

- 305 Efficacy of Dinitroaniline Herbicides in Ornamentals and Plant Morphological Response. C. L. Elmore, University of California, Davis and W. A. Skroch, North Carolina State University, Raleigh.

Dinitroanilines are most effective for controlling grasses from seed and some small seeded broadleaf weeds in ornamental plantings. Injury to the ornamentals varies with chemical and ornamental species. Injury in the form of stem swelling at the soil line on conifers has been shown. Root pruning in container production has been reported on some species resulting in suppressed growth. Over-the-top applications has damaged terminal buds on some azaleas. Recent research shows some dinitroanilines killing the vascular cambium in certain azalea varieties.

- 306 Behavior of Dinitroaniline Herbicides in Soil. J. B. Weber, North Carolina State University, Raleigh.

The behavior of a given herbicide in soil is dependent upon the chemical properties of the herbicide, the properties of the soil, and climatic conditions. The dinitroaniline herbicides have water solubilities which range from 0.05 to 1.0 ppm and are among the least water soluble of the herbicide families. Some of the dinitroanilines are volatile. They fall into three volatility classes. The compounds with very low vapor pressures and which are considered to be nonvolatile include dinitramine and prodiamine. Those with moderate vapor pressure and considered to be moderately volatile include benefin, ethalfluralin, fluchoralin, isopropalin, pendimethalin, and profluralin. The last group contains only one herbicide, trifluralin, and it has a high vapor pressure and is considered to be highly volatile. All of the dinitroaniline herbicides contain nitro groups which readily hydrogen bond to proteinaceous substances, including soil organic matter, which greatly decreases their bioactivity. Because of their low water solubility and high adsorption to soil colloids, particularly soil organic matter, the herbicides are not readily washed into the soil by rainfall and, particularly in the case of the highly volatile herbicide trifluralin, performance is generally more predictable and dependable when the chemicals are incorporated into the soil. Because of their high adsorption to organic soil colloids, the dinitroanilines are nearly immobile in soil leaching waters. Those which have moderate to high vapor pressures do diffuse through the soil in the vapor state and the amount of diffusion which occurs is dependent upon the moisture content and temperature of the soil. Highest diffusion occurs at high temperature and moderate soil moisture levels and lowest diffusion occurs under cool, dry conditions. The dinitroanilines undergo biological and chemical degradation in soil and last for 8 to 16 weeks normally. Under drought conditions some of the compounds have persisted for as long as 46 to 52 weeks.

- 307 Mechanism of Action and Metabolism of Dinitroaniline Herbicides in Plants. A. P. Appleby and B. E. Valverde, Oregon State University, Corvallis.

Dinitroaniline herbicides injure plants by binding to tubulin. Tubulin is a dimer protein in the cell that polymerizes to form microtubules. Microtubules are important in several ways in cell physiology. They form the major part of the apparatus, including spindle fibers, which enable chromosomes to separate during cell division. Dinitroaniline herbicides prevent tubulin from polymerizing into microtubules, thus arresting mitosis. This leads to abnormal cells with more than the normal complement of chromosomes and, frequently, lobed nuclei. Microtubules also are responsible for orientation of microfibrils in the cell walls. These microfibrils are oriented in such a way that they prevent lateral enlargement of cells, i.e., the reason that root cells grow long and not round. Treatment with dinitroaniline herbicides leads to disorientation of the microfibrils, leading to one of the common symptoms--round cells instead of long rectangular ones. Dinitroaniline herbicides are readily absorbed by roots and, in grasses, by emerging shoots. Translocation within the plant is negligible. Studies on the metabolism of trifluralin in plants have shown that amination, dealkylation, and cyclization can occur. However, the total percentage of these metabolites often amounts to 5% or less. In general, trifluralin seems to be quite stable within the plant.

WSSA ABSTRACTS

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Largeleaf Lantana
Lantana camara L.

RIVERIA HOTEL
LAS VEGAS,
NEVADA

Field Bindweed
Con. ... arvensis L.

Yellow Nutsedge
Cyperus esculentus L.

Water Hyacinth
Eichornia crassipes (Mart.) Solms

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