Texas Cooperative EXTENSION
The Texas A&M University System
http://lubbock.tamu.edu/ipm/AgWeb

FOCUS on Entomology

For South Plains Agriculture

VOLUME XLI, NO. 12 September 6, 2002

IN THIS ISSUE

COTTON INSECTS

With high temperatures adding almost 5 additional heat units (HU's) per day to our long-term average predicted accumulations, our crop has been pushed rapidly to a point where caterpillar pests would be hard pressed to cause significant yield losses. Any boll that has a reasonable chance of accumulating enough heat units for harvest (even looking at temperature records for the last 5 years) already has past the 450 HU threshold for safety from small caterpillar attack. This would include bollworms, tobacco budworms, beet armyworms and fall armyworms. Even pink bollworms in southern counties appear to be no longer a threat to that rapidly advancing crop.

We still have a number of fields with significant bollworm infestations but I doubt that most of these fields would benefit from an insecticide application. If growers or consultants haven't been plant mapping on a weekly basis then they would not be able to consistently recognize whether a boll would reach maturity or whether an individual boll was safe from insect attack. Because boll size can vary by variety and through management practices, size is not a good measure of maturity level. Some folks will use the knife-slicing test but this too is fraught with error. We need to develop some easy, inexpensive test that would allow one to at least determine boll vulnerability to insect attack.

Reports continue to be received on the poor performance of pyrethroids against bollworms. Some have suggested resistance. I will restate some of the non-resistance explanations I aired last week. Many control problems were associated with what I would call a coverage issue. Fields with shoulder-high plants, complete canopy closure, and low spray volumes all can add up to control problems. Two gallons by air is asking for trouble. Some problem fields were not a bollworm issue at all but a misidentification of fall armyworms as bollworms. Still other fields had a mixed age infestation that would lead to less than the high level of control we have all come to expect from pyrethroids. And last but not least, many fields had infestations in which larvae were tucked away in positions that no insecticide could penetrate.

I am not discounting the possibility of some increased tolerance of bollworms to the pyrethroids as a class. It is bound to happen. In fact, a look at Brant Baugh's (Lubbock County IPM Agent) and my bollworm insecticide test at Liberty Gin earlier this year would tend to support the increased tolerance tenet as one of several explanations. Larvin is not a pyrethroid. It is a carbamate insecticide.

Percent control[1] of bollworms by caterpillar size 7 days after insecticide application. Liberty Gin, Lubbock County, Texas. 2002

Insecticide	¼" or smaller	Greater than ¼" up to ½"	Larger than ½"	Total of all sizes
Larvin	100.0	90.9	95.5	90.4
Karate Z	100.0	70.0	78.7	78.3
Decis	100.0	70.0	85.1	76.7

[1]As adjusted by Henderson's formula.

Because of some of the bollworm control problems associated with pyrethroids this year and the chronic nature of bollworm infestations in 2002, I would expect more producers to move to Bollgard type cotton varieties. This may be especially true in areas where late pink bollworm problems could develop. Remember that this technology does not provide adequate control of fall armyworms and would be marginal at best against heavy beet armyworm attack. Bollgard II, on the other hand, will fit the bill if it doesn't cost too much.

Pink bollworm trap catches remain high in some areas but as stated earlier, the cotton crop appears to be outrunning any kind of damage threat. I would expect trap catches to be high at this time of year as bolls open and their food supply rapidly dwindles. Boll weevils face this same type of situation at this time of year resulting in much movement and higher trap catches.

Both fall and beet armyworm egg masses can still be found but these eggs have failed to produce damaging worm infestations. Most of these eggs are either failing to hatch or

Adult green lacewing

Brown lacewing eggs

predators are consuming them or emerging caterpillars. There is an abundance of lacewing larvae in many fields that have been looking for their next meal now that aphid infestations have "crashed". They've had to resort to cannibalism to survive in some cases.

Newly emerged lacewing larvae

Aphid infestations have become a non-issue for most producers. The joint effects of weather and "beneficials" pretty much eliminated their threat. Heavy rains in some of the area last week hammered some of the developing infestations, allowing aphid predators a chance to get ahead of the population. What's the bottom line? Aphids have all but disappeared as a late-season pest. The potential for a later flare-up would appear to be minimal but you never know for sure what the late malathion applications for boll weevil eradication might do. Hopefully, sprayed acreage will remain relatively low.

