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ABSTRACT

This competency-based curriculum unit on insects and diseases is one of four developed for classroom use in teaching the turf and lawn services area of horticulture. The five sections are each divided into teaching content (in a question-and-answer format) and student skills that outline steps and factors for consideration. Topics covered include root-feeding insects, shoot-feeding insects, and fungicides. A list of references precedes a section containing visual aids, student skill checklist, and student activities, such as handouts, discussion activities, field trips, crossword puzzles, hands-on experiences, worksheets, tests, and quizzes. Answer keys are provided. (KC)

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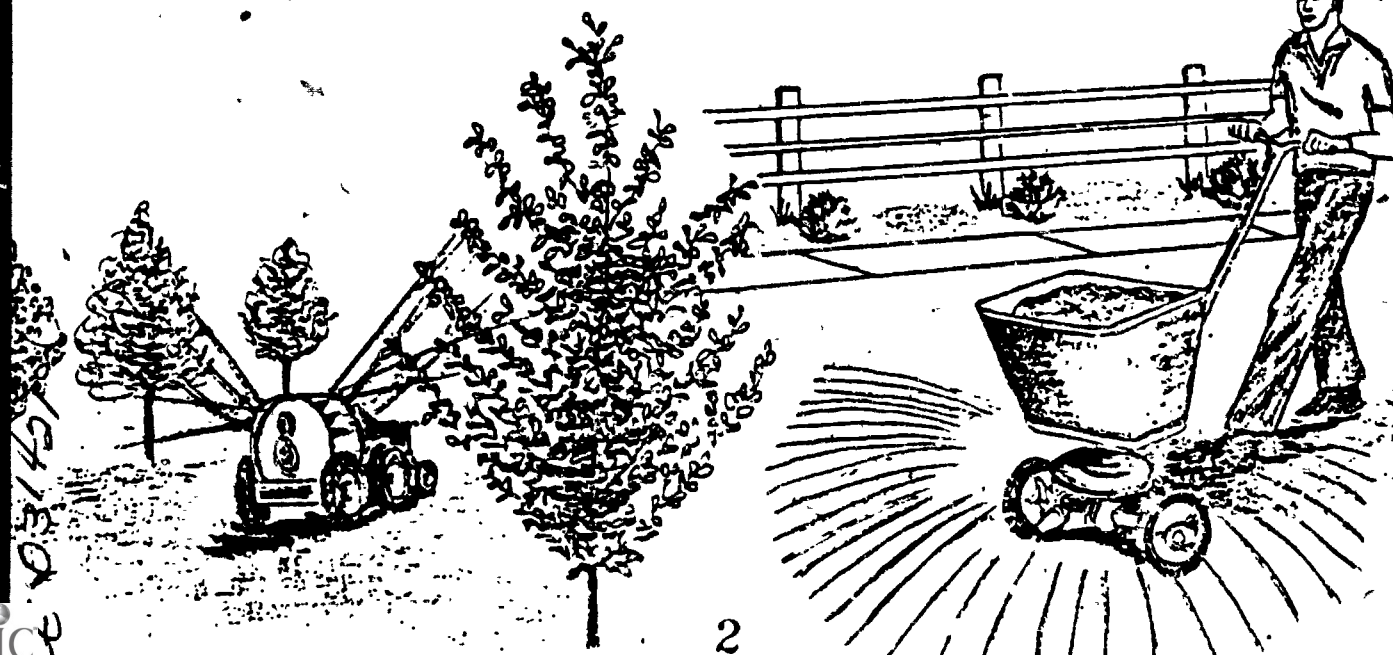
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Insects And Diseases

Competency Based Teaching Materials in Horticulture



ED212878

Listed below are competency based curriculum units developed for classroom use in teaching horticulture. All units are indexed and include teaching content; references, student activities, a skill check list, and visual aids.

<p style="text-align: center;">LANDSCAPE/NURSERY</p> <p>Tree Identification</p> <p>Developing a Landscape Plan</p> <p>Implementing the Landscape Plan</p> <p>Maintaining the Landscape</p> <p>Nursery Propagation</p>	<p style="text-align: center;">GREENHOUSE PRODUCTION & MANAGEMENT</p> <p>Controlling the Greenhouse Environment</p> <p>Greenhouse Soils</p> <p>Foliage Plants</p> <p>Propagation</p> <p>Sales</p> <p>Cut Flower Production</p> <p>Bedding Plants</p>
<p style="text-align: center;">TURF AND LAWN SERVICES</p> <p>Identification of Turf Grasses</p> <p>Soils and Fertilizers</p> <p>Planting Turf Grasses</p> <p>Insects and Diseases</p>	<p style="text-align: center;">VEGETABLE PRODUCTION</p> <p>Identification of Cool Season Vegetables</p> <p>Identification of Warm Season Vegetables</p> <p>Vegetable Production</p> <p>Insects, Diseases, and Weeds</p>
<p style="text-align: center;">FRUIT PRODUCTION</p> <p style="text-align: center;">(In progress)</p>	

