DICAMBA AND PHENOXY HERBICIDES

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DICAMBA AND PHENOXY HERBICIDES

• GROUP 4 HERBICIDE

• GROWTH REGULATORS (GROUP 4)

• THIS MODE OF ACTION, ALSO KNOWN AS SYNTHETIC AUXINS, INCLUDES MANY COMMONLY USED PLANT HORMONE-TYPE HERBICIDES IN AGRONOMIC CROPS, AND TURFGRASS SETTINGS.

• THESE HERBICIDES ARE GENERALLY SELECTIVE FOR BROADLEAF CONTROL IN TURFGRASS.

• THIS GROUP OF HERBICIDES CAN DAMAGE NURSERY AND LANDSCAPE TREES AND SHRUBS GREATLY.
AMONG THE MOST COMMONLY USED HERBICIDES AGAINST BROADLEAF WEEDS ARE SYNTHETIC AUXINS AND PHENOXY HERBICIDES SUCH AS

- 2,4-D,
- MCPA,
- MECOPROP, AND
- DICHLORPROP.
SETTING THE STAGE

• Why in a Nursery and Landscape Breakout is a discussion on Phenoxy Herbicides being held?
• ANNUAL WEED SPECIES COMMONLY OCCUR IN TURFGRASS, MANY ARE CULTURALLY CONTROLLED BY MOWING.

• PERENNIAL WEEDS ARE NOT CONTROLLED EFFECTIVELY BY MOWING, SO THEY GENERALLY REQUIRE TREATING WITH AN HERBICIDE.

• DANDELION, BROADLEAF PLANTAIN, BUCKHORN PLANTAIN, FIELD BINDWEED, SPEEDWELLS, CLOVERS, CURLY DOCK, AND CREEPING WOODSORREL ARE A FEW OF THE MANY PERENNIAL SPECIES INFESTING TURFGRASS.
• MOST PHENOXY HERBICIDES CAN BE USED SELECTIVELY IN TURFGRASSES WITHOUT DAMAGE, WHILE MANY BROADLEAF PLANT SPECIES HAVE HIGH LEVELS OF SUSCEPTIBILITY.

• A GREAT AMOUNT OF MONEY IS SPENT EACH YEAR CONTROLLING ANNUAL WEEDS USING PRE-EMERGENCE HERBICIDES.

• ANNUAL WEEDS THAT BECOME ESTABLISHED OR PERENNIAL WEEDS REQUIRE POST EMERGENCE HERBICIDES THAT CAN INCLUDE PHENOXY HERBICIDES FOR EFFECTIVE CONTROL.
• BROADLEAF WEEDS ARE PHYSIOLOGICALLY DIFFERENT FROM TURFGRASSES AND GRASS WEEDS, BUT SIMILAR TO TREES AND SHRUBS.

• SELECTIVE CONTROL OF BROADLEAF WEEDS IN THE APPROPRIATE SETTING CAN BE ACHIEVED BY USING THE PHENOXY AND OTHER CLASSES OF HERBICIDES, EITHER INDIVIDUALLY OR MORE COMMONLY IN COMBINATIONS.
• THERE ARE FOUR PHENOXY HERBICIDES AVAILABLE FOR USE IN TURF INCLUDING 2,4-D, MECOPROP (MCPP), MCPA, AND DICAMBA.

• THE PHENOXY HERBICIDES ARE EFFECTIVELY USED AGAINST MOST BROADLEAF WEEDS IN MOST TURFGRASSES.

• NOT ALL OF THE PHENOXY HERBICIDES ARE EQUALLY EFFECTIVE AGAINST BROADLEAF WEEDS.
• Ester derivatives have higher vapor pressures than amines.
• Higher vapor pressures result in the potential for increased volatilization.
• Even though there are some "low volatile" esters available, amine salts are generally less volatile than esters.
• Amines are typically used in landscape settings and scenarios when herbicide movement is a concern.
• ESTER FORMULATIONS ARE TYPICALLY MORE ACTIVE ON WEEDS IN COMPARISON TO AMINES.

