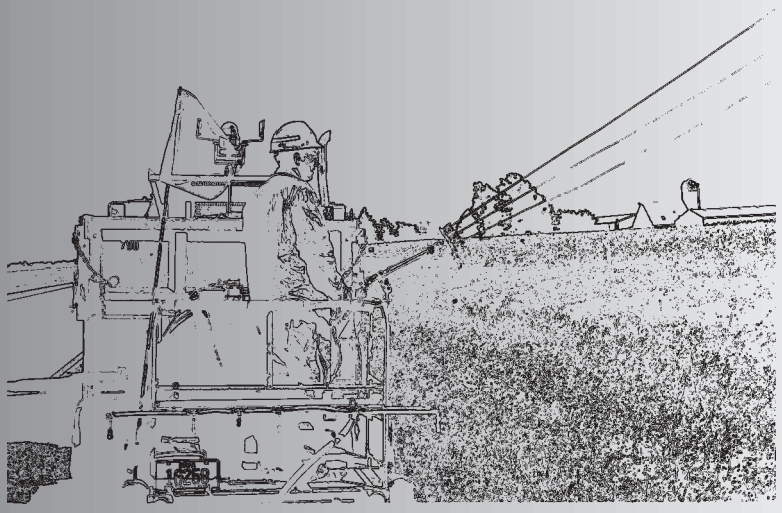
Iowa Commercial Pesticide Applicator Manual

Category

6



Right-of-Way

IOWA STATE UNIVERSITY
University Extension

Ames, Iowa

CS-18 Revised March 2000

File: Pest Management 7-1

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…and justice for all
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Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

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Right-of-Way

Category 6

Prepared by Bob Hartzler, extension weed specialist

This manual is for individuals planning to become certified in commercial pesticide applicator Category 6, Right-of-Way Pest Control. This manual will supplement the general information in the *Iowa Core Manual*, *Apply Pesticides Correctly*, IC-445, and should not be used for certification preparation without reference to the core manual.

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Contents

Introduction

This manual has been prepared to assist persons studying to become certified in Category 6, Right-of-Way Pest Control. A wide variety of weed control situations is encompassed within this category. An applicator trained for Category 6 must be knowledgeable about a large number of herbicides with widely varying characteristics. Right-of-way management often involves the application of herbicides directly adjacent to privately owned land. An applicator is responsible for any damage to private or public property resulting from careless application or misuse of herbicides. After completing the training required for certification in Category 6, a person should be able to select and apply a herbicide treatment that will provide effective weed control with minimal risk of damage to nearby plants or the environment.

This manual will discuss the various management strategies used in right-of-way weed control. The major characteristics of the herbicides most commonly used in these situations will be described. More detailed information regarding these topics can be obtained through your local extension office and pesticide dealers and manufacturers.

Roadside management objectives

Due to reduced budgets and increased environmental awareness, the objectives of roadside management have changed dramatically. In the past, a high level of management typically was practiced to maintain a well-groomed, uniform stand of turf. Regular mowing, along with broadcast applications of broadleaf herbicides, was used to maintain this neat appearance. In most situations, it is no longer considered necessary to maintain this "front yard" appearance. A mixed vegetation is more desirable for wildlife and often provides additional color while broadleaf plants are in bloom.

The current goal of many roadside management programs is to control only those plants listed as noxious weeds or plants that interfere with the vision of motorists, inhibit the flow of water through drainage ditches, pose a fire hazard, or interfere with activities of humans in other manners. Spot treatments of problem areas, rather than broadcast applications, are commonly used along roadsides. Procedures that maintain a healthy, competitive stand of turf are also important aspects of roadside management. Fertilization, reseeding, and mowing can reduce the number of weeds that invade the roadside.

Many Iowa counties are using a mixture of native prairie grasses and wildflowers to achieve these new objectives. Once the prairie vegetation is established, counties integrate several different management techniques to maintain a strong, healthy plant community. Techniques include spot spraying perennial weeds, mowing of annual and biennial weeds to control seed production, and periodic burning to recycle nutrients and increase plant diversity.

