

Cacodylic acid is the common name for dimethylarsonic acid. The other organic arsenicals are salts of methylarsonic (also known as methanearsonate) acid, varying one form or another in respective categories:

MSMA	-	monosodium methanearsonate
MAMA	-	monoammonium methanearsonate
CMA	-	calcium methanearsonate
DSMA	-	disodium methanearsonate
MAA	-	methylarsonic acid
AMA	-	ammonium methanearsonate

Uses

The methanearsonates are used to selectively remove annual grass weeds (such as crabgrass and goosegrass,) and some broadleaf weeds and sedges, from turf species such as bermudagrass, zoysiagrass and tall fescue. Repeat applications will control selective perennial weeds such as bahiagrass, thin paspalum, or dallisgrass. Susceptible broadleaf weeds include chickweed, woodsorrel, cocklebur, pigweed, ragweed, and puncture-vine. **Cacodylic acid** is a non-selective material used for desiccation, industrial sites, etc.

Behavior in Plants

Absorption and translocation

The methanearsonates are absorbed by plant foliage and show apoplastic and symplastic movement towards the growing tips of roots, leaves, and rhizomes. **Cacodylic acid** is considered to be a general contact material and behaves as a contact herbicide. It is applied to cuts around the base of trees, or to foliage where only apoplastic movement occurs. Symplastic movement is prevented by rapid contact action, which injures the phloem and damages membranes.

Selectivity

The methanearsonates are utilized selectively in row crops such as cotton and turf. They are active primarily on grassy weeds. **Cacodylic acid** is a non-selective contact-type material used for desiccation, industrial sites, ditch banks, fence rows, sidewalks, etc. With the exception of **cacodylic acid**, susceptible plants are killed slowly. Symptoms of injury are leaf chlorosis and a cessation of growth, followed by desiccation and eventual plant death.

Mechanism of Action

Arsenates are absorbed and translocated much like phosphates and can substitute for phosphates in numerous areas of plant metabolism. For example, organic arsenicals interfere with oxidative phosphorylation during the production of ATP (adenosine triphosphate), the major source of chemical energy for metabolic processes. Arsenates also may interfere with enzyme activity and disrupt plant membranes.

Degradation

Methanearsonate metabolites (i.e. a MAA-sugar complex) have been found in tolerant plants. Very little evidence exists demonstrating the degradation of **cacodylic acid** in plants.

Behavior in Soils

Adsorption and leaching

The methanearsonates and **cacodylic acid** almost are completely inactivated in soils through adsorption and ion exchange by competing with phosphorus in the soil. MSMA, DSMA, and MAA are degraded microbially to CO₂ and arsenate and are nonvolatile.

Persistence

Phytotoxic effects of the organic arsenicals do not persist in soils due to rapid inactivation by soil colloids. Standard use rates contribute relatively insignificant amounts of elemental arsenic to the soil.

Distinguishing characteristics

- Used as postemergence grass herbicides;
- No herbicidal activity in soil systems;
- Methanearsonates are translocated in a manner similar to phosphates in susceptible grass species;
- **Cacodylic acid** is a contact, nontranslocated herbicide;
- Wetting agents (surfactant) enhance the activity of these herbicides and are either part of their formulations or must be added to the spray mixture;
- Centipedegrass and St. Augustinegrass are highly susceptible to these herbicides;
- Bentgrass has intermediate tolerance, depending on the timing of application, formulation and rate used;