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IN THIS ISSUE

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COTTON INSECTS

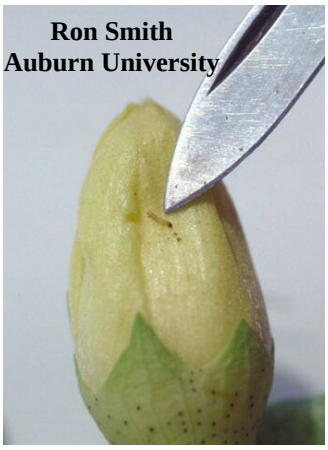
Hot, dry weather conditions continue to provide high mortality to caterpillar pests, hold back aphid population development and push many fields into cutout where survival is limited anyway. This is all good news except for the really late irrigated fields that need every boll and every heat unit left to make a good yield. These fields will receive the brunt of the remaining insect problems and will need protection from some pests all the way through September (see table in COTTON AGRONOMY section).

The name of the game now is boll protection, not square protection. Unless something went terribly wrong, your fruit set should have been quite high this year. So what is left for well-watered fields with squares and small bolls left? This young fruit will provide an ideal source of food for your caterpillars and for Lygus bugs to feed upon. Establishment of these pests will be facilitated by these conditions. Once temperatures begin to drop in September survival of insect pests will increase but their development will slow down. Unfortunately, the daily accumulation of heat units needed to make a boll safe from damage will also slow down. The key to late season management is to identify those few fields that are at risk, scout these intensely and spray only those infestations that are clearly above threshold and well established.

Beneficial insects and spiders have been most useful this year with their activity adding to the mortality already tallied by our persistent hot and dry weather conditions. Most commonly encountered predators have been the minute pirate bug, damsel bugs, lacewings, big-eyed bugs, spiders and lady beetles (where aphids have been abundant enough to draw their attention). I have not counted the numerous hooded beetles because I feel that they are not active predators but rather opportunists. They can persist on the nectary secretions of cotton plants. What are these other true predators feeding on? Mostly thrips in flowers and sometimes each other. The parasitic wasp, Cotesia, has been most helpful in controlling beet armyworms.

Minute pirate bug in flower

Bollworm infestations remain very spotty across the area. Most fields that have cutout because of boll load or because of moisture limitations are no longer supporting infestation development even though eggs are sometimes found. I would be surprised to see very many worms make it past 3 days if squares are all but gone. Irrigated fields will receive the most pressure from the remaining egg lay and caterpillar survival will be highest where squares and small bolls are still present.



One day old bollworm

Not all irrigated fields are receiving their equal share of egg laying activity even fields that look to be similar in production practices. I have detected an upswing in egg-laying activity and moth numbers in cotton in the Denver City area this week. These egg lays will have to increase considerably before enough worms accumulate to justify treatment. Likewise, there is increased bollworm activity north and west of Lubbock as corn earworms (aka bollworms) move from corn to cotton. Even these infestations have been only moderate in size for the most part, ranging up to levels generally below my nominal threshold of 10,000 very small bollworm caterpillars per acre. A few exceptions exist where numbers have reached toward 20,000 per acre.

While some infestations of young larvae have been in blooms and beneath bloom tags or stuck pink blooms, most of what I have observed have been associated with squares. When scouting, be very deliberate in checking each fruiting form for larvae and tops of leaves for eggs. Most eggs I have observed on the undersides of leaves have been the vertically flattened looper eggs. Unless egg counts exceed 30,000 or more per acre I would not even think about calling a control shot based on eggs alone. Too much mortality will occur before worms can begin to damage important bolls. I am also reluctant to spray infestations of very small caterpillars (1/16" to 3/16") right around threshold levels.

Aphids are mostly remaining in the terminal area. Until they move down on lower expanded leaves and begin to increase, their presence is a blessing rather than a curse. At least they provide some food for our natural enemies. Until recently there have been few applications of pyrethroids to trigger aphid outbreaks and hot, dry conditions have continued to hold them back. If control becomes necessary consider Intruder or Centric first, followed by Bidrin or Trimax. Intruder

will also give you ovicidal activity against bollworm eggs. Under our present conditions of hot weather and moderate levels of predators, I can't get too excited about preemptive strikes against cotton aphids.

