistency either. The loss of consistency with an insecticide has often been the precursor to resistance problems.

Furadan will be the choice for many growers who want a cheap application by airplane. There is a 14-day reentry restriction and posting requirement with this material. Intruder is still my favorite for ground application at a rate of 0.6 ounces per acre. We have limited experience now with this rate by air. At three days it has looked very good but like most materials we have used, it is not taking out the aphids infesting squares and blooms. I don't know why?? Most applicators would be apprehensive in using the lower Intruder rate by air. Bayer CropScience appears to be backing the 0.8 ounce rate of Intruder by applied by ground equipment or aircraft.

Lygus bug numbers remain below treatment levels in most instances. However, there are now some fields that have infestations that have reached or exceeded our threshold of 2 adults or nymphs per 3 foot of row as sampled using the beat sheet method. Since much of the cotton is in the boll-filling stage, I would suggest holding off a treatment, even if this threshold is met if less than 20% of the bolls examined that were quarter in size had Lygus damage. Don't rely on external damage symptoms though. Any boll that has an external blemish that you suspect is Lygus related should be opened and examined for either a callus (bump or wart) on the inside of the carpal (boll wall) or for evidence of seed feeding or lint staining. But if there are still a lot of squares present in your field, do not wait until the percent damaged boll number exceeds 20%. The reason for this latter advice? Lygus actually prefer feeding on squares rather than bolls. Also, if Lygus numbers exceed the threshold by 2 or more per three row feet, I wouldn't wait for boll damage confirmation to treat.

When the infestation is represented solely by adults, the field may or may not develop a problem. Often times adults will move into a field for a few days if their nearby preferred host is disturbed (such as cutting an alfalfa field). They may move back to the alfalfa after a few days of growth and never lay any eggs in cotton. I would recheck this type of field in a few days to see if any nymphs appear. If, however you find both adults and nymphs present you can be assured that a resident infestation has been established and will need to be dealt with.

There are quite a few insecticide choices including several of the pyrethroids, Orthene of Address, Bidrin, dimethoate insecticides, Trimax/Provado, and Vydate. If you have a building problem with lots of reinfestation pressure, I would go with a pyrethroid. If, on the other hand, you have a situation where a

single shot will suffice, then consider Orthene/Address.

The boll weevil eradication program has held its course in spite of increased problems with secondary pests such as beet armyworms and cotton aphids. The Southern High Plains Zone remains at a more conservative spraying scheme, treating only 40 acres each in the field catching one or more weevils and the adjacent one. Only a single work unit in the Northern High Plains Zone was added to this more conservative approach. This Hale County area is bordered on the east by I-27, then south by the Lubbock County Line, then west by the Lamb County line and north by HWY 37.

Trap catches remain low indicating that weevils have not been successful at increasing their numbers. The limited number of fields needing treatment each week also indicates that weevils have not been able to move out and establish new populations in more fields. Hopefully, the Foundation will be able to restore treatment criteria to their original settings by August 20th. This is about the time that weevil adults begin to move from field to field quite a bit in search of a rapidly diminishing supply of food needed to make it through the host-free winter-spring period.

Have you seen me recently?

Average number of boll weevils per trap per week accumulated over 16 weeks. (Week ending August 4, 2002)

Zone	2002	2001	2000
NWP	0.00014	0.01	0.224
WHP	0.0003	0.016	0.45
PB	0.0009	0.015	0.466
NHP	0.004	--------	--------
SHP	0.002	--------	--------

The changes in treatment criteria the past several days have resulted in a reduction in acres treated this past week, especially in the Southern High Plains Zone, where acreage was cut in half from the previous week's. Most work units have zero acres treated this past week. **JFL**

Acres sprayed this past program week (ending August 4, 2002) and accumulative acres sprayed to this date.

Zone	Week ending 8/4	Accumulative	Acres in zone
NWP	1,180	6,757	482,547
WHP	5,868	23,075	744,689
PB	1,556	8,686	489,980
NHP	7,900	109,487	445,450
SHP	11,335	271,202	1,090,915

LATE SEASON IRRIGATION MANAGEMENT FOR COTTON

Since irrigation is one of the most expensive crop inputs in South Plains cotton production, and since crop moisture status has important implications for crop yield, fiber quality, and harvest management, late-season irrigation management can be a key economic decision. There are several factors to consider, including whether the yield is from an early or late crop, irrigation system limitations, soil moisture storage, plant and climate-driven water demand, and rate of heat unit accumulation (and therefore rate of boll maturation).

