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13. Transformation of Herbicide in Plant



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13.1 Absorption soil applied herbicide

The pathway and mechanism of herbicide absorption by roots is similar to that of nutrient absorption through active and passive mechanism. A nonpolar herbicide can dissolve suberised casperian strip which separate cortex and still at endo-dermis and diffuse through it to reach the stle and move symplastically. However the polar herbicide move inwards with water along apoplast system. Soil applied herbicide are also absorbed by developing shoot and coleoptiles.



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13.2 Absorption of foliage applied herbicide

13.2.1 Foliar penetration

Post-emergence applied herbicide enter the plant system through foliage .The effect of herbicide depends its ability to penetrate the cuticle. which is the part of apoplast & protoplasm,which cover all the surface of symplast.



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13.2.2 Trichome and stomata penetration

Trichome (leaf hair) are extension of epidermal cells which contain protoplasm. They play significant role on herbicide absorption. Stomatal leaf allow gaseous exchange. Aqueous solution don't penetrate stomata and hence addition of wetting agent necessary to improve spreading of herbicide solution on leaf surface.

13.2.3 Penetration through stem

The degree of herbicide penetration through stem surface depends on growth stage of plant. Penetration is rapid through young and immature stem. Herbicide entry through bark of woody plants is normally done by mechanical cuts or by injection.



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13.3 Herbicide translocation

Herbicide absorbed into plant system moves either apoplastically or symplastically. Apoplast refers to the system of non living interconnecting cells with air and water filled xylem elements. Symplast refers to the system of inter connected protoplasm with sieve tube.



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13.4 Factor affecting absorption and translocation

Plant factor

Plant factor such as branching habit, leaf surface, growth stage, crop & cultivar influence absorption and trans location of herbicide. Broad leaf weeds generally have open and horizontally branching habit which can retain spray droplets and easy surface coverage. Grasses foliage usually have rough surface hence non polar herbicides are effective against grasses. Waxy surface restrict herbicide entry. Addition of wetting agent is necessary for better spread of herbicide.



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Chemical factors

High temperature affecting physiological and biochemical processes in the plant absorption and translocation of herbicide. High humidity facilitates free movement of herbicide. Rains immediately after herbicide application may wash off the spray deposit.



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Soil factors

Soil moisture stress affects permeability of root water and herbicide. Soil moisture stress also reduces entry and translocation of foliage applied herbicides. Most herbicide remain in ionic form at pH between 4.5 and 7.5. Soil organic matter and clay minerals influence movement, availability and absorption of herbicide.



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Chemical nature

Herbicide concentration, pH of herbicide & its chemical structure affect herbicide absorption. Use of surfactant enhances the absorption of polar herbicides. Surfactants improve herbicide spray retention on foliage, penetration, absorption and translocation of post emergence herbicide