A changing picture

Long-term changes are the trends we observe in landscaping with new turfgrass varieties and new landscape plantings.

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Those of us involved in landscape and turf management experience both short and long-term adjustments. When I speak of short-term adjustment I am referring to annual weather conditions. This would include above or below normal temperatures or precipitation during the season. These fluctuations from "normal" weather may have a significant impact on the abundance of specific insect pests.

Short-term effects - the summer of '97

Throughout the Southeast, late summer produced a drought in many areas. This encouraged outbreaks of southern chinch bugs on St. Augustinegrass, in particular, but also on some other warm-season grasses. Southern chinch bugs do best under hot, dry conditions and their abundance is usually enhanced in turf that is over fertilized and has a significant amount of thatch. While good cultural practices and irrigation can help minimize the impact of chinch bugs, St. Augustinegrass is always under threat when the weather has been hot and dry, for an extended period of time.

The hot, dry conditions also appear to enhance the impact of ground pearls on centipedegrass. Ground pearls continue to be a sporadic, yet fluctuating pest of centipede from the Carolinas across to California. Our major frustration with this pest has been our lack of success to develop effective management strategies.

Weather creates unusual turfgrass stresses and pest problems. The interaction between them can be most damaging to the turf.

While North Carolina is at the northern range for bermudagrass mites, we saw in increased incidence of this pest, which again was a reflection of the drought. Proper fertilization can help bermudagrass outgrow the damage, but this was effective only where adequate irrigation was available.

The hot, dry conditions also appeared to have negative consequences on other pests. Many grub species were hard to detect and species which spend time near the surface, (e.g. green June beetle bugs) appeared nonexistent. The dry soils apparently resulted in some delays in egg-laying, egg hatch, and grub tunneling and feeding near the surface. When sufficient rains finally occurred, grub feeding and injury became quite apparent. This sudden "increase" in green June beetle grubs caught many turfgrass managers by surprise.

Weather the previous winter (1996-97) also appeared to have a significant impact on several pests. Throughout much of the Southeast, winter temperatures averaged almost four degrees above normal for December through February. This ensured good winter survival of southern pests such as imported fire ants along the northern extent of their range. The fall of 1997 saw a significant increase in fire ant mounds along the edge of their northern movement.

Long-term effects

Insects are opportunistic creatures with an amazing ability to take advantage of what we set in front of them. Provide them with an adequate source of food in an appropriate environment and they will find it. This is often times the result of our landscape design and plantings. This occurs in several ways. When the adults of various scarab or white grubs lay eggs in the soil, they need to acquire moisture from their surrounding environment to

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The hot, dry August made green June beetle grub damage slow to appear. Rains later in the summer showed much damage.

maintain the ability to hatch. Japanese beetles fly during the day and actively seek those areas of lush, healthy turf (a sign of adequate soil moisture). Some of the other beetles that fly at night don't make that distinction and simply lay their eggs in a more random fashion. If their egg laying coincides with sufficient rainfall and soil moisture an infestation may occur. The availability and use of irrigation in the landscape obviously creates a more suitable habitat and increases the likelihood for the presence of white grubs.

In addition, landscaping, particularly the planting of ornamentals, may influence the abundance of turf pests. Perhaps the most frequently observed is that of ornamentals that are continually fed upon by Japanese beetles. Once the beetles are attracted to an area that also contains high quality turf, it only seems logical they may use that turf as a site to lay their eggs. Thus we create the complete habitat for all stages of the pest. We see the same with the use of hollies as landscape plantings often attracting twolined spittlebug adults and subsequently creating infestation of the nymphs in the turf. In addition, the continued population growth observed in the warm-season turfgrass areas of the United States is creating the need for new housing developments. In the Southeast these developments are going up in what was previously pine forests. More and more commonly I am observ-

Alternative control more common

The future of integrated pest management for turfgrass is dependent upon the development of environmentally and economically sound tools for insect control. The good news is that we already have a number of "non-conventional" products available for use and many more in development.

Over the years we have seen several entomogenous nematode products on the market, but problems with consistent results, shelf life, formulations, and product viability have limited their success and marketability. Several companies are still actively involved in insect parasitic nematode and striving to overcome the shortcomings of current technology.

Recent improvements in the ability to mass produce the insect fungal pathogen *Beauveria bassiana* have allowed at least two companies to begin serious investigation into its application as a turfgrass bioinsecticide. One company, Troy Biosciences, currently has a product called Naturalis-T labeled for use against a number of turf insect pests. Independent testing of this product is underway.

DowAgroSciences recently introduced Conserve SC, a natural compound that is in the spinosad class and is a fermentation product from a naturally-occurring soil organism. This insecticide has good efficacy against a number of Lepidopterous or caterpillar pests. It is most effective when applied against the smaller stages of worms.

