Issues in Agriculture

The Newsletter about Integrated Pest Management for the El Paso Valley

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Announcements

- **The 2013 El Paso Pesticide Applicator Training** will be held on Wednesday February 13 at the Ysleta Cultural Arts Center, 9600 Simms (Exit I-10 @ McRae), El Paso, Texas 79925 from 7:30 A.M. to 3:00 P.M. This event is sponsored by the Texas AgriLife Extension Service, the Texas Department of Agriculture, El Paso Pest Management Association, and the Ysleta Independent School District. The cost will be the same as last year, $50.00 early registration (before January 20) and $60.00 on site registration including lunch, handouts, and other goodies. Five CEUs may be obtained for the Texas Department of Agriculture, the Structural Pest Control Service, and the New Mexico Department of Agriculture, for commercial, non-commercial, and private pesticide applicators. For general information, please call Texas AgriLife Extension Service at (915) 860-2515. For licensing information, contact Mario Saavedra (TDA) at (915) 859-3942.
- **The Cotton Root Rot Team received the 2012 Superior Service Award!** Dr. **Tom Isakeit**, Professor and Extension Plant Pathologist, lead a group of 15 other AgriLife professionals in a multi-year effort to search for an effective control for the management of cotton root rot. As a result of this work, cotton growers have, for the first time, an effective management tool in flutriafol, a fungicide sold under the trade name of Topguard. Field research was conducted throughout Texas including Hudspeth County. This award is the highest honor conferred by AgriLife Extension to faculty and staff who have excelled in their job performance. The award was presented on January 8, 2013 during the AgriLife Extension general session of the Texas A&M AgriLife Conference in College Station. : Mr. **Richard R. Minzenmayer**, IPM Extension Agent Runnels County, Mr. **Archie Abrameit**, Extension Specialist and Stiles Farm Manager, **Dr. David Drake**, Assistant Professor and Extension Agronomist, **Mr. Warren Multer**, IPM Extension Agent Glasscock County; Mr. **Marty Jungman**, IPM Extension Agent Hill County, Dr. **Gaylon Morgan**, Associate Professor and Extension Agronomist, Mr. **Dale Mott**, Extension Program Specialist-Cotton, Mr. **Norman Fryar**, AG/NR County Extension Agent Pecos County, Mr. **Jeffrey Stapper**, AG/NR County Extension Agent Nueces County, Mr. **Steve Sturtz**, AG/NR County Extension Agent Tom Green County, Dr. **Dan Fromme**, Assistant Professor and Extension Agronomist, Dr. **Salvador Vitanza**, IPM Extension Agent El Paso County, Dr. **Jaime Iglesias-Olivas**, AG/NR County Extension Agent El Paso County, Mr. **Ryan Collett**, AG/NR County Extension Agent Hill County, Mr. **Rebel Royall**, AG/NR County Extension Agent Glasscock County, and Dr. **Chris Sansone**, Professor, Associate Department Head and Extension Entomologist (retired).
- **Topguard for root rot:** In related news, the U.S. Environmental Protection Agency (EPA) has granted a **Section 18 exemption for Texas cotton growers to use Topguard** for the control of cotton root rot effective from February 1, 2013 until June 30, 2013. Info: http://www.cheminova-us.com/topguardnews/
- **The 2013 New Mexico Chile Conference** hosted by the Chile Pepper Institute will be held on February 5, 2013 from 7:30 AM to 4:00 PM at the Hotel Encanto de Las Cruces, Las Cruces, NM.

ENTOMOLOGY SCIENCE CONFERENCE: The Texas A&M AgriLife Entomology Science Conference was held in November 27-29, 2012 at the USDA-ARS Southern Plains Agricultural Research Center in College Station, TX. The following are brief summaries of selected presentations at the conference that may be of your interest:

Trends in IPM in Southern States: Private and Public IPM-related Resources and Implications for the Future (Dr. Charles Allen)

IPM in its first 50 years used field-specific tactics, but it has gradually shifted to area-wide approaches. IPM can be divided into two main periods: the synthetic organic insecticide era and the transgenic era. This second era uses preventative, area-wide tools such as: boll weevil eradication, transgenic crops (i.e., *Bt* technology), seed treatments, disease/nematode tolerant varieties, and herbicide resistant crops. This shift can be illustrated in the Lower Rio Grande Valley from the years 1980 to 2012: the number of Consultants fell from 18 to just 5, Fieldmen went from 35-40 to 12, Aerial Applicators from 30 to 5, the

USDA-ARS fully-staffed "Kika de la Garza Center" was closed in 2012, the Texas A&M AgriLife Research and Extension Center has gone from fully-staffed to reduced-staff. Similar trends have been observed throughout Southern USA. Can we produce enough food and fiber for the rapidly increasing world population? The 11 billion people on the planet in 2011 are projected to increase by 1 billion every 10-12 years until 2050. After 16 years of GM crops problems are emerging. There is declining private and public sector IPM support for farmers. Universities are adapting to the new realities by focusing on the development of novel genetic/molecular tactics, fewer students trained in field-specific IPM, and fewer Professors have experience in field-specific IPM. If a sudden need for people with field-specific skills were to happen: How long would it take to develop the people-resource? Farmers have crossed the "bridge" into the Transgenic Era and this bridge has fallen into disrepair. The way back to field-specific tactics would be long, expensive, and difficult. Consider the consequences of resistance in primary pests to *Bt* crops: there would be an insufficient numbers of applicators and insufficient numbers of IPM professionals. Will the overuse of existing insecticides lead to resistance? Will we return the pest management of the 1940s - 1950s with minimal field scouting, weekly insecticide treatments? Conclusion: There is a dire need for increased funding for public sector IPM to meet increasing needs for food and fiber and to stabilize and increase public sector crop protection specialists.

