

Georgia Entomological Society Arthropod Survey

2021

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Apple

Apple insect and mite IPM in GA has been and continues to be quite stable. In most GA apple orchards insecticide applications timed by temperature-driven developmental models still provide excellent control of codling moth (*Cydia pomonella*) and Oriental fruit moth (*Grapholita molesta*) our key fruit feeding lepidopterans. That said, significant GA apple acreage exhibits signs of resistance to phosmet (Imidan), methoxyfenozide (Intrepid) and/or novaluron (Rimon). Fortunately, orchards experiencing declining insecticide performance continue to get good to excellent codling moth and Oriental fruit moth control with pheromonal mating disruption.

Brown marmorated stink bug (*Halyomorpha halys*) is readily observed in GA's mountain counties. Population numbers have been on the rise over the past few years, but fortunately, to date there has only been marginal issues due to BMSB in North GA apple and peach production.

However, during the 2021 season, crop loss in North GA apple production ranged from 80-100%. As such, many of the fruit-attacking pests were not a problem for apple producers. Even with a lack of fruit, the apple industry was at risk of tree-attacking pests. A potential new pest(s) for the region is a complex of ambrosia beetles (subfamily Scolytinae). These small beetles excavate tunnels in stressed trees and inoculate the bored-out galleries with a fungus. The resulting injury, fungal infection, and secondary infections can rapidly kill trees. Such injury, known as rapid apple decline, has been observed in surrounding states, such as North Carolina. Thus, season-long activity was monitored in North GA orchards in 2020 to better understand the incidence of this pest. Several species of ambrosia beetles and bark beetles were recorded with the black stem borer (*Xylosandrus germanus*) the most abundant species. Although numerous beetles were collected during sampling, there were no reports of ambrosia beetle attacks or losses of trees due to rapid apple decline in North GA during 2021.

Blueberry

Spotted-wing drosophila (SWD) remains the key pest of blueberries in Georgia. SWD populations were lower early in the season, but they built up as the harvest season progressed. Most of the growers followed management programs developed by UGA Blueberry Entomology program and didn't experience any issues related to SWD infestation in their fruit. However, a few growers who were not able to implement SWD management programs in a timely manner reported issues with SWD infestations in their fruit. Consequently, crop losses due to SWD infestations were very low. Overall, SWD management costs ranged from \$100-150 per acre.

Over the last couple of years, we have seen a significant increase in secondary pest problems likely due to multiple applications of broad-spectrum insecticides (OPs and pyrethroids) to control SWD. During 2021, gall midge populations were reported by several growers; however, gall midge populations were low. Flower thrips, scales, mealybugs, and bud mites were reported to be the major concerns. In fact, bud mite infestations were more widespread than in previous years, and in one situation infestation was extremely high which resulted in 100% crop loss. Other insect pests reported during 2021 included cherry fruit worm, cranberry fruit worm, leafhoppers, whiteflies, flat headed borers, blueberry leaf beetles, and slugs. Statewide, a significant proportion of the blueberry acreage was treated with 1-3 insecticide applications to control these secondary insect pests.

Corn

Corn acreage in Georgia was 472,022 acres planted and 445,000 acres harvested which was more than 2020. Growing conditions generally were cooler and wetter than normal. Average grain yield was 182 bu/acre, which was greater than the year before, but many irrigated fields yielded 250-300 bu/acre. Average corn grain price received was \$5.80 per bushel. An additional 30,000 acres were harvested as silage with a yield of 21 tons per acre. All corn seed is treated with a neonicotinoid insecticide, so soil insect damage was minimal. Stink bug are the most important foliar pest of corn. Stink bug infestations were moderate to high in 2021 in most areas, and preventive sprays were still widely used. Fall armyworm had a major outbreak in 2021 later in the season, but infestations were low in on-time planted corn. Fall armyworm whorl infestations were severe in non-Bt corn in later plantings. Corn earworm infestations were low to moderate in on-time planted corn, but increased to damaging levels in late-planted corn. Bt corn adoption is about 90% in the state. Cost of Bt technology was about \$16 to \$28 per acre depending on trait package. Bt products continue to provide very good control of stalk borer and fall armyworms in the whorl. More unexpected ear/kernel damage by corn earworm was observed in Bt corn than a few years earlier suggesting that field-evolved resistance is occurring to older Cry Bt trait products in Georgia. Studies in 2021 indicate resistance in corn earworm populations to the Cry1A and Cry1A.105 genes are now widespread in the southern U.S.