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TURF INSECTS AND DISEASE

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Mole crickets: damage, reproduction	
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Armyworms: identifying features, reproduction, feeding habits	
Mites: damaging species	
Aphid: reproduction, damage	
Frit flies: damaging stages, turfgrass types susceptible to damage, method to determine infestation	
Chinchbug: feeding patterns, damaging species, identifying features, reproduction	
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Cutworm: feeding habits, reproduction, damage	
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Turf Insects and Disease

ROOT-FEEDING INSECTS

Teaching content: 12 questions; 1 student skill

- Question 1** What types of root-feeding insects harm turf grasses?
- grubs
 - mole crickets
 - billbugs
 - wireworms
- Question 2** At what life cycle do grubs feed on turfgrass?
- Adults do not feed on turf
 - Larvae (crescent-shaped) feed on turf, especially during late summer and fall
- Question 3** How do grubs damage the turfgrass?
- They eat a great deal of the root system.
- Question 4** What is one method the homeowner can use when destroying grubs?
- Irrigate turf; this will decrease further damage and will promote development of adventitious roots
- Question 5** How do billbugs affect the turfgrass system?
- The larvae eat both the roots and stems
- Question 6** What are some identifying features of billbug damage?
- Plants turn brown
 - a material of sawdust appearance is seen around infestation sites
 - Plants pull up easily from soil (especially during summer months)
- Question 7** What types of billbugs do the most damage to turfgrasses?
- Phoenix and hunting billbug--bermudagrass and zoysiagrass
 - Bluegrass billbug--Kentucky bluegrass
- Question 8** How do mole crickets destroy the turf system?
- Eat turfroots--mainly newly seeded turfs
 - Uproot younger turf plants which dries out the soil
- Question 9** When do mole crickets reproduce?
- In late spring eggs are laid
 - Summer--eggs hatch into nymphs
 - Nymphs overwinter and mature the next spring

Question 10 What do wireworms look like?

- A cylinder shape
- A hard and wirelike larvae
- About 1 inch in length

Question 11 What is the life span of a wireworm?

- Adults live about 1 year
- They live 2-6 years in the soil

Question 12 What is an identifying feature of wireworm damage?

- Patchy spots of dead looking grass

Student Skill 1

IDENTIFY INSECTS	
<u>Steps</u>	<u>Factors for Consideration</u>
1. Examine grass's roots	1. Roots severely pruned so sod can be easily lifted from soil (grubs, billbug, mole cricket, wireworm)

SHOOT-FEEDING INSECTS

Teaching content: 34 questions; 7 student skills

Question 1 What are shoot-feeding insects that destroy turf grasses?

- | | |
|--|--|
| <ul style="list-style-type: none"> - Sod worms - Army worms - Mites - Aphids - Frit flies | <ul style="list-style-type: none"> - Chinchbugs - Leafhoppers - Cutworms - Scale insects - Annual bluegrass weevils |
|--|--|

Question 2 How many generations of sod webworms are produced annually?

<u>Alternatives</u>	<u>Factors for Consideration</u>
1. Spring 2. Mid-summer 3. Could complete possibly another life cycle before winter, resulting in 2 or 3 annual generations	<ul style="list-style-type: none"> - Larvae feeds on grass blades until May when moths emerge - New generations of larvae appear; last 4-5 weeks until moth emerges

Question 3 How extensive can sod webworm damage become?

- Intense feeding will produce great losses of turf

Student
Skill 1

IDENTIFY SOD WEBWORM DAMAGE

<u>Steps</u>	<u>Factors for Consideration</u>
1. Inspect upper blades of grass	1. Blades clipped just above sod

Question 4 What do armyworms look like?

- A caterpillar--1.5 inches at adult stage

Question 5 How often do armyworms reproduce?

- 1-6 generations per growing season

Question 6 What is a characteristic of an armyworm's feeding habits?

- Nocturnal feeders

Question 7 Where do female mites deposit their eggs?

- Below sheath of turf

Question 8 What specie of mite causes the greatest amount of damage to turfgrass?

- The bermudagrass mite (*Aceria neocynodonis* Keifer)

Question 9 How does the bermudagrass mite damage the turf?