The boll weevil eradication program trap catches have remained low the week ending September 1. Accumulative trap catches for all five zones continue at very low levels. Reductions in the three oldest zones compared to 2001 accumulative trap catches amounts to 97.7% for the Northwest High Plains zone, 99.3% for the Permian Basin Zone and 96.9% for the Western High Plains Zone. All three of these zones have reduced weevil numbers of 99.9% this season compared to the same time frame in 2000.

Average number of boll weevils per trap per week accumulated over 19 weeks. (Week ending September 1,2002)

Zone	2002	2001	2000
NWP	0.00018	0.008	0.135
WHP	0.0004	0.013	0.399
PB	0.0001	0.014	0.417
NHP	0.004	--------	--------
SHP	0.002	--------	--------

Sprayed acreage has increased significantly for all zones for last week and will probably continue to do so this week. You may have noticed more planes in the air. The most significant increases occurred in the NWP, PB, and SHP zones. This is a critical time for the program. It is very important to kill as many weevils as possible so that few if any get a chance to overwinter. This means that the Foundation will spray more acreage when a trap triggers, than they did before.

Acres sprayed this past program week (ending September 1, 2002) and accumulative acres sprayed to this date.

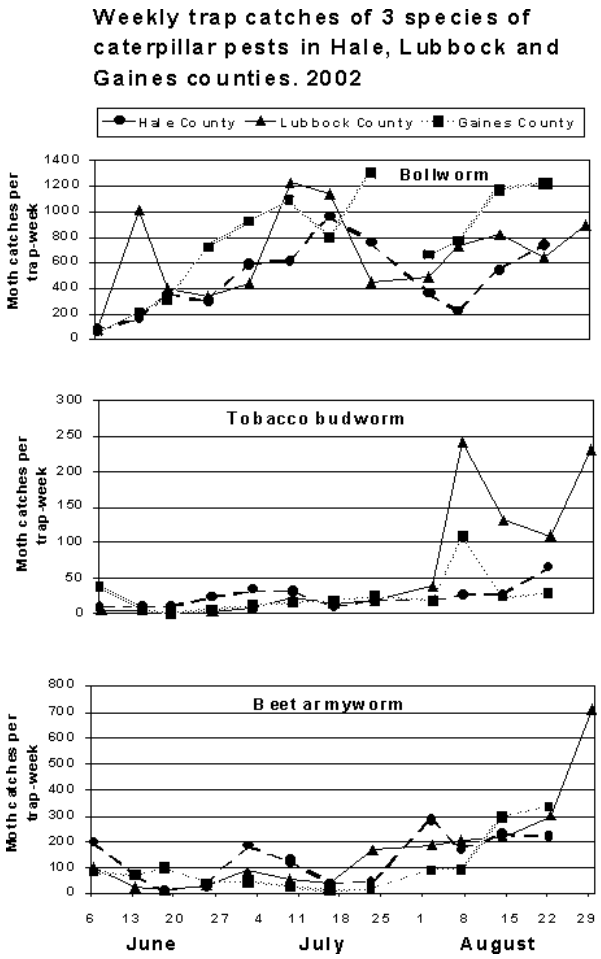
Zone	Week ending 9/1	Accumulative	Acres in zone
NWP	3,959	13,470	478,085
WHP	3,008	49,159	691,115
PB	24,876	43,131	469,154
NHP	16,690	166,288	431,424
SHP	45,267	350,997	1,100,066

Moth Trap Catch Review. We have experienced quite a bit of caterpillar activity in our cotton crop this year. Bollworms have been the highest we have seen in three years. Beet armyworm numbers didn't set any records but were certainly the highest since 2000. While we did not detect any tobacco budworms in our fields based on examinations of survivors in pyrethroid-treated fields, they were probably out there in low numbers.