Lygus bugs continue to pester certain fields. Damage has not been very noticeable in most fields as Lygus have continued to feed mostly on squares. Once these are gone, expect boll damage to increase. Once again I must advise you not to base control decisions on either damage or bug numbers alone. I must also caution you not to determine your damaged boll count based on external symptoms. If those black sunken lesions do not result in penetration through the carpel wall then neither yield nor fiber quality will be impacted. You must open the boll and examine the interior of the carpel wall to determine effective damage. Insecticides to consider for control include Orthene, Vydate, Centric, Intruder, Bidrin or one of the pyrethroids. A pyrethroid will also provide incidental control of any bollworms you might have but also could flare your aphids.

Lygus bug damage

Beet armyworms, yellow-striped armyworms and loopers continue to be found often mixed in with bollworms. For the most part, their numbers alone have not been enough to trigger an application. Armyworms are best addressed with Intrepid, loopers with Steward or Tracer and bollworms with pyrethroids.

Yellow-striped armyworms

Pink bollworms continue to cause concern for growers in western Gaines County. There may be other areas of concern as well but I have not received any reports to this effect. It appears that while moths are being trapped in other areas to the south of Lubbock, infested fields appear to be mainly within 15 miles of the New Mexico state line.


Pink bollworm damage

Some people refer to the pinkie as the other boll weevil in cotton but I can assure you that it is a harder pest to deal with in the field. Like boll weevils, pinkies can only be controlled in the moth stage with insecticides. Once an infestation becomes well established in a field, it is extremely difficult and costly to get them out. I would again recommend that anyone that has a field that has evidence of pink bollworm presence should plant one of the Bollgard varieties next year, no exceptions! I do understand that this is not possible for seed blocks. Nothing controls pinkies as well as the Bollgard technology of Monsanto. Please refer to an earlier FOCUS Off-Season Management Tips Supplement for more management information including helpful cultural control techniques.

If you have a pink bollworm problem in western Gaines County and are shooting for a high yield, you can expect to need to protect potential harvestable bolls from flowers set from August 20-25 for 600-650 heat units. This would be about 30-40 days. This would be a long time if you already have been dealing with this pest when it first appeared around July 4. You might cut your losses and only protect bolls from flowers

appearing on the 15th. Otherwise you could be looking at a worst-case scenario of 2-4 more sprays at least. Now you know why Bollgard varieties are so important.

Boll weevil trap activity remained at low levels with the exception of the Permian Basin Zone. Weevil trap catches tripled compared to the previous week's 17 weevils caught. This only goes to show the importance of detection and having enough properly run traps in the area to detect weevils moving through the area. Just as a reminder, because of a reduced trapping policy in place in 2002 on fields with a failed cotton crop, weevils moving out of northern Glasscock County into the Permian Basin zone went basically undetected, reproduced and came out in relatively large numbers a generation later to infest not only fields in this zone but also in the Rolling Plains Central zone. This was a costly mistake, which has yet to be corrected in spite of all the efforts made late last year and this year. You can see by the following two tables that the Permian Basin zone is the only zone among five High Plains zones that is out of line. Yet----even with these problems, the High Plains area still is closing rapidly on a weevil-free status**. JFL**

Average accumulative number of boll weevils caught per trap through the week ending August 17.

Zone	2003	2002	2001	2000
Northwest Plains	0.00001	0.0002	0.0084	0.1223
Western High Plains	0.00001	0.0004	0.0147	0.4143
Permian Basin	0.0017	0.0001	0.0129	0.3996
Northern High Plains	0.00004	0.0035	-------	-------
Southern High Plains	0.00003	0.0021	-------	-------

Total number of boll weevils trapped the week ending August 17, 2003 Texas High Plains.

Zone	Number of traps checked	Total number boll weevils
Northwest Plains	38,556	0
Western High Plains	79,191	0
Permian Basin	89,748	54
Northern High Plains	65,001	2
Southern High Plains	148,362	2

COTTON AGRONOMY

Our temperatures have been considerably above normal during the month of August. We are currently nearly 80 DD60s above normal for the first 19 days of August. Seasonal total heat unit accumulation has been about 1915 for Lubbock for a May 1 planting, based on National Weather Service data, which is considerably above the 1783 DD60s for the 30-year long-term average.