COTTON:

Treating thrips on insecticide-seed-treated cotton (Stephen Biles)

Most Victoria County farms had relatively high numbers of thrips regardless of seed treatments used. Many growers were applying insecticides on 2-4 leaf cotton to control thrips. Growing conditions were good with warm temperatures and adequate moisture. This test evaluated the benefit of applying insecticides for thrips control to seedling plants. In 3-leaf cotton plants the following thrips levels were observed in the 3 treatments: 12.46 thrips/plant (Untreated), 2.6 thrips/plant (Acephate), and 4.4 thrips/plant (Intruder). These insecticide applications had no significant effect on yield. Why? Although cotton plants had visual injury from thrips, the weather was favorable for active growth. Usually, under cool temperatures yield differences are greater, but differences are minimized when weather is optimal. Also, applying insecticides to cotton seedlings from treated-seed rarely results in yield differences.

Resistance in cotton to feeding by the cotton fleahopper (Dr. Allen Knutson)

CFH is the number one cotton pest in Texas, but no new work has been conducted on host plant resistance to cotton fleahopper since 1972. US cotton varieties vary in susceptibility to CFH feeding damage. There is a significant correlation between plant hairs (trichomes) on leaves and fleahopper density: CFH loves hairy leaves, but this is not necessarily an indication of susceptibility to damage. For instance, Pilose is a cultigen with very dense covering of long trichomes on leaves, high CFH populations, but very little damage. CFH spends most time feeding on susceptible varieties, but very little time feeding on resistant varieties. Some US cotton varieties express moderate resistance to CFH. A total of 69 entries, representing 19 groups, were screened from 2,200 accessions collected primarily from Mexico and Guatemala during the years 1946-1948. *Gossypium arboretum* is highly sensitive to CFH. After two years of field data and cage studies: most lines are moderately resistant. DP 50 was the best variety.

Fungal endophyte survey in Texas (Dr. Maria Julissa Ek-Ramos)

According to the Pesticide Action Network, each year, cotton growers spend approximately $2.6 billion worth of pesticides worldwide. Endophytes have great potential as a valuable pest management tool in crop protection. Endophytes are organisms that live within plant tissues without causing apparent damage. Some endophytes are protective agents against drought, stress, heat, insects, or pathogens. There are no published studies in the US on cotton endophytes. Research has been conducted in Australia, Brazil. A total of 17 different fungal endophyte genera were isolated from Australian native species of cotton, but potential pathogens were not isolated. In Brazil, fungal endophyte communities were isolated from Bt and non Bt cotton. In Texas High Plains, samples obtained from leaves and squares/bolls of Bt cotton varieties resulted in the identification of 69 endophyte species in 2012.

Beneficial fungal endophytes for insect and nematode management (Dr. Greg Sword)

Fungal pathogens: *Beauveria bassiana* is a well known insect pathogen and biocontrol agent, but is not used on cotton because of its susceptibility to desiccation, high temperatures and high ultra violet light. Several candidate endophytes are known to have effects against insects, nematodes and/or plant pathogens. There were significant differences in aphid population levels between endophyte-inoculated and control plants. The endophyte does not reduce root knot nematode entry into plant or the number of root galls, but it reduces egg production. More first-position squares and bolls were retained in all endophyte treatments. Larger yields in endophyte-inoculated fields were due to higher yield per plant and not to a larger number of plants. Conclusion: manipulating endophytes can positively affect cotton yield. Future: conduct expanded field trials, identify other endophytes, study mechanisms involved.

Results of insecticide overspray of bollworms in transgenic Bt cotton (Stephen Biles, Roy Parker, Clyde Crumley, Dale Mott, Rick Minzenmayer, Kerry Siders, and Monti Vandiver)

This tests had the following two objectives: 1. Determine if any benefit is gained by treating *Bt* cotton for caterpillars (bollworm, tobacco budworm, cotton square borer, loopers, armyworms, and others). 2.

Determine if yield is enhanced by insecticide alone without pest present. The varieties used were PHY367WRF, PHY499WRF, DP1044B2RF, and FM1944B2RF. Treatments included Prevathon 14.0 oz/a, Belt 3.0 oz/a, Belt+Mustang 2.0+3.6 oz/a, Mustang Max 3.6 oz/a, Besiege 8.0 oz/a, and untreated. There were no significant differences in yield (except for 1 test site) and few caterpillars were found in the fields during the test. No benefit of insecticide sprays of *Bt* cotton was detected across all locations.

