# AGRONOMY NOTES

UNIVERSITY OF FLORIDA
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**IN THIS ISSUE**

**Irrigating Corn**

Corn grown for grain should be irrigated until black layer formation. This is the layer that can be seen at the base of the kernel when grain is shelled from the cob. Black layer formation signifies that the kernel is no longer receiving nourishment from the plant and that seed fill is complete. If the corn crop experiences stress during seed fill, significant yield loss can occur.

As a general rule, irrigation will increase yield by 25 and 50% in most years. But, in excessively dry years the influence of irrigation can be even greater. With increasing costs for genetic technology and other inputs, it is important to produce high yields in order for the crop to remain profitable.

*David L. Wright*

**Hardlock Control in Cotton**

Hardlock is a condition that causes cotton to not fluff out of the boll. Consequently, much of the cotton is missed by the picker and many Florida cotton fields look like they have not been picked after harvest. Hardlock has been attributed to the fungus *Fusarium* that infects cotton flowers on the first day of bloom. The development of this disease has been shown to be associated with environmental conditions such as high heat and humidity during the bloom period; as is common during July and August.

FDACS and UF have worked diligently to make fungicides available for use during this period. Research has shown best results occur when multiple fungicides applications are made one to two weeks apart starting at early bloom and continuing for several weeks during the blooming period. If applied properly, fungicide applications can improve cotton yield by almost 100% in those fields most severely impacted by hardlock.

*David L. Wright and James J. Marois*

**Late Season Cotton Decisions**

August is often a welcome relief and a chance to slow down after a long season if the field. But, there are still some decisions to be made that are critical to finishing the season with high yields. Late season insect control, particularly stinkbugs, is critical to quality cotton production. Stinkbugs are present in many other crops through out the season and cotton becomes especially attractive as the other crops begin drying down. Stinkbugs often inflict the most damage on newly developing bolls which are susceptible for about 3 more weeks after bloom. Since young bolls are susceptible to damage from stinkbugs throughout the month of August and into September, this means that insect protection is necessary for several more weeks.

Irrigation should be maintained throughout the bloom period to keep cotton from shedding squares. Many squares will shed late in the season as fruit set continues and other factors such as environmental stress, and insect pressure increases. Therefore, environmental extremes such as hot and dry or hot and wet conditions may reduce fruit set late in the season. Growers should begin planning for cotton defoliation and readying equipment for harvest. Picking cotton in a timely manner after the crop is mature is the most effective way to retain the highest yield and lint quality.

*David L. Wright*

**Bahiagrass Decline: Causes and Solutions**

Bahiagrass decline is a general term used to describe the gradual deterioration of a pasture with no apparent or specific reason. Damage in the pasture may first appear in yellow patches which subsequently turn brown and die. These pastures also have virtually no root system and plants are easily pulled from the soil by grazing cattle or destroyed by foot traffic. The vacated areas in pasture soon get invaded by a wide

variety of broad-leaf weeds including goatweed, doveweed and dogfennel. This scenario is usually associated with a high population density of mole crickets. Due to the tunneling activity of mole crickets, the surface 6 to 10-inch soil layer in damaged pastures will be honeycombed with numerous galleries that cause the ground to feel spongy when stepped on. As shown by the South Florida Beef and Forage Program survey in 1998, mole crickets caused a $40 million dollar loss in annual hay revenue and cost an additional $10 million for insect control.

Mole cricket damage to pasture and turf grasses is mainly due to feeding on roots by 'Tawny' mole crickets. Currently, pest mole crickets are resident on most Florida pastures. So the obvious question is: why don't all infested bahiagrass pastures show a similar degree of decline? We have identified environmental, nutritional, and biological factors that influence mole-cricket decline in Florida.