Cotton

The 2021 production year will be remembered for excessive rainfall. Frequent rainfall events challenged growers' ability to make timely inputs. Yields in southwest Georgia were lower than average, but some areas of central and east Georgia had excellent cotton. Cotton was harvested on 1.16 million acres with an average yield of 931 lbs lint per acre. Average insecticide applications were 2.62 per acre, average yield loss due to insects was 2.6 percent, and the total cost associated with insect pests (losses plus control costs) was \$95.31 per acre.

Thrips infestations were generally higher on April planted cotton compared with May and June planting dates. Most acres received an at-plant insecticide; however, 26 percent of the acres received a supplemental foliar application. Yield loss from thrips was minimal.

Tarnished plant bugs infested 65 percent of Georgia cotton and 34 percent of the acres were treated for this pest. We continue to see a disturbing trend for increased numbers of tarnished plant bugs in cotton. Clouded plant bugs were also more numerous compared with previous years. Insecticide applications targeting plant bugs disrupt beneficial insects and have the potential to flare secondary pests. Although cotton aphid infests most acres each year, this sucking pest rarely causes economic loss. However, growers treated 7 percent of acres for cotton aphid. Since the initial detection of Cotton leafroll dwarf virus (CLRVD) in Georgia during 2018, this virus which is vectored by cotton aphid has been observed in all cotton production regions in Georgia. Although CLRVD infections are common, yield loss has only occurred in a few fields. Aggressive applications of effective aphid insecticides (weekly sprays following emergence) have not significantly impacted CLRVD plant infections or yield.

Over 99 percent of cotton planted in Georgia is Bt cotton. The industry is transitioning to 3-gene Bt cottons which were planted on approximately 70 percent of the acres. This transition needs to continue

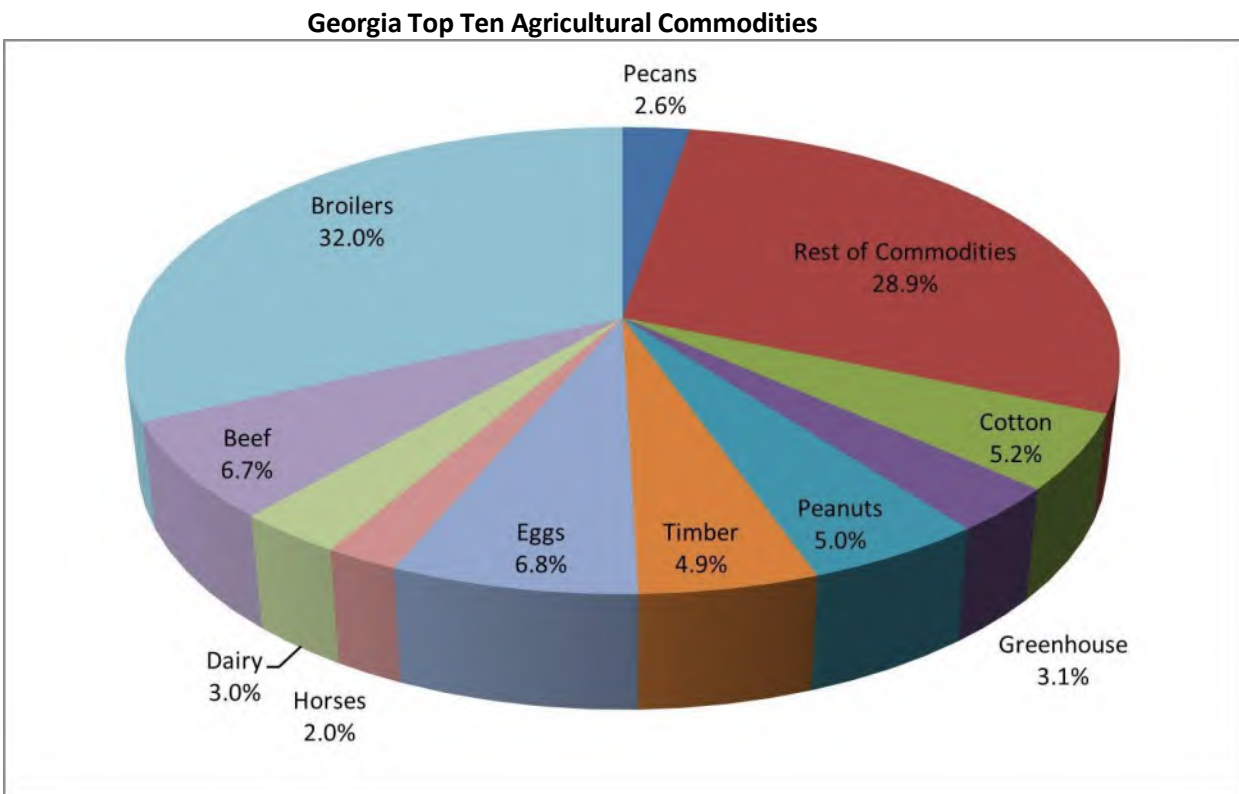
since laboratory bioassays suggests high levels of resistance to Cry1Ac (the first Bt trait introduced in 1996) and decreased susceptibility to Cry2Ab. The third Bt trait, Vip3A continues to be very active on CEW. In spite of these concerns, less than 1 percent of the acreage was treated for corn earworm due to low corn earworm populations infesting cotton. Stink bugs continue to be the most common insect requiring treatment. Approximately 78 percent of acres were treated for stink bugs; averaging nearly 2 applications per acre.

