

# 1987 COLORADO PESTICIDE GUIDE — FIELD CROPS

XCM-45



The 1986 Colorado Pesticide Guide - Field Crops has been prepared by the Insecticide, Herbicide, and Fungicide Committees of Colorado State University. These committees are composed of Extension Service and Experiment Station personnel. The recommendations have been approved by the Colorado Agricultural Chemicals Clearing Committee.

Acknowledgement is made to the Colorado Agricultural Chemicals Association, dealers, growers, County Agricultural Extension Agents, and others who contributed valuable suggestions in the preparation of these recommendations.

Control suggestions in this guide are based in part upon research findings and demonstrations of the Colorado State University Agricultural Experiment Station and Extension Service. Some of the treatments suggested have not been tested in Colorado but are based upon research findings or recommendations from other states, USDA reports, or data provided by the chemical manufacturer. Information in this publication is intended only as a guide. Final usage of control chemicals should be based on directions printed on the label of the container which has been approved by the EPA and the Colorado Department of Agriculture.



Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Kenneth R. Bolen, director of Cooperative Extension, Colorado State University, Fort Collins, Colorado. Cooperative Extension programs are available to all without discrimination. To simplify technical terminology, trade names of products and equipment occasionally will be used. No endorsement of products named is intended nor is criticism implied of products not mentioned.

1987 COLORADO PESTICIDE GUIDE

FIELD CROPS

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## Forward

This guide is another step towards a unified field crop pesticide guide. In the past, separate guides were prepared for diseases, insects and weeds. Our intent is now to have a single guide for field crops which covers all of these problems.

The introductory section contains information on pesticides, pesticide performance and suggested further readings on some problems covered in the guide. The crop sections then follow alphabetically. Each crop section has an insect subsection which lists alphabetically the major pests and the insecticides registered for their control. The disease subsection lists most diseases reported from Colorado and surrounding areas and may also include diseases that are suspected to occur or could possibly occur in the state at the same time. The weed control subsection is found at the end of the guide, although in future versions it may be integrated into the crop sections.

Pesticides with Colorado or federal labels for each crop/problem combination are listed. Some information on rates, preharvest intervals and precautions is provided as an aid in selecting the pesticide to be used. This information is much less than should be known about a product before it is used, so a current product label should be read and understood before the application.

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### DILUTION TABLE FOR INSECTICIDES

Insecticide formulation	Amount of formulation needed per acre to obtain the following amounts of actual chemical per acre								
	1/8 lb.	1/4 lb.	1/2 lb.	3/4 lb.	1 lb.	1-1/2 lbs.	2 lbs.	2-1/2 lbs.	3 lbs.
10% - 12% emulsion concentrate (contains 1 lb. chemical per gal.)	1 pt.	1 qt.	2 qts.	3 qts.	1 gal.	1-1/2 gals.	2 gals.	2-1/2 gals.	3 gals.
15% - 20% emulsion concentrate (contains 1-1/2 lbs. chemical per gal.)	1/3 qt.	2/3 qt.	1-1/3 qts.	2 qts.	2-2/3 qts.	1 gal.	1-1/3 gals.	1-2/3 gals.	2 gals.
25% emulsion concentrate (Contains 2 lbs. chemical per gal.)	1/2 pt.	1 pt.	1 qt.	3 qts.	2 qts.	3 qts.	1 gal.	5 qts.	1-1/2 gals.
40% - 50% emulsion concentrate (contains 4 lbs. chemical per gal.)	1/4 pt.	1/2 pt.	1 pt.	1-1/2 pts.	1 qt.	3 pts.	2 qts.	5 pts.	3 qts.
60% - 65% emulsion concentrate (contains 6 lbs. chemical per gal.)	1/6 pt.	1/3 pt.	2/3 pt.	1 pt.	1-1/3 pts.	1 qt.	2-2/3 pts.	3-1/3 pts.	2 qts.
70% - 75% emulsion concentrate (contains 8 lbs. chemical per gal.)	1/8 pt.	1/4 pt.	1/2 pt.	3/4 pt.	1 pt.	1-1/2 pts.	1 qt.	2-1/2 pts.	3 pts.
25% wettable powder	1/2 lb.	1 lb.	2 lbs.	3 lbs.	4 lbs.	6 lbs.	8 lbs.	10 lbs.	12 lbs.
40% wettable powder	5 oz.	10 oz.	1-1/4 lbs.	1-7/8 lbs.	2-1/2 lbs.	3-3/4 lbs.	5 lbs.	6-1/4 lbs.	7-1/2 lbs.
50% wettable powder	1/4 lb.	1/2 lb.	1 lb.	1-1/2 lbs.	2 lbs.	3 lbs.	4 lbs.	5 lbs.	6 lbs.
75% wettable powder	1/6 lb.	1/3 lb.	2/3 lb.	1 lb.	1-1/3 lbs.	2 lbs.	2-2/3 lbs.	3-1/2 lbs.	4 lbs.

### ACTUAL TOXICANT PER ACRE

The recommendations in this handbook for the use of insecticides, except for granular formations, are given in terms of pounds or ounces of actual toxicant per acre. This is necessary because of the wide variety of pesticide formulations and of equipment for applying them. Pesticides are usually available as wettable powders, soluble powders, emulsifiable concentrates, granules or solutions. Each of these is designed for a specific method of application. For example, the wettable powders are designed mainly for high volume pressure sprayers, while the emulsifiable concentrates, when diluted with water, form emulsions which may be used in low gallonage, low pressure sprayers. The job to be done and the equipment to be used will govern the type of formulation to be used.

The above table can be used to relate the recommended rates to the formulations available. Rates for granular formulations are given in ounces of formulation per 1,000 feet of row, and thus do not need to be converted.

**INSECTICIDE HAZARDS TO MAMMALS, HONEY BEES AND WILDLIFE**

	Mammals		Honey Bees	Birds	Fish
	Oral	Dermal			
Acaraben (chlorobenzilate)	M	L	L-M	-	M
Ambush (permethrin)	L	H	L	L	VH
<u>Bacillus thuringiensis</u> (Dipel, Thuricide)	L	L	L	L	L
Broto (trimethacarb)	M	L	-	VH	L
Comite (propargite)	L	M	L	-	-
Counter (terbufos)	VH	VH	-	-	-
Cygon (dimethoate)	M	M	V-VH	VH	L
Diazinon	H	M	H	VH	H
Dibrom (naled)	M	M	H	H	M
Disyston (disulfoton)	VH	VH	L	VH	M
Dyfonate (fonofos)	VH	H	M	VH	VH
Dylox (trichlorfon)	M	L	L-M	VH	L
EPN	VH	M	H	VH	M
Ethion	H	M	L	L	M
Furadan (carbofuran)	VH	L	VH	VH	M
Guthion (azinthosmethyl)	VH	M	VH	H	VH
Imidan (phosmet)	H	L	H-VH	M	M
Lannate/Nudrin (methomyl)	VH	L	H	VH	M
Lindane (gamma BHC)	H	L	-	H	H
Lorsban (chlorpyrifos)	H	L	M-H	VH	VH
Malathion (Cythion)	L	L	M-H	H	M
Malathion ULV	L	L	VH	H	M
Metasystox R (oxydemeton methyl)	H	M	L-M	VH	L
Methoxychlor (Marlate)	L	L	L	L	H
Methyl parathion	VH	VH	H	VH	VH
Mocap (ethoprop)	H	VH	-	VH	-
Monitor (methamidaphos)	VH	H	M	VH	-
Orthene (acephate)	M	L	H	M	L
Parathion (ethyl parathion)	VH	VH	H	VH	H
Pennacap M (commercial formulation)	M	L	VH	VH	H
Phosdrin (mevinphos)	VH	VH	H	VH	H
Phosphamidon	VH	H	M-VH	VH	L
Pounce (permethrin)	L	L	H	L	VH
Pydrin (fenvalerate)	M	L	H	L	VH
Sevin (carbaryl)	M	L	VH	M	L

**INSECTICIDE HAZARDS (continued)**

	Mammals		Honey Bees	Birds	Fish
	Oral	Dermal			
Sevin XLR+ + (carbaryl)	M	L	L	M	L
Supracide (methidathion)	VH	M	H-VH	VH	VH
Temik (aldicarb)	VH	VH	-	VH	H
Thimet (phorate)	VH	VH	-	VH	H
Thiodan (endosulfan)	VH	H	L-M	VH	VH
Vydate (oxamyl)	VH	M	H-VH	VH	L

LD<sub>50s</sub> Used to Define Hazard<sup>1/</sup> Categories

	Mammals		Honey <sup>4/</sup> Bees	Birds <sup>2/, 5/</sup>	Fish <sup>3/, 6/</sup>
	Oral <sup>2/</sup>	Dermal <sup>2/</sup>			
L (low)	½1000	½1000	--	½1000	½1.0
M (moderate)	200-1000	200-1000	--	200-1000	.01-1.0
H (high)	50-200	50-200	--	50-200	.001-.01
VH (very high)	0-50	0-50	--	0-50	¼0.001

- 1/ Most hazards are based on properties of the pesticide technical material. Certain formulations may be relatively much less hazardous.
- 2/ LD<sub>50</sub>, mg/kg
- 3/ LC<sub>95</sub>, ppm
- 4/ Based on publications of E.L. Atkins (Univ. of California at Riverside) and C.A. Johansen (Washington State University) which take into account acute toxicity and persistence in the field.
- 5/ Primary reference: Tucker, R. K. and D.G. Crabtree. 1970. Handbook of Toxicity of Pesticides to Wildlife. USDI Resource Publication No. 84, 131 pp.
- 6/ Primary reference: Brown, A.W.A. 1978. Ecology of Pesticides. John Wiley & Sons, New York, 525 pp.



### POST TREATMENT REENTRY PERIODS

Pesticides vary in the amount of time which must pass after an application before it is safe to reenter treated field without protective clothing and equipment. This time will also be affected by the rate applied, the size of the crop, and the amount of time to be spent in the field. The following reentry periods are taken from current product labels. Suggested reentries are given for those products without label statements. THESE SHOULD BE CONSIDERED MINIMUM WAITING PERIODS.

INSECTICIDE	LABEL REENTRY	SUGGESTED REENTRY
Ambush 2E	None	After spray has dried
Broot 15G	After dusts have settled	-
Comite 6.5EC	None	48 hours
Counter 15G	None	7 days
Cygon 400	None	48 hours
Diazinon 14G	None	48 hours
Diazinon AG500	After spray has dried	-
Dibrom	None	After spray has dried
Dipel 10G, ES	None	0 days
Disyston 15G	24 hours	7 days (foliar)
Disyston 8E	After spray has dried	-
Dyfonate 10G, 20G	After dusts have settled	-
Dylox 80S	After spray has dried	-
EPN + M Parathion	48 hours	-
EPN 5E	24 hours	-
Endosulfan 3E	After spray has dried	-
Endosulfan 50W	24 hours	-
Ethion 8E, 4M	24 hours	-
Furadan 4F	Corn (prolonged contact) 14 days	-
Guthion 2S, 2L, 50W	24 hours	-
Imidan 50W	After spray has dried	-
Lannate 90S, 1.8L	After spray has dried	-
Lorsban 15G	After dusts have settled	-
Lorsban 4E	24 hours	-
Malathion EC, ULV	After spray has dried	-
Metasystox R 2E	48 hours	-
Methoxychlor 2E	After spray has dried	-
Methyl parathion	48 hours	-
Mocap 15G	After mixed with soil	-
Nudrin 90S, 1.8L	None	After spray has dried
Orthene	After spray has dried	-
Parathion	48 hours	-
Pennacap M	After spray has dried	-
Phorate 15G	After dusts have settled	-
Phosdrin, mevinphos	None	After spray has dried
Pounce 3.2 EC	After spray has dried	-
Pydrin 2.4EC	After spray has dried	-
Rampart 10G	After dusts have settled (soil	7 days (foliar)
Sevin (all formulations)	After sprays have dried	-

## POST TREATMENT REENTRY PERIODS (continued)

<u>INSECTICIDE</u>	<u>LABEL REENTRY</u>	<u>SUGGESTED REENTRY</u>
Supracide 2E	48 hours Long sleeves, pants from day 3 to day 7	-
Temik 15G	Until soil dries after initial irrigation or rain. Protective footgear and long sleeves at all other times.	
Thimet 20G	After dusts have settled (soil) 7 days (foliar)	-

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### CHEMIGATION SAFETY

Several pesticides listed in this guide are specifically labelled for application through center pivot irrigation systems, as well as by conventional methods such as aircraft or ground equipment. It will most likely become illegal within the near future to apply any pesticide in this manner that is not so labelled.

Any center pivot system that is used to apply pesticides should be equipped with safety devices designed to protect groundwater from pesticide contamination and applications to noncrop areas. These safety devices will also soon become legal requirements. Specific safety practices are also recommended.

- a. An anti-backflow check valve should be installed to prevent injected chemicals from siphoning into the well. This valve should be automatic, quickclosing, tight-sealing and able to exert 1 lb psi back flow pressure. The valve housing should be equipped with a low-point, manual drain as well as an access port and/or drain plug between the valve and the well to allow inspection to insure that the valve is functioning properly. An air release-vacuum breaker should also be fitted between the valve and the well to prevent air locks which affect the functioning of the check valve.
  
- b. An in-line check valve should be installed at the point of injection into the main water line to prevent the flow of water from the irrigation system back into the nurse tank and thus avoid overflow of chemicals on the ground.

- c. The irrigation and the injection pump should be interlocked electrically so that if the irrigation pump stops, the injection pump also stops. Additionally, irrigation systems should be operated in the automatic mode, so if the forward motion of the sprinkler system stops, both pumps will be shut off automatically. This will prevent pumping the entire contents of the nurse tank on to the area of the field under the stationary system.
  
- d. The first 2-3 nozzles should be shut off during the application to avoid overapplication of pesticides in the well area. The end gun should also be shut off.
  
- e. Since the grower himself is likely to be applying pesticides through the center pivot system, he will be responsible for proper disposal of the containers. All containers must be triple rinsed, which is best accomplished by the following procedure, recommended by the National Agricultural Chemicals Association:

- Empty the container into the spray tank and allow to drain in the vertical position for 30 seconds.

- Add a measured amount (1/4 to 1/5 of the container capacity) of water or other diluent to the container.

- Rinse the container thoroughly, pour into the spray tank, and allow to drain for 30 seconds. Repeat 3 times, then bring spray tank up to level.

- Crush the container immediately. Crushed, triple-rinsed containers may be buried at a sanitary landfill or on the farm. Containers that are too large to be crushed will require special handling. No pesticide container should be re-used.

Recommended Reading on Chemigation Safety

Applying pesticides through center pivot irrigation systems. CSU Service in Action No. 4.713

Chemigation: Recommended safety devices. CSU Service in Action No. 2.801.

Fertigation: Applying fertilizers through irrigation water. CSU Service in Action No. .512.

## COLD WEATHER STORAGE OF PESTICIDES

Product	Minimum Storage Temperature ( F )
Acaraben 4E	32
Bravo 500	32(a)
Citcop 5E	(b)
Comite 6.5E	No special precautions
Cygon 400	45
Cythion 5E	32(b)
Diazinon AG500	No special precautions
Diazinon 4E	No special precautions
Disyston 8E	No special precautions
Dithane FZ	32
Dyfonate 4E	-40(b)
Dylox 1.5	0
Dylox LS	32
Dylox 4E	32
EPN	(a)
Furadan 4F	32(c)
Guthion 2L	55
Guthion 2S	32
Kocide 101	No special precautions
Lannate 1.8L	No special precautions
Lorsban 4E	0(d)
Malathion ULV	-20
Manzate FL	32
Manzate 200 FL	32
Metasystox R	0(d)
Methoxychlor EC	(b)
Monitor 4E	25
Nudrin 1.8L	32
Parathion 8E (FMC)	20
Parathion 8E (T-H)	32
Pay-Off 2.5E	(b)
Penncap M	32(d)
Pounce 3.2E	10
Pydrin 2.4E	No special precautions
Ridomil 2E	40
Sevin (all liquids)	(b)
Supracide 2E	32(a)
Telone II	No special precautions
Terrachlor 2E	0
Thiodan 3E	20
Thiram 42S	32(a)
Vydate L	No special precautions

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- (a) Do not use after freezing; contact manufacturer.
  - (b) May be stored at temperature below freezing, but warm to 40° and shake well before using.
  - (c) Do not use after freezing, thawing, and refreezing.
  - (d) Warm and agitate to dissolve crystals. If crystals do not dissolve, do not use; contact manufacturer.

## INSECTICIDE PERFORMANCE SUMMARIES

CSU does not have a policy of ranking insecticides according to the efficacy for a particular problem, nor does it currently have the research capacity to make such comparisons properly. Substantial research data are, however, available for corn and sorghum insects in Northeast Colorado and the Arkansas Valley which can be used as an aid in selecting insecticides for use in those areas. This information is summarized in the following tables. Additional summaries will be provided when sufficient information is available. The trials reported below were conducted by W. Hantsbarger, F. Peairs, S. Pilcher, and F. Schweissing.

TABLE 1. Summary of performance of planting-time insecticides against western corn rootworm, 1982-1986, in northern Colorado.

Insecticide	Average Root Rating*
Broot 15G*	2.4 (5)
Counter 15G	2.3 (5)
Dyfonate 20G	2.4 (5)
Furadan 15G	2.2 (5)
Lorsban 15G	2.7 (5)
Mocap 15G	2.5 (5)
Thimet 20G	2.4 (5)
Untreated Control	4.5 (5)

\*Rated on a scale of of 1-6, with 1 being least damaged, and 6 being most heavily damaged. Number in parenthesis is number of years in average.

\*\*Tested as Landrin 15G in 1982.

TABLE 2. Summary of performance of lay by applications of western corn rootworm insecticides, 1982-86, in northeast Colorado.

Insecticide	Average Root Rating*
Broot 15G*	2.2 (5)
Counter 15G	2.0 (5)
Dyfonate 20G	2.2 (5)
Furadan 15G	2.0 (5)
Lorsban 15G	2.6 (5)
Thimet 20G	2.4 (5)
Untreated Control	4.5 (5)

\*Rated on a scale of of 1-6, with 1 being least damaged, and 6 being most heavily damaged. Number in parenthesis is number of years in average.

\*\*Tested as Landrin 15G in 1982.

TABLE 3. Summary of insecticide performance against first brood European corn borer, 1982-86, in Northeast Colorado

Material	AI/acre	Method*	% Control**
Counter 15G	1.00	C	84 (5)
Counter 15G	1.00	A	85 (3)
Dipel 10G	10 lbs product	A	78 (2)
Dipel 10G	10 lbs product	C	84 (2)
Dipel 14G	7 lbs product	A	87 (2)
Dipel 14G	7 lbs product	C	79 (2)
Dipel ES	1 qt product + oil	C	92 (2)
Dyfonate 20G	1.00	C	84 (6)
Dyfonate 20G	1.00	A	75 (3)
Furadan 15G	1.00	A	90 (6)
Furadan 15G	1.00	C	93 (6)
Lorsban 15G	1.00	A	81 (4)
Lorsban 15G	1.00	C	81 (5)
Lorsban 4E	1.00	I	89 (6)
Pounce 3.2E	0.15	I	88 (6)
Pounce 1.5G	0.15	C	91 (2)
Pounce 1.5G	0.15	A	68 (2)
Pydrin 2.4E	0.15	I	58 (5)
Thimet 20G	1.00	C	77 (4)
Thimet 20G	1.00	A	73 (3)

\*A = Aerial, C = Cultivator, I = Center Pivot Injection.

CSU does not recommend the use of aerially-applied liquids for control of first brood European corn borer.

\*\*Numbers in parentheses indicate that % control is the average of that many trials.

Table 4. Summary of insecticide performance against western bean cutworm, 1982-86, in Northeast Colorado.

Material	AI/acre	Method**	% Control
Ambush 2E	0.05	A	99 (2)
Ambush 2E	0.05	I	99 (2)
EPN + Parathion	0.25 + 0.25	A	87 (3)
Lorsban 4E	0.75	A	98 (3)
Lorsban 4E	0.75	I	94 (4)
Pounce 3.2E	0.05	A	97 (4)
Pounce 3.2E	0.05	I	100 (4)
Pydrin 2.4E	0.05	A	97 (5)
Pydrin 2.4E	0.05	I	98 (5)
Sevin 4-Oil	2.00	A	91 (2)

\*Numbers in parentheses indicate that % control is average of that many trials.

\*\*A = Aerial, I = Center pivot injection.

Table 5. Summary of insecticide performance against second brood European corn borer, 1982-86, in northeast Colorado.

Material	AI/acre	Method*	% Control**
Dipel ES	1 qt product	I	70 (2)
Furadan 4F	1.00	A	64 (5)
Lorsban 4E	1.00	A	21 (4)
Lorsban 4E	1.00 + oil	I	74 (8)
Pennacap M	1.00	A	74 (7)
Pennacap M	1.00	I	74 (7)
Pydrin 2.4EC	0.15	A	58 (5)
Pydrin 2.4EC	0.15 + oil	I	67 (5)

\*A = Aerial, I = Center pivot injection.

\*\*Numbers in parentheses indicate how many trials are averaged.

Table 6. Performance of registered miticides against Banks grass mite, 1981-85, Rocky Ford, Colorado.

Material	AI/Acre	Rank*				
		1981	1982	1983	1984	1985
Comite	1.65	5	7	2	5	2
Cygon	0.50	2	3	6	3	5
Disyston	1.00	4	2	4	2	4
Metasystox R	0.50	3	5	3	4	3
Supracide	0.50	1	1	1	1	1
Thimet 20G	1.00	6	4	5	6	6
Untreated control	--	7	6	7	7	7

\*Evaluations were made at 2 weeks. Materials were originally tested with many other products (ranked 1-7, with 1 = the best).