Trap records don't always tell you what is currently going on or even provide consistent predictive power; they do provide some insight into what may have happened. A series of pheromone traps have been run for the past several weeks in three locations by Lubbock Experiment Station entomologist, Dr. Megha Parajulee's crew. The results of these trapping efforts are provided in the accompanying graph. Lubbock County had three increases in trap catches: mid June, mid July and mid August on. Gaines County traps caught large numbers of bollworm moths beginning with an increase in late June and continuing through August except for a couple of dips. Hale County trap catches peaked in mid July and again in August. These trap catch trends would correspond roughly with the egg laying activity we observed except for Hale County. I would expect that the corn crop would have absorbed the earlier egg lay in this county.

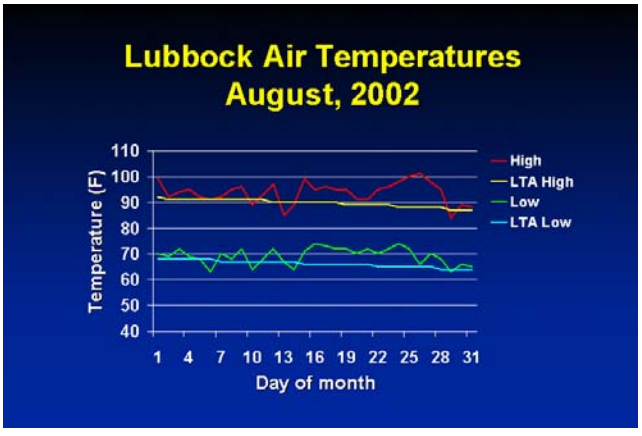
Tobacco budworm numbers were always low compared to bollworm moth numbers and did not increase until later in the season. Peak numbers were caught in Gaines and Lubbock counties in early August. Only low numbers continued to be caught in Hale County during this time period. Budworms are rarely a problem except in the southern acreage of the High Plains. Again, while there were some control difficulties in and around the greater Lubbock area, none of these could be attributed to the presence of pyrethroid-resistant tobacco budworms.

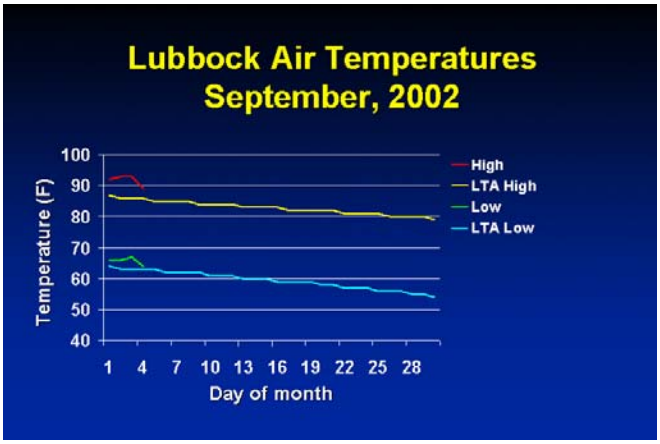
Beet armyworm moth trap catches displayed a small peak in early June and again in early July, but mainly for Hale and Lubbock County locations. Trap catches have continued to rise during August, especially in Lubbock County. These later increases are reflected in continued egg lay but low survival has prevented any of this recent activity to produce a significant infestation of caterpillars. For most of the season, beet armyworm trap catches were well below levels we observed in traps during the major outbreak in 2000. **JFL**



COTTON AGRONOMY

Overview. The crop is moving along at a quickened pace due to lack of rainfall and somewhat above normal temperatures. Bolls in many dryland fields across the region are opening quickly. Even irrigated cotton is moving along rapidly. We can almost see the finish line with this crop. Some producers are killing lower yielding cotton as we speak. Long-term average (LTA) heat unit (HU) accumulation per day is being surpassed due to higher than normal temperatures. August finished up with about 110 HU's above our LTA (665 for 2002 vs. 555 for the LTA). The total for the year, based on National Weather Service data is 2142 for a May 1 planting through the end of August. If we obtain our average HU accumulation for September (about 335), we are again looking at 2500 HU season at Lubbock. For the first few days of September, Lubbock HU accumulation has averaged about 19 per day, nearly 4 above the 30-year LTA.





