

WEED CONTROL

The weed control suggestions in this production guide are based on the assumption that all herbicides mentioned will have a registered label with the Environmental Protection Agency. Herbicides should not be used which are no longer registered or have not yet received registration for sugarbeet. Sugarbeet treated with a non-registered herbicide may have an illegal residue which, if detected, could cause condemnation of the crop. Non-registered herbicide is illegal and a user could be subject to a heavy fine even without detectable residue.

CHEMICAL WEED CONTROL GUIDE FOR SUGARBEET

Herbicide and cost	Form ulation /A (Act. Ingre.d.lb/A)	Weed	When to apply	Remarks
Assure II (Quizalofop) S/A=8.10-10.15	8 to 10 fl oz (0.055 to 0.07)	Annual grasses	Wild oat: 2-6 in. Foxtail: 2-4 in.	Apply with oil adjuvant. Treat quackgrass regrowth with 6 to 7 fl oz/A when 4-8 in. tall
	10 fl oz (0.07)	Quackgrass	Vol. wheat or barley 2- 4 in. 6 - 10 inches	

<p>Betamix (Desmedipham+ Phenmedipham) S/A=9.40-93.75</p> <hr/> <p>Betanex (Desmedipham) S/A=9.40-93.75</p>	<p>0.75 to 7.5 pt (0.12 to 1.2)</p> <hr/> <p>0.75 to 7.5 pt (0.12 to 1.2)</p>	<p>Most annual broadleaf weeds.</p>	<p>Postemergence when broadleaf weeds are from cotyledon to 4 leaf stage. Sugarbeet with less than 4 leaves will tolerate 0.12 to 0.33 lb/A and sugarbeet with 4 or more leaves will tolerate higher rates.</p>	<p>Risk of sugarbeet injury is increased by morning or midday application and by hot, humid, wet environments. Split application with reduced rates has reduced sugarbeet injury and increased weed control compared to single full dose application. See following table for rate adjustment for sugarbeet size, spray pressure and soil-applied herbicide.</p>
<p>Progress (Desmedipham+ Phenmedipham+ Ethofumesate) S/A= 7.50-49.50</p>	<p>0.5 to 3.3 pt (0.12 to 0.75)</p>	<p>Most annual broadleaf weeds.</p>	<p>Postemergence from cotyledon to 4 leaf stage of sugarbeet.</p>	<p>Betamix and Nortron SC can be tankmixed with a 1:1:1 ratio of active ingredients to substitute for Progress. Total rate of desmedipham + phenmedipham + ethofumesate in lb/A should equal the normal rate of desmedipham +phenmedipham for a given situation.</p>

Herbicide and cost	Formulation /A (Act.Ingred.lb/A)	Weed	When to apply	Remarks
<p>Betanex/Betamix/ Progress+UpBeet+ Stinger+methylated seed oil adjuvant S/A=20.25</p> <p>MICRO-RATE</p>	<p>0.5/0.5/0.4 pt + 0.125 oz +1.3 fl. oz. +1.5% v/v (0.08+0.004+ 0.03+1.5%) The Betanex/Betamix/ Progress rate can be increased to 12/12/8.7fl oz/A after sugarbeet has four leaves.</p> <p>PROGRAM</p>	<p>Most annual broadleaf weeds, fair to good annual grass control. Will not control ALS resistant ko chia nor lanceleaf sage.</p>	<p>Apply a minimum of three times starting when sugarbeet is in cotyl to early 2-leaf stage with subsequent treatments at 5 to 7 day intervals.</p>	<p>Timely application is critical to success of micro- rate program. A grass control herbicide at 1/3 normal rate can be added. Precipitation and nozzle plugging has been a problem. Nozzle plugging can be reduced by mixing in warm water, raising water pH to 8 to 9, premixing UpBeet, use of a grass herbicide and frequent cleaning of sprayer.</p>

<p>Eptam (EPTC) \$/A= 9.20-13.60 E</p> <p>\$/A= 16.00-20.00 E 17.85-23.10 G</p>	<p>2.3 to 3.4 pt (2 to 3)</p> <hr/> <p>4 to 5 pt 7E, 17 to 22 lb 20G (3.5 to 4.38)</p>	<p>Annual grasses and some broadleaf weeds.</p>	<p>Preplant incorporated.</p> <hr/> <p>Fall incorporated after Oct. 15 until freeze-up.</p>	<p>See Sugarbeet Research and Extension Reports for details. Some stand reduction and temporary stunting may occur from the use of Eptam. Weak on wild mustard.</p>
<p>Eptam+Ro-Neet (EPTC+ Cycloate) \$/A= 22.80-21.60</p> <p>\$/A=22.80-38.75</p>	<p>1.1 to 2.3+2.7 to 3.3 pt (1 to 2 + 2 to 2.5)</p> <hr/> <p>1.1 to 2.9+ 2.7 to 4 pt (1 to 2.5 + 2 to 3)</p>	<p>Grass and some broadleaf weeds.</p>	<p>Preplant incorporated.</p> <hr/> <p>Fall incorporated after Oct. 15 until freeze-up.</p>	<p>Less sugarbeet injury than from Eptam alone and less expensive than Ro-Neet alone. See "Herbicide Combinations" section for various soil textures and organic matter content.</p>

