University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Historical Materials from University of Nebraska-Lincoln Extension

Extension

1981

EC81-1238 A Common Sense Approach to Turfgrass Insect Damage Prevention and Control

Arthur H. Bruneau

David Bishop

Robert C. Shearman

Follow this and additional works at: http://digitalcommons.unl.edu/extensionhist

Bruneau, Arthur H.; Bishop, David; and Shearman, Robert C., "EC81-1238 A Common Sense Approach to Turfgrass Insect Damage Prevention and Control" (1981). *Historical Materials from University of Nebraska-Lincoln Extension*. 4377.
http://digitalcommons.unl.edu/extensionhist/4377

This Article is brought to you for free and open access by the Extension at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Historical Materials from University of Nebraska-Lincoln Extension by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

AGRI
S
85
E7
#81-1238
c.2

Nebraska Cooperative Extension Service—EC 81-1238

Integrated
Pest
Management

Institute of Agriculture
and Natural Resources

A Common Sense Approach To TURFGRASS INSECT DAMAGE PREVENTION AND CONTROL

Integrated
Pest
Management

Institute of Agriculture
and Natural Resources

A Common Sense Approach To
TURFGRASS INSECT DAMAGE PREVENTION AND CONTROL

Contents

Acknowledgments 1
Introduction 2
Detection 2
Pest Management Practices 3
Key to Lawn Insects 7
White Grubs 9
Bluegrass Billbug 14
Sod Webworm 17
True Armyworm 20
Cutworms 22
Greenbugs 25
Fall Armyworms 27
Chinch Bugs 29
Occurrence and Treatment Timing Chart 31
Notes 32

Issued February 1981, 3,000

Authors

Arthur H. Bruneau, Extension IPM Turf Specialist
David Bishop, Extension Assistant IPM Turf
Robert C. Shearman, Turfgrass Specialist
Robert E. Roselle, Extension Entomologist

ACKNOWLEDGMENTS

The authors are indebted to the following entomologists for their help in preparation of this guide.

J. Ackland Jones, Ph.D., Assistant Professor, Department of Entomology, University of Nebraska–Lincoln.

David L. Keith, Ph.D., Extension Entomologist, Department of Entomology, University of Nebraska–Lincoln.

S. Dean Kindler, Ph.D., Associate Professor, USDA, Department of Entomology, University of Nebraska–Lincoln.

ZB Mayo, Ph.D., Associate Professor, Department of Entomology, University of Nebraska–Lincoln.

INTRODUCTION

All mature insects have six legs and three body segments. The developmental stages of insects, called metamorphosis, results in a change in size and form. Most turf insect pests exhibit this complex life cycle. The larva, commonly known as caterpillar or grub, hatches from an egg, and when full grown, changes into a pupa and then into an adult.

Only a few of the many insects inhabiting the earth damage turf. Turf insects can be categorized into two groups: (1) surface active insects typified by armyworms, greenbugs, cutworms and sod webworms that feed on above ground portions of plants and (2) soil active insects, typified by white grubs and billbugs, that damage turf by feeding on roots. Some surface active insects such as the greenbug, a species of aphid, damage turf by sucking juices from the turf plant.

The unavailability of long term residual insecticides, environmental concerns, insect resistance to insecticides, and the increasing cost of chemicals has reemphasized the importance of efficient turf management and the reduction of a dependency on pesticide use. Research has shown that many turfgrass insect pests are attracted to lush turf. A well-watered, properly fertilized and carefully managed turf will tolerate many more insects than one which is neglected and mismanaged. In addition, poorly maintained turf will exhibit injury sooner and be slower to recover following insect injury. Careful management can reduce turf injury.

DETECTION

Successful control of turf insects depends upon the early detection of pests before they reach damaging levels. **This can be accomplished through frequent turf inspections, looking for early signs of insect damage, insuring that the pest is present.** For example, blades chewed off at the crown, birds feeding, and moths flying in a zigzag pattern are good

indicators that sod webworms are present.

The presence of surface active insects can be shown by mixing one tablespoon of 1% pyrethrins in two gallons of water and applying this mixture to one square yard of turf. Pyrethrins irritate webworms and other surface feeding pests causing them to come to the surface in five to ten minutes. The procedure is ineffective for soil active insects.

Other indicators of soil insect activity include a general thinning of the turf and individual plants easily pulled from the soil. Turf destruction by animals is also a good indicator. Soil insect activity can be verified by cutting several square foot sections of sod about four inches deep and physically examining the soil around the roots for insects.

