

Manitoba Agriculture, Food and Rural Initiatives

Weed Control for Non-Crop Areas

Including:

- **Aquatic Weeds**
- **Total Vegetation Control**
- **Rights-of-way, Roadsides,
Industrial Sites, Storage Areas**



2006 Revised Edition



Manitoba

CONTACTS:

Manitoba Agriculture, Food and Rural Initiatives

Manitoba Weed Supervisors Association - For contact information please go to their website at

<http://www.gov.mb.ca/agriculture/contact/weeddistricts/>

CENTRAL PLAINS GO TEAM	
Carberry	834-8815
Gladstone	385-6633
Portage la Prairie	239-3352
Treherne	723-3232
EASTMAN GO TEAM	
Beausejour	268-6094
Dominion City	427-2950
St. Pierre	433-7749
Steinbach	346-6080
Vita	425-5050
NORTH INTERLAKE GO TEAM	
Arborg	376-3300
Ashern	768-2782
Fisher Branch	372-6526
Lundar	762-5649
NORTH PARKLAND GO TEAM	
Dauphin	622-2042
Ethelbert	742-4060
Roblin	937-6460
Ste Rose	447-4032
PEMBINA GO TEAM	
Killarney	523-5260
Pilot Mound	825-3512
Somerset	744-4050
RED RIVER GO TEAM	
Altona	324-2804
Carman	745-5610
Morden	822-5461
Morris	746-2312
Starbuck	735-4080

SOUTH INTERLAKE GO TEAM	
Dugald	853-5170
Selkirk	785-5035
Stonewall	467-4700
Teulon	886-2696
SOUTH PARKLAND GO TEAM	
Birtle	
Hamiota	764-3010
Minnedosa	867-6572
Neepawa	476-7020
Russell	773-5130
Shoal Lake	759-4050
SOUTHWEST GO TEAM	
Boissevain	534-2010
Brandon	726-6482
Melita	522-3256
Souris	483-2153
Viriden	748-4770
URBAN GO TEAM	
Winnipeg	945-4521
VALLEYS NORTH GO TEAM	
Swan River	734-3417
The Pas	627-8255
CROPS KNOWLEDGE CENTER	
Pesticide Licensing Coordinator	945-7706
Crop Diagnostic Specialist	945-7707
Plant Pathologist	745-5694
Entomologist	745-5669
Crop Nutrition	745-5644
Weeds	745-5651

Crop Protection Companies

BASF Canada Inc 1-877-371-2273
 Bayer 1-888-283-6847
 Dow AgroSciences Canada Inc 1-800-667-3852
 DuPont Canada Inc 1-800-667-3925
 Ecoval Inc 1-866-298-2229
 Enviro-Science Laboratories 1-800-267-1191

Interprovincial Co-operative 1-204-233-3461
 Monsanto Canada Inc 1-800-667-4944
 Nufarm 1-800-868-5444
 Syngenta 1-877-964-3682
 True North Specialty Products 1-877-248-3338
 United Agri Products 1-800-561-5444

Emergency Numbers

Poison Control Centre
1-204-787-2591

Pesticide Spill Line
1-204-945-4888

Introduction/Disclaimer

This publication is intended to be used as a guide only. Information contained herein is that available at time of printing. While every effort has been made to ensure accuracy, Manitoba Agriculture, Food and Rural Initiatives does not accept responsibility for label changes. When more than one trade name is listed, not all pests may appear on all labels.

This publication is only a guide. Always refer to the product label for application details and precautions.

Certain recommendations in this publication are given in quantity of commercial product per acre (mL, L, g or kg/acre). Product labels are given in quantity of product per hectare (mL, L, g or kg/ha). To avoid application errors be sure to read and understand label recommendations.

The guide *Weed Control for Non-Crop Areas* includes the most recent recommendations for non-crop areas such as rights-of-way, industrial sites, utility lines and others. The guide concentrates on two main areas:

- Non-Crop Areas
 - Selective Herbicides
 - Non-Selective Herbicides (Total Vegetation Control)
- Aquatic Weeds

For landscape areas refer to the guide *Weed Control in Landscape and Turf Areas*. For herbicides registered for use in shelterbelts, see the *Guide to Crop Protection*.

These recommendations are based on the uses registered under the federal *Pest Control Products Act* which is administered by the Pest Management Regulatory Agency (PMRA), Health Canada. It is an offence under *The Pest Control Products Act* to apply any chemical in a manner not consistent with the product label. If you have any doubts regarding the instructions in this publication or on the product label, contact the company representative, the local PMRA office, local weed supervisor or your local Manitoba Agriculture, Food and Rural Initiatives GO office for further advice.

**These recommendations are intended for commercial applicators.
Do not use this guide to make recommendations for the home garden.
The recommendations in this guide are for Manitoba conditions only.**

Table of Contents

Pesticide Information

Herbicides for Use in Non-Crop Areas	1
IPM for Weed Control in Non-Crop Areas	1
Selective Herbicides for Use in Non-Crop Areas	1
Herbicides for Use in Aquatic Areas	2
Herbicides for Total Vegetation Control in Non-Crop Areas	3
Pesticide Use Permits	4
Pesticide Safety.....	5
Protecting Yourself from Exposure	6
Sprayer Calibrations	10
Avoiding Spray Drift	13
Handling a Drift Complaint	14
How to Identify Weed Leaf Stages.....	15

Herbicide Labels

2,4-D	20
Amitrol 240.....	21
Arsenal.....	23
Calmix Pellets.....	24
Dichlorprop + 2,4-D	25
Diurex	26
DyVel DS.....	27
Ecoclear	28
Escort	29
EZJECT Herbicide Capsules	30
Garlon 4	31
Glyphosate	32
Gramoxone	37
Hyvar X-L.....	38
Karmex DF	39
Krovar 1	40
MCPA Ester 500.....	41
MCPA Ester 600.....	42
Milestone – Aminopyralid Herbicide	43
Reglone Desiccant, Reward.....	45
Simazine 480, Simadex 500	46
Telar	47
Think Purity Algaecide Solution.....	48
Tordon 22K.....	49
Tordon 101.....	50
Transline	51
Vaquish.....	52

Herbicides for Use in Non-Crop Areas

Vegetation on non-crop areas such as rights-of-way, road sides, storage areas, public works yards, parking lots and transmission lines can create problems ranging from creating fire hazards, reducing drainage, reducing accessibility and visibility to snow blockage. Weed control in such areas can control these problems and give a well-kept appearance to the area. Weeds can be controlled by cultural methods like mowing or cultivation in combination with herbicide use.

For total vegetation control, non-selective post-emergent herbicides can be used after weed emergence and, in some situations, soil sterilants can be used for long-term vegetation control. For areas where total weed control is not necessary or desirable, a number of herbicides are available for control of broadleaf or grassy weeds in non-crop areas.

Select a herbicide only after considering the weeds to be controlled, restrictions on use of treated area, precautions given on the label, potential damage to adjacent areas and public concern. See Tables 1, 2 & 3 for herbicides that can be used to control weeds in non-crop areas. For landscape areas see the guide *Weed Control in Landscape and Turf Areas*. For herbicides registered for use in shelterbelts, see *The Guide to Crop Protection*.

IPM for Weed Control in Non-Crop Areas

Integrated Pest Management (IPM) is an approach to controlling pests that use a combination of techniques in an organized program to suppress pests effectively, economically and in an environmentally sound manner. In an IPM program, pest managers use regular inspections (monitoring) to collect information they need to make treatment decisions. The central idea in IPM is that pesticide application is only used when pest numbers justify it, not as a routine measure. This eliminates unnecessary pesticide use without sacrificing results. Another important idea in IPM is keeping pest populations at manageable levels as opposed to pest

elimination. If treatment is needed, pest managers choose a combination of methods that suit the site and local conditions.

Developing an IPM program may result in short-term increased cost for initial program setup. However, in the long-term, an IPM program may be more cost effective as it may prevent future problems, improve site quality and reduce pesticide application costs.

A good IPM program may include:

- identifying potential pest problems,
- managing sites to prevent a potential pest(s) from becoming a major problem(s),
- monitoring populations of pests and beneficial organisms, pest damage and environmental conditions,
- using pest injury thresholds to make treatment decisions,
- using a number of strategies including combinations of biological, physical, cultural, mechanical and chemical controls to reduce pest populations to acceptable levels,
- annual evaluations to assess the effectiveness of the program.

IPM also provides a way to manage pesticide resistant pests and control pests in areas where pesticides cannot be used. It is important to realize that IPM programs change and improve as people gain experience and as new tools and information become available.

Selective Herbicides for Use in Non-Crop Areas

Selective herbicides can be used in areas where complete kill of all vegetation is not required or desired. These herbicides generally target broadleaved weeds and some are also registered for control of brush and woody plants. Most herbicides registered for use in non-crop areas will provide a list of specific areas where the herbicide(s) can be applied, (i.e. roadsides, rights-of-way, industrial sites). See label summaries for the products of interest for details on uses and listings of weeds controlled.

Remember that the information in this publication is only a guide. Always read and

follow the information given on the actual product label.

Table 1. Selective Herbicides for Use in Non-Crop Areas

Products	Broadleaf Weed Control			Brush Control
	Roadsides	Rights-of-way	Other sites	
2,4-D	x ¹			x
Diclorprop + 2,4-D	x	x	x ³	x
Dyvel DS	x			
Escort	x	x	x	x
Garlon 4	x	x	x	x
MCPA Ester 500	x		x ²	
MCPA Ester 600	x			
Tordon 22K	x	x	x	
Tordon 101		x		x
Transline	x	x	x	
Vanquish	x	x	x	x

- 1 2,4-D is manufactured by more than one company. Information on the labels may vary with regard to specific uses, weeds controlled, restrictions, etc.
- 2 Vacant lots only.
- 3 Utility lines only.

Herbicides for Use in Aquatic Areas

There are herbicides registered for control of weeds in aquatic areas. An aquatic herbicide can only be applied by a licensed pesticide applicator under a Pesticide Use Permit unless it is applied by a landowner onto a water body which is wholly contained within his/her private property. See section on Pesticide Use Permit on page 4.

Some products can be used in waters that are used for irrigation, consumption, fish farming or swimming. Products used in waters containing fish may cause problems if large amounts of vegetation in the water are killed at once. Oxygen in the water is used up as the killed

vegetation undergoes decomposition and fish may suffocate as a result. For this reason, it may be necessary to remove some of the vegetation by mechanical means prior to application of the herbicide or it may be necessary to treat only a portion of the water at one time. Consult the specific product label for recommendations.

See the individual label summary in this guide for information regarding application, weeds controlled and any restrictions on use of the treated water. Refer to Table 2 for herbicides that can be applied in aquatic areas. **Remember that the information in this publication is only a guide. Always read and follow the information given on the actual product label.**

Table 2. Herbicides for Use in Aquatic Areas

Products listed below are to be used only in the manner authorized; consult Manitoba Conservation about a Pesticide Use Permit, which may be required.

Product	Farm Ponds (fish or irrigation)	Ponds for consumption	Ditches	Ditchbanks	Canals	Dugouts
Amitrol 240				x		
Gramoxone	x ¹	x ¹				
Diurex 80, Karmex DF	x ²		x ²			
Polydex	x	x				X
Reward	x ³	x ³	x ³		x ³	x ³

- 1 Do not use treated water for at least 7 days after treatment for swimming, or human or animal consumption. For irrigation do not use for at least 5 days after treatment.
- 2 If rainfall has not totaled at least 10 cm following treatment and before intended use of irrigation ditch, fill with water and let stand for 72 hours; drain off waste and remaining water before using ditch.
- 3 Allow at least 24 hours after treatment before swimming or allowing animal consumption. Do not use for irrigation or human consumption for at least 5 days after treatment.

Herbicides for Total Vegetation Control in Non-Crop Areas

Non-Selective Post-Emergent Herbicides

Non-selective herbicides will control all plants including grasses and broadleaf weeds when applied according to the label directions. These herbicides are applied after weeds have emerged and used in areas where either residual control is not needed or where soil sterilants cannot be used. When applied to perennial weeds, some products will control only top growth and some will kill the entire plant including the roots. See Table 3 for a list of non-selective post-emergent herbicides. **Remember that the information in this publication is only a guide. Always read and follow the information given on the actual product label.**

Soil Sterilants

Soil sterilants are recommended for complete vegetation control in areas such as industrial sites, hydro yards, storage areas, parking lots, along fence-lines, railway ballasts, power poles and towers. Follow label guidelines carefully. Soil sterilants are residual, can move laterally and are not registered for use in residential areas or on home grounds. Do not apply these products to frozen ground or in any area where contamination of irrigation ditches or water for

consumption could occur and do not clean application equipment where such contamination could occur.

The movement of a soil sterilant downward and laterally will depend on the solubility of the herbicide and its absorption to soil particles. Soil sterilants move deeper in light textured (sandy) soils with low organic matter. The degree of movement also depends on the rate and amount of rainfall after application. Do not apply these products on slopes as surface movement may occur causing damage outside the treated area.

Avoid application of soil sterilants or cleaning of application equipment near desirable trees, in areas where roots of desirable trees may extend or where the chemical may be washed into contact with the roots causing injury. Rainfall is usually required to move the sterilant into the root zone of plants where it is adsorbed. The length of residual control depends upon rainfall, soil type and rate of application.

Soil sterilant is difficult to clean out of application equipment. To prevent tank contamination damage to desirable plants, do not use soil sterilant application equipment to apply other pesticides. See Table 3 for a list of soil sterilant herbicides. **Remember that the information in this publication is only a guide. Always read and follow the information given on the actual product label.**

Table 3. Herbicides for Total Vegetation Control

Products	Non-Selective Post Emergents	Soil Sterilants
Amitrol 240	x	
Arsenal	x	
Calmix Pellets		x
Ecoclear	x	
glyphosate	x	
Gramoxone	x	
Hyvar X-L		x
Karmex DF, Diurex		x
Krovar 1		x
Reglone Desiccant, Reward	x	
Simazine	x ¹	
Telar	x	

¹ also has soil residual activity.

Pesticide Use Permits

Provincial Pesticide Use Permits are required prior to applying pesticides (herbicides, insecticides, fungicides, rodenticides) in the following circumstances:

- Pesticides will be applied to private property which the public may normally use for recreational purposes (i.e. lodges and cottages, subdivisions, parks, campgrounds).
- Pesticides will be applied to public lands on behalf of a government department, CCCrown corporation, school board, rural municipality (i.e. CCCrown lands, rights-of-way, parks, schoolyards, playgrounds).

- Pesticides will be applied on or in a body of water that is not wholly contained within the person's own property.

Information on Pesticide Use Permits and/or permit applications are available from:

Pesticides/Fertilizers Section
Manitoba Conservation
Suite 160, 123 Main Street
Winnipeg, MB R3C 1A5

Contact: Ken Plews (204) 945-7067 or on the Manitoba Government website at:

<http://www.gov.mb.ca/conservation/envapprovals/pesticide/index.html>

Pesticide Safety

The guide *Weed Control for Non-Crop Areas* contains information on personal protection when mixing or applying products. It is important to avoid accidental contamination by wearing protective equipment and frequently laundering clothing worn when handling products.

Safe Use of Herbicides

Herbicides are classified according to the use hazard and risk involved.

The categories of hazard are:

- toxicity
- flammability
- explosive potential
- corrosivity

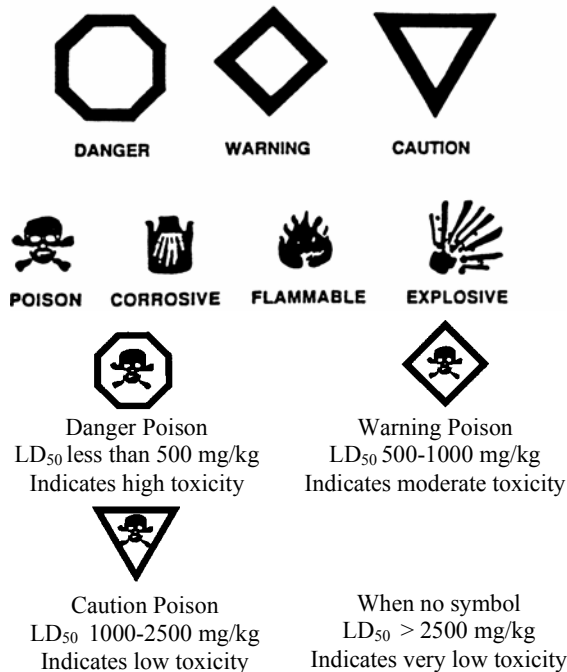
The degree of risk is represented by symbols taken from common traffic sign shapes represented by the stop, caution and yield signs. The signal word for each of the signs is danger (high risk), warning (moderate risk) and caution (low risk). Where the risk is minimal, no designation is required. The label on the container will carry the appropriate signs for the protection of the user. The symbols are illustrated in Figure 1.