Ro-Neet (Cycloate) S/A= 30.00-39.75 S/A=39.75	4 to 5.3 pt 6E (3 to 4) <hr/> 5.3 pt 6E (4)	Annual grasses and some broadleaf weeds.	Preplant incorporated. <hr/> Fall incorporated after Oct. 15 until freeze-up.	See Sugarbeet Research and Extension Reports for details. Sugarbeet has better tolerance to Ro-Neet than to Eptam. Weak on wild mustard.
Glyphosate S/A ^a =varies with formulation.	0.5 to 2 pt of a 3 lbae/gal conc. (0.19 to 0.75) <hr/> 0.38 to 1.5pt of a 4 lbae/gal conc. (0.19 to 0.75)	Emerged grass and broadleaf weeds.	Preplant or anytime prior to crop emergence.	A non-selective, non- residual, systemic post- emergence herbicide. See label for rates for different weed species. Apply with a nonionic surfactant.
Herbicide and cost	Formulation/A (Act.Ingred lb/A)	Weed	When to Apply	Remarks
Paraquat S/A=5.80-11.60	1.25 to 2.7 pt of a 3 lb/gal conc. (0.47 to 1)	Emerged annual grasses and broadleaf weeds.	Preplant or anytime prior to crop emergence.	A non-selective, postemergence herbicide. No soil residual activity. Apply with a nonionic surfactant. Good coverage is essential. Restricted use herbicide.

<p>Far-Go (Triallate) S/A=15.00 EC 13.80 G</p>	<p>1.5 qt EC 15 lb 10 G (1.5)</p>	<p>Wild oat</p>	<p>Fall incorporated after Oct. 15 until freeze-up or snow cover. <u>Spring PPI before</u> wild oat germination.</p>	<p>Incorporate immediately after application with a tillage tool set 3 to 4 in. deep. A second incorporation at an angle to the first will improve uniformity of distribution. One pass in the fall followed by spring seedbed preparation is sufficient for fall application.</p>
<p>Nortron SC (Ethofumestate) S/A= 137.25-171.60</p>	<p>6.0 to 7.5 pt F (3.0 to 3.75)</p>	<p>Many annual grasses and broadleaf weeds. Especially good on redroot pigweed.</p>	<p>Preemergence or preplant incorporated in band.</p>	<p>Incorporation generally improves weed control. Possible soil residue harmful to wheat, barley and oats. Band application reduces cost and risk of carryover into the next year.</p>

Poast (Sethoxydim) S/A=4.10-12.20	0.5 to 1.5 pt (0.1 to 0.3)	Annual grasses	Wild oats up to 4 inches tall, foxtail 3 to 8 inches, volunteer cereals up to 6 inches, volunteer corn 6 to 20 inches, wild proso millet 4 to 10 inches.	Apply to actively growing grasses. See Sugarbeet Research and Extension Reports or label for rates for different weed species. Always apply with oil adjuvant and with ammonium sulfate or 28% liquid nitrogen for certain weed species or to compensate for salty water.
Pyramin SC (Pyrazon) S/A= 58.40-143.40	6.0 to 14.5 pt (3.1 to 7.6)	Most broad-leaf weeds.	Preemergence or preplant incorporated	Pyramin has been less effective on soils with more than 5% organic matter. Incorporation generally improves control.
Select/Prism (Clethodim) S/A=8.70-11.60 <hr/> S/A= 11.60-23.10	6 to 8/12.8 to 17 fl oz (0.095 to 0.125) <hr/> 8 to 16/17 to 34 fl oz (0.125 to 0.25)	Annual grasses <hr/> Quackgrass	Wild oat: 2 to 6 in. Foxtail: 2 to 6 in. Volunteer cereals: 2 to 6 in. Quackgrass: 6 to 10 in.	Always apply with an oil adjuvant. Apply to actively growing grasses.

Herbicide and cost	Formulation/A (Act.Ingred.lb/A)	Weed	When to apply	Remarks
Stinger (Clopyralid) \$/A= 15.00-39.60	0.25 to 0.66 pt (0.09 to 0.25) See "micro-mate" program for reduced rates in combination	Canada thistle, common cocklebur, sunflower, marshelder, wild buckwheat.	Postemergence to sugarbeet with 2 to 8 leaves. Rosette to pre- bud Canada thistle, small annual weeds.	See label and Sugarbeet Research and Extension Reports for details. Do not exceed 0.66 pt/A per season.
UpBeet (Trifluralin) \$/A=22.50	0.5 oz (0.0156) See "micro-mate" program for reduced rates in combination.	Annual broad- leaf weeds.	First treatment to cotyledon to 2-leaf weeds.	Apply two or more times in combination with Betanex, Betamix, Progress or Stinger. Research in ND/MN has shown that 3 treatments including 0.25 oz/A of UpBeet generally gave better weed control than two treatments including 0.5 oz/A of UpBeet. Do not exceed 2.5 oz/A/season.
Trifluralin \$/A=varies with formulation.	1.5 pt of a 4 lb/gal formulation (0.75)	Late emerging annual grasses and broadleaf weeds.	Sugarbeet 2 to 6 inches tall and well- rooted to withstand incorporation.	May be applied over top of sugar- beet. Does not control emerged weeds. Must be incorporated into soil. Exposed beet roots should be covered with soil before application.