Where do we stand with accumulated heat units after cutout? COTMAN uses 850 HU's past bloom as a point at which a bloom can make a "normal" boll. In the High Plains, HU accumulations of 750 past bloom will probably make an "acceptable boll" that may not have "normal" lint production or may be lower quality (low micronaire).

The heat unit table below indicates where we are as of September 4. It is based on actual Lubbock heat units from August 1 through September 4, 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 (here defined as 5 NAWF) on August 1, we obtained 350 heat units by about August 18. For the 450 total, it should be around August 21. For cutout at

August 10, we obtained 350 heat units by August 25, and hit 450 heat units by August 29. This table also indicates the likelihood of obtaining maturity of late season bolls.

Heat unit events based on date of cutout (5 NAWF) and actual Lubbock August 1-September 4 temperatures with subsequent LTA values for the remainder of the season.

Heat Unit Accumulation (DD60s)	**Date When Crop Achieved Cutout (5 NAWF)**					
	Aug 1	Aug 5	Aug 10	Aug 15	Aug 20	Aug 25
+350 HU (safe from lygus)	Aug 18	Aug 21	Aug 25	Aug 30	Sept 6	Sept 15
+ 450 HU (safe from boll-worm egg lay)	Aug 21	Aug 25	Aug 29	Sept 4	Sept 13	Sept 25
+ 750 HU (near mature boll)	Sept 5	Sept 12	Sept 21	Oct 26	N/A	N/A
+ 850 HU (fully mature boll)	Sept 13	Sept 21	Oct 4	N/A	N/A	N/A

Since it appears that we are again in a warmer than "normal" late summer (at least thus far), it is possible that the targeted maturity levels (750 and 850 heat units past NAWF=5) will be obtained earlier than projected using the long-term data after September 4.

Cutout in PCIP systems variety trials. The next table provides information pertaining to cutout (again, using the COTMAN definition, NAWF=5) for three varieties that are common to all locations in the large plot replicated systems variety trials. These range in maturity, with the two picker types (FiberMax 958 and SureGrow 215BG/RR) being the latest in terms of reaching cutout.

Days to cutout (DTC) and cutout dates (defined as NAWF=5) for three common varieties in the systems variety trials. 2002

Variety	**Cone**		**Muleshoe**		**Tokio**	
	DTC	Cutout date	DTC	Cutout date	DTC	Cutout date
Paymaster 2326RR	86	Aug. 1	90	Aug. 3	83	Jul. 31
FiberMax 958	88	Aug. 3	100	Aug. 12	86	Aug. 3
SureGrow 215BG/ RR	88	Aug. 3	100	Aug. 12	86	Aug. 3

Based on Lubbock weather data found in the first Table, these observations point out that some varieties at Cone and Tokio may be ready to terminate by late next week. However, the Muleshoe location will need more time, perhaps to the end of September depending upon temperatures, in order to obtain adequate maturity based on 850 heat units past NAWF=5.

To terminate or not to terminate? Many producers view harvest aid applications as a means to reduce overall economic risk due to adverse weather conditions. However, with all of the money spent on producing this year's crop, the additional expense of harvest aid application may not make financial sense to some. The yield potential of the crop must of course be factored in, but we also need to look at the calendar and see where we are at this stage of the game. First, we have many fields that are finishing up early this year. If we take the National Weather Service's word for it (at least based on long-term averages), then the average freeze date is worth checking out (see table).

Average first freeze date for various High Plains locations.1

Station	Average date of first freeze	Years of record
Big Spring	Nov. 10	56
Brownfield	Nov. 1	41
Crosbyton	Oct. 30	48
Dimmitt	Oct. 18	32
Floydada	Oct. 29	40
Friona	Oct. 23	32
Hereford	Oct. 23	45
Lamesa	Nov. 4	45
Levelland	Oct. 30	46
Littlefield	Oct. 30	40
Lubbock	Oct. 31	83
Morton	Oct. 26	31
Muleshoe	Oct. 22	46
Olton	Oct. 21	29
Plains	Oct. 27	46
Plainview	Oct. 31	73
Post	Nov. 7	32
Seminole	Nov. 1	62
Tahoka	Nov. 2	42
Tulia	Oct. 30	98

1From Public Information Statement, October 14, 1998, National Weather Service, Lubbock, TX, also available at: http://www.srh.noaa.gov/lub/climate/first_freeze.html

For fields at Lubbock, we would expect the first freeze around October 31. With the early crop we have this year, this implies that we would have a crop opening up early sitting in the field undergoing at least some weathering. If cotton reaches a high percentage of open bolls in early- to mid-September, then it could possibly experience 6 weeks (or more) of weathering. Last year, we did not have a killing freeze at Lubbock until November 27.