LD₅₀ values are used to rate the toxicity of pesticides. The LD₅₀ refers to the dose of pesticide (in mg per kg of the test animal's body weight) that is lethal to 50 percent of the group of test animals. For example, if a pesticide has a LD₅₀ value of 10 mg/kg, and the test animals each weigh 1 kg, then 50 percent of the animals would die if they each ate 10 mg of the pesticide.

Oral LD₅₀ Values as they relate to the Risk/Hazard Symbols

Different types of protective equipment are required for pesticides that differ in toxicity. Special equipment requirements are described

Figure 1. Degree of Risk and Hazard Symbols



on the product label, but in general, the following precautions must be taken when using pesticides of different hazard ratings.

Danger Poison: requires goggles, respirator, gloves and skin protection, avoid fumes and spray mist.

Warning Poison: requires goggles, gloves and skin protection, avoid fumes and spray mist.

Caution Poison: requires gloves and skin protection, avoid fumes and spray mist.

The absence of a hazard symbol on a pesticide label indicates low toxicity to mammals. Nevertheless, protective clothing should be worn when using pesticides that do not have a hazard symbol.

Protecting Yourself from Exposure

The use of protective equipment and sound safety procedures will help minimize your exposure to herbicides, insecticides and fungicides. Follow the 10 rules for safe application listed, and wear the safety equipment recommended.

10 Rules for Safe Application

1. Never smoke or eat while applying pesticides.
2. Avoid inhaling sprays or dusts. Wear protective clothing and a respirator.
3. Sprayer lines carrying chemicals should not enter the operator's cab.
4. Have soap, water and a towel available. Should concentrated product spill on skin, hands, face or eyes, wash immediately.
5. Wash hands and face when leaving the treated area, before break periods, lunch or urination.
6. Bathe or shower and change to clean clothing after working with pesticides. Wash clothing each day before re-use.
7. Call a physician or get the patient to a hospital immediately if symptoms of illness occur during or shortly after pesticide application. Be sure to take along the product label or container.
8. Store pesticides out of reach of children and where there is no chance of contact with human food or livestock feeds. Do not store herbicides with insecticides and avoid cross-contamination. Storage areas should be locked.
9. Keep chemicals in their original containers, never in unmarked containers or bottles used for food or drink.
10. Follow proper container disposal methods. All containers should be triple rinsed or pressure rinsed, punctured to render the container non-reusable, and delivered to designated disposal sites.

Wash contaminated clothes separately – never with a regular family wash.

Protective Clothing

Wear protective equipment as described in the chart to reduce exposure.

Equipment	Protection	How to wear it
Coveralls	<p>There are two types of coveralls: disposable and reusable. Disposable coveralls are lightweight and comfortable on warm days. They can be worn for mixing and applying pesticides, then discarded at the day's end. If they become contaminated, they should be discarded at once.</p> <p>The second type of coveralls is made of washable fabric and may be reused many times. These fabric coveralls are adequate for use with all but the most highly toxic and concentrated pesticides.</p>	<p>Button (or zip) right up to the neck. Loose coveralls around the neck will suck and blow pesticide in and out of the interior of the coveralls as you bend and move.</p> <p>Wear coveralls over a long-sleeved shirt and pants.</p>
Aprons	<p>When pouring or otherwise handling concentrated pesticides, it makes good sense to wear protection in the form of an apron. The apron protects the front of your body from spills or splashes of the concentrate. The apron should be made of rubber or synthetic liquid-proof material that will resist the solvents used in formulating the pesticide.</p>	<p>Make sure the apron covers your body from your chest to your boots.</p>
Gloves	<p>Protect your hands by wearing chemical-resistant gloves. Neoprene gloves provide the best protection. Natural rubber gloves may be used when handling organo-phosphorus or carbamate pesticides. Be sure that they are designed for use with solvents and pesticides. Never use lined gloves, gloves with wristbands or leather gloves.</p>	<p>Put gloves on and roll up the first inch or two of the cuff. That way when you lift your hands, any liquid on the gloves won't drip down your arm.</p>
Hats	<p>Use a chemical-resistant hat, preferably made of washable plastic. The hat may be a hard hat, or it may be made of flexible plastic. In either case, it should have a plastic sweatband. Wash and dry entire hat after each use and before storing. Ordinary baseball caps with cloth sweatband are dangerous as they absorb the pesticide and recontaminate the forehead each time you wear them. Even small amounts of moderately or slightly toxic pesticides may cause severe skin irritation or other illness if exposure continues for several days.</p>	<p>Ensure hat fits snugly on head.</p>
Boots	<p>Wear chemical-resistant, unlined boots. These boots are available in a variety of styles and materials. Neoprene boots are the best. Knee-length boots offer greater protection because they extend above the lower end of the apron. Avoid leather or fabric boots and shoes because they will absorb pesticide and cannot be cleaned effectively.</p>	<p>Wear your pant legs outside the top of your boots. This will prevent spills and splashes from running into the boot and on to your leg.</p>

Protecting Your Eyes, Face and Lungs

Wear the following equipment to protect your facial area from exposure.

Equipment	Protection	How to wear it
Goggles	Chemical-resistant goggles keep your eyes safe from both splashing and, if using dry formulations, dust or granules. Don't use goggles with cloth or elastic headbands as these will absorb pesticides.	Wear goggles snugly on your face so that the sides of your head are protected from splashes. If you wear glasses, make sure you purchase goggles which fit snugly over them. Never wear contact lenses when working around pesticides.
Respirators	Only NIOSH-approved respirators should be used. Do not exchange parts of different respirators. (For example, do not use a cartridge produced by Company "A" with a respirator produced by Company "B" as the combination may not provide adequate protection to the user). Dust masks are ineffective in protecting against herbicide vapors. Similarly, the filters on tractor cabs are intended to remove dust and are not designed to protect against pesticide vapors or mists. Chemical cartridge respirators are recommended for outdoor use when mixing and applying pesticides.	When carrying out operations, change filters each day. The cartridge should be replaced when chemical odour becomes apparent or when breathing becomes difficult. New cartridges should always be installed at the beginning of spray season. Prior to commencing work, check the face seal while the respirator is on the wearer's face. Regardless of design, respirators cannot be worn securely by people wearing beards, moustaches or sideburns.
Face Shields	Goggles offer protection, but frequently full-face protection is advised or required according to the pesticide label. It is especially important to protect your eyes and face when pouring or mixing liquid concentrates. Effective face shields are made of clear plastic.	Since the shield attaches to the hard hat, you can raise or lower it as needed.

Laundering Pesticide Soiled Clothing

Skin can absorb chemicals from clothing and equipment that have not been handled and washed properly. Additionally, improper laundering can result in contamination of the washing machine or dryer.

Just as the operator needs to be cautious when handling pesticides, the person doing the laundry needs to be cautious when handling pesticide soiled clothing.

Consult the Manitoba Agriculture factsheet "Protective Clothing for Use with Pesticides" for further information.

Container Disposal

Properly rinsed containers should be delivered to a designated pesticide container disposal site. Contact your Agricultural Representative or your Rural Municipal office for the locations of pesticide container disposal sites in your municipality.

Triple Rinsing

Triple rinsing renders used pesticide containers (metal, plastic, glass) more than 99.9 percent free of residues, in most cases. Recent data shows that over 78 percent of pesticide containers are being rinsed by farmers. Here are the steps that should be followed:

1. Empty contents of the container into the spray tank and drain in a vertical position for 30 seconds.
2. Add a measured amount of rinse water or other diluent so container is about one-fifth full.
3. Rinse the container thoroughly and pour the rinsate into the spray tank.
4. Repeat the procedure twice (it should only take about 5 minutes in total).
5. Puncture or break triple rinsed containers to render them non-reusable. Paper bags should be rinsed once prior to disposal.

Pressure Rinsing

Also available are pressure rinsers that can rinse all sizes of empty pesticide containers that can be lifted into position over the spray tank. A 30-second rinse with a pressure rinser is convenient

and just as effective as triple rinsing. Pressure rinsers are constructed to be thrust into the bottom of a metal can or plastic jug. Holes, situated laterally in the rinser tip, direct water from a pressurized source against the inner sides of the container and effectively wash the residual pesticide into the spray tank.

Some farmers have found it convenient to attach a rinser to the pump on their large water storage tank to minimize container handling. Pressure rinsers have the added advantage of rendering containers useless by automatically puncturing them.

Pesticide Formulations and Compatibilities

Abbreviations associated with product names indicate the type of formulation.

Abbreviations most often used are:

W or WP	= wettable powder
E or EC	= emulsifiable concentrate
SC	= spray concentrate
WDG	= wettable dispersible granules
DF	= dry flowable

When tank mixes are being considered follow any specific label instructions and check label for incompatibilities. Compatibility is usually better if WP is mixed with WP. EC formulations are more likely to cause compatibility problems when mixed with WP formulations.

Sprayer Calibrations

Sprayer calibration is a two stage procedure which should be done before the spraying season begins. Before calibrating make sure that all nozzles, screens and filters are clean, and that the pressure gauge is giving an accurate reading of boom pressure.

Definitions

L/min – nozzle capacity in litres per minute

L/ha – application volume in litres per hectare

km/h – forward speed in kilometres per hour

cm – band width in centimetres

Procedure

1. Check the out-put of each nozzle.

With the sprayer operating at the desired pressure, collect the output from each nozzle for one minute, using an accurate measuring cup or graduated cylinder.

Record the output from each nozzle and replace any nozzles that are more than 5 per cent above or below the average, or have a visibly distorted pattern.

If the outputs are more than 15 percent above their original output, replace the whole set.

2. Check the entire sprayer for output to determine the correct forward speed.

The following method requires no calculations or distance measurement. It is also much more accurate than checking the output of only one or two nozzles.

- Fill the sprayer tank with water.
- Operate the sprayer at the desired pressure for 15 minutes.
- Measure the number of litres needed to refill the tank.
- Refer to the table (Number of Nozzles) for the correct speed in km/h.

Note: The table is correct only for a nozzle spacing of 500 mm. For 1000 mm spacing, multiply the number of nozzles on the sprayer by 2 before entering the table.

Example: Sprayer with 26 nozzles at 500 mm spacings. Desired application volume – 100 L/ha. After 15 minutes of spraying, 260 litres are required to refill the sprayer tank. follow the 100 L/ha column down to 260 and go across to the column for 26 nozzles. Read off the correct speed – 8.0 km/h.

Proper sprayer calibration minimizes input cost by ensuring that the product meets the target at the recommended dose.

Metric Calibration Chart

Litres per 15 minutes to apply		Number of Nozzles – 500 mm spacings													
50 L/ha	100 L/ha	26	27	30	32	33	34	35	36	37	38	41	42	48	49
100	200	6.2	5.9	5.3	5.0	4.8	-	-	-	-	-	-	-	-	-
110	220	6.8	6.5	5.9	5.5	5.3	5.2	5.0	4.9	-	-	-	-	-	-
120	240	7.4	7.1	6.4	6.0	5.8	5.6	5.5	5.3	5.2	5.1	-	-	-	-
130	260	8.0	7.7	6.9	6.5	6.3	6.1	5.9	5.8	5.6	5.5	5.1	5.0	-	-
140	280	8.6	8.3	7.5	7.0	6.8	6.6	6.4	6.2	6.1	5.9	5.5	5.3	-	-
150	300	9.2	8.9	8.0	7.5	7.3	7.1	6.9	6.7	6.5	6.3	5.9	5.7	5.0	4.9
160	320	9.8	9.5	8.5	8.0	7.7	7.5	7.3	7.1	6.9	6.7	6.2	6.1	5.3	5.2
170	340	10.5	10.1	9.1	8.5	8.2	8.0	7.8	7.6	7.4	7.2	6.6	6.5	5.7	5.5
180	360	11.1	10.7	9.6	9.0	8.7	8.5	8.2	8.0	7.8	7.6	7.0	6.9	6.0	5.9
190	380	11.7	11.3	10.1	9.5	9.2	8.9	8.7	8.4	8.2	8.0	7.4	7.2	6.3	6.2
200	400	-	11.9	10.7	10.0	9.7	9.4	9.2	8.9	8.6	8.4	7.8	7.6	6.7	6.5
210	420	-	-	11.2	10.5	10.2	9.9	9.6	9.3	9.1	8.8	8.2	8.0	7.0	6.9
220	440	-	-	11.7	11.0	10.7	10.4	10.1	9.8	9.5	9.3	8.6	8.4	7.3	7.2
230	460	-	-	-	11.5	11.1	10.8	10.5	10.2	9.9	9.7	9.0	8.8	7.7	7.5
240	480	-	-	-	12.0	11.6	11.3	11.0	10.7	10.4	10.1	9.4	9.1	8.0	7.9
250	500	-	-	-	-	-	11.8	11.4	11.1	10.8	10.5	9.8	9.5	8.3	8.2
260	520	-	-	-	-	-	-	11.9	11.6	11.2	10.9	10.1	9.9	8.7	8.5
270	540	-	-	-	-	-	-	-	12.0	11.7	11.4	10.5	10.3	9.0	8.8
280	560	-	-	-	-	-	-	-	-	-	11.8	10.9	10.7	9.3	9.1
290	580	-	-	-	-	-	-	-	-	-	-	11.3	11.0	9.7	9.5
300	600	-	-	-	-	-	-	-	-	-	-	11.7	11.4	10.0	9.8
310	620	-	-	-	-	-	-	-	-	-	-	-	11.8	10.3	10.1
320	640	-	-	-	-	-	-	-	-	-	-	-	-	10.7	10.5

For other application volumes or numbers of nozzles use this formula:

$$\text{Forward Speed (km/h)} = \frac{(\text{litres per 15 min}) \times 80}{(\text{number of nozzles}) \times (\text{desired application volume})}$$

Example: Sprayer with 28 nozzles (500 mm spacing) uses 330 litres in 15 minutes.
Desired application volume is 150 L/ha.

$$\text{Correct forward speed} = \frac{330 \times 80}{28 \times 150} = 6.3 \text{ km/h}$$

Speed Chart

Tractor speedometers are often inaccurate so the actual forward speed should be checked in the field using the following chart.

km/h	mph	Time to Travel 800 m (1/2 mile) (min:s)	km/h	mph	Time to Travel 800 m (1/2 mile) (min:s)
5.0	3.1	9:36	8.6	5.3	5:35
5.2	3.2	9:14	8.8	5.5	5:27
5.4	3.4	8:52	9.0	5.6	5:20
5.6	3.5	8:34	9.2	5.7	5:13
5.8	3.5	8:17	9.4	5.8	5:07
6.0	3.7	8:00	9.6	6.0	5:00
6.2	3.8	7:44	9.8	6.1	4:54
6.4	4.0	7:30	10.0	6.2	4:48
6.6	4.1	7:16	10.2	6.3	4:43
6.8	4.2	7:04	10.4	6.5	4:38
7.0	4.4	6:52	10.6	6.6	4:32
7.2	4.5	6:40	10.8	6.7	4:27
7.4	4.6	6:29	11.0	6.8	4:22
7.6	4.7	6:19	11.2	7.0	4:17
7.8	4.8	6:09	11.4	7.2	4:13
8.0	5.0	6:00	11.6	7.2	4:08
8.2	5.1	5:51	11.8	7.3	4:04
8.4	5.2	5:43	12.0	7.5	4:00

Avoiding Spray Drift

To minimize the risk of drift, follow these guidelines:

1. Do not spray in winds above 15 km/hr (9 mph).
2. Do not spray under conditions of dead calm. Dead calm conditions are often associated with temperature inversions, and the combination of these factors can result in long distance spray drift (2 km or more). Fog or dust that seems to hang in the air is a good indicator of inversions, and spraying should be avoided.
3. Avoid using nozzle pressures above 45 psi (310 kPa).
4. Use a minimum of 10 L/acre (45 gallons/acre) water for all herbicides unless otherwise specified for the product.
5. Do not spray when the wind is blowing towards a nearby sensitive crop, shelterbelt, gardens or bodies of water.
6. Use amine formulations of 2,4-D or MCPA where possible. Use special care when applying volatile herbicides (e.g. ester formulations).
7. Ensure that the air flow from air-assist sprayers is properly calibrated to minimize drift for different crop and weed canopies.
8. Use 80 to 110 degree nozzles. 80 degree nozzles can be run 4 inches (10 cm) closer to target plants than 65 degree nozzles. 110 degree nozzles can be run 4 to 8 inches (10 to 20 cm) closer than 65 degree nozzles. This lowering of boom height reduces exposure of the spray droplets to the wind and results in reduced droplet drift. Special nozzles are available that create relatively large droplets and further reduce the risk of drift.
9. Consider equipping your sprayer with protective drift shrouds. A number of different designs are available that can significantly reduce drift. Note that some drift shrouds are more effective than others at reducing drift.

