

# FOCUS on Entomology

For South Plains Agriculture

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# **COTTON INSECTS**

#### Bollworm infestations are finally winding

**down** as producers treat their last fields. Some of these latest applications were more like "revenge shots" as worms were quite large by the time they were discovered. Some of the earlier applications were also unnecessary as caterpillar numbers were well below any nominal treatment threshold. Sometimes applications appear to target fields based on a subjective assessment of damage while other July 26, 2002

fields are treated solely because other fields in the area needed treatment. Lesson to be learned here? Scout fields using an acceptable objective monitoring method and only treat those fields meeting threshold criteria. Don't wait until worms are 5/8" or larger to treat. Control declines as worms increase in size, especially as these larger worms spend more time in unexposed positions. Besides, by the time they are this big, they've already damaged a lot of fruit.

Most scouts look for damage and worms. Some size or age the worms realizing that larger worms are harder to control. But not too many scouts divide worms they find into "exposed" and "unexposed" categories. I've been doing this for years and it certainly has helped me objectively evaluate insecticide control. In fact, I treat fields based on the number of  $\frac{1}{2}$ " or smaller exposed worms, not based on total worms found. What is an unexposed worm? Caterpillars found in white blooms will be tucked away by the time the plane arrives. Also included worms in pink blooms, those between the calyx and boll wall, under bloom tags and those that for the most part are inside fruit. Now I know some of these will move out to exposed positions by the time a plane drops its load on the field but probably an equal number will move to unexposed positions during that time as well.

This latest bollworm flurry was probably the heaviest I have ever seen for this time of year over this much territory. It covered the Rolling Plains, a significant part of the High Plains, Oklahoma and parts to the Far West Texas area south of us. These were no home grown caterpillars, having arrived in the area as migrating moths. These moths were like smallscale bombers, dropping their arsenal on many fields of unsuspecting producers. Low temperatures, high humidity and lower beneficial insect numbers than we needed greatly contributed to the establishment of this early infestation. The stage of cotton was also very vulnerable to fruit loss and these resulting worms took their share of squares and small bolls.

How was control? Not as good as I would have

liked. Since many worms were tucked away, out of harms way, insecticides often failed to "take them out". Even some of the pyrethroid applications were marginal. Tracer and Steward treatments did not fare any better and cost much more than the cheap pyrethroid applications. Will there be a price to pay? Use of pyrethroids for worm control can often increase

aphid problems by reducing predator numbers. Most of this aphid infestation flaring though would come from an increase in reproductive rates of these aphids. Somehow the pyrethroids increase this rate either directly or by effects on the leaves they feed upon. <u>And by the way, all</u> <u>pyrethroids flare aphids!!</u>

Will Leverage insecticide alleviate this problem? As you know, Bayer CropScience formulated Provado in with their pyrethroid, Baythroid, in an effort to alleviate this flaring problem. Provado is labeled for aphid control. Our experience would indicate that this formulation is less than reliable in accomplishing its task of eliminating aphid flaring following a bollworm control application. I can look back at an earlier attempt that we did in mixing Bidrin with a pyrethroid. By doing so we were able to use a lower than maximum labeled rate of Bidrin and still achieve 95% plus control. Unfortunately there were two consequences to this application. The reduced Bidrin rate also

reduced residual activity but more importantly the pyrethroid still flared the remaining aphid infestation.

Back to bollworm insecticide performance. We were not entirely happy with the results we got from both Steward and Tracer. These are high priced pyrethroid alternatives that do not directly flare aphids and are "softer" on beneficial insects. Tracer has coverage issues

and both insecticides are just not equal to pyrethroids for bollworm control. Brant Baugh (Lubbock IPM agent) and I did succeed in getting out a bollworm test with 14 treatments which included Steward, Tracer, Denim, Curacron, Larvin, Asana, Decis, Karate Z and various other mixtures. We'll let

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you know what happens.