CHEMICAL NAMES AND CONCENTRATIONS

COMMON NAME	TRADE NAME¹ AND MANUFACTURER	COMMERCIAL FORMULATIONS	REENTRY INTERVAL (Hours)	PREHARVEST INTERVAL (Days)
Clethodim	Select (Valent)	2 lb/gal E	12	40
Clopyralid	Stinger (Dow)	3 lb/gal S	12	45
Cycloate	Ro-Neet (TRI-Ag)	6 lb/gal E	12	
Desmedipham	Betanex (Aventis)	1.3 lb/gal E	24	75
Desmedipham + Phenmedipham	Betamix (Aventis)	0.65 + 0.65 lb/gal E	24	75
Desmedipham + Phenmedipham + Ethofum esate	Progress (Aventis)	0.6 + 0.6 + 0.6 lb/gal E	48	75
EPTC	Eptam (Syngenta)	7 lb/gal E, 20% G	12	
Ethofum esate	Nortron SC (Aventis)	4 lb/gal F	12	

CHEMICAL NAMES AND CONCENTRATIONS

COMMON NAME	TRADE NAME¹ AND MANUFACTURER	COMMERCIAL FORMULATIONS	REENTRY INTERVAL (Hours)	PREHARVEST INTERVAL (days)
Glyphosate	Several trade names and formulations.		12	
Paraquat	Several trade names and formulations.		12	
Pyrazon	Pyramin SC (BASF)	4.2 lb/gal F	12	0
Quizalofop	Assure II (DuPont)	0.88 lb/gal E	12	45
Sethoxydim	Poast (BASF)	1.5 lb/gal E	12	60
Triallate	Far-Go (Monsanto)	4 lb/gal E, 10% G	12	
Trifluralin	Several trade names and formulations.		12	
Triflurosulfuron	UpBeet (DuPont)	50% DF	4	60

¹ The mention of trade names does not imply that they are endorsed or recommended over those of similar nature not listed.

² G=granular, E=emulsifiable concentrate, F=flowable, S=solution powder.

Research has shown that Betanex and Betamix give greater weed control and sugarbeet injury when applied with 200 psi and 15 to 20 gpa of water as compared to 40 psi spray pressure. Also, Betanex and Beta mix are more phytotoxic when applied to areas previously treated with a soil applied herbicide than when applied to untreated areas. The suggested rates in the following table are adjusted for these factors and sugarbeet growth stage. The rates in the table are conservative rates which assume good growing conditions, afternoon or evening application, and weeds which are the same growth stage or smaller than the sugarbeet. Rates may need to be increased for a dry, cool environment or reduced if the weather has suddenly changed from cloudy, wet and cool to hot and sunny. Micro-rate treatments should not be adjusted for method of application or presence of soil applied herbicide.

Conventional Betanex, Betamix, Broadcast Rate								
Sugarbeet stage	No soil herbicide				With soil herbicide			
	Low pressure (<100 psi)		High pressure or aerial		Low pressure (<100 psi)		High pressure or aerial	
	(lb/A)	(p/A)	(lb/A)	(p/A)	(lb/A)	(p/A)	(lb/A)	(p/A)
Cotyledon-2 leaf	0.25	1.5	0.16	1.0	0.16	1.0	0.12	0.75
2 leaf	0.33	2.0	0.25	1.5	0.25	1.5	0.16	1.0
4 leaf	0.5	3.0	0.4	2.5	0.33	2.0	0.25	1.5
6-8 leaf	0.75	4.6	0.75	4.6	0.5	3.0	0.5	3.0

Progress (premix of Nortron plus Betamix) gives increased control and greater risk of sugarbeet injury than Betanex or Betamix alone. In order to limit the risk of sugarbeet injury, the total pounds per acre of active ingredient in Progress should be equal to the normal total pounds per acre of active ingredient of Betanex or Betamix that would be applied alone for a given situation. See the following table.

Conventional Progress Broadcast Rate								
Sugarbeet stage	No soil herbicide				With soil herbicide			
	Low pressure (<100 psi)		High pressure or aerial		Low pressure (<100 psi)		High pressure or aerial	
	(lb/A)	(pt/A)	(lb/A)	(pt/A)	(lb/A)	(pt/A)	(lb/A)	(pt/A)
Cotyledon-2 leaf	0.25	1.1	0.16	0.7	0.16	0.7	0.12	0.5
2 leaf	0.33	1.5	0.25	1.1	0.25	1.1	0.16	0.7
4 leaf	0.5	2.2	0.4	1.8	0.33	1.5	0.25	1.1
6-8 leaf	0.75	3.3	0.75	3.3	0.5	2.2	0.5	2.2

Rainfall shortly after application often reduces weed control from post-emergence herbicides because the herbicide is partially washed from the leaves. Herbicides vary in absorption rate and in ease of being washed from leaves. The rainfall effect also can vary depending on rainfall amount and intensity. The approximate time between application and rainfall needed for maximum weed control is given in the following table.

Herbicide	Time between application and rain
Assure II	1 hour
Betamix, Betanex, Progress	6 hours
Paraquat	4-6 hours
Poast	1 hour
Glyphosate	6 hours
Select/Prism	1 hour
Stinger	6 hours
UpBeet	6 hours

HERBICIDE COMBINATIONS

Sugarbeet herbicides may be legally tank mixed if all herbicides in the mixture are registered for use on sugarbeet and if no prohibitions against tank mixes appear on a label. However, *the user must assume liability* for any resulting crop injury, inadequate weed control, or illegal and/or harmful residues. When a non-registered combination is used, none of the manufacturers of the products used in the combination will stand behind their products.