Winter and early spring temperatures were above average which favors silverleaf whitefly (SLWF) survival and reproduction. However, frequent rainfall events suppressed SLWF populations. Only 7 percent of the acreage was infested with SLWF and less than 1 percent of the acreage was treated with insecticide for SLWF.

Forest: No report submitted

Livestock, Poultry, and Pets

Among Georgia’s Top 10 agricultural commodities, five are animal agriculture – broilers, egg-laying hens, beef cattle, dairy cattle, and horses. Combined, the farm gate value of these five commodities totals over half the state’s entire agricultural farm gate income, illustrating the significance of animal agriculture in the state.



Beef Cattle

Georgia ranks 20th nationally in cattle production, with over a half million cows on pasture annually, amounting to a farm gate value of over \$663 million. Horn flies (*Haematobia irritans*) are the main pest of pastured cattle, causing cattle irritation and aggravation by their blood-feeding habit. More significantly, the cow's avoidance behaviors disrupt calf nursing, meaning calf weaning weights may be reduced by 18 pounds per calf compared with calves on mother cows with good horn fly control. Due to recent mild winters, cattlemen in South Georgia claimed that they had horn flies on their animals continuously, with some treating for flies as early as February. Statewide, annual losses to horn flies on Georgia cow-calf operations were over **\$15.4 million**. Horn fly suppression is dependent on insecticides, although due to insecticide resistance there are few options that effectively reduce horn fly numbers for more than a few days. Stable flies, another bloodsucking fly attacking cattle, account for over **\$15 million** in losses for Georgia cattle herds. To control horn flies and stable flies (as well as other ectoparasites such as face flies, lice, etc.), Georgia cattlemen invest ca. **\$6.1 million** annually. In September 2021, the Asian Longhorned Tick (*Haemaphysalis longicornis*) was first reported in Georgia, on a cow-calf operation in Pickens County. This new invasive may significantly impact how pest suppression is practiced on Georgia livestock.

Broilers

Georgia continues to be the nation's number 1 broiler producing state. Broilers rank at the top of Georgia's agricultural commodities, bringing in over \$3 billion annually, or 32% of the state's farm gate value.

