the soil in relationship to the germinating crop or weed seed.

Mechanism of action

DNA's prevent nucleic acid metabolism and thus prevent cell division. They strongly inhibit root growth - especially lateral or secondary root development. As roots develop, they are somewhat thickened, stubby and have few secondary roots. They are also called mitotic inhibitors. Specifically, they prevent tubulin from polymerizing into microtubules. Microtubules, in association with other proteins, form spindle fibers, determine the plane of cell division, and orient microfibril deposition in the walls of growing cells. The lack of spindle fibers due to a treatment of DNA does not allow the normal separation of chromosomes, and chromosomes are then found scattered throughout the cytoplasm.

Degradation

Dinitroanilines are poorly absorbed in tolerant plants. Little reaches the internal portions of plants. It is believed they are either slowly degraded or not degraded by higher plants.

Behavior in Soils

Adsorption

Low water solubility and high potential for hydrogen bonding cause DNA's to be strongly adsorbed by the soil organic fraction and clay minerals. Dinitroanilines bound by the organic fractions of soils are unavailable, thus diminishing their capability for weed control. Because of this, soils high in organic matter require higher rates to overcome adsorption affinity. DNAs are not recommended for use on peat or muck soils that have more than 10 percent organic matter due to their unavailability.

Leaching

Dinitroanilines are relatively immobile in soils and do not readily leach.

Persistence and Degradation

Over time, dinitroaniline herbicides can be lost from soils through volatility, photodecomposition, and microbial degradation, Table 12. Wet soil surfaces, high soil temperatures and sunlight increase the loss rate of DNA's due to increased volatilization, microbial degradation and photodecomposition. **Benefin** and **trifluralin** have the highest volatility of the DNA's and require incorporation through irrigation. **Pendimethalin** is less volatile and should receive irrigation within seven days of application. **Oryzalin** is the least volatile of the DNA's and should be irrigated within three weeks of application. Half life values range from 7 to 27 days under anaerobic conditions and from 19 to 132 days under aerobic conditions.

Table 12. Longevity of various dinitroanilines in soils

Herbicide	Months
trifluralin	6 - 12
benefin	4 - 8
oryzalin	4 - 12
profluralin	6 - 12
pendimethalin	3 - 6
prodiamine (half life)	4

Distinguishable Characteristics

- Posesses a yellow color because of their chromorphic nitro groups
- Posesses a characteristic odor due to high to moderate vapor pressures
- Subject to varying degrees of photodecomposition
- Readily absorbed by roots and emerging shoots
- Low water solubility
- Selective for grasses and certain broadleaves
- Not readily translocated or degraded in plants
- Suspected mechanism of action is nucleic acid metabolism interference which inhibits cell division
- Little, if any, postemergence activity
- Persistent in soils, generally 6 months or less
- Rainfall, irrigation, or soil incorporation are needed to activate the DNA's and minimize losses from volatilization or photodecomposition
- Most pesticide tank mixes are compatible with the DNA's if proper agitation is used in the spray tank. They also are compatible with ammonium nitrate solutions
- Often impregnated on granular fertilizer
- Non-corrosive