Weathering effects on lint yield and quality – historical data. A boll is at its highest quality when it first opens, and from that point on, lint and seed quality deteriorate. Weight also decreases with time of exposure. If we look at some of the existing older data, we can glean some good information.

Dr. Levon Ray (TAES cotton breeder prior to Dr. John Gannaway) and E. B. Minton conducted a 3-year trial in the late 60's and early 70's that investigated the effects of weathering on stormproof cotton at Lubbock. In this small-plot trial, hand harvests were initiated at 2-3 weeks after the first killing freeze. Please note that harvest aid use was not as popular during that period of time. The losses reported here are relevant for after a freeze. However, this also implies that the losses prior to a freeze would NOT be included in these data. Therefore, I submit that actual losses due to field weathering are greater than those reported from the Ray and Minton study because the weight losses prior to the killing freeze were not determined. The total precipitation during the harvesting period was 1.65 inches in 1969, 0.17 inch in 1970, and 1.32 inches in 1971. Since stormproof varieties were used, no preharvest losses (cotton falling onto the ground) were reported**.**

They concluded that rate of weight loss was greater in the early weeks of the harvesting season, based on regression analysis of the 3-year dataset **(**Lint Weight Loss**)**. Total weight losses of lint were estimated at 3% the first week, 8% after 4 weeks, and 12% after 11 weeks. For 600-lb/acre cotton (their example), losses were estimated at 18, 48, and 72 lb/acre for weeks 1, 4, and 11, respectively. If we apply those same loss rates to varying yield levels, then the data in the next table are pertinent.

Potential yield and gross revenue losses due to field weathering.[1]

Yield potential (lb/acre)	Week 1 Potential yield loss (lb/acre)	Week 1 Potential gross revenue loss ($/acre)	Week 4 Potential yield loss, (lb/acre	Week 4 Potential gross revenue loss ($/acre)	Week 11 Potential yield loss (lb/acre)	Week 11 Potential gross revenue loss ($/acre)
250	7.5	3.75	20	10.00	30	15.00
500	15	7.50	40	20.00	60	30.00
750	22.5	11.25	60	30.00	90	45.00
1000	30	15.00	80	40.00	120	60.00

[1]Assumes 3%, 8%, and 12% yield potential loss due to weathering in weeks 1, 4, and 11, respectively. Assumes cotton price of $0.50/lb.

The project also noted that fiber length was significantly reduced by field exposure. They concluded that 6-7 weeks of exposure would likely result in a 1/32 inch decrease in fiber length. Colorimeter readings of reflectance (or rd) were also detrimentally affected over time and were highly correlated with field weathering. This indicates that color grades have the potential for reduction over time. They concluded (using 1972 loan prices and their estimates of yield loss) that the combined weekly loss in terms of both yield and quality at the beginning of the harvest season would be about $9.50/acre for their 600 lb/acre yield. A separate economic study of the above mentioned data indicated that highest cotton prices were generally obtained earlier in the harvest season. Total gross returns are generally higher earlier in the season, and by the last week of January, severe reductions can usually be expected.

Weathering Effects on Lint Yield and Quality – Cotton Incorporated Project. In 2000, we began work on a Cotton Incorporated Texas State Support Committee project with Alan Brashears (USDA-ARS agricultural engineer) and others on a stripper harvest timing project near Lubbock. Using large plot size of Paymaster 2326RR (thanks to our producer-cooperator Jay Vaughn) and commercial harvesting (John Deere 7455 stripper equipped with a field cleaner) and ginning equipment provided by the USDA-ARS, we were able to obtain excellent data in 2000 and 2001. The project design included early crop termination using ethephon plus Ginstar tank mix, and harvest of subplots with and without field cleaning the cotton. In 2000, the crop yield potential was between 500 and 600 lb/acre. Harvests were conducted in September, October, November, and December, with the final harvest date in January of the next year. This provided us with a wide range of harvest dates.