Table 7. Performance of insecticides registered for greenbug control on sorghum, 1980-83 and 1985, Rocky Ford, Colorado.

Material	AI/Acre	Rank*				
		1980	1981	1982	1983	1985
Cygon	0.50	3	7	3	6	8
Disyston 8E	0.50	8	6	8	9	9
Disyston 15G	1.00	9	10	9	8	10
Dyfonate	1.00	5	2	6	5	5
Furadan 4F	0.50	2	4	1	1	4
Lorsban 4E	0.25	4	--	--	--	1
Metasystox R	0.50	7	5	7	7	7
Parathion (Ethyl)	0.50	1	1	4	2	2
Supracide	0.50	--	9	5	4	6
Thimet 20G	1.00	6	3	2	3	3
Check	--	10	8	10	10	11

\*Based on number of greenbugs 2 weeks after application. Materials were originally tested with many other products (ranked 1-11, with 1 = the best).

### RECOMMENDED READING

Additional pest information can be found in the Colorado State University Service in Action sheets listed below.

- 2.905 Bacterial Wilt of Alfalfa.
- 2.906 Winter Injury of Alfalfa.
- 2.913 Bacterial Diseases of Beans.
- 2.915 Sugar Beet Nematode - Symptoms, Importance and Control.
- 2.918 White Mold of Dry Beans.
- 2.920 White Steak Mosaic.
- 2.923 Downy Mildew of Alfalfa.
- 2.924 Ergot.
- 2.927 Dwarf Bunt of Winter Wheat.
- 2.934 Barley Yellow Dwarf.
- 2.935 Corn Stalk in Colorado.
- 2.936 Rust of Dry Beans.
- 2.938 Root Rots of Dry Beans.
- 2.944 Sunflower Diseases.
- 5.500 Aphids in Small Grains.
- 5.503 Armyworms - Characteristics and Control in Small Grains.
- 5.555 Management of Spider Mites in Corn.
- 5.508 Caterpillars in Colorado Field Crops. Part I.
- 5.524 Blister Beetles.
- 5.535 Grasshopper Control in Field Crops.
- 5.537 European Corn Borers - Characteristics and Control.
- 5.538 Western Bean Cutworms - Characteristics and Control in Corn.
- 5.545 Preventing Insect Damage to Farm-Stored Grain.
- 5.531 Aphids in Alfalfa.
- 5.564 Caterpillars on Colorado Field Crops: Part II.
- 5.565 Caterpillars on Colorado Field Crops: Part III.

### ADDITIONAL DIAGNOSTIC REFERENCES

- A. Recognition and Management of Dry Bean Production Problems, NCR #198. 1983. 57 pages, 105 illus. Available from CSU Bulletin Room.
- B. Common Diseases of Small Grain Cereals: A Guide to Identification. 1983. F.J. Zillinsky. CIMMYT. 141 pages, 301 illus. Available by airmail for \$18.75 + \$2.50 postage from CIMMYT, Londres 40, Apdo. Postal 6-641, 06600 Mexico D.F., MEXICO.
- C. The following disease compendia are available for \$20.00 each (15.00 for APS members) from the American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, Minnesota 55121:
  - 1. Compendium of Alfalfa Diseases. 1979. 65 pages, 118 illus
  - 2. Compendium of Barley Diseases. 1982. 78 pages, 171 illus.
  - 3. Compendium of Corn Diseases. 1980. 105 pages, 179 illus.
  - 4. Compendium of Soybean Diseases. 1982. 104 pages, 191 illus.
  - 5. Compendium of Wheat Diseases. 1977. 106 pages, 166 illus.
  - 6. Compendium of Sorghum Diseases. 1986. 82 pages, 161 illus.
- D. Field Key for Identification of Caterpillars Found on Field & Vegetable Crops in Colorado. Colorado State University Cooperative Extension Bulletin 535A. Available from CSU Bulletin Room.



**ALFALFA FOR HAY****Insects**

**Alfalfa Caterpillar, Armyworm, Cutworms, and Webworms** - (See below for army cutworm.) These are all foliage feeders. Chemical control for alfalfa caterpillars is justified when there is 1 caterpillar/2 plants. Armyworms and cutworms should be controlled when they reach a density of 3-4/sq ft. Webworms should be controlled only if there are more 1 larva per plant more than 2 weeks before cutting. If larvae are large at cutting they may migrate to nearby susceptible crops. (Be sure to use sufficient pressure and gallonage to penetrate the web.)

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
<u>Bacillus thuringiensis</u>	See label	0 days. Alfalfa caterpillar only.
Diazinon	2-4 lb	Prior to planting. Cutworms only.
Dylox	1/2-1 lb	0 days. Safe for bees if applied evening or night. Up to 3 applications/cutting.
Lannate <sup>R</sup> Nudrin <sup>R</sup>	See label for dosage	7 days. Safe for bees if applied when none are in field. Do not apply below 50°F if crop is dormant, semi-dormant.
*Lorsban 4E	1/2-1 lb	14 days (1/2 lb), 21 days (over 1/2 lb). Up to 4 times/year. Hazardous to bees.
Malathion ULV	6/10-9/10 lb	0 days (8 oz), 5 days (12 oz). For alfalfa caterpillar and armyworms. <b>Extremely Hazardous to Bees!</b> Do not apply to alfalfa in bloom.
Malathion	1 1/4 lb	0 days. Armyworm only.
Methoxychlor	See label	7 days.
Parathion <sup>R</sup>	1/2 lb	15 days. Hazardous to bees.
Phosdrin <sup>R</sup> , mevinphos <sup>R</sup>	1/4-1/2 lb	1 day (alfalfa caterpillar, climbing cutworms).

**R** = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Sevin (various formulations)	1-1 1/2 lb	3 days. Sevin is <b>Extremely Hazardous to Bees!</b> Sevimol is hazardous to bees. Sevin XLR+ is safe for bees if applied when none are in the field.

**Alfalfa Weevil** - Adults and larvae feed on terminals, reducing hay quality and quantity. Cut first crop early. Tolerant varieties such as Perry, Arc and Team are available. Chemical control is justified when 1/3 of first crop terminals show feeding, or when larvae average 20 per 180° sweep. Control in stubble is recommended when there are more than 8 larvae/sq ft or when regrowth has feeding on 50% or more of the terminals. Gallonage is important, use at least 10 gallons with ground equipment and 3 gallons by air.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Diazinon	1-1/2 lb	2 days (graze), 10 days (hay).
Furadan 4F <sup>R</sup>	1/4-1 lb	7-28 days depending on rate. 1 application/cutting, 2 applications/season. <b>Extremely Hazardous to Bees!</b>
Guthion 50W	3/8-3/4 lb	14-21 days depending on rate. Hazardous to bees. No more than once/cutting.
Imidan	1 lb	7 days. 1 application/season. Hazardous to bees.
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1 lb	7 days. Safe to bees, if applied when they are not in the field. Do not apply at below 50°F, if crop is dormant or semi-dormant.
*Lorsban 4E	3/4-1 lb	21 days. Up to 4 times/year. Hazardous to bees.
Malathion	1-1 1/4 lb	0 days. Do not use when temperature is below 60°F. Hazardous to bees.
Malathion ULV	16 fl oz	5 days. Do not use when temperature is below 60 F. <b>Extremely Hazardous to Bees!</b> Do not apply to alfalfa in bloom.

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<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Methoxychlor	1/2-1 lb	7 days.
Parathion <sup>R</sup>	1/2 lb	15 days. Hazardous to bees.
*Pennacap-M <sup>R</sup>	1/4-1/2 lb	15 days. Do not use with screens finer than 50 mesh. <b>Extremely Hazardous to Bees!</b> Do not spray during bloom.
Phosdrin <sup>R</sup> mevinphos <sup>R</sup>	1/4-1/2 lb	1 day. Do not use during bloom.
Sevin (various formulations)	1-1/2 lb	3 days. Sevin is <b>Extremely Hazardous to Bees!</b> Sevimol is hazardous to bees. Sevin XLR+ is safe for bees if applied when none are in the field.
Supracide <sup>R</sup>	1/2-1 lb	14 days. Up to 1 stubble and 1 foliar application/cutting. Hazardous to bees.
Rampart 10G <sup>R</sup>	1-1 1/2 lb	35 days.

**Pea aphid, spotted alfalfa aphid, blue alfalfa aphid** - These cause stunting and wilting of the plants. Chemical control is justified for pea aphids when there are 10 aphids per stem at 2 weeks before cutting. Spotted alfalfa aphid should be controlled when they reach 15-20/stem with considerable honeydew, except on seedlings, where one aphid/plant can be economical. Resistant varieties are available for the pea aphid and the spotted alfalfa aphid. Blue alfalfa aphids should be controlled at approximately 50 aphids/stem, except during early regrowth when 20/stem can cause economic loss. If the crop is to be cut in less than one week, immediate cutting is recommended over an insecticide treatment.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Cygon, dimethoate	1/4-1/2 lb	10 days. 1 application/cutting. Hazardous to bees.
Diazinon	1/3-1/2 lb	0 days (grazing). 7 days (green chop, hay).
Disyston 15G <sup>R</sup>	1 lb	Early spring or stubble broadcast. Minimum 28 days between applications.

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<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Furadan 4F <sup>R</sup>	1/2-1 lb	14-28 days depending on rate. 1 application per cutting, 2 per season. <b>Extremely Hazardous to Bees!</b>
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/2-1 lb	7 days. Safe for bees if applied when none are in the field. Do not use below 50°F if crop is dormant, semi-dormant.
*Lorsban 4E	1/2-1 lb	14 days (1/2 lb), 21 days (over 1/2 lb). No more than 4 times/year. Hazardous to bees.
Malathion	1-1 1/4 lb	0 days. Do not use below 60°F. Hazardous to bees.
Parathion <sup>R</sup>	1/2 lb	15 days. Hazardous to bees.
*PennCap M <sup>R</sup>	1/2 lb	15 days. <b>Extremely Hazardous to Bees!</b>
Phosdrin <sup>R</sup> / mevinphos <sup>R</sup>	1/8-1/4 lb	1 day. Do not use during bloom.
Supracide <sup>R</sup>	1/2-1 lb	14 days. 1 foliar, 1 stubble application/cutting. Hazardous to bees.

**Army Cutworms** -- These are early-season foliage feeders. Chemical control may be justifiable when their density reaches 3-4/sq.ft Under heavy pressure, control may be difficult.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
*Lorsban 4E	1/2-1 lb	14 days (1/2 lb), 21 days (1 lb). Up to 4 times/year. Hazardous to bees.
Sevin (various formulations)	1 1/2 lb	3 days. Sevin is <b>Extremely Hazardous to Bees!</b> Sevimol is hazardous to bees. Sevin XLR+ is safe for bees if applied when none are in the field.

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**Blister Beetles** -- Adults feed on flowers and foliage. Blister beetles are highly toxic to horses and are occasionally trapped or crushed by the crimper and thus retained in the hay. The old harvest method of cutting the hay and allowing it to dry before raking and bailing allowed the beetles to escape. Early cutting should avoid most problems as the beetles are attracted to flowers and don't build up in the alfalfa until bloom. No economic level has been established for blister beetles, but if beetle swarms are noted in the field and the crop is destined for horses, an insecticide treatment may be justified. During bloom, Sevin XLR+ would be preferred in terms of reduced honey bee hazard.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Methoxychlor	2 lb	7 days.
Parathion <sup>R</sup>	1/2 lb	15 days. Hazardous to bees.
Sevin (various formulations)	1/2-1 lb	3 days. Sevin is <b>Extremely Hazardous to Bees!</b> Sevimol is hazardous to bees. Sevin XLR+ is safe for bees if applied when none are in the field.

**Grasshoppers and Crickets** -- These are foliage feeders. Chemical control may be justified when there are 8/sq yd in the field or 20/sq yd in field margins. With registered materials, reinfestation may occur after 10-14 days. Use the higher dosages for adults, lower for immatures. Sufficient gallonage is important.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Cygon	1/4-1/2 lb	10 days (harvest, grazing). Do not apply during bloom.
Furadan 4F <sup>R</sup>	1/8-1/4 lb	7 days. No more than 2 applications/season, 1/cutting. <b>Extremely Hazardous to Bees!</b>
Guthion 50W	1/2-3/4 lb	16 days (1/2 lb), 21 days (3/4 lb). Hazardous to bees. No more than once/cutting.
*Lorsban 4E	1/4-1/2 lb	14 days. Hazardous to bees.
Malathion	1-1 1/4 lb	0 days. Hazardous to bees.
Malathion ULV	8 fl oz	0 days. <b>Extremely Hazardous to Bees!</b>
Parathion <sup>R</sup>	1/2 lb	15 days. Hazardous to bees.

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<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
*Penncap M <sup>R</sup>	1/4-3/4 lb	15 days (harvest or grazing). Do not apply during bloom. <b>Extremely Hazardous to Bees!</b>
Phosdrin <sup>R</sup> mevinphos <sup>R</sup>	1/4-1/2 lb	1 day. Do not use during bloom.
Sevin (various formulations)	1/2-1 1/2 lb	3 days. Sevin 80S is <b>Extremely Hazardous to Bees!</b> Sevimol and Sevin 4-Oil are hazardous and Sevin XLR+ is safe if applied when bees are not present. Bait formulations are also available.

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## ALFALFA FOR HAY

## Diseases

**Damping Off and Seedling Blights (Pythium spp., etc.):** Seedlings emerge and then die. Generally watery discolored rot at soil surface. Favored by cool, wet, poorly drained, heavy soils.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> Remarks
Apron 25	2.0 fl oz	-	Seed treatment
Captan 30DD	6.5 fl oz	-	Seed treatment
Thiram 42S	7.5 fl oz	-	Seed treatment

**Fungus Leaf Spots - (Leptosphaerulina briosiana, Cercospora medicaginis, Pseudopeziza medicaginis, Phoma sp. and others):** Various leaf spots, generally not important. Frequently adequately controlled by cutting as early as possible. Various sources of resistance are also available.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> Remarks
Kocide 101	2 lb	-	10-14 days
Kocide 606	2.6 pt	-	10-14 days

**Bacterial Leaf Spot (Xanthomonas campestris pv alfalfae):** Small round-to-irregular, water soaked spots, frequently angular. Occurs in moist weather following warm to hot periods. Resistance available. Generally of little importance in Colorado.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> Remarks
Kocide 101	2 lb	-	10-14 days
Kocide 606	2.6 pt	-	10-14 days

**Nematodes (excluding stem nematode).** Use Telone C-17 at 10-17 gal/acre or Telone II at 9-15 gal/acre as a preplant treatment. Aerate at 7-14 days.

Additional diseases in Colorado for which no pesticides are labelled:

AMV	<u>Alfalfa Mosaic Virus</u>
Bacterial Wilt	<u>Corynebacterium michiganense</u> pv <u>insidiosum</u>
Downy Mildew	<u>Peronospora trifolium</u>
Fusarium Wilt	<u>Fusarium oxysporum</u> f. sp. <u>medicaginis</u>
Phytophthora Root Rot	<u>Phytophthora megasperma</u>
Spring Blackstem and Leaf Spot	<u>Phoma medicaginis</u>
Stem & Bulb Nematode	<u>Ditylenchus dipsaci</u>

**DRY BEANS****Insects**

**Aphids, Spider mites** - Not enough is known to establish an economic level for these insects.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
<u>Aphids</u>		
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/2-1 lb	25 days. 3 to feed vines, 7 to feed hay.
Penncap M <sup>R</sup>	1/2 lb	15 days. Observe bee warnings.
Pydrin 2.4E <sup>R</sup>	1/10-2/10 lb	21 days. Do not feed or graze treated vines. Pea aphid.
Orthene	1/2-1 lb	14 days. Do not feed vines.
<u>Spider Mites</u>		
Ethion	1/4-1/2 lb	2 days. Do not feed to livestock.
<u>Aphids and Mites</u>		
Cygon, dimethoate	1/4-1/2 lb	0 days. Do not feed vines.
Dibrom	1/2 lb	1 day. Do not feed vines.
Disyston <sup>R</sup>	1-2 lb	60 days. 1 application per season. Do not allow direct contact with seed. Dosage for 30" rows. See label for phytotoxicity disclaimer.
Malathion	1 lb (mites) 1 1/4 lb (aphids)	1 day.
Parathion <sup>R</sup>	1/2 lb	15 days.
Phosdrin <sup>R</sup> / mevinphos <sup>R</sup>	1/8-1/4 lb (aphids) 1/4-1/2 lb (mites)	1 day.
Temik 15G <sup>R</sup>	5.5-7.5 oz formulation/ 1000 row ft (aphids) 7.5-14 oz (mites)	90 days. Planting time or side dress. Do not feed to livestock. Do not consume green pods.

**R** = Restricted Use



<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Rampart 10G <sup>R</sup> Thimet 20G <sup>R</sup>	4.5-7.0 oz/1000 row ft	60 days to feed foliage. Planting time.

**Garden Symphylan** - Little is known about the economic importance of this animal. If they appear to be in damaging numbers, broadcast and incorporate into the soil 2 lb AI/acre Dyfonate.

**Grasshoppers** - Will occasionally invade bean fields, more commonly damage margins. 8/sq yd within the field is the accepted economic level.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Cygon, dimethoate	1/4-1/2 lb	0 days. Do not feed treated vines.
Orthene	1/4-1/2 lb	14 days. Do not feed treated vines.
Phosdrin <sup>R</sup> mevinphos <sup>R</sup>	1/4-1/2 lb	1 day.
Pydrin 2.4E <sup>R</sup>	1/10-2/10 lb	21 days. Do not feed or graze treated vines.

**Mexican Bean Beetle** - Defoliate plants during pod filling. A treatment is probably justified when there is 1 larva/plant or 15% defoliation. Adults usually feed after pod filling is completed, so the large larvae are of primary importance.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Malathion	1-1 1/4 lb	1 day.
Penncap M <sup>R</sup>	1/2 lb	15 days. Observe bee warnings.
Pydrin 2.4E <sup>R</sup>	1/20-1/10 lb	21 days. Do not feed or graze treated vines.
Rampart 10G <sup>R</sup> Thimet 20G <sup>R</sup>	See label	60 days.
Thiodan, endosulfan	1/2-1 lb	3 days. No more than 3 applications. Do not feed treated foliage to livestock.

**Mexican Bean Beetle and Flea Beetle**

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Parathion <sup>R</sup>	3/4 lb	15 days.
Sevin (various formulations)	1/2-1 lb	0 days.

**Seed Corn Maggots** - Appear sporadically, but can be a serious problem in a given field. Seed treatments with diazinon, lindane, Lorsban and methoxychlor are recommended, but results have been inconsistent with some products. Follow label directions.

**Thrips** - Onion thrips can attack foliage, producing leaf cupping and distortion. The economics of this problem is unclear, but at least 15 thrips per plant should be present before a treatment is made. 4-6 flower thrips/blossom have been shown to cause abortion (pod loss), but it has not been shown that this translates to significant field loss.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Disyston <sup>R</sup>	1-2 lb	60 days. 1 application/season. Planting time or side-dress. See label for phytotoxicity statement.
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/2-1 lb	25 days. 3 for vines, 7 for hay.
Orthene	1/2-1 lb	14 days. Do not feed vines.
Parathion <sup>R</sup> (ethyl only)	1/2 lb	15 days.
Rampart 10G <sup>R</sup> Thimet 20G <sup>R</sup>	1/2 lb	60 days to feed foliage. Planting time, do not place in contact with seed.
Sevin (several formulations)	1 lb	0 days.

Western Bean Cutworm (WBC), Other Cutworms - Feed on foliage. Some, such as WBC, chew holes in pods and feed on developing seeds. Not enough is known about cutworms other than WBC to establish an injury level. For WBC in irrigated beans, if more than two larvae are found per foot of row then the field should be treated. In dryland beans, fields should be treated if one larva is found in two feet of row. If a field has been or is going to receive a foliar treatment (not a planting-time systemic) for Mexican bean beetle it is unlikely that it will need a western bean cutworm treatment since the timing, products and rates used for Mexican bean beetle will also provide adequate control of western bean cutworm.

<sup>R</sup> = Restricted Use

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Dylox	1/2-1 lb (WBC) 1-1 1/2 lb (Cutworms)	14 days.
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/2 lb	25 days. 3 for vines, 7 for hay. For variegated cutworm, armyworms.
Orthene	1/2-1 lb	14 days. Do not feed vines.
Pydrin 2.4EC <sup>R</sup>	1/10-2/10 lb	21 days. Do not exceed 0.8 lb active ingredient/acre/year. Do not feed treated foliage.
Sevin (various formulations)	1-1 1/2 lb	0 days.

## DRY BEANS

### Diseases

**Common Bacterial Blight (Xanthomonas campestris pv. phaseoli):** Medium to large brown spots, often surrounded by a narrow lemon-yellow border on foliage usually after flowering. Reddish brown, water-soaked spots may occur on pods also. Favored by warm, moist weather. Other controls include certified seed, crop rotation, volunteer bean control, and resistant varieties.

Pesticide	Rate (Acre)	Application	Preharvest Interval
		Frequency (days)	Remarks
Copper Count N*	0.5-.75 gal	5-10	-
Kocide 101 (Champion)	1-3 lb	7-14	-
Kocide 404S	1-3 qt	7-14	-
Kocide 606*	1.3-4 pt	7-14	-
Tri-Basic			
Copper (Micro Cop)	1-2 qt, 2-3 lb	7-10	Maximum of 6 times
Basicop	2-4 lb	7-10	-
Manpower	4-6 pt	7-14	-

\*Provided effective disease control in CSU test plots.