Weed management strategies

Selective broadleaf weed control

The most commonly used herbicides for roadsides are postemergence chemicals that selectively control herbaceous, broadleaf plants without injuring grasses.

A large number of herbicides is registered for this use; the majority of these products are either growth regulator herbicides or ALS-inhibiting herbicides (see below). These herbicides are classified according to their mode of action, or how they kill plants.

Growth regulator herbicides include the phenoxy products (2,4-D; 2,4-DP; and MCPP), dicamba (Banvel), triclopyr (Garlon), picloram (Tordon) and clopyralid (Stinger). To broaden the spectrum of control, these herbicides are often tank-mixed or formulated as products that contain more than one active ingredient (e.g., Crossbow is a combination of 2,4-D and triclopyr). The specific combination of herbicides used should be based upon the weeds present, rather than indiscriminately adding herbicides to the spray tank.

Growth regulator herbicides have several similar characteristics. Most of these herbicides are rapidly degraded in the soil; thus, they provide little residual control. Only weeds that are established at the time of application will be controlled. All of the growth regulator herbicides are translocated within the plant, making them effective for both annual and perennial weeds.

A second class of herbicides used for selective weed control in roadsides is the ALS-inhibitors. ALS is an enzyme involved in the synthesis of specific amino acids in plants. Sulfometuron methyl (Oust) and chlorsulfuron (Telar) are the most common ALS-inhibitors used on roadsides for broadleaf control. Certain perennial grasses, including tall fescue and smooth brome, have a relatively low tolerance to these chemicals and may be injured under certain conditions. Label rates for selective control must be followed closely to avoid damaging these grasses. Both Oust and Telar have a long soil persistence and will provide both preemergence and postemergence control of many annual and perennial weeds. They are often tank-mixed with growth regulator herbicides to control a wider variety of species.

Plateau is another ALS-inhibitor that can be used for control of broadleaf weeds on roadsides and other noncrop areas. Plateau is unique in that it is safe on many native grass and wildflower species, and thus can be used for renovation and restoration of native grasses and prairie. Use rates are dependent upon the desirable species present in the target area.

The performance of these herbicides can be improved by scheduling applications during periods when weeds are most susceptible. The best time for application varies according to the biology of the weed. Generally, herbicides are most effective when applied to actively growing plants. Applications should be avoided during hot, dry periods of midsummer.

Annual weeds, such as velvetleaf and pigweed, are easiest to control early in the spring while they are still small. Musk

thistle, common mullen, and other biennials should be treated in the fall or early spring while they are in the rosette stage. Biennials become fairly tolerant to most herbicides once the flower stalk begins to elongate.

Proper timing is especially critical to obtain effective control of perennial weeds. Optimum control of perennials, such as Canada thistle and field bindweed, can often be achieved with applications made while the plant is in early bloom. Two applications of a herbicide may be required to provide effective control of some perennials.

The ability of the phenoxy and other selective herbicides to selectively control broadleaf weeds in grass areas makes them especially useful along roadsides. However, these herbicides can cause severe injury to nearby nontarget plants if applied carelessly. Precautions must be taken to prevent physical drift or volatilization from carrying the herbicide off the target site.

Woody vegetation control

Controlling undesirable woody vegetation is another important aspect of roadside maintenance. A variety of application techniques can be used in controlling woody plants. The technique used should be selected after evaluating the species to be controlled, the site of application, and the susceptibility of nearby desirable plants to the herbicide.

Foliar sprays

Foliar applications should be made when leaves are fully expanded in the spring until fall color develops. Avoid applications during midsummer. Many growth regulator herbicides previously discussed are effective against woody species.

Krenite is an alternative to the growth regulator herbicides for foliar applications. Krenite should be applied in late summer or early fall prior to development of fall color. Little effect will be seen the year of application. The following spring, however, treated plants will fail to leaf out. Total coverage of the plant foliage is essential for effective control.

Although foliar sprays are widely used for controlling woody species, there are several disadvantages with this application technique. To achieve sufficient coverage of the plant foliage for effective control, large volumes of carrier are required. The high pressures frequently required for foliar application can result in considerable herbicide drift. Finally, foliar-applied herbicides often are the least effective type of treatment on resprouting species.