• WHY? ESTERS ARE MORE SOLUBLE WHEN IN CONTACT WITH THE PLANT'S WAXY CUTICLE AND IN COOLER WEATHER.

• PLANTS ARE MORE LIKELY TO QUICKLY ABSORB ESTERS, AS AMINES ARE MORE WATER SOLUBLE.
GENERATE A DISCUSSION

• IF YOU ARE A NURSERY GROWER, HAVE A DISCUSSION WITH THOSE THAT LIVE, FARM OR APPLY CHEMICALS AROUND YOUR PROPERTY.

• SOME OF THESE PRODUCTS HAVE THE ABILITY TO MOVE SEVERAL HUNDRED YARDS AND CAUSE DAMAGE.

• IF YOU ARE A LANDSCAPER, BE AWARE OF THE PRODUCTS USED IN THE NEARBY TURF.
DRIFT AND VOLATILIZATION CONCERNS

• MANY LOCATIONS IN THE REGION CAN EXPERIENCE THE UNFORTUNATE RIGHT CONDITIONS THAT ALLOWED PRODUCTS TO MOVE FROM THE TARGETED SITE.
• GOOD OPERATORS CAN MAKE ERRORS THAT CAN BE EXTREMELY COSTLY.
CONCERNS

- DRIFT AND VOLATILIZATION.
  - WEATHER CONDITIONS COUPLED WITH CERTAIN PRODUCTS CAN CREATE PROBLEMS FOR APPLICATORS.
  - USING PRODUCTS NEAR DESIRABLE TREE SPECIES CAN LEAD TO DAMAGE.
  - WHILE OFTEN NOT LETHAL, IT DOES CREATE PROBLEMS FOR THE LANDSCAPE.
WHAT IS VOLATILIZATION?

• HERBICIDE VOLATILIZATION (VAPOR DRIFT) OCCURS AFTER THE SPRAY DROPLET CONTAINING THE HERBICIDE LANDS ON THE TARGET AS DESIRED AND DRIES.

• A PORTION OF THE HERBICIDE CAN **EVAPORATE** FROM THE SURFACE OF THE PLANT TISSUE IT LANDS UPON AND THEN MOVE FROM THE TREATED SITE WITH AIR CURRENTS.

• **WHAT CONDITIONS WOULD PROMOTE THIS?**
VOLATILIZATION

• ONLY HERBICIDES WITH RELATIVELY HIGH VAPOR PRESSURES ARE PRONE TO VOLATILIZATION, SO THE RISK OF VAPOR DRIFT VARIES WIDELY AMONG HERBICIDES.
VOLATILIZATION

• THE RISK OF VOLATILIZING IS DIRECTLY RELATED TO AIR TEMPERATURES, AND AS TEMPERATURES EXCEED 80° F THE POTENTIAL FOR OFF-TARGET MOVEMENT INCREASES.

• THE MAJORITY OF VOLATILIZATION OCCURS WITHIN A FEW DAYS OF APPLICATION.
VOLATILIZATION

• MANY OF THE PHENOXY HERBICIDES (2,4-D, 2,4-DP, ETC.) ARE AVAILABLE AS ESTER OR AMINE FORMULATIONS.

• THE AMINE FORMULATIONS ARE GENERALLY NON-VOLATILE, UNFORTUNATELY ESTER FORMULATIONS ARE PRONE TO VAPOR DRIFT.

• MOST ESTER FORMULATIONS AVAILABLE TODAY ARE REFERRED TO AS LOW-VOLATILE (LVE), AND POSE MUCH LESS OF A RISK THAN PRODUCTS SOLD IN THE PAST. (BUT NOT ELIMINATED THE RISK)
A BRIEF HISTORY

• The use of 2,4-D on turfgrass was one of the first uses of the selective herbicide.

• 2,4-D is the most commonly used herbicide for turfgrass broadleaf weed control.