**Damping Off and Seedling Blights (Pythium, Aphanomyces, Rhizoctonia, Fusarium):** Pre or post emergence wilting and death of seedlings. Roots and hypocotyls are discolored, watersoaked and/or rotted. Other controls include crop rotation, proper planting date, and deep tillage.

Pesticide	Rate (100 lb seed)	Application	Preharvest Interval
		Frequency (days)	Remarks
Agrox 3-way	5 oz	-	Seed treatment
Apron 25	2 oz	-	Seed treatment
Arasan 70S	1.3 oz	-	Seed treatment
Captan 50, 4L	5-6 lb, 2.5-3 qt/acre	-	Seed furrow trt.
Captan 400	2-3 fl oz	-	Seed treatment
Chloroneb 65	4 oz	-	Seed treatment
Dithane FZ	3.3-6.7 fl oz	-	Seed treatment
Orthocide 50	5-6 lb or 10-12 lb/acre	-	Seed furrow trt. or broadcast
Ridomil 2E	1 pt/13,000 ft row	-	Seed furrow trt.
Terra Flo 25	3.8 fl oz	-	Seed treatment
Terraclor			
Super X 20.5D	3.3 oz	-	Seed treatment
Terracoat SD205	3.3 oz	-	Seed treatment

**Fusarium Root Rot, (Fusarium solani f. sp. phaseoli):** Red-to-brown streaks on primary root and hypocotyls of old seedlings or young plants. Affected areas enlarge and lower root becomes brown, and root system and plant may be poorly developed and stunted. Other controls include crop rotation, proper planting date, adequate fertility and moisture, and deep tillage.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> <u>Remarks</u>
Terra Flo	3.8 fl oz	-	Seed treatment
Terraclor			
Super X 20.5D	3.3 oz	-	Seed treatment
Terracoat SD205	3.3 oz	-	Seed treatment

**Halo Blight (*Pseudomonas syringae* pv. *phaseolicola*)\*\***: Small to medium greenish-yellow spots on foliage. Systemic infection may cause yellowing of new leaves, and water-soaked spots may form on pods. Favored by cool, moist weather. Other controls include certified seed, crop rotation, volunteer bean control, and resistant varieties.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> <u>Remarks</u>
Agristep 500	0.83 lb/gal	-	Slurry seed trt. (50,000 ppm.)
Tenn-Cop 5E*	3 pt	7-10	Maximum of 5 times.
Copper Count N*	4-6 pt	5-10	-
Kocide 101	1-3 lb	7-14	-
Kocide 404S	1-3 qt	7-14	-
Kocide 606*	1.3-4 pt	7-14	-
Tri Basic Copper* (Microcrop)	1-2 qt, 2-3 lb	7-10	Maximum of 6 times
Basicop	2-4 lb	7-10	-
Manpower	4-6 pt	7-14	-

\*Provided effective diseases control in CSU test plots.

\*\*Many of these products have been also used to manage Bacterial Brown Spot (*Ps. syringae* pv. *syringae*).

**Nematodes**: Poor root development, root galls, rooy cysts, and/or stunted and yellow plants. Other controls include crop rotation.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> <u>Remarks</u>
Telone	10-17 gal	-	Preplant, aerate at 7-14 days.
Telone II	9-15 gal	-	Preplant, aerate at 7-14 days.
Temik 15G	7-14 lb	-	Planting treatment.
Vapam	40-100 gal	-	Preplant, aerate at 7 days.
Vorlex	7-15 gal	-	Preplant, aerate at 14 days.

**Rhizoctonia Root Rot (*Rhizoctonia solani*):** Linear to circular, sunken, reddish brown cankers on hypocotyl and roots, severe infection may cause a brick red discoloration of the pith. Other controls include crop rotation (not with potatoes or sugarbeets) and recommended planting dates.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> <u>Remarks</u>
Chloroneb 65	4 oz	-	Seed treatment
Terraclor 75	1.3-2 lb/14,500 ft	-	Seed furrow trt. Do not feed debris
Terraclor 10G	10-15 lb/14,500 ft	-	Seed furrow trt. Do not feed debris
Terraclor EC	1 gal in 8-10 gal water per 14,500 row ft	-	Seed furrow trt. Do not feed debris
Super X 20.5D	3.3 oz	-	Seed treatment
Terracoat SD205	3.3 oz	-	Seed treatment
Terra Flo 25	3.8 fl oz	-	Seed treatment

**Rust (*Uromyces phaseoli*):** Small, reddish-brown spots (pustules), often surrounded by a yellow border. Favored by cool, moist weather near flowering. Other controls include resistant varieties and proper planting dates.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> <u>Remarks</u>
Bravo 500* (See Bravo 720 also)	2-3 pt	7-10	14 days. Do not feed debris. Colorado 24C.
Bravo W75	3 lb	7	7 days.
Dithane FZ*	0.8-2.4 qt	4-10	4 days.
Dithane Z78	3-4 lb	7-14	7 days.
Dithane M22 Sp.	1-3 lb	7	4 days.
Kocide Maneb*	1.2-1.6 qt	5-7	4 days.
Kocide 404S	1.5-3 qt	7-10	Maximum of 4 times.
Maneb 80*	1.5-2 lb	4-7	4 days. Maximum 2 lb/acre
Manpower	4-6 pt	7-14	-
Super Six	4-8 pt	7-14	-
Top Cop & S	2 qt	7	-
Ziram F4	2 pt	4-7	4 days. Maximum 7 pt/acre

\*Provided effective disease control in CSU test plots.

**White Mold (Sclerotinia sclerotiorum):** Watersoaked spots on foliage, branches or pods become covered by white mycelium and have black sclerotia. Favored by cool, moist weather after flowering. Other controls include crop rotation, fertility and irrigation management and resistant varieties.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> <u>Remarks</u>
Benlate*	1.5-2 lb or 1-1.5 lb	Midbloom or early bloom, 7-10 days later	14-28 days.
Botran 75	3-4 lb	7	2 days. Not for livestock feed.
Mertect 340F	16-32 fl oz	10% and 100% bloom	28 days. Not for livestock feed.
Terraclor 75	2.75 lb/14,500 ft	-	Do not feed debris. Seed furrow, base of plants.
Terraclor 2E	1 gal in 8-10 gal water/14,500 ft	-	Seed furrow (avoid contact with seed), base of plant.
Topsin M*	1-2 lb, 20-30 fl oz	4-7	14 days. 28 for limas.

\*Provided effective disease control in CSU test plots.

Additional diseases for which no pesticides are labelled:

BCMV	Bean Common Mosaic Virus
BYMC	Bean Yellow Mosaic Virus
CTV	Curly Top Virus
Red Node	Tobacco Necrosis Virus
Bacterial Wilt	<u>Corynebacterium flaccumfaciens</u> pv. <u>flaccumfaciens</u>

## FIELD CORN

### Insects

**Armyworms** - These migrate into corn from grasses or onto corn within grassy cornfields. They are mostly a problem later in the season. They feed on the corn plant from the bottom leaves upward. If the lower 1/3 of the foliage is consumed before hard dent stage, chemical control may be justified.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
*Ambush <sup>R</sup>	1/10-2/10 lb	Apply prior brown silk (blister) stage.
Dylox	1/4-1/2 lb	0 days.
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/4-1/2 lb	0 days grain, 3 days forage.
*Lorsban 4E	1/2-1 lb	35 days. 14 days grazing.
Malathion	1-1 1/4 lb	5 days.
Pounce 1.5G <sup>R</sup> , *Pounce 3.2G EC <sup>R</sup>	1/10-2/10 lb	Apply prior brown silk (blister) stage.
Pydrin 2.4E <sup>R</sup>	1/10-2/10 lb	21 days.
Sevin (various formulations)	2 lb	0 days.

**Corn Earworms** - Control of corn earworms in field corn is usually neither practical nor economical. Registered materials include Ambush<sup>R</sup>, Lannate<sup>R</sup>, Nudrin<sup>R</sup>, Parathion<sup>R</sup>, Pydrin<sup>R</sup>, Sevin.

**Corn Leaf Aphids** - Very rarely, they can build up enough on the tassel to interfere with pollination and thus justify a control measure. Use diazinon, Disyston<sup>R</sup>, EPN + Parathion<sup>R</sup>, Lorsban, Metasystox R, Parathion<sup>R</sup> (ethyl, methyl), Pydrin<sup>R</sup> or Thimet<sup>R</sup> according to label.

**Corn Rootworm Larvae** - Damage from these insects is most likely in continuous corn. Chemical applications to first year corn is not recommended. Incorporation of soil insecticides into the soil protects wildlife. If corn is planted prior to May 15, post emergent treatments are preferable. Under Colorado conditions, post-emergent (layby) treatments are generally more reliable than planting-time treatments. Some performance problems have occurred with all rootworm insecticides. Performance of soil insecticides should be checked by leaving an untreated strip in each field. Examine some roots from this strip in late July. If poor control should occur, switch insecticides, preferably to another class (carbamate or organophosphate).

<sup>R</sup> = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.



<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
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PLANTING TIME TREATMENTS  
(Formulation /1000 Row Feet)

Granules

Broot 15G	8 oz	Band all materials according to label directions and incorporate lightly into the soil. Check label to determine granules can be allowed to come in contact with the seed.
Counter 15G <sup>R</sup>	8 oz	
Dyfonate 10G	9-12 oz	
Dyfonate 20G <sup>R</sup>	4 1/2-6 oz	
Furadan 15G <sup>R</sup>	8 oz	
Lorsban 15G	6-8 oz	
Mocap 15G <sup>R</sup>	8 oz	
Rampart 10G <sup>R</sup>	See label	
Thimet 20G <sup>R</sup>	See label	
Phorate 15G <sup>R</sup>	See label	

Granules in Furrow

Counter 15G <sup>R</sup>	8 oz	These materials can safely come in contact with the seed. Labels contain specific application instructions and restrictions. University tests have not shown any consistent advantage for this type of placement.
Furadan 15G <sup>R</sup>	8 oz	

Liquids

Dyfonate 4E <sup>R</sup>	2.5 fl oz	No liquids should be applied before May 15. Consult the label for specific application directions and restrictions.
Furadan 4F <sup>R</sup>	2.4 fl oz	

POST-EMERGENT TREATMENTS

The granular formulations listed above can be applied, at the same rates, as a band on either side of the row, by cultivator shoes and disc hillers at lay-by. Diazinon granules at 4-8 oz/1000 row-feet may also be used. Liquids for lay-by application include diazinon, Furadan 4F<sup>R</sup> and Lorsban. Consult the label for dosage and application method.

Application at lay-by is usually more reliable than at planting under Colorado conditions. APPLY ONLY BEFORE JUNE 15.

**Corn Rootworm Adults** - In rare instances, adults become numerous enough to interfere with pollination. If there are more than 5 beetles/plant during the wet silk stage, control may be justifiable. The number of beetles present is also a good indicator of whether soil insecticides should be applied in the following year. If beetles average 3 or more beetles per 4 ear zones on any

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one scouting day during July and August, then a soil insecticide application should be considered for the following season. Adult control can pose a significant threat to bees, which frequently visit corn fields during pollen shed. Take the appropriate precautions to avoid bee kills. The materials listed for western bean cutworm, as well as diazinon, Furadan 4F<sup>R</sup> and malathion, may be used to control adult corn rootworms.

**Cutworms** - These are the most prevalent in corn following sod, alfalfa, or small grain stubble and after corn in fields with much crop or weed residue. EARLY DETECTION OF THEIR PRESENCE IS ESSENTIAL. If one plant in 20 is injured, and cutworms are present, treatment is justified. Crusting or dry surface soil can reduce control with some materials, which can be counteracted by rotary hoeing immediately before or after the application. Synthetic pyrethroids (Ambush, Pay-Off, Pounce, Pydrin) have performed better without incorporation in most studies.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Ambush <sup>R</sup>	1/10-2/10 lb	Pre-emergence treatment
Diazinon 14G	2-4 lb	Broadcast preplant and work into top 2" soil. Also prior to or at lay-by cultivation.
Dyfonate 10G, 20G <sup>R</sup> , 4E <sup>R</sup>	1 lb	Black cutworm only.
Dylox	1/2-1 lb	No restrictions.
*Lorsban 4E	1-1 1/2 lb	35 days.
Lorsban 15G	8 oz formulation/ 1000 fow ft	Banded at planting.
Mocap 15G <sup>R</sup>	1 lb	Black and sandhill cutworms only.
Pay Off 2.5E <sup>R</sup>	4/100-8/100 lb	60 days. Ground application only.
Pounce 1.5 G <sup>R</sup> , *Pounce 3.2 EC <sup>R</sup>	1/10-2/10 lb	Pre-emergence treatment.
Pydrin 2.4 EC <sup>R</sup>	15/100-2/10 lb	21 days. Do not exceed 1 lb/acre/year.
Sevin (various formulations)	2-6 1/2 lb	0 days. See label for application instructions.

<sup>R</sup> = Restricted Use

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**European Corn Borer** - Some hybrids have useful resistance to the first brood of this insect, which feeds in the whorls and later enters the stalk. Granules applied by ground and air as well as some center-pivot applied liquids have given the best results in university tests. The second brood feeds in leaf axils and the ear tip, and later enters the stalk or the ear. Second brood damage increases the possibility of lodging and ear drop losses, so heavily infested fields should be harvested early. Aerially-applied and center-pivot applied liquids have performed better than granules for control of second generation larvae in university tests. MONITOR TREATED FIELDS FOR SPIDER MITES AS APPLICATIONS FOR CONTROL OF SECOND GENERATION ARE OFTEN ASSOCIATED WITH MITE OUTBREAKS.

The need to treat European corn borer can be determined by a simple method based on average Colorado conditions, or by a more complex method which takes into account treatment costs, individual field yields and current market conditions. Incorrect treatment decisions, by either method, are much more likely with second generation infestations. This is partly due to the second generation egg laying period which can last up to 4 weeks and thus makes proper treatment timing very difficult.

By the **simple method** chemical control of the first generation is economical when 25% of the plants have feeding damage and larvae are present in the whorls. Once larvae have entered the stalk, control is impossible. Survival of second generation larvae is highest during pollination, so treatments should be considered when weekly scouting has an accumulated total of 25% plants with egg masses. This percentage should be raised to at least 50% after pollination. If egg laying continues after the treatment, a second application may be justified under some circumstances.

The **complex method** requires the calculation of the **potential population density (PPD)** of the corn borer from scouting data and comparing that to the **economic threshold (ET)** calculated from control costs, corn prices, and crop stage. Keep in mind that these calculations assume 100% control, which is often not feasible, particularly with the second generation. The PPD can be reduced according to the percent control that you expect. The PPD is calculated differently for each generation:

#### First generation

1. Determine the percent damaged plants in the field.
2. Determine the number of live larvae per plant. Avoid counting newly hatched larvae as their mortality is very high.
3. The **PPD** = (percent damaged plants) x (average larvae/plant). For example, if 50% of the plants were damaged and there was an average of 3 larvae/plant, then the first generation **PPD** is 1.5.

#### Second generation

1. Scout the field weekly for borer egg masses, including those already hatched.
2. Begin counts of egg masses per plant with the first sign of eggs in

the field. It is unlikely that eggs will be detected until 5% of the eggs have been deposited.

$$3. \text{PPD} = \frac{(\text{SV})(23)(\text{EM})}{\text{PO}} \text{ where}$$

SV = the average proportion of individuals surviving through the damaging stage. A value of 0.2 is recommended.

EM = the number of egg masses per plant which is multiplied by the average number of eggs per mass (23).

PO = the proportion of eggs which have already been deposited. This is based on the length of the egg-laying period. On the first scouting day 0.05 is used because this is the amount of egg-laying which usually occurs before eggs can be detected.

4. Resample the field and recalculate the PPD after 8 days. At this time use a PO of 0.50. (Assuming a 3-week egg-laying period, 50% of the eggs would have been laid by this time.)

5. For example, the the second generation PPD from step 4 if there were 15 egg masses in 100 plants would equal  $\frac{(0.2)(23)(0.15)}{0.50} = 1.38$  larvae/plant.

Estimate the **ET** by:

1. Estimate control costs in dollars per acre. This is the total of the insecticide cost and the application cost.

2. Estimate market value of the crop and the yield at harvest.

$$3. \text{ET} = \frac{\text{CC/MV}}{(\text{DL}/100)\text{EY}} \text{ where}$$

CC = control costs (\$/acre)

MV = market value (\$/bu)

DL = percent yield lost to each borer per plant at the time of infestation. These will change with the crop stage as follows:

<u>Crop Stage</u>	<u>DL</u>
Early whorl	5.5
Late whorl	4.4
Pre-tassel	6.6
Pollen shedding	4.4
Kernels initiated	3.0

EY = Estimated yield (bu/acre).

4. For example, during pollen shed with \$14 control costs, \$2.75 corn, and a yield of 160 bu/acre,  $\text{ET} = \frac{\$14.00/\$2.75}{(4.4/100) 160 \text{ bu}} = 0.72$  larvae/plant.

Since the **ET** (0.72 larvae/plant) is lower than the second generation **PPD** (1.38 larvae/plant) calculated above, an insecticide treatment would be economical. The weakest parts of this procedure are the assumptions concerning SV, DL, and the length of the egg-laying period which affects the value of PO.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
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First and Second Generation

Ambush <sup>R</sup>	1/10-2/10 lb	Apply prior to brown silk (blister) stage.
Diazinon 14G	1-2 lb	10 days.
Dipel 10G Dipel ES	See label	0 days.
Dyfonate 10G, 20G <sup>R</sup>	1 lb	30 days.
Furadan 15G <sup>R</sup>	1 lb	No more than 2 applications/season.
Lorsban 15G, *Lorsban 4E	3/4-1 lb	35 days.
*Penncap M <sup>R</sup>	1 lb	12 days.
Pounce 1.5G <sup>R</sup> , *Pounce 3.2EC <sup>R</sup>	1/10-2/10 lb	Apply prior brown silk (blister) stage.
Pydrin 2.4EC <sup>R</sup>	15/100-2/10 lb	21 days. Do not exceed 1 lb/acre/year.
Rampart 10G <sup>R</sup> , Thimet 20 G <sup>R</sup>	1 lb	30 days. No more than 1 application over plant.

Second Generation Only

EPN EC <sup>R</sup>	1/2 lb	14 days.
Furadan 4F <sup>R</sup>	3/4-1 lb	30 days. No more than 2 applications/season. Use bond (sticker) with this material. Do not apply to seed corn less than 14 days prior to detasseling or roguing.
Parathion <sup>R</sup>	1/2 lb	12 days.

**R** = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

**Grasshoppers** - These build up in the margins of the field, which should be scouted during the season. If the small hoppers (nymphs) reach 20/sq yd in the margins, a chemical treatment may be economical. Once they disperse through the field, 8/sq yd is considered to be of economic importance. Use the higher rates when adults are present.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Cygon, dimethoate	1/2 lb	14 days. No more than 3 applications/year. Extremely hazardous to honey bees - do not apply during pollen shed.
Furadan 4F <sup>R</sup>	1/8-1/4 lb	30 days. No more than 4 applications at the high rate. 10 gal minimum/acre ground, 2 gal by air.
*Lorsban 4E	1/4-1/2 lb	35 days.
Malathion	1 lb	5 days.
Malathion ULV	8 oz	5 days.
Parathion <sup>R</sup>	1/3-1/2 lb	12 days.
*Penncapp M <sup>R</sup>	1/2 lb	12 days.
Pydrin 2.4EC <sup>R</sup>	1/10-2/10 lb	21 days. Do not exceed 1 lb/acre/year.
Sevin (various formulations)	1/2-1 1/2 lb	0 days. Bait formulations of Sevin for grasshoppers are available.

**Southwestern Corn Borer** - The first brood causes dead heart by destroying the growing point of young plants. Second brood larvae girdle stalks which often results in lodging. Early planted corn may escape second brood damage. Early varieties and crop rotation may also reduce yield losses. Fall and winter stalk destruction, on an area wide basis, can reduce overwintering populations. If 25% of the plants have egg masses or newly-hatched larvae, chemical control is justifiable.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Ambush 2E <sup>R</sup>	1/10-2/10 lb	Apply prior to brown silk (blister) stage.
Diazinon 14G	1-2 lb	10 days.
Dyfonate 10G, 20G <sup>R</sup>	1 lb	30 days, harvest and grazing.

<sup>R</sup> = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Furadan 4F <sup>R</sup>	1/2-1 lb	30 days. No more than 2 applications/year. Bond (sticker) should be used with this material. Do not apply to seed corn within 14 days of roguing or detasseling.
*Lorsban 4E	3/4-1 lb	35 days.
*Pounce 3.2EC <sup>R</sup>	1/10-2/10 lb	Apply prior to brown silk (blister) stage.
Pydrin 2.4EC <sup>R</sup>	1/10-2/10 lb	21 days. Do not exceed 1 lb/acre/year.

**Spider Mites** - In most corn growing areas of Colorado Banks grass mite is the principal species on corn. In the north-central part of the state (Boulder, Larimer, Morgan and Weld counties, and other areas along the front range) corn is attacked by a mixture of Banks grass mite and two-spotted spider mite. These two situations are treated separately, as the 2 species respond differently to miticides.

**Banks Grass Mite** - This mite builds up on the plant from the bottom up. If there is visible damage in the lower third of the plant and small colonies are present in the middle third of the plant before hard dough stage, a chemical application can prove economical. If the mites build up early and hot, dry weather persists, a second application may prove necessary. Infestations are often localized, so it may not be necessary to treat the entire field. Areas of stressed plants are often the main source of infestation for the rest of the field. All registered materials except Comite have failed to control mite outbreaks at one time or another. Control with Comite may not last for the full season.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Comite	1 1/2-2 lb	30 days. This material will prevent buildup, but will not control already high populations. Apply at flag leaf or pretassel stage when populations are still low. There is a Colorado Special Local Need Registration for a second application.
Cygon, dimethoate	1/3-1/2 lb	14 days. Not more than 3 applications/year. <b>Extremely Hazardous to Bees!</b> Do not use during pollen shed.