Combinations of Soil Applied Herbicides nearly always give improved weed control compared to the use of individual herbicides. Unfortunately the risk of sugarbeet injury also increases with herbicide combinations so selecting the proper rate for each

herbicide combination and each farming situation is very important and also sometimes difficult.

Eptam + Ro-Neet may be used in ND and MN either fall applied or spring applied. Research has indicated that Eptam + Ro-Neet gives less sugarbeet injury than straight Eptam and costs less per acre than straight Ro-Neet. Eptam + Ro-Neet also has given better weed control over a range of environmental conditions as compared to straight Eptam or straight Ro-Neet. Rates of Eptam + Ro-Neet should be adjusted for time of application and soil type to minimize the risks of sugarbeet injury while maintaining weed control.

Effective fall applied rates in research have been 1.0 to 2.5 pounds per acre of Eptam plus 2.0 to 3.0 pounds per acre of Ro-Neet. Approximate suggested fall application rates would be:

Ro-Neet alone at 4 lb/A on soils with less than 3% organic matter, Eptam + Ro-Neet at 1 + 3 pounds per acre on loam or coarser soils with 3% organic matter, 1.5 + 2.5 pounds per acre on loam to clay loam soils with 3 to 4% organic matter, 2 + 2 pounds per acre on clay loam with soils with 3.5 to 4.5% organic matter, and 2.5 + 2.5 pounds per acre on heavier soils. These rates should be adjusted on individual fields as experience is obtained.

Effective spring applied rates in research have been 1 to 2 pounds per acre of Eptam plus 2 to 2.5 pounds per acre of Ro-Neet. Approximate suggested spring application rates would be: Ro-Neet alone at 3 pounds per acre on loam or coarser soils with 3% or less organic matter, Eptam + Ro-Neet at 1 + 2.5 pounds per acre on loam or coarser soils with 3 to 3.5% organic matter, 1.5 + 2.5 pounds per acre on loam to clay loam soils with 3.5 to 4.5% organic matter, and 2 + 2 pounds per acre on clay loam or finer soils with 4.5% or more organic matter. Rates should be adjusted on individual fields as experience is obtained.

Combinations of Postemergence Herbicides can give more broad spectrum and greater total weed control compared to individual treatments. The risk of sugarbeet injury also increases with combinations so combinations should be used with caution.

A tank-mix of one of the grass control herbicides (Poast, Select, Prism, Assure II) plus an adjuvant plus one of the broadleaf control herbicides (Betanex, Betamix, Progress) will often give less grass control than the grass herbicide plus adjuvant. The control of broadleaf weeds is not affected by the tank-mix. Stinger does not antagonize grass control. Antagonism of grass control by a broadleaf herbicide may not be significant with small grass, optimum soil moisture, grass that is actively growing, and a grass species that is very susceptible to the grass herbicide chosen. For example, antagonism of Poast would be greater on wild oat and volunteer grain than on green and yellow foxtail while antagonism of Assure II would be greater on yellow foxtail than on wild oat and volunteer grain. Antagonism will be less if an adjuvant is included in the tank-mix but excessive sugarbeet injury may occur from a broadleaf herbicide plus an adjuvant. Antagonism can be nearly eliminated by applying the grass herbicide plus adjuvant 24 hours before the

broadleaf herbicide or by applying the broadleaf herbicide 3 to 5 days before the grass herbicide. Also, research results indicated that a full rate of grass herbicide plus a broadleaf herbicide (no adjuvant) applied twice at a 7-day interval gave grass control nearly equal to a single application of the grass herbicide plus adjuvant when the grass was small at treatment. A one-third rate of grass herbicide applied three times at a 7-day interval in combination with the micro-rate generally provides excellent grass control.

Stinger plus Betamix or Betanex gave better control of common lambsquarters, Russian thistle, wild buckwheat, ladythumb (smartweed), nightshade, common cocklebur, lanceleaf sage, and buffalo bur than Betamix or Betanex alone or Stinger alone. Stinger alone controlled common sunflower, Canada thistle and giant ragweed as well as Stinger plus Betamix or Betanex in experiments in North Dakota and Minnesota.

UpBeet plus Betanex, Betamix or Progress gave better control of redroot pigweed, prostrate pigweed, Kochia, common mallow, nightshade, ladythumb (smartweed), Venice mallow, nightflowering catchfly, wild mustard, sunflower and velvetleaf compared to treatments without UpBeet. A three-way combination of Betanex + UpBeet + Stinger has given good to excellent control of all common broadleaf weeds in sugarbeet. See following table for relative response of weeds to various herbicide treatments.

COMBINATIONS OF HERBICIDES AND INSECTICIDES

Betanex or Betamix at conventional rates plus liquid Lorsban 4E has sometimes caused more sugarbeet injury than normal rates of Betanex or Betamix alone. Sugarbeet should have four or more leaves if Lorsban is mixed with conventional rates of Betanex or Betamix. Lorsban 4E can be tank-mixed with the micro-rate without increasing the risk of sugarbeet injury. Post plus liquid Lorsban plus oil gave grass control similar to Poast plus oil. However, Poast plus Lorsban (no oil) gave less control of volunteer grain than Poast plus Lorsban plus oil so Lorsban will not fully substitute for the oil adjuvant. The use of herbicides plus insecticides has not resulted in reduced control of insects or weeds.