Most farms across the region have not received significant rainfall for 55-75 days. Daily crop water use values as determined by the Reference ET Network have been averaging about 0.25 to 0.30 inches per day across the area for the last several days. We have a very good crop out there in lots of places where bad weather did not negatively impact crop growth. We are again looking at some great yields where water is not limiting. Hopefully irrigation capacity will not diminish for these fields as we enter the "home stretch" for the 2003 crop.

Irrigated cotton replanted in the second week of June at the Lamesa AgCARES facility has about 16 mainstem nodes, 90% fruit retention, and is near cutout. If September cooperates,

even late fields such as this have some good yield potential. The dryland crop continues to "bloom out the top" in many areas, and amazingly some fields are still in fair condition in spite of the drought.

Ag Cares dryland cotton fields

Moisture stress. With the lack of substantial rainfall across the region for the last two months or so, fruit shed has been underway in dryland and some irrigated fields that producers can't keep pace with crop moisture demands. It is amazing that some fields are still not severely wilted. Normally a boll will be retained once it reaches 10-14 days past bloom. Even though the plant may still retain the boll, the boll will likely be smaller and have shorter fiber length due to moisture stress.

Many deficit irrigated pivot fields have soil profiles that are getting depleted of moisture. We would like to target the soil profile to be nearly depleted as we enter harvest aid season. One should keep the field with reduced stress at least until the final bloom to be taken to the gin becomes about a 10-14 day old boll. This will reduce the likelihood of small bolls shedding due to water stress. Fiber length is generally determined during the first 25 days or so in the life of the boll. This indicates that small amounts of irrigation should be applied to carry the boll through the important length development phase. After that, late bolls can handle considerable stress. For a boll set on August 10th, it is apparent that the field should have reduced amounts of water stress probably at least through the end of the month, unless rainfall is obtained to offset irrigation needs. Otherwise moisture stress could limit quality of the uppermost bolls. A rod probe or other tool may be useful in determining the amount of moisture remaining in profiles in fields.

Many fields across the area have now reached cutout, the 4-5 nodes above white flower (NAWF) point. At this juncture, the growth of the mainstem is severely reduced or ceases, and the vertical flowering rate overcomes the rate of terminal growth, thus the cotton "blooms out the top." Once this occurs the so-called "heat unit clock" starts ticking for some important management considerations. Over the past several seasons, we have worked with the COTMAN cotton management program. One of the key components of COTMAN for determining when to stop spraying for insects and when to apply harvest aids is identifying cutout. We have a lot of fields this year that exhibited physiological cutout fairly early, especially dryland fields.

Physiological cutout is defined as the point at which the plant reaches NAWF=5 after an extended bloom period. Plants can "linger" around this point for several days and NAWF can even increase briefly. Once plants reach NAWF=5 without any further upward fluctuation, you should start your heat unit calculator. When cotton "blooms out the top" and quits, this is an example of physiological cutout IF there is adequate time to mature the bloom on that date.

Seasonal cutout is defined as the point in the season at which there is no longer enough anticipated heat units (based on long-term temperature data sets) available for a bloom after that date to produce a high quality boll. 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). It is now apparent that we may have some cotton fields ready to terminate by mid to late September if things stay on track.

Countdown after cutout. Some hot fields cut out early this year due to the fruit load adjusting to available moisture. Other earlier higher yielding fields that missed the bad weather have recently reached cutout (here defined as NAWF=5). We have developed a table that indicates where we were as of August 19. It is based on actual Lubbock 2003 heat units from August 1 through 19, and from that point forward, it uses the 30-year long-term average for each day. For example, the table shows that for a field that reached cutout on August 1 that a bloom was able to obtain 250 heat units by about August 10. For the 450 total, it will occur about August 20. For cutout at August 10, we should obtain 250 heat units by August 23, and 450 heat units by September 5. This table also indicates the likelihood of obtaining maturity of late season bolls. I will spend more time next week discussing some of these issues.

DD60 heat unit events based on date of cutout (5 NAWF) and actual Lubbock August 1-19, 2003 temperatures with subsequent long-term average values for the remainder of the season.

