

Behavior in Plants

Absorption and translocation

Substituted Ureas are primarily absorbed by plant roots and move in the transpiration (apoplastic or xylem) stream. In general, the substituted ureas are applied preemergence, however, some such as **linuron** are applied to young weeds postemergence. Some foliar absorption of the ureas can occur and accumulate in mature leaves.

Selectivity and Degradation

The principle mode of selectivity with the substituted ureas is positional rather than physiological tolerance. However, selectivity among weed and crop species for some ureas have been attributed to differential absorption, translocation, and metabolism. For example, **linuron** is readily translocated in susceptible plants, while tolerant plants metabolize it into inactive products. Several degradative reactions occur in plants leading to the breakdown product, aniline. Demethylation is the primary detoxification mechanism. Aniline may be subject to oxidation in order to yield the corresponding nitrite or to conjugation with normal cellular constituents.

Mechanism of action

The primary site of action of the substituted ureas is inhibition of photosynthesis. Therefore, light is required for herbicidal activity. In addition, a secondary phytotoxic substance is formed in the oxygen pathway of photosynthesis. **Siduron** is an exception to the class because it does not inhibit photosynthesis. Its phytotoxic effects are on root growth and disruption of mitosis.

Behavior in Soils

Adsorption and leaching

In general, the ureas are readily adsorbed to soil colloids and resist leaching. The small degree of leaching that occurs is related to water solubilities and soil texture. Adsorption involves weak bonds and is

Table 23. Longevity of urea herbicides in soils (months).

Herbicide	Months
diuron	4 - 12
linuron	2 - 4
fluometuron	4 - 12
monuron	4 - 12
siduron	4 - 6
tebuthiuron	12 - 15

lowest in sandy soils, intermediate in clay loams and highest in organic soils with a high organic matter content. Adsorption on organic soils can completely negate herbicidal activity.

Persistence

The ureas, as a class, are fairly persistent (Table 23) and can lead to residual or carryover problems. The ureas are chemically stable in soil systems and do not undergo extensive chemical alterations. Some ureas are subject to photodecomposition but one of the most important degradation means is microbial activity.

Distinguishing characteristics

- Low to intermediate water solubilities;
- Generally applied preemergence;
- Photosynthetic inhibitors;
- Absorbed primarily by root with apoplastic movement in plants;
- Moderately persistent in soils.
- Siduron is an exception to many of the general characteristics of the group.
- Most are formulated as wettable powders and therefore, require agitation to be kept in solution.

Toxicological Properties

<u>Acute Oral Toxicity</u>	<u>Rats LD₅₀(mg/kg)</u>
Siduron	>7500
Tebuthiuron	644
Monuron	3600