**R** = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Disyston 15G <sup>R</sup> , 8E <sup>R</sup>	1 lb	28 days (liquid), 40 days (granules). No more than twice season.
Metasystox R	3/8-1/2 lb	7 days.
Rampart 10G <sup>R</sup> , Thimet 20G <sup>R</sup>	1 lb	30 days. Apply granules to whorls of plants, once only.

**Spider Mite Complex** - In the areas where the mixture of the two mite species occurs (see above), the only effective chemical treatment seems to be a preventative application of Comite as described for Banks grass mite control. Other materials registered, but not recommended, for this situation are Disyston, Ethion, Metasystox R, and Thimet.

**Western Bean Cutworm** - Eggs are laid on upper leaf surfaces on the upper part of the plant. Fields should be scouted closely, as once the larvae move into the ear good control will be difficult to obtain. Chemical control should prove economical if 8% or more of the plants have egg masses or small larvae in the tassels, and the crop is at least 95% tasselled. If tasselling is much less than this, the percentage of infested plants should be raised as fewer larvae are likely to reach the ears. Many of the insecticides registered for western bean cutworm control have been associated with spider mite outbreaks, so fields should be checked for mites after a treatment is made.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Ambush 2E <sup>R</sup>	1/20-1/10 lb	Apply prior to ear formation (blister stage).
EPN + methyl parathion <sup>R</sup>	See label	14 days.
*Lorsban 4E	1/2-1 lb	35 days.
Parathion <sup>R</sup>	1/2 lb	12 days.
*Penncap M <sup>R</sup>	1/2-1 lb	12 days. Do not apply when bees are visiting field.
*Pounce 3.2E <sup>R</sup>	1/20-1/10 lb	Apply prior to ear formation (blister stage).
Pydrin 2.4EC <sup>R</sup>	1/20-1/10 lb	21 days. Up to 1 lb/acre/year.
Sevin (various formulations)	2 lb	0 days.

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## FIELD CORN

## Diseases

**Damping Off and Seedling Blights** (Pythium spp., Fusarium spp., Rhizoctonia solani, etc.): Seedlings emerge and then die. Generally a watery soft rot is observed at the soil surface on the stem. Favored by cool, wet, poorly drained soils.

Pesticide	Rate (100 lb seed)	Application Frequency (days)	Preharvest Interval Remarks
Agrox 3-Way	5.3 oz	---	Seed treatment
Apron 25	1-2 fl oz	---	Seed treatment
Arasan 70S (Thiram 42S)	2 oz	---	Seed treatment
Captan 30DD (Captan 400)	1.5-2.4 fl oz	---	Seed treatment
Dithane FZ	3.3-6.7 fl oz	---	Seed treatment
Dithane M45	2.7 oz slurry or 5.4 oz dry	---	Seed treatment
Dithane M22 sp.	3 oz	---	Seed treatment
Super X 20.5 D	2 oz	---	Seed treatment
Terra Flo 25	2.2 fl oz	---	Seed treatment
Terraclor			
Terracoat SD205	2 oz	---	Seed treatment
Vitavax 25DB	4-6 oz	---	Seed treatment

**Nematodes (Root Lesion, Pratylenchus sp., possibly others):** Stunted growth, chlorosis, roots may show oblong necrotic lesions.

Pesticide	Rate (Acre)	Application Frequency (days)	Preharvest Interval Remarks
Counter 15G <sup>R</sup>	8-16 oz/1000 ft row	---	Banded at planting
Furadan 15G <sup>R</sup>	8-16 oz/1000 row feet.	---	Banded at planting
Telone C-17	10-17 gal	---	Preplant, aerate 7-14 days
Telone II	9-15 gal	---	Preplant, aerate 7-14 days
Vapam	40-100 gal	---	Preplant, aerate

Additional diseases in Colorado for which no pesticides are labelled:

Common Smut	<u>Ustilago maydis</u>
Goss's Wilt	<u>Corynebacterium michiganense</u> pv. <u>nebraskense</u>
Rust	<u>Puccinia sorghi</u>
Stalk and Ear Rots	Various fungi

**FORAGE GRASS****Insects**

**Armyworms** - No economic injury level has been established for these insects.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Dibrom	1 lb	0 days. Do not graze lactating dairy animals.
Dylox	1/2-1 lb	0 days. No more than 3 applications per cutting.
Malathion	1 1/4 lb or 1 lb in 1 gal diesel fuel	0 days.
Parathion <sup>R</sup>	3/4 lb	15 days (harvest, grazing).
Sevin (various formulations)	1-1 1/2 lb	0 days.

**Grasshoppers** - Vary a lot from year to year so scouting is very important. Since chemical controls work best against small, young hoppers scouting will also give the best timing. Baits with a disease organism have been recommended, but have not been tested extensively in Colorado, nor do they provide any short-term control. If the grasshoppers are at a density of 8 or more/sq yd, then chemical control is probably economical. This figure should be raised as the condition (value) of the pasture or range goes down. Use lower rates for adults.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Diazinon	1/2-1 lb	0 days (grazing), 21 days (hay). Liquid formulations are very hazardous to birds, especially during breeding season.
Dibrom	1/2-3/4 lb	Animals may be present during application. Do not graze lactating dairy cows.
Malathion	1-1 1/4 lb	0 days.
Malathion ULV	8 fl oz	0 days. Do not apply to clover in bloom.

**R** = Restricted Use

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Orthene	1 1/2-3 oz	21 days (grazing, feeding to lactating dairy cows). Do not apply over lactating dairy cows. Meat cows present within 21 days of application must be removed at least 1 day before slaughter. Rates over 2 oz are Colorado Special Local Needs Registration.
Pennacap M <sup>R</sup>	1/4-1/2 lb	15 days. Very hazardous to birds, particularly during breeding season.
Sevin (various formulations)	1/2-1 1/2 lb	0 days. Sevin is available in a bait formulation. Sevin 4-Oil may be applied in diesel fuel or ULV.

**Labops spp. (Black grass bugs, Crested Wheat Bugs)** - Not enough is known to give an economic injury level for these insects.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Malathion ULV	8-12 fl oz	0 days. Do not apply to clover in bloom.
Parathion <sup>R</sup>	3/4 lb	15 days (harvest or grazing).
Sevin (various formulations)	1-1 1/2 lb	No restrictions.

**Leafhoppers, False Chinch Bugs** - Not enough is known to suggest alternative control measures or economic injury levels.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Parathion <sup>R</sup>	3/4 lb	15 days (to harvest or to grazing).

**Range caterpillars** - 2-3 larvae/sq yd should justify chemical control.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Ambush 2E <sup>R</sup>	1/100 lb	Cattle may be present during application. Do not harvest or feed hay. 1 application/year.
<u>Bacillus thuringiensis</u>	See label	No restriction.

**R** = Restricted Use

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Dibrom	1/2-3/4 lb	Animals can be present during treatment. Do not graze lactating animals.
Dylox (in oil)	1/4-1/2 lb	No more than 2 applications.
Pounce 3.2E <sup>R</sup>	1/100 lb	Cattle may be present during application. Do not harvest or feed hay. 1 application/year.
Sevin (various formulations)	1-1 1/2 lb	0 days.

**R** = Restricted Use

**SMALL GRAINS****Insects**

**Small grain insecticides** - Insecticides differ in their small grain registrations. The following list gives the crops for which each product is registered (B = barley, O= oats, R = rye, W = wheat). This list is only a guideline; read the label before actually using any product.

Cygon (W)	Nudrin (B,O,R,W)
Disyston (B,W)	Penncap M (B,O,W)
Dylox (B,O,W)	Rampart 10G (W)
Ethyl Parathion (B,O,W)	Sevimol (W)
Furadan 4F (B,O,W)	Sevin 4-Oil (W)
Lannate (B,O,R,W)	Sevin 80S (W)
Malathion ULV (B,O,R,W)	Sevin XLR+ (W)
Malathion (B,O,R,W)	Thimet 20G (W)
Methyl Parathion (B,O,R,W)	

**Aphids** - Different aphids have different impacts on small grains, and different growth stages of the plant react differently. The most important small grain aphid in Colorado is the Russian wheat aphid. Infested fields should be treated when 10-20% of the plants show symptoms. If one tiller shows damage, then the plant should be considered damaged. The following is a guide to the possible combinations of other small grain aphids and when a treatment should be made.

<u>Type of Aphid</u>	<u>Aphids/stem which justify chemical control</u>		
	<u>Seedling</u>	<u>Boot to Heading</u>	<u>Heading</u>
Greenbug	5-15	25	Treatment
Corn leaf aphid	20	30	Rarely
Oat bird-cherry aphid	20	30	Economical
English grain aphid	30	50	

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Cygon, dimethoate	1/4-3/8 lb	60 days grain. 14 days graze.
Disyston 15G <sup>R</sup> , 8E <sup>R</sup>	1 lb	See label.
Malathion	1 lb	7 days (harvest, grazing). Do not use below 60°F.
Parathion <sup>R</sup>	1/2 lb	15 days.
Penncap M <sup>R</sup>	1/4-3/8 lb	15 days.
Rampart 10 G <sup>R</sup> Thimet 20G <sup>R</sup>	1 lb	60 days. Do not graze.

**R** = Restricted Use

**Army Cutworms, Armyworms** - Army cutworm cut plants at soil line, feed on foliage in the spring. They prefer grassy weeds, but once weeds are gone 4-5/sq ft can cause economic losses. Armyworms can destroy plants from planting to frost. The most important damage is clipping of heads just before maturity. If head clipping occurs, treatments are justified at 2 armyworms/sq ft.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
<u>Armyworms</u>		
Dylox	1/2-1 lb	21 days. No more than 3 applications/season.
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/4-1/2 lb	7 days (grain), 10 days (forage).
Sevin (various formulations)	1/2-1 1/2 lb	0 days forage. 21 days grain. Up to 2 applications after heading.

Army Cutworms

Parathion <sup>R</sup>	1/2 lb	15 days.
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**Banks grass mite, Brown wheat mite** - Minute animals which web leaves. Banks grass mite may be a problem in newly planted small grains near corn which had an uncontrolled mite problem. Brown wheat mite is an early spring problem. The benefits of its control have not been determined. The insecticides listed above for aphids may be used for mites.

**Grasshoppers** - In the fall, grasshoppers can build up in the weedy field margins and then move into the newly planted crop. If numbers in the margins reach 40 adults/sq yd, then an application of an insecticide to the margins or a Thimet 20G<sup>R</sup> or Disyston 15G<sup>R</sup> perimeter treatment (see below) should be considered. Once they move into the wheat, then a density of 8/sq yd is justification for a conventional treatment.

Grasshoppers can also occasionally cause problems by clipping heads. If they reach 8/sq yd during heading, an application may be justifiable. Populations will build up in field margins. Treating these areas early may save treating the entire field.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Cygon, dimethoate	1/4-3/8 lb	60 days grain. 14 days graze.
Disyston 15G <sup>R</sup>	1 lb	See label.
Furadan 4F <sup>R</sup>	1/8-1/4 lb	Up to 2 applications/season. Do not feed foliage to livestock. Apply before heads emerge.

<sup>R</sup> = Restricted Use

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Malathion	1 lb	7 days. (cutting or harvest).
Malathion ULV	8 fl oz	7 days.
Parathion <sup>R</sup>	1/2 lb	15 days. Check label for restrictions.
Penncap M <sup>R</sup>	1/2 lb	15 days.
Sevin (various formulations)	1/2-1 1/2 lb	0 days forage. 21 days grain. Up to 2 applications after heading.
Rampart 10 G <sup>R</sup> Thimet 20G <sup>R</sup>	1 lb	See label.

**Say's Plant Bug** - Heavy infestations of these during heading can damage kernels. Use parathion<sup>R</sup> (methyl, ethyl, combinations) at 3/4 lb active ingredient/acre. Do not apply within 15 days of harvest.

**Hessian Fly** - Where soil blowing is not a hazard, planting after September 20-25 should avoid damage. The variety Scout has some resistance. Disyston 15G<sup>R</sup> or Thimet 20G<sup>R</sup> at 1 lb active ingredient/acre applied in the furrow at planting time will also control this pest.

**Pale Western Cutworm** - Cuts plants at or below the surface. 2-3 larvae/row-foot probably cause economic damage. There are no insecticides registered for controlling this pest. Emergency registrations are being sought.

**Wireworms** - Use seed treated with approved insecticide such as diazinon, lindane, Lorsban, methoxychlor.

## SMALL GRAINS

## Diseases

**Damping Off and Seedling Blights (Fusarium spp., Cochliobolus sativus, Pythium spp. etc.):** On barley, oats, rye, wheat. Seedlings emerge and die. Generally with a watery dark discolored rot at soil level. Favored by cool, wet, poorly-drained heavy soils.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> <u>Remarks</u>
Apron 25	1-2 oz(B,W) 2 fl oz(O)	-	Seed treatment
Arasan 70S (Thiram 42S)	3 oz(B) 2.5 oz (R,W)	-	Seed treatment
Captan 30 DD (Captan 400)	1.8-3 fl oz(B) 2.4 fl oz(O) 2.1-3.0 fl oz(R) 1.5 fl oz	-	Seed treatment
Dithane M22	0.9-2.5 oz/bu(B) 3.75(O) 2 oz(R) 1.8 oz(W)	-	Seed treatment
Dithane FZ	3-8 fl oz(B) 4.7-12.5 fl oz(O) 2.7-7.0 fl oz(R) 2.5-6.7 fl oz (W)	-	Seed treatment
Dithane M45	2.7 oz slurry, 4 oz dry(B) 4 oz slurry, 6 oz dry(O) 2.4 oz slurry, 3.5 oz dry(R) 2.2 oz slurry, 3.0 oz dry(W)	-	Seed treatment
Manzate 200	3 oz(B,R,W)	-	Seed treatment
Terracoat SD205	3 oz(W)	-	Seed treatment
TerraFlo 25	3.75 fl oz(W)	-	Seed treatment
Vitavax 200	3-4 oz(B,O,W)	-	Seed treatment
Vitavax 25DB (Orthocide)	4 oz(B,O,W)	-	Seed treatment
Vitavax 20-20	4 oz(B,O,W)	-	Seed treatment

**Bacterial Leaf Blight (Pseudomonas syringae pv. striafaciens):** On barley. Usually only upper leaves attacked. Small water soaked lesions form that eventually coalesce to larger lesions that may cover entire leaf. Not common. Generally found associated with sprinkler irrigation in cool wet weather. Treat seed with Kocide SD at 4 oz per 100 lb.

**Bacterial Streak (Xanthomonas campestris pv. translucens)** On barley. First appear as small linear water soaked lesions. Later elongate to long streaks. Eventually lose their color and become tan to brown streaks. Not common and generally associated with cool moist weather or sprinklers. Treat seed with Kocide SD at 4 oz per 100 lb.



**Bacterial Leaf Blight (*Pseudomonas syringae* pv. *striafaciens*):** On wheat. Blight is at first a small (1 mm or less) water soaked spot on top of leaves in boot to early heading. Spots eventually grow together and form elongated dead areas. Treat seed with Kocide SD at 4 oz per 100 lb.

**Black Chaff (*Xanthomonas campestris* pv. *translucens*):** On wheat. Black chaff symptoms show as brown to black, interveinal streaks and blotches on glumes and leaves. Treat seed with Kocide SD at 4 oz per 100 lb.

**Bunt (*Tilletia foetida* and *T. caries*):** On wheat. Infected plants may be somewhat stunted, bunted heads remain green longer and rupture at harvest releasing spores, which have a fishy odor hence the name stinking smut. Common in Western Colorado, rare in Eastern Colorado. More severe when seed is sown into cool soil. Resistant cultivars are available. Seed treatment essential.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> <u>Remarks</u>
Arasan 70S	2.5 oz	-	Seed treatment
Dithane FZ	2.5-6.7 fl oz	-	Seed treatment
Dithane M22 Sp.	1.8 oz	-	Seed treatment
Kocide SD	4 oz	-	Seed treatment
Manzate 200	3 oz	-	Seed treatment
Mertect LSP	6.7-10 fl oz	-	Seed treatment
Vitavax 20-20	4 oz	-	Seed treatment
Terraclor 75	1.5 oz	-	Seed treatment
Terracoat SD205	3 oz	-	Seed treatment
TerraFlo 25	3.75 fl oz	-	Seed treatment
Vitavax 34	2-3 fl oz	-	Seed treatment
Vitavax 200	3-4 fl oz	-	Seed treatment
Vitavax 25DB	6 oz	-	Seed treatment

**Dwarf Bunt (*Tilletia controversa*):** On barley. Infected tillers are severely stunted, anywhere from 1/2 to 1/4 normal height. Smut balls are formed that are very black and have a "fishy" odor especially when moist.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u> <u>Remarks</u>
Arasan 70S	2.5 oz	-	Seed treatment
Dithane M22	2.5 oz	-	Seed treatment
Dithane FZ	3-8 fl oz	-	Seed treatment
Mertect LSP	6.7-10 fl oz	-	Seed treatment
TerraCoat SD205	6 oz	-	Seed treatment
Terra Flo 25	4.5-9 fl oz	-	Seed treatment
Vitavax 25DB	4.0 fl oz	-	Seed treatment
(Orthocide)			
Vitavax 20-20	4 oz	-	Seed treatment
Vitavax 200	3-4 fl oz	-	Seed treatment

**Helminthosporium Leaf Blight or Spot Blotch (Helminthosporium spp., Cochliobolus sativus):** On barley spots develop on leaves and leaf sheaths at all stages of plant growth. Sizes vary from very small to large but are uniformly brown and frequently have a yellow halo. Associated with cool wet weather. On oats lesions on leaves are small initially, enlarging to long stripes of dead tissue. Sometimes distinct spots do not form but leaves wither as if by drought. On wheat small round to lens shaped leaf spots, generally darker in the center, occasionally with light colored centers and dark border. Not common. Associated with cool wet weather.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Dithane M45	2 lb(B,O,W)	7-10 (3 times	26 days.
Kocide 101	1.5-2 lb(B,W)	Early heading, 10 days later	-
Kocide 606	2-2.6 pt(B,W)	Early boot, early heading maximum)	-
Manzate 200	2 lb(B,O,W)	7-10 (3 times maximum)	26 days.

**Loose Smut (Ustilago tritici):** On wheat. Dark-to-brown spore masses develop in heads. The grey membrane ruptures during flowering and by harvest an erect naked rachis protrudes above healthy plants. Very common in Colorado.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Vitavax 20-20	4 fl oz	-	Seed treatment
Vitavax 25 DB	4 fl oz	-	Seed treatment
Vitavax 34	2-3 fl oz	-	Seed treatment
Vitavax 200	3-4 fl oz	-	Seed treatment

**Powdery Mildew (Erysiphe graminis):** On barley white powdery spots occur first on lower leaves, usually more prevalent on upper sides of leaves. Not common in Colorado except under cool humid conditions. On wheat leaves are affected with a white cottony-like fungus spot on the upper surface of lower leaves. Spots darken and enlarge as plant matures. Especially severe on tender rank growing wheat under heavy nitrogen, cool, humid and cloudy weather.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Bayleton 50	2-4 oz(B,W)	-	21 days. Not to exceed 16 oz/acre/season

**Rust Diseases: Stem Rust (Puccinia graminis f. sp. hordei) and Stripe Rust (Puccinia striiformis):** On barley. These diseases form brick red to yellow pustules on stems and leaves. Because of dry climate, rusts are not normally a problem in Colorado. Considerable resistance is available. Chemical recommendation here is only for use under unusual epidemic conditions.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Bayleton 50	4-8 oz	-	21 days. Not to exceed 16 oz/acre/season

**Rust Diseases: Stem Rust (*Puccinia graminis* f. sp. *tritici*), Stripe Rust (*Puccinia striiformis*), Leaf Rust (*Puccinia recondita* f. sp. *tritici*):** On wheat. Yellow-red or black spots or stripes (pustules or spores) are observed to erupt through plant tissue. Generally high levels of control are obtained through use of resistant cultivars.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Bayleton 50	4-8 oz	-	21 days. Not to exceed 16 oz/acre/season

**Septoria Leaf Blotch (*Septoria* spp.):** On barley causes greyish green to light colored lesions on leaves and leaf sheaths. Spots are variable in size, with definite margins. On oats leaf spots appear first on lower leaves as round to diamond shaped spots that are yellowish to light brown and surrounded by a band of dull brown. Pycnidia show as small speckles in the spots. On rye leaves and stems are infected but not heads. Nodes become shriveled and dark with speckled appearing pycnidia. Light brown spots occur on leaves. Frequently spots have a brown margin and pycnidia are found inside.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Dithane M45	2 lb(B,O,R)	7-10 (3 times maximum)	26 days
Kocide 101	1.5-2 lb(B)	Early heading, 10 days later	-
Kocide 606	2-2.6 pt(B)	Early boot, early heading	-
Manzate 200	2 lb(B,O,R)	7-10 (3 times maximum)	26 days

**Smuts (*Ustilago avenae* and *U. kolleri*):** On oats. Smutted heads have a powdery dark appearance. Infected plants are shorter and dark mass of spores are frequently gone by harvest.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Dithane FZ	4.7-12.5 fl oz	---	Seed treatment
Dithane M2 Sp.	3.75 oz	---	Seed treatment
Vitavax 20-20	4 oz	---	Seed treatment
Terracoat SD205	3-5 oz	---	Seed treatment

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Vitavax 34	2-3 fl oz	---	Seed treatment
Vitavax 200	3-4 fl oz	---	Seed treatment

Additional diseases in Colorado for which no pesticides are labelled:

#### Barley

BYDV	Barley Yellow Dwarf Virus
WSMV	Wheat Streak Mosaic Virus

#### Oats

Crown Rust	<u>Puccinia coronata</u>
Red Leaf (BYDV)	Barley Yellow Dwarf Virus
Stem Rust	<u>Puccinia graminis</u>

#### Rye

Black Chaff	<u>Xanthomonas campestris</u> pv. <u>translucens</u>
Ergot	<u>Claviceps purpurea</u>
Rusts	<u>Puccinia spp.</u>

Other diseases of rye are known elsewhere but are of no importance in Colorado at this time.