Since mole crickets have a one-year life span, the yearly nymph crop population dictates the level of activity on the pasture for that year. With the exception of mating flights in February and March, mole crickets spend nearly the rest of their life cycle underground. Eggs are then laid in clutches in underground chambers between April and May and hatch from June to July. Hatchlings feed in upper soil layer and litter. Nymphs and adults occupy an extensive tunnel system in the ground, coming out only in the night to feed. The exclusive subterranean lifestyle implies that pest mole crickets tend to avoid heavy clay soils and low-lying areas that are subjected to prolonged waterlogged conditions. More importantly, extremely wet summer and fall conditions tend to flush out and expose nymphs to predators (birds, raccoons) during daytime while normal to dry summers promote survival of nymphs underground. Long-term experiments have confirmed that high summer rainfall totals result in reduced pest mole cricket activity. A few producers who are already aware of this relationship use controlled summer flooding on their ranch to curtail soil born pests in general.

Nitrogen fertilizer holds the key to bahiagrass pasture production but here is the catch: All the commonly used N-fertilizer materials contain ammonium which lowers the soil pH when they undergo nitrification. We have learned that bahiagrass is very sensitive to changes in soil pH. When soil pH falls below 4.5, deficiencies of sulfur, molybdenum and boron may be created, the root system is weakened and the grass turns yellow during the early spring growth flush. Likewise, a soil pH of around 7, as a result of repeated sludge use, causes reduced forage growth as well as iron, zinc, manganese and copper deficiencies. A weakened sod makes is then more susceptible to mole cricket damage. Therefore, we recommend that producers check the soil pH every 3 years and lime bahiagrass pastures to maintain pH between 5 and 6 for a healthy sod.

Grazing intensity (how low or how high) controls how much stored energy is required to recover and generate new leaves. Prolonged overgrazing reduces stored energy in the sod and could encourage further mole cricket damage to the pasture. Most of the mole cricket-damaged pastures in south-central Florida have been overgrazed. It is advisable to leave a stubble that is greater than 3" when grazing bahiagrass and rotate cattle to other pastures when grass is short.

The University of Florida holds a patent on a beneficial nematode (a tiny worm) that controls pest mole crickets. Once the parasitic nematode enters a mole cricket, it kills the cricket within 48 hours. The nematodes then multiply and young nematodes emerge from the dead cricket about a week later to look for other hosts. MicroBio (http://www.beckerunderwood.com) is the commercial source for nematode production. The product bears a trade name Nematac® S and cost $200/A for complete (wall-to-wall) field coverage. However, we have investigated methods of strip application as means to reduce the cost for producers. It was determined that when nematodes were applied to 13% of a field (in strips), by infected mole crickets would spread the nematodes and fill in gaps between the treated strips within one year.

The strip-treatment method reduced the cost of material from $200 to $25 per acre. Three years after strip- application of nematodes, it was found that about 30% of mole cricket population was infected at any particular time. The mole cricket population then declined by 85% and bahiagrass ground cover increased 40-95%. Follow up surveys show that nematodes have become successfully established on almost all locations and continue to infect 20-30% of the mole cricket population. Hopefully, as more producers use the product, the nematode will become widespread and naturalized to provide permanent relief to bahiagrass producers throughout Florida.

*Martin B. Adjei*

**Using Warm Season Grass Hay Production to Remove Phosphorus (P) from P-Enriched Soils**

Intensive animal feeding operations generate large amounts of manure that can cause high levels of phosphorus (P) in the soil and groundwater. One way to tie up the excess P is by applying soil amendments such as Alum. However, approximately 35 tons of Alum is often required and this involves huge transportation costs of about $2,000 per acre. There is also the question as to how Alum will work and whether the aluminum in the material will become toxic in the long-term. Another alternative is the use of wetlands for treating P-enriched water sources. This approach has been highly successful, but wetland establishment can cost $12,000 to $18,000 and this often proves to be prohibitive.

Pasture production for beef, dairy and horse feeding represents the largest land use system in south-central Florida. Nitrogen (N) is the most limiting nutrient to grass production and large amounts on N fertilizer are applied to pastures every year. Intensively managed pastures for hay production may offer another option for reducing the environmental risk of P.

Research

University of Florida-IFAS conducted research that was funded by the Florida Department of Agriculture and Consumer Services. The research was initiated in 2003 to evaluate the effects of increasing N fertilizer application rates on forage production, nutritive value and P-harvesting capacity of bahiagrass, limpograss and stargrass on a P-impacted dairy site in the Lake Okeechobee Basin. A secondary objective of that study was to determine the concentrations of nitrates and dissolved P in surface runoff and drainage water associated with the increased N fertilizer application.