If no insects or evidence of feeding are found, the problem is probably due to some other cause and an insecticide would be of no value. Environmental factors, especially heat and drought injury, are often mistaken for insect injury. Refer to the specific insect in this bulletin for a description of symptoms.

PEST MANAGEMENT PRACTICES

Mowing

Mowing height and frequency are important for maintaining quality turf and must be adjusted to the time of year and growth rate of the grass. For example, mow Kentucky bluegrass and fine fescues at 1.5 to 2.0 in. (3.8-5.0 cm) in spring and fall and at 2.5 to 3.0 in. (6.3-7.5 cm) in the summer. The higher summer cutting heights maintain more vegetation which helps insulate the crown of the grass plant from high temperature stress. Do not mow when it exceeds 90°. Gradually adjust the mowing height during the seasonal transition. As a general rule, remove no more than 30 to 40% of the leaf area with any mowing. Avoid scalping or mowing lower than the recommended cutting height.

Fertilization

Fertilize to meet the nutritional needs of the turf, but avoid over-stimulation. Slow release nitrogen fertilizers containing a combination of fast-and-slow-release carriers are preferred since they do not promote lush, succulent growth. Timing of fertilizer applications is also important. If two applications are made, they should be done in October and again in May. Avoid early spring (March and April) applications with fast-release nitrogen carriers.

Irrigation

The amount of water needed varies with turfgrass species or cultivar, season of the year, location, climate, intensity of culture, and use. Water deeply but infrequently to encourage the plant to develop a deep root system. Light, frequent watering encourages a shallow root system and weakened turf more prone to pest damage.

Early morning is the best time to water. Avoid evening watering. Diseases may develop rapidly if grass blades are continuously wet for six or more hours.

Soil Cultivation

Heavy soils compact readily when exposed to traffic and prevent insecticide penetration. Soil compaction slows turfgrass growth and development by limiting air, water, and nutrient penetration. Soil cultivation (coring or aerification) when turf is actively growing helps relieve compaction and improves turfgrass root penetration. This allows the turf to better withstand high temperature and drought stress.

Thatch

Practices that promote vigorous turf growth may encourage thatch development. Soil aeration or coring can be used to minimize thatch accumulation and modify it for better turfgrass growth. Dethatch turfs when thatch accumulation exceeds one-half inch (1.3 cm). A combi-

nation of aerification and power raking is preferred. Turfs should be dethatched when actively growing. Light, repeated-power raking is preferred when excessive 1.5 inch (3.8 cm) or greater, thatch is present.

Genetic Resistance

Adapted turfgrass cultivars are better able to tolerate stress and are less likely to be damaged by insects than nonadapted grasses. While some turfgrass selections and cultivars have exhibited tolerance to different insects, more studies are required to confirm this. For this reason it is impossible to group turfgrass cultivars into resistant, moderately resistant or susceptible cateogories.

Base turfgrass selection on cultivar (variety) trials conducted over a number of years under conditions similar to those where the grass is to be grown. University recommendations are largely based on such regional trials.

In general, use a blend of improved adapted grasses rather than a single cultivar. This helps insure good performance over a wide range of conditions. **A blend of at least three improved Kentucky bluegrass cultivars is suggested for best performance when a Kentucky bluegrass lawn is desired.**

Biological Control

Contolling turf pests through the use of natural enemies is appealing, however, technological problems have limited this use. Despite the problems, agriculturalists and commercial interests are taking a serious look at biological control agents because of their potential effectiveness, and relative safety.

One successful bio-control program in the East has been the use of *Bacillus popillae*, a commercially available, bacterial disease that attacks Japanese beetle grubs. However, this "milky spore disease" does not control all forms of white grubs, takes several years to appreciably

reduce populations, and can be affected by certain pesticides.

Insecticides

Presently available insecticides are relatively fast acting, but have short residual action. Because of this, proper pest identification and familiarity with pest life cycles is critical. This will help insure choosing an effective insecticide and applying it when the insect is most susceptible.

It is often impractical, if not impossible, to eliminate an insect pest from an area. However, certain management practices can prevent insect populations from reaching damaging levels. Insect pest populations considered capable of causing turf injury are presented throughout this booklet. Chemical control may be required if these levels are reached or exceeded. **Before using any insecticide, consult a turf professional, extension agent or entomologist for current recommendations and restrictions. If chemical control is required, select an appropriate insecticide, read and follow label directions, become aware of proper use of the insecticide, and time applications when the insect is most susceptible.** Apply only to infested areas.

