TYPES OF HERBICIDES

IMPROVE THE EFFECTIVENESS OF WEED CONTROL PROGRAMS BY UNDERSTANDING TYPES OF HERBICIDES

By Dr. Michael Pfeiffer

PREEMERGENCE HERBICIDES

Herbicides which are applied to soil and prevent weeds from emerging or disrupt plant tissues sufficiently to kill seedlings after they emerge. To be effective, preemergence herbicides need to be applied before germination of the weed seed and moved with rainfall or irrigation to the depth where seeds germinate (incorporation). The period that preemergence herbicides can remain on the soil surface before incorporation and still remain active varies. Check the label - know the herbicide. Preemergence herbicides will not control established weeds but Dimension and Prograss have some postemergence activity on very young grasses. A knowledge of when specific weeds germinate is a must for effective weed control using these herbicides. Thorough coverage is necessary and soil should not be disturbed after preemergence herbicides are applied as weeds will emerge in these areas. Length of control with preemergence herbicides decreases with increases in rainfall, irrigation, organic matter content and clay content. Preemergence herbicide may be “selective” or “nonselective” with respect to types of plants controlled.

EXAMPLES: Barricade, Bensulide, Dacthal, Gallery, Ronstar, Surflan and Treflan.

POST EMERGENCE HERBICIDES

Herbicides which are applied to foliage after weeds emerged from soil. Herbicide uptake is from foliage or in some cases roots. Post emergence herbicides may either be selective or nonselective based on: rate used, characteristics of the active ingredient, plant species or cultivar. Thorough coverage of plant foliage is necessary for good herbicide performance. Spray adjuvants such as surfactants, buffers, or fertilizers can influence the effectiveness and relative selectivity of post emergence herbicides.

EXAMPLES: Image, Kerb, Fusilade, Ornamec, Manor, Trimec(s) and Turflon.

SELECTIVE HERBICIDES

Herbicides which are more toxic to some plant species or cultivars than others. 2,4-D can be used to “selectively” remove broadleaf plants from certain established grasses. Tenacity can be used to “selectively” eliminate certain annual grasses and broadleaves in cool season turf. Fusilade or Vantage can be used to remove annual and perennial grasses in certain broadleaf plants. Selective herbicides can be either pre- or post emergence herbicides. Remember, selective is a relative term. Although established broadleaf weeds can be eradicated from desirable grass species by the labeled rate of 2,4-D, many warm season grasses are also injured by the 2,4-D as evidenced by yellowing or necrosis. Many types of cool season turf show good tolerance to Tenacity but bent grass is severely injured or killed. Both Fusilade and Vantage are termed selective grass herbicides but will damage some species or cultivars of broadleaf plants. Factors which affect the relative selectivity of herbicides include: rate of herbicide, growth stage of, and environmental stress on the desirable crop. Edaphic (soil) characteristics and spray adjuvants can also influence selectivity of herbicides.

EXAMPLES: 2,4-D and similar compounds, Gallery, Fusilade Lontrel, Monument and Pendulum.

NONSELECTIVE HERBICIDES

Herbicides which injure or eradicate any and all types of plants. Nonselective herbicides may be either pre- or post emergence herbicides. Some nonselective herbicides such as borates, bromacil or prometon persist for long periods of time in soil and can harm both existing desirable vegetation or new plantings of desirable vegetation from root absorption. Other nonselective herbicides such as Roundup and Reward are “deactivated” by binding tightly to soil particles or organic matter. Once bound to soil particles, these types of nonselective herbicides pose no threat to existing or new plantings. Plants differ in susceptibility to a specific herbicide. Rates used may also determine the relative selectivity in a given
situation. Factors affecting weed control when using nonselective herbicides include: rate of herbicide, coverage, edaphic characteristics, growth stage of the plant, and environmental conditions prior to, during and after application.

**Examples:** Arsenal, Diuron, Hyvar, Oust and Prometon.

**Contact Herbicides**

Herbicides which injure only that portion of the plant which the spray solution contacts. Translocation (movement) within the plant is very limited. Contact herbicides “burn-off” the above ground portion of the weed. These herbicides are most effective against annual weeds and not very effective against established perennial weeds. Spray adjuvants are usually recommended to increase performance of contact herbicides because good coverage of plant foliage is essential for acceptable control.

**Examples:** Finale, Gramoxone, Reward and Scythe

**Systemic (Translocated) Herbicides**

Herbicides which enter plant tissue by either root or shoot absorption and move within the plant in either the phloem (food conducting tissue) or xylem (water conducting tissue). 2,4-D and Roundup are examples of foliar applied herbicides which move primarily via the phloem. Phloem transport results in herbicides being moved from foliage to roots which results in elimination of both roots and shoots. Princep (simazine) is taken up almost exclusively via root uptake and translocated to shoots via the xylem where it inhibits photosynthesis. The roots will die if there is no food production. Systemic herbicides are usually effective against both annual and perennials. If systemic herbicides are applied via plant foliage, spray adjuvants may be needed for effective absorption.

**Examples:** 2,4-D, MCPP, Manage, Roundup, Simazine and Turflon.

**Herbicide Categories Overlap**

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<thead>
<tr>
<th><strong>Reward</strong></th>
<th><strong>Gallery</strong></th>
<th><strong>Roundup</strong></th>
<th><strong>Princep</strong></th>
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<tbody>
<tr>
<td>Post-emergence</td>
<td>Preemergence</td>
<td>Post-Emergence</td>
<td>Preemergence</td>
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<tr>
<td>Nonselective</td>
<td>Selective</td>
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<tr>
<td>Contact</td>
<td>Systemic</td>
<td>*Selective</td>
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* Selectivity based on rate used

**Other Considerations**

When selecting a program for weed control, many factors must be taken into consideration to achieve the desired response.

1. What type of weed is it: Annual, Biennial or Perennial? How does it reproduce: seeds, rhizomes, bulbs, stolons or a combination of methods? Is it a broadleaf, narrowleaf or sedge? When do seeds germinate?

2. If herbicide control is selected: does the herbicide have good activity against the weed(s)?

3. Are other methods of weed control such as cultural or physical control more appropriate or needed to achieve the desired level of control?

4. Will the herbicide leave undesirable residues which can injure succeeding crops or cause damage to desirable vegetation?

5. Are there toxicity problems to humans or other animals associated with the herbicide(s) selected?

6. What spray adjuvants if any and what rates are needed for effective weed control?

7. Will the herbicide damage the desirable crop because of environmental stress or disease stress on the desirable crop or the growth stage of the desirable crop?

If the above questions can not be answered unequivocally, it is time to rethink and re-analyse the situation.

**ALWAYS READ AND THOROUGHLY UNDERSTAND THE PESTICIDE LABEL**

DISCLAIMER: The information in this brief does not in any way replace or supersede the information on the pesticide product labeling or other regulatory requirements. Please refer to the pesticide product labeling.