Basal bark applications

Basal bark sprays can be very effective on difficult-to-control species. With this type of application, the spray is directed to contact only the lower portion of the stem. The spray should saturate the lower 18 inches of the trunk and crown. To obtain effective penetration of the bark, oil soluble herbicides are applied using diesel oil or kerosene as a carrier. Diesel oil and kerosene can only be added if allowed as the diluent on the pesticide product label. Basal bark applications are generally effective on woody species up to 6 inches in diameter. Applications can be made throughout the year, but avoid applications when the bark is wet. This type of application reduces the amount of carrier required and greatly reduces the risk of drift.

Frill and cut-surface applications

Frill and cut-surface treatments have the same advantages as basal bark applications, but are effective on larger trees. With trees larger than 6 inches in diameter, the bark is frequently too thick to allow effective penetration of a herbicide. Frill or injection application requires mechanical disruption of the bark. A water-soluble herbicide is applied directly to the sapwood of the tree following cutting of the bark. The same herbicides used for frill treatments also can be applied to the stumps of cut trees to prevent resprouting. Best results are obtained when applications are made within a few hours of cutting. Several products are available in formulations that do not require dilution for cut-surface treatments.

Soil applications

Certain herbicides for woody vegetation control are intended to be applied to the soil. Pelleted formulations are often favored for soil applications due to convenience. These materials need to be accurately measured to avoid overapplication.

Hyvar and Spike are the most commonly used soil-applied brush herbicides. These chemicals are persistent and will remain active in the soil for several months. They should not be used in areas where the roots of sensitive, desirable plants are located. To prevent injury to nontarget plants, these persistent materials should not be applied within an area equivalent to twice the desirable tree's height (Figure 1). Extra precautions are needed when applying Tordon. Picloram, the active ingredient in Tordon products, is highly water soluble and is not readily bound to the soil particles. These properties allow Tordon to move freely downhill from the site of application with runoff water. Tordon should not be used in areas where it might move into contact with sensitive plants. All formulations of Tordon, except Tordon RTU, are restricted-use products due to the risk of injury to nontarget plants.

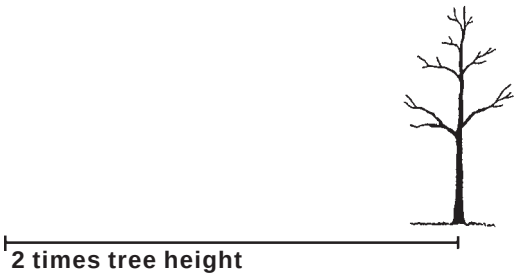

Figure 1. Do not apply persistent herbcides within an area twice the desirable tree's height.

Short-term total vegetation control

In certain situations it is desirable to control all the vegetation in an area. Nonselective herbicides are often used to eliminate the need for trimming around signs, light poles, and guard rails. The characteristics of these chemicals vary widely—select the herbicide that best fits the need of a specific situation.

Paraquat (Gramoxone Extra) is a nonselective contact herbicide. Thorough coverage of the plant foliage is required for effective control. Most perennial plants will quickly resume growth because paraquat does not translocate and kill the perennial's root system. Paraquat is rapidly inactivated by soil and will not provide any residual control. Paraquat is a restricted-use pesticide and should be used with appropriate caution.

Glyphosate (Roundup Ultra/Touchdown) is similar to paraquat in that it will provide complete burndown of all vegetation with no residual control. Glyphosate, however, is translocated within plants and will effectively control many perennial plants.

Velpar or Arsenal can be used in areas where it is desirable to prevent plants from quickly invading the treated area. These products combine the characteristics of a nonselective burndown herbicide and a preemergence herbicide. The length of control provided will vary with application rate, soil type, and climatic conditions, but will normally range from 1 to 6 months.