Apply insecticides in late afternoon or early evening for insects that are active at night. Mow the lawn before application and remove the clippings. Water thoroughly before application. Water lightly after insecticides are applied to control surface active insects to wash the insecticides off grass blades and into the turf. Heavy watering is required immediately following application of an insecticide to control soil active insects to insure good thatch-soil penetration.

Keep children and pets off treated areas until the spray has dried. Never allow sprays to puddle as birds or pets may be injured. Above all, don't be impatient. It may take several days after treatment to achieve control of surface-active insects and longer for soil-active insects.

KEY TO LAWN INSECTS

Contact a turf specialist, county agent, or entomologist if diagnosis is uncertain. Remember, not all insects are injurious to turf.

Soil-active Insects

1. Cream blunt ended bodies; C-shaped with hard yellow or brown heads, six legs near head.
   ..... **White Grubs**
   a. Spines on raster in two distinct lines ..... **May Beetle Grubs**
   b. Spines on raster erratic
      ..... **Masked Chafer Grubs**
   c. Spines on raster erratic; two pad-like structures on raster
      Black Turfgrass Ataenius Grubs
2. Small white bodies; like grain of puffed rice with yellow to brown head; legless ..... **Billbug Grubs**

Surface-active Insects

1. Larvae .2-1 in. (0.5-2.6 cm) long, dark brown head; dark spots scattered over body from which hairs grow ..... **Sod Webworms**
2. Larvae with six true legs on front part of body, prolegs on abdomen, and distinct head; 1½-2 in. (3.8-5.1 cm) long
   ..... **Armyworms and Cutworms**
   a. Gray to yellowish green; stripes down center of back and along each side, yellow heads
      ..... **True Armyworm**
   b. Dark brown-black on upper

side; pale on underside; three narrow yellow stripes on top and a broad yellow stripe on each side, bronze sheen ...**Bronzed-Cutworm**

c. Gray to olive; no distinguishing markings .....**Black Cutworm**

d. Row of yellow dots down middle of back .. **Variegated Cutworm**

e. Gray to yellow-green, stripes on side of body, inverted "Y" marking on heads ..... **Fall Armyworm**

3. Soft, light green body .1 in. (1.6 mm) long, wingless, dark green stripe on back, black tipped legs and cornicles. "tail pipes" ..... **Greenbug**

4. Predominantly black bodies with white wings; .2 in. (3.2 mm long); white, folded wings; scurry if disturbed. Nymphs are small, red, or red with a white band. .....**Chinch bugs**

WHITE GRUBS

Scientific Name: *Phyllophaga spp., Cyclocephala spp., Ataenius spretulus*
Turfgrasses Affected: Bentgrass, Kentucky bluegrass, annual bluegrass, coarse and fine fescue
Damaging Stage: Larvae
Occurrence and Treatment Timing: See chart on page 31.

Characteristics

White grubs are the larval stage of several different species of beetles known collectively as the scarab beetles (Family: *Scarabaeidae*). Common species of white grubs infesting turf in Nebraska are the May beetle or Junebug *(Phyllophaga spp.)* and the masked chafer *(Cyclocephala spp.)*. A third species, the black turfgrass ataenius *(Ataenius spretulus)* has recently become a problem in Nebraska golf courses.

White grub.

Life cycles of white grubs vary from two generations per year to one generation every three years. It is important to correctly identify the species of grub causing damage to time treatment for

best control.

All white grubs have creamy blunt-ended bodies with hard yellow or brown heads. They have three pairs of legs, and are usually C-shaped. Mature grubs range from .25-1.5 in. (.6-3.8 cm) long depending on the species.

The different species of grubs can be identified by the patterns of spines found on the underside of the last abdominal segment or raster. The patterns can be distinguished by using a small hand lens. The arrangement of spines on the masked chafer larvae is erratic with no clearly defined lines, while spines on the May beetle raster are arranged in two distinct lines. The black turfgrass ataenius is distinguished by the pad-like structures on the end of the abdomen and erratic pattern of the spines.

All white grubs feed below the surface—attacking the roots and rhizomes of grass plants.

Symptoms

Grub infestation can appear similar to several other turf problems such as disease, heat, or drought stress. Patches of grub-damaged turf have a soft spongy feel when walked on, and can be easily pulled from the soil. Damage is most apparent in April and May, or September

Patterns of spines found on rasters of (from left) May Beetle, Masked Chafer, Black Turfgrass Ataenius.

and October when grub activity is highest.

Several mammals, especially skunks, raccoons, and moles, feed heavily on grubs, and signs of their feeding in an area are strong indications of the presence of grubs or webworms. Flocks of birds, particularly starlings, feeding in the turf is further evidence of possible infestation.