Cotton pests as vectors of boll rot pathogens (Dr. Enrique G. Medrano, J. F. Esquivel, and A. A. Bell)

Emerging boll disease was initially reported in South Carolina in 1999 where healthy-looking bolls were rotten inside. Yield losses were estimated in 10-15%. This condition quickly spread to fields throughout southeastern cotton belt states. Insect pests with piercing/sucking mouthparts that feed on developing fruit include stink bugs, Lygus, cotton fleahoppers, and verde plant bug. Cotton fleahoppers carry their own set of pathogens. Southern green stink bugs *Nezara viridula* is one of the main vector of boll rot pathogens into developing cotton bolls. Insect feeding not carrying pathogens result in callus formation but not rot. If insect pest carries pathogens feeding result in internal boll rot. As early as three weeks, developing bolls become immune to damage by stink bugs and transmitted pathogens. Thus, there is no need for farmers to spray infested fields at that point. Damage to bolls by stink bugs alone versus those transmitting cotton pathogens can clearly be differentiated. Collectively, these data warrant an adjustment of thresholds based on pathogen presence and abundance. Ongoing research: pathogen transmission by the verde plant bug, identify the genes in the pathogen involved in causing disease, and determine the movement of the pathogen through the insect.

Setting an economic injury level (EIL) for verde plant bug, and how does it relate to other boll-feeding sucking bugs? (Dr. Mike Brewer and Darwin Anderson)

The main challenges to determining an EIL for the boll-feeding-sucking bug species complex: When/where are they found on cotton? Is the damage similar among species? Can same method(s) be used to monitor them? Can we construct decision rules for use in scouting? Is there a rot-prone or bacteria-prone situation? Stink bugs and verde plant bugs usually occur at peak or late bloom. External feeding damage cannot be the only tool to make a decision. You need to crack open at least 40 green bolls/field (quarter-sized) to look for rot. Monitor verde plant bug in early bloom and measure at mid-bloom. A damage score of 0.8 to 1 (0-4 scale) results in economic damage. Insect monitoring alone is a poor indicator of damage. However, internal injury alone overestimates the damage. A preliminary table was developed which combines percentage of internal boll injury plus number of verde plant bugs per 100 plants. This is a “beta” version and it will need some fine tuning.

Economic threshold for stink bug/verde plant bug (Stephen Biles)

Start sampling at 10-day-old bolls (1” diameter boll). External spot with or without internal-feeding-damage (warts). An average of 80.8% of bolls with external spots had 31.4% internal feeding. When scouting, it may be possible to consider bolls without external feeding marks as unfed upon. These data suggest that a 20% economic threshold may be used for both stink bugs and verde plant bugs.

Leaf-footed bug damage and yield effects on late season cotton (Darwin Anderson, Dr. Mike Brewer, and Charlene Farias)

Leaf-footed bugs appeared very late (90-100 DAP) at 5 NAWF. Higher leaf-footed bug numbers were observed in late-planted plots and in irrigated plots. They were usually found on the top plant canopy. Open bolls ratings (0-4 scale). Damage was significantly higher in late-planted cotton on top bolls, but yields increased as irrigation increased. Yields were not influenced by leaf-footed bugs because the top bolls do not contribute much to yield. Probably, it is not important to control leaf-footed bugs under normal growing conditions; especially if they occur late in the season.

PECAN:

Imidacloprid resistance in the blackmargined pecan aphid - An opportunity to promote pecan IPM (Bill Ree, Dr. Juan Lopez, Selyna Nunez, and Nichole Boatman)

Historical problems with insecticide resistance. Resistance to organophosphates in the 1970s in the southwestern pecan-growing states. President of the Federated Pecan Growers in 1980’s: “If we cannot control aphids we will be out of business”. Stahmann Farms, Las Cruces , NM spent $750,000 over 3,600 acres to control pecan aphids in 1986 and could not do it (Nut Grower Magazine, Nov/Dec. 1989). Imidacloprid is a class 4A neonicotinoid. It was first introduced by Bayer as Provado (foliar) and as Admire (soil-applied). Now there are over 25 generic commercial products plus many home-use formulations based on imidacloprid as active ingredient. Its price has come down and this discourages rotation of chemical classes. Imidacloprid is labeled at a rate of 3.5-7.0 oz/a for yellow aphids, leafhoppers, sharpshooters, phylloxera sp., and spittle bugs. It is also recommended for black pecan aphid control at 8.0 oz/a. According to Brad Lewis data, soil applications in pecan orchards are not working on an increasing number of acres in Arizona and New Mexico, but foliar applications of imidacloprid continue to work. Other neonicotinoid class 4A insecticides include acetamiprid, clothianidin, dinotefuran, nitenpyran, thiacloprid, and thiamethoxam. Belay (clothianidin – class 4A – Valent) is one of the new insecticides for pecan aphids control. Beleaf, (flonicamid – class 9C – FMC) and Closer (sulfoxaflor – class 4C – Dow AgroSciences) may include pecan aphids in their label as early as 2013.

Test results from 2011 and 2012 show evidence that resistance to foliar-applied imidacloprid is occurring in commercial pecan orchards. Suggestions: rotate group-numbered products. Do not use the same group-numbered product more than twice in a row. Where possible treat only problem varieties or areas. Do not base your treatments just on the presence of honeydew.