This was a good year for Bollgard cottons in areas that experienced this earlier bollworm problem. Especially in those situations where these infestations went undetected until worms would have been  $\frac{1}{2}$ " or larger. Remember, we use the same thresholds for these fields but base our decisions on 3/8" or larger worm numbers. If a significant number of smaller worms are in blooms, then the risk of a breakthrough is great. Otherwise, this technology has successfully prevented economic damage thus far.

When will the next wave of bollworm activity hit our area? Well the migration did extend over a two-week period, depending upon where you are located. Trap catches of moths have fallen off this past week in the Lubbock, Hale and Gaines county locations run by Dr. Megha Parajulee's (Lubbock Experiment Station Cotton Entomologist) group. Most worms are cycling out of cotton to pupate in the soil. In



another two weeks, plus or minus a few days, moths should emerge and begin laying eggs. This means we could see an upsurge of field activity as we approach August 10<sup>th</sup>. This could also hold true for the areas where corn is grown. As you know, corn is preferred over cotton by bollworms (a.k.a. corn earworms) and holds their attention until corn dries down and is no longer suitable for oviposition. Anyway, don't take my predictions as gospel. Scout fields for developing pest problems on a regular basis and you won't be unpleasantly surprised.

**Aphid numbers continue to increase** with larger hot spot areas reported. Beneficial insect numbers are generally not high enough to prevent a problem from developing if aphid

infestations "take off". But with hotter days in the forecast, maybe aphids will be held in check. We currently recommend treatment when aphids average 50 per leaf or more across the field.



Aphids infesting terminal

We also look at a top fully expanded leaf and a middle mainstem leaf on each plant checked. When there are 50 aphids on average per leaf, honeydew is not obvious, especially from the turnrow or speeding pickups. If you can easily see "glistening" cotton, then you waited too long and aphid numbers are now 100 or much more per leaf. Control will be more difficult under these circumstances and selection of an insecticide and rate will be more critical.

There are some interesting alternatives for control that are available to producers this year. We still have Bidrin, which can be very effective sometimes. Be sure to maximize coverage and use the maximum-labeled rate of 8 ounces per acre. Furadan is also available under a section 18 with no restrictions in place to delay applications. If you want to use this insecticide then go right ahead. But before you do, consider this. All Furadan treated fields must be posted. Reentry following an application requires protective clothing for 14 days. This includes the wearing of rubber gloves. This is no fun in hot weather and makes "bug checking" that much harder. Also, with lots of fields to be irrigated this coming week, consider the safety of your workers. Furadan requires the use of closed mixing and loading systems for both aerial and ground applications. Only two applications per season are permitted with Furadan. On the other hand, both Centric and Intruder carry the signal words "caution" and have an REI of only 12 hours. No posting is required and these products are "softer" on "beneficials" than either Furadan or Bidrin.

Rates to use are 2 ounces per acre for Centric and 0.6 to 1.1 ounces per acre for Intruder. Bayer CropScience will push the safer (performance consistency) rate of 1.1 ounces (a "blow away rate") in its launch season but I have seen ground-applied tests at the lower rate that were fantastic. Centric can work very well but may not have the residual activity level of Intruder or even Furadan. Provado/Trimax can be effective at times but control in our area is often lower than that of Bidrin, Furadan.

Centric or Intruder. Residual control levels also are less.

Lygus bug numbers remain below treatment levels in most instances. There are more reports of fields with near threshold levels of this pest complex, especially some areas north of Lubbock. With most cotton approaching peak bloom or later in their development, it would behoove producers and consultants to watch more carefully the progression of these pests. They can be especially damaging to small, soft bolls. We are rapidly approaching or have approached the time when square protection is no longer a viable economic decision. Not enough time left to make a good boll for harvest. This quarter inch long bug (both the western tarnished plant bug and the pale legume bug) probably cause similar damage and certainly



look about the same to the untrained eye. Until we know better, that will be the assumption we will work under. Once fields reach heavy

Western tarnished plant bug adult

bloom, the threshold is two Lygus adults or nymphs per 3 foot of row as sampled by a drop cloth or beat sheet. You should look at damage as a final determinant as to whether or not to treat. The presence of wingless individuals means that reproduction took place in your field. If only winged adults are present then it is possible they may not stay long. Scout often! Some folks will use visual whole plant counts while others will use a seep net. Our thresholds are based on the drop cloth method of sampling. We do not have confidence in the other methods of sampling at this time.