• Applications of 2,4-D in the home and garden sectors totaled between 8 and 11 million pounds.

• 2,4-D remains a critical tool for controlling broadleaf weeds in turfgrass.
Dicamba Ag Timeline

- **1950**: Dicamba Discovered
- **1960**: Banvel approved for use in 1962
- **1970**: Label Expansion
- **1980**: Banvel II* (Na+ salt)
- **1990**: Marksman (dicamba + atrazine)
- **2000**: Clarity *
- **2010**: Current Registrations Until
- **2020**: Engenia *, Fexapan VGT *, Xtendimax VGT *
- **2025**: * Indicates low volatility formulations.
• **DICAMBA** IS AVAILABLE IN SEVERAL FORMULATIONS, SOME LESS VOLATILE THAN OTHERS **BUT ALL HAVING** THE RISK OF VAPOR DRIFT.
• Research has shown that potential for volatilization can occur more often than runoff of this group of herbicides.

• When soil moisture conditions are very high, as temperature increases, the risk increases.

• Be aware, read the label.
ALTERNATIVES TO ROUNDUP?

• SOME SYNTHETIC AUXIN HERBICIDES CAN BE USED IN LANDSCAPE PLANTINGS TO CONTROL PERENNIAL BROADLEAF WEEDS.

• HERBICIDES IN THIS MODE OF ACTION MIMIC AUXIN, A PLANT HORMONE THAT REGULATES MANY ASPECTS OF GROWTH.

• BIND TO HORMONE RECEPTORS IN PLANT CELLS AND CAUSE A CHAIN OF EVENTS WITHIN THE PLANT THAT LEAD TO RAPID AND UNCONTROLLED GROWTH.
ALTERNATIVES TO ROUNDUP?

• SYNTHETIC AUXIN HERBICIDES ARE SYSTEMIC, THEY MOVE BOTH FROM ROOTS TO SHOOTS AND SHOOTS TO ROOTS.

• THIS CLASS OF HERBICIDES ARE USUALLY SELECTIVE FOR BROADLEAF PLANTS.
SYNTHETIC AUXIN HERBICIDES

- CLOPYRALID (CONFRONT, CURTAIL, LONTREL, MILLENNIUM WEED AND FEED, AND TRANSLINE) IS PARTICULARLY EFFECTIVE FOR THE CONTROL OF LEGUME AND ASTER WEEDS, SUCH AS VETCH, KUDZU, THISTLES AND HORSEWEED.

- IT IS LABELED FOR DIRECTED APPLICATIONS AROUND MANY WOODY LANDSCAPE PLANTS, BUT NOT IN RESIDENTIAL TURF.

- BUT, **USE THIS WITH CAUTION.** SMALL AMOUNTS OF THIS HERBICIDE CAN CAUSE SEVERE DAMAGE OR DEATH OF ORNAMENTAL PLANTS IN THE ASTER OR LEGUME FAMILIES, **EVEN FROM ROOT UPTAKE.**

  - CLOPYRALID CONTAMINATION OF COMPOST IS A COMMON CONCERN.

  - PLANT WASTE CANNOT BE COMPOSTED!
• SYNTHETIC AUXIN HERBICIDES

• TRICLOPYR (GARLON 3, GARLON 4, PATHFINDER) ARE LABELED FOR CONTROL OF WOODY WEEDS IN LANDSCAPE PLANTINGS.

• WHERE ARE THESE PRODUCTS USUALLY USED?