Using PNC forecast to manage pecan nut casebearer (Dr. Allen Knutson and Dr. Mark Muegge)

Pecan nut casebearer (PNC) is the most damaging pecan pest, accounting for annual yield loss of 7%. The spring generation is the most important to control. Insecticides are most effective when applied at egg hatch or before just before the first larvae tunnel into the nutlets. Apply insecticide 1-2 days prior to first nut entry by larvae. One well-timed insecticide application is usually sufficient for first generation. To best determine when to make that application, you first need to know when eggs are laid. However, egg sampling is tedious. In addition, optimum timing can vary between years by 2 weeks or more depending on spring temperatures. Optimum timing can vary within a region due to orchard site and tree variety and between years, by 2 weeks or more, depending on spring temperatures. Identification of the sex attractant pheromone of the pecan nut casebearer: it was a joint research effort between Texas A&M and University of California-Riverside and funded by the New Mexico Pecan Growers Association. It took four years to finally identify the active compound in 1994. Results were published in a peer-reviewed journal: Millar, J. G., A. E. Knutson, J. S. McElfresh, R. Gries, G. Gries and J. H. Davis. 1996. Sex attractant pheromone of the pecan nut casebearer. Biorganic & Medicinal Chemistry 4:331-339. The pheromone was commercially available in 1997. A survey conducted in 2005 found that 45% of growers were using pheromone traps to monitor PNC flights. New question: how to relate trap captures of adult males to oviposition? An unintended consequence of pheromone traps is that some growers use moth captures alone to decide when to make their insecticide applications. Instead, growers should use a degree day model of pecan nut casebearer oviposition and nut entry to predict: optimum period to sample for PNC eggs, anticipate the treatment date for insecticide if needed. This model starts on date of first significant moth capture in pheromone traps. The PNC forecast system uses pheromone trap data from specific orchards and local temperatures to forecast when to assess egg infestations. This model was developed using field data collected during 10 years (1997-2006) from 16 commercial pecan orchards. This model was published in 2010: Knutson, A. E. and M. A. Muegge. 2010. A degree-day model initiated by pheromone trap captures for managing pecan nut casebearer (Lepidoptera: Pyralidae) in pecans. J. Econ. Entomol. 103:735-743. Growers must capture the first moths and visit the Pecan.ipmpipe.org website and enter location of orchard to determine historic temperature. The expected heat unit accumulations following first moth capture are estimated using 25 years of historic temperatures for the specific orchard location. Proper identification is sometimes an issue. The date of first moth capture in their orchard initiates degree day model and as output growers receive the dates of expected egg lay in percentage. A survey of the growers attending the Texas Pecan Growers Association in the 2009 annual meeting (68 completed surveys) found 50% of respondents used the PNC Forecast System as an aid in their decision making. Approximately 5% of respondents said the decision window in the model opened too early or too late. Conclusion: the PNC Biofix Model reliably predicts percent oviposition and first nut entry by pecan nut casebearer during the first generation.

GRAPES:

Grape berry moth (GBM), its impact on growers and an overview of the extension viticulture program (Fritz Westover, Dr. Christian Nansen, and Philip W. Shackelford)

Texas American Viticulture Areas (AVAs) include Texas High Plains, the Mesilla Valley, Davis Mountains, Escondido Valley, Texoma, Texas Hill Country, Bell Mountain, and Fredericksburg. The Grape berry moth, *Paralobesia viteana*, overwinters as pupa, then emerges in the spring when the temperature and day length are ideal. The first emerging moths mate and the females lay eggs on young grape clusters. The first instar or neonate larva causes the damage to grapes by feeding internally. Once mature, the larvae exit the berries they infested and pupate. The cycle continues and there can be as many as 3 to 4 generations of GBM in the Gulf Coast in one growing season. GBM often overwinter as pupae on leaf litter. The leaf litter can remain in the vineyard or be blown to the edge of the vineyard to low-lying areas, or against buildings. GBM also infest wild grapes and can emerge from wooded areas surrounding vineyards. Most often the damage is worse near the sources of spring emergence (wooded edges). The first sign of GBM is the silken web that is cast by the neonate larvae after emerging from the egg. This web also protects the larva from predation. It is very fine, and often difficult to see. The webbing may be confused with spider webbing. In newly formed red grapes, the feeding by larvae will produce a pre-mature reddening of the berries. In white berries, the larva is detected by the sunken brown to black areas, produced by feeding within the berry. Sometimes a silken "tag" can be detected from the entry point of the larva (right). Later in the summer, multiple berry infestation can be observed. One larva can move to up to 7 berries, which are often stuck together, before pupating. Usually, a small hole is left in hollowed out berries. This is the exit wound from the mature larva. If opened, the berry will contain the frass from the larva. Late season GBM feeding can lead to rots of part or whole clusters, making fruit unmarketable. Spray timing trial: Intrepid 2F sprayed on 6 vines in five sites. It has an ovicidal effect if sprayed before oviposition. We are encouraging growers to spray at first capture and make only 2 sprays per season. Future work: degree day models for hot climate, involve growers in extension lead efforts to track GBM in Texas, and focus on best control just prior to or after cluster closure.

