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Weeds and the Grass Diseases on Golf Courses

By C. R. ORTON*
Boyce Thompson Institute

BECAUSE the weeds which are most troublesome in fairways may not be important on greens this problem may be divided into two sections: (1) fairway weeds and (2) weeds most troublesome on greens.

(1) Weeds on fairways are chiefly broad-leaved plants such as *plantains*, *dandelion*, *thistles*, *yarrow*, *hawkweeds*, and others which may be locally important.

(2) Weeds on greens are more generally the smaller leaved forms, such as *chickweeds*, *speedwell*, *knotweed*, *pearlwort* (in eastern regions) and *white clover*. *Crab grass* and *goose grass*, two annuals, are often serious weeds on greens but appear late in season and die off after a few weeks.

Control Methods

The four chief lines of control presented are:

(1) **Hand pulling**, the most practical method of removing weeds from well established greens;

(2) **Prevention of reseeding with weed seeds** is very important, especially with such annuals as crab grass and goose grass. Therefore take special precautions to avoid using weedy soil in preparing compost. Steam sterilization of compost may be practiced to kill weed seeds;

(3) **Chemical treatment** may be practiced on areas in fairways which are badly infested and where the danger of injuring turf is minimized. Iron sulfate, sodium arsenite, and lead arsenate have been successfully employed for such purposes but none of these appear to be very practical for killing weeds in greens or in well established turf.

*Penn State Greenkeepers' Short Course Paper.

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(4) Fertilization as a means of controlling weeds is probably the most practical method known for both fairways and greens. The success of this method depends upon the factors of competition and differential food requirements of the desired grasses vs. the undesirable weeds. If a system of fertilization is followed which is particularly favorable for the desired grass, then most weeds are choked out and the weed problem is solved in a practical manner.

Some valuable data are available on this point from the long continued fertilizer experiments at the Pennsylvania Agricultural experiment station. Some points of special interest are here presented.

Fairway Weeding

For fairways: When blue grasses (*Poa* spp.) are desired for fairways the soil must be limed if calcium is deficient. A fertilizer containing ammonia (sol. nitrogen) and phosphoric acid, or superphosphate with the larger percentage of the latter, is the best combination for blue grass. The addition of potash favors clover as well as other weeds. It seems probable that the fescue grasses behave somewhat like blue grass to soil reactions, in that they appear to prefer the presence of lime. Not much experimental evidence is available on this point, however.

When red top (*Agrostis alba*) or bent grasses are desired, an abundance of lime is not so essential and the application of ammonia and potash with the latter element predominating is favorable for these grasses. The weeds are not so well controlled, however, with this combination since potash favors their growth. With some attention to hand or machine removal in weed areas, this problem can be solved, however, as these grasses will tend to replace the weeds if given favorable soil conditions.

Weed Control on Greens

For greens: The important weeds here are crab grass, chickweeds, and, in the East, goose grass and pearlwort.

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If the soil is natural or only slightly acid, then the application of fertilizers which tend toward the production of higher acidity is advisable where bent grasses are being grown. Applications of ammonium sulphate will bring about such a condition and tend to control the weeds by encouraging the grass, but this practice should not be continued indefinitely because of the danger of producing too great acidity in the soil. The desired balance may be generally maintained by substituting organic forms of nitrogen, such as urea, for ammonium sulphate in the fertilizer formula at the proper time.

If the soil is acid to begin with, avoid the excessive use of ammonium sulphate. Use a balanced fertilizer which will maintain the desired soil reaction.

Clover will not be troublesome if conditions are maintained which are most favorable for the grass. The liberal use of potash favors clover and other weeds; therefore, generally omit it or make it a minor part of the fertilizer program on greens. The addition of phosphorus in the form of superphosphate to the nitrogen carrier is recommended.

Crab grass and goose grass are especially troublesome late in the season. Hand weeding with the aid of a rake to loosen the runners in the case of heavy infestation of crab grass is the most effective method to follow. Goose grass must be pulled by hand.

Where *Poa annua* is dominant and it is desired to maintain the greens with this grass, ammonium sulphate should not be used as it promptly tends to produce an acid soil inimical to the growth of *Poa annua*. Use a balanced fertilizer with urea as the source of nitrogen.

Controlling Grass Diseases

(1) "Drum-head" patch was very severe and extensive in 1928. It was mistaken many times for "large brown patch," but is quite distinct.

Symptoms of "drum-head." (a) Bluish color of grass in spots of irregular size and outline. (b) Blades of grass become thin and narrow and the spots appear thinly covered with grass. (c) Grass "tracks" easily and the tracks persist. (d) Turf gets hard and crusty, and when a plug is removed the roots are dead and the turf very thin. (e) Water does not readily penetrate the affected spots, but in early stages frequent watering will temporarily hold them. (f) Grass eventually

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dies and spots turn brown. *Poa annua* is killed before the bent grasses.

Cause of drum-head. The appearance and history of this disease checks with the continued use of ammonium sulphate as a source of nitrogen on greens. This produces an acid condition in the soil which increases from year to year until the degree of acidity becomes so great that the grasses fail to grow and the roots commence to die. It is possible that such toxic salts as aluminum sulphate are produced in the soil, but there is also a probability that lack of bacterial action in the soil under such acid conditions may be a factor. The removal of lime in the soil under these conditions is also suggested as a possible factor since all plants require calcium for normal growth.

Remedy. Apply 25 pounds of ground limestone per 1,000 sq. ft. of green. Fork the diseased spots and water thoroughly. Mercury compounds or other fungicides are not effective in remedying this type of disease. Maintain the degree of acidity best adapted to the dominant grass desired on the greens. This may be done by using a balanced fertilizer with occasional light applications of limestone at intervals of perhaps not oftener than once in three or four years.

(2) Large brown patch. A widely distributed disease which attacks many grasses and other plants.

Symptoms: Circular brown spots from a few inches to as much as 2 ft. in diameter. In the early morning when dew is present the margin of the spot shows a greasy ring of about 1 in. in width. Cobwebby threads are conspicuous on these spots when moisture is present. The spots increase in size from day to day, enlarging chiefly during the night. When spots are numerous they coalesce and may kill large irregular areas of grass.

Cause. A fungus known as *Rhizoctonia solani*.

Control. Apply mercury compounds, preferably the organic form of mercury, according to directions. The use of high-pressure spray pumps saves much time and makes the material go much further. Apply these fungicides immediately after the disease is first noted. Treat the rims and approaches as well as the greens.

(3) Small brown patch—a widely distributed disease of grasses which is quite distinct from large brown-patch.

Symptoms: The individual spots are small, rarely larger than a quarter-dollar,

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and most of them nearer the size of a dime or even smaller. The spots are usually a lighter brown than those of large brown-patch. They are "buff" or "tan" in color, especially in the early stages. The spots are usually numerous when first noted, and they may increase in number so rapidly that the grass on an entire green will be destroyed in a few days. Under such severe conditions this disease is sometimes mistaken for large brown-patch.

Cause. An undescribed fungus which attacks individual blades and spreads to a few adjacent leaves, but is restricted in its spread from a single point of infection by some biological factor not yet understood.

Control. Same as for large brown-patch. Especial attention must be given to treating approaches and rims because this disease is invariably present outside the greens and is spread to the greens by mowers and the feet of players and workmen. The disease is spread in the greens chiefly by the mower. Do not attempt to treat individual spots. Treat the whole green with its rim and approaches as soon as the first spots appear.

(4) Other diseases and pests: "Ring-patch" and "snow mold" are both fungus diseases which are sometimes met with. Apparently the mercury compounds are effective, but little experimental work has been done with these diseases.

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