- Shortens the internodes

Student
Skill 2

IDENTIFY MITE DAMAGE

<u>Steps</u>	<u>Factors for Consideration</u>
1. Examine entire leafblade	1. Blade will have abnormal growth 2. Blade will have shortened internodes

Question 10 How is the birth and reproduction of the greenbug aphid different from most insects?

- Aphids are born alive
- They can reproduce without mating

Question 11 Where is most turfgrass damage from the aphid likely to occur?

- Shaded areas around trees and shrubs

Question 12 What damage does the aphid do to turfgrass?

- The grass appears chlorotic and eventually turns brown and dies
- Death usually occurs from mid-June to September

Student Skill 3

IDENTIFY GREENBUG APHID DAMAGE

Steps

Factors for Consideration

1. Examine types of patches and where located

1. Circular or oval patches appear often beneath shade trees

Question 13 At what stage do frit flies feed on turfgrass?

- The larval stage

Question 14 What are the different stages of the frit fly growth cycle?

- Larvae overwinters in grass stem
- Larvae pupate in spring
- Adult fly emerges
- Female adults lay eggs after mating on turf leaves
- Several generations are produced per growing season

Question 15 What types of turfgrass are most susceptible to frit flies?

- Bentgrass
- Bluegrass

Question 16 How can the homeowner determine if adult frit flies are infesting his turf?

- Put a white object on turf (e.g., piece of paper)
- Many black adults will soon appear since they are attracted to white

- Question 17** Why are the feeding patterns of the chinchbug harmful to the turfgrass plant?
- They suck out the fluids from the grass plant
 - When the insect's saliva enters the plant, the turf yellows and eventually dies
- Question 18** What are the two principal turf chinchbug pests?
- Hairy chinchbug--feeds on cool season turfgrass
 - Southern chinchbug--feeds on warm season turfgrass
- Question 19** What do chinchbugs look like?
- Adults--1/5" long; black and white with folded wings
 - Nymphs--1/20" long; red colored; wingless with a white stripe across the back
- Question 20** How do chinchbugs reproduce?
- Female adults insert eggs in leaf sheaths
 - Within 10-30 days eggs hatch
 - 5 instars (stages between molts) occur between hatching and adulthood
- Question 21** Why is damage from the chinchbug less severe in wet years than in dry years?
- Chinchbugs vulnerable to a fungal disease in moist environments
- Question 22** How can chinchbug damage be identified?
- Sunlit areas become discolored
 - Shaded areas often stay green
- Question 23** What is one practice the homeowner can follow to determine if chinchbugs are present in the turfgrass system?
- Put a container (open on both ends) into the turf (e.g., coffee can)
 - Fill with water
 - Add household detergent
 - Chinchbugs will float to the surface in 5-10 minutes if present

*Student
Skill 4*

IDENTIFY CHINCHBUG DAMAGE	
<u>Steps</u>	<u>Factors for Consideration</u>
1. Observe leaf color	1. Grass leaves will appear pale green to brown

- Question 24 What do the different stages of leafhoppers look like?
- Adults--1/5" long; small, wedge-shaped; fly or jump short distances when disturbed
 - Nymphs--resemble adults but are small and wingless

- Question 25 How do leafhoppers injure the turfgrass?
- Juices are sucked from the grass; causes discoloration and stunting of growth.

- Question 26 How many generations of leafhoppers occur each year?
- Many generations per growing season
 - Greatest amount reproduced during summer months

Student Skill 5

IDENTIFY LEAFHOPPER DAMAGE

<u>Steps</u>	<u>Factors for Consideration</u>
1. Examine entire blade of grass	1. Grass leaves will appear discolored 2. Grass leaves will have a stunted growth

- Question 27 What are the cutworm's feeding habits?
- Devour grass roots

- Question 28 How many generations of cutworms are produced each year?
- 1-4, dependent upon specie and climate

Student Skill 6

IDENTIFY CUTWORM DAMAGE

<u>Steps</u>	<u>Factors for Consideration</u>
1. Examine lower blades of grass	1. Grass leaves cut off at or near ground surface

Question 29 What are scale insects?

- Small, almost invisible insects, 1/16" across

Question 30 What does scale-infested turfgrass look like?

- Whitish or moldy appearance on the blades

Question 31 What types of scale insects infect turfgrass?

- Bermudagrass scale: bermudagrass
- Rhodesgrass scale: bermudagrass and St. Augustine grass

Question 32 What are the annual bluegrass weevil's feeding habits like?

- Both larvae and adults feed on blades
- Larvae cause the greatest amount of damage

Question 33 How do annual bluegrass weevils reproduce?

- The adults overwinter to mate
- Eggs are deposited between leaf sheaths of annual bluegrass
- When larvae hatch, grass stems are hollowed out and cut at the base

Question 34 When is weevil damage first visible?

