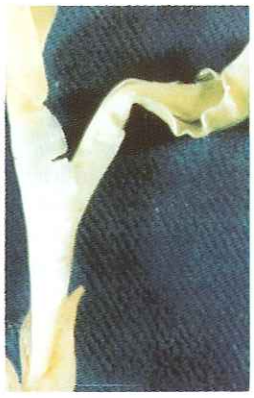
HERBICIDE INJURY — MERISTEMATIC INHIBITORS I

1. Improper Leaf Unfurling of Corn



2. Corn Leaf-Out Underground

3. Leaf Puckering and Drawstring of Soybean

4. Stunted, Twisted, Buggy-Whipped Corn

5. Stunted Plants and Crinkled Leaves: Soybean

6. Soybean Bud Seal

7. Stunted Corn With Swollen Proliferated Roots

8. Purple Corn Syndrome

9. DNA Soybean Injury

10. Lodged Soybeans

11. Corn Injury From Herbicide Carryover

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The meristematic inhibitors reduce the ability of meristems or regions of active cell division to develop and grow normally. Meristematic inhibitors can be divided into three categories: herbicides that primarily affect shoot meristems (**Shoot Inhibitors**) which include the acetanilide and thiocarbamate herbicides; herbicides that primarily affect root meristems (**Root Inhibitors**), which include the dinitroanilines; and herbicides that inhibit both root and shoot meristems or growing points (**Shoot and Root Inhibitors**), which include the imidazolinones, sulfonylureas, amino acid type herbicides, and the postemergence grass herbicides.

SHOOT INHIBITORS

ACETANILIDES. This family of herbicides includes alachlor (Lasso and several premixes), metolachlor (Dual and several premixes), propachlor (Ramrod), and acetachlor. These herbicides translocate with the transpiration stream and primarily affect shoot meristems in sensitive plants.

1. **Improper Leaf Unfurling of Corn.** Stressful environmental conditions or excessive rates of alachlor, metolachlor, or acetachlor may cause improper unfurling of corn leaves. Corn seedlings may appear malformed and stunted. Injured plants often out-grow this damage after emergence. Injury symptoms are similar to those caused by thiocarbamate herbicides.

2. **Corn Leaf-Out Underground.** Germinating corn injured by alachlor, metolachlor, or acetachlor may result in plants leafing-out underground. This problem is more severe with deep planting, soil crusting, cool temperatures, and certain sensitive hybrids.

3. **Leaf Puckering and Drawstring of Soybean.** Acetanilide injury to soybeans may cause a slight puckering of the first few leaves. Injured plants may also show a "drawstring effect" where the midrib of the leaf is shortened, giving the injured leaves a heart-shaped appearance.

THIOCARBAMATES. This family of herbicides includes butylate (Sutan+, Sutazine, and Genate Plus), EPTC (Eradicane, Eradicane Extra, and Eptam), and vernolate (Vernam). This family of herbicides translocates with the transpiration stream and primarily affects shoot meristems, so symptoms of injury can look very similar to acetanilide injury.

4. **Stunted, Twisted, Buggy-Whipped Corn.** Herbicides such as butylate and EPTC may cause stunting, twisting, and buggy-whipping of some corn plants. Crop safeners in Eradicane, Eradicane Extra, Sutan+, and Genate Plus reduce, but do not eliminate, the risk of injury, especially with certain sensitive hybrids. Injury symptoms resemble those caused by acetanilide herbicides.

5. **Stunted Plants and Crinkled Leaves: Soybean.** Injury to soybean from butylate or EPTC can occur through either misapplication of the herbicides or planting of soybeans into a thiocarbamate treated field after a corn crop failure. Vernolate, a soybean herbicide, can cause similar injury symptoms. Injury symptoms include stunted plants with crinkled, malformed leaves. If the injury is not too severe, plants often recover and grain yields are unaffected.

6. **Soybean Bud Seal.** Severe soybean injury called "bud seal" may occur from misapplication of thiocarbamate herbicides. Soybeans may recover from all but the most severe bud seal injury.

ROOT INHIBITORS

DINITROANILINES (DNA). This herbicide family includes trifluralin (Treflan and Trilin), pendimethalin (Prowl), ethalfluralin (Sonalan), oryzalin (Surflan), and several premixes containing these DNA herbicides. The dinitroaniline herbicides translocate very little in plants and therefore primarily affect root meristems.

7. **Stunted Corn With Swollen Proliferated Roots.** Dinitroaniline herbicides such as trifluralin, pendimethalin, oryzalin, and ethalfluralin may cause corn injury through misapplication or carryover of herbicide residues. Corn seedlings may appear stunted and chlorotic and develop proliferated, stubby root systems with club-shaped lateral roots.

8. **Purple Corn Syndrome.** Dinitroaniline or DNA induced root inhibition may cause corn plants to appear stunted, chlorotic, and purple. Cool wet soils, fertility imbalance, compaction, and other stresses that slow plant growth and development may accentuate injury.

9. **DNA Soybean Injury.** Excessive rates of dinitroaniline herbicides may result in early soybean injury denoted by pruned lateral roots, swollen and cracked hypocotyls, stunted plants, and crinkled leaves.

10. **Lodged Soybeans.** Preemergence applications or shallow incorporation of dinitroaniline herbicides can occasionally cause symptoms of soybean injury that include girdling or callusing of plant stems at the soil surface. Later in the season, stems may easily break off (lodge). Injury may occur because of misapplication or where prolonged dry periods allow the chemical to remain in a concentrated layer near the soil surface.

11. **Corn Injury From Herbicide Carryover.** Carryover injury from any herbicide rarely appears uniformly throughout the field. Differences in herbicide rate and distribution, soil texture, organic matter content, pH, tillage, etc. often cause herbicide injury to appear in streaks or in isolated areas of the field.

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