Worldwide, darkling beetles (*Alphitobius diaperinus*), whose larvae are known as lesser mealworms, are the primary pest of broiler production. These insects burrow into insulation to pupate, damaging facilities and lowering insulative capacity. Costs of heating during winter and cooling houses in summer significantly increase production costs, and chickens eat more in cold weather to maintain body heat. When litter is removed and applied to pastures or fields as soil amendment, beetles are distributed and may migrate to nearby homes, creating neighborhood friction. Lesser mealworms feed on dead birds and feces, thereby acquiring numerous pathogens which they can transfer to uninfected birds when consumed. They also maintain Salmonella in their guts during pupation, so that newly emerged adult beetles are infectious to chickens. Chickens are predators and prone to eating insects; filling their digestive tracts with indigestible beetles prevents their consuming nutritious feed and gaining weight, as meat birds are intended to do. *Alphitobius* populations worldwide have been shown resistant to most of the pesticides registered for their suppression, so management strategies are extremely limited. Suppression efforts have some effect on beetle numbers, but there are no tactics that significantly reduce beetle populations.

All 13,000 Georgia broiler houses are infested with darkling beetles, and broiler producers spend approximately **\$12.5 million** annually for *Alphitobius* suppression, and statewide losses to the beetles are estimated at **\$4.9 million** annually. The resulting total, ca. **\$17.4 million** annually, probably vastly underestimates the impact of this pest in the state. Again, even the most conscientious and strategic intervention strategy is ineffective at suppressing *Alphitobius* beetles with current products and technology.

Caged Layers

Table eggs are Georgia's third most lucrative commodity, with an annual value to the state of over \$804 million (ranking Georgia 6th nationally). The principal pest in caged layer houses is the house fly (*Musca domestica*), which causes spotting of eggs, degradation of equipment through fecal contamination, and neighborhood aggravation when flies migrate away from the poultry farm to nearby residences. Because of suitable conditions inside layer houses, house flies can be a year-round problem. Producers use manure and water management, trapping, biological control (fly parasitoids and predators), and various pesticides to suppress house flies around caged layer operations. Worldwide, house flies have been shown resistant to most insecticides, so control is seldom adequate. Losses due to flies combined with costs of management are estimated to total over **\$8.1 million** annually.

Northern fowl mites (*Ornithonyssus sylviarum*) are the second most significant pest in layer flocks. These mites are bloodsuckers that spend their entire life cycle on the chicken host, causing itching, scabbing, anemia, and general bird discomfort and lack of thriftiness. Workers bothered by mites moving to them, biting and crawling, can be so alarmed that they refuse to work in such conditions. Losses due to reduced feed conversion efficiency and reduced egg production are estimated at **\$1.9 million** annually, while suppression costs (primarily acaricides) are about **\$1.8 million** per year, totaling **\$3.7 million** statewide annually.

Dairy

Georgia's 112 dairy farms currently house over 81,000 dairy cows. Dairy cattle are affected by the same pests that plague beef herds, and stress from ectoparasites can compromise cow health and milk production. Stable flies are more severe on dairy animals, both because there is more larval habitat (spilled feed, decaying hay, etc.) on dairy properties than on pasture and because milk cows are more severely impacted by stable fly feeding than are beef animals. Milk cows are more susceptible to mastitis (associated with horn flies and stable flies). Stable fly feeding interrupts cow feeding; host avoidance behaviors raise animal temperatures and waste energy. House fly emigration from dairies creates neighborhood ill will, so house fly suppression becomes a priority, even though this species has minimal direct impact on the animals. While dairy losses are difficult to assess, combined lost production and costs of control are estimated at about **\$500,000** per year.

Pets

In the last couple of years, due to the coronavirus pandemic, people have been working from home, so more people have adopted dogs, increasing the numbers of pet-owning households in Georgia. Approximately 2.7 million Georgia households have dogs and cats. The three major arthropod pests affecting pets are fleas, ticks, and mosquitoes. Because fleas transmit tapeworms, ticks transmit pathogens such as *Ehrlichia*, and mosquitoes carry heartworm, pest suppression is essential for disease prevention and to maintain pet health. Recent advances in ectoparasite control have yielded flea and tick control products with enhanced efficacy and concomitant premium prices. In Georgia, expenditures for ectoparasite control on dogs and cats amount to over **\$135 million** annually. The aforementioned Asian Longhorned Tick will also infest dogs, cats, horses, and other companion animals, greatly affecting how ectoparasites are suppressed.