DD60 Heat Unit Accumulation	Date When Crop Achieved Cutout (5 NAWF)					
	Aug 1	Aug 5	Aug 10	Aug 15	Aug 20	Aug 25
+250 HU (safe from lygus)	Aug 10	Aug 16	Aug 23	Aug 28	Sept 4	Sept 10
+ 450 HU (safe from bollworm egg lay)	Aug 20	Aug 27	Sept 5	Sept 11	Sept 21	Oct 1
Total HU through Sept. 30	970	855	723	638	532	446
Total HU through Oct. 15	1057	942	810	725	619	533
Total HU through Oct. 31	1103	987	855	770	664	578

Late season weed control with glyphosate in Roundup Ready cotton. We have been getting some calls concerning the use of Roundup (or other glyphosate materials) over-the-top to kill some late-season weeds. Roundup WeatherMax can be applied over-the-top per label directions once the crop has reached 20 percent open bolls. Up to a maximum of 44 oz per acre of Roundup WeatherMax can be applied at least 7 days prior to harvest.

If producers choose to treat fields that are not at 20 percent open bolls, they should recognize that they are on the “salvage” portion of the Roundup UltraMax label. The “salvage treatment” is limited to 22 oz/acre of Roundup UltraMax sprayed over-the-top of cotton plants and weeds. Based on data from previous field projects, in some years we obtained slight, but statistically significant yield losses when applying the salvage label rate of Roundup near cutout. Plant condition, as affected by environmental factors, appears to influence potential yield loss. I doubt if there would be any problems going later than that, but remember, unless your field is at 20 percent open bolls you are on the “salvage label.”

Roundup can also be applied as a harvest aid material to conventional cotton specifically to target weed problems and/or to reduce regrowth potential. Effective silverleaf nightshade (whiteweed) control can be observed in the following season with application of 22-44 ounces per acre of Roundup WeatherMax when weeds are in the green-berry stage. Control of severe weed infestations may be increased by the higher rate. Research has shown that

reductions in weed populations of up to 97 percent can be obtained from such an application. Applications made in September should target cotton that is 50-80 percent open. After October 1, cotton can be treated when 30 percent of the bolls are open. Regrowth in Roundup Ready cotton varieties will not be controlled by Roundup application. Roundup also should not be applied to fields grown for seed production since viability and/or vigor of seed will likely be reduced.

The High Plains Cotton Harvest Aid Guide is being updated with only minor changes to the 2002 model and will include some new information. It should be available by the end of next week. For now you can still view the 2002 version. **RB**

HIGH PLAINS CROP TOUR SCHEDULE	
Hockley County Drip Irrigation Turnrow Meeting	Sept. 2
Castro County Crop Tour	Sept. 9
Dawson County Crop Tour	Sept. 10
Yoakum County Crop Tour	Sept. 11
Lubbock County Crop Tour	Sept. 12
Floyd County Crop Tour	Sept. 16
West Texas Agricultural Chemicals Institute	Sept. 16
Lynn County Crop Tour	Sept. 17
Terry County Crop Tour	Sept. 18
Crosby County Crop Tour	Sept. 24
Mitchell County Crop Tour	Sept. 30

SORGHUM AGRONOMY

Herbicide damage in sorghum. I noted in last week's FOCUS apparent 2,4-D damage on sorghum roots and the problems one producer will have with the crop standing up as it begins to grain fill. With input from some of our herbicide people who had looked at the plants we were more inclined to believe 2,4-D as the culprit rather than trifluralin damage. Furthermore, check areas in the field and near a garden where 2,4-D was not sprayed appeared normal. Similar field symptoms have also been reported this week in grain sorghum using Clarity (dicamba).

How does one tell the difference between sprays using growth regulator type herbicides (2,4-D or dicamba) vs. possible damage from trifluralin on cotton ground? Brent Bean, Amarillo Extension Agronomist, notes from his herbicide work these differences in the field when evaluating whether brace root damage on sorghum may be from 2,4-D/dicamba vs. trifluralin. If trifluralin is the problem, most likely brace roots remain short, but maintain their individual integrity, that is, they just don't lengthen any more. As these brace roots would try to penetrate the soil, the root tip encounters the presence of trifluralin, and the sensitive growing point on the end of the root does not grow. With potential damage from 2,4-D/dicamba not only do root tips not grow, but also the brace roots tend to fuse together. Two, three, four roots or more may become one, ½" wide or even more. See the picture of an extreme example below. The some of the brace roots in several of the plants from which we picked the one pictured in last week's FOCUS appeared to be stacked on top of each other. Furthermore several brace roots, about 25%, were also joined on the side. Fellow research and extension personnel have felt, however, that true 2,4-D/dicamba injury would be much more pronounced than the photos indicated, and that last week's injury more likely depicted trifluralin injury. The lack of brace root deformation in untreated check areas in the field, however, shifted our belief toward 2,4-D injury.