Impact of the leafcutter ant in an organic vineyard of the Rio Grande Valley (Dr. Gabriela Esparza-Diaz, David Garza, and Dr. Raul Villanueva)

Leafcutter ant, *Atta texana*, cultivate *Leucocoprinus* fungus as food. Kaolin, PurShade, citrus oil, and Spinosad were evaluated as control methods. An average of 60% defoliation reduced yield in 84%. Leafcutter ants cut flowers too. Neem oil and azadiractin were very effective in preventing defoliation.

SMALL GRAINS:

Seed treatments for <u>SOYBEAN</u> Lepidoptera control (Dr. Michael O. ["Mo"] Way, Becky Pearson, Suhas Vyavhare, and Justin Wilson)

Biggest insect pest problems on the Gulf Coast: Lepidoptera (velvetbean caterpillar, soybean looper, and green cloverworm) and stink bugs (primarily redbanded stink bug). 10 treatments plus untreated control. Treated seed provided by Syngenta under a secrecy agreement. Sampling: 10 sweeps per plot about every 10 days once insects began to appear (R4 stage to full pod). Defoliation ratings were measured using template at R6 stage. Plots were harvested at maturity for yield/quality. The primary pest was the velvetbean caterpillar. There were dramatic differences among treatments. Damage by Lepidoptera defoliators: 3 treatments had less than 10% defoliation whereas 5 treatments had more than 60% defoliation. Names of active ingredients cannot be revealed at this time.

Update on <u>WHEAT</u> curl mite and wheat viral diseases research (Price, Jacob; Simmons, A.; Workneh F.; Rashed, A.; and Rush, C. M.)

Wheat management in Northern Texas: The majority of wheat production in the U.S. is located in the Central/Western Great Plains. A total of 29 million acres are planted there with a value of $6.4 billion annually. The Great Plains is a semiarid region with irrigated production on center pivot. A large percentage of wheat production is for dual purpose (both grazing and grain production). Most wheat is planted in early September. Early planting increases exposure to viral diseases such as: wheat streak mosaic virus (WSMV), wheat mosaic virus (WMoV), and Triticum mosaic virus (TriMV). Total losses due to diseases are possible. TriMV was discovered in 2006 with symptoms similar to WSMV. Both These 3 viruses are transmitted by the wheat curl mite which is a microscopic, cigar-shaped mite that causes a rolling effect of the leaf margins. Reservoir for mite vectors: volunteer wheat and native grasses. Mites are transferred by winds and most times clear disease/vector gradients are observed throughout fields. Volunteer wheat and native grasses serve as reservoir mite vectors. We cannot avoid this mite or change the environment, but we can control the vector or develop resistant varieties. Does WSMV affect root growth or water use efficiency? There are dramatic differences (up to 50% reduction) in root weight between inoculated vs non-inoculated plants. Karl 92 is a susceptible variety, whereas KS 10-3 is resistant. TAM 111 and TAM 112 are popular varieties widely planted in the Central Great Plains. Wheat lines containing WSMV resistant genes include Mace-WSM1 and RonL-WSM2. However, resistance is temperature-sensitive and above 25°C the plants are no longer resistant. Future studies: mite population dynamics in native and non-native grasslands. Environmental factors that impact movement. Transmission efficiency at different temperatures. Identification of resistance gene in TAM 112. Disease identification and quantification on a regional scale using satellite imagery. Mixed variety TAM 112 and others for multiple pathogen resistance. Conclusions: The resistant varieties could not be used for early planting in the northern TX panhandle. TAM 112 could be used for early planting due to the reduction in vector numbers and reduced disease development. Control of the vector will not only help with WSMV, but also TriMV and WMoV. Studies on water use efficiency and grain yield indicated that yield increases with added water, but there is no increase of disease. However, water use efficiency was decreased with disease. At all water treatments, WSMV reduced the plants ability to uptake available soil water.

Effectiveness of new and existing grain protectants on stored <u>SORGHUM</u> (Dr. Roy Parker)

Insecticides tested: Storcide II (chlorpyrifos-methyl + deltamethrin), Sensat (spinosad), Actellic 5E (pirimiphos-methyl), and Diacon II (methoprene which is and insect-growth-regulator and thus not effective on weevils because eggs are laid inside kernels and larvae are not exposed). Grain pests evaluated included: red flour beetle, rusty grain beetle, rice weevil, and the lesser grain borer. As expected, the higher the temperature, the greater the number of insects. Sorghum treated with Actellic suffered the most damage and had the greatest percentage of loss in grain value at 324 days after treatment. Storcide II with and without Diacon generally maintained insect numbers at a lower level longer than the other insecticides. Sensat with and without Actellic did a fairly good job in keeping insects at low levels. Actellic alone was not effective on lesser grain borer, and pest numbers where greater than in the untreated grain. There may be a resistance issue with Actellic for lesser grain borer. Actellic + Diacon was not as effective as the Storcide or Sensat treatments. A follow-up test has been established to see if these results can be confirmed.

