

Uses

Used primarily for preemergence annual broadleaf and grass weed control in corn, sorghum, sugarcane and rangeland. At higher rates, the triazines are used for non-selective weed control. In turf, the triazines are used for preemergence and early postemergence grass, broadleaf, and sedge control in bermudagrass, St. Augustinegrass, centipedegrass, and zoysiagrass. Activity is greatest for broadleaf weeds. Activity is reduced as weeds emerge and mature. Higher rates are needed on peat, muck and high organic clay soils. Preemergence activity of the triazines will be reduced in these soil conditions. **Metribuzin** is used alone and in combination with the arsenical herbicides (e.g., MSMA, DSMA, and CMA) for postemergence goosegrass, crabgrass and broadleaf weed control in bermudagrass and zoysiagrass. In Florida, the triazines (primarily **atrazine**) provide good to excellent pre- and postemergence broadleaf control and fair pre- and postemergence grass control.

Behavior in Plants

Absorption

Triazines are primarily preemergence herbicides that are rapidly absorbed by emerging seedling roots. Roots are not killed directly, but the destruction of shoot growth leads to the eventual root starvation. Some shoot absorption can occur except for simazine and propazine.

Translocation

Rapid translocation occurs from root absorption and is upward in the xylem with the transpiration stream. Triazines accumulate in the apical meristem and leaves. Some foliage absorption occurs but is limited in most plants. The most severe triazine symptoms develop on lower mature leaves. On individual leaves the symptoms appear at the leaf tips and margins, followed by loss of chlorophyll between the veins and death of the leaf occurs from the tip.

Selectivity and Degradation

In general, dicot (broadleaf) crops are less tolerant than monocots (grasses). Hexazinone tolerance, especially with woody species, is associated with reduced uptake and translocation of the herbicide by the tolerant plants. In general, the triazines are degraded rapidly in resistant species

(monocots) to hydroxytriazine and amino acid conjugates. Susceptible species (dicots) degrade them slowly and the unaltered triazine accumulates, causing chlorosis and death. Resistant weed biotypes have developed with the herbicide no longer being able to attach and inhibit electron-transport. Certain goosegrass biotypes have been cited as a possible triazine-resistant turf weed.

Mechanism of action

Inhibition of photosynthesis. Interferes with normal electron transport. Eventual membrane destruction occurs with resulting chlorophyll loss. Foliar chlorosis, usually interveinal, followed by necrosis, is the usual phytotoxic symptom of the triazines. Light is required for herbicide activity.

Behavior in Soils

Absorption and Leaching

Absorption of the triazines in soils is related to the soil organic content, pH, and clay minerals--not to the water solubility of the compounds. **Atrazine** is more readily adsorbed on muck or clay soils. Adsorption generally is greater under acidic conditions, when clay minerals are present. Leaching of the triazines is dependent on water solubility, soil pH and texture. **Metribuzin** and **prometon** are the most mobile of the triazine herbicides and when used on many row crops, they are generally restricted to soils containing at least 1.5 to 2% organic matter. These should not be applied directly to water or wetlands. The extent of leaching is less in soils receiving low rainfall and in fine-textured high organic soils as compared to coarse, low organic soils.

Persistence

As a class, the triazines are fairly persistent in soils (Table 27).

- Half-life for hexazinone ranges from 30 to 180 days
- Triazine degradation in soils is generally attributed to microbial activity.

Distinguishing Characteristics

- Compatible with most other pesticides and fertilizers
- Noncorrosive under normal use conditions
- Shelf life is stable over several years.