Future

Currently populations of the exotic invasive Asian Longhorned Tick (*Haemaphysalis longicornis*) have been documented in 17 states, with it being found in Georgia (Pickens County) in September 2021. Unfortunately, the Asian Longhorned Tick prefers cattle (although it has an extensive list of acceptable hosts including most mammals and numerous avians), so it likely will significantly impact Georgia beef production as its range expands. Impacts on dairy, horses, small ungulates, pets, and other animals have not been estimated. The Asian Longhorned Tick has one feature that makes it particularly successful; it is parthenogenetic (meaning female ticks can produce viable eggs without mating), and each individual is able to lay up to 2,000 eggs, leading to rapid population increases.

Peach

Pest pressure from fruit-attacking insect pests, such as Oriental fruit moth (*Grapholita molesta*), assorted stink bugs, and green June beetles in peach orchards across GA was light to moderate in 2021. We anticipated high pressure from plum curculio (*Conotrachelus nenuphar*) during the 2021 season, but levels were relatively low, and management with primarily pyrethroids and phosmet kept injury below levels of economic loss.

Premature tree decline associated with scale, lesser peachtree borer, and peachtree borer continued to cause serious losses in 2021. Cover sprays do little to control/suppress these key tree pests. Lesser peachtree borer (*Synanthedon pictipes*) control is stable where dilute, pre-bloom chlorpyrifos sprays are complimented by in-season cover sprays and a post-harvest application of chlorpyrifos. Peachtree borer (*Synanthedon exitiosa*) infestations are worsening. Peachtree borer populations (univoltine) are showing the same upward population trends previously seen with the multivoltine lesser peachtree borer. Mating disruption utilizing the female sex pheromone of peachtree borer and lesser peachtree borer is now an effective management strategy in the Southeast with the Southeastern-formulated mating disruption pheromone, Isomate-LPTB Plus. This relatively new formulation was registered for use in Georgia and South Carolina for the 2020 and 2021 seasons, but deployment in 2021 waned. As the broad-spectrum insecticide, chlorpyrifos was banned in 2022, it is expected that growers will return to using alternative management strategies like mating disruption in future seasons.

Scale insects, particularly San Jose scale (*Comstockaspis perniciosus*), are continuing to cause significant damage to trees and fruit in Middle GA. Scale control is very demanding but doable with rigorous application of dormant oils followed by block-specific responses with an insect growth regulator application for scale outbreaks through October. Regardless, every orchard needs to receive two dormant, dilute oil applications each year. Growers that apply their dormant oil applications at higher volumes, 150-175 gal/acre, and including an insect growth regulator, such as pyriproxyfen, are seeing improved scale management, but not complete control. With the mild winter, the 2021 season was considerably bad in terms of San Jose scale pressure. Even in orchards under “good” management programs, scale numbers on average were 2 to 30 times higher in than on previous seasons.

The abundance of the invasive brown marmorated stink bug (*Halyomorpha halys*) was observed to be increasing in Fort Valley, the key peach growing region of GA. Population numbers were highest post-

harvest and there was no reported crop loss/injury due to this pest. The brown marmorated stink bug will continue to be monitored in 2022 in GA peaches.

Peanut

Peanut was produced on 755,000 acres in Georgia in 2021, and the average yield reported was 4,450 pounds per acre. Favorable environmental conditions and good seed quality resulted in excellent stands of early planted peanuts. Dry conditions in late May resulted in above threshold populations of lesser cornstalk borer (LCB) in some areas of the state. A survey of growers at UGA peanut maturity clinics at the end of the growing season showed that 15% of surveyed acres were treated for LCB in 2021. Much of Georgia's peanut growing region experienced above average rainfall beginning in June and lasting until harvest. The combination of high soil moisture and below normal temperatures kept LCB at sub-economic levels after early June.

