Kansas Insect Newsletter

For Agribusinesses, Applicators, Consultants and Extension Personnel

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Earthworms and Pesticides

Earthworms are organisms that have been present on earth for over 500 million years, and there are more than 3000 species distributed world-wide. There may be over one million earthworms in one acre of land. One earthworm can produce over 100 offspring per year, with an average lifespan of up to nine years. Earthworms may be found in a wide-range of soil types, and are extremely beneficial to soils by enhancing aeration, improving water penetration/infiltration, reducing thatch, and breaking-down plant material (e.g. leaf litter) thus increasing the organic matter content of soils. This then provides nutrients to plants. They may also improve compacted soils as their burrowing and feeding reduces soil compaction and enhances thatch decomposition. Earthworms consume and excrete organic and mineral components as they migrate through the soil profile to acquire food such as dead tissue, fungi, bacteria, and other micro-organisms. As plant material and soil filter through the digestive system of an earthworm, the "gut" breaks down particles into smaller fragments. After excretion, these fragments may be further decomposed by other micro-organisms. Earthworms also convert mineralized forms of nitrogen, phosphorus, and potassium into soluble forms that are readily available for plant up-take. Furthermore, they may increase the soil-to-air ratio by up to 30%.

Earthworms are most active during spring and fall as summer and winter temperatures cause earthworms to burrow deep into the soil profile where they enter a resting stage similar to hibernation. Heavy rains will cause earthworms to appear on side-walks and driveway. They do this to increase their chances of travelling aboveground without desiccating, which may occur when they are exposed to dry, sunny conditions. Earthworms require moisture for survival because they do not have an exoskeleton to protect them from drying-out. In addition, earthworms prefer a soil with a pH between 6.0 and 7.0. They are also the major food source of moles (Not Grubs!!) and cluster fly larvae.

Despite the benefits associated with earthworms, there are cases, unfortunately, in which there is a perception or need to "control" earthworms with pesticides. This occurs when small mounds or worm castings are present on lawns. These worm castings are a mixture of soil and fecal matter deposits created when earthworms emerge from their burrows. These worm castings are an excellent soil amendment, are an abundant source of beneficial micro-organisms, and they are "rich" in nutrients. Furthermore, worm castings have been suggested to increase resistance to insect pests although this requires further study. However, worm castings can be both "unsightly" and inhibit lawn mowing, especially in golf course settings. In addition, excessive earthworm activity may result in very soft ground, root drying, and possibly thinning of the lawn.

Earthworms vary in their susceptibility to pesticides depending on the type (e.g., insecticides, fungicides, and herbicides). Although there are no insecticides specifically registered for control of earthworms (why should there be) several insecticides are known to be directly toxic to earthworms including carbaryl (Sevin)

and imidacloprid (Merit). Also, copper-based fungicides and fungicides with the active ingredient, thiophanate-methyl (e.g. Cleary's 3336) have been shown to reduce earthworm populations. In addition to direct toxicity, these pesticides may indirectly affect earthworms by reducing feeding or inhibiting growth rates; however, this varies depending on the rate applied. Furthermore, earthworm distribution and behavior may be negatively impacted. For example, areas treated with certain pesticides may repel earthworms, which results in earthworms avoiding areas thus reducing the breakdown and incorporation of organic matter into the soil. As such, reducing earthworm populations may have a negative effect on the chemical and physical properties of soils. Moreover, it should be noted that these pesticides have broad-spectrum activity and may kill other beneficial organisms (e.g. insects and mites) in addition to earthworms, which may result in disrupting the "soil ecosystem" and possibly leading to problems with other pests.

Since earthworms are a major contributor to the physical, chemical, and biological processes associated with "healthy soils," and they are an important part of the ecosystem, the thought of controlling earthworms seems counter-intuitive and as such it may be best to live with the situation or attempt to implement practices such as lowering the soil pH, increasing soil drainage, and/or aerating lawns regularly. All these practices will likely alleviate problems with earthworms. Now it is time to go fishing!!