- Late spring

Student
Skill 7

IDENTIFY BLUEGRASS WEEVIL DAMAGE

Steps

1. Examine lower blades of grass

Factors for Consideration

1. Grass stems are hollowed out and cut at the base
2. Complete loss on severely infected sites

BURROWING INSECTS

Teaching content: 6 questions; 1 student skill

Question 1 What types of burrowing insects are harmful to turfgrasses?

- Periodical cicadas
- Ants
- Bees and Wasps

- Question 2* Why is the life cycle of the periodical cicada considered to be unusual?
- Adults appear every 13-17 years from soil. This causes a lot of holes to be made beneath trees
 - After the females mate, they deposit their eggs in twigs of trees
 - When eggs hatch, the nymphs fall to the ground and bury themselves into the ground where they feed on tree and shrub roots
- Question 3* When does damage to the turf from periodical cicadas occur?
- Every 13-17 years when the nymphs have come out from their burrows
- Question 4* Why are periodical cicada nymphs impossible to control?
- They are too deeply located in the soil
- Question 5* How do ants destroy the turf's soil?
- They open up a great deal of the soil, mounding it on the surface
 - Soil mounding destroys uniformity of soil surface
 - Soil mounding dries out the soil
 - Soil mounding buries turf plants around nesting sites
- Question 6* Why are some species of bees and wasps harmful to turf?
- They burrow into the turf to form nests

Student Skill 1

IDENTIFY BURROWING INSECT DAMAGE	
<u>Steps</u>	<u>Factors for Consideration</u>
1. Examine soil surface	1. Soil will be mounded upon surface

TURF DISEASES

Teaching content: 16 questions; 1 student skill

- Question 1* What are the shapes of some diseased patches?
- Shapes of patches are elongated, streaks, crescent or circles

Question 2 What can be done to prevent the spreading of the green patches 2-6" in diameter?

Alternatives

1. Cutting
2. Water
3. Fungicide

Factors for Consideration

- Raise height of cut during summer
- Adequately water entire area

Question 3 What size spots appear on the turf?

- Spots appear as round somewhat sunken areas from 1 - 2 1/2" in diameter (about the size of a silver dollar)

Question 4 What might be found on the outer edge of each patch?

- A grayish-black ring may border spots when moist

Question 5 What might happen to the grass spots if they remain wet throughout the day?

- Small irregular shaped spots ranging from 4-6" in diameter may appear in the morning and if they remain wet by evening, spots may enlarge up to 2-3' in one day

Question 6 How can the round to irregular slimy patches be prevented from spreading?

Alternatives

1. Weather
2. Fungicide

Factors for Consideration

- In hot weather avoid overwatering, excessive fertilizer and control thatch

Question 7 What measures should be taken to stop dollar spot disease?

Alternatives

1. Cutting
2. Fungicide

Factors for Consideration

- Keep thatch less than 1/2"
- Apply fungicide at regular intervals when disease is active

Question 8 What can be done to prevent the spreading from the outer edge inward?

Alternatives

1. Water-fertilizer
2. Air
3. Fungicide

Factors for Consideration

- Avoid overwatering and excessive fertilizer
- Improve air circulation

Question 9 What happens to the leaf blade when there is a growth or disease development on it?

- Leaf changes from reddish to chestnut brown or black with blisters or dusty pustules

Question 10 What will deter growth on leaves?

Alternatives

1. Fertilizer
2. Water
3. Fungicide

Factors for Consideration

- A light application of fertilizer
- Maintain adequate soil moisture, deep during dry periods

Question 11 What are the colors of leaf spots on the leaves of grass?

- Dark brown to reddish-brown to purplish-black spot on leaves. Spots enlarge and develop gray or tan centers.

Question 12 What can be done to prevent round to elongated brown spots on leaves?

Alternatives

1. Fertilizer
2. Mow
3. Fungicide

Factors for Consideration

- Fertilize to maintain vigor base on a soil test
- Remove no more than 1/3 of leaf surface

Question 13 What color do the leaves turn during progressive disease development?

- As the grass dies, leaves progress to a grayish-white color. Later stages turn a darker grayish-white.

Question 14 What measures can be taken to prevent the appearance of gray to straw colored areas?

Alternatives

1. Mow
2. Barrier
3. Fungicide

Factors for Consideration

- Keep grass mowed until growth stops
- Erect snow barriers where drifts occur each year

Question 15 What color are the streaks that appear in the leaves?

- Infected plants develop long yellow-green streaks on the leaves which gradually assume a silvery-gray appearance.

Question 16 What measures should be followed to prevent streaks in leaves?