Banks Grass Mite Trials in <u>SORGHUM</u> (Monti Vandiver and Dr. Ed Bynum)

To reduce the effect of mite natural enemies, a half rate of Baythroid plus Orthene 6 oz/a were applied 10 days before testing the miticides. Treatments included Oberon + COC (5 + 16 oz/a), Onager + COC (10 + 16 oz/a), Portal + NIS (32 oz/a) + 0.25% v/v, and Comite II A (36 oz/a). Conclusions: mites crashed at

12 DAT. Oberon, Onager, and Portal reduced mite pressure at 7 DAT. Comite provided no mite control at 7 DAT. Other field observations indicate activity at 14 DAT. No phytotoxicity was observed at 20 GPA.

Banks Grass Mite Management in CORN (Monti Vandiver and Dr. Ed Bynum)

To reduce the effect of mite natural enemies, a half rate of Baythroid plus Orthene 6 oz/a were applied 10 days before testing the miticides. Food for thought: Conservation of beneficials is critical to spider mite management. Treatments included Oberon 4 & 6 + COC, Onager 10&12 + COC, Zeal 2 + NIS, and Portal + NIS. Percentage of leaf damage was measured at 26 DAT. All miticides treatments provided similar control and had significantly lower leaf damage.

Effect of Bt CORN refuge arrangement on corn earworm, fall armyworm, and corn flea beetle damage (Dr. Roy Parker)

The test was planted late (Aug 10, 2012) to have the highest pest levels possible. All Bt varieties provided very good control of fall armyworm (FAW). Corn earworm (CEW) infested 100% of ears. Bt11 had almost no damage. Flea beetle damage was very late. Number of kernels damaged per ear: Bt11xMIR162xTC1507 suffered 0 damage, but 604 sustained 20.4% and the non-Bt 46.9%. Bt11xMIR162xTC1507 is highly effective against FAW and CEW. Damage by flea beetle was reduced by the Bt11xMIR604xTC1507 corn-rootworm gene. Refuge ear damage by CEW is reduced when non-Bt plants are located within Bt-corn plots. The Bt11xMIR604xTC1507 gene reduces CEW damage by about half compared to non-Bt plants.

A field test of Bt/non-Bt CORN seed blended refuge concept (Dr. Mike Brewer and Darwin Anderson)

Currently structured refuge for Bt-corn in the south. 50% for single trait Bt corn. 20% for stacked trait Bt-corn. VT3 Triple PRO (VT3Pro) was the best performer for CEW & FAW. No treatment differences were detected in yield. Very few FAW observed. High percent infested ears with corn earworm in nearby border rows of non Bt corn. Pure Bt-corn stand damage did not occur.

The proposed seed blends contain 5% to 20% non-Bt seed. The following questions for proposed blends arise: I. Will compliance increase? It is highly likely if marketed in pre-blended seed bags. II. Will yield increase? It is highly probable in up to 10% blend. Besides, South Texas has negligible root-feeding pressure. III. Will seed blend refuge maintain susceptibles? Increased corn earworm feeding occurs in 20% blend, but larvae development was not evaluated. Questions to explore in future research: Blends are viable to increase refuge compliance and increase overall yield, but are blends serving as a true refuge for Bt susceptibles? Pure non-Bt treatment would be helpful? Rearing larvae from the treatments would be helpful? Determination of Bt toxin in the treatments would be helpful?

Strip refuges for Bt CORN for Lepidoptera: Good IPM and bad IRM-Insecticide Resistance Management (Dr. Pat Porter, Dr. Ed Bynum, Monti Vandiver, Greg Cronholm, and Gary Cross)

Refuge ears in a seed blend are not much of a refuge. Probably, there is toxicity from Bt pollen. Most likely, there are low to moderate levels of Bt in kernels. Segregation of toxins in pollen may occur hence in kernels (select for 1 or 2 toxins at a time). Bottom line: high dose refuge strategy may be nullified. Evolution of resistance may speed up. Seed blends may increase likelihood of resistance development. EPA "accidentally" approves seed blend refuges for the "cotton zone" with added 20% structured refuge. Our selected moths will fly north to be selected again in the next generation. Univ. of MN published a paper stating that non-Bt adjacent to Bt plants receive approximately 75% cross-pollination in first 4 rows. New recommendations for Texas: abandon large-block refuges, plant strip refuges of 4-8 rows, harvest the toxic pollen and enjoy the additional toxic kernels, and expect much less damage in the refuge (at a cost of enhanced selection for resistance).

Insecticide spray timing for optimal control of fall armyworm on reproductive stage CORN (Dr. Pat Porter, Dr. Ed Bynum, Monti Vandiver, Greg Cronholm, Sydney Glass, Becca Hager, Al Perez, Joshua Correa, and Gary Cross)

Insecticide: Prevathon 5% SC (20 oz/a). Treatments: 1. Application at 7-days-pre-silk._ 2. Application at 7-days-pre-silk, silk, 7-days-post-silk, 14-days-post-silk, and 21-days-post-silk._ 3. Silk._ 4. 7-days-pre-silk, silk._ 5. 7-days-post-silk._ 6. Untreated. Conclusions: A single Prevathon application at 7 days before silk or at silk protected yield as well as multiple applications. One application at 7 days after silk had numerically greater yield loss. All applications increased yield over untreated plots.