Dicamba injury on corn

Note the brace root masses with several brace roots fused together in picture.

Bean notes that producers can view additional pictures of root herbicide injury in sorghum at the following websites.

http://www.extension.umn.edu/distribution/cropsystems/components/3832[p24-27].html

http://www.extension.umn.edu/distribution/cropsystems/components/3832[p01-10].html

Irrigation termination. If you are planning to irrigate sorghum that is still maturing, when can you cut the water off and not affect yield? First, a quick review of the remaining relevant grain sorghum components of yield potential.

Growing point differentiation has already occurred for all South Plains sorghum, typically about 30-35 days after germination. Many fields are approaching or already flowering. Boot stage has the highest water requirement in grain sorghum, and the most potential return for irrigation. Flowering is the second component of yield potential. This determines the number of grains per spikelet. Heat and moisture stress at this point will reduce the number of grains in the head. We can't control the heat, but for sorghum with irrigation, however limited, timely irrigation in advance of flowering, i.e. boot stage, can alleviate some of the moisture stress that may occur. Grain fill, the third component of grain yield, determines seed weight. Moisture requirements are lower at this stage than at flowering and boot, but still reduced moisture can limit seed size and weight. High moisture stress may lead to low test weight.

About 10 days after an individual flower, if pollination is successful, the seed is in the milk stage. Producers pondering additional irrigation would be advised to continue irrigation through the milk stage if at all possible. At that point, if soil moisture is good, a producer can reliably discontinue irrigation and have only minor effects on yield potential. If soil moisture is poor then subsequent irrigation forward to early soft dough would be required to preserve yield potential.

For a detailed description of grain sorghum growth and development consult "How a Sorghum Plant Develops" by Richard Vanderlip, Kansas State University. The document is available on the web at http://lubbock.tamu.edu/sorghum **CT**

SUNFLOWER AGRONOMY

Irrigation termination. Guidelines for determining when to cease irrigation on sunflower yet achieve full yield potential are based on growth stage. Petal drop normally occurs about 3 weeks after flowering on the head. If soil moisture is good at petal drop (see picture) then you have only a small chance of increasing yield with additional irrigation. The sunflower will be completing seed fill (and oil content for oilseed sunflower) within about 7 days. In this scenario, obviously you would not row water again. For sprinkler irrigation, if soil moisture is but fair, one final pass might be justified. If soil moisture is good, additional irrigation will have little effect on crop yield.

Petal drop in sunflower

For conditions with minimal soil moisture remaining at petal drop but on row water irrigation, the ability to get lesser amounts of irrigation (<2") is difficult. In this case, producers should simply make their best estimate if additional row water irrigation might be needed about 5-7 days beforehand (note days since bloom) and put the water on earlier (7-10 days) instead of waiting for petal drop. Center pivot irrigation has the flexibility of easily adding water. For dry conditions at near petal drop one last substantial pivot irrigation is probably advised, but don't delay it or else there will be a diminishing return with each passing day.

Physiological maturity occurs when the back of the head is lemon yellow AND the short bracts on the back of the head turn brown and black (see picture, at right).

Physiological maturity in sunflower. Left – Lemon yellow color on back of head but no brown bracts. Right – bracts are also brown.

Producers who anticipate planting a fall small grains crop after sunflower may be advised to err on the side of irrigating as sunflower with its deep root system can leave the ground quite dry.

Custom combine harvest. Growers need to start several weeks ahead of time deciding who will combine their crop. Experienced harvesters are valuable because they probably have the right equipment and have learned how to set the combine for proper cleanout. Sunflowers can be harvested with a conventional platform header equipped with "pans," specific attachments that prevent head and seed loss at the header. A set might cost $900-1200. Also, a low-profile row crop header (all crop header) can be used. Common mistakes in sunflower harvest include not slowing fan air movement down enough (seed loss) or slowing it too much thus retaining a lot of trash for which you will be docked. For tips on sunflower harvest efficiency, whether you try it yourself or hire a custom harvester, consult KSU's brief guide (see 'Sunflower Harvesting' at http://lubbock.tamu.edu/sunflower/) on setting your combine. The key is don't wait until the sunflowers are about ready to harvest before deciding who will cut them. Your neighbor may be willing to give it a try, but he may not have the right equipment let alone the handy experience to do the job right and reduce losses in the field. **CT**