To confirm the presence of white grubs, carefully examine the root zone and first three or four inches of soil. Take samples of one square foot from several locations. If you are uncertain of the identification, have specimens checked by a turf specialist, extension agent, or entomologist.

Treatment

Control of white grubs is difficult and there will probably always be some level of activity in the soil following treatment. Proper management, however, will reduce damage by minor infestations. Proper fertilization and watering to maintain a healthy turf will enable the grass to recover and reestablish in damaged areas. A well-aerated turf with no more than .5 in. (12.8 mm) of thatch will increase the likelihood of success when chemical treatment is needed. Thatch in excess of .5 in. (12.8 mm) can prevent penetration of insecticides and reduce their effectiveness.

Inadequate irrigation and drought stress may result in more extensive damage to turf by white grubs. Egg laying females are generally attracted to vigorous, well-watered turf and adequate moisture is necessary for eggs to develop. Grubs will feed just as readily on dry turf as they will in well-watered soil.

Chemical treatment may be justified when May beetle larvae number three per square foot, or masked chafer larvae number five per square foot. The condition of the turf, its value, and the damage caused by birds and mammals in searching for grubs, may alter these

guidelines.

When chemical treatment is necessary, it must be applied to insure maximum penetration into the soil. If thatch is present, water the turf the night before treatment to help penetration. Then water the insecticide into the soil before the spray dries. When granular applications are made, they should also be well-watered into the soil. Apply at least 1 inch of water and repeat in 5 or 6 days if rainfall does not occur.

To be most effective, apply treatments in the late summer or early fall when grubs are in the early stages of development and feeding occurs near the soil surface.

May Beetle ***(Phyllophaga spp.)***

An adult May beetle is large (.6-.9 in., 16.0-22.4 mm) with a hard shell that ranges in color from tan to brown to black. Adults emerge from the soil in May and early June and can be seen flying around lights at night. While adults do not attack turf, they do feed on foliage of a broad range of trees, shrubs, and other plants.

May beetle and pupa. Courtesy H. Tashiro, New York State Ag Exp. Sta.

Eggs are deposited in holes made by burrowing female beetles. Upon hatching, the larvae feed on turf roots until cooler temperatures force them to burrow below the frost line where they overwinter. Grubs return to the surface to feed in April or May and feed actively throughout the next growing season be-

fore again moving down into the soil. In the third year, the grubs appear near the surface and feed until May or June when they enter the pupal stage. Adults develop late in the summer, overwinter in the soil and emerge the next May or June.

Masked Chafer *(Cyclocephala spp.)*

The adult masked chafer is about .6 in. (16 mm) long, has a tan hard shell, and black mask-like eyes. The adults emerge from the soil in June and July and, like the May beetle, are attracted to lights.

Unlike the May beetle, the masked chafer completes its life cycle in one year. Eggs are deposited in the soil and upon hatching, the larvae feed on roots and rhizomes before over-wintering below the frost line. Pupation occurs the following May or June with the adult emerging in June and July.

Black Turfgrass Ataenius *(Ataenius spretulus)*

The black turfgrass ataenius is .2 in.

Masked chafer adult.

Black turfgrass ataenius. Courtesy J. Weaver, West Virginia University.

(4.8 mm) long and black in color. The adult overwinters in loose soil, pine needles, and leaf litter and begins moving into turfgrass in March or April.

Females deposit eggs in soil and thatch. Upon hatching, the larvae feed on grass roots for 3-5 weeks before pupating. Most first generation adults emerge in mid July. Second generation larvae begin appearing in late July or early August and mature into the over-wintering adults by October.

BLUEGRASS BILLBUG

Scientific Name: *Sphenophorus parvulus*
Turfgrasses Affected: Kentucky bluegrass
Damaging Stages: Mostly larvae, minor with adults
Occurrence and Treatment Timing: See chart on page 31.

Characteristics

Billbugs belong to the weevil family (Curculionidae). Adult billbugs have a characteristic snout with the mouthparts at the end. The adult bluegrass billbug is small (.25 in., 6.4 mm) and black. Although it has wings, the billbug does not fly. In May and June and again in September and October the adults may be seen on sidewalks and driveways, especially during mid to late afternoon hours.

Adults feed on stems and blades of the grass plant causing minor damage. In late May, females deposit their eggs in the stems just above the crown.

Billbug larvae are small (.4 in., 10 mm

Adult billbug.

at maturity), legless, white, and grublike with a yellow to brown head. Their bodies appear like a grain of puffed rice.