Irrigation Method. An important advantage to center pivot irrigation systems, including Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA), and subsurface drip irrigation (SDI) systems, is that irrigation application rates are easily adjusted to meet crop water requirements. With these systems, it is relatively easy to manage soil moisture to provide adequate plant-available-water to support boll filling, without over-watering which may support late season rank growth. If the crop seems to be drying down too quickly, a light irrigation can be applied rather quickly to prevent excessive plant stress. Application depth is controlled by adjusting the speed of the sprinkler/LEPA system (or the run time of the subsurface drip system).

With raw-water irrigation systems, including gated pipe and flexible irrigation tubing, timing the last irrigation application can be more difficult. Depending upon the field slope and layout, soil permeability, length of row, etc., it can be more difficult to control irrigation application depth across the field and to make shallow applications. Gross application depth in a furrow irrigation system can be estimated through the following equations:

(In-furrow) stream size (gpm) =	Total flow in pipe in gallons per minute (gpm)
	Number of furrows in set

Gross Application depth (in) =	1155 X stream size (gpm) X run time of set (hours)
	Furrow length (ft.) X wetted furrow spacing (inches)

Application depth is controlled by adjusting the in-furrow stream size (total flow, gate opening size, and number of furrows in the set) and by the run time per irrigation set. Long furrows and/or combinations of sandy soils/flat slopes or clay soils/excessive slopes make it a challenge to apply the desired amount uniformly over the field. Surge valves and cut-back management can be very helpful in improving application uniformity and level of control in application depth. More information on managing furrow irrigation systems is available on-line from University of Nebraska Cooperative Extension at http://www.ianr.unl.edu/pubs/irrigation/g1338.htm and Kansas State University Cooperative Extension Service at http://www.oznet.ksu.edu/library/ageng2/L913.PDF

Soil Water Storage Capacity. The amount of plant available water stored within the root zone is primarily determined by the soil texture and by depth of the root zone. In a deep soil, cotton may have roots as deep as 5-6 feet, but cotton generally extracts most of its water from the top 2-3 feet of soil. If there is a hard pan, caliche layer, dry layer, water table, or other root-restricting layer in the soil, the rooting depth will often be limited to the depth of the restricting layer.

Available Water Capacity by Soil Texture
(Inches water/Foot of soil)

Coarse Texture Fine Sand and Loamy Fine Sand	Moderately Coarse Texture-Sandy Loam and Fine Sandy Loam	Medium Texture - Sandy Clay Loam, Loam, and Silt Loam	Fine Texture-Clay, Clay Loam, or Silty Clay Loam
0.6 - 1.2	1.3 - 1.7	1.5 - 2.1	1.6 - 2.4

Source: USDA Natural Resources Conservation Service. http://www.mt.nrcs.usda.gov/pas/soilmoisture/guideline.html

More specific soil water storage information can be determined by soil physical analysis, or from the USDA-NRCS (formerly Soil Conservation Service) Soil Surveys, available for most counties. Plant available water storage capacity listed by USDA-NRCS for representative soils from the South Plains area are shown below:

Permeability and Available Water Storage Capacity by Soil Type			
Soil Name	**Depth of layers (inches)**	**Permeability (inches/hour) ***	**Available Water Capacity* (Inches water/inch of soil)**
Acuff	0-12 12-38 38-80	0.6-2.0 0.6-2.0 0.6-2.0	0.12-0.18 0.14-0.19 0.10-0.16
Amarillo	0-14 14-46 46-80	2.0-6.0 0.6-2.0 0.6-2.0	0.06-0.10 0.14-0.18 0.10-0.15
Brownfield	0-24 24-64 64-80	0.6-2.0 0.6-2.0 6.3-20.0	0.15-0.17 0.10-0.12 0.05-0.07
Olton	0-10 10-42 42-80	0.6-2.0 0.2-0.6 0.2-0.6	0.15-0.20 0.14-0.19 0.10 -0.16
Pullman	0-12 12-46 46-80	0.2-0.6 <0.06 0.06-0.2	0.14-0.19 0.12-0.17 0.10-0.16
Randall	0-62	<0.06	0.12-0.18

*Permeability and soil water holding capacity are affected by organic matter content and soil structural condition; hence the actual soil properties may be somewhat different from these stated values.