Long-term total vegetation control

Herbicides used to maintain bare ground areas are frequently called soil sterilants. Soil sterilants are often used in storage yards, parking lots, along pipelines, and in other areas where it is desirable to completely eliminate plant growth. Herbicides used for this purpose have a long persistence and relatively little mobility in the soil. It may be necessary to use a combination of products to control all species of weeds present. If a single product is used continually over a period of years, plants that are tolerant of that herbicide are likely to move into the treated area.

Before using any soil sterilant, it is essential to carefully evaluate the site. Due to the nature of these herbicides, the use of a soil sterilant in an inappropriate area can cause disastrous results. Soil sterilants should not be used on areas that are susceptible to erosion. Because treated areas will be free of vegetation, severe erosion may occur even on fairly level ground. Soil sterilants should not be used in areas adjacent to desirable trees or shrubs. Follow the same guidelines recommended for the soil-applied brush herbicides when applying soil sterilants.

In certain instances it may be possible to limit the damage caused by misapplication of a soil sterilant. It is especially important to take action as quickly as possible; delaying action will greatly reduce the effectiveness of cleanup. If the mistake is discovered before rain moves the herbicide into the soil, the chemical can be eliminated by removing the first inch of soil. If significant rain has occurred, more soil will need to be removed.

An alternative method is to mix activated charcoal into the soil. Herbicides are tightly bound to the charcoal, making them unavailable to plants. To be effective, the charcoal must be thoroughly mixed in the soil to the depth that the herbicide has moved. Approximately 3 pounds of activated charcoal per 1,000 square feet will be required for every pound of herbicide (active ingredient) per acre.

If a desirable tree has roots extending into a treated area, damage to the tree can be limited by severing the roots that are in contact with the herbicide. A trencher can be used to cut the roots; the trench should be made at least a foot from the treated area. A barrier should be placed in the trench to prevent new roots from growing into the contaminated soil.

Growth regulators

Growth regulators may be used on turf areas to reduce the grass height, suppress seedhead development, or reduce mowing requirements. Their use should be limited to areas of low-to-medium-maintenance turf that receive low levels of foot or vehicular traffic. Growth regulators may reduce the competitiveness of a turf stand, thus allowing weeds to become a more serious problem than in untreated areas.

Proper timing of application is important when using a growth regulator. Best results are obtained with early spring applications made following greening of the sod. The effectiveness of these products varies widely depending on the grass species. Consult the product label to determine if the material is intended for use on the specific grass found in the area to be treated.

Integrated roadside vegetation management

Over the past several years a new approach to county roadside management has been developed. The program is called Integrated Roadside Vegetation Management (IRVM). Counties across Iowa are considering the integrated approach to roadside management on their secondary roads.

The objective of IRVM is to establish and maintain a safe, stable, low-maintenance roadside that is healthy and attractive for humans and wildlife. Driver and vehicular safety is an important consideration when choosing and using various roadside management techniques and vegetative covers.

Stability is attained through the use of a vegetative roadside cover that will not weaken and die back over an extended period of time. By using prairies as the model, county roadside managers (CRMs) mimic the durable, diverse prairie plant community that has existed in Iowa for thousands of years and restore this vegetative community in rural roadsides. If the site will not tolerate tall prairie grasses and wildflowers, CRMs may substitute medium or short non-native grasses and legumes better suited for that specific roadside area. Along with the use of native and non-native grasses and wildflowers, CRMs are integrating several different vegetation management techniques. In addition to the traditional use of herbicides and mowing, CRMs also employ nontraditional methods to invigorate and sustain the vegetative cover. Burning is one such method. During the early spring CRMs will select several sites to conduct a planned or prescribed burn. A properly timed burn will retard the growth of many invading weeds and invigorate the existing prairie plants. Due to the tall, dense growth of native prairie grasses, invading weeds are overshadowed, stunted, and slowly pushed out of existence.

In some cases a patch of noxious weeds may dominate a site. Integrating several vegetation management techniques, such as frequent mowing followed by a spot herbicide application in the fall, a spring burn followed by several mowings, or three spot herbicide applications 30 days apart followed by a spring burn, may be

necessary to obtain adequate weed control. A follow-up reseeding of desirable vegetation will be necessary to establish a stable vegetative cover.