Newly hatched larvae appear in late May and June, feeding inside the stem where they hatch. The larvae move into the crown by mid June where they continue to feed. Infested shoots turn brown and die. Later in June the larvae move into the soil and feed on roots and rhizomes. In well-watered turf, larvae tend to remain near the soil surface and

Billbug larvae. Courtesy H. Tashiro, New York State Ag Exp. Sta.

can often be found feeding in or near the thatch layer. In dry soils, larvae tend to be deeper in the soils.

Adults begin to appear in early July and are active until cool weather in September and early October forces them to move to overwintering sites.

Symptoms

Most damage occurs from mid June through July when larvae are feeding and heat and drought stress are most severe.

Billbug damage.

Improper fertilization and irrigation appears to intensify the damage. Billbug adults overwinter in leaf litter in protected areas such as hedges, tall grass, and around houses. Damage does not generally occur in turf stands less than three years old.

Adult activity is the earliest sign of potential billbug problems. Look for adult billbugs on sidewalks and driveways in May and June. Later, when larvae have been feeding, grass appears weak, easily drought-stressed and when pulled, breaks readily at or near the crown. Close inspection of the infested shoots reveals tunneling and the presence of fine ground white or brown sawdust-like plant debris.

Diagnosis of billbug larvae is best confirmed by carefully examining thatch and the top 2-3 inches of soil.

Treatment

Proper cultural practices can reduce billbug damage. Adequate fertilization and watering reduce stress and enable plants to survive minor infestations. Some cultivars may have natural resistance to billbug injury.

Control adults before egg laying occurs. Experience has shown that one billbug adult per square foot may justify treatment, particularly in high valued turf. Insecticides used for adult billbug should not be watered into the soil.

Control of larvae is more difficult.

Treatments are often ineffective because they do not penetrate the thatch and reach the soil where larvae are active. Turf should be well-watered before treatment to moisten the thatch and soil and enhance insecticide penetration. After application, water again to move the insecticide to the larvae. Aerification can enchance insecticide penetration in conjunction with watering.

SOD WEBWORM

Scientific Name: *Crambus spp.*
Turfgrasses Affected: Bluegrass, bentgrass, coarse and fine fescue, zoysiagrass
Damaging Stage: Larvae
Occurrence and Treatment Timing: See chart on page 31.

Characteristics

Sod webworms are the larvae of the buff colored "lawn moth." These larvae are .2-1 in. (.5-2.6 cm) long with a dark brown head. Most have dark spots scattered over the body from which hairs grow. Webworms usually construct silk-lined burrows through the thatch layer and into the soil. In their protected "homes," the worms hide during the day and eventually overwinter.

The adult moth is .5-.75 in. (1.9-2.6 cm) long with a wing span of about .75 in. (1.9 cm). At rest, the buff-colored wings are folded close to the body. The most prominent characteristic of the adult is a pair of snout-like projections which extend forward from the head. They hide

Sod webworm.

during the day and are observed to fly in a zigzag pattern at dusk.

Partially grown larvae overwinter in the thatch and soil and become active as temperatures warm in the spring. They mature and pupate from mid May to mid June.

Sod webworm moths begin to emerge during late May and June and females begin dropping eggs randomly as they fly over the turf at dusk. First generation larvae feed from late June to the end of July when a new brood of moths emerge. A second generation will occur in July and possibly a partial third generation in September. Frequently, generations will overlap and all stages will be found by mid-summer.

Webworms feed at night on grass leaves and stems near the soil surface, resulting in irregular brown spots and thinned turf. During hot dry periods, damage will increase. In extreme situations, the webworm kills turf.

Symptoms

Since webworms feed only at night, damage may occur before the larvae are seen. Small patches of grass clipped off at ground level is an early sign of possible infestation. Green pellets of excrement (frass) are also evidence of their presence. Adult flight activity over the turf at dusk is an early sign of potential webworm infestation later in the growing season.

To confirm the presence of webworms, spread 1 tablespoon of 1-2% pyrethrins

Webworm larva. Courtesy H. Tashiro, New York State Ag Exp. Sta.

or ¼ cup of household detergent mixed in 1 gallon of water over one square yard of turf. This irritates the larvae and drives them to the surface. Scratching thatch and soil surface with a knife blade also may reveal their presence.

Treatment

Good cultural practices, especially irrigation, are usually enough to overcome light to moderate infestations. In such cases, the grass will outgrow the injured area. Hot dry periods often result in increased turf injury.

Chemical control is desirable when numbers of larvae reach 15 or more per square yard in healthy turf. Fewer larvae can cause significant damage to weak turf.

