

of damage to certain crops, especially the vegetable crops.

The activities of all nematodes are not harmful to the growth of higher plants. They aid in bringing about an intimate mixture of the mineral and organic matter and in breaking down organic matter. They may improve soil aeration in heavy soils.

Perhaps the most important group of the larger animals inhabiting the soil is the common earthworm. They prefer a moist environment with an abundance of organic matter and a plentiful supply of available calcium. They are found only sparingly in acid sandy soils low in organic matter. Obviously, figures indicating numbers are merely suggestive. The numbers per acre-plowed-layer may range from a few hundred or even less to more than a million. It has been estimated that between 200 and 1,000 lbs. of earthworms are present in an acre of soil.

It is believed that in some soils these organisms may pass several tons of soil through their bodies annually and in so doing bring about an increased availability of plant nutrients. Considerable soil mixing is accomplished as a result of their action. Holes left in the soil aid in increasing soil aeration and drainage. Frequently earthworms bring considerable quantities of soil from the lower soil layers to the surface which is very objectionable in the soil of golf greens. This frequently occurs where such soils have received heavy applications of organic fertilizers.

Other groups of the larger animals inhabit the soil, namely: rodents, ants, snails, spiders, mites, millipedes and centipedes. Some of these organisms may spend all and others only a part of their life cycle in the soil. Although soils may be directly benefited by their activities, it is obvious that they may prove unfavorable under certain conditions.

Soil organisms, in general, have the same nutritional requirements as higher forms of life. For their growth and synthesis they all require supplies of energy in addition to the several essential elements including carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, sulphur, calcium and others. With the exception of algae all the important soil microbes are devoid of chlorophyll and must obtain their energy either from the oxidation of simple inorganic substances or from complex organic substances as is

## TIMELY TURF TIPS

### WHITE GRUB CONTROL

White grubs, or the larvae of the May or June beetle, are a menace to fine turf. Grubs of the green June beetle do damage too, but are more difficult to control because they work deeper in the soil. In eastern regions, grubs of the Oriental, Garden, Asiatic, and Japanese beetle do similar damage. All can be controlled by applying acid lead arsenate, commonly called lead arsenate.

When any of these beetles occur in sufficient numbers, resulting grubs will damage grass, unless enough lead arsenate is applied to kill the young grubs. On new seedings lead arsenate should be applied and worked into soil before seeding. This treatment may retard, but will not prevent germination. Apply at 5 to 10 pounds per 1,000 square feet, which is 200 to 400 pounds per acre.

Since lead arsenate is an exceedingly fluffy, fine powder, a carrier is needed to insure even distribution. Besides being the best carrier for applying lead arsenate, Milorganite is the ideal source of nitrogen for new seedings. Use 30 to 50 pounds per 1,000 square feet. (1,200 to 2,000 pounds per acre). Simply mix the lead arsenate with it and scatter evenly over the area. Then apply 20% grade superphosphate at 10 pounds per 1,000 square feet (400 pounds per acre); scratch all three into surface and sow seed. The Milorganite and phosphate insure quick development of uniform turf.

Milorganite is the ideal carrier for applying lead arsenate to established turf, also. From 3 to 5 pounds Milorganite are needed for each pound lead arsenate used. Where infestation is light, 5 pounds lead arsenate per 1,000 square feet (200 pounds per acre) is enough; but from 10 to 15 pounds (400 to 600 pounds per acre) is needed for heavy infestation.

While lead arsenate may be applied at any time when there is no frost in the ground, early August treatments seem most effective for killing newly hatched grubs, particularly in the Japanese beetle belt. It gets the small grubs before they appreciably injure the turf.

**Tell us about your Turf Problems. Write:**

**Turf Service Bureau**

**THE SEWERAGE COMMISSION**

Dept. B-7.

**Milwaukee, Wisconsin**

## MILORGANITE for BETTER TURF