Thrips pressure was typical for Georgia and ranged from mild to severe depending on management practices and location. The majority of peanut acreage was treated with an at plant insecticide for thrips management. Phorate was applied to 46% of acres while imidacloprid and aldicarb were applied to 30% and 0.4% of acres respectively. Based on county agent surveys, the statewide average incidence of spotted wilt disease (caused by *tomato spotted wilt orthotospovirus*) in peanut was 6.39%.

Severe early season tobacco budworm infestations occurred at the highest level in more than 8 years, but above threshold populations were still sporadic and tended to occur mostly in counties in the south-central part of the state.

Recent studies revealed that banded cucumber beetle outnumbered southern corn rootworm in Georgia peanut fields. Areas of the state with a history of rootworm infestation saw above average rootworm injury in 2021 even though damage reports from the Georgia Federal State Inspection Service were low (over 99% of the 2021 crop graded Segregation 1). The US EPA made the decision in 2021 to revoke all food use tolerances for the organophosphate insecticide chlorpyrifos. Chlorpyrifos was the only registered insecticide active ingredient that provided consistent and acceptable levels of management for the rootworm complex, peanut burrower bug, and wireworm species.

Pecan: No report submitted

Sorghum

Sorghum acreage in 2021 was 31,1230 acres for grain production and 12,000 acres for forage/silage production. Grain yield averaged 53 bu/acre. Price received is not available for 2021, but averaged \$7.96 per 100 lb seed in 2017. Acreage was up compared to a few years ago, but continues to be limited by low commodity prices and cost of controlling the sugarcane aphid (SCA). SCA infestations were first detected in late May in southern GA and throughout the state by the end of June. However, for the first year since its arrival in 2014, SCA infestation were not severe in most fields, although fields of susceptible hybrids usually needed to be sprayed for control. An increasing number of grain-type hybrids are available with good levels of plant resistance to SCA. Silage type hybrids generally remain susceptible to SCA. Control of SCA in silage and forage sorghum is problematic. Virtually all grain sorghum hybrids were pretreated with the neonicotinoid insecticides clothianidin, thiamethoxam or imidacloprid which

provided good control for SCA for 30-35 days after planting. Sivanto prime and Transform WG are registered and effective for control of SCA. Chlorpyrifos is sometimes also used but is slated to be canceled for use in February of 2022. Estimated cost of insecticide application for sugarcane aphid control was about \$15 to \$20 per acre. Sorghum midge infestations were absent or very low. Some later planted fields were treated for fall armyworm in the whorl or headworms (fall armyworm, corn earworm and/or sorghum webworm) on the grain heads. About 105 acres of sweet sorghum is grown in Georgia for syrup production with a retail value of about \$5,000 per acre. Sivanto prime is now labeled for use on sweet sorghum for syrup production, which prevented severe damage in most sweet sorghum fields.

Soybean

Insect pest problems in soybean were relatively minor during 2021. Soybeans were harvested from 135,000 acres with a record average yield of 46 bushels per acre. Velvetbean caterpillar, stink bugs, soybean looper, and kudzu bugs were the most common pests treated; 50, 25, 12, and 6 percent of acres were treated respectively. The average number of insecticide applications per acre was 0.94, yield loss was 4.15 percent, and the total cost associated with insect pests (losses plus control costs) was \$35.10 per acre.

Turfgrass

We witnessed a fall armyworm outbreak in 2021. The infestations started in mid-June, intensified by late July, and lasted until October in turfgrass. Although the exact reasons for the outbreak are unclear, we suspect early dispersal events, wet weather, and warmer temperatures contributed to the problem. The problem was observed in golf courses, sod farms, and residential lawns. The clientele used pyrethroids for management, but pyrethroid treatments did not provide effective control in some locations. The researchers in neighboring states also suffered similar severe pressure from fall armyworm. There are two strains of fall armyworm, rice- and corn-strain, that occur on crops. The studies have shown that most of the fall armyworms found on turfgrass were rice-strain. The corn-strain of fall armyworms was rarely reported from turfgrass. The researchers working with turfgrass pests in the southeastern US suspect that the fall armyworm outbreak in 2021 on turfgrass could be from corn-strain. The corn-strain of fall armyworm is suspected to be less susceptible to pyrethroids treatments. Many sod growers and golf course superintendents reported reduced fall armyworm control when using pyrethroid products. The strains are determined using molecular tools rather than morphological characters.