#### Wheat

BYDV	Barley Yellow Dwarf Virus
Cephalosporium Stripe	<u>Cephalosporium gramineum</u>
Ergot	<u>Claviceps purpurea</u>
Take All	<u>Gaeumannomyces graminis</u> var. <u>tritici</u>
WSMV	Wheat Streak Mosaic Virus

## SORGHUMS

## Insects

**Aphids (Greenbug, Corn Leaf Aphid)** - Greenbug-resistant varieties are available. The decision to treat greenbugs chemically should be based on the amount of damage to the plant.

<u>Plant Size</u>	<u>When to Treat</u>
Emergence to 6"	Plants beginning to yellow, visible colonies on leaves.
6" to Pre-boot	Colonies causing red spotting or yellowing leaves, before any leaves are killed.
Pre-boot to Heading	Before death of 1 functional leaf.
Heading to Hard-dough	When numbers are sufficient to kill 2 normal-sized leaves.

The corn leaf aphid usually reduces yield only by causing stand losses in seedling plants. At other times it is probably not important.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Counter 15G <sup>R</sup>	8-16 oz formulation/ 1000 ft row	Knife-in granules below seed at planting. Once/season.
Cygon, dimethoate	1/4-1/2 lb	28 days. Up to 3 applications
Diazinon	1/2 lb	7 days (grain). Greenbug only.
Disyston <sup>R</sup>	See label (rates depend on row spacing)	See label for preharvest interval.
Dyfonate 4E <sup>R</sup>	3/4-1 lb	14 days. Up to twice/season.
Furadan 15G <sup>R</sup>	6-8 oz/1000 row feet.	Planting time only.
Furadan 4F <sup>R</sup>	1/2 lb	Do not apply after heads emerge. Do not graze or cut for forage.
Temik 15G <sup>R</sup>	1 lb	Planting time.
*Lorsban 4E	1/4 lb	30 days.

<sup>R</sup> = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Metasystox R	1/4-1/2 lb	21 days (forage), 45 days (grain). Up to 3 applications.
Parathion <sup>R</sup> (ethyl)	1/2 lb	15 days.
Phosdrin <sup>R</sup> mevinphos <sup>R</sup>	1/8-1/4 lb	3 days.
Supracide <sup>R</sup>	1/2 lb	30 days. Up to 3 applications.
Rampart 10G <sup>R</sup> Thimet 20G <sup>R</sup>	See label.	28 days. Once only over plant.

**Armyworms, Climbing Cutworms, Corn Earworm, Fall Armyworm** - All of these are foliage pests; the first 2 have an economic level of 2/plant on 25% of the plants. The last 2 feed in the whorls which shouldn't affect yield unless they feed on the growing bud. Later they feed on the heads which is economical to control if there are 2 or more larvae/head.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/4-1/2 lb	14 days.
*Lorsban 4E	1/2-1 lb	30 days (1/2 lb), 60 days (1 lb). Up to 1 1/2 lbs/season.
Phosdrin <sup>R</sup> mevinphos <sup>R</sup>	1/4-1/2 lb	3 days. Corn earworm and fall armyworm (1/2 lb).
Sevin (various formulations)	1-2 lb	0 days (forage), 21 days (grain). For cutworms use 2 lb.

**Banks Grass Mite** - Start in lower leaves and build up through the plant, especially after boot formation and during hot dry weather. Protecting from water stress will help plants tolerate mites. It is difficult to say when chemical control is economical, but if populations are heavy in the lower third of the leaves and the plant has not reached hard-dough state, control is probably justifiable. Sufficient gallowage is important for consistent control. Consult with your County Agent as to which chemicals have had problems in your area.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Comite	1 1/4-1 2/3 lb	30 days (silage), 60 days (grain). 1 application/year. Check a small area of field for phytotoxicity. 5 gal/acre minimum (aerial), 20 gal/acre (ground).

<sup>R</sup> = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Cygon, dimethoate	1/2 lb	28 days. Up to 3 applications.
Disyston <sup>R</sup>	1 lb	7 days (grain), 28 days (fodder). Check label for other preharvest intervals.
Ethion	1/2-1 lb	30 days. Up to 3 applications.
Metasystox R (grain).	1/2 lb	21 days (forage), 45 days
Supracide 2E <sup>R</sup>	1/2 lb	30 days.
Thimet 20G	1 lb	28 days. 1 application after planting.

**Grasshoppers** - These build up in the margins of the field which should be scouted during the season. If the small hoppers (nymphs) reach 20/sq yd in the margins, treatment may be economical. Once they have dispersed through the field, 8/sq yd is considered to be of economic importance.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Cygon, dimethoate	1/2 lb	28 days. Up to 3 times/season.
Furadan 4F	1/8-1/4 lb	Colorado Special Local Needs Registration.
*Lorsban 4E	1/4 lb	30 days.
Malathion ULV	8 fl oz	7 days.
Sevin (various formulations)	1/2-1 1/2 lb	21 days (grain), 0 days (forage).

**R** = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

## SORGHUMS

## Diseases

**Damping Off and Seedling Blights** (Pythium spp., Rhizoctonia solani, Fusarium spp., etc.): Seedlings emerge and then die or are stunted. Generally a watery, soft rot is observed on the stem at the soil surface. Disease is favored by cool, wet, poorly drained soil.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u>	<u>Remarks</u>
Agrox 3-way	5.3 oz	---		Seed treatment
Apron 25, 2E	2 oz	---		Seed treatment
Arasan 70S	2.5 oz	---		Seed treatment
Captan 400	4-6 fl oz	---		Seed treatment
Dithane FZ	2.7 fl oz	---		Seed treatment
Dithane M45	3 oz slurry or 5 oz dry	---		Seed treatment
Terra Flo 25	2.2 fl oz	---		Seed treatment
Terracoat SD205	2 oz	---		Seed treatment

**Covered Kernel Smut** (Sphacelotheca sorghi): Plants appear normal until heading. Kernals become replaced by a dark brown powdery mass of spores. Spore mass is covered by a grey to brown membrane that persists until broken by harvest equipment. Seed borne and favored by planting in wet warm soil.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval</u>	<u>Remarks</u>
Arasan 70S	2.5 oz	---		Seed treatment
Captan 30DD (Captan 400)	3.7-4.5 oz	---		Seed treatment
Dithane FZ	2.7 fl oz	---		Seed treatment

Additional diseases in Colorado for which no pesticides are labelled:

Anthracnose	<u>Collectotrichum</u> spp.
Leaf Spots & Blights	<u>Helminthosporium</u> spp.
Stalk Rots	Various organisms



**SOYBEAN****Insects**

**Corn earworm** - Small larvae feed on foliage, while larger larvae attack pods. One or more corn earworms/row-foot is the current economic infestation.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Ambush 2E <sup>R</sup>	1/10-2/10 lb	60 days.
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/4-1/2 lb	14 days (3 forage, 7 hay)
*Lorsban 4E	1/2-1 lb	28 days (14 grazing and forage, 28 days straw). Up to 3 lb total/year. Treatments should be at least 14 days apart.
Orthene	3/4-1 lb	14 days. Do not graze or feed to livestock.
Parathion <sup>R</sup>	1/2-3/4 lb	20 days. Up to 2 applications.
Penncap M <sup>R</sup>	3/4-1 lb	20 days. Up to 2 applications.
Pounce 3.2EC <sup>R</sup>	5/100-1/10 lb	60 days. Do not graze or feed to livestock.
Pydrin 2.4EC <sup>R</sup>	1/10-2/10 lb	21 days. Do not graze or feed to livestock. Up to 0.8 lb/year
Sevin (various formulations)	1/2-3/4 lb	0 days.

**Grasshoppers** - Grasshopper control is best achieved when they are still small and haven't moved into crop areas. When grasshopper numbers reach 15-20/sq yd in nearby noncrop areas, a treatment with diazinon, malathion, Orthene, Penncap M or Sevin may be economical. Once the grasshoppers have moved into the crop, 8/sq yd is considered to be an economic infestation. Infestations start in the field margins and it may be possible to just treat these areas.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Cygon, dimethoate	1/2 lb	21 days (5 feeding or grazing).
*Lorsban 4E	1/4-1/2 lb	28 days (14 grazing and forage, 28 straw). Up to than 3 lb total/year. Treatments should be at least 14 days apart.

**R** = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Furadan 4F <sup>R</sup>	1/8-1/4 lb	21 days. Up to 2 applications. Do not graze or feed to livestock.
Malathion ULV	8 fl oz	7 days.
Orthene	1/4-1/2 lb	14 days. Do not graze or feed to livestock.
Parathion <sup>R</sup>	1/2 lb	20 days. Up to 2 applications.
Pennacap M <sup>R</sup>	1/4-3/4 lb	20 days. Up to 2 applications.
Pydrin 2.4E <sup>R</sup>	1/10-2/10 lb	21 days. Do not feed or graze treated plants.
Sevin (various formulations)	1/2-1 1/2 lb	0 days

**Mexican Bean Beetle** - Both adults and larvae will defoliate soybeans and, if populations are high, damage pods. Treat if defoliation reaches 30% prior to bloom or 20% between bloom and pod fill.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVALS, REMARKS</u>
Ambush 2E <sup>R</sup>	5/100-1/10 lb	60 days.
Cygon, dimethoate	1/2 lb	21 days (5 days feeding or grazing).
Guthion (liquids- <sup>R</sup> )	1/2-3/4 lb	45 days. Do not graze or feed to livestock.
Furadan 4F <sup>R</sup>	1/4-1/2 lb	21 days. Do not graze or feed to livestock. No more than 2 applications/year.
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/8-1/4 lb	14 days (3 forage, 7 hay).
*Lorsban 4E	1/2-3/4 lb	28 days (14 grazing and forage, 28 straw). Up to 3 lb total/year. Treatments must be at least 14 days apart.
Malathion	1 7/8 lb	0 days.
Malathion ULV	8 fl oz	7 days.

<sup>R</sup> = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Parathion <sup>R</sup> (methyl)	3/8-1 lb	20 days. No more than 2 applications.
Orthene	1/2-1 lb	14 days. Do not graze or feed to livestock.
Penncap M <sup>R</sup>	1/2-3/4 lb	20 days. Up to 2 applications.
Pounce 3.2EC <sup>R</sup>	5/100-1/10 lb	60 days. Do not graze or feed to livestock.
Pydrin 2.4EC <sup>R</sup>	5/100-1/10 lb	21 days. Do not graze or feed to livestock. No more than 0.8 lbs/year.
Thimet 20G <sup>R</sup>	9 oz/1000 row feet (formulation)	Planting time. Do not place in direct contact with seed. Do not feed treated foliage.
Sevin (various formulations)	1/2 lb	0 days.

**Mites** - If mites are abundant on the lower sides of most leaves, and they are causing the lower leaves to drop, then a treatment is probably necessary.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVALS, REMARKS</u>
Cygon, dimethoate	1/2 lb	21 days (5 days feeding or grazing).
*Lorsban 4E	1/4-1/2 lb	28 days (14 days grazing and forage, 28 straw). Not more than 3 lb total/year.
Parathion <sup>R</sup> (methyl)	1/2 lb	20 days. No more than 2 applications.
Thimet 20G <sup>R</sup>	9 oz/1000 row feet (formulation)	Planting time. Do not place in direct contact with seed. Do not feed treated foliage.

**Thrips** - These may feed in flowers and reduce pod set. In dry beans at least 6 thrips/blossom are required before economic losses occur.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVALS, REMARKS</u>
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/4-1/2 lb	14 days (3 forage, 7 hay).

**R** = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Parathion (methyl) <sup>R</sup>	3/8 lb	20 days. No more than 2 applications.
Pennacap M <sup>R</sup>	1/2-3/4 lb	20 days. Up to 2 applications.
Thimet 20G <sup>R</sup>	9 oz/1000 row feet (formulation)	Planting time. Do not place in direct contact with seed. Do not feed treated foliage.

<sup>R</sup> = Restricted Use

\*Registered for application through center-pivot irrigation systems in addition to applications with conventional equipment.

## SOYBEANS

## Diseases

**Anthracnose (Colletotrichum dermatium):** Numerous, small shallow elongated reddish brown to dark lesions may form on the stem and kill young plants before or after emergence. Stems of older plants may exhibit small cushions with black spines (acervuli) in the lesions. Infected seeds appear dark brown and shriveled. Manage with clean, treated seed, remove old debris and rotate with other crops.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Benlate	0.5-1 lb	Early pods, 14-21.	35 days.
Bravo 720	1.5-2.5 pt	Early pod set and seed fill.	42 days. See Bravo 500 label. Do not feed debris to livestock.
Bravo 90 DG	1.2-2.0 lb	Early pod set and seed fill.	Same as Bravo 720.
Mertect 340-F	6-10 fl oz	Early pod, 14. Maximum of 2 times.	21 days.
Topsin M	8-16 oz, 10-20 fl oz	10-14 (maximum of 2 times).	Not for animal feed.

**Bacterial Blight (Pseudomonas syringae pv. glycines):** This bacterial pathogen is seed-borne, can overwinter in residue, and is spread by wind and water. The disease is favored by cool, wet weather and possibly by overhead springkler irrigation. Symptoms may appear 5-7 days after a storm has occurred, especially early in the season. Small, angular watersoaked spots form on leaves which yellow and turn brown to black. As these spots enlarge, large areas of the leaf may fall out. Pods and seeds can also become infected. Manage with clean, treated seed, remove old debris, rotate crops, and do not cultivate when foliage is wet.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Copper Count N	0.5-0.67 gal	5-10	---

**Brown leaf spot (Septoria glycines):** Small, angular, red to brown spots may form on primary leaves, especially the lower surface, in the spring. Other leaves, stems and pods may become infected with tan to dark brown lesions. Defoliation may occur from the bottom of the plant upwards. Small, black spots (pycnidia) form on infected stems or petioles. Manage with treated, clean seed, remove old debris, and rotate crops.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Benlate	0.5-1 lb	Early pods, 14-21	35 days.

Pesticide	Rate (Acre)	Application	Preharvest Interval
		Frequency (days)	Remarks
Bravo 720	1.5-2.5 pt	Early pod set and seed fill.	42 days. See Bravo 500 label. Do not feed debris to livestock.
Bravo 90 DG	1.2-2.0 lb	Early pod set and seed fill.	Same as Bravo 720.
Mertect 340-F	6-10 fl oz	Early pod, 14 (maximum of 2 times).	21 days.
Topsin M	8-16 oz, 10-20 fl oz	10-14 (maximum of 2 times).	Not for animal feed.

**Damping Off and Seedling Blights (*Fusarium*, *Rhizoctonia*, *Pythium* spp.):**

Young plants may be killed before or after emergence. Roots and the lower hypocotyl may exhibit water soaking, a dry rot, and light tan to dark brown discoloration depending upon the specific pathogen involved. Individual plants and portions of a field may be affected. Manage with clean, treated seed and rotate to non-legume crops.

Pesticide	Rate (100 lb seed)	Application	Preharvest Interval
		Frequency (days)	Remarks
Agrox 3-way	5 oz	---	Seed treatment
Apron 25, 2E	2 fl oz	---	Seed treatment
Arasan 70S	1.3 oz	---	Seed treatment
Captan 30DD (Captan 400)	2 fl oz	---	Seed treatment
Chloroneb 65	4 oz	---	Seed treatment
Dithane FZ	3.3-6.7 fl oz	---	Seed treatment
Ortho (Mo) 2X	3.3 oz	---	Seed box treatment
Terra Flo 25	3.7-7.5 fl oz	---	Seed treatment
Terraclor			
Ridomil 5G	3-6 oz/1000 row ft	----	Seed furrow trt.
Ridomil 2E	2.7-5.5 pt	----	At planting
Super X 20.5D	3-5 oz	----	Seed treatment
Terracoat SD205	3-5 oz	----	Seed treatment
Top Cop & S	8-12 fl oz	----	Seed treatment
Vitavax 200	4 fl oz	----	Seed treatment

**Frogeye Leaf Spot (*Cercospora sojina*):** Small circular to angular reddish brown spots form on leaves. Spots develop brown to white centers bordered by a narrow red-brown line. No yellow halo surrounds lesions. Spots may coalesce, become thin and paper-like and heavily infected leaves drop prematurely. Stem and pod lesions are elongated, and reddish with a black border. Seed can become infected also. Manage with clean, treated seed and rotate crops.

Pesticide	Rate (Acre)	Application	Preharvest Interval
		Frequency (days)	Remarks
Benlate	0.5-1 lb	Early pods, 14-21	35 days.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Bravo 720	1.5-2.5 pt	Early pod set and seed fill.	42 days. See Bravo 500 label. Do not feed debris to livestock.
Bravo 90 DG	1.2-2.0 lb	Early pod set and seed fill.	Same as Bravo 720.
Mertect 340-F	6-10 fl oz	Early pod, 14 (maximum of 2 times).	21 days.
Topsin M	8-16 oz, 10-20 fl oz	10-14 (maximum of 2 times).	Not for animal feed.

**Nematodes:** Infected plants may be stunted and yellowed, with poor or rotted root systems. Small white cysts or knots may form on the root system depending upon the nematode parasite involved. Manage with crop rotation and clean implements when moving between fields.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Nemacur 3E	3.2-8.7 fl oz	---	Do not feed debris. Planting treatment.
Nemacur 15G	26.7-40 lb	---	Planting treatment.
Telone C-17	10-17 gal	---	Preplant, aerate 7-14 days.
Telone II	9-15 gal	---	Preplant, aerate 7-14 days.
Temik 15G	10-20 lb	---	Planting treatment.
Vapam	40-100 gal	---	Preplant, aerate 7 days.

**Phytophthora Root Rots (*Phytophthora* spp.):** Treat at planting with Ridomil 2E at 2.7-5.5 pt per acre.

**Pod and Stem Blight (*Diaporthe phaseolorum* var. *sojae*):** Symptoms usually appear on pods and stems of older plants, especially during warm wet weather. Small, black fungal structures (pycnidia) appear in linear rows on the stem or are scattered over the pod. The plant may be killed, and seeds are destroyed or shriveled. Manage with clean, treated seed, remove old debris and rotate crops.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Benlate	0.5-1 lb	Young pod, 14-21.	35 days.
Bravo 720	1.5-2.5 pt	Early pod set and seed fill.	42 days. See Bravo 500 label. Do not feed debris to livestock.
Bravo 90 DG	1.2-2.0 lb	Early pod set and seed fill.	Same as Bravo 720.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Mertect 340-F	6-10 fl oz	Young pod, 14 (maximum of 2 times).	21 days. Do not feed debris.
Topsin M	8-16 oz, 10-20 fl oz	10-14 (maximum of 2 times).	Not for animal feed.
Vitavax 200	4 fl oz	---	Seed treatment.

**Purple Seed Stain (Cercospora kikuchii):** A pale to dark purple discolorization appears on affected seed coats. Infected seeds may produce a seedling with cotyledons that are dark purple and fall prematurely. Later, thick and crusty, reddish brown spots may form on infected leaves. Manage with clean, treated seed.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Benlate	0.5-1 lb	Early pod, 14-21	35 days.
Bravo 720	1.5-2.5 pt	Early pod set and seed fill.	42 days. See Bravo 500 label. Do not feed debris to livestock.
Bravo 90 DG	1.2-2.0 lb	Early pod set and seed fill.	Same as Bravo 720.
Mertect 340-F	6-10 fl oz	Early pod, 14 (maximum of 2 times).	21 days. Do not feed debris.
Topsin M	8-16 oz, 10-20 fl oz	10-14 (maximum o 2 times).	Not for animal feed.

Additional diseases for which no pesticides are labelled:

Brown Stem Rot	<u>Phialophora gregata</u>
Fusarium Wilt	<u>Fusarium spp.</u>
SMV	Soybean Mosaic Virus



**SUGARBEETS****Insects**

**Aphids and Leafhoppers** - Reduction in yield due to heavy aphid infestation can reach 0.85%/day/plant so control decisions should be made on the basis of the number of days left until harvest and the percentage of plants infested. In other words, the more days left until harvest, the lower the percentage of infested plants which can be tolerated.

Leafhopper vector curly top virus, a problem on the west slope. The best control is the use of virus-resistant varieties, such as TASC AH-10. Systemic insecticides will kill leafhoppers and sometimes reduce virus incidence.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
<u>Aphids Only</u>		
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/4-1/2 lb	7 days (30 if tops are fed).
Malathion	1-1 1/4 lb	7 days to feed tops.
Thiodan, endosulfan	1/2-1 lb	30 days. Do not feed treated tops.
<u>Leafhoppers Only</u>		
Sevin (various formulations)	1-1 1/2 lb	14 days.
<u>Aphids and Leafhoppers</u>		
Metasystox R	3/8-3/4 lb	30 days. Up to 6 applications.
Parathion <sup>R</sup>	1/2-3/4 lb	15 days.
Temik 15G <sup>R</sup>	1 1/2-2 lb	90 days, 120 days for tops. May be applied in 2"-6" band over seed row and incorporated or side-dressed. Do not exceed 40 lb formulation per acre. Up to 1 at-planting and 2 post-emergence applications. Do not use tops as food for humans.
Rampart 10G <sup>R</sup> , Thimet 20G <sup>R</sup> , Phorate 15G <sup>R</sup>	See label.	30 days. Do not feed to dairy cattle.