• THIS HERBICIDE IS PARTICULARLY EFFECTIVE FOR CONTROLLING POISON IVY, TREE OF HEAVEN, AND BRAMBLES.
GARLON - TRICLOPYR

- BROADLEAF SELECTIVE
  - WOODY SPECIES

- GARLON 3-A – DANGER
  - AMINE
  - VOLATILE
  - FOLIAR
  - CUT STUMP
  - INJECTION, GIRDLE/FRILL

- BRUSH B GONE – ORTHO
- VINE-X
- CONFRONT - W/CLOPYRALID
- CROSSBOW – DOW
- 2,4-D & GARLON

- GARLON 4 – CAUTION
  - ESTER
  - VOLATILE
  - DORMENT STEM
  - BASEL BARK TREATMENT WITH BASEL OIL

- PATHFINDER II
• SYNTHETIC AUXIN HERBICIDES
• 2,4-D, AMINOPYRALID (MILESTONE), DICAMBA, FLUROXYPYR (ROW ONLY) AND PICLORAM (TORDON®, GRAZON®, PATHWAY®).
• THESE PRODUCTS ARE NOT DESIGNED NOR LABELED FOR USE IN LANDSCAPE SETTINGS.
• SOME HAVE USE IN TURFGRASS, OTHERS IN RIGHT OF WAY, ALWAYS CHECK THE LABEL AS THESE HAVE CONCERNS FOR LANDSCAPE PLANTINGS.
• MOST WEEDS IN TURF GRASS CAN BE CONTROLLED SELECTIVELY WITH HERBICIDES.

• IT IS IMPORTANT TO SELECT THE APPROPRIATE HERBICIDE FOR THE TARGET WEED, AS WELL AS TO APPLY THE APPROPRIATE AMOUNT OF HERBICIDE AT THE CORRECT STAGE OF THE WEED’S GROWTH.
• WEED CONTROL IS ACHIEVED WHEN THE PLANTS ARE COMPLETELY DESICCATED AND NECROTIC OR WHEN THEIR GROWTH CEASES BECOMING COMPETITIVE WITH TURF.

• 2,4-D TREATED BROADLEAF PLANTS EXHIBIT TWISTED AND DISTORTED FOLIAGE AND STEMS, WHICH CAN BE FOLLOWED BY NECROSIS.

• ALTHOUGH ERADICATION OF WEEDS IS NOT ALWAYS POSSIBLE, CONTROL IS USUALLY ADEQUATE FOR THE TURFGRASS TO CROWD OUT MOST REMAINING WEEDS.
• SOME SYNTHETIC AUXIN HERBICIDES CAN BE USED IN LANDSCAPE PLANTINGS TO CONTROL PERENNIAL BROADLEAF WEEDS.

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• THIS HERBICIDE IS PARTICULARLY EFFECTIVE FOR CONTROLLING POISON IVY AND BRAMBLES.

• BUT IT CAN ALSO BE VERY INJURIOUS TO ORNAMENTAL PLANTS, SO THE USER MUST BE CAUTIOUS NOT TO CONTACT DESIRABLE PLANTS WITH THE SPRAY APPLICATIONS.
SYNTHETIC AUXIN HERBICIDES

• TRICLOPYR IS TYPICALLY APPLIED TO THE FOLIAGE OF ACTIVELY GROWING WEEDS. HOWEVER, IT IS ALSO EFFECTIVE WHEN APPLIED TO FRESHLY CUT STEMS OF UNDESIRABLE TREES.

• CUT THE WEED CLOSE TO THE GROUND THEN APPLY TRICLOPYR TO THE FRESHLY CUT STEM, WETTING THE ENTIRE CUT SURFACE AND BASE OF THE WEED.

• BUT IT CAN ALSO BE VERY INJURIOUS TO ORNAMENTAL PLANTS, SO THE USER MUST BE CAUTIOUS NOT TO CONTACT DESIRABLE PLANTS WITH THE CHEMICAL APPLICATIONS.
FLUROXYPYR HERBICIDE

Label
For use on on-farm non-cropland, conservation reserve program acres, rangeland and permanent pastures, non-crop land areas including Industrial sites, non-irrigation ditch banks, rights of way such as electrical power lines, communications lines, road sides and railroads including grazed areas within these sites and pine plantations.
LABELS TO READ! AMINE 4
2,4-D WEED KILLER

• FOR SELECTIVE BROADLEAF WEED CONTROL IN CERTAIN CROPS, TURF AND NON-CROP AREAS.