Boll damage must be taken into account. Don't just look for lesions on the outer surface of the boll (carpel) wall. Lygus must penetrate the boll wall to be successful in damaging the lint and/or seed. Look for the callus (wart) on the

inside of the boll wall as evidence of this penetration. Only count these boll or bolls with obvious lint staining as damaged. Squares that have been fed on by Lygus and are in the "candle" stage of development will display obvious external yellow "wet" spots. Blooms will look "dirty" where the bugs have fed on developing pollen in squares.



Lygus boll damage

Several insecticides can be effective against Lygus, depending upon your situation. If shortterm control is needed then Bidrin, Provado (Trimax), dimethoate, and Vydate may be your ticket. If longer control were needed than one of the pyrethroids or Orthene would be your choice. I have not looked at Intruder for Lygus control but it is supposed to be good at the higher rates. Steward would be ok for suppression if being used primarily for bollworm control. We also list Parathion, Penncap-M. and Lannate as control alternatives in our guide. I don't know how some of the above products will perform as most studies have involved the tarnished plant bug species, not the one commonly found here.

## The boll weevil eradication program

remains on track, keeping weevils at low levels and preventing them from spreading across more acreage. Producers in the two newer zones will need to be extra vigilant on those fields being treated and watch out for any possible aphid increases. Most acreage across the High Plains is not being treated so that the threat of area-wide aphid problems enhanced by the eradication program will probably not materialize. Beet armyworm activity remains at very low levels in fields and trap catches in the three older programs are 11 to 43-fold lower than those reported in 2000, a bad beet armyworm year. Trap catches of beet armyworms in the two newest zones are 12 to 17-fold lower than last year. Producers should

> still keep an eye peeled for this pest, especially in fields with careless weed (pigweed) problems. **JFL**

Average number of boll weevils per trap per week accumulated over 14 weeks. (Week ending July 21, 2002)

Zone	2002	2001	2000
NWP	0.00012	0.013	0.142
WHP	0.00029	0.019	0.523
PB	0.00008	0.019	N/A
NHP	0.004		
SHP	0.002		

Acres sprayed this past program week (ending July 21) and accumulative acres sprayed to this date.

Zone	Week	Accumulative	Acres in
	ending		zone
	7/21		
NWP	475	3,968	510,670
WHP	6,338	13,013	763,679
PB	2,176	5,217	526,159
NHP	20.708	92,424	551,173
SHP	44,191	237,664	1,063,083

## **CORN AND SORGHUM INSECTS**

Southwestern corn borer flights are picking

**up rapidly,** and non-Bt corn should be scouted for eggs and small larvae. Greg Cronholm, Pest Management Agent in Hale and Swisher counties, operates a computer model that predicts percent emergence of moths from the pupal state. According to Greg's model for the Earth area, we can expect 50% of the adults in this flight to have emerged by July 31. August 5 is the date when 75% of the adults will have emerged. And unlike some models, Greg's is verified by actual insect collections. It can be trusted.

#### Banks grass mites are still around and

increasing in many fields. If you intend to spray for corn borers, it would be a good idea to add a miticide like dimethoate to the tank.

**Corn earworms (CEW) have not gone away either.** CEW (a.k.a. headworm, bollworm) egg deposition has been lighter in the past week, but sorghum is still at risk. We expect another generation of moths in a week or so. You can find more information on headworms in our sorghum guide, but here is the economic threshold table.