Alternatives

1. Seeds
2. Mow
3. Fungicide

Factors for Consideration

- Overseed with tolerant grasses
- Keep thatch to 1/2" or less

Student
Skill 1

IDENTIFY COMMON DISEASES

Steps

1. Examine area of turf
2. Examine area of grass
3. Check edge of patch
4. Examine blades of grass
5. Examine middle of grass blade
6. Examine melting snow
7. Examine grass color
8. Examine area of grass

Factors for Consideration

- Scattered, light green patches, 2-6" across that soon enlarge, turn tan, finally straw-colored. (Fusarium blight)
- Roundish, straw-colored spots 1 - 2 1/2" across (Dollar spot)
- A grayish-black ring may border spots when moist; round, light-brown patches up to 2 or 3' across (Brown Patch)
- Oval to elongated, yellow to orange, reddish to chestnut brown or black dusty pustules on leaves (Rusts)
- Leaf appears purplish-red spot or a dull white or straw-colored spot with brown edges. Usually die back from tip (Leaf Spot)
- Seen where snow is melting
Grass covered with fluffy, white to bluish-gray mold or a silvery membranous crust (Gray snow mold)
- Dull gray streaks in leaves and sheaths. Streaks rupture exposing black masses of smut spores (Stripe Smut)
- Round to irregular, water-soaked, greasy or slimy patches; up to 6" across (Pythium Blight)

TURF INSECTICIDES AND FUNGICIDES

Teaching content: 3 questions; 1 student skill

Question 1 What are the names of the insecticides and what insects do they destroy?

- Insecticide diazinon - (white grub)
- Insecticide carbaryl, diazinon, chlorpyrifos and aspon (sod webworm)
- Insecticide chlorpyrifos and aspon (chinchbug)
- Insecticide chlorpyrifos (cutworm)
- Insecticide malathion (Aphid)

Question 2 What are the application rates of turf insecticides?

Alternatives

Factors for Consideration

- | | |
|--------------------|--|
| 1. White grub | - Apply as spray or granules to small area and then water in thoroughly before treating another small area |
| 2. Sod webworm | - Use at least 2.5 gal. water per 1000 sq. ft. Do not water for 72 hrs. after treatment |
| 3. Cutworms | - Apply as sprays or granules. Use 5 to 10 gal. of water per 1000 sq. ft. |
| 4. Chinchbugs | - Spray infested areas where bugs are present |
| 5. Aphids-Greenbug | - Spray grass thoroughly |

Question 3 What are the application rates of turf fungicides?

Alternatives

Factors for Consideration

- | | |
|-------------------------------|--|
| 1. Fusarium Blight | - Apply Tersan 1991 at rate of 5-8 oz. per 1000 sq. ft. and repeat 7-10 days. Water well |
| 2. Dollar Spot | - Apply Tersan 1991 at 1 oz/1000 sq. ft. It should be used in conjunction with Tersan 75 at 3 oz/1000 sq. ft. |
| 3. Brown Patch | - Apply Tersan 1991 at rate of 2 oz/1000 sq. ft. Follow with 3-4 oz. per 1000 sq. ft. of Tersan 75 or Tersan LSK. |
| 4. Rust | - Apply Tersan LSK at rate of 3-4 oz/1000 sq. ft. Apply some nitrogen to get turf growing. |
| 5. Helminthosporium Leaf Spot | - Apply Tersan LSK early as possible at rate of 3-4 oz/1000 sq. ft. Repeat at 7-10 day intervals as long as disease persists |

6. Gray Snow Mold
7. Stripe Smut
8. Pythium Blight
- Apply Tersan SP in late Oct. or early Nov. at rate of 6-9 oz/1000 sq. ft. in as little water as needed to get complete coverage.
 - Apply Tersan 1991 at rate of 6 oz/1000 sq. ft. between Oct. and early spring, before grass starts to show color and water well.
 - Apply Tersan SP at rate of 4 oz/1000 sq. ft. in 3-5 gal. water.

*Student
Skill 1*

DEMONSTRATE SAFE HANDLING OF PESTICIDE EQUIPMENT

Steps

1. Protective clothing & equipment
2. Put on proper clothing & equipment
3. Check respirator
4. Mix and load pesticides
5. Apply pesticides
6. Pesticide clean-up
7. Store pesticides

Factors for Consideration

1. Protect skin--applicator must wear a protective barrier: gloves, boots, goggles and head and neck covering.
2. Wear clean clothing each day you spray. If fabrics get wet during spraying, change. Wash all equipment daily and separate from regular clothes.
3. Use where label indicates a respirator is needed.
4. Put on correct protective clothing. Should be mixed out-of-doors with good ventilation and light. When pouring, keep container below eye level. If spilled, remove clothing; wash thoroughly with soap and water. Important that soap and water be near mixing area.
5. Avoid exposure--don't work in spray drift or runoff. Avoid sensitive areas; beehives, lakes, houses, playgrounds, etc. Avoid drift--check weather conditions and high winds.
6. Immediately after use, clean equipment thoroughly. Take shower end of day.
7. Should be stored in a locked and posted facility where children and other untrained people cannot get to them.