If insecticides are used, mow turf and remove all clippings before application to insure thorough penetration. Also, water the grass thoroughly before application to bring the larvae closer to the surface. A late afternoon to early evening treatment is most effective. Following application, do not mow or water for 24-48 hours. If you use granular materials, the grass should be dry at application to insure that the insecticide will fall to the ground. After application, water lightly (.125 in. or less) to release the insecticide. Do not allow children and pets on treated areas until the surfaces have dried.

TRUE ARMYWORM

Scientific Name: *Pseudaletia unipuncta*
Turfgrasses Affected: All species
Damaging Stage: Larvae
Occurrence and Treatment Timing: See chart on page 31

Characteristics

True armyworms are larvae with six true legs on the front part of the body and with a distinct head. They are 1.5-2 in. (3.8-5.1 cm) long at maturity and vary in color from gray to yellowish green with yellowish heads. The true armyworm has stripes down the center of the back and along each side.

True armyworm adults are brown with a small white spot near the center of each fore-wing. The moths fly at night and are attracted to light.

Females begin depositing eggs on grasses in May. Upon hatching, larvae begin to feed on grass blades. Damage generally occurs in circular patches.

Typically, large numbers of armyworms will develop in one area and then

True armyworm.

migrate as a group to another. Feeding and migration usually occur at night. Unless it is cloudy larvae hide in thatch during the day.

Infestations of fall armyworms are sporadic and occur only when egg laying adults migrate north. Most entomologists feel that the true armyworm is not a permanent resident of Nebraska, and that it migrates from the south. In Nebraska, it has two or three generations a year.

Symptoms

Since armyworms feed at night, damage may occur before the larvae are seen. Grass blades that appear skeletonized are frequently an early sign of feeding activity by small larvae. Areas that have been damaged by large infestations often appear closely mowed and circular.

To confirm the presence of armyworms, spread 1 tablespoon of 1-2% pyrethrins *or* ¼ cup of household detergent mixed in one gallon of water over one square yard of turf. This irritates the larvae and forces them to the surface. Scratching around the debris with a knife also may reveal their presence.

Treatment

Good cultural practices, which promote a healthy vigorous turf, are usually sufficient to withstand a light to moderate infestation. In such cases, the grass will normally outgrow the injury.

Several natural factors often combine to keep armyworm populations at low levels. When weather becomes warm and humid, fungal diseases sometimes infest the armyworms, reducing populations. In addition, parasitic flies lay their eggs on the larvae and internal feeding by maggots later kills them. Several species of wasps are also important parasites of the armyworm.

Chemical control may be warranted when natural enemies and cultural practices are not enough to prevent damage. If sprays are used, use enough volume to insure complete and uniform coverage.

Following application do not mow or water for 24-48 hours. If you use granular materials, the grass should be dry at application to insure that the insecticide will reach the ground. After application, water lightly (.125 in. or less) to release the insecticide.

CUTWORMS

Scientific Name: Several species in the *Noctuidae* family: Lepidoptera
Turfgrasses Affected: All species
Damaging Stage: Larvae
Occurrence: Rarely a problem on turf in Nebraska

Characteristics

Cutworms are the larvae of several species of night-flying moths. They have three pairs of legs and fleshy prolegs. The most common species are the black cutworm, variegated cutworm, and the bronzed cutworm. Fully grown larvae average about 1.5 in. (38.4 mm) in length with the bronzed slightly larger. All species have a dark brown to brownish gray head. The body of the black cutworm is pale gray to olive with no distinguishing markings. The bronzed cutworm is dark brown-black on the upper part of the body and pale on the underside. The upper surface has three narrow yellow stripes and a broad white-yellow stripe running down each side. The entire body has a distinctive bronze sheen. The variegated cutworm larva has a row of yellow dots down the middle of the back.

Adults are robust, drab-colored hairy

Bronzed cutworm.

Black cutworm. Courtesy R. Randall, Univ. of Illinois.

moths that are active at night. Wingspan is 1.5 in. (38.4 mm) with the front wing darker in color with various light and dark markings. They do no damage.

Life cycles of the different species vary. The black cutworm overwinters in the soil and may produce as many as three generations a year. The bronzed cutworm, a single generation species, overwinters as an egg which hatches in early spring. Small larvae are found in April. Variegated cutworms overwinter as pupae or larvae in the soil. Adult variegated cutworms emerge in the spring and deposit eggs. They produce three generations each year.

Symptoms

Larvae feed at night on the blades of grass close to the base. Damage appears as dead or dying spots that increase in size as the worms approach maturity. Cutworms can be a problem on golf course greens where they live and eat around the open-

Variegated cutworm.

ings made by aerification.