Spray only in favourable wind conditions.

Handling a Drift Complaint

When spray drift occurs, it is important to take the right steps to resolve the complaint. If you suspect that your crop or property has been damaged because of spray drift, use the following guidelines for resolving the situation.

1. Are you sure that the symptoms or damage you see has been caused by spray drift? Contact your local agricultural office to help determine if the damage is the result of spray drift.
2. Contact the suspected applicator as soon as possible. View the damage with the suspected applicator and determine if that person did, in fact, cause the damage.
3. If the damage was caused by the applicator, determine the extent of the damage and the level of compensation (if any) with the applicator.
4. If the situation cannot be resolved quickly because of disagreements of the extent of damage or level of compensation, contact your local agricultural office to discuss options on how to proceed. Documentation will be required, particularly if insurance companies are involved.
5. The involvement of a private consultant is recommended if documentation is required. Required documentation often includes samples of the damaged plants, photographs, and yield comparisons to determine losses. Your agricultural office can provide you with a list of private consultants in your area.
6. The best approach is to start an open and honest line of communication with the suspected applicator. The majority of drift complaints are resolved quickly and efficiently by communicating with the applicator, without the involvement of outside parties.

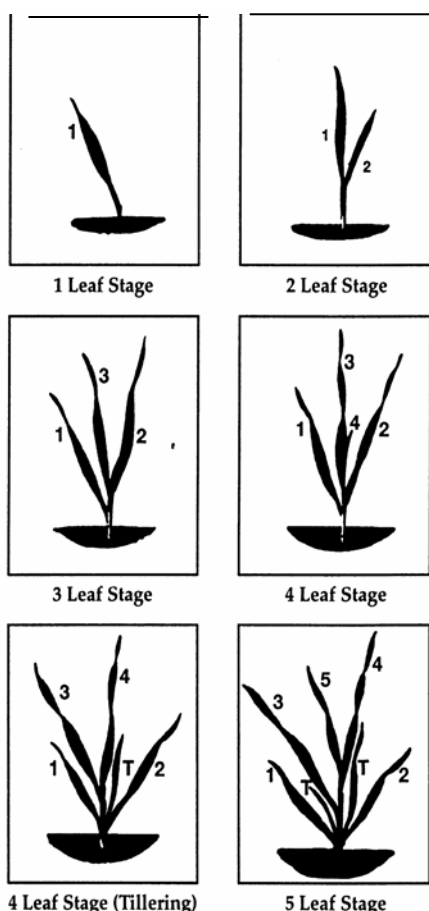
How to Identify Weed Leaf Stages

Recognition of plant growth stages is essential for effective weed control. In some cases, weeds are controlled only when they are at certain growth stages. For most post-emergence products, growth stages are described by number of leaves.

Annual Grass Weeds

Leaves are counted, starting at one for the first leaf, and progressing up the primary shoot. Tillers are important but not counted as leaves. A leaf should be counted as soon as it emerges, but may be labelled as early, mid or full leaf. The early leaf stage is when it begins to emerge, the full stage is just before the next leaf emerges. (Figure 2).

Figure 2. Leaf Stages for Annual Grass Weeds



Tillers, or stools, are the secondary shoots of a grass plant. The first tiller emerges from the axil of the first leaf, the second just above the second leaf and so on. Tillers generally appear at the three to four leaf stage. Be sure to identify tillers, and count only leaves on the primary shoot. As well, do not remove any leaves from the main shoot when separating the tillers.

Broadleaf Weeds

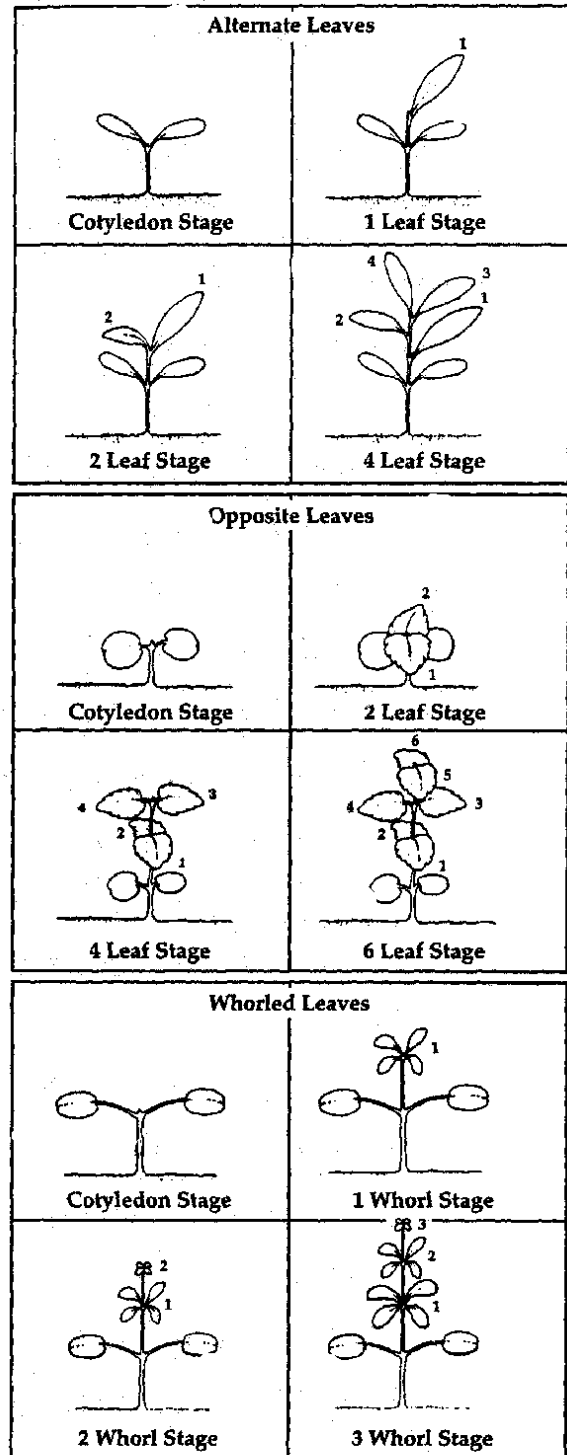
Cotyledons - These are the seed leaves which usually emerge above ground. On some plants, such as fababeans, lentils and peas, they stay below the soil surface. Cotyledons are not true leaves and are not counted when determining leaf number. They are a different shape than the true leaves and may dry up and disappear at an early stage.

Alternate leaves - Some plants have one leaf at each node on the stem. The next leaf emerges at the next higher node and extends away from the stem in the opposite direction. These plants (lamb's quarters and wild mustard are good examples) are said to have alternate leaves. To determine the leaf stage, simply count the numbers of leaves present (Figure 3).

Opposite leaves - Plants with two leaves at each node, one on each side of the stem, are said to have opposite leaves. The next pair of leaves on the next node are rotated about 45 degrees so that they are not directly over the previous pair. Plants with opposite leaves have even-leaf numbers only. When counting, the leaf number progresses from cotyledons to 2 leaf, 4 leaf, etc. These plants generally appear shorter than plants with alternate leaves at a similar leaf stage. **Be sure to count each pair as two leaves.** Hemp nettle is a weed which has opposite leaves (Figure 3).

Whorled leaves - More complex plants like cleavers may have whorled leaves. These plants have three or more leaves at each node on the stem. The leaf number in each whorl may vary, so be sure to count each individual leaf unless label recommendation refers to the number of leaf whorls (Figure 3).

Figure 3. Leaf Stages for Broadleaf Weeds



Resistance of Weeds to Herbicides

In recent years, the number of herbicide-resistant weeds and the areas they infest in Manitoba have increased.

Herbicide-resistant weeds arise following repeated use of the same herbicide (or herbicide group) for a number of years on the same area. Where weed resistance has developed, typically a weed, which is normally controlled by a herbicide, escape uncontrolled after a number of years of use of the same product or product group.

Herbicide resistance should be suspected under the following conditions:

- A weed species that the herbicide controlled in previous seasons now escapes the treatment, while other weeds which appear on the label continue to be controlled.
- The escapes cannot be attributed to adverse weather or emergence after application (if a post-emergence product is in question).
- Irregular-shaped patches of a weed develop where the herbicide gives little or no control.
- Records of the past history show repeated use of the same herbicide, or combinations of herbicides, which kill the weed in question in the same way.

Herbicide Resistant Weeds in Manitoba

Current Status of Herbicide Resistance	
Weed	Description of Resistance
Kochia, wild mustard, chickweed, hemp nettle	Resistant to Group 2 herbicides. Wild mustard, chickweed and hemp nettle confirmed in Manitoba only.
Wild Oat	Resistant to Group 1 herbicides. Resistant to Group 2 herbicides (At present, confirmed in Manitoba only). Resistant to Group 8 herbicides. Resistant to three different groups of herbicides that includes: Group 1, 2, and 8.
Green Foxtail	Resistant to Group 1 herbicides. Resistant to Group 3 herbicides. Resistant to herbicides in both Groups 1 and 3.
Wild Mustard	Resistant to Group 4 herbicides. Resistant to Group 5 herbicides.

How to Identify Weed Resistance

It is important to avoid confusing herbicide failure due to resistance with herbicide failure due to various other factors such as weather or application errors. When a herbicide fails to control weeds due to weather or application factors, that herbicide may work the next season. But when herbicides fail due to the development of resistance, they will fail in subsequent years, regardless of weather or application procedures.

Avoiding Weed Resistance

It is far easier to avoid development of resistant weed strains than it is to eradicate or control them after they develop and infest an area.

To avoid the development of resistance, take the following steps:

1. Rotate herbicide usage so that the same herbicide is not used year after year. Rather than using the same product on an annual basis, consider using other products with different mechanisms of action if alternative choices are available.
2. Be aware that when resistance to one product develops in a weed population, it can often mean the weed population has developed resistance to other herbicides that act in a similar manner.
3. Keep accurate records of herbicide use. It will be easier to plan your long term weed management strategies if you have good records of your past management practices.
4. Limit the use of herbicides that remain active in the soil for extended periods of time.

If Weed Resistance Develops on Your Area of Concern

It is important to identify weed resistance before it spreads. A “patch watch” scouting program is recommended this summer to identify suspicious patches before they become difficult to manage. Resistant weed patches have been identified on fields where producers were unaware of their existence.

1. Report suspected cases of resistance to your weed specialist or industry representative.
2. Mow, cultivate or spot spray the patches. Resistant patches should not be allowed to produce seed.
3. Clean equipment before leaving the area to prevent the spread of seeds across the area or to a neighbouring area.
4. Check patches each year to monitor their spread. Keeping your resistant weeds isolated to a manageable patch is easier than dealing with an entire field of resistant weeds.

Resistance Grouping

The following table lists herbicides presented in this guide and places them in groups according to their mechanism of action. New herbicides will not necessarily have a unique mode of action and may fall within groups listed in the charts. Using herbicides from different groups can help to delay or prevent the development of resistant weed populations. Herbicide choices are more limited

for non-crop areas than for crop situations but may still be possible depending on the situation.

Important: Herbicides that have the same mechanism of action may not control the same weed spectrum or be safe for use on all target areas. Always read and follow the product label.

Herbicide Groups Based on Mechanism of Action

<p>Group 2 (contain ALS/AHAS inhibitors) Arsenal, Escort, Telar</p>	<p>Group 7 (contain photosynthetic inhibitors – ureas/amides) Diurex, Karmex, Krovar*</p>
<p>Group 4 (contain growth regulator herbicides) 2,4-D, Calmix*, Dyvel DS, Dichloprop +2,4-D, Garlon 4, MCPA, Tordon 101, Tordon 22K, Transline, Vanquish</p>	<p>Group 9 (contain growth regulator herbicides) Glyphosate products</p>
<p>Group 5 (contain photosynthetic inhibitors – triazines/uracils) Calmix*, Hyvar, Krovar*, Simazine</p>	<p>Group 22 (membrane rupture, photosynthetic inhibitors) Gramoxone, Reglone, Reward</p>
<p>Group 11 Amitrol 240</p>	

*Some products contain more than one active ingredient and therefore may appear in more than one group. In some instances, both active ingredients act to kill the same weed using different mechanisms of action. In these instances, use of tank mixes may slow down the process of developing weed resistance.

New herbicides do not necessarily have a unique mode of action and may fall within the groups listed in the chart.

2, 4-D

Company

Nufarm (distributed by True North Specialties),
IPCO, United Agri Products (UAP)
2,4-D Amine 600, 2,4-D Ester 700 – IPCO
2,4-D Amine 600, 2,4-D Ester 700 – Nufarm
2,4-D Amine 500, 2,4-D Amine 600, *2,4-D
Ester 600, *2,4-D Ester 700, Salvo 2,4-D 700 –
UAP

Formulations

Application details may differ with different
product labels. Consult specific product labels
for more information.

470 g/L – UAP 2,4-D Amine 500
564 g/L – Nufarm 2,4-D Amine 600
560 g/L – IPCO 2,4-D Amine 600
564 g/L – UAP 2,4-D Amine 600
*564 g/L – UAP 2,4-D Ester 600
660 g/L – Nufarm 2,4-D Ester 700, UAP Salvo
2,4-D 700, IPCO 2,4-D Ester 700
*658 g/L – UAP 2,4-D 700

**(Formulations of 2,4-D Ester 600 and some
700 formulations may still be available but are
being phased out of production in 2006.
However, many 700 formulations will still be
available after 2006.)*

Use

Roadsides and non-cropped land.

Weeds Controlled

Susceptible : Annual sow-thistle, bluebur (up to
4 leaf stage), burdock (before 4 leaf stage),
cocklebur, common ragweed, daisy fleabane,
false flax, false ragweed, flixweed, goat's beard,
giant ragweed, kochia, lamb's quarters, mustards
(except dog and tansy), narrow-leafed hawk's-
beard (susceptible in fall and at 1-2 leaf stage in
spring), plantain, prickly lettuce, redroot
pigweed, Russian pigweed, Russian thistle,
shepherd's purse, stinging nettle, stinkweed,
sweet clover (seedling), thyme-leafed spurge,
volunteer canola, wild radish, wild (prairie)
sunflower.

Hard to control: Curled dock (up to 4 leaf),
dog mustard, field pepper-grass, flixweed
(spring prior to bolting), groundsel, hairy
galinsoga, hawkweed, heal-all, knotweed (up to

4 leaf), narrow-leafed hawk's-beard (spring
prior to bolting), oak-leaved goosefoot,
pineappleweed, prostrate pigweed, purslane,
sheep sorrel, tansy mustard, tumble pigweed,
velvet leaf.

Top growth only: Biennial wormwood, blue
lettuce, bull thistle, burdock, buttercup, Canada
thistle, chicory, curled dock, dandelion, field
bindweed, field chickweed*, field horsetail*,
gumweed, hedge bindweed, hemp-nettle*
(before 4 leaf stage), hoary cress, lady's thumb*,
leafy spurge, mouse-eared chickweed*,
perennial sow-thistle, Russian knapweed,
scentless mayweed, smartweed*, tartary
buckwheat, teasel, volunteer sunflower, wild
buckwheat*, yellow rocket (before 4 leaf stage).
*use highest rates for suppression only.

Brush: chokecherry, western snowberry,
willow, poplar. (Not all species listed on
product label).

Application Timing

Broadleaf: Apply when weeds are actively
growing. Under conditions of good growth and
adequate soil moisture, sprays can be applied up
to 2 weeks before normal frost time.