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STUDENT ACTIVITIES

KEY TO PLANT-NUTRIENT DEFICIENCY SYMPTOMS

Element Deficient

- A. Parasitic and virus diseases disseminated by bacteria, fungi or virus entities (excluded from present discussion).
- A. Non parasitic troubles; never infectious; caused by element deficiencies.
 - 1. Older or lower leaves of plant mostly affected; effects localized or generalized.
 - a. Effects mostly generalized over whole plant; more or less drying or firing of lower leaves; plant light or dark green.
 - 1) Plant light green; lower leaves yellow, drying to light brown color; stalks short and slender if element is deficient in later stages of growth Nitrogen
 - 2) Plant dark green, often developing red and purple colors; lower leaves sometimes yellow, drying to greenish brown or black color; stalks short and slender if element is deficient in later stages of growth Phosphorus
 - b. Effects mostly localized; mottling or chlorosis with or without spots of dead tissue on lower leaves; little or no drying up of lower leaves.
 - 1) Lower leaves mottled or chlorotic, with or without dead spots; leaf margins sometimes tucked or cupped upward or downward.
 - a) Mottled or chlorotic leaves typically, may redden, as with cotton; sometimes with dead spots; tips and margins turned or cupped upward; stalks slender Magnesium
 - b) Mottled or chlorotic leaves with large or small spots of dead tissue.
 - i) Spots of dead tissue small, usually at tips and between veins, more marked at margins of leaves; stalks slender Potassium
 - ii) Spots generalized; rapidly enlarging; generally involving areas between veins and eventually involving secondary and even primary veins; leaves thick; stalks with shortened internodes. Zinc
 - 2. Newer or bud leaves affected; symptoms localized.
 - a. Terminal bud dies, following appearance of distortions at tips or bases of young leaves.
 - 1) Young leaves of terminal bud at first typically hooked, finally dying back at tips and margins, so that later growth is characterized by a cut-out appearance at these points; stalk finally dies at terminal bud Calcium

- 1) Young leaves of terminal bud becoming light green at bases, with final break-down here; in later growth, leaves become twisted; stalk finally dies back at terminal bud Boron
- b. Terminal bud commonly remains alive; wilting or chlorosis of younger or bud leaves with or without spots of dead tissue; veins light or dark green.
 - 1) Young leaves permanently wilted (wither-tip effect) without spotting or marked chlorosis; twig or stalk just below tip and seedhead often unable to stand erect in later stages when shortage is acute Copper
 - 2) Young leaves not wilted; chlorosis present with or without spots of dead tissue scattered over the leaf.
 - a) Spots of dead tissue scattered over the leaf; smallest veins tend to remain green, producing a checkered or reticulated effect Manganese
 - b) Dead spots not commonly present; chlorosis may or may not involve veins, making them light or dark green in color.
 - i) Young leaves with veins and tissue between veins light green in color Sulphur
 - ii) Young leaves chlorotic, principal veins typically green; stalks short and slender Iron

J. E. McMurtrey, Jr., Diagnostic Techniques for Soils and Crops. The American Potash Institute, 1948.

MANAGEMENT PRACTICES THAT HELP PREVENT LAWN DISEASES

These practices are general guides to be used according to one's judgment. Their importance depends on the kind and seriousness of the disease threat. Not all of them are practicable under all conditions.

- Select grass species best adapted to the soil, climatic, and light conditions under which they will be grown.

- Plant mixtures of recommended grasses. Species vary in their susceptibility to different disease organisms, and in a mixture one or more of the grasses usually will survive a severe disease attack.

- Do not clip upright-growing grasses such as Kentucky bluegrass and red fescue too closely—1¾ to 2 inches is the best height. Creeping grasses such as bentgrass and zoysia may be clipped at ½ inch or less.

- Mow the grass before it gets too tall; not more than one-half of

the leaf surface should be removed at one time.

- Mow the lawn frequently enough in the fall to prevent the accumulation of a thick mat of grass before snow comes.

- Apply enough fertilizer to keep grass vigorously growing, but avoid overstimulating the grass with nitrogen. Apply lime if soil tests indicate a need for it.