Raymond Cloyd

Just Rolling Along in our Rollercoaster Spring------

Eastern Tent Caterpillars and European Pine Sawfly Larvae

It doesn't feel like spring-has-sprung in Kansas. And many people probably have occasionally turned on their furnaces to ward off the chill of cool day and evening temperatures. Yet outdoors, ETC and EPS have steadily progressed in their seasonal development.

While the Eastern tent caterpillars have "snuggled" into their tents and European pine sawfly larvae have "clustered" at the bases of the needles during the coolest of nights, both species have been active most days when temperatures have risen to (for them) comfortable levels. Currently, ETC have expanded the size of their tents to accommodate their increased size (Figure 1A), and EPS are have progressed to in size that they are capable of consuming entire needles (Figure 1B).

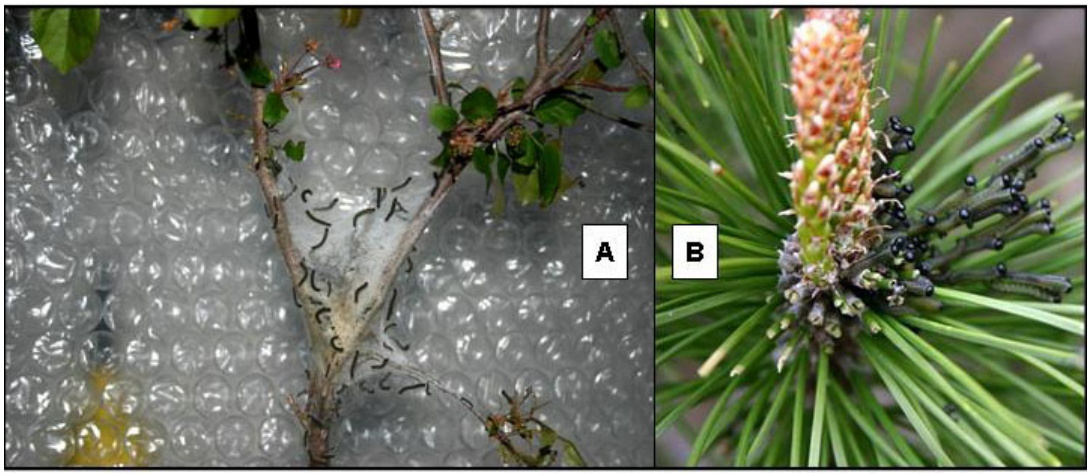

Figure 1

ETC web masses are not (now) easily detected since host trees are in full bloom or have fully flushed out, thus obscuring them from view (Figure 2). Most people are unaware of ETC activities. However, this should not be of great concern, for even if ETC completely strip a few branches of their leaves, after they complete their feeding in several weeks, trees will rapidly replace the bare branches with a lush flush of new foliage, being none-the-worse-for-wear.

Figure 2

EPS larvae present a different situation. They feed on the previous year's needles ---- and once those needles have disappeared, they are not replaced. The saving grace is, however, that EPS larvae will complete their feeding phase in several weeks, after which the current-season needle production gets underway. Although not "dead", bare branches will have a sparse appearance. Depending on the extent of the EPS populations, entire plantings may appear scrawny. Therefore, it is important that people inspect pine plantings for the presence of EPS larvae.

As previously mentioned, at this stage of their seasonal cycle, larvae are consuming entire needles. This may not be readily apparent due to adjoining branches with intact needle clusters which tend to draw attention away from those clusters where larvae are currently feeding. However, the presence (or absence) of EPS larvae can be visually determined via quick inspections. The giveaway is dead and twisted browned needles (Figure 3).

Figure 3

Clustered larvae will be found nibbling away on nearby needles (Figure 4).

Figure 4

Given their small size, they have not yet caused extensive feeding damage. They can be eliminated by merely pruning out that portion of the needle cluster upon which they are confined. Or, a simple "spritz" with a horticultural oil, horticultural soap or duly registered insecticide will easily kill the larvae which are relatively delicate. There is no need to treat the entire pine ----- just the terminals with the larval clusters.

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Sincerely,

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