Brush: Spray brush up to 3 meters (10 ft) tall
after foliage is well developed. Brush or trees
above 3 meters (10 ft) feet tall should be cut
close to the ground and sprayed when re-growth
is over 0.6 meters (2 ft) tall. With good growing
conditions and adequate soil moisture, spray
may be applied up to 2-3 weeks before normal
frost time.

Rates and Water Volume

700 Ester Formulation: *Susceptible young
weeds* – Apply 0.60 L/acre in 40 to 120 L/acre
of water.

Susceptible older and harder to control weeds –
Apply 0.94 L/acre in 40 to 120 L/acre of water.

Brush – Apply 1.30 to 2.72 L/acre in 400 to
1200 L/acre of water.

500 Amine Formulation: *Weeds and woody
plants* – Apply 0.7 to 1.8 L/acre in 40 L/acre of
water. Use higher rates for perennial weeds and
susceptible woody growth.

Brush – Apply 0.9 to 1.8 L/acre in 40 or more L/acre of water. Use lower rates on susceptible species.

600 Amine Formulation (IPCO):

Woody plants – Apply 1.5 to 2.2 L/acre in 40 L/acre of water.

600 Amine Formulation (Nufarm):

Weeds – Apply 0.6 to 1.6 L/acre in 40 L of water.

Woody plants – Apply 1.1 to 2.2 L/acre in 40 L/acre of water.

600 Amine Formulation (UAP):

Weeds – Apply 0.6 to 1.1 L/acre in 40 L/acre of water

Brush – Apply 1.2 to 3.0 L/acre in 400 L/acre of water.

Tank Mixes

Some formulation of 2,4-D can be tank mixed with dicamba for brush and weed control. (See Vanquish)

Restrictions

Grazing: It is possible that plants poisonous to livestock will appear more palatable and could be grazed more readily after 2,4-D treatment. Livestock should not be allowed to graze the treated area until poisonous plants have been removed, are dead or have resumed a normal

growth habit. Treated woody growth should not be grazed.

Aerial application: Do not apply by air to roadsides.

Storage: Store above 0° C.

Precautions

Avoid spray drift to any desirable vegetation NOT listed on the label as damage may occur. Avoid contamination of ponds, streams, rivers and other water sources. Do not spray during periods of high winds when spray is likely to drift. Coarse sprays are less likely to drift.

How it Works

2,4-D is a systemic herbicide that is absorbed through foliage and roots and is translocated to actively growing areas within the plant. Symptoms include bending and twisting of leaves and stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Hazard Rating

Warning, Poison: Amine formulations

Danger, Poison: IPCO Ester 700, Salvo 2,4-D 700, Nufarm Ester LV 700

Amitrol 240

Company

Nufarm

Formulation

231g/L amitrol formulated as a liquid.
Container size: 10 L.

Use

Non-crop areas (roadside, fence rows, ditch banks).

Weeds Controlled

Dandelion, Canada thistle, sow thistle, quackgrass, toadflax, milkweed, hoary cress, horsetail, poison ivy, poison oak and most annual weeds actively growing.

Rate and Timing

Weed	Stage	Rate L/acre
Canada thistle, sow thistle	early bud to bloom	5.06-6.68
quackgrass	growth is 10 – 15 cm height	5.06-6.68
dandelion	young and actively growing	1.70-5.06
toadflax	advanced rosette to bud	7.59-11.34
milkweed	early summer when most shoots emerged	7.59-11.34
leafy spurge	between advanced flowering and early seed development	15.19-18.53
horsetail	growing vigorously, 10- 15 cm height	5.06-6.68
cattails	after catkins fully developed	15.19-18.53
poison ivy	after foliage developed	3.75

Spot Treatment

Dandelion, Canada thistle, sow thistle, hoary cress, milkweed, poison ivy, and toadflax - apply 165 mL in 10 L of water to treat a 10 x 10 m area.

Horsetail, leafy spurge, quackgrass and most other weeds – apply 460 mL in 10 L of water to treat a 10 x 10 m area.

Water Volume

40-122 L/acre for most weeds. Larger volumes may be used to obtain adequate coverage. For poison ivy apply in 203-405 L/acre.

Tank Mixes

Amitrol 240 may be tank mixed with Roundup to improve control of dandelion, horsetail and other weeds. Tank mix 1.68 L/acre Amitrol 240 with 0.5 L/acre Roundup.

Follow directions on both labels for timing and use precautions.

Restrictions

Aerial Application: Do not apply by air.

Grazing: Do not graze treated crops or weeds or use for hay or feed.

Rainfall: No rainfall period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Recropping: Residues may be present 8 months following application.

Storage: Do not store where temperatures may exceed 50°C or near open flames. Do not store below 4°C.

Re-entry: Do **NOT** re-enter treated areas within 12 hours.

How it Works

Amitrol 240 is a systemic herbicide which inhibits pigment production, including chlorophyll. Whitening begins in 7-14 days, followed by plant death.

Tank Cleaning

Rinse all sprayer parts several times with clean water. Rinse immediately after use to prevent corrosion of metal parts.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelter. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating

Caution Poison, Warning Eye Irritant

Arsenal

Company

BASF, distributed by Truenorth Specialty Products.

Formulation

240 g/L imazapyr. Container size: 9.5 L

Use

Season long control of most annual and perennial grasses and broadleaf weeds on non-cropland areas (industrial sites, railroad ballast, rail and hydro rights-of-ways, and pipeline right of ways, well sites, battery stations, and compressor or value station).

Weeds Controlled

Annual Broadleaf weeds: Black medic, mustard spp., cinquefoil (rough), pigweed spp., fleabane spp., pineappleweed, groundsel (common), hemp-nettle, ragweed spp., kochia, Russian thistle, lamb's-quarters, stinkweed, sow-thistle (annual), wild buckwheat.

Annual Grass weeds: Bluegrass (annual), foxtail spp., old witchgrass.

Perennial/Biennial (b) weeds: Bladder campion, leafy spurge, bromegrass, milkweed, bull thistle (b), mouse-ear chickweed, burdock (b), mullein spp. (b), Canada bluegrass, ox-eye daisy, Canada thistle, plantain spp., cinquefoil (sulfur), poison ivy, clover spp., quackgrass, dandelion, sheep sorrel, dog-strangling vine, toadflax, Fescue spp., tufted vetch, field bindweed, wild carrot (b), goat's-beard (b), wild grape, goldenrod, wild strawberry, yellow nutsedge.

Woody Species (seedling): Maple, raspberry, poplar, wild rose.

Timing

Weeds should be actively growing at the time of application.

Rate

Apply 1.2 L/acre. For spot treatment apply 300 mL in 10 L of water to treat an area 1000 m².

Water Volume

Apply uniformly with properly calibrated equipment in 40 to 220 L/acre with spray pressure of 175-425 kPa. For best results, apply Arsenal using the least amount of water practical to obtain uniform coverage of the vegetation foliage.

If using spray volumes greater than 220 L/acre, a non-ionic surfactant must be added at rate of 1 L/400 L of spray solution.

Restrictions

Application: This product is to be applied by licensed applicators only.

Aerial Application: Do not apply by air.

Grazing: Do not graze the treated area or cut for hay.

Storage: Do not store below -12°C. Do not store or mix in unlined steel (except stainless steel) containers or spray tanks.

Precautions

DO NOT apply where runoff water may flow onto agricultural land as injury to crops may result. Keep from contact with fertilizers, insecticides, fungicides and seeds.

Keep Arsenal herbicide away from areas where tree roots may extend into the treated area or in locations where the chemical may be washed or moved into contact with their roots (maintain a distance from the tree equal to at least twice the distance from the tree trunk to the dripline).

DO NOT use on lawns, walks, driveways, tennis courts, or similar areas. Prevent drift of spray to desirable plants.

DO NOT contaminate ponds, lakes, streams, wetlands or sloughs and do not apply within 15 metres of a wetland area or body of water.

How it Works

Arsenal is a systemic herbicide that is absorbed

through foliage and roots and is translocated rapidly throughout the plant. Treated plants stop growing soon after spray application. Chlorosis appears in the newest leaves, followed by tissue necrosis. In perennials, the herbicide is translocated into, and kills underground storage organs, thus preventing regrowth. Symptoms occur up to 2 weeks after application and complete kill may not occur for several weeks.

Tank Cleaning

Thoroughly clean all traces of Arsenal from

application equipment immediately after use. Flush tank, pump, hoses and boom with several charges of water after removing nozzle tips and screens (clean these parts separately). Drain and flush equipment away from desirable trees and plants. Do not contaminate water when disposing of equipment wash waters.

Hazard Rating

Caution, Poison

Calmix Pellets

Company

Nufarm

Formulation

3% bromacil and 5% 2,4-D formulated as pellets. Container size: 5 kg

Use

Calmix is a general purpose weed killer and soil sterilant for use in non-crop areas such as, around farm buildings, fuel tanks, storage areas, road signs, bridge approaches, guard rails, under pavement, well heads, tank farms, power installations and other industrial and commercial areas.

Weeds Controlled and Rate

Annual weeds and perennial seedlings: 2.5 kg in 100 square meters (120 square yards).

Shallow rooted perennials: 3.75 kg in 100 square meters (120 square yards).

Heavy perennial growth: 5.0 kg in 100 square meters (120 square yards).

Spot treatment: 37.5 g to 1 square meter.

Timing

Use any time during the growing season. Best results are obtained when Calmix Pellets are applied early in the spring or in the fall.

Application

Apply pellets dry to the soil directly with Calmix spreader or by hand. Apply the higher rate to heavier soils and/or to extend the growth control period.

Restrictions

Aerial Application: Do not apply by air.

Precautions

Do not apply within 1-1/2 times the height of desirable trees or plants as the roots of these plants may extend into the treated area. Do not apply on slopes where water erosion may carry the chemical onto areas of desirable vegetation. Do not contaminate irrigation ditches or water used for domestic purposes.

How it Works

The active ingredient bromocil inhibits photosynthesis. It is absorbed mainly through the roots, with slight absorption through stems and leaves. The active ingredient 2,4-D is absorbed through the roots and foliage and is translocated to actively growing areas within the plant. Eventual browning and death of plants occurs.

Hazard Rating

Caution, Poison

Dichlorprop + 2, 4-D

Company

United Agri Products (UAP): Diphenoprop BK 700, Turboprop 600

Nufarm (distributed by True North Specialty Products): Estaprop Plus, Desormone

Inter-Provincial Co-op (IPCO): Dichlorprop-D

Formulation

Dichlorprop-D, Turboprop 600, Estaprop Plus: 300 g/L dichlorprop ester + 282 g/L 2,4-D ester. Container size: 10 L, 10.6 L (Estaprop Plus)

Diphenoprop BK 700: 350 g/L dichlorprop ester + 329 g/L 2,4-D ester. Container size: 10 L

Desormone: 350 g/L dichlorprop + 330 g/L 2,4-D ester. Container size: 10 L, 115 L

Use

Non-crop areas (roadsides, utility lines and railway rights-of-way).

Weeds Controlled

Most annual broadleaf weeds including ragweed, alfalfa, bull thistle, burdock, buttercup, Canada thistle, chicory, cinquefoil, dandelion, dogbane, goat's beard, goldenrod, hawk weed, horsetail, milkweed (top kill), mullein, perennial sow thistle, plantain, sweet clover, tansy, teasel, toadflax (partial control), vetch, wild carrot, yellow rocket.

Brush Controlled

Susceptible species: hawthorn, poplar, scotch pine, white cedar, cherry, wild plum, wild raspberry

Harder to control species: alder, aspen, balsam fir, basswood, birch, blueberry, bur oak, elderberry, elm, ground juniper, hazel, hickory, honeysuckle, Manitoba maple, pine, poison ivy, rose (some re-growth may occur), silver maple, sugar maple, sumac, tamarack, wild apple, willow

Timing of Application

Weeds: Apply in May or September. Some

weed species may require a second treatment.

Brush: Apply in late spring or early summer just after brush is in full leaf.

Rate and Water Volume

Weeds:

Dichlorprop-D, Estaprop Plus, Turboprop 600 – Apply 1.6 L/acre (80 to 240 L of spray mixture/acre).

Diphenoprop BK 700 – Apply 1.4 L/acre (80 to 240 L of spray mixture/acre).

Desormone – Apply with power equipment 7.0 to 10.0 L in 1000 L of water.

Brush:

Desormone – Apply with power equipment 7.0 to 10.0 L in 1000 L of water.

Dichlorprop D, Estaprop Plus – For susceptible species use 8.75 L/1000 L of water. For harder to control species use 11.7 L/1000 L of water. Apply 300 to 600 L of spray mixture/acre.

Diphenoprop BK 700 – For susceptible species use 7.5 L/1000 L of water. For harder to control species, use 10 L/1000 L of water. Apply 300-600 L of spray mixture/acre.

Turboprop 600 – For susceptible species use 8.0 L/1000 L of water. For harder to control species, use 11 L/1000 L of water. Apply 300 to 600 L of spray mixture/acre.

Basal Bark Method: Mix 23 - 32 L *Estaprop Plus* or 27 L *Desormone* or 24 to 32 L *Turboprop 600* or 23 - 32 L *Dichlorprop-D* or 28 to 44 L *Diphenoprop BK 700* in 1000 L of fuel oil. Apply to basal part of woody plant any time of the year using low volume backpack sprayer or power equipment. Apply spray mixture to runoff from ground level up to 1 m high on all sides of the stem. (Not effective on basswood or ash).

Modified Basal Method: *Early spring* – Mix 7 to 10 L *Desormone* or 8 -12 L of *Dichlorprop-D* or *Estaprop Plus* or 24 to 32 L *Turboprop 600* to 100 L of fuel oil. Add this mixture to 890 L of water.

Dry Weather or Fall Application: Mix 10 L *Desormone* or 12 L *Estaprop Plus* to 150 L of fuel oil and add to 840 L of water or mix 12 L of *Turboprop 600* or 12 L of *Dichlorprop-D* to 150 L of fuel oil and add to 835 L of water. Drench plant bases then wet remaining stems and leaves to runoff, spraying 4/5 of the plant from bottom up. Treat when brush is in full foliage.

Restrictions

Grazing: Treated areas can not be grazed or cut for hay.

How it Works

Dichlorprop and 2,4-D are systemic herbicides which are absorbed through foliage and roots and are translocated to actively growing areas within plants. Symptoms include bending and twisting of leaves and stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Tank Cleaning

(From *Turboprop 600* and *Diphenoprop BK 700* labels) - Wash the outside of the sprayer and drain tank completely. Remove and clean filters, screens and nozzle tips separately. Fill the sprayer with water. With the agitator running flush out the lines and boom, then drain. Fill the sprayer with clean water and use TANK and EQUIPMENT CLEANER or for each 100 L, add 1 L household ammonia. Operate the pump and agitator for 15 minutes. If possible, let the solution remain in the tanks and hoses overnight, re-circulating and draining each time. DO NOT contaminate irrigation or drinking water when cleaning sprayer.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating

Warning, Poison

Diurex

Company

Makhteshim-Agan, distributed by United Agri Products.

Formulation

80% diuron formulated as a water dispersible granule. (A wettable powder formulation is being phased out and may be available as existing stocks last).

Uses

Total vegetation control in non-crop areas.

Restricted Use: Aquatic vegetation control in irrigation and drainage ditches.

Weeds Controlled

Most annual and perennial broadleaf and grass weeds.

Rates

Total vegetation control: Apply 4.4 to 11.0

kg/acre on sands or sandy loams; 16.0 to 22.0 kg/acre on clays or high organic soils. Use lower rates where annuals are predominate and where one season's control is desired. Use higher rates where perennials predominate and where more than one season's control is required. To extend control, use follow-up treatment of 4.4 kg/acre to control annuals and seedlings.

Spot treatment: For deep rooted perennials (ie quackgrass, toadflax) - 0.725 to 0.975 kg/100 m². Retreat as necessary. This treatment will result in loss of soil productivity for an extended period.

Small areas: 0.150 kg/100 m² is approximately 22 kg/acre.

Aquatic vegetation control: Apply 9.0 to 44 kg/acre (0.25 to 1.25 kg in 2.5 to 5.0 L/100 m²). For irrigation ditches apply during the non-crop season and when ditch is not in use. For best results apply before weed growth begins. Remove dense weed growth. Do not apply when ground is frozen.

Application Information

Water Volume: 100 to 160 L/acre.