Research Questions

We established and maintain field studies at the Butler Oak Dairy in Okeechobee to answer the following research questions: 1) What are the effects of four rates of N-fertilization on forage productivity and quality?; 2) What are the responses of bahiagrass, stargrass and limpograss to N fertilizer rates in their P-uptake capacity?; and 3) What effects will the N fertilizer rates have on residual nitrates and P concentrations in the soil and groundwater?

Methods

In 2003 we re-planted the existing stargrass field because of heavy weed infestation and installed electrical fences around grass fields. The bahiagrass and limpograss pastures did not have sufficient soil P levels initially. Therefore, we applied dairy manure to raise the initial P levels to the desired range of 25-30 ppm of plant available P. After manure application, we allowed adequate time for it to break down and the P to be redistributed within the soil top layer. The average P levels in the upper layer in spring of 2004 were 25, 26, and 21 ppm of plant available P for the bahiagrass, limpograss and stargrass, respectively.

The fertilizer treatments consisted of 0, 0.75, 1 and 1.3 times of UF-IFAS N recommendation for each grass hay harvest. This translated into the application of 0, 45, 60 and 90 lb of N per acre for each hay crop. In 2004, we applied our N fertilizer treatments to all three grasses in mid-April. We harvested bahiagrass and stargrass to a 4 inch-stubble and on a 30-day frequency and the limpograss to a 6-inch stubble and on a 45-day frequency between May and November. There were a total of seven harvests each for bahiagrass and stargrass and five harvests for limpograss in 2004 and each plot received same repeated N application following every harvest. Runoff, shallow well (above the hardpan layer) and deep well (below the hardpan layer) groundwater samples were collected after each heavy rainfall and analyzed for nitrates and dissolved P concentrations. Soil was sampled every spring from the top (Ap) middle (E) and hardpan (Bh) horizons and analyzed for P and other elements (K, Ca, Mg, Fe, Al).

Applied Questions

1) Did N Fertilizer Application Rate Affect Forage Yield and Quality?

   As expected, forage yield, crude protein (CP) concentration and TDN of all three grasses increased as N increased. The annual forage production at 0 N rate increased 2 fold (4.4-9.2 T/A) for bahiagrass, 85% (4.8-8.9 T/A) for limpograss and 60% (5.1-8.1 T/A) for stargrass. Bahiagrass and stargrass crude protein increased 4 percentage units (12-16%) with increasing N rate, while limpograss CP increment was only 2 percentage units (7-9%). Digestibility was highest for limpograss and lowest for bahiagrass but it increased by 3% units for all grasses with increasing levels of N.

2) Did N Fertilizer Application Rate Affect Soil P Removal?

   Total P removal by crop increased as the N fertilizer rate increased. At the highest N rate, P-harvested in crop was 57, 46, and 30 lb P/A (117, 95, 63 lb $P_2O_5$/A) annually, for bahiagrass, limpograss and stargrass, respectively.

3) Did N Fertilizer Application Rate Affect Residual Soil P and Groundwater Quality?

   Phosphorus removal by crop resulted in an overall reduction in soil P of 6 ppm in topsoil, 1 ppm in the mid-soil and 17 ppm in the hardpan during 2004. Increasing N application rate did not increase nitrate concentrations in deep wells, but did result in appreciable increase of nitrates in the shallow wells. Dissolved P concentration was greater in runoff and shallow wells for the recently manure-amended production sites (bahiagrass and limpograss) than for the un-amended site (stargrass), regardless of N fertilizer rate. These initial results favor the use of warm-season grass hay production for P-phytoremediation but long term data are being collected to substantiate this option and resolve the nitrate problem.