- Clippings need not be removed except on heavily fertilized lawns or during periods when the grass is growing rapidly. Clippings provide nutrients for fungi and help to maintain humidity long after the sun has dried off surrounding uncovered areas.

- Water early enough in the day to allow grass leaves to dry out before night. Avoid frequent, light waterings, especially during warm weather.

- Do not water grass until it begins to wilt, then soak the soil to a depth of 6 inches or more. Provide good surface drainage.

Science and Education Administration.
Control Them (Revised). Washington, D.C.:
Office, Home and Garden Bulletin 61, 1979.

Lawn Diseases - How to
U.S. Government Printing



Read the entire pesticide label
It tells you

- what the chemical is
- the diseases it controls
- grass species on which to use it
- how much to use
- when to use

Apply only as directed

- controls will be more effective
- chances of plant injury are reduced

Handle pesticides carefully

- take proper precautions with children and pets
- avoid drift
- wear protective clothing if specified
- clean-up immediately after application
- safely dispose of empty containers
- keep and store in the original labeled containers out of the reach of children and irresponsible adults

TURF INSECTS AND DISEASES

Student Skill Checklist

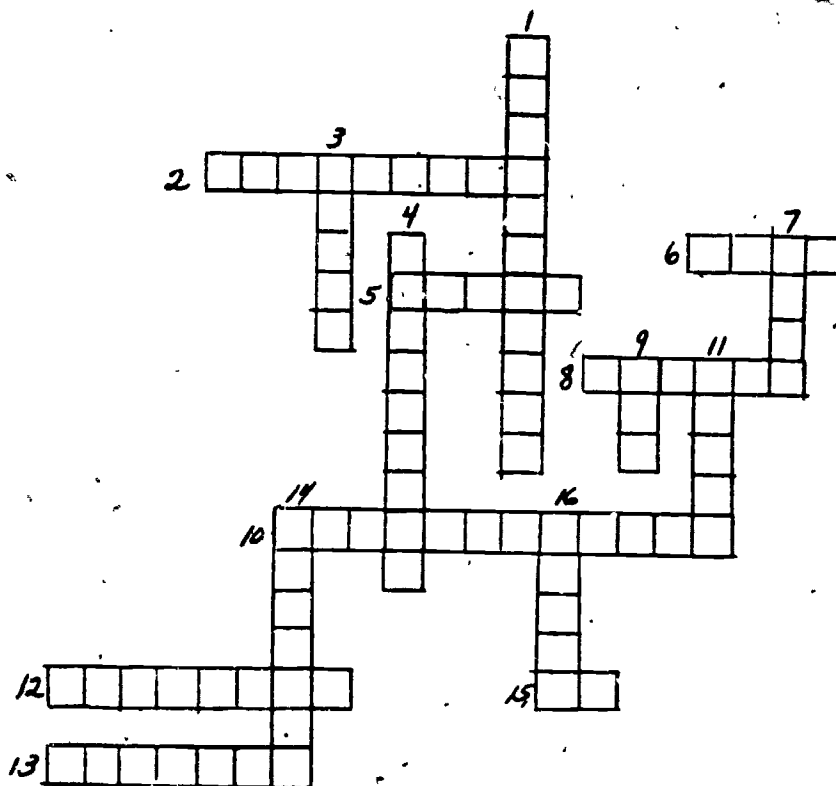
Evaluation form for identifying diseases.

1. Are there scattered, light green patches, 2" to 6" across that enlarge and turn a straw color?
2. Do the spots appear roundish 1" to 2 1/2" in diameter?
3. Does a grayish-black ring appear bordering spots in moist environments?
4. Are there oval to elongated spots usually yellow to orange or reddish to chestnut in color?
5. Do the leaves appear purplish to red or dull white with brown edges?
6. Is grass covered with fluffy white to bluish-gray mold after snow melts?
7. Do the leaves have dull gray streaks when they rupture, thus exposing black spores?
8. Are round to irregular, water-soaked, greasy patches present?