Determination of yield loss to fall armyworm (FAW) and its associated fungi in CORN (Dr. Pat Porter and Dr. Ed Bynum)

FAW direct damage begins at milk stage. Visible fungal damage begins at dent stage. Fungi affected 56% of kernels, FAW 44% (was 58.42% in 2011 preliminary data set). A yield loss of 0.202 lbs/ear occurred with one FAW per lower 2/3 of the ear. Yield loss of 0.202 lbs/larva in the lower ear is reasonable and accurate. Presently, we do not know the percentage of larvae that move to the lower ear.

Early season pre-tassel miticide applications for mite control in CORN (Dr. Ed Bynum Emilio Nino, Monti Vandiver, and Dr. Pat Porter)

Farmers are making applications when corn is only 1-foot tall because current miticides are slow acting.

Control from applications at and after tassel is uncertain. They hope to reduce mite densities to levels that will not build back to damaging populations. They save application costs by mixing miticides with herbicides. Questions: Do early season miticide applications at V4 to V7 grow stages (1 – 2 ft tall corn) provide effective season long control? What impact do natural predators have on suppressing and managing early season mite infestations? Are applications of Comite® (propargite), Oberon® (spiromesifen), and Onager® (hexythiazox) equally effective when applied early? Western flower thrips are early predators and may knock down high mite populations and keep them down for a good part of the season. Later in the season, six spotted thrips and predatory mites become the key mite predators. Under stressful hot and dry conditions, mite numbers can develop into damaging level. No significant difference in yield was observed among treatments. Early season mite infestations may be naturally suppressed by predator populations. Early miticide applications to 1-2 ft tall corn proved to be too unpredictable in terms of benefits for season-long control. Therefore, early miticide applications to 1-2 ft tall corn constitute an unreliable practice for managing mites. These data suggest that miticide applications at 4-5 ft tall corn would be better than applications at 1-2 ft tall corn.

LIVESTOCK AND POULTRY:

Arthropod Management in White-tailed Deer *(Odocoileus virginianus* Zimmermann*)* Production Facilities (Dr. Roger Gold)

Texas white tailed is the leader in dear hunting with $3 billion dollar/year. In the captive cervid industry Texas is the leader with $700 million/year. The costs are estimated in $200,000 plus for 684 acres. The permits Texas Department of Parks and Wildlife (TDPW) issued 1,261 permits in 2011. The Texas Deer Breeder Association has over 2,600 members. The white-tailed deer “Breeder Stock” varies: Does are worth between $1,000 and $100,000 each. Bucks go for $5,000-$1 Million. There are many nuisance flies and vectors of pathogens such as Culidoides variipennis which transmit Orbivirus which cause the Epizootic Hemorrhagic Disease (EHD) and Bluetongue (BTD). These two diseases are clinically indistinguishable. Culicoides are the main focus of the study. Other nuisance flies include house, face, stable, little house, horn, horse, and deer flies. Manure management is almost non-existent at these facilities. These operations spray pyrethroids up to 20 times a day. Future work: monitor for presence of flies, correlate habitat with habitat and sanitation issues, and develop pest management strategies.

Effects of condensed tannins on house fly (Diptera: Muscidae) development in ruminant fecal material (Cassie Schoenthal, Barry D. Lambert, David H. Kattes, and Dr. Sonja L. Swiger)

Fly larvae depend on bacteria, such as *E. coli*, and organic matter in the manure as a food source. Adults require organic matter as a place to lay eggs and as a food source. House flies are a major nuisance of cattle and serve as vectors of pathogens. Condensed tannins found in the forage have been shown to suppress gastro-intestinal nematodes in ruminants. They can also reduce house fly pupal development in ruminant manure. Conclusions: Dietary condensed tannins impacted fly development in house manure. Lespedeza had the greatest effect on the number and weight of pupae reared from goat manure. Manure from infected goats consuming a diet of alfalfa reared more pupae than uninfected goats fed alfalfa, but a similar number of pupae to those fed panicled tick-clover. Infected goats fed alfalfa reared larger adults house flies than any other treatment. There was no effect of condensed tannins on adult house fly development. Infected goats fed alfalfa reared larger adults house flies than any other treatment.

Using commercial fly baits to control house flies in livestock barns and facilities (Dr. Sonja Swiger)

QuickBayt captured the largest number of house flies in swine and dairies facilities among baits tested. QuickBayt traps collected huge numbers of June beetles. Other fly traps evaluated included QuikStrike, and Golden Malrin. The non-insecticide traps that collect the flies by design are showing higher numbers. Effectiveness of the baits is still not resolved. Lab testing is planned to observe time until death or “resurgence from death”.

Darkling beetles: a reservoir for Salmonella between broiler flock rotations (Dr. Tawny “TC” Crippen, Dr. Cynthia Sheffield, Dr.Toni Poole, Dr. Bob Droleskey, Dr. Jesus Esquivel, Sharon Esquivel, Dr. Jeff Tomberlin, and Dr. Longyu Zheng)

The US broiler industry is the largest broiler chicken industry in the world. The number one protein consumed in the US. Comes from chicken: Americans consume 83.6 lbs per capita. Lesser mealworm or darkling beetle, *Alphitobius diaperinus* (Panzer), is a common pest in poultry breeder, layer, broiler, and egg production facilities. They live in the floor environment, walls, manure pits, under floor boards and are in contact with bedding, excreta and carcasses. They carry a large variety of animal and human health pathogens. Beetles tunnel into earth floors, decreasing effectiveness of clean out; pupate in insulation, decreasing the insulation value which has to be replaced every 5 years; and eat the bird feed. They can acquire salmonella in 15 minutes and it will pass through their digestive system in as little as 75 minutes. Salmonella can be retained up to 2 weeks and it can survive metamorphosis of the beetle. The lesser mealworm is potentially a significant bacterial reservoir that retains salmonella spanning the time between flock rotations. Modifications of current management practices may help reduce or eliminate the unintentional propagation and dissemination of bacterial pathogens.