ALFALFA AGRONOMY

Alfalfa variety selection and seed cost. In last week's FOCUS I noted that it has been hard to distinguish significant differences in yield potential among the many alfalfa varieties. Sometimes this even applies to the 'Commons,' older varieties or releases that are often used locally and whose genetic identity is even in question. Yes, 'Texas Common' or 'New Mexico Common' may still yield well some of the time, but more often than not when pests or diseases arise these will be the first alfalfas to crash. Furthermore, the advances in alfalfa genetics have greatly surpassed the genetic potential in these older lines.

Are the newer lines worth paying for at $3-4 per pound of seed vs. $2 per pound for a common? Here's an example from earlier this year with a Lubbock area grower. He was looking at a common alfalfa variety called 'Mesilla' available for $2.00/lb from an out-of-town grower. It was a 1978 release from NMSU, it had minimal insect and disease resistance, and it was replaced around 1984 by another New Mexico common 'Dona Ana,' which is still used as a check in New Mexico variety trials. I had several questions: How do you even know (or the farmer know) that it is Mesilla? Is the seed inoculated with a *Rhizobium* inoculant? What is the

germination? How old is the seed? Wouldn't Mesilla's Fall Dormancy (FD) rating be too high for the Lubbock area? All the answers were unknown.

I asserted that this seed was probably not a good buy. Alfalfa varieties have improved greatly since 1978. But to put numbers on the potential purchase of Mesilla seed for this farmer, I used the following example: Assume you are going to seed alfalfa at 20 lbs. live seed product per acre. High quality alfalfa in 2002 in New Mexico averaged $138/ton, so I used $120/ton. A good alfalfa variety that this producer could buy locally might cost $3.50/lb. Pricier? Yes, but not the highest cost seed. Yet this seed would still have alfalfa-specific *Rhizobium* inoculant on the seed (and what would that be worth?).

I assumed that this producer would have his stand for five years. Thus the question: How much more alfalfa would he need to produce per year to pay for the added seed cost? The answer is only 100 lbs. per year for five years! This perspective for the producer demonstrated that this cheap seed was not such a good deal. He didn't buy. Modern alfalfa varieties, appropriately selected for regional adaptation, should easily repay the cost difference. And the farmer hasn't taken the risks noted in the questions above; rather he has made an investment in his crop that should pay for years to come.

Preplant weed control. Having good herbicide options for weed control in alfalfa is no substitute for having a clean field before you seed. Weed problems in spring-planted alfalfa is one of several reasons Texas Cooperative Extension advises against spring planting. With the investment in establishing an alfalfa crop and the five years or more that you hope to maintain good growth, effective weed control prior to seeding is essential. Some producers this year are using glyphosate or paraquat to burn down and hopefully kill pesky perennials like Texas blueweed, silverleaf nightshade (whiteweed), woollyleaf bursage (lakeweed), and bindweed. These and other perennials are tough to control in established alfalfa.

Good stand establishment in alfalfa apart from herbicide considerations is important as well. I walk in to numerous alfalfa fields that have small bare patches that are as little as 3 square feet. You can bet if the stand is about two years old or more, there will be weeds in those spots.

Most alfalfa herbicides are labeled for application during winter dormancy or after alfalfa has achieved a certain number of trifoliate leaves emerged (usually 2 to 4). Keep in mind that the higher the alfalfa variety's FD rating the less dormant the alfalfa will be in the winter. This is especially true for any alfalfa that is rated FD 7 (planted south of Lubbock). FD 5 and 6 might suffer some damage, too, especially in a warmer winter.

Summaries of alfalfa herbicides, one from Dr. Brent Bean and the other from New Mexico State University, are available at http://lubbock.tamu.edu/othercrops Bean notes that among preplant alfalfa herbicides, though options are limited, Balan and Eptam do offer decent control but must be incorporated. Neither herbicide will last that long, but Eptam may be preferred in part because it can be chemigated. **CT**

WEST TEXAS AGRICULTURAL CHEMICALS CONFERENCE

The 51st Annual West Texas Agricultural Chemicals Conference is scheduled for Tuesday, September 16, 2003 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 5.5 CEU credits for Certified Crop Advisors.

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