Additional information on determining soil moisture storage is available online at:
Estimating Soil Moisture by Appearance and Feel (Univ. of Nebraska)

Estimating Soil Moisture by Feel and Appearance (High Plains Underground Water District No. 1 PDF)
Soil Water Measurements: An Aid to Irrigation Water Management (Kansas State Univ., PDF)

Crop Termination. The goal of late-season irrigation management in cotton is to provide adequate moisture for boll filling and maturation without excessive moisture, which can promote re-growth. Generally speaking, (and depending upon heat unit accumulation), it takes about 45-55 days to carry a bloom to open boll, longer for late-season blooms. We want to provide adequate soil moisture through this period, and allow for soil moisture depletion beyond that point. According to Randy Boman (August 31, 2001 *FOCUS on Entomology*), "COTMAN uses 850 heat units past bloom as a point at which a bloom can make a "normal" boll. In the High Plains, heat unit accumulations of 750 past bloom will probably make an "acceptable boll" that may not have "normal" lint production or may be of lower quality (low micronaire)." This translates into a requirement of about 4-8 weeks of good soil moisture to mature the last harvestable blooms. Unless early season fruiting site losses demand development of a late crop, soil moisture should be maintained for 4-8 weeks after cut-out (NAWF<5).

Long-term average heat units (DD60) by month:

Production Regions	**Months**						**Total**
	Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	
Southern High Plains	78	270	493	594	540	313	2288

Source: Cotton Production in Texas. http://aggiecotton.tamu.edu/21.htm

Crop water demand is affected by crop growth stage and climate (air temperature, wind, humidity, and solar radiation). Cotton crop water demand and average precipitation are shown below:

Estimated Cotton Crop Water Demand based upon May 1 Planting, Full Irrigation, and long-term average Reference Crop ET Demand* (inches/month)							
City	May	Jun	Jul	Aug	Sep	Oct **	Estimated Annual Water Demand (inches)
Abilene	1.15	2.87	7.7	8.15	4.05	2.2	24 - 26
Lubbock	1.21	3.08	7.97	8.26	3.76	1.25	24 - 25.5
Midland	1.25	3.08	8.80	8.35	4.33	2.29	26-28

* Crop water demand is zero between harvest and crop emergence, but there may still be evaporative losses from the soil.
** Crop water demand will essentially cease at crop termination.

Average Historic Rainfall (inches/month)													
City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**
Abilene	0.87	0.9	1	2.2	3.25	2.5	2.25	2.25	3.5	2.25	1.25	0.85	**23.07**
Lubbock	0.5	0.56	0.87	1.22	2.73	2.56	2.17	2.05	2.53	2.03	0.61	0.61	**18.44**
Midland	0.5	0.65	0.5	0.75	2	1.5	2	1.75	2.5	1.5	0.6	0.5	**14**

Reference: Texas ET Website:
http://texaset.tamu.edu/

Additional resources on late season irrigation management for cotton and other crops include the following:

Deciding on the Final Irrigation (University of Arizona Cooperative Extension)
http://ag.arizona.edu/crops/cotton/cropmgt/final_irrigation.html#table1

Irrigation scheduling that aides crop termination. California Cotton Review, Volume 52. University of California Cooperative Extension.
http://cottoninfo.ucdavis.edu/images/ccraug99.pdf

Focus on Entomology, August 31, 2001 Issue.

Focus on Entomology, August 30, 2000 Issue

Predicting the Final Irrigation for Corn, Grain Sorghum and Soybeans (Kansas State Univ. PDF)

Predicting the Last Irrigation for Corn, Grain Sorghum and Soybeans (Univ. of Nebraska)

Soybeans - Crop Irrigation. University of Arkansas Cooperative Extension Service.
DP

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