Max. Score	Your Score
<u>10</u>	_____
<u>10</u>	_____
<u>10</u>	_____
<u>10</u>	_____
<u>10</u>	_____
<u>10</u>	_____
<u>10</u>	_____
<u>10</u>	_____
<u>10</u>	_____
Total 80	

TURF INSECTS AND DISEASES

Crossword Puzzle



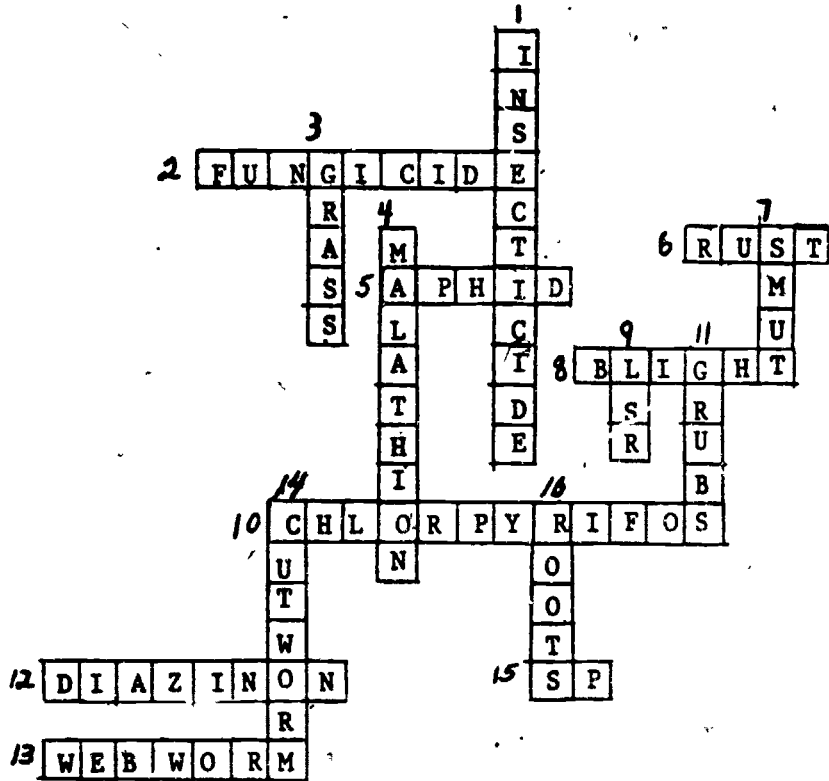
Down

1. Used to control insects
3. Can be destroyed by insects or diseases
4. An insecticide used to kill aphids
7. A disease that causes long yellow-green streaks on plants
9. A fungicide used to kill leaf spot
11. Will chew grass leaves off at, or near the ground surface
14. An insect that severely prunes grass roots
16. White grubs usually destroy these severely

Across

2. Used to control diseases
5. An insect that leaves circular to oval patches, often beneath trees
6. First seen as light yellow flecks, will turn to reddish-brown pustules
8. Irregular shaped spots that can enlarge up to 2 or 3 feet in one day
10. An insecticide used to kill cutworms
12. This insecticide destroys white grubs
13. This insect will clip the blades just above the sod
15. A fungicide used to destroy pythium blight

PLANT CROSSWORD KEY



TURF INSECTS AND DISEASES

Quiz

Multiple Choice:

1. What insect cuts grass leaves off at or near the ground surface?
 - a. white grub
 - b. sod webworm
 - c. cutworm
 - d. aphid
 - e. chinch bug
2. Identify the insect that severely prunes the grass roots resulting in the sod being easily lifted from the soil?
 - a. white grub
 - b. cutworm
 - c. sod webworm
 - d. aphid
 - e. chinch bug
3. Which of the following insecticides is used to destroy white grubs?
 - a. chlorpyrifos
 - b. diazinon
 - c. aspon
 - d. malathion
 - e. carbaryl
4. The insecticide malathion is used primarily to destroy what insects?
 - a. billbugs
 - b. sod webworms
 - c. mole crickets
 - d. grubs
 - e. none of the above
5. What disease leaves a round to irregular, water-soaked, greasy or slimy patch up to six inches in diameter on the blade?
 - a. pythium blight
 - b. stripe smut
 - c. fusarium blight
 - d. dollar spot
 - e. rust
6. Identify the type of damage dollar spot does to turf.
 - a. dull gray streaks rupture, leaving black masses of spores
 - b. leaves appear purplish to red with leaves dying back from tip
 - c. scattered light green notches finally turn straw color
 - d. roundish, straw-colored spots one to two inches across
7. The turf fungicide tersan 1991, made by DuPont, will destroy which of the following diseases?
 - a. dollar spot
 - b. rust
 - c. stripe smut
 - d. pythium blight
 - e. all of the above

8. Which of the following fungicides will destroy rust?
- a. Tersan LSR
 - b. Tersan 75
 - c. Tersan SP
 - d. Tersan 1991
 - e. Tersan 1991 and 75
9. A chemical used to destroy, prevent, or control pests:
- a. insecticide
 - b. fungicide
 - c. pesticide
 - d. herbicide
 - e. b and d
10. In the safety handling of pesticides, one must consider exposure when:
- a. transporting
 - b. storing
 - c. mixing
 - d. loading
 - e. all of the above