HERBICIDE CARRYOVER

Herbicide residue or the persistence of phytotoxic levels of a herbicide for more than one year can be a problem with some of the herbicides used in North Dakota and Minnesota. Herbicide residues are most likely to occur following years with unusually low rainfall because chemical and microbial activity needed to degrade herbicides is limited in dry soil.

Some herbicides, like Broadstrike, Pursuit and Raptor, carry over more in low pH soils while other herbicides, like sulfonyl ureas Accent, Ally, Beacon, Classic and others, carry over more in high pH soils.

Crop damage from herbicide residues can be minimized by application of the lowest herbicide rate which will give good weed control, by using band rather than broadcast applications, and by moldboard plowing before planting the next crop. Moldboard plowing reduces phytotoxicity of some herbicides by diluting the herbicide residue in a large volume of soil and by providing untreated surface soil in which sugarbeet can germinate and begin growth.

The number of trade names for herbicides and herbicide combinations is increasing each year. The active ingredients of a herbicide should be identified prior to use to avoid unpleasant surprises with unexpected crop injury from carryover. Some of the various trade names are given in the table with the trade name of the combination listed by the herbicide in the combination that has the longer carryover for sugarbeet.

Rotation Restrictions for Sugarbeet and Rotational Crops

Herbicide	Sugar-beet	Bar-ley	Corn	Dry bean	Flax	Oat	Pot-ato	Soybean	HRS/Durm
(months after application)									
Accent(a)	18a	8	0	10	18	8	18a	0.5	8
Accent Gold	26b	8	0	10.5	B	8	18	10.5	8
Ally(c)	34d	10	22e	22e	22e	10	34d	34d	1/10
Amber	B	18c	22	B	B	18c	B	36b	0
Assert	20	NCS	NCS	NCS	15	15	15	NCS	NCS
Atrazine/Aatrex	B	B	0	B	B	B	B	B	B
Authority	30	4	10	12	18	4	30	0	4
Axiom	18	12	0	12	12	12	1	0	12
Balance/Pro(j)	18	6	0	18	18	6	6	6	6
Basis	10	8	0	8	18	8	4	0.5	8

Basis Gold	18	18	0	18	18	18	18	10	18
Rotation Restrictions for Sugarbeet and Rotational Crops									
Herbicide	Sugar-beet	Bar-ley	Corn	Dry bean	Flax	Oat	Pot-ato	Soybean	HRS/Durm
(months after application)									
Beacon(r)	B	3	0.5	8	18	8	2CS	8	8
Brdstrike+Dual	26b	4.5	0	4	26b	4.5	12	0	4.5
Brdstrk+Treflan	26b	4	8	4	B	18	12	0	4
Buckle	14g	0	16	NCS	NCS	16	NCS	NCS	NCSg
Callisto	18	4	0	18	18	4	18	NCS	4
Canvas(0.2 oz/A)e	22	10	22	22	22	10	22	22	1/10
Celebrity Plus	18a	8	0.25	10	18	8	18a	4	8
Clarity(< 1.5pt/A) h	4	4h	0h	4	4	4h	4	4	0h
Curta il/M	18	1	10.5m	10.5m	10.5m	1	18	10.5m	1

Degree(n)	NCS	NCS	0	NCS	NCS	NCS	NCS	NCS	4
Dicamba(<1.5pt)h	4	4h	0h	4	4	4h	4	4	0h
Dom ain	18	12	1	18	18	18	1	0	12
Distinct(h)	4	4	4h	4	4	4	4	4	0
Epic	12	12	0	18	12	12	6	6	12
Everest	9	9	NCS	NCS	NCS	18	9	9	4
Extreme	Same as Pursuit								
Far-Go	NCS	0	NCS	NCS	NCS	18	NCS	NCS	0
Finesse	B	16	B	B	B	10	B	B	0
FirstRate	30b	B	9	9	B	9	18	0	3
Flexstar	18	4	10	10	18	4	18	0	4
Gauntlet	30	12	10	12	B	12	B	0	4
Harness(n)	NCS	NCS	0	NCS	NCS	NCS	NCS	NCS	4
Hornet	B	4	0	10.5m	B	4	18	10.5m	4

Lexone(u)	18	8u	4	12	12	12	4	4	8u
Liberty ATZ	B	B	0	B	B	B	B	B	B
Lightning	40b	9.5	8.5	9.5	40b	18	26	9.5	4
Rotation Restrictions for Sugarbeet and Rotational Crops									
Herbicide	Sugar-beet	Bar-ley	Corn	Dry bean	Flax	Oat	Pot-ato	Soybean	HRS/Durm
(months after application)									
Matrix	18	9/18p	0	10	18	9	0	10	9
Maverick	B	B	B	B	B	B	B	B	0
Muster	22b	10	22b	22	10	10	22b	22b	10
NorthStar(r)	36r	8	0.5	8	18	8	18	8	8
Paramount	24	10	10	10	24	10	10	10	0
Peak(r)	22	0	1	22	22	0	22	22	0
Permit	36	2	1	9	B	2	9	9	2
Plateau	40	18	9	9	26	18	40	9	4