• SUSCEPTIBLE PLANTS

• DO NOT APPLY UNDER CIRCUMSTANCES WHERE SPRAY DRIFT MAY OCCUR TO FOOD, FORAGE, OR OTHER PLANTINGS THAT MIGHT BE DAMAGED OR CROPS THEREOF RENDERED UNFIT FOR SALE, USE OR CONSUMPTION. SUSCEPTIBLE CROPS INCLUDE, BUT ARE NOT LIMITED TO, COTTON, OKRA, FLOWERS, GRAPES (IN GROWING STAGE), FRUIT TREES (FOLIAGE), SOYBEANS (VEGETATIVE STAGE), ORNAMENTALS, SUNFLOWERS, TOMATOES, BEANS, AND OTHER VEGETABLES, OR TOBACCO.

• SMALL AMOUNTS OF SPRAY DRIFT THAT MIGHT NOT BE VISIBLE MAY INJURE SUSCEPTIBLE BROADLEAF PLANTS.
LABELS TO READ!

• DICAMBA

• THE LABEL STATES
  • FOR WEED CONTROL IN CORN, SORGHUM, SMALL GRAINS (WHEAT, BARLEY, AND OATS), PASTURE, HAY, RANGELAND, GENERAL FARMSTEAD (NON CROPLAND), FALLOW, COTTON, SUGARCANE, ASPARAGUS, TURF, AND GRASS SEED CROPS.

• NO LANDSCAPE IS MENTIONED, AND FOR VERY GOOD REASONS!
FATE OF THESE PRODUCTS

• THE AVERAGE HALF LIFE FOR 2,4-D IS 4 DAYS.

• THE RATE OF DEGRADATION OF 2,4-D WAS THE SAME IN ALL THREE SOILS, BUT FOR THE OTHER HERBICIDES IT WAS CONSISTENTLY FASTER IN SOIL REMOVED FROM UNDER GRASS VEGETATION THAN FROM UNDER TREES.

• WHY? THAT IS VERY IMPORTANT!
TRICLOPYR BREAKS DOWN RELATIVELY QUICKLY IN SOILS.

IT IS MAINLY BROKEN DOWN BY MICROBES.

THE SOIL HALF-LIFE RANGES FROM 8 TO 46 DAYS. IN DEEPER SOILS WITH LESS OXYGEN, THE HALF-LIFE IS LONGER.
• DICAMBA PERCOLATES DOWN INTO THE SOIL AND IS DEGRADED BY MICROBES AND WATER TO FORM SALTS, CHLORIDES, ACIDS -- AND CARBON DIOXIDE.

• HALF OF THE SUBSTANCE DEGRADES **WITHIN 30 TO 60 DAYS**, DEPENDING ON THE AMOUNT OF HERBICIDE USED, THE MOISTURE IN THE SOIL AND MICROBIAL ACTION PRESENT.
• MICROBES MAY PLAY A MAJOR ROLE IN DEGRADATION.

• COMPARATIVE STUDIES DEMONSTRATED THAT ESTER AND AMINE SALT FORMS OF 2,4-D HAVE SIMILAR SOIL BREAKDOWN RATES BECAUSE THEY ARE CONVERTED RAPIDLY TO THE SAME ANIONIC FORM
SHOULD THESE PRODUCTS BE BANNED?

• RETAINING 2,4-D AND THE PHENOXY HERBICIDES FOR BROADLEAF WEED CONTROL IS CRITICAL TO ENSURE THAT APPLICATORS WILL HAVE A WIDE ARRAY OF CHOICES FOR MANAGING QUALITY TURF.

• ELIMINATING 2,4-D OR AN ENTIRE CLASS OF HERBICIDES WILL SEVERELY LIMIT THE ALTERNATIVES THAT ARE AVAILABLE TO A BROAD RANGE OF END-USERS.
WHAT SHOULD OCCUR

• EDUCATION
• CONVERSATION
• WATCH FOR THE LABEL CHANGES