A natural product that has been in use for many years is the active ingredient azadirachtin which is found in the oil of the leaves and seeds of the neem tree which grows in many tropical areas. This product is also effective against caterpillars and works as an insect growth regulator and is more effective when applied to the smaller worms. Trade names for azadirachtin-containing products include Azactin and Turplex.

Companies continue to experiment with various strains, of the bacterium *Bacillus thuringiensis*. This product has received limited use against caterpillars, but new strains may emerge in the future that are effective against turf insect pests.

Research has dramatically improved the formulation, shelf life, handling and application characteristics of these natural and biological products. Research is looking into isolating the toxins found in many natural controls and producing them synthetically. This has the potential of producing an even more cost effective and efficacious product for insect management.

The short-tail cricket has increased in importance in the Southeast in the past few years. We are unsure if this is due to changes in the turf landscape or a reflection of short-term weather effects.

Pest identification and numbers can be determined by a variety of sampling tools, one of which is a flush with soapy water.

ing infestations of short-tailed crickets creating unsightly mounds throughout home lawns. These crickets create their tunnels and mounds in turf, but feed primarily on pine cones and bark. There presence as a pest is a reflection of our invasion into their habitat.

What's ahead in 1998?

As we look ahead to 1998 it is, as usual, anyone's guess as to what will be the unexpected problems and which pests will be more troublesome than normal. Such questions about predicting pest problems are often subject to pure speculation. The dry period in late summer may have reduced some of our grub population.

Theother news about what's ahead for 1998 is a rapidly increasing arsenal of insect management tools that include conventional, natural, and biological products. **LM**

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Management of warm-season insect pests

CUTWORMS, ARMYWORMS

Hosts: all warm-season grasses
Field Diagnosis: Clip turf off at soil level. Severe infestations may leave large bare areas where turf has been consumed.
Control Practices:
- use "soap flush" to detect
- treat late in day
- do not mow and remove clippings for 1-3 days
- may be present from early spring to late fall

FIRE ANTS

Hosts: all warm-season grasses
Field Diagnosis: Ants create unsightly mounds which may also damage mowing equipment.
Painful stings of concern in high traffic areas.
Control Practices:
- best controlled in spring and fall when workers are actively foraging for food.
- mound treatments generally most effective, but are labor-intensive
- controls must be continued once program is started (fire ants will return at higher levels if treatments are stopped)
do not disturb mounds during treatment
- use baits prior to contact insecticides to allow workers to return baits to mound

MOLE CRICKETS

Hosts: prefers bahiagrass and close-cut bermudagrass
Field Diagnosis: Extensive tunneling is unsightly. Root feeding causes dieback, thin spots.
Control Practices:
- use "soap flush" to detect
- treat in June/July as soon as egg hatch
- follow-up treatments usually necessary
- look for adult activity in March/April to define areas of high risk for egg hatch

GROUND PEARLS

Hosts: most commonly attacks bermudagrass and centipedegrass
Field Diagnosis: Yellowing and then complete dieback of turf with no new regrowth the following season
Control Practices:
- no known effective control measure
- practice good turf management to increase turf tolerance
- irrigate during dry weather

SOUTHERN CHINCH BUGS

Hosts: all warm-season grasses prefers St. Augustinegrass
Field Diagnosis: Feeding results in turf becoming yellow and eventually turning reddish-brown.
Control Practices:
- avoid over-fertilizing
- manage thatch
- irrigate during dry spells
- apply pesticides with plenty of water
- multiple treatments often necessary

TWOLINED SPITTLEBUGS

Hosts: all warm- season grasses
Field Diagnosis: Results in yellowing of infested turf and severe infestation have noticeable unsightly "spittle masses".
Control Practices:
- control adults on ornamentals like hollies
- treat on cloudy days when possible, since spittlebugs are higher up on turf
- begin monitoring in early summer

WHITE GRUBS

Hosts: all warm-season grasses
Field Diagnosis: Grubs feed on roots and cause drought stress and turf dieback. May attract moles, skunks, etc. which damage turf searching for grubs.
Control Practices:
- attracted to low-cut, highly-maintained turf
- dig squares of sod 4-6" deep in late August to detect small grubs
- treatments most effective in late August/early September
- avoid ornamentals attractive to adult stages of Japanese beetles or green June beetles

BERMUDAGRASS MITES

Hosts: only bermudagrass
Field Diagnosis: Initial yellowing of leaf tips, followed by shortening of internodes causing a tufted growth. May die under severe infestations.
Control Practices:
- irrigate during dry spells
- proper fertilization helps turf outgrow damage
- Resistant cultivars Floratex, Midiron, and Tifdwarf
- multiple treatments often necessary

BEES/WASPS

Hosts: all turf types
Field Diagnosis: Holes, mounds, tunneling in turf area. Insects flying over turf area.
Control Practices:
- maintain a healthy, lush stand of turf. Most bees and wasps that live in the soil prefer a thin stand of turf
- mulch areas under shrubs, trees, etc. and keep mulch fresh to discourage nesting.