Prowl/Pendimax	2CS	NCS	0s	0	NCS	NCS	0	0	NCS
Pursuit	40b	18	8.5	4	26	18	26	0	4
Pursuit Plus	40b	18	8.5	4	26	18	26	0	NCS
Python	26b	4	0	4	26b	4	12	0	4
Raptor	18t	4	9	9	18	9	9	0	3
Rave	B	18c	22	b	b	18c	B	36b	0
Reflex	18	4	10	10	18	4	18	0	4
Scorpion III	B	4	0	10.5m	B	4	B	0.5m	4
Sencor(u)	18	8u	4	12	2	12	4	4	8u
Sonalan	2CS	NCS	NCS	0	NCS	NCS	NCS	0	NCS
Spartan	24	4	10	10	24	4	10	0	4
Spirit(r)	18r	3	1	18	18	3	18	18	3
Steadfast	18a	8	0	10	18	8	18a	0.5	8
Stinger	0	0	0	10.5m	0	0	18	10.5m	0
Surpass(n)	NCS	NCS	0	NCS	NCS	NCS	NCS	NCS	4
Tordon (1.5 oz)	2CS	NCS	2CSx	2CS	NCS	NCS	2CS	2CS	NCS
TopNotch(n)	NCS	NCS	0	NCS	NCS	NCS	NCS	NCS	4

Trifluralin(y)	2CS	NCS	NCS	0	0	18	0	0	NCS
Valor	12b	4	1	4	12b	12b	12b	0	1

NCS = Next cropping season after herbicide application.
 2CS = Second cropping season after herbicide application.
 MAA = months after application.

Field Bioassay Instructions - Refer to label or paragraph Y7 in the Narrative Section.

- a Soil pH <7.5 = 10 MAA for sorghum and 11 MAA for sunflower.
 Soil pH >7.5 = 18 MAA for sorghum and sunflower
 Soil pH <6.5 = 10 MAA for sugarbeet and all other crops not listed.
 Soil pH >7.5 = 18 MAA for sugarbeet and all other crops not listed and cumulative precipitation in the 18
 MAA period must exceed 28 inches (includes potatoes).

- B or b** = Bioassay. Do not plant until field bioassay indicates it is safe.
 Crop rotation after Atrazine is rate and soil pH dependant. Accent Gold, Python, and Hornet require a 26 month rotation
 and a successful field bioassay.
 FirstRate requires a 30 month rotation and a successful field bioassay. Lightning, Pursuit, and Pursuit Plus requires a 40
 month rotation and a successful field bioassay.

- c Do not use on soil with pH greater than 7.9. Barley and oat can be planted 6 months after Amber application west of
 highway 83.

- d** Requires soil pH to be 7.9 or less and a 34 month minimum rotation interval and 28 inches of cumulative precipitation.
- e** Requires soil pH to be 7.9 or less, 22 months and 22 inches of precipitation west of Hwy 1 or 34 months and 34 inches of precipitation east of Hwy 1. The previous restriction also applies to Canvas atrates greater than 0.2 oz DF/A.
- f** Imi resistant canola varieties may be planted the season after application.
Conventional canola varieties may be planted the following season after application at 1 pt/A in ND counties of Cavalier, Pembina, Ramsey, Rolette, Towner, and Walsh and MN counties of Kitson, Marshall, Pennington, Red Lake, and Roseau.
- g** Sugarbeet requires 20 months in areas that received less than 20 inches of precipitation during the growing season.
Buckle is labeled as a fall treatment in durum wheat and spring PPI application for durum and HRSW (some varieties excluded).
- h** Any rotational crop may be planted 120 days following application of dicamba at 1.5 pt/A or less, excluding days when ground is frozen. For wheat, barley, oat, and grass seedings, allow 45 days per pint/A of dicamba after application before planting.
For all crops and for rates greater than 1.5 pt/A allow 45 days per 1 pt/A of Clarity used excluding days when ground is frozen.
- j** Balance requires 15 inches of cumulative precipitation from application to planting of rotational crop. Furrow or flood irrigation should not be included in total. No more than 7 inches of overhead irrigation included in total.
- m** Do not plant dry bean, soybean or sunflower for 18 months on soil with less than 2% OM and rainfall less than 15 inches during the 12 MAA OR may be planted 12 MAA if risk of injury is acceptable.
Do not plant lentil, pea, potato or any other broadleaf crop grown for seed for 18 months unless risk of injury is acceptable.
Perform a field bioassay prior to planting for areas that receive less than 15 inches of rainfall and have less than 2% OM.