Sprayers: For large areas use properly calibrated fixed-boom sprayers to insure constant rate of application. Openings in screens should be 50 mesh or larger. For small areas use tank-type hand sprayers or sprinkling.

Agitation: Material must be kept in suspension at all times by agitation. Do not use air agitation.

Restrictions

Aerial Application: Do not apply by air.

Grazing: Do not graze treated areas or cut for hay.

Environmental Effects

Diuron requires moisture (rainfall or irrigation) after treatment to carry the chemical into the root zone of weeds.

Precautions

Do not apply, drain or flush equipment on or near desirable trees or other plants or on areas where their roots may extend. Do not use in residential areas (lawns, walks, driveways, tennis courts etc).

How it Works

The active ingredient diuron inhibits photosynthesis. It is a systemic herbicide that is absorbed mainly by the roots.

Hazard Rating

Warning, Eye Irritation

DyVel DS

Company

BASF, distributed by True North Specialty Products

Formulation

295 g/L 2,4-D amine, 80 g/L mecoprop amine, 110 g/L dicamba formulated as a solution.
Container size: 2 x 10 L, 55 L, 110 L

Use

Roadsides

Weeds Controlled

Broadleaf weeds including bull thistle, chicory, goat's beard, ragwort, white cockle, poison ivy, alders, and sheep-laurel.

Timing

Apply in the spring when weeds are actively growing.

Rate

1.3 L/acre in sufficient water for good coverage.

Restrictions

Application: Do not apply by air.

Grazing: Do not permit lactating dairy animals to graze within 7 days after application. Do not harvest or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Rainfall: No information on label, therefore, allow for an 8 hour rain-free interval following application.

Storage: May be frozen.

Precautions

Do not treat areas where downward movement into the soil or surface water may bring the herbicide in contact with the roots of desirable plants. Follow label directions carefully. DyVel DS may injure sensitive plants. Do not spray near sensitive plants or when spray may drift onto sensitive plants. Do not apply when temperatures are above 27°C and the relative humidity is very high.

How it Works

DyVel DS is a growth regulator type herbicide that is absorbed primarily by foliage but also through plant roots. It is a systemic herbicide that is translocated throughout plants, causing rapid, undifferentiated growth and bending and twisting of stems and leaves, resulting in plant death in 2 to 3 weeks.

Tank Cleaning

The manufacturer of this product warns that the use of a sprayer that has come in contact with

this product may cause damage to susceptible crops. Restrict use of your sprayer to crops on which DyVel DS is registered if you have used this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating

Warning, Poison

Ecoclear

Company

Ecovale Corporation

Formulation

250 g/L acetic acid. Container size: 10 L, 208 L

Use

Weed control in non-crop, right-of-way, and industrial sites, including sidewalks, driveways, patios; power stations; around farm buildings, storage areas, petroleum tank farms, greenhouses, plant nurseries and golf courses; in fence rows and vacant lots.

Weeds Controlled

Annual Weeds: Black medic, lamb's-quarters, chickweed, ragweed spp.

Perennial Weeds (Suppression): Curled dock, quackgrass, clover spp., toadflax, dandelion, tufted vetch, hawkweed spp., wild carrot, plantain spp.

Timing

Best results are achieved from spring and early summer application to actively growing young weeds (3-5 leaf stage).

Rate & Water Volume

Early season annual weed control:

3 to 5 leaf stage and actively growing - 1 L Ecoclear/3 L water. For broadcast application,

apply a total solution volume of 300 - 400 L/acre. At this rate, 75 L Ecoclear + 225 L water = 300 L solution OR 100 L Ecoclear + 300 L water = 400 L solution.

Larger annual weeds and suppression of perennials: 1 L Ecoclear/2.25 L water. For broadcast application, apply a total solution volume of 300 - 500 L/acre. At this rate, 92.3 L Ecoclear + 207.7 L water = 300 L solution OR 154 L Ecoclear + 346 L water = 500 L solution. Retreatment is required for regrowth of perennial weeds.

Tank Mixes

None registered.

Restrictions

Rainfall: Rainfall within 1 hour of application will reduce degree of control.

Storage: Do not freeze.

Precautions

Overspray of drift will injure contacted foliage. Avoid all contact to desirable plants.

This product may be toxic to aquatic organisms. Do not apply or allow runoff to reach lakes, streams or ponds. A buffer zone of at least 15 m should be established between areas to be sprayed and aquatic environments.

How it Works

Ecoclear is a post-emergent foliar active product. It is non-selective to green foliage and non-residual in soil.

Hazard Rating

Caution, Skin Irritant
Danger, Corrosive to Eyes.

Escort

Company

E.I. Dupont Canada Company, distributed by Truorth Specialty Products.

Use

For brush and weeds control in non-crop areas such as utility rights-of-way, roadsides, industrial sites and fence lines.

Formulation

60% metsulfuron methyl formulated as a dry flowable. Container size: 0.25 kg

Weeds Controlled, Rates and Water Volumes

Rate g/acre**	Weeds and Brush spp. Controlled
8	Canada thistle*, common tansy, dandelion*, kochia, Russian thistle, scentless chamomile, sow thistle*, sweet clover.
10	Above weeds plus: Canada thistle*, dandelion*, sow thistle, western snowberry.
12	Above weeds plus: dandelion, Canada thistle*, sow thistle*
40	Balsam poplar, willow
60	Cherry, trembling aspen

* Suppression only

** Add a recommended surfactant such as Ag-Surf, Agral 90 or Citowett Plus, at 0.2% v/v (2 L/1000 L spray solution).

Brush Applications

Low Volume Foliar Broadcast: Apply as full coverage spray to stems and foliage in 40-200 L spray volume/acre using properly calibrated equipment to ensure uniform coverage.

Thoroughly wet the foliage of target plants, but not to the point of runoff.

High Volume Foliar Broadcast: For control of brush plants up to 2.5 m in height, apply 40-60 g/acre in enough water to make 1000 L of spray solution. Apply as a full coverage spray to foliage, stems and limbs using up to 800 L/acre of spray depending on plant species, height, density of growth and type of equipment used. Do not apply more than 60 g/acre of Escort.

Timing

Apply between mid-June and mid-August after target spp. have leafed out and before fall colouration begins.

Tank Mixes

Apply 0.5-1.2 g/acre Escort + 0.4 kg a.i./acre 2,4-D amine or ester to control listed weeds and weeds controlled by this rate of 2,4-D.

Restrictions

Aerial Application: Do not apply by air.

Grazing: May be grazed on the day of treatment.

Storage: Store in a cool, dry place. May be frozen.

How it Works

Escort is absorbed by leaves and roots and rapidly stops growth of susceptible weeds. Discoloration is visible in 1 to 3 weeks.

Effects of Growing Conditions

Do not apply during periods of intense rainfall or to soil saturated with water. Warm, moist conditions following treatment enhance the activity of Escort, while cold dry conditions may reduce or delay activity. Brush hardened off by cold weather and drought stress may not be controlled.

Tank Cleaning

Escort can cause severe injury to sensitive plants

at low concentrations. Sprayers used to spray Escort should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with 1 L of 3% household ammonia/100 L of water. All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating

Caution, Eye Irritation

EZJECT Herbicide Capsules

Company

Distributed by TrueNorth Specialty Products

Formulation

0.15 grams glyphosate per capsule. Container size: 4 x 48 tube cylinders – 4800 capsules net – each tube contains 25 capsules

Use

Tree and brush control in non-cropland sites (ie. forestry, industrial, rights-of-way).

Brush Controlled

Alder, birch, cedar, cherry, hemlock, maple (suppression), pine, poplar, willow and others.

Application Information

Tree injection: Inject capsules using the EZJECT Herbicide Capsule injection system and equipment only. Capsules must penetrate into the living tissue through the outer bark to provide effective results. Inject 1 capsule/5 cm trunk diameter breast height (DBH). Control of trees with more than 20 cm DBH may not be acceptable at this rate. Space capsules evenly

around the tree below all major branches. For all species (except maple) equivalent rates can be injected on one side of the tree, however a 10-15% reduction in control can be expected. Stems should be more than 3 cm in diameter to withstand the injection procedure.

Timing

Trees may be injected any time of the year except when wood is frozen which may prevent penetration of the capsule. Late fall applications will provide maximum suppression of maples.

Restrictions

Storage: Store unused capsules upright tightly sealed in their original container below 35°C.

How it Works

This product moves throughout the tree from the point of injection to all roots and shoots. Symptoms appear very slowly (2-4 weeks) beginning with gradual wilting, yellowing and browning of the foliage. This is followed by deterioration of all shoots and roots. Allow 1-2 years for complete control.

Garlon 4

Company

Dow AgroSciences

Formulation

480 g/L triclopyr. Container size: 2 x 10 L, 110 L

Use

Broadleaf weed and brush control in non-crop areas including rights-of-way, electrical power lines, communication lines, pipelines, roadsides and railroads, military bases, industrial, manufacturing and storage sites.

Weeds Controlled

Broadleaves: burdock, chicory, curled dock, dandelion, field bindweed, lamb's quarters, ragweed, smartweed, smooth bedstraw, vetch, wild lettuce.

Brush: alder, ash, aspen, basswood, birch, buckthorn, cherry*, chokecherry*, cottonwood, dogwood, elderberry, elm*, maple, oak*, pine*, poison oak, poplar, raspberry*, red maple*, sassafras, sumac, tamarack, wild rose, willow, witch hazel.

*may require treatment at the higher rate and may need to be retreated the following year.

Timing

Apply when woody plants or weeds are actively growing.

Rate

Ground Applications:

Single stem foliar (woody plants up to 2.5 m in height) – Apply 4 to 8 L/1000 L of water. Spray solution to point of runoff. Do not exceed pressures of 140 kPa (200 psi).

Low volume foliar (woody plants up to 2.5 m in height) – Apply 1 to 5 L/100 L of water. Thoroughly wet foliage but not to the point of runoff.

Broadcast foliar (broadleaf weeds) – Apply 0.4 to 1.6 L in a minimum of 80 L of water/acre; (woody plants) – Apply 1.6 to 3.2 L in a minimum of 80 L of water/acre.

Basal Bark Applications:

Use Garlon 4 in oil mixtures (mineral or vegetable oils). Add Garlon 4 to the required amount of oils and mix thoroughly. Read and follow the use directions and precautions on the oil manufacturer's label. Apply at anytime, including winter, except when snow or water prevents spraying at the ground line.

One-sided low volume (woody plants with stems less than 15 cm in diameter) – Apply 20 to 30 L in enough oil to make 100 L. Spray solution at recommended pressure of 70 to 210 kPa (10 to 30 psi). Spray at least one side of each stem to wet the lower 30 cm down to the root collar.

Streamline – to control woody plants use 20 to 30 L in enough oil to make 100 L. Spray solution at recommended pressure of 70 to 210 kPa (10 to 30 psi). Apply sufficient spray to one side of stems less than 8 cm in basal diameter to form a band 5 cm in width. For stems 8 to 15 cm in diameter, treat both sides of the stem. Direct spray 30 to 50 cm above ground level.

Cut stump treatment – Apply 20 to 30 L in enough oil to make 100 L. Spray solution at recommended pressures of 70 to 210 kPa (10 to 30 psi). Thoroughly wet the outer portion at the cut surface and sides of the stump, including root collar area, but not to the point of runoff. Treat all cut stems in a clump.

Aerial Applications

May be applied by air for control of woody plants on rights-of-way, industrial sites and military bases. See label for information on required buffer zones for aquatic areas and sensitive wildlife habitats. Apply 1.6 to 3.2 L/acre in a minimum of water volume of 12.2 L/acre. Use higher application rates when plants are dense or under drought stress.

Restrictions

Grazing:

	Required Interval (in days) between treatment and grazing	
	Lactating Dairy Animals	Other Livestock*
Up to 1.9 L/acre	14	No restrictions
1.9 to 3.2 L/acre	60	14

* If less than 25% of grazing area is treated, there is no grazing restriction.

Haying:

	Required Interval (in days) between treatment and harvesting	
	Lactating Dairy Animals	Other Livestock*
Up to 1.9 L/acre	60	7
1.9 to 3.2 L/acre	60	14

* For meat animals, withdraw livestock from grazing treated grass or consumption of treated hay at least 3 days prior to slaughter.

Storage: Do not freeze.

Precautions

This product is highly toxic to fish, aquatic plants and aquatic invertebrates. Keep out of wetlands, lakes, ponds, streams, rivers and wildlife habitats at the edge of water bodies. Maintain a buffer zone and avoid drift into sensitive terrestrial and aquatic habitats like shelterbelts, wetlands, sloughs, dry slough borders, non-target wooded areas and vegetative areas adjacent to water.

How it Works

The active ingredient triclopyr is in the pyridine family of herbicides. It is absorbed by foliage and stems and accumulates in growing points interfering with cell division causing elongation, leaf cupping, stem distortion and eventual death.

Hazard Rating

Caution, Poison

Glyphosate

Company and Formulation

Product Name	PCP #	Company	Salt*	Formulation
Roundup Dry Water Soluble	24874	Monsanto	MA	68.5%
Credit	25866	Nufarm	IPA	356 g/L
Vantage	26172	Dow	IPA	356 g/L
Vantage Plus Max	27615	Dow	IPA	480 g/L
Razor TMP**	26706	Nufarm	IPA	480 g/L
Catena	27199	Monsanto	IPA	360 g/L
Roundup Weathermax with Transorb 2	27487	Monsanto	K+	540 g/L
Roundup Ultra	27764	Monsanto	K+	540 g/L

* Salt type: IPA = Isopropylamine, MA = Monoammonium, K+ = Potassium.

** Razor TMP is being discontinued in 2006. Product available while stocks last.

Use

Non-crop areas including rights-of-way, recreational, industrial and public areas (i.e. railroad, pipeline, highway, power and telephone rights-of-way, petroleum tank farms and pumping installations; roadsides, storage areas, lumberyards, fence rows, industrial plant sites, parking areas, school yards, parks, golf courses, other public areas, airports).

Weeds Controlled

Annual Weeds: blue grass, crab grass, downy brome, giant foxtail, green foxtail, Persian darnel, volunteer barley, volunteer corn, volunteer wheat, wild oats, fleabane, flixweed, hempnettle, kochia, lady's thumb, narrow leaved hawk's beard, narrow leaved vetch, prickly lettuce, common ragweed, redroot pigweed,

Russian thistle, shepherd's purse, sowthistle, stinkweed, volunteer canola, volunteer flax, wild buckwheat, wild mustard.

Perennial Weeds: Canada blue grass, Kentucky blue grass, smooth brome grass, common cattail, foxtail barley, quackgrass, yellow nutsedge, alfalfa, cotton top, curled dock, dandelion, field bindweed, hemp dogbane, hoary cress, knotweed, milkweed, poison ivy, purple loosestrife, sow thistle, Canada thistle, toad flax, wormwood.

Brush: alder, birch, broadleaved meadowsweet, Canadian rhododendron, cedar, cherry, Douglas fir, hemlock, maple, mountain-fly honeysuckle, pine, poplar, raspberry/salmonberry, sheep laurel, western snowberry, sweet fern, willow, withrod.