In addition to stability, the IRVM program wants a roadside that is low maintenance. Limited maintenance, except for driver safety, should be necessary once good vegetative cover is established and disturbances (such as soil deposition, herbicide drift from adjacent fields, or refuse dumping) are controlled. Another important facet of IRVM is landowner cooperation. The majority of rural roadsides in Iowa lie adjacent to cropland. Farmers are concerned about weed control. They view roadside weeds as a potential weed source for their fields. CRMs, working together with farmers, will improve the appearance and stability of roadsides across the country.

Integrated Roadside Vegetation Management translates into blending safe, timely vegetative management techniques with the optimal vegetative cover on rural roadsides.

Preventing damage to nontarget plants

Due to the nature of the herbicides used in right-of-way management, there is a high risk of injury to valuable plants growing adjacent to treated areas. The applicator is legally responsible for any damage caused by careless spraying. The majority of problems encountered in right-of-way spraying involve the phenoxy or similar herbicides. These herbicides are especially prone to damaging nontarget plants because they are injurious to plants at extremely low rates.

Understanding the factors that affect herbicide movement can help the applicator reduce the risk of injury to nontarget plants. The two principal mechanisms by which a herbicide moves off-target are drift and volatilization. Herbicides also may move off-target in runoff water or be carried away with eroded sediment.

Drift

Drift is the physical movement of spray droplets from the target site. The two primary factors that affect the amount of drift are spray droplet size and wind speed. An applicator can minimize levels of drift by carefully selecting and operating spray equipment and continually monitoring wind conditions. The distance a spray droplet travels laterally dramatically increases as wind speed increases. A spray applicator needs to pay special attention to the spray pattern and to nontarget vegetation downwind of the sprayer whenever wind speeds reach 5 miles per hour or more. Most spray operations should be terminated when winds exceed 10 miles per hour.

The size of spray droplets produced by a sprayer is the second major factor affecting the distance a herbicide will drift. As droplet size decreases, the distance a droplet will travel off-target increases (Table 1). Spray droplet size can be controlled by proper selection and operation of spray equipment. Selecting a nozzle that produces an appropriate range of droplet sizes is an important step in a safe spraying operation. Several nozzle types have been designed specifically for the strict requirements of roadside spraying. The size of droplets and

spray pattern produced by a specific nozzle are dependent upon the pressure at which it is operated. As spray pressure is increased, the range of droplet sizes produced will shift towards smaller droplets. The risk of drift injury can be reduced by operating a sprayer at a relatively low pressure. Always operate the sprayer within the nozzle manufacturer's recommended pressure range to maintain a proper spray pattern.

Off-target movement of a herbicide can normally be maintained at an acceptable level by controlling droplet size and monitoring wind conditions. Occasionally, further precautions may be required to prevent the occurrence of drift. Drift retardants that are added to the spray tank can reduce the formation of small spray droplets. Another method of reducing drift is the use of invert emulsions instead of using water for the carrier. An invert emulsion is a thick mixture of oil and water that has the consistency of mayonnaise. The thickness of the spray dramatically reduces the formation of small spray droplets. Specialized spray equipment is required to handle an invert emulsion; conventional equipment cannot be used with these materials. These products should be used in conjunction with other responsible spray procedures. Their use will not compensate for negligent operation techniques.

Volatilization

Volatilization is a second process that may result in movement of a herbicide from the target site. Volatilization, also known as vapor drift, is due to evaporation of the herbicide after it impinges on the soil or plant. Only herbicides that have a relatively high vapor pressure are susceptible to this phenomenon. The amount of volatilization is directly related to air temperature. Herbicides that have a high vapor pressure are susceptible to vapor drift whenever temperatures exceed 85°F. Volatilization can be minimized by scheduling applications during times of the year when high temperatures are uncommon.

Herbicides that are prone to volatilization include the phenoxy herbicides and dicamba. The volatility of the phenoxy herbicides can be reduced by altering the formulation of the herbicide. Most phenoxy herbicides are available as either ester or amine products. Although the ester products often may be more effective on difficult-to-control weeds, ester formulations are more volatile than amine formulations. Amine or low-volatile ester products should always be used whenever temperatures exceed 85°F.