**R** = Restricted Use

**Army cutworms, Cutworms** - These are foliage feeders that occasionally become common and cause economic damage, especially the variegated cutworm. No economic level has established for them.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
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Cutworms Only

Lorsban 15G	6 1/2-9 oz formulation/ 1000 row-ft	Planting time or post emergence. 1 application/ season.
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Variegated Cutworms, Armyworms

Dylox	1/2-1 1/2 lb	14 days.
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/2 lb	7 days (30 days to feed tops).
Lorsban 4E	3/4-1 lb	30 days. Up to 4 lb/season.

Armyworms, Cutworms

Lorsban 4E	3/4 lb (armyworm) 1 lb (cutworm)	30 days. Up to 4 lb/season.
Parathion <sup>R</sup>	1/2-3/4 lb	15 days.
Sevin (various formulations)	1-1 1/2 lb (armyworms) 1 1/2 lb (cutworms)	14 days.

**Beet Webworms** - If 50% of the leaves have eggs (small, pearly-white) or 1-2 larvae, then chemical control should be economical.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
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Dylox	1/2-1 lb	14 days.
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/4 lb	7 days (30 days to feed tops).
Parathion <sup>R</sup>	1/2-3/4 lb	15 days.
Sevin (various formulations)	1-1 1/2 lb	14 days.
Thiodan, endosulfan	3/4-1 lb	30 days. Do not feed treated tops to livestock.

**R** = Restricted Use

**Flea Beetles** - These can damage seedlings, but their effect on yield is unknown. It appears that the plant usually recovers from the damage.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Lannate <sup>R</sup> / Nudrin <sup>R</sup>	1/2-1 lb	7 days (30 days to feed tops).
Parathion <sup>R</sup>	1/2-3/4 lb	15 days.
Sevin (various formulations)	1-1 1/2 lb	14 days.

**Garden Symphylan** - Preplant broadcast and incorporate 2 lb ai/acre Dyfonate.

**Grasshoppers** - These are not generally considered to be sugar beet pests, but occasionally will feed on them, especially in field margins.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Malathion	1 7/8 lb	7 days to feed tops.
Malathion ULV	8 fl oz	0 days.
Sevin (various formulations)	1/2-1 1/2 lb	14 days. A bait formulation is available.

**Leafminers** - These are usually of little economic importance as they occur mostly early in the season and feed on the lower, older leaves.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Diazinon	3/8-1/2 lb	0 days.
Dylox	1/2-1 lb	14 days.
Parathion <sup>R</sup>	1/2 lb	15 days.
Temik 15G <sup>R</sup>	1 1/2-2 lb	90 days, 120 days (tops). Planting-time or side-dress treatments. See under aphids for additional remarks.
Rampart 10G <sup>R</sup> , Thimet 20G <sup>R</sup> , Phorage 15G <sup>R</sup>	1 lb	30 days. Do not feed tops to dairy animals. Do not place in contact with seed.

**Lygus bugs** - These can kill cotyledon stage plants, 2-leaf plants are somewhat less susceptible and 4-leaf plants are not susceptible. Invasions often occur when adjacent alfalfa is cut. Treat with 3/4 lb ai/acre of ethyl or methyl parathion<sup>R</sup>, which has a 15 day preharvest interval.

<sup>R</sup> = Restricted Use

**Sugarbeet Root Maggot** - These can cause plants to wilt and die, thus reducing stand. Applications at or near peak fly emergence should result in better yield than applications made at planting time. Sticky red stakes, yellow water pans and baited Japanese beetle traps can all be used to monitor fly emergence. Applications made in the absence of the insect will probably reduce yield, but the number of insects which justify treatment is not well defined.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Counter 15G <sup>R</sup>	4-8 oz formulation/ 1000 row ft	Planting-time banded or in-furrow or post-emergence applications. See label. 1 application/year.
Diazinon 14G	1-2 lb	Planting time application. Avoid direct contact with seed.
Dyfonate 10G, 20G <sup>R</sup>	1-1 1/2 lb	Planting time. Avoid contact with the seed.
Furadan 15G <sup>R</sup>	4-8 oz formulation/ 1000 row-ft (22" rows)	Planting time only.
Lorsban 15G	6-9 oz formulation/ 1000 row-ft	Planting time or post-emergence application. 1 application only.
Malthion ULV	8 fl oz	7 days to feed tops. For adult flies, if no soil treatment. Peak adult populations usually occur May 15-20.
Temik 15G <sup>R</sup>	1-2 lb	Planting-time or post-emergence application. See under aphids for additional remarks.
Rampart 10G <sup>R</sup> Thimet 20G <sup>R</sup> Phorate 15G <sup>R</sup>	See label	30 days. Do not place in contact with seed.

**Wireworms** - Not enough is known about the effect of wireworms on yield to establish an economic injury level for them.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Counter 15G <sup>R</sup>	4-8 oz formulation/ 1000 row ft	Band over row or in-furrow, Check label.
Diazinon	2-4 lb	Pre-plant broadcast. Incorporate
Dyfonate 10G, 4E <sup>R</sup>	4 lb	Pre-plant broadcast. Incorporate into soil.

**R** = Restricted Use

## SUGARBETTS

## Diseases

**Damping Off and Seedlings Blights (*Rhizoctonia*, *Pythium* spp., etc.):**

Preemerge and postemerge seed and seedling rots. Frequently seedlings emerge, yellow, and may die. A brownish to black lesion is observed on preemerged attack seedlings at the soil line. *Pythium* damping-off is favored by cool, wet, poorly drained soils, whereas *Rhizoctonia* damping-off occurs when soil temperatures are high.

<u>Pesticide</u>	<u>Rate (100 lb seed)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Apron 25	2 oz	---	Seed treatment
Captan 30DD (Captan 400)	4.8 fl oz	---	Seed Treatment
Chloroneb	6 oz	---	Seed treatment
Dithane FZ	9.6-16 fl oz	---	Seed treatment
Dithane M22 Sp.	6-10 oz	---	Seed treatment
Terra Flo 25	6.6-13.3 fl oz	---	Seed treatment
Terracoat SD205	6-12 oz	---	Seed treatment

**Cercospora Leaf Spot (*Cercospora beticola*):** Spots on leaves are initially small, tanish, and occur on older leaves. As the spots increase in size they become circular, with a brownish to purplish border and may merge to form large dead areas. Under moist conditions, the center of mature spots becomes greyish due to fungal growth.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Benlate	0.4-.5 lb	10-14	21 days.
Basicop	4 lb	7-10	---
Tenn Cop 5E	3.0 pt	10	---
Copper Count N	0.3-.75 gal	10-14 (maximum of 6 times)	---
Dithane FZ	1 12-2.4 qt	7-10	10 days. Do not feed tops to livestock.
Dithane M45	1.5-2 lb	7-10	14 days.
Dithane M22 Sp	1.5-2 lb	7-10	14 days.
Du-Ter	4-10 oz	10-14	14 days. Do not feed tops to livestock.
Kocide 101 (Champion)	2-5 lb	10-14 (maximum of 5 times)	---
Kocide 404S	2-5 qt	10-14 (maximum of 4 times)	---
Kocide 606	2.6-6.6 pt	10-14 (maximum of 3 times)	---
Kocide Maneb	1.2-2.4 qt	7-10 (maximum of 3 times)	---

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Maneb 80	1.5-2 lb	7-10.	10 days. Do not feed tops to livestock.
Manzate 200	1.5-2 lb	7-10	14 days.
Mertect 340-F	6-12 fl oz	14-21	---
Protex	1-2 qt	10-14	14 days.
Topsin M	6-8 oz, 8-10 fl oz	14-21	21 days.
Tri-Basic Copper	2.0 qt	7-10	---
Triple Tin 4L (Super Six)	3.8-9.5 fl oz	10-14	14 days. Do not feed tops to livestock.

**Powdery Mildew (Erysiphe polygoni):** White powdery mildew-like fungus growth appears on leaves 2-1/2 to 6 months after planting. Leaves may be killed or turn brown.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Bayleton 50	8-16 oz	10-14	15 days. (maximum of 16 oz/season).
Tenn Cop 5E	3.0 pt	10	---
Kocide S	4-8 pt	14	---
Magnetic 6	4-9 pt	10-30	---
Super Six	8 pt	10-30	---

**Nematodes (Sugarbeet cyst, Heterodera schachtii; Root Knot, Meloidogyne sp.):** Damage occurs in patches initially. Cyst nematodes appear as small (the size of pin heads), white sphere attached to feeder roots. Root Knot forms small light-tan galls on root fibers and tap roots - sometimes resembling a string of beads.

<u>Pesticide</u>	<u>Rate (Acre)</u>	<u>Application Frequency (days)</u>	<u>Preharvest Interval Remarks</u>
Telone C-17	13-21 gal	---	Preplant, aerate 14 days.
Telone II	12-18 gal	---	Preplant, aerate 7-14 days.
Temik 15G	27-33 lb	---	Preplant or planting treatment.
Vapam	40-100 gal	---	Preplant, aerate 7 days.
Vorlex	7-19 gal	---	Preplant, aerate 14 days.

**Post Harvest Decay (Penicillium, Botrytis, Fusarium spp.):** Rotted tissue is dark brown or black. Gray (Botrytis), whitish to variously colored (Penicillium) to whitish-pink (Fusarium) fungal growth may be present on rotting tissue. Treat with Mertect 340-F at 0.42 fl oz/2000 lb as a post harvest mist within 72 hrs after lifting.

Additional diseases in Colorado for which no pesticides are labelled:

CTV	Curly Top Virus (can control insect vector)
Fusarium Wilt	<u>Fusarium oxysporum</u> f. sp. <u>betae</u>
Rhizoctonia Crown Rot	<u>Rhizoctonia solani</u>





**SUNFLOWER****Insects**

**Cutworms** - Check fields early and control if there is 1/sq ft or 25% stand loss.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Lorsban 4E	1-2 lb (preplant), 1-1 1/2 lb (postemergence)	42 days. Do not graze. Up to 4 1/2 lb total/year.
Pydrin 2.4E <sup>R</sup>	1/10-2/10 lb	28 days. Do not feed forage or fodder to livestock.
Sevin XLR+	1 1/2 lb	60 days. Do not graze.

**Grasshoppers** - An infestation of 8/sq yd is considered to be of economic importance.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Furadan 15G <sup>R</sup>	8-16 oz (formulation/ 1000 row ft)	Planting time.
Furadan 4F <sup>R</sup>	1/8-1/2 lb	28 days.
Lorsban 4E	1/2 lb	42 days. Do not graze. Up to 4 1/2 lb total/year.
Pydrin 2.4E <sup>R</sup>	1/10-2/10 lb	28 days. Do not feed forage or fodder to livestock.
Sevin XLR+	1/2-1 1/2 lb	60 days. Do not graze.

**Head Moths** - (Banded sunflower moth, sunflower head moth) - Applications are made to prevent moths from laying eggs. If banded sunflower moths are observed in field margins at 35-100% bloom, a treatment is probably necessary. Two sunflower head moths per 5 plants at this time would also justify treatment.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Furadan 4F <sup>R</sup>	1/2 lb	28 days.
Lorsban 4E	1/2-3/4 lb	42 days. Do not graze. Up to 4 1/2 lb total/year.
Parathion <sup>R</sup>	1/2-1 lb	30 days.
Pydrin 2.4E <sup>R</sup>	1/10-2/10 lb	28 days. Do not feed forage or fodder to livestock.

**R** = Restricted Use

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Supracide <sup>R</sup>	1/2 lb	50 days. Do not graze.
Thiodan, endosulfan	1 lb	0 days. Up to 3 applications. Do not feed to livestock.

**Seed Weevils** - Applications are made to prevent adults from laying their eggs. If 10-12 adults are present per plant (oil) or 1-3 are present per plant (confectionary) then a treatment may be economical at 85-100% bloom.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Furadan 4F <sup>R</sup>	1/2 lb	28 days.
Lorsban 4E	1/2-3/4 lb	42 days. Do not graze. Up to 4 1/2 lb/year.
Parathion <sup>R</sup>	1 lb	30 days.
Pydrin 2.4E <sup>R</sup>	1/10-2/10 lb	28 days. Do not feed forage or fodder to livestock.
Supracide <sup>R</sup>	1/2 lb	50 days. Do not graze.

**Stem Weevils** - Applications are made to prevent the adults from depositing their eggs in the stalk. A treatment is probably justified when two or more adults are found per plant from the 14-leaf stage to the early bud stage.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Furadan 4F <sup>R</sup>	1/2 lb (foliar) 2.5-5 fl oz/1000 row ft (planting time)	28 days.
Furadan 15G <sup>R</sup>	8-16 oz (formulation)/ 1000 row ft	Planting time.
Lorsban 4E	1/2-3/4 lb	42 days. Do not graze.
Sevin (various formulations)	1/2 lb	60 days. Do not graze.
Supracide <sup>R</sup>	1/2 lb	50 days. Do not graze.

<sup>R</sup> = Restricted Use

**Sunflower Beetle** - Adults attack early in the season, defoliating seedlings. One adult per plant is considered to be economic. Later the larval stage feeds on larger plants. Fifteen larvae/plant or 25% defoliation would justify an insecticide application.

<u>INSECTICIDE</u>	<u>ACTIVE INGREDIENT/ACRE</u>	<u>PREHARVEST INTERVAL, REMARKS</u>
Furadan 4F <sup>R</sup>	1/8-1/4 lb (foliar) 2.5-5 fl oz/1000 row ft (Planting time)	28 days.
Lorsban 4E	1/2-3/4 lb	42 days. Do not graze. Up to 4 1/2 lb total/year.
Pydrin 2.4E <sup>R</sup>	5/100-1/10 lb	28 days. Do not feed fodder or forage to livestock.
Sevin (various formulations)	1-2 lb	60 days. Do not graze.

**R** = Restricted Use

## SUNFLOWERS

### Diseases

**Damping Off and Seedling Blights:** (Fusarium, Pythium spp.): Either pre or post emergence rotting. Favored by cool, wet, poorly drained soil. Treat seed with Captan 400D at 2.4 fl oz per 100 lbs.

Diseases in Colorado for which no pesticides are labelled.

Alternaria Leaf Blight  
Charcoal Rot  
Phoma Black Stem  
Powdery Mildew  
Rhizopus Head Rot  
Root rots  
Rust  
Verticillium Wilt  
White Mold

Alternaria zinniae  
Macrophomina phaseoli  
Phoma oleracea var. helianthi-tuberosi  
Erysiphe cichoracearum  
Rhizopus spp.  
Miscellaneous fungi  
Puccinia helianthi  
Verticillium dahliae  
Sclerotinia sclerotiorum

**1987 COLORADO WEED CONTROL GUIDE**

HERBICIDE USE SUGGESTIONS FOR THE CONTROL OF WEEDS IN ROW CROPS AND NON-CROPLAND

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WARNING: ALWAYS READ AND FOLLOW PRODUCT LABEL DIRECTIONS.  
ALWAYS USE CAUTION, PROTECTIVE CLOTHING, RUBBER GLOVES,  
AND A MASK WITH GOGGLES WHEN WORKING WITH CHEMICALS SUCH  
AS HERBICIDES. SEE THE PRODUCT LABEL REGARDING PROTECTIVE  
CLOTHING REQUIRED DURING THE USE OF DIFFERENT PRODUCTS.  
DO NOT EAT OR SMOKE WHILE APPLYING HERBICIDES. YOUR HEALTH  
IS WORTH MORE THAN A HASTY APPLICATION MADE WITHOUT PROTECTIVE  
GEAR. PROTECT YOUR HEALTH AND OUR ENVIRONMENT.

THE 1987 SUGGESTED USE GUIDE FOR COLORADO WAS PREPARED BY THE HERBICIDE COMMITTEE OF COLORADO STATE UNIVERSITY, AND WAS APPROVED BY THE COLORADO AGRICULTURAL CHEMICALS CLEARING COMMITTEE. SUGGESTIONS IN THIS PUBLICATION ARE INTENDED ONLY AS A GUIDE. FINAL USAGE OF HERBICIDES SHOULD BE BASED ON DIRECTIONS PRINTED ON THE LABEL OF THE CONTAINER WHICH HAS BEEN APPROVED BY THE EPA AND THE COLORADO DEPARTMENT OF AGRICULTURE.

THE INFORMATION CONTAINED IN THIS HERBICIDE GUIDE IS SUPPLIED WITH THE UNDERSTANDING THAT COLORADO STATE UNIVERSITY AND THE COLORADO AGRICULTURAL CHEMICALS CLEARING COMMITTEE DOES NOT INTEND ANY ENDORSEMENT OF A SPECIFIC PRODUCT, NOR IS DISCRIMINATION INTENDED TOWARD ANY PRODUCT INCLUDED IN OR OMITTED FROM THE COLORADO HERBICIDE GUIDE.

\* BE CAREFUL WHEN USING 2,4-D ESTERS, DICAMBA, OR OTHER SUCH HERBICIDES NEAR SENSITIVE CROPS, TREES, OR SHRUBS.

\* SINCE CROP VARIETIES AND HYBRIDS DIFFER IN THEIR RESPONSE TO HERBICIDES, CHECK WITH YOUR SEED DEALER FOR INFORMATION ON THE CROP YOU PLAN TO TREAT.

\* RESTRICTED USE PESTICIDES: TORDON, HOELON, KEEB, ACROLEIN, BLADEX & PARAGUAT (GRAMOXONE) HAVE BEEN CLASSIFIED AS RESTRICTED USE HERBICIDES BY THE EPA. ONLY CERTIFIED PRIVATE OR COMMERCIAL APPLICATORS MAY PURCHASE AND APPLY, OR SUPERVISE THE APPLICATION OF RESTRICTED USE HERBICIDES. SEE YOUR COUNTY EXTENSION AGENT IF YOU NEED TO BE CERTIFIED. OTHER HERBICIDES OR SOME OF THEIR USES MAY BE CLASSIFIED AS RESTRICTED USE AT SOME FUTURE DATE. THE LABEL WILL INDICATE IF A PRODUCT IS FOR RESTRICTED USE.

\* APPLY HERBICIDES ONLY AS DIRECTED. FEDERAL LAW AUTHORIZES SEIZURE OF ANY RAW AGRICULTURAL COMMODITY MOVING IN INTERSTATE COMMERCE WHICH CARRIES A PESTICIDE RESIDUE IN EXCESS OF THE ESTABLISHED TOLERANCE.

\* STORE HERBICIDES IN THEIR ORIGINAL CONTAINERS. KEEP OUT OF THE REACH OF CHILDREN, PETS, LIVESTOCK, AND IRRESPONSIBLE PEOPLE.

\* ELIMINATE HAZARDS FROM CONTAINERS. FOLLOW CONTAINER DISPOSAL GUIDELINES AS LISTED ON HERBICIDE CONTAINERS. CHECK INTO LOCAL BURNING ORDINANCES. BURN PAPER BAGS AND FIBER DRUMS ONLY IF PERMITTED AND STAY OUT OF THE SMOKE. RINSE CONTAINERS THREE TIMES AND USE THIS RINSE MATERIAL IN THE SPRAY SOLUTION. PUNCTURE THE TOP AND BOTTOM OF SOLID CONTAINERS SO THAT THEY CANNOT BE USED FOR OTHER STORAGE. DISPOSE OF CRUSHED CONTAINERS IN ACCORDANCE WITH LOCAL ORDINANCES.

\* READ AND FOLLOW THE LABEL ! YOU ARE RESPONSIBLE FOR ANY HERBICIDE APPLICATION THAT YOU MAKE, YOUR OWN HEALTH, AND THE HEALTH OF OTHERS.

\*\*\*\*\*  
 \* THERE IS A 24 HOUR, EVERY DAY OF THE YEAR, STAFFED POISON INFORMATION CENTER IN COLORADO \*  
 \* EQUIPPED TO PROVIDE CURRENT INFORMATION ON ALL TYPES OF POISONING CASES. IF YOU NEED HELP, \*  
 \* CALL THIS TOLL FREE DENVER NUMBER (800) 332-3073. CALL (303) 629-1123 IF YOU ARE OUTSIDE COLO. \*  
 \* \*  
 \* HERBICIDE POISONINGS SOMETIMES REQUIRE TREATMENT BY A PHYSICIAN. SHOULD YOU REQUIRE TREATMENT, \*  
 \* BRING THE NAME OF THE HERBICIDE, THE REGISTRATION NUMBERS, AND THE CONTAINER IF POSSIBLE. \*  
 \* \*  
 \* FOR INFORMATION CONCERNING A SAFETY TEAM WHICH MAY BE CALLED IN CASE OF A SERIOUS ACCIDENT OR \*  
 \* SPILLAGE INVOLVING AGRICULTURAL CHEMICALS, CALL THIS TOLL FREE NUMBER (800) 424-9300 \*  
 \*\*\*\*\*

THIS GUIDE WAS PREPARED BY STAFF OF THE  
 COLORADO STATE UNIVERSITY  
 WEED SCIENCE COOPERATIVE EXTENSION

PHILIP WESTRA AND K. GEORGE BECK

**READ AND FOLLOW LABEL DIRECTIONS !**

HERBICIDE OR MIX	FOXTAILS										RATING		CONTROL	
	BARNYARDGRASS + WITCHGRASS + SANDBURS + + WILD OAT + + SHATTERCANE + + + NUTGRASS + + + BLACK NIGHTSHADE + + + + BUCKWHEAT -WILD + + + + BUFFALOBUR + + + + FANWEED (PENNYCRESS) + + + + FLOWER-OF-AN HOUR + + + + KOCHIA + + + + LAMBSQUARTERS + + + + LETTUCE-WILD + + + + MUSTARDS-ANNUAL + + + + MUSTARD-BLUE + + + + MUSTARD-TANSY + + + + PIGWEED + + + + PUNCTUREVINE + + + + PURSLANE + + + + RAGWEED-COMMON + + + + RUSSIAN THISTLE + + + + SUNFLOWER + + + + SPURGE A.	CROP TOLERANCE		SOIL CARRYOVER (MONTHS)										
	E	E	E	E	E	E	E	E	E	E	E	G	90 - 100 %	
	G	G	G	G	G	G	G	G	G	G	F	G	75 - 90 %	
	F	F	F	F	F	F	F	F	F	F	F	P	50 - 75 %	
	P	P	P	P	P	P	P	P	P	P	P	N	0 - 50 %	
	N	N	N	N	N	N	N	N	N	N	N	N	NONE	
	-	-	-	-	-	-	-	-	-	-	-	-	-	INFORMATION NOT AVAILABLE
	/	/	/	/	/	/	/	/	/	/	/	/	/	DENOTES THE SAME CHEMICAL COMPOUND; DIFFERENT TRADE NAMES.