Per	Market value of crop (\$ per acre)							
acre	100	125	175	200	225	250	275	300
control								
cost (\$)								
	Number of headworms per head							
6	1.5	1.2	1.0	0.9	0.7	0.6	0.6	0.5
8	2.0	1.6	1.3	1.1	0.9	0.8	0.8	0.7
10	2.5	2.0	1.6	1.4	1.1	1.1	1.0	0.9
12	3.0	2.4	1.9	1.7	1.5	1.4	1.2	1.1

A beat bucket is a good way to sample headworms quickly and accurately. **RPP** 

## **COTTON AGRONOMY**

**Overview.** The cotton crop has really taken off "like a rocket" in many places with adequate rainfall/irrigation over the last few weeks. Certainly, we have pockets of various problems, but this crop has some real potential. Early July temperatures were somewhat below normal, but since the 9<sup>th</sup>, have been reasonably close to normal. As for July heat unit accumulation at Lubbock, we are now at about 450 for 2002, compared to about 480 for the 30-year long term average (LTA). The total heat unit accumulation from May 1 is 1316 for



2002 versus 1426 for the LTA. After looking at the COTMAN data from three replicated systems trial locations, I observed that many varieties entered bloom at 7-10 nodes above white flower (NAWF). This indicates that we have considerable yield potential at these sites. Keeping adequate water on this crop will be essential. The South Plains ET Network data indicate that the average water use for cotton in the blooming stage has averaged about 0.32 inches per day for the last 3-7 days. Assuming that bollworms don't take much yield and we can get some help from mother nature in the form of timely rainfall, we have great potential in many fields.

The dryland crop is yet another story. It is a very mixed bag and we could certainly use some more rainfall to help this situation. We are still sorting out how many dryland acres were actually failed by producers in the drought-affected counties. Hopefully, we will have a summary of the total failed dryland acres for the next issue of FOCUS. The FSA offices are still tallying the numbers in several counties.

**Bacterial Blight.** I have received calls concerning bacterial blight in some fields this year. Dr. Terry Wheeler (Experiment Station plant pathologist at Lubbock) has also indicated that she has received some calls.



See additional pictures at:

## http://lubbock.tamu.edu/ipm/AgWeb/newsletters /Focus2001/Template/August%2010/imageGalle ry\_Aug10.html

Many older varieties are resistant due to genes, which had been identified and incorporated into breeding lines. More recently, many transgenic varieties have not generally been as resistant as their conventional recurrent parents (refer to bacterial blight ratings). Leaf symptoms are angular, dark, shiny spots, which follow the outline of the cells, hence the name Angular Leaf Spot. Symptoms on bolls appear as small, sunken, rounded to irregular, watery lesions. As the infection progresses, the lesions will enlarge and may blacken and look waxy. Once the carpel wall of the boll is breached, secondary microorganisms can colonize the boll. Subsequently, the lint may be discolored, resulting in staining and thus lower grades. This disease can be very devastating to susceptible varieties given the correct environmental conditions.

These bacteria may originate from debris of diseased cotton plants or planting seed. Plants may get infected when bacteria from infected plants are carried by insects or when infested soil gets splashed up onto leaves, bolls or other plant parts. Bacteria may enter stomata on the leaves, or wounds caused by insects, hail, blowing sand, equipment, etc. Boll infection often results in contamination of seeds, which may then carry the bacteria to the developing seedling the next year. Acid delinting of seed has been useful to reduce the carryover to the next generation of plants. Only disease-free fields should be used as seed blocks. Burial of infested debris should help reduce potential for problems in the next crop.