Dicamba (Banvel) is especially prone to volatilization and special care should be taken whenever applying products containing dicamba. Clarity and Vanquish contain the diglycolamine (DGA) salt of dicamba. This formulation has a lower vapor pressure than the dimethylamine (DMA) salt present in Banvel, and therefore reduces the potential for volatilization. Soybeans are particularily sensitive to dicamba, thus care needs to be taken when using any of these materials adjacent to soybean fields.

Herbicide runoff

Herbicides also may move from the treated area in surface water runoff or in sediment. The potential for herbicide loss is determined by many factors, including rainfall events, amount ap-

plied, and the persistence, solubility, and soil absorption characteristics of the herbicide. Herbicides that leave the target area in runoff may damage susceptible plants in areas where the water drains, or they may move into water resources (streams, rivers, lakes, etc.).

Generally, the more water movement over the treated area, the greater the likelihood of significant off-target movement. Herbicides are most vulnerable to runoff during the first rainfall event after application. If the first rainfall event is a gentle rain that infiltrates the soil with little runoff, most of the herbicide will be moved into the soil profile where it is less prone to lateral movement. However, if the first rainfall results in runoff, significant herbicide losses may occur. The potential for herbicide movement is greatest in areas with no vegetation to slow water movement and prevent soil erosion. Nonselective herbicides with a long soil residual should not be used in areas prone to surface water movement because of runoff risk.

The chemical characteristics of a herbicide influence the potential for surface runoff losses. Herbicides with a long residual are most susceptible because they remain in the environment for a longer period. Most soil-applied herbicides bind tightly with soil colloids, thus there is limited lateral movement of these chemicals if soil erosion is minimized. Herbicides with low soil adsorption and high water solubilities (e.g., Tordon) can move from treated areas in surface runoff in the absence of soil erosion. These products should not be used in sloped areas that may experience surface runoff, even if dense vegetation is present to eliminate erosion, because they may move with runoff water.

Summary

Safe and effective management of right-of-way areas can be obtained through careful planning and proper selection and application of herbicides. A combination of cultural, mechanical, and chemical weed control practices often will provide the best results. A certified applicator must keep up-to-date with continually changing herbicide labels. It is the applicator's responsibility to read the pesticide label and use the product only as specified on the label. A herbicide should only be used on those sites specifically mentioned on the label. Before purchasing any product, determine if it is labeled for use on the specific areas to be treated.

Table 1. Effect of spray droplet size on spray drift

Droplet diameter (μm)	Time required to fall 10 ft in still air	Distance droplet travels in falling 10 ft in a 5-mph wind
10	17 min	7,480 ft
100	11 sec	77 ft
200	4 sec	30 ft
400	2 sec	15 ft
1,000	1 sec	7 ft

Herbicides for Woody Vegetation Control

Tradesman	Active Ingredient(s)	Site			Application method				Mode of action[1]
		Pasture	Right-of-way	Non-cropland	Foliar	Cut-surface	Basal bark	Soil application	
2,4-D (many tradenames)	2,4-D	X	X	X	X	X	X	X	GR
Ally, Escort	metsulfuron	X[2]	X	X	X		X		ALS
Arsenal	imazapyr		X	X	X	X			ALS
Banvel	dicamba	X	X	X	X	X	X		GR
Crossbow	triclopyr + 2,4-D	X	X	X	X		X		GR
Hyvar-X	bromacil		X	X			X	X	PSI
Krenite	fosamine		X	X	X				UNK
Pathfinder II	triclopyr	X	X	X		X	X		GR
Pathway	picloram + 2,4-D		X	X		X			GR
Roundup	glyphosate	X	X	X	X	X			ESPS
Spike	tebuthiuron	X	X	X	X			X	PSI
Stalker	imazapyr		X	X		X	X		ALS
Tordon 22K	picloram	X	X	X	X			X	GR
Tordon 101	picloram + 2,4-D		X	X	X	X			GR
Tordon RTU	picloram + 2,4-D		X	X		X			GR
Vanquish	dicamba		X	X	X	X			GR
Velpar	hexazinone	X	X	X	X			X	PSI
Weedmaster	dicamba + 2,4-D	X	X	X	X	X	X		GR
Weedone 170	2,4-DP + 2,4-D		X	X	X	X	X	X	GR

[1] Mode of action: GR, growth regulator; ALS, inhibitor of acetolactate syntase; PSI, inhibitor of photosynthesis; UNK, mode of action unknown.