Rates, Timing and Water Volume (ground application)

Annual Grasses and Broadleaves:

Product	Boom Application		Hand Held High Volume % Solution	Comments: Always add 0.5% v/v of an approved surfactant
	Rate/acre	Water vol. (L/acre)		
Razor TMP, Vantage Plus Max	0.68-1.04 L	20-40	0.75-1.0	Actively growing weeds
Roundup Dry	0.47-0.73 kg	20-40	0.5	
Catena	1.4-1.8 L	20-40	1.0	
Roundup Weathermax with Transorb 2, Roundup Ultra	0.6-0.93 L	20-40	0.67	
Vantage, Credit	0.9-1.4 L	20-40	1.0	

Perennial Weeds

Quackgrass:

Product	Boom Application		Hand Held High Volume % Solution	Comments: Always add 0.5% v/v of an approved surfactant
	Rate/acre	Water vol. (L/acre)		
Razor TMP, Vantage Plus Max	0.76 L *1.4-2.1 L	20-120 *20-120	0.75-1.0 *1.5-2.0	Actively growing weeds *Higher rate for long term control or heavy infestations
Roundup Dry	0.52 kg *1.0-1.5 kg	20-120 *20-120	0.5 *1.0	
Catena	1.8-2.8 L	20-120	2.0	
Roundup Weathermax with Transorb 2, Roundup Ultra	0.66 L *1.26-1.86 L	20-120 * 20-120	0.67 *1.34	
Vantage, Credit	1.0 L *1.9-2.8L	20-120 *20-120	1.0 *2	

Canada Thistle (bud stage):

Product	Boom Application		Hand Held High Volume % Solution	Comments: always add 0.5% v/v of an approved surfactant
	Rate/acre	Water vol. (L/acre)		
Razor TMP, Vantage Plus Max	1.4-2.1 L	40-120	1.5-2.0	Higher rate for long term control or heavy infestations
Roundup Dry	1.0-1.5 kg	40-120	1.0	
Catena	1.8-2.8 L	40-120	2.0	
Roundup Weathermax with Transorb 2, Roundup Ultra	1.26-1.86 L	40-120	1.34	
Vantage, Credit	1.9-2.8 L	40-120	2	

Purple loosestrife :

Product	Boom Application		Hand Held High Volume % Solution	Comments: always add 0.5% v/v of an approved surfactant
	Rate/acre	Water vol. (L/acre)		
Razor TMP, Vantage Plus Max	1.8 L	120-240	0.75-1.5 (or 26%*)	See instructions for purple loosestrife application on individual labels. *for wiper application
Roundup Dry	1.25 kg	120-240	0.5-1.0 (or 17%*)	
Catena	2.4 L	120-240	1-2 (or 33%*)	
Roundup Weathermax with Transorb 2, Roundup Ultra	1.6 L	120-240	0.67-1.34 (or 22%*)	
Vantage, Credit	2.4 L	120-240	1-2 (or 33%*)	

Other Perennials :

Product	Boom Application		Hand Held High Volume % Solution	Comments: always add 0.5% v/v of an approved surfactant
	Rate/acre	Water vol. (L/acre)		
Razor TMP, Vantage Plus Max	2.1-3.6 L	40-120	1.5 – 2.0	Summer through fall is optimum
Roundup Dry	1.5-2.5 kg	40-120	1.0	
Catena	2.8-4.8 L	40-120	2.0	
Roundup Weathermax with Transorb 2, Roundup Ultra	1.9-3.2 L	40-120	1.34	
Vantage, Credit	2.8-4.8 L	40-120	2.0	

Brush and Trees

Birch, Cherry, Poplar, Western Snowberry, (Willow – Vantage Plus Max):

Product	Boom Application		Hand Held High Volume % Solution	Comments: always add 0.5% v/v of an approved surfactant
	Rate/acre	Water vol. (L/acre)		
Razor TMP, Vantage Plus Max	0.88-1.80 L	40-120	0.75-2.0	Summer through early fall.
Roundup Dry	0.62-1.25 kg	40-120	0.5-1.0	
Catena	1.20-2.40 L	40-120	1-2	
Roundup Weathermax with Transorb 2, Roundup Ultra	0.8-1.6 L	40-120	0.67-1.34	
Vantage, Credit	1.20-2.40 L	40-120	1-2	

Maple, Raspberry, Salmonberry, Alder, Willow:

Product	Boom Application		Hand Held High Volume % Solution	Comments: always add 0.5% v/v of an approved surfactant
	Rate/acre	Water vol. (L/acre)		
Razor TMP, Vantage Plus Max	1.80 L	40-120	1.5 – 2.0	Late summer through early fall. Fall is optimum.
Roundup Dry	1.25 kg	40-120	1.0	
Catena	1.80-4.8 L	40-120	2	
Roundup Weathermax with Transorb 2, Roundup Ultra	1.6 L	40-120	1.34	
Vantage, Credit	2.4 L	40-120	2	

Pine, Hemlock, Douglas Fir:

Product	Boom Application		Hand Held High Volume % Solution	Comments: always add 0.5% v/v of an approved surfactant
	Rate/acre	Water vol. (L/acre)		
Catena	2.0-4.8L	40-120	2	Use higher rates for larger, more established plant communities, heavy infestations or if plants are stressed.

Tank Mixes

Residual Control of Annual and Perennial Weeds :

Product	Boom Application		Comments:
	Rate/acre + 1.0-2.24 kg Simazine 80W OR 1.6-3.6 L Simadex	Water vol. (L/acre)	
Razor TMP, Vantage Plus Max	0.76-3.56 L	80-160	always add 0.5% v/v of an approved surfactant Do not apply to coarse, sandy or gravelly soil. One application/year. Use according to most restrictive label for each product in the mixture. For other simazine formulations registered for industrial/non-crop areas, use equivalent rates (ie 0.85-1.80 kg/acre).
Roundup Dry	0.52-2.51 kg	80-160	
Catena	1.2-4.8 L	80-160	
Roundup Weathermax with Transorb 2, Roundup Ultra	0.66-3.20 L	80-160	
Vantage, Credit	1.0-4.8 L	80-160	

Restrictions

Application: Do not mix, store or apply this product or spray solutions of this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Aerial Application: for woody bush control on industrial rights-of-way only. See individual labels (see chart below).

Environment: glyphosate is very toxic to non-target plants.

Ground Applications – Maintain a 15 m buffer zone from the downwind edge of the spray boom to non-target areas to minimize drift damage.

Industrial Rights-of-Way Aerial Applications – Maintain a 25 m buffer zone from water and wetland areas and a 55 m buffer zone from shelterbelts, woodlots and other cover on the edge of treated areas.

Aerial Application

For Industrial Rights-Of-Way Only on Weeds, Woody Brush and Trees

Product	Boom Application		Comments:
	Rate/acre	Water vol. (L/acre)	
Razor TMP, Vantage Plus Max	0.92-1.80 L*	12-40	always add 0.5% v/v of an approved surfactant *Use higher rate for maple, willow (suppression only) and alder species, as well as for hard to control perennial weed species.
Roundup Dry	0.62-1.25 kg*	12-40	
Catena	1.2-4.8 L*	8-40**	**When application rates exceed 2.4L/acre use 20-40L/acre of water.
Roundup Weathermax with Transorb 2, Roundup Ultra	0.8-1.6 L*	12-40	
Vantage, Credit	1.2-2.4 L*	12-40	

How it Works

Glyphosate is a non-selective, systemic herbicide which moves from treated foliage into roots and kills the entire plant. Visual effects include gradual wilting and yellowing of the plant which advance to complete browning of

the above ground growth and deterioration of underground plant parts. Effects may not be visible for 7 to 10 days after application.

Effects of Growing Conditions

Best results are achieved when temperatures are near 20°C and when weeds are actively growing. Frost which kills more than 40% of the above ground tissue will reduce control. Control will also be reduced if foliage is heavily covered with dust.

Hazard Rating

Caution, Eye Irritant (Catena)
Caution, Poison; Danger, Corrosive to Eyes (Roundup Dry)
Danger, Eye and Skin Irritant (Roundup Ultra, Vantage Plus Max)
Caution, Poison; Warning, Eye and Skin Irritant (Roundup Weathermax w/ Transorb 2)
Caution, Irritant (Vantage, Credit)

Gramoxone

Company

Syngenta Crop Protection Canada, Inc.

Formulation

200 g/L paraquat,
Container sizes: 1 L, 5 L, 10 L, 55 L, 110 L, 415 L

Use

Weed control, chemical mowing and brush control in industrial sites and rights-of-way.

Restricted Use

Aquatic weed control.

Weeds Controlled

Annual grasses and broadleaf weeds and top growth of perennial weeds.

Aquatic Weeds: cattails, bulrushes and emerged grasses, pond weeds, duckweed and bushy naiad

Brush: balsam fir, black spruce, cedar, red pine, scotch pine and tamarack

Timing

Industrial sites and rights of way: Apply to emerged weeds and grasses. Thorough coverage with the spray is essential. Annuals are killed but perennials will re-grow and a second application may be required.

Aquatic areas: Apply when cattails and bulrushes are flowering and to other grasses when necessary.

Brush control: Apply between mid-May and late September.

Rates and Water Volume

Weeds: Apply 2.2 to 4.4 L/acre in 220 to 440 L/acre of water. Use higher rates and higher water volumes for dense weed growth.

Chemical Mowing: Apply 1.1 L in 220 to 440 L gramoxone/acre of water.

Aquatic Weeds: Apply 2.2 to 4.4 L gramoxone/acre in 340 to 440 L/acre of water

Brush Control: Apply 2.0 to 4.0 L gramoxone/acre in 400 L/acre of water.

Tank Mixes

Brush control: To control stands of conifers and deciduous brush add 10 L of Tordon 101 to 5 to 10 L Gramoxone in 1000 L of water. Thorough coverage is essential for best results.

Restrictions

Application: Do not apply by air. Do not apply through mist blowers.

Grazing: Do not use treated grass for livestock feed.

Storage: Store above 0° C. Store in original container. Do not contaminate foodstuffs, feed or water supply.

Treated Water: Do not use treated water for at least 7 days after treatment for swimming, human or animal consumption. Do not use for at least 5 days after treatment for irrigation.

Environmental Precautions

Maintain buffer zones of 25 and 55 meters to sensitive terrestrial and aquatic areas, respectively.

Tank Cleaning

Wash equipment thoroughly after spraying. Use a wetting agent (Agral 90 at 60 mL/100 L of water), flush and spray out, then thoroughly rinse with clean water. When possible, the equipment should be filled with clean water and left over night. Spray out before storing equipment or using for other materials.

How it Works

The active ingredient paraquat is a contact herbicide that is absorbed into green leaves and

stems where it causes rapid bleaching of green tissue. Plant wilting and desiccation begin within several hours of application, with complete plant death occurring in 1 to 3 days.

Hazard Rating

Danger, Poison
Danger, Corrosive to Eyes

Hyvar XL

Company

E.I. Dupont Canada Company, distributed by Truenorth Specialty Products.

Formulation

0.24 kg/L bromacil formulated as a water soluble liquid. Container size: 4 x 4 L

Use

Annual and perennial weed control as well as brush control in non-crop areas such as railway, highway and pipeline rights-of-way, storage areas, lumber yards, etc. where bare ground is desired.

Weeds Controlled

Annual and perennial grasses, annual broad-leaved weeds such as crabgrass, foxtail, pigweed, ragweed, dandelion, quackgrass and wild carrot.

Brush Controlled

Alder, ash, maple, aspen poplar, sumac, balsam poplar, oak, cherry, elm, basswood, hawthorn, willow, birch, spruce, dogwood, hemlock and pine.

Timing

Weed control: Apply just before or during period of active weed growth. Do not apply when ground is frozen.

Brush control (grid or basal spot treatment): Apply in spring or summer.

Rates and Water Volume

Grass and Broadleaf Weed Control:

Remove dense foliage prior to application to obtain good soil coverage. Apply 12 to 18 L/acre. Use higher rate on soils with 5% or greater organic matter. For application with a hand gun sprayer, use at least 640 L/acre of water.

Retreatment – 7 to 8.9 L/acre when weeds reappear.

Small Areas – 450 mL/100 square meters in sufficient water for good coverage.

Brush Control:

Undiluted Spot Treatment - Using an exact delivery hand gun application, apply a thin stream of a predetermined volume of undiluted Hyvar X-L at a rate of one 8 mL deposit directed at the base of brush (root collar area) up to 1 m tall; 2 deposits on either side of brush up to 2 m tall; 3 deposits around 3 m brush and 4 to 5 deposits on taller brush. An extra 8 mL deposit may be necessary to control Ash.

Undiluted Grid Treatment - Apply 8 mL on a 1 – 1.2 m grid for large areas requiring non-selective brush control.

Diluted Spot or Grid Treatment - Mix 1 L of Hyvar X-L with 5 L water. Using backpack or large volume spraying equipment, apply as above using 55 mL rather than 8 mL deposits.

Restrictions

Storage: Keep away from heat and open flame and do not store below -17°C. Store in original container only, away from other pesticides, fertilizers, food or feed. Not for storage or use in or around the home.

Precautions

Do not apply, or drain or flush equipment on or near desirable vegetation. Do not apply where desirable tree roots may have extended or to locations where the chemical may be washed or move into the root zone of desirable vegetation. Do not use on lawns, walks, driveways, tennis courts or similar areas.

How It Works

Bromacil inhibits photosynthesis. It is absorbed mainly through the roots, with slight absorption through the leaves and stems.

Karmex DF

Company

E.I. Dupont Canada Company, distributed by TrueNorth Specialty Products.

Formulation

80% diuron, formulated as a dispersible granule.

Use

Total vegetation control in non-crop areas.

Restricted Use: Aquatic vegetation control in irrigation and drainage ditches.

Weeds

Annual and perennial grasses, and herbaceous weeds such as dandelion, goldenrod, thistle, milkweed, plantain and wild carrot. Aquatic weeds such as naiads, pondweed, duckweed, bladderwort, Chara and also algae, including filamentous algae.

Tank Cleaning

Thoroughly clean application equipment immediately after use. Flush tank, pump, hoses and boom with several changes of water after removing nozzle tips and screens (clean these parts separately).

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating

Hyvar X-L – Danger, Poison

Rates and Timing

General Weed Control: 5.7 to 10.9 kg/acre on sand or sandy loam soil. 16.2 to 22.3 kg/acre on clays or high organic soils.

Use lower rate within respective soil classification to control annuals for one season. Use higher rate to control perennials for more than one season. To extend control, a follow-up treatment of 1.1 kg may be used to control annual weeds and weed seedlings.

Spot Treatment: To control deep rooted perennials (ie toadflax, couchgrass) apply 0.75 to 1.0 kg/100 square meters. Re-treat as necessary. Apply at any time, except when ground is frozen, providing soil is moist. For best results apply shortly before weed growth begins. Dense growth should be removed before treatment.

Irrigation and Drainage Ditches – 9.3 to 27.1 kg/acre (0.25 to 0.75 kg/100 square meters). Apply in non-crop season when ditch is not in use. To avoid movement of Karmex with irrigation water, apply before expected seasonal rainfall and if possible when soil is still moist. If rainfall has not totaled 10 cm (4 inches) following treatment and before use of irrigation

ditch, fill with water and allow to stand for 72 hours. Drain off and waste remaining water before using ditch.

Ponds and Dugouts – 2.6 to 10.1 kg/acre to water which is 3.3 feet (1 m) deep. Do not exceed a seasonal total of 10.1 kg/acre. Lower rates control algae for several weeks. Use higher rates for aquatic weed control and extended algae control. Apply in a minimum of 40 gallons/acre (180 L/acre). Apply early in season as a spray to the water surface.

Restrictions

Application: Do not apply by air.

Grazing: Do not graze treated areas or cut for hay.

Storage: Store in original container, away from food, feed, other pesticides and fertilizers.

May be frozen.

Treated Water: Do not use water from treated ponds for irrigation within one year. Do not use in water producing fish for human consumption.

Precautions

Do not use in domestic water supplies. Do not treat any ditch area into which roots of trees or other desirable plants may extend.

How It Works

Diuron inhibits photosynthesis. It is a systemic herbicide that is absorbed mainly by the roots.

Hazard Rating

Warning, Eye Irritant

Krovar 1

Company

E.I Dupont Canada Company, distributed by TrueNorth Specialty Products.

Formulation

40% bromacil, 40% diuron formulated as a dry flowable.

Container size: 20 kg

Use

For total vegetation control in non-crop areas (railroad and pipeline rights-of-way, industrial plant sites, lumber yards, petroleum tank farms and storage areas).

Weeds

Annual and perennial grasses (crabgrass, foxtail) and annual broadleaved weeds (pigweed, ragweed, wild carrot, dandelion).

Timing

Apply just before or during period of active growth of weeds. If dense foliage is present, results will improve if vegetation is removed before treatment. Moisture is required to move chemical into the root zone through rainfall or

artificial means. Do not apply when ground is frozen.

Rate

5.4 to 7.2 kg/acre in enough water to thoroughly cover the area to be treated. Use the higher rate on soil with 5% or greater organic matter. Use only the lower rate, 5.4 kg/acre, on sand or sandy loam soils. For small areas, use 180 g/100 square meters (120 square yards).

Re-treatment: Apply 2.7 to 3.6 kg/acre when annual weeds and grasses reappear.

Water Volume

Apply in a minimum of 20 L of water per 1 kg of Krovar 1.