- n** Restriction applies to DoublePly, FullTime, Hamess, Surpass, and TopNotch. Label restricts crops allowed to be planted the next season as corn, soybean, sorghum, and wheat only. Restriction to other crops is based on incomplete residue data and not on crop safety.
- p** Barley can be planted 9 months after application in Cass, Grand Forks, Pembina, Towner, Traill, and Walsh counties of ND. In all other counties of ND allow an 18 month rotation restriction before planting barley.
- r** Do not apply Beacon, NorthStar, Peak, or Spirit in the Red River Valley of ND and MN or on soil with pH greater than 7.8.
User must follow crop rotation restrictions as given on labels. Refer to label for additional information on soil pH, rotation intervals, maximum use rates, application timing and other restrictions. The number of months after application given in the previous table are applicable only on soil with a pH less than 7.8, only using less than maximum rates allowed, only using approved application timings, and only on approved locations (inside or outside Red River Valley) as indicated on the label.
Do not replant to any broadleaf crop if less than 10 inches of precipitation has occurred since Peak application.
For situations not covered on the label or in the previous table, conduct a soil bioassay to determine if Peak soil residue will allow successful planting of desired rotational crop.
- s** Corn can be planted only if Prowl is applied PRE. DO NOT APPLY PPL.
- t** Rotation to sugarbeet is after 26 months if soil pH is less than 6.2.
- u** Must add 2 months if soil pH is 7.5 or above. Wheat and barley can be planted 4 MAA following lentils or soybeans.
- w** CRP grasses may be planted 13 MAA under the following conditions:
1. By label this is deemed as a non-standard rotation.
 2. Dow assumes no liability for injury.
 3. Fall is recommended as the best time to plant CRP grasses.

4. A field bioassay is recommended prior to planting CRP grasses.

- x Do not plant corn or sorghum until soil samples analyzed for Tordon residue indicates no detectable levels present. Restriction is based on non-legal residue that may be found in corn and sorghum and not on crop safety.
- y Oats, sorghum, and annual or perennial grass crops may be planted at least 12 MAA in areas that received 20 inches or more of precipitation during the growing season. CRP grasses may be planted 18 MAA if trifluralin is spring applied or 21 MAA if fall applied.

Single nozzle band sprayers: Approximate nozzle height, nozzle capacity, and delivery rate per treated acre and per total acre assuming 22 inch rows: 3, 4, and 7 mph and 40 psi.

Nozzle	Nozzle Capac. (Gal/hr)	Spray Press (PSI)	Approx. nozzle height (in.)	Band Width (in.)	22 inch Row Width					
					3mph		5mph		7mph	
					Gal/ treated acre ^a	Gal/ total acre ^b	Gal/ treated acre ^a	Gal/ total acre ^b	Gal/ treated acre ^a	Gal/ total acre ^b
HC-4	4	40	12	10	13.2	6.0	7.9	3.6	5.7	2.6
45°	4	40	8.5	7	18.8	6.0	11.3	3.6	8.0	2.6
40067	4	40	14	10	13.2	6.0	7.9	3.6	5.7	2.6
E	4	40	9.5	7	18.8	6.0	11.3	3.6	8.0	2.6
HC-6	6	40	12	10	19.8	9.0	11.9	5.4	8.5	3.9
45°	6	40	8.5	7	28.2	9.0	16.9	5.4	12.1	3.9
4001E	6	40	14	10	19.8	9.0	11.9	5.4	8.5	3.9
	6	40	9.5	7	28.2	9.0	16.9	5.4	12.1	3.9
LE-1 or	6	40	6	10	19.8	9.0	11.9	5.4	8.5	3.9
8001E	6	40	4	7	28.2	9.0	16.9	5.4	12.1	3.9
HC-8	8	40	12	10	26.4	12.0	15.9	7.2	11.3	5.1
	8	40	8.5	7	37.6	12.0	22.6	7.2	16.1	5.1

Nozzle	Nozzle Capac. (Gal/hr)	Spray Press (PSI)	Approx. nozzle height (in.)	Band Width (in.)	22 inchRow Width					
					3mph		5mph		7mph	
					Gal/ treated acre ^a	Gal/ total acre ^b	Gal/ treated acre ^a	Gal/ total acre ^b	Gal/ treated acre ^a	Gal/ total acre ^b
HC-10	10	40	12	10	33.0	15.0	19.8	9.0	14.2	6.4
	10	40	8.5	7	47.0	15.0	28.2	9.0	20.1	6.4
HC-12	12	40	12	10	39.6	18.0	23.8	10.8	17.0	7.7
	12	40	8.5	7	56.4	18.0	33.5	10.8	24.1	7.7
4002E	12	40	14	10	39.6	18.0	23.8	10.8	17.0	7.7
	12	40	9.5	7	56.4	18.0	33.8	10.8	24.1	7.7
LE-2 or	12	40	6	10	39.6	18.0	23.8	10.8	17.0	7.7
8002E	12	40	4	7	56.4	18.0	33.8	10.8	24.1	7.7
LE-4 or	24	40	6	10	79.2	36.1	47.5	21.6	34.0	15.4
8004E	24	40	4	7	112.8	36.1	67.7	21.6	48.2	15.4

^a Gallons per treated acre indicates the delivery rate to the treated portion of the field.

^b Gallons per total acre indicates the delivery rate per total acre in the field. With a 7 inch band and 22 inch rows, only 7/22 of the total acreage would receive the gallonage indicated.

Double nozzle band sprayers: Approximate nozzle height, nozzle capacity, and delivery rate per treated and per total acre assuming 22 inch rows; 3, 5, and 7 mph; 40 psi; and two nozzles per row set at 45° from vertical directly over the row.