A summary of the 2000 data indicated that for lint turnout, only small effects were observed due to harvest date, but overall had an increase of about 5% in turnout for field cleaned plots. Lint yields indicated that we had a statistically significant 25 lb/acre reduction from field cleaning in terms of the amount of cotton put into the bale **(**2000 Yield**)**. This sounds a bit excessive, but the cotton ended up with low micronaire. Perhaps we might have had more losses due to that.

No significant differences among harvest dates were noted, but no high-intensity rainfall events were encountered **(**2000 Precipitation and 2000 LTA**)**. Perhaps we did not have a yield level sufficient to detect 10% yield loss over time? We did observe statistically significant reductions in USDA-AMS fiber quality due to rainfall, biotic activity and photodegradation. Color grades were reduced from 11 in early harvests prior to October rain down to 42/52 with later harvests. In addition to color grade losses, staple losses of about 1/32nd of an inch, strength losses of about 2 g/tex, and uniformity losses of about 1.25% were all encountered when cotton was weathered by rainfall events. Bark contamination ranged from 0% in early harvests up to 75 -100% incidence with later harvest dates. Leaf was only slightly affected, but was reduced from 2's early on to 3's with

later harvest dates. For the 2000 crop year, this resulted in a $0.44/lb USDA Loan value before weather events which was ultimately reduced to a $0.38/lb Loan value after weather events. When this is calculated on a per bale basis, it translated into a $ 28.80 loss in Loan value per 480-lb bale.

In 2001, things were considerably different in terms of yield and the environment. We had a much higher yield potential, up to 1000 lb/acre **(**2001 Yield**)**. Significant yield losses were encountered in 2001 due to field exposure after the 2.6 inches of rain that came after the November 6 harvest date. Early harvest (October and November 6) dates did not differ in terms of lint yield, but we did observe up to 100 lb/acre in yield losses after those dates. Even at $0.50/lb for lint price, a loss of 100 lb/acre translates into a $50/acre revenue loss. In contrast to the 2000 crop year, I believe that we had a yield level sufficient to detect a 10% yield loss in the 2001 crop.

Only small effects on lint turnout were noted due to harvest date, but overall, we observed an increase of about 6% for field cleaning. I submit that the yield loss was due to high intensity rainfall events **(**2001 Precipitation and 2001 LTA**)**. No statistically significant yield losses from using a field cleaner (in terms of the cotton put into the bale) were obtained with this crop, although the average reduction across all harvest dates was about 15 lb lint/acre. We don't have all of the USDA-AMS fiber data "in a pile" at this time, but based on Texas Tech University International Textile Center HVI analysis data from the 2001 project, weathering losses of the fiber were similar to 2000 data.

High Plains Cotton Harvest Aid Price List. For those that are interested, we have updated and completed the 2002 High Plains Cotton Harvest-Aid Price List. For the 2002 High Plains Harvest-Aid Guide go to: http://lubbock.tamu.edu/ipm/AgWeb/newsletters/Focus2002/August30/Images/2002_HarvAidHandout.pdf

Updated yield estimation chart. Dr. Will McCarty, at Mississippi State University, just informed me that he has updated the yield estimation charts that we discussed in last week's newsletter. For those that are interested, the new information can be found at: http://msucares.com/crops/cotton/index.html Two particularly good documents are: How do you estimate yield by boll counting? How do you estimate potential yield loss? **RB**

WHEAT FORAGE PRODUCTION

Last week I discussed the importance of phosphorus in maximizing small grains forage production. The data can not be overlooked in that P certainly drives forage production. Other factors are also important. It appears that we are mostly past the really hot temperatures of summer, but we will still see a few days in the low 90's. Wheat planted early when temperatures are still hot may have difficulty becoming established or will require more inputs to produce earlier forage. Therefore, the economic benefit of wheat planted in August has been questionable.