**Verticillium Wilt.** Dr. Wheeler reported a while back that some verticillium wilt symptoms were noted in some research fields at Halfway. With the recent warm up, this should not be an issue. If anyone has observed these symptoms, perhaps the following will help. The disease is favored by cool air, soil temperatures and excessively moist soils. High N rates tend to promote the disease. The organism is present in the soil and first infects roots, then colonizes the xylem (water conducting) tissue in the mainstem. Irregular



chlorotic areas appear between the veins and on the margins of the first true leaves, which result in a mottled appearance. Defoliation and plant death can occur if environmental conditions favor disease development. Many modern varieties are reported to exhibit at least some tolerance to the disease. **RB** 

# COTMAN PLANT MONITORING TOOL

With most fields blooming now, SQUAREMAN use should be pretty much over with BOLLMAN now taking its place. Last



week we explained how to collect BOLLMAN data, i.e., Nodes Above White Flower (NAWF) and

temperature data for heat unit

calculations. As cotton approaches cutout, growth slows and white blooms appear to be nearing the terminal. Well actually they are as terminal growth comes to a screeching halt. Once NAWF reaches a stable 5 or lower number, then physiological cutout has occurred. If cutout is delayed until late in the season then we have to rely on seasonal cutout dates to calculate the most likely crop of bolls we will be able to mature for harvest. By using BOLLMAN, we can calculate roughly when it is safe to stop spraying for bollworms (450 heat units past NAWF=5), when a boll is safe from Lygus penetration (350 HU past NAWF=5) or boll shed from Lygus (about 250 HU past NAWF=5) and crop termination (harvest aid applications) (850 HU past NAWF=5).

Growth curves, as derived from data collected using COTMAN, provide a composite picture of all factors influencing plant development including: planting date, plant density, cultivar, soil, water, weather, other growing conditions and pest problems. When interpreting growth curves we consider square retention, comparison with the Target Development Curve (TDC), and the latest possible cutout date (seasonal cutout or weather limited cutout date). When evaluating growth curves we consider alignment in reference to the TDC, general slope, apogee or peak of curve (when first flower appears), change in slope between sampling dates and cutout date relative to weather-based rules.

I am presenting a figure of actual growth curves in a plant density study as an example. It shows the curves prior to first flower, the apogees, the decline in NAWF toward cutout, the horizontal line representing physiological cutout (NAWF=5) and the vertical line representing seasonal cutout for the Lubbock area. This is when all blooms at that date have a 50% chance of making a harvestable boll



based on long term weather data. There are three plant density generated growth curves compared to the TDC or idealized growth curve. Next week I will continue TDC interpretation including what this specific graphic means. **JFL** 

# **IRRIGATION SCHEDULING**

Localized storms continue to produce patchy precipitation on the South Plains. During the period from July 18 to July 24, South Plains Evapotranspiration Network (SPET) weather stations recorded precipitation in the amounts of 0.01 inches at Lubbock, 0.10 inches at Halfway, and 0.0 inches at Lamesa. Other weather stations in the area report very localized precipitation near Lamesa, Lubbock, and Seminole. Crop water use estimates for the same time period are indicated in the table below. superior product. Hooey. The New England Journal of Medicine has published a very good study on the effectiveness of repellents. Before I give you the score card, I will quote from the article concerning the safety of DEET. The article, Comparative Efficacy of Insect Repellents against Mosquitoes, was written by M. S. Fradin, M.D. and J. F. Day, Ph.D. and published in the July 4

issue.

"Despite the substantial attention paid by the lay press every year to the safety of DEET, this repellent has been



subjected to more scientific and toxicologic scrutiny than any other repellent substance. The extensive accumulated toxicologic data on DEET have been reviewed elsewhere. DEET

Crop water use estimates based on SPET Network Data July 18 – 24, 2002 (Inches per day)						
Location	Cotton 1 <sup>st</sup> square	Cotton 1 <sup>st</sup> bloom	Peanut max node	Peanut full pod	Sorghum GPD	Sorghum flower
Halfway	0.27	0.29	0.31	0.28	0.21	0.28
Lubbock	0.27	0.32	0.30	0.28	0.22	0.28
Lamesa	0.27	0.35	0.32	0.29	0.24	0.31