Tank Mixes

2.7 to 3.6 kg/acre Krovar 1 + 0.05 kg/acre of Telar will control Canada thistle, field horsetail, kochia, Russian thistle, dandelion and other broadleaved weeds controlled by Telar. Add a non-ionic surfactant registered for use with Telar at a rate of 1 L/1000 L with this tank mix.

Restrictions

Application: Do not apply by air. Not for residential use.

Precautions

Do not apply or drain or flush equipment near desirable trees or other plants or on areas where their roots may extend or in areas where the chemical may be washed or moved into contact with their roots.

How It Works

Bromacil inhibits photosynthesis. It is absorbed mainly through the roots, with slight absorption through the leaves and stems.

Tank Cleaning

Thoroughly clean equipment after use. Flush

tank, hoses, pump and boom with several changes of water after removing nozzle tips and screens. Clean nozzle tips and screens separately.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating

Danger, Eye Irritant

MCPA Ester 500

Company

Nufarm, UAP

Formulation

500 g/L MCPA ester formulated as an emulsifiable concentrate. Container size 10 L. (There are other MCPA products on the market that may not be legal for industrial applications. If you are in doubt contact your local PMRA office.)

Use

Broadleaf weed control on roadsides and vacant lots.

Weeds Controlled

Susceptible weeds include: burdock, cocklebur, field pennygrass, flixweed, kochia, lamb's-quarters, mustard (except dog & green tansy), prickly lettuce, ragweeds, Russian pigweed, shepherd's purse, annual sunflower, vetch, wild radish, field horsetail*, hoary cress*, plantain*.

Hard to kill weeds include: biennial wormwood, bluebur, dog mustard, field peppergrass, hairy galinsoga, hemp nettle, goatsbeard, oakleaf goosefoot, dandelion, redroot pigweed, smartweed, annual sow thistle, sweet clover, tartary buckwheat, tumbleweed, blue lettuce*, Canada thistle*, burdocks*, field bindweed*, gumweed*, hedge bindweed*, lady's thumb*, perennial sow-thistle*, tansy*.

* top growth control only.

Timing

Apply when weeds are young and actively growing. Deep-rooted perennials (i.e. bindweed) Canada thistle, may require additional applications as new growth appears.

Rate and Water Volume

Roadsides and general weed control: 1.6 L/acre. Use sufficient water to ensure uniform coverage.

Spot treatment (knapsack application): Mix 200 mL/10 L of water. Wet all foliage thoroughly.

Precautions

Vegetables, flowers, fruit trees, special crops and other desirable plants are sensitive to MCPA even in minute quantities. Care should be taken to avoid spraying these types of plants or allowing spray mist to drift onto these plants during both their growing and dormant periods.

Restrictions

Grazing: Allow 7 days between applications of product and grazing/cutting for hay.

How it Works

MCPA is a systemic herbicide that is absorbed through foliage and roots and is trans-located to actively growing areas of the plant. Symptoms include bending and twisting of leaves and

stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Hazard Rating

Warning, Poison

MCPA Ester 600

Company

Nufarm: Nufarm MCPA Ester 600

UAP: Checkmate MCPA Ester 600

IPCO: IPCO MCPA Ester 600

Formulation

600 g/L MCPA ester formulated as an emulsifiable concentrate. Container size 10 L (There are other MCPA products on the market that may not be legal for industrial applications. If you are in doubt contact your local PMRA office.)

Use

Broadleaf weed and brush control on roadsides.

Weeds Controlled

Susceptible weeds include: burdock (before the 4-leaf stage), cocklebur, flixweed*, lamb's-quarters, mustard (except dog & tansy), plantain, prickly lettuce, ragweeds, Russian pigweed*, shepherd's purse*, stinkweed, vetch, wild radish, wild annual sunflower.

* use the higher rate in the rate range.

Hard to control weeds include: annual sow thistle, biennial wormwood, blue lettuce*, bluebur, corn spurry*, curled dock, dandelion, dog mustard, field bindweed*, field horsetail*, field peppergrass, goatsbeard, gumweed, hairy galinsoga, hedge bindweed*, hemp nettle (before the 4-leaf stage), hoary cress*, kochia, lady's thumb*, leafy spurge*, oakleaf goosefoot, perennial sow-thistle*, purslane, Russian knapweed*, Russian thistle, smartweed*, sweet clover (seedling), tansy mustard, tartary buckwheat.

* top growth control only.

Timing

Apply when weeds are young and actively

growing usually May, June and/or September. Spray brush species up to 3 m. tall after foliage is well developed. Under conditions of good growth and adequate soil moisture, sprays can be applied up to 2 weeks before normal frost time.

Rate and Water Volume

Roadsides and general weed control – 0.56-1.12 L/acre. Use in 40-120 L of water/acre. Use higher rate to control perennial weeds. A second application may be required.

Woody growth in non-grazing areas – 0.72-1.48 L/acre in at least 40 L of water/acre to ensure complete coverage. Use the lower rate for more susceptible species (ie chokecherry, western snowberry and willow).

Precautions

Vegetables, flowers, fruit trees, special crops and other desirable plants are sensitive to MCPA even in minute quantities. Care should be taken to avoid spraying these types of plants or allowing spray mist to drift onto these plants during both their growing and dormant periods.

Environmental Precautions

Avoid contamination of ponds, streams, rivers and other water sources. These products contain petroleum distillate which is moderately to highly toxic to aquatic organisms.

Restrictions

Grazing: Allow 7 days between applications of product and grazing/cutting for hay.

Application: Do not apply IPCO MCPA Ester 600 by air for control of woody growth.

How it Works

MCPA is a systemic herbicide that is absorbed

through foliage and roots and is trans-located to actively growing areas of the plant. Symptoms include bending and twisting of leaves and stems within 2 to 7 days, followed by browning and plant death 3 to 4 weeks after application.

Hazard Rating

Warning, Poison

Milestone – Aminopyralid Herbicide

Company

Dow AgroSciences

Formulation

240 g/L aminopyralid. Container sizes: 10 L

Use

For control of broadleaf weed and woody plants in industrial and other non-crop areas.

Timing

Apply when weeds are small and actively growing.

Rates and Weeds Controlled

Rate (L/acre)	Weeds Controlled	Weeds Suppressed
0.10		Canada thistle, spotted knapweed
0.12	Canada thistle, spotted knapweed	Canada goldenrod, scentless chamomile
0.15	Weeds listed above plus scentless chamomile	Canada goldenrod, absinth wormwood
0.20	Weeds listed above plus absinth wormwood	Canada goldenrod, common tansy, dandelion

Tank Mixes

Rates/acre	Weeds Controlled
0.12 L Milestone + 350 g.ae 2,4-D Amine	Annual sow thistle, blue bur, burdock (> 4 leaf), cocklebur, common plantain, flixweed, goat's beard, prickly lettuce, ragweeds, stinging nettle, sweet clover, curled burdock (> 4 leaf), hawkweed, peppergrass, Canada thistle (season long), spotted knapweed, scentless chamomile, Canada goldenrod, blue lettuce (top growth), bull thistle, buttercup, gum weed, hoary cress, perennial sowthistle.
0.15 L Milestone + 450 g.ae 2,4-D Amine	All weeds listed above plus season long control of absinth wormwood, dandelion.
0.20 L Milestone + 600 g.ae 2,4-D Amine	All weeds listed above plus season long control of western snowberry, common tansy.

Water Volume

Aerial: Apply recommended rates in a minimum spray volume of 8 L/acre. Refer to the tank-mix partner label for additional instructions and precautions.

Ground: Apply in a minimum of 42 L/acre of water.

Restrictions

Aerial: Do not apply during periods of dead calm or when wind speed is greater than 16 km/h. Do not apply with spray droplets smaller than ASAE coarse classification.

Application: Do not apply more than 0.20 L/acre per annual growing season. Only one application per growing season is permitted. Do not apply on domestic or commercial turf grass. Do not apply to fresh water habitats (lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs, and wetlands), estuaries or marine habitats.

Buffer Zones Requirements: (see additional information on buffer zone requirements on the label). When using a tank mix, observe the most restrictive buffer zone of the products involved in the tank mix. *For applications to rights-of-way, buffer zones for protection of sensitive terrestrial habitats are not required. Best application strategies which minimize off-site drift should be used. Applicators must observe buffer zones for protection of sensitive aquatic habitats.*

Grazing: Allow 3 days of grazing on an untreated pasture (or feed untreated hay) before transferring livestock to areas where sensitive broadleaf crops may be grown.

Ground: When using a field sprayer, a buffer zone of 10 m is required for the protection of non-target terrestrial and aquatic habitats. The buffer zone can be reduced by 70% when using shrouds or 30% when using cones.

Storage: Do not ship or store with food, feed drugs or clothing.

Spray Quality	Buffer zone (m) required for the protection of non-target terrestrial and aquatic habitat	
	Aircraft Type	
	Fixed Wing	Rotary Wing
ASAE Coarse (VMD = 385.22µm)	175	150
ASAE Coarse-Very Coarse (VDM = 439.39µm)	125	100
ASAE Very Coarse (VDM = 477.94µm)	100	90
ASAE Very Coarse-Extremely Coarse (VDM = 521.38µm)	80	70

How it Works

The active ingredient aminopyralid is a systemic herbicide that is absorbed by foliage and stems and accumulates in growing points interfering with cell division causing elongation, leaf cupping, stem distortion and eventual death.

Hazard Rating

Caution, Poison

Reglone Desiccant, Reward

Company

Syngenta Crop Protection Canada, Inc.

Formulation

240 g/L diquat formulated as a solution.

Reglone Desiccant: Container sizes: 10 L, 110 L and bulk.

Reward: Container sizes: 1 L, 3.78 L and 5 L.

Use

Reglone Desiccant: for top kill of weeds in non-crop land and chemical mowing.

Reward (Restricted Use): for aquatic weed control and temporary control of algae in still or slow flowing water of farm dugouts, farm ponds, farm ditches, lakes and canals.

Weeds Controlled

Reglone Desiccant: broadleaf and grass weeds.

Reward: *Water Weeds* – coontail (*Ceratophyllum* sp.), duckweed (*Lemna* sp.), Canada water weed (*Elodea*, *Anacharis* sp.), pondweeds (*Potamogeton* sp.) and water milfoil (*Myriophyllum* sp.).

Algae – *Cladophora*, *Spirogyra* and *Pithophora* spp. Reward will NOT control *Chara* (stonewort, muskgrass).

Timing

Apply when weeds are visible and in active stage of growth, normally in late May through June. Application to dense growth of mature weeds will not give satisfactory control.

Rate

Non-crop Weed Control and Chemical Mowing: Apply 0.93 to 1.82 L/acre. Use higher rate for dense weed growth. Use Agral 90 at a rate of 1.0 L/1000 L of spray mix.

Aquatic Weed Control (Reward):

For weeds growing in 1.5 m of water or less, apply 7.4 L/acre. 1.9 L will treat a farm dugout 25 m x 50 m (82 ft x 164 ft). Milfoil may be controlled at 3.7 L/acre in early stages of growth. For weeds growing in more than 1.5 m of water, apply 10.1 to 11.8 L/acre. For

temporary control of water weeds growing above the water surface (ie) waterlilies, apply a uniform spray of Reward at 3.7 to 10.7 L in 680 to 880 L of water/acre. Use Agral 90 at 1 L/1000 L of water.

Water Volume

Non-crop Weed Control and Chemical Mowing: *Reward* - Apply in a minimum of 90 L/acre of water. Do not exceed solution strength of 200 mL Reward in 10 L of water.

Reglone Desiccant - Apply a spray volume of 220 to 440 L/acre. Use higher rates and water volumes for dense weed growth. Thoroughly wet foliage.

Aquatic Weed Control: *Reward* - For injection below the water surface, dilute 1 part Reward with 10 parts clean water. For surface application, dilute 1 part Reward with 4 parts clean water.

Restrictions

Application: Do not apply by air. Do not apply through mist blowers.

Storage: Do not freeze. Store in original container. Do not contaminate food, feed or water.

Treated Water: Do not use treated water for at least 24 hours after treatment for swimming or animal consumption. Do not use for human consumption or irrigation for at least 5 days after treatment.

Precautions

Excessive exposure to diquat may cause a health hazard. Follow directions and precautions on the label to reduce exposure. To protect fish in small ponds, do not treat more than 1/4 to 1/3 of the area at one time, as oxygen deprivation may result when large areas are treated at once.

Do not drift onto non-target vegetation.

For the use of Reward, a permit may be required by Manitoba Conservation. See page 4 for information.

How it Works

The active ingredient diquat is a non-selective contact herbicide that is absorbed by the foliage. Wilting and drying begin several hours after application with plant death occurring in 1 to 3 days of application.

Tank Cleaning

Thoroughly wash spray equipment after application using a wetting agent (Agral 90 at 60 mL/100 L of water), flush and spray out then thoroughly rinse with clean water. When

possible, equipment should be filled with clean water and left overnight. Spray out before storage or using other materials.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating

Caution, Poison
Warning, Skin Irritant, Potential Skin Sensitizer

Simazine 480, Simadex 500

Company

Bayer CropScience (distributed by True North Specialties): Simadex 500

United Agri Products: Simazine 480

Formulation

Simazine 480: 474 g/L simazine, 6 g/L related actives formulated as a liquid. Container size: 9.46 L

Simadex 500: 500 g/L simazine formulated as a liquid. Container size: 10 L

Use

For total weed control and bare ground maintenance on non-crop land.

Weeds Controlled

Kills and prevents re-growth of most annual and perennial broadleaf and grass weeds that are found on non-cropped land. Some naturally occurring triazine tolerant biotypes of broadleaf weeds may not be controlled by simazine alone. Some weeds (i.e. horsetail, milkweed and sedges) may require more than one treatment.

Timing

In Manitoba, apply in August to freeze-up to control perennial weeds.

Rate

	Simadex 500		Simazine 480	
	L/acre	L/100 m ²	L/acre	L/100 m ²
Perennial seedlings	9.0	0.225	9.4	0.235
Light growth of shallow rooted perennials	14.0	0.350	14.6	0.365
Well established perennials	18.0	0.450	18.8	0.470

Spot Treatment

Apply 47 to 57 mL Simazine 480 or 45-55 mL Simadex 500 in 5-10 L of water and to 10 m² of infested area.

Application Information

Water Volume:

Apply uniformly in 100 to 800 L of water/acre (5 to 50 L/100 m²). Use higher volume where old vegetation is dense or obstructions frequent.

Pressure: 200-300 kPa

Nozzle screens: 50 mesh size or larger

Restrictions

Application: Do not apply by air. Do not apply when ground is frozen or snow covered.

Storage: Do not freeze.

How it Works

Simazine is a residual systemic herbicide which is absorbed by the roots. Photosynthesis is blocked.

Effects of Growing Conditions

Rainfall is required to move the chemical into the root zone of weeds. Effects on weeds may be delayed if soil is dry at time of application.

Hazard Rating

Caution, Poison

Telar

Company

E.I. Dupont Company

Formulation

75% chlorsulfuron formulated as a dry flowable granular herbicide contained in water soluble bags. Container size: 500 g (5 x 100 g)

Use

For total vegetation control in industrial sites such as rights-of-way, railroads, airports, plant sites, storage areas, petroleum tank farms, fence-lines and utility sub stations.

Weeds Controlled

Certain annual, biennial and perennial broadleaf weeds (see Rates).

Timing

Apply when weeds are small (less than 10 cm tall), and actively growing.

Rate

6 grams/acre + 2,4-D: annual sunflower, ball mustard, common ragweed, cow cockle, flixweed, green smartweed, hemp nettle, lady's thumb, lamb's quarters, kochia, narrow leaved hawk's beard (spring seedlings), plantain, prickly lettuce, redroot pigweed, Russian pigweed, Russian thistle, shepherd's purse, stinkweed, stork's bill, sweet clover, volunteer

rapeseed, wild mustard.

12 grams/acre: blue bur, chickweed, common groundsel, corn spurry, cow cockle, flixweed, green smartweed, hemp nettle, lady's thumb, lamb's quarters, redroot pigweed, scentless chamomile, shepherd's purse, stinkweed, stork's bill, volunteer rapeseed, wild mustard.

16 grams/acre: weeds controlled at 12 grams/acre plus wild carrot.

28 grams/acre: weeds controlled at 16 grams/acre plus Canada thistle*, common tansy, dandelion*, golden rod*, sweet clover, wild strawberry*, horsetail*, kochia, perennial sowthistle*, Russian thistle, wild rose*. This rate may cause severe damage to certain grass species.