For additional guidelines including nitrogen management, consult the Lubbock Center website for "Basic Best Management Practices Help Boost Wheat Forage Productivity" from Brent Bean, Texas A&M Research & Extension Center, Amarillo: http://lubbock.tamu.edu/othercrops/index.html Use a higher seeding rate for forage production than you would for grain production and try to sow the crop by early to mid-September). Early-planted wheat will push roots deeper and has a greater ability to use available soil moisture than later-planted wheat.

Nitrogen rules of thumb for wheat. The wheat nitrogen fertility guideline is to apply 1½ pounds of N for every bushel of grain the crop should produce, after residual soil N is accounted for. For forage production, 60 to 80 pounds of N will be required for each ton of dry forage produced. If grazing and grain

production is your goal, apply about 2 pounds of N for every bushel of your yield goal, and then topdress the crop at jointing with ¾-pound of N per bushel of yield goal after you've pulled the cattle off.

For information on managing small grains pasture and stocker calf head per acre guidelines consult Oklahoma State University's factsheet at http://www.agr.okstate.edu/plantsoilsci/extension/publications/grains/pt95-18.pdf **CT**

ALFALFA AGRONOMY

Seeding rates. Alfalfa seeding rate is not only important in what stand you may achieve, but alfalfa seed price can also have a major impact on establishment costs. However, the cheap approach is not necessarily better as with alfalfa seed, "You get what you pay for". Per pound costs run $2-4 per acre. Cheap seed such as "common" and "Variety Not Specified" (VNS) are suspect. You want a proven variety. Also, cheap alfalfa seed is often not inoculated with *Rhizobium*.

Some seeding rates from dealers may run as high as 30-35 lbs./A. Farmers are better to invest their money in establishing a firm seedbed (a rain helps pack the soil down well) and focus on good seed establishment. A seeding rate of 15-20 lbs./A north of Lubbock should be satisfactory with good seedbed preparation. Use a packer if necessary to obtain a firm seedbed. For areas south of Lubbock, 20-25 lbs./A should be a good target. Experienced growers still do well using seeding rates in the upper teens. It is always better to have a thick stand early on, but if soil, weather, and irrigation conditions are favorable, then in years 1 and 2 you will have about the same stand, whether you planted 30 lbs./A or 20 lbs./A. This seeding rate range will produce about 20 to 25 plants per square foot.

Sizing alfalfa fields to irrigation capacity. This is greatly misunderstood by first-time growers. Do you have enough water to grow peanuts or corn? No? Then you shouldn't be growing alfalfa without cutting down on acreage. As a rule of thumb, optimal alfalfa production occurs when irrigation capacity is near 8 gallons per acre per minute or more. In the Lubbock area, figure that water use efficiency is about 6 to 7" or water (sprinkler irrigation or rain) per ton of production, and near Clovis or north of Amarillo we might see that rule of thumb drop to 5 to 6" per ton of production. The bottom line is to not increase the seeding costs by having too many acres for your irrigation only to not be able to water it adequately for optimal production. **CT**

CORN EARWORM IN SUNFLOWER

I have received reports of corn earworm feeding on pre-bloom and blooming sunflowers. My own observations on pre-bloom sunflower infestations were about 1-2 larvae on about one head in 20. Most of the damage was around the sepals and not necessarily on the head. Dr. Robert Bowling, IPM agent for Moore and Sherman counties, has reported numerous fields with this sort of damage, but we are unsure of threshholds and control recommendations at this time. Feeding certainly could occur on floral parts, which could damage pollination and seed set on late-planted sunflowers. We will provide more information on this topic next week. **CT**

NEWSLETTER CONTRIBUTORS

James F. Leser, Extension Entomologist, Lubbock
Randy Boman, Extension Agronomist, Lubbock
Calvin Trostle, Extension Agronomist, Lubbock

Focus on Entomology is published by
Texas Cooperative Extension
Route 3, Box 213AA
Lubbock, TX 79403

For more information call or e-mail:
806-746-6101 or
m-coffman@tamu.edu

Editor: James F. Leser
Web Site Layout: Michelle Coffman