Crop water use for other crops (corn, soybeans, and lawn grasses) and growth stages are available. For more specific crop evapotranspiration information, please consult the South Plains ET Network daily summaries at <u>http://lubbock.tamu.edu/irrigate/et/etMain.html</u>. Climate data for these and other locations are also available on the North Plains ET Network at <u>http://amarillo2.tamu.edu/nppet/station.htm</u>. **DP** 

# THE DOPE ON MOSQUITO REPELLENTS

Everyone has heard of the debate about mosquito repellents. Some people claim that DEET-based repellents are unsafe and that "natural" (plant-based) repellents are the has a remarkable safety profile after 40 years of use and nearly 8 billion human applications. Fewer than 50 cases of serious health effects have been documented in the medical literature since 1960, and three quarters of them resolved without sequelae

[consequence]. Many of these cases involved long-term, heavy, frequent or whole-body application of DEET. No correlation has been found between the concentration of DEET used and the risk of toxic effects. As part of the Reregistration Eligibility Decision on DEET, released in 1998, the U.S. Environmental Protection Agency reviewed the accumulated data on the toxicity of DEET and concluded that "normal use of DEET does not present a health concern to the general population". When applied with common sense, DEETbased repellents can be expected to provide a safe as well as a long-lasting repellent effect. Until a better repellent becomes available, DEET-based repellents remain the gold standard of protection under circumstances in which it is crucial to be protected against

arthropod bites that might transmit disease." (New England Journal of Medicine v. 347 page 14.)

On to the scorecard. In tests on human subjects the investigators evaluated the minutes of protection offered by various repellents.

Product	Active	Complete
	ingredient and	protection time in
	concentration	minutes (+ or -)
OFF!	DEET, 23.8%	301.5 (37.6)
Deep Woods		
Sawyer		
Controlled	DEET, 20%	234.4 (31.8)
Release		
OFF!	DEET, 6.65%	112.4 (20.3)
Skintastic		
OFF!		
Skintastic for	DEET, 4.75%	88.4 (21.4)
Kids		
Skin-So-Soft		
Bug Guard	IR3535, 7.5%	22.9 (11.2)
Plus		
Natrapel	Citronella,	19.7 (10.6)
	10%	
Skin-So-Soft	Citronella,	10.3 (7.9)
Bug Guard	0.1%	
Skin-So-Soft		
Bath Oil	Uncertain	9.6 (8.8)
Gone Original		
Wristband	DEET, 9.5%	0.3 (0.2)

**Protection Times of Insect Repellents** 

This is a partial list of products presented in the author's paper. Please refer to the published paper for a full list of products.

Some of the results of this important and practical work are: 1) DEET is the best repellent of any tested, 2) Higher concentrations of DEET provide longer protection, and 3) Citronella and the new ingredient IR3535 are significantly worse than even the lowest dose of DEET applied to the skin. (But they are better than the DEET wristband).

In my opinion, anyone who wants effective protection from insects and ticks should use a DEET-based repellent. Children should be protected with lower concentrations of DEET than adults, so I would choose a product with about 5% DEET and then reapply it more often if necessary.

In addition to the safety review, you now have some authoritative information on the effectiveness of DEET and other repellents. Mosquito repellents are chosen for various reasons including fear of "man-made" chemicals, personal philosophy, and effectiveness. Insect-vectored diseases are serious. Read the last edition of FOCUS for an update on our latest Texas problem – West Nile Virus. I am often asked what repellent I use. Well, you can't buy it off the shelf in the U.S. It is called Bushman (http://www.bushmanrepellent.com/) and is made in Australia. It is 80% DEET, low odor, dry, and contains a SPF 15 sunscreen. Most importantly, it works. In heavy-mosquito environments such as irrigated fields and pecan orchards, I want good protection from insects and the diseases they carry. I spray an aerosol formulation of OFF! on my clothes and then apply Bushman to exposed skin. In the end, repellents help prevent the transmission of insect and tickborne disease, and they should be chosen with that in mind. **RPP** 

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