- **Pronamide** acts as a mitotic poison, interferes with mitosis and cell division, inhibits root and shoot development. Protein, DNA and RNA levels are markedly changed in treated grasses.
- **Isoxaben's** mode of action is similar to napropamide and pronamide.

Degradation

Through the processes of hydrolysis, dehydroxylation, dealkylation, and deamination, these herbicides are metabolized into various acetic acids and water soluble metabolites, and alterations in the aliphatic side chains may occur.

Behavior in Soils

Adsorption

- **Diphenamid** and **napropamide** are absorbed by soil organic matter but have good activity in sandy and medium textured soils.
- **Pronamide** is absorbed by soil colloids and is more active in high organic matter-containing soils such as peats or mucks.
- **Isoxaben** is strongly adsorbed by soil organic fractions and clay minerals due to its low water solubility and high potential for hydrogen bonding.

Leaching

- **Diphenamid** leaches readily in sandy soils and slowly in clay and loam soils.
- **Napropamide** does not leach in most soils probably because of its adsorption to organic matter and colloidal material and its low water solubility. **Napropamide** must be incorporated in soil by mechanical means or irrigation to reach weed seed zone for consistent results.
- **Pronamide** is the same as napropamide but may not need to be incorporated because of its use which is recommended only during the cool seasons of the year.
- **Isoxaben** is relatively immobile in soils and does not readily leach.

Persistence

- **Diphenamid** is intermediate in persistence which ranges from 3 to 6 months depending upon moisture, temperature, and soil type and may persist in soils longer if rainfall is absent. Soil microorganisms appear to degrade the material. It is nonvolatile and non-photodecomposed.
- **Napropamide** is generally persistent in soils, with an average half-life of 8 to 12 weeks, but can persist up to 9 months. Soil microorganisms slowly break this material down. It is nonvolatile but somewhat susceptible to photodecomposition.
- **Pronamide** has medium persistence, ranging from 3 to 8 months depending upon soil type and climatic conditions, particularly temperature. Herbicidal activity is lost due to volatility, photodecomposition and microbial action.
- **Isoxaben** has a half-life of 5 to 6 months. Soil microorganisms degrade this material.

Distinguishing characteristics

- Nonionic class of herbicides
- Moderate to low water solubility
- Apoplastic (xylem) movement in plants with possible exception of **pronamide**
- Interact with soil colloids, particularly organic matter
- Preemergence herbicide activity
- Mode of action is mitotic poison, however, many effects have been identified but no consistent patterns are known
- Short to long soil persistence

Toxicological Properties

Acute oral toxicity	Rats - LD_{50} (mg/kg)
Diphenamid	1717
Napropamide	>5000
Pronamide	8350
Isoxaben	10,000