*Martin B. Adjei and Johannes M. Scholberg*

**Boron in Peanut Production**

All peanut producing states recommend applications of boron (B) since it is a highly mobile nutrient. High application rates of other nutrients can make B deficiency more pronounced. Deficiencies are most often found on highly weathered, sandy soils. The symptom we most often associate with B deficiency is internal fruit damage called “hollow heart”, which reduces the quality and value of the crop. However, in more severe cases, B deficiency can result in split stems and roots (Figure 1), shortened internodes, terminal death, and

extensive secondary branching. Leaves may be dark green and mottled with few or no peanuts developing on stubbed pegs. Some fields have been observed with severe B deficiency and this is a reminder that B is often needed even if few observations of deficiency are seen. B may be applied early with various pesticides to save time and sprayer cost. However, split-applications are desirable on sandy soils to reach a total of ½ to ¾ pound of B per acre for the year.

Figure 1. Split peanut stems due to boron deficiency .

*David L. Wright and Henry (Ed) Jowers*

**Asian Soybean Rust**

Asian soybean rust (ASR) has been found on kudzu and in 2 sentinel soybean plots across Florida. Therefore, it is advisable to consider a fungicide application at early bloom. In double cropped soybeans in Brazil, it has been observed that the second crop is often devastated if the early crop shows light infections. Therefore, if there are other soybeans in the area that have been planted earlier, late planted soybeans may be at a higher risk to have a severe outbreak.

*David L. Wright and James J. Marois*

**New Tests Screen Weed for Resistance to Major Herbicide**

According to a recent issue of Pesticide & Toxic Chemical News, two rapid, nondestructive tests have been developed by USDA-ARS scientists to screen horseweed for resistance to glyphosate.

One method of testing resistance involves dipping a whole leaf into a glyphosate-based mixture and looking for signs of injury. To achieve double confirmation of the weed's status, a second assay can be used, taking advantage of glyphosate's mode of action, which involves inhibiting amino acid metabolism. Leaf tissue samples are removed, and amino acid levels are measured with specialized lab equipment.

If glyphosate resistance is confirmed, the tests should help reduce the spread of resistant weed populations because growers will use different herbicides to manage the resistant weeds.

*Fred M. Fishel*

**Glyphosate Resistant Palmer Amaranth**

Glyphosate resistant Palmer amaranth has been found in Houston County Georgia. Resistance was suspected in this population last season, but a year of diagnostic research conducted by Monsanto and the University of Georgia has confirmed this biotype is indeed resistant.

The resistance was documented in a field that has been in continuous Roundup Ready Cotton for approximately 8 years with Roundup as the only herbicide used for weed control during this time. Currently, only a small area (2 or 3 adjacent fields) has been confirmed to possess the resistant biotype. However, pigweed seed can be spread by birds and we anticipate the spread to continue. The level of resistance in this biotype is high with individuals surviving multiple applications of Roundup Weathermax totaling 88 fl. oz of product.

Can glyphosate resistant Palmer amaranth occur in Florida? Yes, particularly if no crop and/or herbicide rotation is observed. But, a proactive herbicide approach can greatly reduce the probability of this weed resistance. By simply diversifying the herbicide program, particularly by adding various residual herbicides to the program, the likelihood of developing herbicide resistant weeds decreases dramatically. Also,

many herbicides control Palmer amaranth and can easily (and often inexpensively) be incorporated into the current weed control program. For example, all the herbicides listed below are known to control pigweeds and many possess both preemergence and postemergence activity.

| Preemergence | Postemergence (foliar) | Postemergence (directed) |
|---|---|---|
| Prowl | Staple | MSMA |
| Treflan | Dual | Cotoran |
| Cotoran | | Diuron |
| Zorial | | Valor |
| Diuron | | Prowl |
| Staple | | Layby Pro (linuron + diuron) |
| | | Cobra |
| | | Caparol |

It is important that we return to the time-tested principles of crop production. Weed management is a season-long practice and the easiest solution may not always be the best. Yes, the new genetic technologies that have been developed are excellent tools. However, even the best of tools can be broken if abused.

*Jason A. Ferrell*

**Showy Crotalaria/Rattlebox**

Rattlebox, or showy crotalaria (*Crotalaria spectabilis*), is an annual weed that is often found in isolated areas of pastures, rangeland, and roadsides (Figure 2). Although showy crotalaria is not a highly competitive or invasive weed, it is important to monitor this pest since it is toxic to most livestock. The primary toxins in showy crotalaria are the alkaloids pyrrolizidine and monocrotalamine. These toxins are found throughout the plant, but seeds contain the highest concentration of these toxins. Acute death sometimes occurs when livestock eat large quantities (about 3% of their body weight) of the seeds or the plant, but more typically animals will develop signs of wasting due to liver disease and photosensitization with symptoms lasting from a few days up to 6 months. In severe cases, monocrotalamine can also cause acute damage to the lungs.