Cattle fever tick update (Dr. Pete Teel)

The tropical cattle tick, *Rhipicephalus (Boophilus) microplus* originated from the tropics of India and Asia. The southern cattle tick, *Rhipicephalus (Boophilus) annulatus*, originated from the Meditarranean steppe. The historical range of these ticks in America used to be all southeast U.S. and southern California. Now there is a permanent quarantine zone next to the border in southeast TX for *R. annulatus* and *R. microplus*. They crossbreed and produce sterile male hybrids, but it is not practical to use them as part of an eradication effort. In the 1970s, TX experienced 5 years of above-average precipitation and had large tick outbreaks. There is another outbreak now, but not high levels of precipitation. It is probably driven by deer populations and exotic game. Threats to US security: shift from cattle centric system into native and exotic game, acaricide resistance, climate oscillation (wet/dry cycles), land fractionation, and border zone security. There is no treatment for bovine babesiosis. To eliminate the cattle fever tick we need to use Coral in dip-vat applications for cattle and feed Ivermectin-treated corn to white-tailed deer. Synthetic pyrethroid booster treatment stations. Any resistant tick populations need to be identified. Potentially, the GAVAC tick vaccine may be used in cattle. For proper surveillance, detection, and containment a new non-intrusive, reliable detection method is needed because currently ticks are detected by scratching animals with hands. Mobile smart phone resource: http://tickapp.tamu.edu

Evaluating the chemical effectiveness of pesticide-impregnated ear tags on beef cattle in Texas (Dr. Sonja Swiger)

In 2010 horn fly pressure was heavier than in 2011 with an average of 440 horn flies/cow compared to 352. This was possibly due to less precipitation. People are not treating their animals because of the impact that the severe drought had on their operations.

URBAN PESTS:

Bed bugs: Evaluating heat and cold as control techniques (Dr. Roger Gold)

There has been a resurgence in bed bugs population in the US and worldwide due to increasing resistance to pyrethroid insecticides. There were no significant differences among different durations; all treatments killed 100% of eggs; no mold or staining problems. It took 20 minutes to kill bed bugs at -20C.

MEDICAL ENTOMOLOGY:

Community Impacts of the 2012 West Nile Virus Outbreak in North Texas (Dr. Mike Merchant)

The West Nile Virus is caused by an arbovirus discovered in Uganda in 1937 and found in New York state in 1999. More than 30,000 Americans have been infected in the last 13 years. An avian cycle with mosquito vectors (mainly Culex) results in bird deaths. Human and horses are considered dead end vectors (humans and horses become sick but not vectors). It can also be transmitted by blood transfusion or organ donation. 2012 was the worst year in number of cases since its introduction (5,387 cases as of 12/11/2012). An estimated 80% of all human infections are asymptomatic or effects are very mild and 20% of cases produce West Nile Fever. Only 1 in 150 cases results in neuroinvasive disease. After an incubation period of 2-15 days, dengue-like symptoms develop with fever, headache, rash, lymphadenopathy, nausea, vomiting and rarely pancreatitis, hepatitis or myocarditis. It takes in average 60 days to recover. It primarily affects people older than 50. Severe neurologic illness produces: disorientation, cognitive impairment, stiff neck, muscle weakness, and Parkinson-like muscle movement disorders with a 4-18% fatality rate. The recovery may take years and some are left with permanent disabilities. What happened in North Texas in 2012? A mild winter (fewest number of freezes on record), wet weather in first four months (wettest in a decade), dry May followed by relatively dry weather through mid August. Blood donations are commonly screened for WNV and can serve as an early sign for an epidemic. WNV is not associated with poor living conditions. For instance, the Highland Park in Dallas, where most of the cases occurred, is one of the richest parts of the city. A total of 405 cases and 18 deaths were reported from Dallas County alone. Deaths in Texas due to WNV from years 2007 to 2012 were reported as follows: 17, 1, 9, 7, 2, and 86. Integrated Mosquito Management relies on surveillance, source reduction, larvicides to treat breeding sites, adult mosquito control (truck-mounted ultra-low-volume and aerial application), and public education (on source-reduction and personal protection). Municipal adult mosquito control is not as effective or desirable as source reduction and its effectiveness is reduced in neighborhoods with vegetation and fence screens. Aerial spraying is superior to ground application in treating tree canopies and inaccessible areas. One plane can treat 64,000 acres per night (100 times more than ground-based trucks). The cost to treat mosquitoes in Dallas in 2012 was $1 million (borne by state and federal government). Information: visit the Texas Extension Disaster Education Network (EDEN) at Texashelp.tamu.edu, http://mosquitosafari.tamu.edu or http://citybugs.tamu.edu

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