[2] Ally is cleared for use in pastures.

	Comments
2,4-D; 2,4-DP	The phenoxy herbicides are sold under many tradenames and also are present in many prepackage mixes. Dichlorprop (2,4-DP) is more effective on many woody species than 2,4-D.
dicamba	Vanquish is less volatile than Banvel, reducing the risk of off-target movement.
triclopyr	Triclopyr is less persistent than picloram. Crossbow, a premix of triclopyr and 2,4-D, is cleared for use in pastures. Pathfinder II is formulated for basal-bark and cut-surface treatments.
picloram	Picloram is persistent and mobile in the soil. All products containing picloram are restricted use products, except for Tordon RTU. Tordon RTU is a mix of picloram and 2,4-D designed for cut-surface treatments.
imazapyr	Arsenal and Stalker are intended for general noncropland use, whereas Contain is registered for farmstead noncropland use. Stalker is cleared for basal-bark and cut-surface treatments.
metsulfuron	Escort is intended for industrial use, whereas Ally is registered for pastures. Metsulfuron is effective on multiflora rose and blackberry.
glyphosate	Roundup Pro is for noncropland and forestry use. Accord is for use in forestry and utility right-of-ways, whereas Rodeo is for aquatic use.
fosamine	Krenite is applied in late summer to woody species and prevents leafing out the next spring. It is often used in areas where the appearance of dieing trees is undesirable. Complete coverage of tree is required for total kill.
tebuthiuron	Spike is available as a wettable powder or a pellet formulation for direct application to soil. Spike 20P is cleared for use in pastures. Tebuthiuron is persistent; do not apply in the vicinity of desirable trees.

Herbicides for Nonselective Weed Control

Common Names	Trade Names	Approximate Length of Control*	Comments
bromacil	Hyvar, Krovar	1–2 years	Bromacil is sold in combination with diuron as Krovar. Hyvar is relatively mobile in the soil.
dichlobenil	Casoron, Norosac, Barrier	1–3 months	Dichlobenil must be applied during cool temperatures or be incorporated to reduce volatilization losses. May be used safely around many ornamentals.
diuron	Karmex, Krovar, Sahara	1–2 years	Krovar is a premix of diuron and bromacil; Sahara is a combination of diuron and imazapyr. The combination products will prove broader spectrum control than a single active ingredient product.
glyphosate	Roundup Pro, Accord	No residual	Roundup is effective against most annuals and perennials.
hexazinone	Velpar	1–3 months	Will provide good burndown of existing foliage.
imazapyr	Arsenal, Contain, Sahara	2–6 months	Provides good control of difficult-to-control weeds such as bindweed. Apply as foliar spray. Sahara is a premix of imazapyr and diuron.

Herbicides for Nonselective Weed Control (continued)

Common Names	Trade Names	Approximate Length of Control*	Comments
paraquat	Gramoxone Extra	No residual	Paraquat is a contact herbicide and ineffective on most perennials. Restricted-use pesticide.
prometon	Pramitol	1–2 years	Apply prior to weed emergence or to small, actively growing weeds for best results.
sulfometuron	Oust	3–24 months	Use in combination with other residual herbicides for improved control.
tebuthiuron	Spike	1–2 years	Use in combination with Treflan for improved grass control.

*Length of control will vary widely depending upon rate applied, soil texture, and climatic conditions.

Before Using Any Pesticide

STOP

READ THE LABEL

All pesticides can be harmful to health and environment if misused.

Read the label carefully and use only as directed.