Larvae can be found close to the edges of dead areas. Other signs of possible cutworm infestation are green fecal pellets, and large numbers of birds, particularly starlings, feeding on the turf.

To confirm the presence of cutworms, spread 1 tablespoon of 1-2% pyrethrins *or* ¼ cup of household detergent mixed in one gallon of water over one square yard of turf. This irritates the worms forcing them to the surface where they can be identified. Scratching around in debris with a knife also may reveal their presence.

Treatment

A properly managed turf will help reduce damage by cutworms. In cases of light to moderate infestations, a healthy turf will normally outgrow this injury.

If infestations are severe enough to warrant chemical control, mow the grass and remove all clippings before treatment so that the insecticide can penetrate the thatch. Water the grass thoroughly before application to drive the worms to the surface. A late afternoon or early evening treatment is most effective since worms normally feed at night. Following application, do not mow or water for 24-48 hours. If you use granular materials, the foliage should be dry at application to insure that the insecticide will fall to the ground. After application, water lightly (.125 in. or less) to release the insecticide. Keep children and pets off treated areas until dry.

GREENBUGS

Scientific Name: *Schizaphis graminum*
Turfgrasses Affected: Kentucky bluegrass
Damaging Stage: All
Occurrence: Rarely a problem on turf in Nebraska

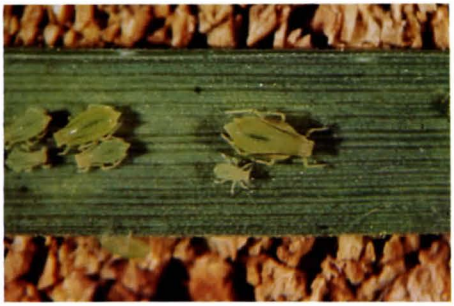
Characteristics

The greenbug, a long-time pest of small grains and sorghum, has infested turf in some neighboring states. Little is known about the greenbug as a turf pest, but it has been observed in Nebraska on Kentucky bluegrass but has not caused serious damage.

The greenbug is an aphid, .1 in. (1.6 mm) long, generally wingless, with a soft, light green body. Characteristic markings are a very narrow, dark green stripe down the back, black tipped legs, and cornicles ("tail pipes"). The greenbug migrates from the south appearing in Nebraska in April, May and June and is active throughout the growing season.

Greenbugs are females. They reach maturity in 7-10 days and begin reproducing without mating.

Greenbugs feed by piercing the plant



Greenbugs.

leaf, injecting saliva, and sucking the plant juices. The saliva is apparently quite toxic to plant cells, therefore grasses that have been infested appear yellow and may eventually die.

Symptoms

Circular patches of yellow to light orange or dying turf may be an indication of greenbug infestation. Lady beetles feed on aphids, and their presence may indicate the presence of greenbugs.

Close examination of leaf blades will reveal the presence of greenbugs. A damaged blade may have 30 or more aphids. Concentrations of 3,000 or more greenbugs per square foot may be found in infested areas.

A mild spring and summer will often lead to major infestations of greenbugs. Infestations generally occur in shaded areas but can occur in sunny areas as well.

Treatment

Consult an extension agent or turf professional for current information and recommendations. If large numbers are present, and injury is obvious, contact insecticides may be warranted. A contact insecticide is necessary because greenbugs are sucking insects.

FALL ARMYWORMS

Scientific Names: *Spodoptera frugiperda*
Turfgrasses Affected: All species
Damaging Stage: Larvae
Occurrence: Rarely a problem on turf in Nebraska

Characteristics

Fall armyworms are larvae with six true legs on the front of the body and with a distinct head. They are 1.5-2 in. (3.8-4.5 cm) long at maturity and vary in color from gray to yellowish green with yellowish heads. The fall armyworm has stripes and an inverted white "Y" marking on the head capsule.

Females begin depositing eggs on grass in May. Upon hatching, the larvae begin to feed on the grass blades. Damage generally occurs in circular patches.

Typically, large numbers of armyworms will develop in one area and then migrate to another. Feeding and migration usually occur at night. Larvae hide in thatch during the day.

Infestations of fall armyworms are sporadic and occur only when egg laying adults migrate north. In surrounding

Fall armyworm.

areas, it goes through three generations a year and overwinters as a larvae in soil and debris.

Symptoms

Since armyworms feed at night, damage may occur before the larvae are seen. Grass blades that appear skeletonized are frequently an early sign of feeding activity. Areas that have been damaged by large infestations often appear closely mowed and circular.

