- Root uptake can occur but movement into the aerial portion of the plant is limited;
- "Source to Sink" type movement occurs with the phenoxies: they move in the phloem and tend to accumulate in regions of high metabolic activity such as meristems. Active movement of nutrients through plants is required for good distribution of phenoxies in plants. Thorough topical application of the entire plant, especially the lower leaves, is important, especially against perennial weed species. **2,4-D** moves with the photosynthate sugars and the treatment of rapidly developing leaves of perennial weeds in the spring causes little or no translocation of **2,4-D** to the roots. Better control is obtained when applied to more mature plants that are sending sugars to the rhizomes or other storage structures. Excessive rates can also halt translocation to the roots by killing the living phloem cells. Therefore, low rates of chemical applications, repeatedly applied, give better perennial weed control than a single heavy application.

Mechanism of action

Specific mechanism of action is unknown. Interference with nucleic acid (DNA and RNA) metabolism and protein synthesis are possible modes of action. Epinastic bending is a characteristic of the phenoxies as are swollen, tumorous stems and roots resulting in vascular tissue plugging. A slow dieback occurs over a period of several weeks due to food and water transport being blocked within the plant.

Selectivity and Degradation

Phenoxies are selective for broadleaf weed species. Use depends on formulation. The salt and long chain ester formulations are low enough in volatility to be used near susceptible crops if spray drift is prevented. However, high volatile ester formulations should not be used near susceptible plants and are illegal in the state of Florida. Regardless of formulation, phenoxy herbicides should not be used near susceptible plants if environmental conditions are unfavorable, e.g. strong winds or extremely hot temperatures. Phenoxies are degraded in plants through hydroxylation, oxidation, hydrolysis, and through complexing with proteins and amino acids.

Behavior in soils

Adsorption and leaching

Depending on their formulation, phenoxies can leach from certain soils. Amine and salt formulations dissociate and are water soluble, leaching readily in sandy soils. The ester formulations have low water solubility and are resistant to leaching. Less leaching occurs as the organic matter and clay content of the soil increases. **2,4-D** is a relatively small organic acid, so it dissociates to form a negatively charged ion in soil solution and is not strongly attracted by soil colloids. It can be leached and has been used as a preemergence treatment on muck and peat soils. One of the first uses for **2,4-D** was for early preemergence broadleaf weed control in newly planted corn.

Persistence

- All phenoxies are degraded by soil microorganisms and do not persist for long periods of time in the soil (Table 19).
- Minor losses occur from photodecomposition.
- The half-life for **2,4-D** is 10 days, 5 to 6 days for **MCPA**.

Table 19. Longevity of phenoxy herbicides in soils (months).

Herbicide	Months
2,4-D	1
MCPA	1 - 2
2,4,5-T	1 - 3
2,4-DB	1
2,4-DP	1 - 2

Distinguishing Characteristics

- Phenoxies are not readily adsorbed in soils;
- Salt and amine formulations have high water solubility, whereas ester formulations generally have low water solubility;
- Only the amine or oil soluble amine formulations should be used during warm temperatures; No formulation should be used during windy conditions;
- Translocated in the phloem (food channels);
- Growth hormone type herbicides;