49 grams/acre: weeds controlled at 28 grams/acre plus Canada thistle, dandelion, golden rod*, horsetail, willow*, wild strawberry*, narrow leaved hawk's beard, perennial sowthistle*, wild buckwheat, wild rose*. (* Suppression only)

Water Volume

Spray volume of 80 to 160 L/acre is recommended. Do not use less than 40 L/acre of water.

Tank Mixes

Broadleaf weed control in total vegetation control programs:

Telar + Krovar - Apply 48 g/L Telar + 2.7 to

3.6 kg/acre Krovar and apply when weeds are less than 10 cm tall. A recommended surfactant may be added at 1 L/1000 L of spray solution.

Soil-Active herbicides for total vegetation control:

Telar + 2,4-D - Apply 6 g/acre Telar + 0.32 to 0.44 L/acre 2,4-D amine 500 or 0.24 to 0.32 L/acre 2,4-D Ester LV 700. Addition of recommended surfactant at 1 L/100 L spray solution may improve weed control under adverse conditions.

Restrictions

Application: Do not apply more often than once every 3 years. Do not apply to frozen ground or to soils saturated with water or during periods of heavy rainfall. Do not apply consecutive applications of Telar without alternating with a sequential partner herbicide.

Precautions

Do not apply, drain or flush equipment on or near desirable vegetation or on areas where their roots may extend. Do not use in residential areas or where run-off may carry the herbicide onto agricultural land or other desirable plantings. Do not contaminate any bodies of water including irrigation water.

How it Works

Chlorsulfuron is a selective, systemic herbicide

that is absorbed by the foliage and roots. It acts by inhibiting cell division (growth) in the growing root and shoot tips of sensitive plants.

Tank Cleaning

- 1) Drain and flush tank, boom and hoses with clean water for at least 10 minutes. Inspect tank to assure removal of all visible residues. Repeat if necessary. Do not clean sprayer near well or water source or near desirable vegetation.
- 2) Add 1 L household ammonia*/100 L of water while filling tank. Flush solution through boom and hoses and add more water to fill the tank. Allow to sit for 15 minutes with agitation. Again flush the tank, boom and hoses with the cleaning solution and drain tank.
- 3) Remove nozzles and screens and clean separately in a bucket of cleaning agent and water.
- 4) Repeat step 2.
- 5) Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing water through hoses and boom.

* Do not use ammonia with chlorine bleach. Do not clean tank in an enclosed area.

Hazard Rating

Caution, Poison

Think Purity Algaecide Solution

Company

Axsys Direct Manufacturing, Distributed by Truenorth Specialties

Formulation

5.0% copper as elemental.
Container size: 20 L

Use

Ponds, lagoons, dugouts and potable water tanks.

Weeds Controlled

Algae

Rates

Apply 1 L to 60,000 to 600,000 L of water for prevention of algal bloom. Water condition and extent of active micro-organisms present determines the effective application rate. For permanent algae control maintain 0.5 to 1.0 ppm copper in the water. (Add 1.6 mL/1000 L to increase copper by 0.1 ppm).

Precautions

This product is toxic to copper-sensitive aquatic plants, invertebrates and fish. When fish are present special application procedures must be followed. Do not apply to waters containing fish

without consulting distributor first.
Apply according to Pesticide Use Permit (if required).

How it Works

The active ingredient copper inhibits

photosynthesis. It is absorbed mainly through the cell walls and into the chloroplast.

Hazard Rating

Caution, Poison, Danger Corrosive

Tordon 22K

Company

Dow AgroSciences

Formulation

240 g/L picloram

Use

For control of biennial and deep-rooted perennial weeds on non-crop land areas such as rights-of-way, including electrical transmission and distribution lines, roadsides, railroads and pipelines.

Rates

Weeds	Rate/ acre	Rate/100 m ² *
Scentless chamomile	0.45 L	11 mL
Knapweed (diffuse, spotted)	0.91 L	22 mL
Canada thistle, pasture sage, poverty weed, Russian knapweed, sow thistle	1.8 L	45 mL
Leafy spurge, field bindweed, toadflax	3.6 L	90 mL

* mix with 18 L of water and apply 18 L of spray solution per 100 square m.

Water Volume

Use enough water to wet weeds without run-off, 160 to 320 L of spray solution/acre is usually required.

Restrictions

Application: Do not apply by air.

Grazing: Do not graze lactating dairy animals within 6 weeks of application.

Recropping: Tordon 22 K may persist in the soil for up to 5 years. Do not use on cultivated land. Only licensed pesticide applicators may apply this product as a spot treatment on cultivated land.

Storage: Do not freeze. Do not ship or store with food, foodstuffs, fertilizers, seeds or other pesticides.

Weeds

Canada thistle, perennial sow thistle field bindweed, toadflax, pasture sage, scentless chamomile, knapweed, poverty weed, leafy spurge.

Timing

Apply when weeds are actively growing. To get best results, deep-rooted perennials should have fully developed green leaves at time of application

Spray Drift: Do not allow spray to drift.

Precautions

Tordon 22 K is very persistent and water-soluble. It will carry over in soil. Treated soil should not be moved out of the treated area. Do not apply to soils that are very permeable, have sinkholes or over limestone bedrock. Do not apply to surfaces composed of fractured rock or unconsolidated gravel. Application to these sites may allow herbicide movement to underlying water sources or aquifers. When applying Tordon 22K over sandy soils, ensure that shallow aquifers (less than 1.8 meters to groundwater) do not underlie the area. Do not apply Tordon 22K if shallow aquifers are present.

How It Works

Picloram is a selective systemic herbicide. It is absorbed by roots and leaves and accumulates in new growth interfering with cell division and elongation. Symptoms include leaf cupping, stem distortion and eventual death.

Effects of Growing Conditions

Avoid spraying if temperatures exceed 28°C. Rain within 6 hours of application may cause poor results. Heavy rainfall may dissolve and carry picloram away from target area or may cause dissolved picloram to leach out of the targeted plants' root zone.

Tank Cleaning

The manufacturer does not provide enough

information on tank cleaning to make recommendations. Tordon 22K can be very dangerous to off target vegetation. Use of different sprayers for applying other herbicides is recommended to prevent sprayer contamination. Many broadleaved crops and ornamentals may be severely injured by in-tank picloram residues.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating

Caution, Poison

Tordon 101

Company

Dow AgroSciences

Formulation

65 g/L picloram and 240 g/L 2,4-D. Container sizes: 2 x 10 L, 110 L drum

Use

Control of broadleaf weeds and brush on rights-of-way.

Weeds Controlled

More susceptible: Canada thistle, dandelion and common yarrow

Less susceptible: sweet and red clover, wild carrot, common ragweed, goldenrod, dock, plantain, prickly lettuce, burdock, fleabane and vetch

Brush Controlled

Highly Susceptible: willow, locust, sumac, poplar, aspen, cherry

Less Susceptible: maple, pine, spruce, red oak, oak, brush on heavy clay soils

Timing

Weeds: Apply in spring or early summer after growth appears.

Brush: Apply when leaves are fully developed in spring or early summer and prior to autumn discoloration.

Rate and Water Volume

By Ground:

Broadcast Foliar (weeds) – Apply 1.5 L/acre in 80 L/acre of water to control more susceptible weeds or 2.8 L/acre in 80 L/acre of water to control less susceptible weeds, (see Weeds Controlled).

Broadcast Foliar (brush) – Apply 7.2 to 10 L/acre in 80 L/acre of water.

Directed Leaf-Stem Applications with Single Nozzle application Equipment (brush) – Apply 10 L Tordon/1000 L of water. Spray solution should wet foliage and stems when plants are actively growing for maximum control.

By Air:

Broadcast (brush on rights-of-way) – apply 10 to 14 L/acre in 60 to 80 L/acre of water. Use higher rates for less susceptible species and lower rate for more susceptible species, (see Brush Controlled).

Broadcast (other industrial sites ie, military training sites) – application using lower delivery volumes may be considered.

For faster burndown of coniferous species, use Sylgard 309 Silicone Surfactant at a rate of

0.25% by volume (250 mL/100 L of water). If maximum rainfastness is desired, increase rate to 0.375% (375 mL/100 L of water).

Restrictions

Grazing: Do not apply Tordon 101 at rates higher than 7.2 L/acre to rights-of-way intended for grazing. Do not allow lactating dairy animals to graze areas within 7 days of treatment. Do not harvest forage or cut hay within 30 days of application. Withdraw meat animals from treated areas at least 3 days before slaughter.

Storage: Do not store near food, feed, fertilizers, seeds, other pesticides (herbicides, insecticides, fungicides) intended for use on picloram sensitive crops.

Precautions

Most broadleaved plants are sensitive to picloram. Avoid application to or drifting on desirable plant species during both growing and

dormant periods. Avoid contaminating soil in which desirable plants will be grown. Avoid contaminating bodies of water. Clippings from vegetation treated with Tordon 101 should not be used for composting or mulching, nor should manure from animals grazing treated areas be used around susceptible plants, as picloram residues pass through the animal unchanged and are still herbicidally active.

How it Works

The active ingredients picloram and 2,4-D are selective systemic herbicides. They are absorbed by roots and leaves and accumulate in new growth interfering with cell division and elongation. Symptoms include leaf cupping, stem distortion and eventual death.

Hazard Rating

Caution, Poison

Transline

Company

Dow AgroSciences

Formulation

360 g clopyralid/L
Container size: 4 x 4.45 L

Use

For broadleaved weed control in non-crop areas including rights-of-way (hydro, railroad, communication lines, pipelines) and associated stations, industrial manufacturing sites, storage sites, roadsides, airports, military bases and low maintenance rough turf areas.

Weeds Controlled

Alsike clover, Canada thistle, scentless

chamomile, wild buckwheat, common groundsel, common ragweed, sheep sorrel, ox-eye daisy, perennial sow-thistle, vetch.

Timing

Treat when weeds are actively growing with adequate soil moisture.

Canada thistle, perennial sow-thistle and scentless chamomile: between rosette and pre-bud.

Wild buckwheat: 2-6 leaf stage (up to 15 cm tall).

Common ragweed: 5-10 cm tall.

Vetch (*Vicia* spp.): when stems are 10-15 cm long.

Other weeds: prior to reaching 15 cm in height.

Rate

Weeds Controlled	Rate L/acre
Canada thistle (suppression of top growth for 6-8 weeks), vetch (<i>Vicia</i> spp.), alsike clover.	0.16
Canada thistle (season-long top growth control), scentless chamomile, wild buckwheat, common groundsel, common ragweed, sheep sorrel*, ox-eye daisy*, perennial sow-thistle (top growth).	0.22
Canada thistle (season long control of top growth with a reduction in population in the following year).	0.33

*suppression

Water Volume

Use in enough water to ensure thorough coverage. Use 40-80 L/acre of spray solution.

Tank Mixes

To control Canada thistle, cocklebur, common ragweed, dandelion, lamb's quarters, scentless chamomile, perennial sow thistle, shepherd's purse, stinkweed, tartary buckwheat, wild buckwheat and wild mustard, apply 0.16 to 0.33 L/acre Transline + 168 to 224 g/acre active ingredient 2,4-D or MCPA.

Restrictions

Application: Do not apply by air.

Rainfall: Within 6 hours of application may reduce control.

Storage: Do not freeze. Store away from food, feed, fertilizers, seeds and other pesticides.

Precautions

Do not apply Transline directly to, or otherwise permit it to come in contact with sunflowers, legumes (such as beans, peas, lentils, alfalfa, clover), fruit or vegetable crops, flowers or other desirable broadleaved plants. Take precautions to prevent spray mists containing it from drifting onto them. Transline residues can remain in the soil following the year of use, thereby affecting growth of sensitive plants.

Special precautions should be taken during application to roadsides, pipelines and railways where sensitive vegetation may be present. Do not apply to or allow drift to come into contact with sensitive vegetation such as vetch or clover which may be found on embankments.

How it Works

The active ingredient clopyralid is a selective systemic herbicide that is absorbed by the roots and leaves. It accumulates in the growing points and interferes with cell division and elongation. Symptoms include leaf cupping, stem distortion and eventual death.

Tank Cleaning

Equipment used to apply Transline herbicide should not be used to apply other herbicides to sensitive crops without thorough cleaning.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Hazard Rating

Caution, Poison

Vanquish

Company

Syngenta Crop Protection Canada, distributed by True North Specialty Products.

Formulation

480 g/L dicamba formulated as a liquid. Container size: 10 L

Use

Non-crop areas (roadsides, hydro, pipeline and railway rights-of-way, airports, military bases, wastelands).

Weeds Controlled

Coniferous and deciduous brush species and broadleaf weeds.

Rates and Water Volume

Broadleaf weeds

Species Controlled	Rate/acre (Apply in 44 to 88 L/acre of water)
Absinthe*, Canada thistle*, leafy spurge*, poverty weed*, perennial sow-thistle*, scentless mayweed*	0.5 *controls top growth only
Perennial sow-thistle, common ragweed, false ragweed, giant ragweed, English daisy, goldenrod, tansy ragwort, Canada thistle, field bindweed, curled dock *	0.92 *controls top growth only
Diffuse Knapweed, goat's beard, ground cherry, pasture sage, poverty weed, sheep sorrel, thyme-leafed spurge	1.84
Baby's breath, fringed sage brush, lambkill, velvet grass, bracken fern*, perennial cinquefoil*, Russian knapweed*	3.68 *controls top growth only

Tank Mixes

Species Controlled	Rate/acre. (Apply in 44 to 88 L/acre of water)
Poison ivy	0.68 L Vanquish + 0.88 L 2,4-D amine (500 g/L)
Wild carrot	0.84 L Vanquish + 1.76 L 2,4-D amine (500 g/L)

Brush weeds

Stem Foliage: Apply to foliage and stems to the point of runoff. Complete coverage is essential for effective control. Volume of spray/acre will vary according to height and density of brush

species present. A water volume of 88 to 132 L/acre of water is recommended for brush stands.

Species Controlled	Rate/1000 L of Water
Western snowberry (buckbrush), wolf willow (silver willow), aspen poplar, wild rose, alder, cherry	2.1 L Vanquish + 4.0 L 2,4-D amine (500 g/L formulation) or 2.1 L Vanquish + 3.3 L 2,4-D ester (600 g/L formulation)
Balsam poplar, basswood, birch, elm, hickory, vine maple, black cottonwood, bur oak, red oak, tamarack, spruce, pine, balsam fir, white cedar	4.0 L Vanquish + 8.0 L 2,4-D amine (500 g/L formulation) or 4.0 L Vanquish + 6.6 L 2,4-D ester (600 g/L formulation)

Broadcast Ground Treatment:

Species Controlled	Rate/acre (Apply in 88 to 132 L/acre of water)
White (paper) birch, willow, aspen poplar	1.68 L Vanquish + 3.20 L 2,4-D amine (500g/L formulation) or 1.68 L Vanquish + 2.64 L 2,4-D ester (600g/L formulation)

Roadside Vegetation Control:

	Rate/acre
Annual vegetation control on 1-2 m wide roadside shoulders	0.5-1.0 L Vanquish + 0.3-0.4 Roundup* or 0.3 L Vanquish + 0.48 L 2,4-D amine (500 g/L formulation) + 0.3-0.4 L Roundup* *refer to Roundup label for appropriate rate of Roundup for specific weed control and additional precautions and application instructions.

Application Timing

Apply in spring or early summer to brush species after leaves have fully expanded and stop applications at least 3 weeks prior to leaf colour in fall. For best results and ease of application, cut brush or trees over 2 m in height and treat re-growth when it develops.

Restrictions

Grazing: Treated areas should not be grazed or cut for hay.

Application: Do not apply by air.

Precautions

General: Do not apply on or near desirable trees or other plantings. Apply in the morning or late evening when air temperature is between 10-25 degrees C. Do not contaminate domestic or irrigation waters.

Herbicide Resistance : To delay herbicide resistance rotate the use of Vanquish (or other group 4 herbicides) with different herbicide groups.

Mixing: Do not mix with oils.

How it Works

Vanquish is a growth regulator type of herbicide that is absorbed primarily by foliage but also through plant roots. It is systemic and translocates throughout the plant causing rapid, undifferentiated growth and bending and twisting of stems and leaves resulting in plant death in 2 to 3 weeks.

Hazard Rating

Caution, Poison