Gallons/acre with 2 nozzles/row and 22 inch row

Nozzle	Nozzle capac. for 2 nozzels (Gal/hr)	Spray Press (PSI)	Approx. nozzle height (in.)	Band Width (in.)	3mph		5mph		7mph	
					Gal/ treated acre ^a	Gal/ total acre ^b	Gal/ treated acre ^a	Gal/ total acre ^b	Gal/ treated acre ^a	Gal/ total acre ^b
40067E	8	40	10	10	26.6	12.1	15.9	7.2	11.4	5.2
	8	40	7	7	37.8	12.1	22.6	7.2	16.1	5.2
4001E	12	40	10	10	39.6	18.0	23.8	10.8	17.0	7.7
	12	40	7	7	56.4	18.0	33.8	10.8	24.1	7.7
8001E or LE-1 80°	12	40	4	10	39.6	18.0	23.8	10.8	17.0	7.7
	12	40	3	7	56.4	18.0	33.8	10.8	24.1	7.7
4002E	24	40	10	10	79.2	36.1	47.5	21.6	34.0	15.4
	24	40	7	7	112.8	36.1	67.7	21.6	48.2	15.4
8002E or LE-2 80°	24	40	4	10	79.2	36.1	47.5	21.6	34.0	15.4
	24	40	3	7	112.8	36.1	67.7	21.6	48.2	15.4

^a Gallons per treated acre indicates the delivery rate to the treated portion of the field.

^b Gallons per total acre indicates the delivery rate per total acre in the field. With a 7 inch band and 22 inch rows, only 7/22 of the total acreage would receive the gallonage indicated.

RELATIVE RESPONSE OF WEEDS TO HERBICIDES^a

	Buffalo bur	E. black nightshade	Barnyard grass	Cocklebur	Canada thistle	Foxtail (pigongrass)	Kochia	Ladysthumb (smartweed)	Lambsquarters, C	Mallow, common	Pigweed, redroot	Pigweed, prostrate	Ragweed, C	Russian thistle	Sunflower, volunteer	Wild buckwheat	Wild mustard	Wild oats
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PREPLANT

INCORPORATED

Eptam	G	F-G	G-E	P	N	G-E	F	P	F-G	F-G	F-G	F-G	F	P	N	P-F	P	G
Nortron SC	F	F-G	P	P	N	F-G	F-G	G	P-F	P	G-E	F-G	P	F-G	P	F-G	P-F	F-G
Ro-Neet	G	F-G	G	P	N	G-E	P	P	F-G	F-G	F-G	F-G	F	P	N	P-F	P	F-G

PREEMERGENCE

Pyramin, SC	-	G	P	P-F	P	P	P-F	F-G	G	-	G	G	F-G	P-F	P	P-F	G	P
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^a The tables give a general comparative rating of the relative effectiveness of herbicides to weeds. Under vary favorable conditions, control may be better than indicated. Under unfavorable conditions some herbicides rated good to excellent may give erratic or unfavorable results.

RELATIVE RESPONSE OF WEEDS TO POSTEMERGENCE HERBICIDES^a

	Betanex	Betamix	Progress	Stinger	Betanex + Stinger	Betamix + Stinger	Bnex, Bmix or Progress + UpBeet	Bnex, Bmix or Progress+ UpBeet+Stinger	Poast, Assure II, Select, Prism	Trifluralin (Lay-by)
Barnyardgrass	P	P	P	P	P	P	P	P	E	G
Buffalo Bur	G	G	G	F-G	G-E	G-E	G	G-E	N	P
Canada thistle	N	N	N	G-E	G-E	G-E	P	G-E	N	N
Cocklebur	P	P-F	F	E	E	E	F-G	E	N	P
Common lambsquarters	G	G	G-E	P-F	G-E	G-E	G-E	G-E	N	G
Common sunflower	P	P	P	G-E	E	E	G	E	N	N
Eastern black nightshade	F-G	F-G	G	F-G	G-E	G-E	G	E	N	N
Foxtails (pigeongrass)	P	F	F-G	P	P	F	F-G	F-G	E	G
Giant ragweed	P	P	P	G-E	E	E	P-F	E	N	P
Kochia	P-F	F	F-G	N	F	F-G	E	E	N	F-G

Ladysthumb (Smartweed)	P	P	F-G	P-F	G-E	G-E	G	G-E	N	P
Lanceleaf sage	P	P	P-F	F	F-G	F-G	P-F	F-G	N	P
Marshelder	G	G	G	E	E	E	G	E	N	P
Mallow, common	P	P	P	P	P	P	G-E	G-E	N	P
Mallow, Venice	P	P	P	P	P	P	F-G	G	N	P
Nightflowering catchfly	P	P	F	P	P	P	G-E	G-E	N	P
Pigweed, redroot	G-E	G	G	P	G-E	G	G-E	G-E	N	G
Ragweed, common	F	F	F-G	G-E	G-E	G-E	F-G	G-E	N	P
Russian thistle	P	P	P	P-F	G	G	P	G	N	F-G
Wild buckwheat	P-F	F	F-G	F-G	G	G-E	F-G	G-E	N	P-F
Wild mustard	G-E	G-E	G	P	G-E	G-E	E	E	N	P
Wild oat	N	N	N	N	N	N	P	P	E	F

E=Excellent, G=Good, F=Fair, P=Poor, N=None

This table is a general comparative rating of the relative effectiveness of herbicides to weeds. Under very favorable conditions, control might be better than indicated. Under unfavorable conditions, some herbicides rated good to excellent might give erratic or unfavorable results. The rankings assume that the weed population has not developed resistance to the herbicide.

