

In summary:

Selective killing of crabgrass, as shown in 1951 tests, was most efficient when chemicals were applied in liquid form as sprays.

Rates heavier than recommended caused excessive injury to desired turf grasses.

Retreatment planned for from five to seven day intervals to prevent the weakened crabgrass from recovering gave best and quickest control.

As each chemical usually acts within three days after having been sprayed, early summer applications require treatments on schedule until all crabgrass plants are dead.

KOCN appeared more adapted to use on bluegrass than on fescue or bentgrass, as less leaf burn of bluegrass was experienced.

Sodium arsenite was by far the cheapest compound tested. However, the greater turf burn and necessary safety precaution tend to limit its use to special areas (such as fairways).

The 3 per cent KOCN dust proved to be excellent for use by home owners for fall renovation and fertilization.

The use of pre-emergence applications toward a preventive program needs further investigation.

GROUND PEARL DAMAGING SOUTHERN TURF GRASSES

By B. P. ROBINSON and L. W. MORGAN

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Lawn owners in the Southeast during the last two years have been puzzled over the loss of turf grasses. Irregular areas of turf often showed signs of wilting, becoming thin, turning brown and eventually dying. Visual observations by most home owners and other turf producers did not reveal the cause. The casual organism was discovered to be a soil-inhabiting insect called ground pearl, which has a peculiar feeding stage.

Even though one species (*Margarodes meridionalis* Morr.), presumably native to the United States, was described more than twenty years ago, extensive damage was not observed until the Southeast experienced two of its most severe droughts in 1951 and 1952. As the insects appear to disturb the water relations of grasses, damage was very noticeable during the last two seasons. This was true especially in infested turf areas which were not irrigated or fertilized well.

Ground pearls belong to a group of insects known as coccids. This group contains some of the most destructive plant

insects known. During the last two years ground pearls belonging to two genera (*Margarodes* and *Eumargarodes*) have been reported as damaging turf grasses in the coastal area of the Southeast. Distribution of ground pearls, however, is not confined to the southeastern United States. They are found in areas throughout the temperate zone.

Although grasses are the only types of plants known to have been damaged, reports from the United States and other countries suggest that the insect has potentialities beyond that of injury to lawns or other turfed areas. It may become a serious pest on other grass crops in the temperate zone.

Differing from the life cycle of grubs, army worms and so forth in which the destructive stage is easy to control, the life cycle of the ground pearl includes a specialized, protected pre-adult feeding stage. In that stage the insect loses all means of mobility and becomes enclosed in a lustrous shell or cyst, commonly called ground pearl. A single hair-like

Cooperative investigation at Tifton, Georgia, of the Georgia Coastal Plain Experiment Station and a number of southern golf associations.

mouth part, sometimes an inch long after extrusion, extends from the ground pearl to a grass root. The insect, after hatching from an egg and while in a crawling stage, attaches itself to the root and forms the ground pearl. While in this stage, the insect appears to be protected from changes in environment and most of the common insecticides. One species which belongs to this group of insects has been reported to have lived in a dry room without food for seventeen years.

The ground-pearl stage may be observed in areas where the insect occurs. The size of the pearls varies from that of a match head down to one which can be seen barely with the eyes. Their color is usually yellowish-white, with a pearly luster. If soil to a depth of six inches is removed with a clump of turf, and an examination is made, the largest ground pearls are found by crumbling the soil between the fingers. Ground pearls can be seen more easily, however, if the soil is allowed to dry and then is spread thinly over a flat surface. A survey of infested areas at Tifton, Ga., revealed that as many as one and one-half million pearls may exist in an area of 1,000 square feet and to a soil depth of one foot.

Preliminary tests of most of the com-

COMING EVENTS

- Sept. 8-9: Turf Field Day, Pennsylvania State College, State College, Pa., H. B. Musser. (Starts at noon September 8 and ends at noon September 9.)
- Sept. 23: Turf Field Day, New York-Connecticut Turf Improvement Association, Ryewood Country Club, Rye, N. Y. Ted Joswick.
- Oct. 21-22: Fourth annual Central Plains Turf Foundation Turf Conference, Manhattan, Kan. William F. Pickett.
- Nov. 16-20: American Society of Agronomy Meetings, Dallas Texas. L. G. Monthey.

mon insecticides have not been successful in controlling the insect. Work is continuing, however, with the hope of finding a material or a method of control. If possible, individuals purchasing turf grasses for vegetative planting should be certain that the original source of material is free of ground pearls. At Tifton, Georgia, the insect has damaged turf grasses of bermuda, carpet, centipede and St. Augustine. Injury to infested areas may be decreased if ample water and fertilizer are applied throughout the growing season.

SCALE ATTACKS BERMUDAGRASS PUTTING GREENS

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Bermudagrass putting greens in South Texas have suffered severely from infestations of scale insects during the summer months in recent years. Rhodesgrass scale, *Antonina graminis* (Mask.) and Ruth's scale *Odonapis ruthae* Kot. are the insects responsible for the damage.

An accompanying article by B. P. Robinson and L. W. Morgan, of Tifton, Ga., describes turf injury by ground pearl. While ground pearls and the insects described above belong to the same family (Coccidae), they belong to different genera. Rhodesgrass and Ruth's scale

appear to attach themselves securely to the nodes of the grass and are usually detected by pulling back the leaf sheath with the blade of a pocket knife.

Adults of these insects have small dark bodies which are covered by a soft, white, cottony scale. They attach themselves to the nodes of the Bermudagrass rhizomes and stolons and suck sap from the plant. Growth of the grass is retarded. As injury progresses, the turf becomes thinner and many dead, discolored leaves appear. In some cases turf actually may be killed. Sometimes relatively small spots