To confirm the presence of armyworms, spread 1 tablespoon of 1-2% pyrethrins *or* ¼ cup of household detergent mixed in one gallon of water over one square yard of turf. This irritates the worms and forces them to the surface. Scratching around in debris with a knife also may reveal their presence.

Treatment

Good cultural practices, which promote a healthy vigorous turf, are usually sufficient to withstand a light to moderate infestation. In such cases, the grass will normally outgrow the injury. Rank and lodged grass are factors which create an ideal environment for an armyworm infestation.

Several natural factors often combine to keep armyworm populations at low levels. When weather becomes warm and humid, fungal diseases sometimes infest the armyworms, reducing populations. In addition, parasitic flies lay their eggs on the worms and internal feeding by maggots later kills them. Several species of wasps are also important parasites of the armyworm.

Chemical control may be warranted when natural enemies and cultural practices are not enough to prevent damage. If sprays are used, use enough volume to insure complete and uniform coverage. Following application, do not mow or water for 24-48 hours. If you use granular materials, the foliage should be dry at application to enable the insecticide to reach the ground. After application, water lightly (.125 in. or less) to release the insecticide.

CHINCH BUGS

Scientific Name: *Blissus spp.*
Turfgrass Affected: Kentucky bluegrass, fine fescue, bentgrass
Damaging Stage: All
Occurrence: Rarely a problem on turf in Nebraska

Characteristics

Chinch bugs are sucking insects that can damage turfgrass at all stages of development. Nymphs, similar in shape to adults, are 0.5 in. (0.8 mm) long when they hatch and increase in size as they mature. First stage nymphs are bright red with a white band on the abdomen. As nymphs mature, color changes to orange-brown and finally black. Adults are .2 in. (3.2 mm) long and are black with white wings which fold over the back. Movement by flight is seldom observed.

Adults emerge from the resting stage (diapause) in early spring and females begin laying eggs in May. Eggs inserted behind the lower leaf sheaths develop in about two weeks. Nymphs emerge in May and June and go through five stages in 30 days. A second generation develops

Chinch bugs. Courtesy H. Tashiro, New York State Exp. Sta.

in September with adults moving to overwintering sites in October. The second generation is the most damaging.

Symptoms

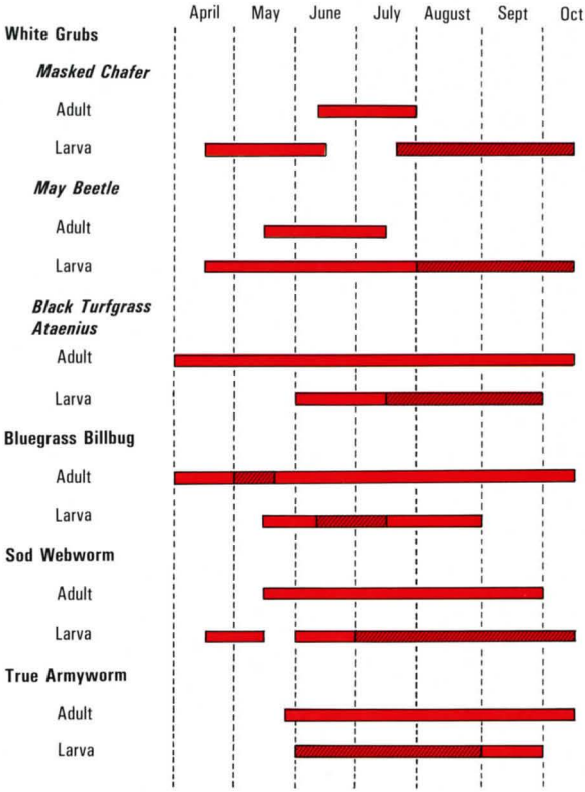
All stages of chinch bugs damage turf by sucking juices from trufgrass plants. A salivary fluid is injected into the plant that disrupts water conduction causing wilt and eventual death. Damage is heaviest in sunny locations during hot, dry periods and often mistaken for drought stress. Patchy bleached areas of grass may indicate presence of chinch bugs. They tend to scurry for cover when exposed.

Diagnosis of chinch bugs is best confirmed by removing both ends from a metal can, pressing it into the ground in an area of suspected infestation and filling the can with water. Chinch bugs will float to the surface in a matter of minutes.

Treatment

If large numbers are present, and injury is obvious, controls are justified. As a rule of thumb, about 20 chinch bugs per square foot is sufficient to justify treatment under normal circumstances. A contact insecticide is necessary because chinch bugs are sucking insects.

MAJOR INSECT PEST OCCURRENCE AND TREATMENT TIMING CHART



Approximate period may vary two weeks from season to season