How is showy crotalaria identified? Showy crotalaria is an erect, annual legume (can act as a perennial in some environments) with simple, alternate leaves. Although the plant fixes nitrogen, it tends to have a slightly off-green to yellow color. Leaves can be hairy, but are often hairless. The stem of the plant becomes angled as the plant matures. Flowers are yellow and are typical to that of the legume family, except that the flowers are attached to a long stalk at the top of the plant. The fruit looks similar to that of the pea pod, but it is much wider. There are approximately 10 to 20 heart-shaped seeds in each pod. At maturity, the seeds become detached inside the fruit, giving the fruit a 'rattlebox' sound when shaken.

How is showy crotalaria controlled? Very little data exist for this species and no herbicide labels list *Crotalaria* species as a controllable weed. However, any type of growth regulator herbicide (2,4-D, Weedmaster, Remedy, etc.) should give some activity on showy crotalaria. Personally, I think PastureGard at 3 pints of product per acre would have good control of this weed. If spot-spraying, a 1-2% (v/v) solution can be applied directly to the plant. Other products such as Weedmaster and Outlaw may also have good activity, but the rate would likely need to be higher. Alternatively, glyphosate can be spot sprayed onto individual plants.


Figure 2. Showy Crotalaria. Photo credit, Allen Boatman (www.plantatlas.usf.edu)

*Brent A. Sellers*

**Artificial Ripening in Florida Sugarcane**

Sugarcane harvest in Florida requires a full 5 months due to the ratio of sugarcane acres to mill processing capacities. Consequently, some sugarcane is harvested in October when warm temperatures, adequate soil moisture, and high nitrogen levels limit early season natural ripening. Mature, or ripe, sugarcane plants contain a higher percentage of sucrose and as a result produce more pounds of sugar per acre. In order to overcome this lack of natural early season ripening, sugarcane is treated with herbicides or plant growth regulators to induce ripening. In the past, Polado L and Touchdown (glyphosate is the active ingredient in both) were the only products labeled for sugarcane ripening in Florida. Roundup Weathermax (glyphosate) recently received a label for sugarcane ripening and will be available for the 2005-2006 harvest season. In Florida, glyphosate can only be applied in the final ratoon. Application to earlier ratoons can result in reduced stand counts and yields in subsequent years. Applications should be made 3 to 6 weeks prior to harvest. Rates are 5 to 14 oz/A for Polado L, 5 to 12 oz/A for Roundup Weathermax, and 8 to 18.5 oz/A for Touchdown. Trials at EREC have shown that Polado and Touchdown perform similarly. Monsanto data indicates that Polado and Roundup Weathermax are also similar when applied at equivalent rates.

*Curtis Rainbolt*

**Crompton Crop Protection and Great Lakes Chemical Merge**

Crompton Corporation and Great Lakes Chemical Corporation have combined to form Chemtura Corporation. Chemtura (pronounced chem-choo'-ra) will be based in Middlebury, Connecticut and will be the fourth largest publicly-traded U.S. specialty chemicals company. The product line of the new company will combine the fumigants of Great Lakes (Methyl-bromide, Terr-O-Gas and Chlor-O-Pic) with the insecticide/growth regulators (Diamond, Dimilin, and Micromite), acaracides (Acaramite, Comite and Omite), fungicides (Procure and Terraclor), herbicides (Alanap and Casoron), and plant growth regulators (Harvade,Leafless, and Royal MH-30) of Crompton.

*Richard K. Sprenkel*

**The Florida Department of Agriculture and Consumer Service's (FDACS) Continuing Education Unit (CEU) System for Certified Pesticide Applicators**

Applicators must become recertified in order to renew their pesticide applicator licenses. To become recertified, individuals have the option of either retaking the certification exams or earning CEUs. CEU credits are earned by attending professional meetings, seminars or completing online or correspondence courses.