Mole cricket continues to be a threat to golf courses in 2021. Most golf course facilities used acephate and fipronil for management and were applied preventatively. We suspect most of the issues were related to poor application timing. Applications that are administered too early may not provide adequate control as the residual activity of the applied insecticide early in spring tends to wear off as eggs continue to hatch until June. It is critical to understand peak adult flight activity in the local area in spring to determine the appropriate application timing of insecticide.

Rhodesgrass mealybug, Tuttle mealybug, and bermudagrass mite issues persisted in golf courses during the 2021 growing season. The mealybugs can be managed using neonicotinoids, but re-application is warranted at 30 d intervals, especially at the beginning of August or September. These problems are

mostly restricted to golf courses in Georgia's southern and coastal regions. Bermudagrass mite problems were also reported from golf courses in the southern and coastal regions. The mite infestations are challenging to manage using miticides.

Urban and Structural: No report submitted

Vegetables

Onions experienced a very light year as far as thrips pest pressure.

Cole crop production continues to experience problems with managing diamondback moth, with most populations of this pest showing resistance to multiple insecticide MOAs. Resistance to the diamide insecticides appear to be broadly distributed and stable. Resistance levels to most other MOAs vary field-to-field. DBM pest pressure was moderate in 2021, with some individual fields experiencing severe pressure, but most experiencing light to moderate pressure. Imported cabbageworm is becoming a more consistent pest and appears more difficult to control. Pyrethroid insecticides no longer eliminate this pest; however, most newer chemistries for lepidopterous pests work well. Cole crops produced in the spring did experience infestations of aphids, mostly green peach aphid. This is becoming a more consistent pest problem for cole crops.

Thrips densities in Spring crops were high in multiple crops but occurred later in the Spring. Squash bug was an issue in multiple cucurbit crops and has become a more consistent issue in recent years, with infestations occurring in the spring and carrying over to fall production.

Pepper weevil is now a consistent pest in both spring and fall pepper and eggplant production. While most growers are managing this pest successfully, management does require insecticide applications on a maximum 5-day interval from first bud until final harvest. Fields with inadequate control experience crop loss early followed early crop termination. In addition to pepper weevil, fall pepper production is also experiencing more consistent problems with broad mite. A majority of the fall acreage received one or more acaricide applications for broad mite in 2021.

Silverleaf whitefly and associated viruses occurred late in 2021. Whitefly pest pressure was light to moderate in fall production, with insecticides providing adequate control. Virus incidence was low in 2021.

Southern peas continue to have cowpea curculio problems, particularly for peas flowering from May through late August. No registered (nor non-registered) insecticide provides adequate control of this pest. Late planted cowpeas that flower mid-September to October experienced less damage from the curculio due to the curculio going into diapause and not laying eggs late in the year.

Wheat

Planted wheat acreage in 2021 was about 126,388 acres with an average statewide yield of 56 bu/acre at \$6.65/bu. Acreage was substantially higher than the previous year but remained low by historical standards. Nevertheless, some farmers harvested 80-100 bu/acre under a high-input system. Resistant

varieties continue to be the main line of defense against the Hessian fly. Some fields of susceptible varieties had significant Hessian fly damage in the spring. Aphids and barley/cereal yellow dwarf disease levels were generally low to moderate in the coastal plain region but caused some damage in northern Georgia. Cereal leaf beetle infestations were low, but some fields were treated in east-central Georgia. Scab disease remains a major concern but was not as severe as the previous season. In addition, about 200,000 acres of winter rye were planted for winter grazing, and 41,615 acres of winter oats and 430 acres of winter barley were planted in Georgia.