The Pesticide Information Office has received questions concerning the new CEU system for certified applicators. It's inevitable that these recent changes have caused some confusion with many applicators. Since few applicators opt

to retake the exams, let's review the recent CEU changes that affect those who work in agronomic settings (a complete listing of current CEU requirements for all applicator categories is provided in UF/IFAS EDIS document PI-40).

Before January 1, 2005: All applicators who renewed their licenses with CEUs before January 1, 2005, were required to earn at least 2 Core CEUs for each primary category that was being renewed, and at least half the required number of CEUs earned for each category must have been approved for the specific category. The remainder of the required CEUs could have been earned in either Core or the specific category. If licensed in more than one category, the applicator would have been required to earn at least 2 Core CEUs per category (the same 2 Core CEUs could not be used for all categories) and the total CEUs earned must have been the sum of the CEUs required per category. As an example, an applicator who had 3 categories would have needed 6 Core CEUs to renew.

After January 1, 2005: Commercial and public applicators who renew their licenses with CEUs after January 1, 2005, must have 4 Core CEUs plus the number of category CEUs shown in the table below. Only 4 Core CEUs are required per license - not 4 Core CEUs per category. The new system is much more straight-forward. Beginning in 2005, all category CEUs must be approved for the specific category. There will no longer be a requirement for having 2 Core CEUs per primary category, and Core CEUs can no longer be used to meet the required number of category CEUs. Example: After January 1, 2005, private applicators must earn 4 Core CEUs plus 4 CEUs approved for the Private Applicator Agriculture category. No substitutions of other types of CEUs will be allowed.

Table of CEU Requirements

The table below lists the number of CEUs required for applicators who choose to recertify with CEUs. ***Effective January 1, 2005, all applicators must earn 4 Core CEUs in addition to the category CEUs listed below.***

| Categories | Number of Category CEUs Required |
|---|---|
| Aerial | 16 |
| Agricultural Row Crop Pest Control | 8 |
| Agricultural Tree Crop Pest Control | 8 |
| Private Applicator Agricultural Pest Control | 4 |
| Raw Agricultural Commodity Fumigation | 4 |
| Seed Treatment | 4 |
| Soil & Greenhouse Fumigation | 4 |
| Demonstration & Research | 4 |

No Core CEUs are required and cannot be used to renew the secondary category of Demonstration and Research. To renew the Demonstration and Research category, the license holder must earn 4 CEUs approved for Demonstration and Research (no Core CEUs).

Aerial CEUs

Aerial License Renewal. Aerial applicators must earn 4 Core CEUs plus 16 Aerial CEUs to renew the Aerial category - no substitutions allowed.

Using a Combination of CEUs and Exams to Renew

Applicators may recertify by re-taking and passing the certification exams if they do not have enough CEUs for renewal. If an applicator has earned the required category CEUs but not enough Core CEUs, the Core exam may be re-taken. Applicators may also choose to re-take the category exam(s) providing 4 Core CEUs have been earned, regardless of the number of

categories being renewed. Applicators who are licensed in more than one category may choose to renew some categories with CEUs and other categories by exam.

> Example 1: Private applicators are required to have 4 Core CEUs plus 4 CEUs approved for the Private Applicator Agriculture category. A private applicator who has 4 Private Applicator CEUs and only 2 Core CEUs may choose to re-take the Core exam instead of earning 2 additional Core CEUs, if desired.

> Example 2: A commercial applicator licensed in both the Agricultural Row Crop category and the Agricultural Tree Crop category has earned 8 Ag Row Crop CEUs, 2 Ag Tree Crop CEUs, and 3 Core CEUs. The applicator will need to earn 6 more Ag Tree Crop CEUs plus 1 more Core CEU. To recertify in both categories, the applicator has the option of re-taking the Ag Tree Crop and Core exams instead of earning additional CEUs, or take either of those exams and earn the required CEUs for the other.

Additional information may be obtained from FDACS at http://www.flaes.org/ and the University of Florida Pesticide Information Office at http://pested.ifas.ufl.edu/.

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