CORN PAGES 4, 5, & 6

SUTAN+/GENATE+	E	E	E	E	G	G	G	G	F	G	F	P	F	F	P	F	P	P	F	F	P	F	F	P	F	F	P	E	1-2
ERADICANE	E	E	E	E	G	G	G	F	G	F	P	F	G	G	F	P	F	P	F	F	F	G	F	P	G	F	P	G	1-2
LAZZO	E	E	E	F	G	P	G	G	G	F	P	F	F	F	P	P	P	G	F	P	P	G	F	P	E	2			
ATRAZINE	G	G	G	F	F	P	P	E	E	G	G	R	E	G	R	E	G	G	R	G	G	G	G	F	R	4-12			
BLADEX	G	G	E	F	F	P	P	E	G	G	G	G	G	G	E	G	F	F	F	G	G	G	F	G	2-4				
MODOWN	P	P	P	P	P	P	P	F	F	F	F	F	E	E	P	F	F	F	G	G	F	F	F	F	G	1-2			
DUAL	E	E	E	F	-	P	E	G	P	-	-	-	P	G	-	-	-	G	-	-	F	P	P	E	2-5				
PROWL	E	E	G	G	-	F	P	-	-	-	-	F	G	-	P	-	-	G	-	-	P	-	F	F	4-12				
SUTAN+/GENATE+ OR ERADICANE + ATRAZINE OR BLADEX	E	E	E	G	-	G	-	-	-	-	-	E	E	-	-	-	E	-	-	G	G	G	-	E	6-18				
SUTAN+/GENATE+ + ATRAZINE	E	E	E	G	-	G	-	-	-	-	-	E	E	-	-	-	E	-	-	G	G	G	-	E	6-18				
SUTAN+/GENATE+ + ATRAZINE + BLADEX	E	E	E	G	-	G	-	-	-	-	-	E	E	-	-	-	E	-	-	G	G	G	-	E	6-18				
LAZZO + BLADEX OR ATRAZINE DUAL + BLADEX OR ATRAZINE	E	E	E	G	-	P	-	E	G	-	-	E	E	-	-	-	E	-	-	E	G	G	-	E	2-12				
DUAL + ATRAZINE	E	E	E	G	-	P	-	E	G	-	-	E	E	-	-	-	E	-	-	E	G	G	-	E	6-18				
BANVEL	N	N	N	P	N	N	N	P	E	F	P	F	E	E	F	F	F	G	E	G	F	G	E	G	F	1-2			
2,4-D	N	N	N	P	N	N	N	G	P	G	E	F	G	E	G	F	F	F	E	E	P	F	G	G	F	< 1			
BROMINAL/BUCTRIL	N	N	N	N	N	N	N	G	G	G	G	P	G	G	F	G	G	G	F	E	P	G	F	E	P	< 1			
BROMINAL/BUCTRIL + ATRAZINE	-	-	-	-	-	-	-	E	-	-	-	E	G	E	-	-	-	E	-	-	E	-	E	-	G	6-18			

SORGHUM PAGE 6 & 7

MILOGARD	F	F	F	P	-	-	G	-	-	-	G	G	E	-	-	-	G	G	-	G	-	F	-	G	8-12	
IGRAN	G	G	G	F	-	-	G	-	-	-	G	G	-	-	-	-	G	-	-	P	-	P	-	F	1-3	
MILOGARD + IGRAN	F	F	G	F	-	-	G	-	-	-	G	E	-	-	-	G	F	-	G	-	F	-	F	8-12		
MODOWN	P	P	P	P	P	P	P	F	F	F	F	F	E	E	P	F	F	F	G	G	F	F	F	F	1-2	
MODOWN + LAZZO OR DUAL OR RAMROD	G	G	G	F	-	-	F	-	-	-	G	G	-	-	-	-	F	-	-	-	-	-	F	1-2		
RAMROD	G	G	G	F	-	-	G	-	-	-	G	G	-	-	-	-	G	-	-	G	-	F	-	E	1-2	
DUAL	E	E	E	F	-	P	-	G	P	-	-	P	G	-	-	-	G	-	-	F	P	P	-	E	2-5	
LAZZO	E	E	E	F	G	P	G	G	G	F	P	F	F	F	P	P	P	G	F	P	P	G	F	P	2	
2,4-D	N	N	N	P	N	N	N	G	P	G	E	F	G	E	G	F	F	F	E	E	P	F	G	G	F	1





**CORN**

READ AND FOLLOW LABEL DIRECTIONS

HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
1. SUTAN+ /GENATE+	4 TO 6 LBS	PPI. BOTH HERBICIDES ARE A COMBINATION OF BUTYLATE PLUS A SAFENING COMPOUND. APPLY PREPLANT AND INCORPORATE 3 TO 4" DEEP AS SOON AS POSSIBLE. DELAYED INCORPORATION, ESPECIALLY ON MOIST SOILS MAY REDUCE WEED CONTROL. THIS HERBICIDE IS NOT PERSISTENT IN THE SOIL, AND MAY NOT GIVE GOOD LATE SEASON WEED CONTROL.
2. ERADICANE AND ERADICANE EXTRA	3 TO 6 LBS	PPI. ERADICANE IS A COMBINATION OF EPTC (EPTAM) PLUS A SAFENING COMPOUND. ERADICANE EXTRA ALSO INCLUDES AN EXTENDER WHICH INCREASES THE SOIL PERSISTENCE OF THE HERBICIDE. THE SAFENER AND EXTENDER HAVE NO HERBICIDAL ACTIVITY BY THEMSELVES. APPLY THIS HERBICIDE PREPLANT AND INCORPORATE IMMEDIATELY. ERADICANE PROVIDES ESPECIALLY GOOD CONTROL OF SANDBURNS AND WILD CANE, AND CAN BE APPLIED THROUGH CENTER PIVOT IRRIGATION SYSTEMS.
3. LASSO	2 TO 3 LBS	LASSO MAY BE APPLIED PREPLANT AND SHALLOWLY INCORPORATED, OR IT MAY BE APPLIED POSTPLANT PRIOR TO CROP OR WEED EMERGENCE. IT MAY BE APPLIED THROUGH A CENTER PIVOT, POST-EMERGENCE TO CORN UP TO 5 IN. TALL AND PRIOR TO WEED EMERGENCE. IT MAY BE APPLIED WITH A FLUID FERTILIZER. A MINIMUM OF 10 GPA SHOULD BE USED FOR GOOD COVERAGE. TO CONTROL LATE EMERGING BROADLEAF WEEDS, USE 2,4-D AS A DIRECTED SPRAY.
4. ATRAZINE	1.5 TO 3 LBS FOLLOW LABEL DIRECTIONS	ATRAZINE MAY BE APPLIED PPI, PREEMERGE, POSTPLANT BEFORE WEEDS EMERGE, OR POSTEMERGENCE BEFORE WEEDS ARE 1 1/2" TALL. IN AREAS WHERE WEEDS HAVE A TENDENCY TO HARDEN OFF SOON AFTER EMERGENCE, APPLICATION AT PLANTING OR SOON THEREAFTER IS PREFERRED. USE 1 1/2 LBS ON LIGHT SANDY SOIL, AND 2 LBS ON HEAVIER SOILS. BE AWARE OF ATRAZINE CARRY-OVER AND POTENTIAL RECROPPING PROBLEMS THE FOLLOWING YEAR. ATRAZINE MAY BE APPLIED THROUGH CENTER PIVOT IRRIGATION SYSTEMS. CHECK YOUR PRODUCT LABEL FOR APPLICATION PROCEDURES. ATRAZINE, BICEP, DUAL, DUAL + ATRAZINE, BICEP + ATRAZINE, AND BICEP + DUAL MAY BE APPLIED PREPLANT UP TO 45 DAYS BEFORE PLANTING IN MINIMUM OR NO-TILL CORN. THIS IS LIMITED TO MEDIUM AND FINE TEXTURED SOILS. THIS MAY BE MADE AS A SPLIT APPLICATION WITH 2/3 APPLIED PREPLANT, AND 1/3 APPLIED AT PLANTING. PARAGUAT (GRAMOXONE) OR ROUNDUP MAY BE USED IF NECESSARY FOR ADDITIONAL WEED CONTROL.
5. BLADEX EXTRAZINE	1.5 TO 2 LBS FOLLOW LABEL DIRECTIONS	BLADEX CAN BE APPLIED PREPLANT, AT PLANTING, OR POSTPLANT BUT BEFORE THE CROP HAS EMERGED. SHALLOW INCORPORATION IS RECOMMENDED IF RAINFALL OR SPRINKLER IRRIGATION DOES NOT OCCUR WITHIN 6 DAYS AFTER APPLICATION. UNDER MOST CONDITIONS, BLADEX DOES NOT PERSIST IN THE SOIL MORE THAN 1 SEASON. FOLLOW THE LABEL TO DETERMINE THE AMOUNT OF PRODUCT TO USE ON DIFFERENT SOIL TYPES. BLADEX CAN BE APPLIED BY GROUND OR BY AIR.
6. MODOWN OR MODOWN + LASSO OR DUAL	1.5 TO 2 LBS FOLLOW LABEL DIRECTIONS	APPLY MODOWN OR MODOWN PLUS LASSO OR DUAL AFTER PLANTING BUT BEFORE THE CROP OR WEED SEEDLINGS EMERGE; DO NOT INCORPORATE. WORKS BEST UNDER GOOD GROWING CONDITIONS.
7. DUAL	1.5 TO 2 LBS	CAN BE APPLIED UP TO 45 DAYS PREPLANT IN A MINIMUM OR NO-TILL FARMING PROGRAM--SEE LABEL FOR DIRECTIONS. UP TO 3 LBS MAY BE APPLIED OR A LAYBY TREATMENT. DUAL CAN BE APPLIED WITH WATER OR A LIQUID FERTILIZER, IN A MINIMUM OF 10 GALLONS PER ACRE IN GROUND SPRAYERS, OR 2 GALLONS IN AERIAL APPLICATIONS. DUAL CAN BE APPLIED THROUGH CENTER PIVOT IRRIGATION SYSTEMS. APPLY PREPLANT WITH SHALLOW INCORPORATION, OR POST PLANT, BEFORE WEEDS AND CORN EMERGE. FOLLOW LABEL DIRECTIONS FOR RATES ON VARIOUS SOIL TYPES.
8. PROWL OR PROWL + ATRAZINE OR BLADEX	1 - 1.5 LBS	WHEN APPLYING IN WATER USE 10 OR MORE GALLONS; IN LIQUID FERTILIZER USE 20 OR MORE GALLONS; FOR AERIAL APPLICATIONS USE 5 OR MORE GALLONS. PROWL CAN BE MIXED WITH ATRAZINE OR BLADEX. FOLLOW LABEL DIRECTIONS FOR COMBINATION RATES, MIXING INSTRUCTIONS, AND PRECAUTIONS. PROWL + ATRAZINE MAY BE APPLIED AS AN OVER-THE-TOP SPRAY OR A DIRECTED SPRAY. USE DROP NOZZLES IF THE CORN FOLIAGE PREVENTS UNIFORM SOIL COVERAGE. ROLLING CULTIVATORS OR SWEEPS MAY BE USED FOR INCORPORATION.
9. SUTAN+/GENATE+ OR ERADICANE + ATRAZINE, BLADEX, OR EXTRAZINE	FOLLOW LABEL DIRECTIONS	TANK MIXES BROADEN THE WEED CONTROL SPECTRUM. THESE MIXES MAY BE APPLIED PPI; THE FOLLOWING SEQUENCE MAY BE EMPLOYED; THE ERADICANE, SUTAN+, OR GENATE+ APPLIED PPI, AND THE ATRAZINE OR BLADEX APPLIED PREEMERGE. THESE HERBICIDES MAY BE APPLIED THROUGH CENTER PIVOT IRRIGATION SYSTEMS. RATES AND COMBINATIONS DIFFER FOR SPECIFIC WEEDS AND CONDITIONS. FOLLOW USE PRECAUTIONS, WARNINGS, AND MIXING DIRECTIONS AS STATED ON THE INDIVIDUAL LABELS.



HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
10. SUTAN+/GENATE+ +ATRAZINE +BLADEX OR SUTAZINE	FOLLOW LABEL DIRECTIONS	THREE WAY COMBINATIONS CAN BE USED TO REDUCE ATRAZINE CARRYOVER IN THE SOIL AND BROADEN THE WEED CONTROL SPECTRUM. SUTAZINE+ IS A COMBINATION OF SUTAN+ AND ATRAZINE (4.8 + 1.2 LB AI/GAL) IN A 4:1 FLOWABLE FORMULATION. IT SHOULD BE APPLIED PREPLANT AND INCORPORATED AS SOON AS POSSIBLE. SUTAZINE+ CAN BE APPLIED THROUGH CENTER PIVOT SPRINKLERS. IT CAN BE APPLIED WITH LIQUID FERTILIZER OR IMPREGNATED ON DRY BULK FERTILIZERS. SUGGESTED USE RATES RANGE FROM 5.25 TO 7.0 PINTS PER ACRE. WILD PROSO MILLET CAN BE SUPPRESSED BY THE USE OF 7.33 PINTS OF ERADICANE OR SUTAN+ 6.7E OR 8.0 PINTS OF ERADICANE EXTRA PPI, PLUS 1.0 LB/ACRE BLADEX.
11. BLADEX + LASSO DUAL, OR ATRAZINE	FOLLOW LABEL DIRECTIONS	THESE ARE TANK MIXES WHICH REDUCE ATRAZINE CARRYOVER IN THE SOIL AND BROADEN THE WEED CONTROL SPECTRUM. REFER TO THE INDIVIDUAL LABELS FOR INFORMATION REGARDING MIXING, RATES, SOIL TYPES, TIMES AND METHODS OF APPLICATION, SOIL INCORPORATION, AND COMPATIBILITY.
12. LASSO + ATRAZINE  LASSO + ATRAZINE + BLADEX	1.5 - 2.5 LBS PLUS 1.0 TO 1.4 LBS  1.5 - 2.0 LBS PLUS .75 -1.0 PLUS 1.0-1.25 LBS  FOLLOW LABEL DIRECTIONS	THESE COMBINATIONS CAN BE USED PPI, PREEMERGE, AND VERY EARLY POSTEMERGE ON GRAIN AND SILAGE CORN. IF USED PPI, INCORPORATE 2" DEEP WITHIN 7 DAYS. BECAUSE OF ATRAZINE CARRYOVER ONLY CORN OR SORGHUM SHOULD BE PLANTED THE FOLLOWING YEAR. THE ATRAZINE+BLADEX MIX HELPS TO REDUCE ATRAZINE CARRYOVER. FOR SANDBUR CONTROL, USE 3 LBS OF LASSO PLUS 1 TO 1.6 LBS AI/ACRE OF ATRAZINE APPLIED PREPLANT WITH A SHALLOW INCORPORATION OR APPLY WITHIN THREE DAYS AFTER LAST LAST PREPLANT TILLAGE. AERIAL APPLICATIONS MAY BE MADE IN 3 GPA OF CARRIER. LASSO AND LASSO + ATRAZINE MAY BE APPLIED THROUGH CENTER PIVOT IRRIGATION SYSTEMS TO WEEDS LESS THAN 2" TALL AND CORN LESS THAN 5" TALL. APPLY IN 1/3 TO 3/4 INCH OF WATER/ACRE AND MAINTAIN GOOD AGITATION IN THE HOLDING TANK. SEE THE LABELS FOR MORE DETAILED INSTRUCTIONS.
13. DUAL + ATRAZINE OR BICEP	1.25 TO 2.5 LBS + 1 TO 2 LBS	THE TANK MIX OR PRE-MIX (BICEP) WILL CONTROL MORE BROADLEAF WEEDS THAN DUAL ALONE. ATRAZINE CARRYOVER SHOULD BE CONSIDERED WHEN PLANNING CROP ROTATIONS. BICEP IS A FLOWABLE FORMULATION OF DUAL + ATRAZINE CONTAINING 4.5 LBS AI PER GALLON. DUAL AND DUAL MIXES CAN BE APPLIED THROUGH CENTER PIVOT IRRIGATION SYSTEMS. SEE THE LABEL FOR INFORMATION REGARDING SOIL TYPES AND SOIL ORGANIC MATTER. DO NOT APPLY POSTEMERGENCE IN LIQUID FERTILIZER. APPLY EARLY POSTEMERGENCE BEFORE WEEDS PASS THE 2 LEAF STAGE AND BEFORE CORN IS 5" HIGH. SOME EARLY CORN LEAF BURN MAY OCCUR. CAN BE APPLIED UP TO 45 DAYS PREPLANT IN A MINIMUM OR NO-TILL FARMING PROGRAM--SEE LABEL FOR DIRECTIONS. BICEP IS A 4.5 OR 6 L. UP TO 4 QT. OF BICEP 4.5 L (3 QP. OF 6 L) MAY BE APPLIED AS A LAYBY TREATMENT.
14. BANVEL OR BANVEL + 2,4-D	8 TO 16 OZS 4 TO 8 OZ FOLLOW LABEL DIRECTIONS	APPLY BANVEL WHEN THE WEEDS ARE SMALL AND THE CORN IS LESS THAN 36" HIGH OR UNTIL 15 DAYS BEFORE TASSEL EMERGENCE, WHICHEVER OCCURS FIRST. DO NOT APPLY BANVEL AFTER THIS HEIGHT OR GROWTH STAGE. BANVEL/2,4-D MIXES MAY BE APPLIED OVER THE TOP OF CORN UP TO 8" TALL. USE DROP NOZZLES FOR CORN MORE THAN 8" TALL. * BANVEL CAN ALSO BE USED AS AN "OVERLAY" TREATMENT FOLLOWING A PREEMERGE OR PREPLANT APPLICATION OF ATRAZINE, BLADEX, DUAL, ERADICANE, SUTAN+/GENATE+, OR LASSO. APPLY THESE HERBICIDES ACCORDING TO LABEL DIRECTIONS, AND APPLY UP TO 0.5 LB AI/ACRE OF BANVEL ANYTIME FROM PLANTING UP TO 5" CORN. THIS WILL HELP CONTROL SEVERAL BROADLEAF WEEDS THAT OFTEN GERMINATE AFTER THE OTHER HERBICIDES HAVE DISSIPATED FROM THE SOIL. NOTICE BANVEL RATE IS GIVEN IN <u>OUNCES</u> PER ACRE.
15. BANVEL + DUAL, ATRAZINE, OR PROWL	8 TO 16 OZ CHECK LABEL	DO NOT USE ON SANDY OR COARSE SOILS. USE ONLY ON FLAT PLANTED CORN. CONSULT BANVEL LABEL FOR APPLICATION TIMING. 1 1/2" HIGH.
16. 2,4-D AMINE OR LV ESTER	0.5 TO 0.75 (LOWER RATE FOR ESTER)	2,4-D CAN BE APPLIED TO SMALL, EMERGED BROADLEAF WEEDS IN CORN THAT IS 6" TO 12" TALL. CULTIVATION OR WINDSTORMS SOON AFTER APPLICATION MAY ENHANCE SOME CORN INJURY. THIS HAZARD INCREASES AS THE CORN GETS LARGER, AND FOLLOWING A PERIOD OF HIGH TEMPERATURES (85 DEGREES F AND ABOVE).
17. BROMINAL/BUCTRIL	FOLLOW LABEL DIRECTIONS	THIS HERBICIDE REQUIRES GOOD SPRAY COVERAGE. SPRAY WHEN THE CORN IS IN A 2 LEAF STAGE TO 14" HIGH, AND THE FOLIAGE IS DRY. WARM TEMPERATURES INCREASE THE ACTIVITY ON WEEDS. BUCTRIL MAY BE TANK MIXED WITH 2,4-D.
18. BROMINAL/BUCTRIL + ATRAZINE	0.25 TO 0.38 LB + 0.5 TO 1.2 LBS	THIS MIX BROADENS THE SPECTRUM OF WEED CONTROL AND PROVIDES RESIDUAL CONTROL OF GERMINATING WEED SEEDLINGS.
19. TREFLAN	FOLLOW LABEL DIRECTIONS	CULTIVATE AND DESTROY ALL EMERGED OR EXISTING WEEDS. USE DROP NOZZLES IF CORN FOLIAGE PREVENTS UNIFORM COVERAGE OF THE SOIL. INCORPORATION MAY BE ACCOMPLISHED WITH SWEEPS OR ROLLING CULTIVATORS.

HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
20. LOROX	FOLLOW LABEL DIRECTIONS	LOROX SHOULD BE APPLIED AS A DIRECTED SPRAY AT THE BASE OF THE CORN PLANTS WHEN THERE IS SUFFICIENT HEIGHT DIFFERENTIAL. DO NOT SPRAY OVER THE TOP OF CORN, AND DO NOT SOIL INCORPORATE.
21. PROWL OR TREFLAN + ATRAZINE OR BLADEX	FOLLOW LABEL DIRECTIONS	THIS MIX CAN HELP TO CONTROL WILD PROSO MILLET. APPLY WHEN THE CORN IS HIGH ENOUGH TO HILL, AND WHEN THE MILLET IS SMALL ENOUGH TO COVER. SOIL INCORPORATION WITH SWERPS OR ROLLING CULTIVATORS IS NECESSARY, AND TREATED SOIL SHOULD BE MOVED INTO THE CROP ROW. ONE SHOULD DESTROY OR COVER ALL MILLET PLANTS. THESE HERBICIDES PERSIST LONG ENOUGH TO PROVIDE SEASON LONG CONTROL.
<b>SORGHUM</b>		
1. MILOGARD OR MAXX	2 LBS	APPLY AT PLANTING TIME OR IMMEDIATELY AFTER PLANTING, BEFORE WEEDS AND SORGHUM EMERGE. THIS HERBICIDE SHOULD NOT BE USED ON SANDY SOILS AS IT MAY CAUSE CROP INJURY. ONLY SORGHUM OR CORN SHOULD BE PLANTED INTO TREATED LAND FOR 18 MONTHS FOLLOWING APPLICATION, SINCE CARRYOVER MAY INJURE OTHER CROPS.
2. IGRAN	1.6 TO 2.4 LBS	IGRAN CAN BE USED PPI, AT PLANTING, OR POST PLANT BEFORE THE WEEDS AND SORGHUM EMERGE. DO NOT APPLY TO EMERGED SORGHUM. DO NOT USE IGRAN ON SANDY OR LOAMY SAND SOILS, SINCE CARRYOVER MAY AFFECT SENSITIVE CROPS SUCH AS BEANS OR SUGARBEETS THE FOLLOWING YEAR. DO NOT GRAZE OR FEED FORAGE FROM TREATED AREAS. IGRAN AND DUAL CAN BE APPLIED IN WATER OR LIQUID FERTILIZER OVER "CONCEP" TREATED SEED FOR IMPROVED GRASS CONTROL.
3. MILOGARD + IGRAN	0.4 + 1.6 LBS	THIS TANK MIX CAN INCREASE THE SPECTRUM OF WEEDS CONTROLLED, BUT SHOULD NOT BE USED ON SANDY OR SANDY LOAM SOILS.
4. MODOWN OR MODOWN + LASSO, DUAL, OR RAMROD	1.5 TO 2 LBS FOLLOW LABEL DIRECTIONS	MODOWN OR MODOWN + LASSO, DUAL, OR RAMROD CAN BE APPLIED POSTPLANT BUT BEFORE THE CROP OR WEEDS HAVE EMERGED. WHEN USING LASSO OR DUAL, THE SORGHUM SEED SHOULD BE TREATED WITH THE PROPER SEED PROTECTANT; DO NOT SOIL INCORPORATE. GOOD GROWING CONDITIONS FAVOR GOOD WEED CONTROL, BUT MODOWN AND RAMROD ARE LESS DEPENDENT THAN SOME PREEMERGE HERBICIDES ON GOOD WEATHER CONDITIONS.
5. RAMROD OR RAMROD + LOROX	5 LBS 1.5 TO 2.5 LBS 1 TO 1.6 LBS	RAMROD OR THE RAMROD + LOROX MIX SHOULD BE APPLIED PRIOR TO CROP OR WEED EMERGENCE. RAIN OR IRRIGATION MOISTURE IS NEEDED SOON AFTER APPLICATION TO ACTIVATE THE HERBICIDES. RAMROD WILL CONTROL MOST ANNUAL GRASSES, WHILE THE RAMROD + LOROX MIX WILL CONTROL ANNUAL GRASSES AND BROADLEAF WEEDS.
6. RAMROD + MILOGARD	2.5 TO 3 LBS 1 TO 1.3 LBS	APPLY THIS MIX POSTPLANT BEFORE THE CROP AND WEEDS EMERGE. DO NOT PLANT ANY CROPS OTHER THAN CORN OR SORGHUM FOR 18 MONTHS FOLLOWING TREATMENT, AS CARRYOVER MAY INJURE OTHER CROPS.
7. LASSO	2.5 TO 3 LBS	CAN BE APPLIED PPI, PRE-EMERGE, OR POSTPLANT BEFORE CROP OR WEED EMERGENCE; ONLY USE SORGHUM SEED TREATED WITH "SCREEN" SEED PROTECTANT. LASSO CAN BE MIXED WITH MODOWN, MILOGARD, OR ATRAZINE FOR BROADER SPECTRUM WEED CONTROL. CAN BE APPLIED WITH FLUID FERTILIZER. FOLLOW LABEL DIRECTIONS FOR PROPER COMBINATION RATES.
8. DUAL BICEP MILOCEP	FOLLOW LABEL DIRECTIONS	BICEP = DUAL + ATRAZINE. MILOCEP = DUAL + MILOGARD. THESE HERBICIDES SHOULD BE APPLIED POSTPLANT ONLY TO SORGHUM SEED THAT HAS BEEN TREATED WITH "CONCEP" SEED PROTECTANT. SEED THAT IS NOT PROTECTANT TREATED WILL ALLOW SEVERE CROP INJURY. DUAL, DUAL + ATRAZINE, BICEP, BICEP + ATRAZINE, BICEP + DUAL, AND DUAL + MILOGARD CAN BE APPLIED UP TO 45 DAYS PREPLANT IN A MINIMUM OR NO-TILL FARMING PROGRAM. THIS IS LIMITED TO MEDIUM AND FINE TEXTURED SOILS. THE APPLICATION CAN ALSO BE SPLIT WITH 2/3 PREPLANT AND 1/3 AT PLANTING. PARAQUAT (GRAMOXONE) OR ROUNDUP CAN BE ADDED IF NEEDED. THE SORGHUM SEED MUST BE TREATED WITH A PROTECTANT WHEN USING DUAL OR BICEP.
9. 2,4-D AMINE	0.5 LB	USE 2,4-D ON SORGHUMS ONLY AS AN EMERGENCY TREATMENT WHEN WEEDS CANNOT BE CONTROLLED WITH CULTIVATIONS. SORGHUMS ARE LESS RESISTANT TO 2,4-D THAN CORN AND SOME TEMPORARY INJURY SHOULD BE EXPECTED, ALTHOUGH RECOVERY IS USUALLY COMPLETE. TREAT WHEN THE SORGHUM IS 4 TO 8" HIGH. FORAGE SORGHUMS APPEAR TO BE MORE RESISTANT THAN GRAIN TYPES.
10. BROMINAL/BUCTRIL	FOLLOW LABEL DIRECTIONS	BROMOXYNIL REQUIRES GOOD SPRAY COVERAGE FOR EFFECTIVE WEED CONTROL. WARM TEMPERATURES INCREASE BROMOXYNIL ACTIVITY. PIGWEED IS SOMEWHAT RESISTANT. APPLY WHEN SORGHUM IS BETWEEN THE 2 AND 10 LEAF STAGE, UP TO 12" HIGH.



HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
11. PROWL OR PROWL + ATRAZINE	FOLLOW LABEL DIRECTIONS	THESE HERBICIDES WILL CONTROL LATE SEASON GRASSES AND SOME BROADLEAF WEEDS. APPLY WHEN THE SORGHUM IS AT LEAST 4" HIGH; DROP NOZZLES SHOULD BE USED IF FOLIAGE PREVENTS GOOD SOIL COVERAGE. THE FIELD SHOULD BE FREE OF EMERGED WEEDS PRIOR TO APPLICATION; SOIL INCORPORATE WITH SWEEPS OR A ROLLING CULTIVATOR, MOVING TREATED SOIL INTO THE CROP ROW. NORMALLY, THIS INCORPORATION CAN BE ACCOMPLISHED WITH THE CULTIVATION OPERATION.
12. BANVEL	8 OZ	APPLY AFTER SORGHUM IS IN 3 LEAF STAGE BUT BEFORE 15 INCHES TALL. BEST PERFORMANCE MAKE APPLICATION WHEN SORGHUM IS IN 3-5 LEAF STAGE. USE DROP NOZZLES IF SORGHUM IS 8" HT. OR GREATER. BANVEL MAY BE APPLIED AS AN OVERLAY TO LASSO, ATRAZINE, DUAL, RAMROD, OR MILOGARD.
13. BANVEL + ATRAZINE	8 OZ 0.5 TO 1.25 LBS	CONTROL OF BROADLEAF WEEDS INCLUDING TRIAZINE RESISTANT SPECIES. MAKE APPLICATION WHEN SORGHUM IS 3-8" TALL AND BROADLEAF WEEDS ARE LESS THAN 6 INCHES TALL.

**FIELD BEANS**

1. EPTAM/GENEP	3 LBS	EPTAM/GENEP MUST BE INCORPORATED WITHIN MINUTES AFTER APPLICATION. INCORPORATE 2 TO 4" WITH A DISK, SPIKETooth HARROW, OR ROTARY TILLER. PLANT AS SOON AS POSSIBLE AFTER APPLICATION AND INCORPORATION.
2. TREFLAN OR PROWL	0.5 TO 0.75 LBS 0.5 TO 1.5 LBS	TREFLAN OR PROWL SHOULD BE APPLIED TO WEED FREE SOIL AND THOROUGHLY INCORPORATED 2 TO 4" DEEP SINCE INCORPORATION LESS THAN 2" MAY RESULT IN ERRATIC WEED CONTROL. TOLERANT WEEDS INCLUDE NIGHTSHADE, COCKLEBUR, AND ESTABLISHED PERENNIAL WEEDS. USE THE LOWER RATE ON SANDY OR SANDY LOAM SOILS, AND THE HIGHER RATE ON LOAM SOILS. A TANK MIX OF EPTAM/GENEP + TREFLAN CAN BE USED TO CONTROL NIGHTSHADE IN ADDITION TO ANNUAL GRASSES AND BROADLEAF WEEDS. THE SUGGESTED RATE FOR THIS MIX IS 0.5 LBS TREFLAN + 3 LBS EPTAM/GENEP; THIS SHOULD BE THOROUGHLY INCORPORATED 2 TO 4" DEEP.
3. SONALAN	0.75 TO 1.5 LBS	SONALAN SHOULD BE APPLIED PPI (UP TO 3 WEEKS BEFORE PLANTING), IN EITHER WATER OR LIQUID FERTILIZER. IT SHOULD BE UNIFORMLY INCORPORATED INTO THE TOP 2 TO 3" OF SOIL. SONALAN WILL CONTROL MOST ANNUAL GRASSES AND SOME BROADLEAF WEEDS. IT HAS GIVEN BETTER CONTROL OF NIGHTSHADE SPECIES THAN TREFLAN, BUT GOOD, UNIFORM INCORPORATION (PERHAPS DOUBLE DISK) APPEARS TO BE VERY IMPORTANT. HIGHER RATES ARE RECOMMENDED WHERE NIGHTSHADES ARE A PROBLEM; FOLLOW LABEL DIRECTIONS FOR THE AMOUNT TO USE ON DIFFERENT SOIL TYPES. FOR BROADER SPECTRUM WEED CONTROL, IT CAN BE TANK MIXED WITH EPTAM, LASSO, DUAL, AND AMIBEN. BASAGRAN CAN BE USED POSTEMERGE TO CONTROL LATE EMERGING BROADLEAF WEEDS.
4. LASSO	2.5 - 3.0 LBS	APPLY PREPLANT AND SHALLOW INCORPORATE 2" DEEP. IF DRY CONDITIONS EXIST, IRRIGATE WITHIN 7 DAYS AFTER APPLICATION TO ACTIVATE THE HERBICIDE. LASSO MT FORMULATION MAY BE USED.
5. LASSO + TREFLAN	2.5 - 3.0 LBS PLUS 0.5 LB	APPLY PREPLANT AND SOIL INCORPORATE 2" DEEP WITHIN 8 HOURS OF APPLICATION AND 7 DAYS OF PLANTING. THE LASSO MICROTCH FORMULA CAN BE USED IN DRY BEANS.
6. LASSO + EPTAM/GENEP	2.0 - 3.0 LBS PLUS 1.75 - 2.62 LBS	APPLY THIS TANK MIX FOR CONTROL OF ANNUAL GRASSES AND SOME BROADLEAF WEEDS. THIS COMBINATION IS ESPECIALLY GOOD ON BLACK NIGHTSHADE AND HAIRY NIGHTSHADE. APPLY WITHIN 7 DAYS OF PLANTING AND INCORPORATE 2" DEEP IMMEDIATELY AFTER APPLICATION.
7. DUAL + EPTAM PROWL + EPTAM	1.5 + 2.75 LBS 1.0 + 2.7 LBS	ANY COMBINATION INVOLVING EPTAM MUST BE INCORPORATED 2" DEEP IMMEDIATELY AFTER APPLICATION.
8. DUAL, DUAL + TREFLAN, DUAL + AMIBEN	1.5 TO 3 LBS 1.5 TO 3 LBS 0.5 TO 1 LB 1.5 TO 3 LBS 2 TO 3 LBS	APPLY DUAL PREPLANT AND INCORPORATE, OR APPLY AFTER PLANTING. DUAL/TREFLAN CAN BE APPLIED PPI UP TO 12 DAYS BEFORE PLANTING. FOLLOW LABEL DIRECTIONS. APPLY DUAL/AMIBEN PPI OR AFTER PLANTING. FOLLOW LABEL DIRECTIONS.
9. BASAGRAN	0.75 TO 1 LB	APPLY BASAGRAN EARLY POSTEMERGENCE WHEN WEEDS ARE SMALL AND ACTIVELY GROWING. THE BEANS SHOULD HAVE 1 TO 2 TRIFOLIATE LEAVES. BEANS ARE TOLERANT TO BASAGRAN AFTER THE FIRST TRIFOLIATE LEAF HAS FULLY FORMED. IF THE SOIL IS DRY, IT MAY BE HELPFUL TO IRRIGATE PRIOR TO APPLICATION TO ENSURE ACTIVE WEED GROWTH. DO NOT USE BASAGRAN DURING PERIODS OF COLD WEATHER.

HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
1. RO-NEET	3 TO 4 LBS	RO-NEET MUST BE INCORPORATED 2" IMMEDIATELY AFTER APPLICATION BY DOUBLE DISKING OR BY ROTOTILLING TO INSURE GOOD MIXING WITH THE SOIL. DO NOT USE ON LIGHT SANDY SOILS, AND DO NOT APPLY OR INCORPORATE INTO WET SOIL. ON SANDY LOAM OR LOAM SOILS, USE 3 LBS/ACRE, AND ON CLAY LOAM SOIL USE 4 LBS. THESE RATES ARE ON A TOTAL COVERAGE BASIS; FOR BANDINGS, REDUCE THE AMOUNT USED IN PROPORTION TO THE AREA TREATED. SOME EARLY SUGARBEET INJURY MAY OCCUR, BUT AS LONG AS AN ADEQUATE STAND REMAINS, YIELD WILL NOT BE REDUCED. RO-NEET DOES NOT CONTROL KOCHIA.
2. NORTRON	1.1 TO 3.75 LBS	UNDER FURROW IRRIGATION, INCORPORATE NORTRON THOROUGHLY 1 TO 2" BY POWER INCORPORATION, SUCH AS GROUND DRIVEN ROTARY TILLERS, ROLLING CULTIVATORS, TANDEM DISKS, OR HARROWS. UNDER SPRINKLER IRRIGATION NORTRON CAN BE APPLIED AT PLANTING OR SHORTLY AFTER PLANTING, WITH IRRIGATION FOLLOWING A FEW DAYS AFTER TREATMENT. FOLIAR DEFORMITY MAY OCCUR ON SOME PLANTS, BUT THIS TEMPORARY EFFECT USUALLY DISAPPEARS BEFORE MID-SEASON WITH NO NEGATIVE EFFECT ON YIELD. ONLY SUGARBEETS SHOULD BE REPLANTED TO TREATED AREAS FOR 12 MONTHS FOLLOWING APPLICATION. WHEN OTHER CROPS ARE PLANTED AFTER 12 MONTHS, THE LAND SHOULD BE PLOWED AND THOROUGHLY TILLED.
3. ANTOR	3 TO 4 LBS	UNDER FURROW IRRIGATION, ANTOR SHOULD BE THOROUGHLY INCORPORATED 1 TO 2" BY ROTARY TILLERS OR DISK HARROWS. UNDER SPRINKLER IRRIGATION, ANTOR CAN BE APPLIED AT OR SHORTLY AFTER PLANTING. BEST RESULTS OCCUR WHEN MOISTURE FALLS WITHIN 1 WEEK AFTER APPLICATION. USE 3 LBS ON SANDY OR SANDY LOAM SOILS, AND 4 LBS ON FINER TEXTURED SOILS. FOR BAND APPLICATIONS, REDUCE THE AMOUNT USED IN PROPORTION TO THE AREA TREATED.
4. RO-NEET+ AVADEX	FOLLOW LABEL DIRECTIONS	THIS MIX IS RECOMMENDED FOR FIELDS WHERE THERE IS A WILD OAT PROBLEM, BUT IT ALSO CONTROLS LAMBSQUARTERS AND PURSLANE (PUSLEY) BETTER THAN RO-NEET OR AVADEX ALONE. COMMENTS ABOUT THE APPLICATION AND INCORPORATION OF RO-NEET OR AVADEX ALONE ARE ALSO APPLICABLE TO THE COMBINATION. DO NOT USE ON SANDY SOILS OR SOILS LOW IN ORGANIC MATTER.
5. DALAPON	1.5 TO 5 LBS	DALAPON MAY BE USED ALONE WHERE SMALL SEEDED GRASSES ARE THE MAJOR WEEDS. USE 1.5 TO 3 LBS WHEN SUGARBEETS HAVE LESS THAN 7 TRUE LEAVES. FROM THE 7 LEAF STAGE UNTIL SUGARBEETS ARE 14" TALL, APPLY 3 TO 5 LBS AS A DIRECTED SPRAY TO CONTROL LATE EMERGING GRASSES. CAUTION THIOCARBAMATES LIKE RO-NEET AND AVADEX MAY STRESS SUGARBEETS. THEREFORE, DO NOT USE DALAPON POSTEMERGENCE IF A THIOCARBAMATE HERBICIDE WAS USED PREPLANT, OR IF THE SUGARBEETS ARE GROWING UNDER COOL, WET CONDITIONS.
6. BETANEX	0.75 TO 1.25 LBS	BETANEX MAY INJURE SUGARBEETS UNDER STRESS, FROM RAPID TEMPERATURE CHANGES FROM COOL OVERCAST DAYS TO HOT (85 DEGREES FAHRENHEIT) BRIGHT DAYS; WINDY CONDITIONS OR DROUGHT; USE OF PREPLANT HERBICIDES OR OTHER CHEMICALS; INSECTS, DISEASE INJURY, OR CLOSE CULTIVATION. APPLY AFTER SUGARBEETS HAVE 2 TRUE LEAVES AND BEFORE WEEDS HAVE MORE THAN 4 LEAVES. KOCHIA IS BEST CONTROLLED WHEN IN THE ROSETTE STAGE. THE STAGE OF WEED GROWTH IS CRITICAL. BETANEX IS ALSO LABELED FOR SPLIT LOW RATE APPLICATIONS, THE FIRST OCCURRING WHEN THE WEEDS AND SUGARBEETS ARE JUST EMERGING. FOLLOW LABEL DIRECTIONS.
7. BETAMIX	FOLLOW LABEL DIRECTIONS	BETAMIX IS A 1:1 MIX OF BETANAL AND BETANEX. IT CONTROLS THE SAME WEEDS AS BETANEX, PLUS GREEN AND YELLOW FOXTAIL. BETAMIX AND BETANEX ARE USUALLY APPLIED BEFORE THINNING. A SECOND APPLICATION MAY BE MADE FOR LATE GERMINATING WEEDS. BETAMIX IS ALSO LABELED FOR SPLIT LOW RATE APPLICATIONS, THE FIRST OCCURRING WHEN THE WEEDS AND SUGARBEETS ARE JUST EMERGING.
8. EPTAM/GENEP TREFLAN	3 LBS 0.5 TO 0.75 LBS	THESE HERBICIDES WILL ONLY CONTROL GERMINATING WEEDS; ESTABLISHED WEEDS MUST BE CONTROLLED BY CULTIVATION, HOING, OR SOME PREVIOUS HERBICIDE TREATMENT. APPLY IMMEDIATELY AFTER THINNING AND INCORPORATE 2 TO 4" DEEP. TAKE CARE THAT SOIL SURROUNDS THE SUGARBEET TAPROOT BEFORE HERBICIDE APPLICATION, AND THAT THE INCORPORATION MACHINERY DOES NOT DAMAGE THE SUGARBEET TAPROOTS. TREFLAN WILL NOT CONTROL NIGHTSHADE.
9. POAST	FOLLOW LABEL DIRECTIONS	APPLY POAST TO ACTIVELY GROWING GRASSES WHEN THEY ARE IN THE PROPER GROWTH STAGE AS SPECIFIED ON THE LABEL; THERE SHOULD BE SUFFICIENT GRASS FOLIAGE PRESENT FOR GOOD SPRAY RETENTION. DO NOT APPLY WHEN THE GRASSES ARE UNDER STRESS. ADD A NONPHYTOTOXIC CROP OIL TO THE SPRAY SOLUTION AT 2 PINTS/ACRE. SEE LABEL FOR SPECIFIC GRASS SPECIES CONTROLLED, APPLICATION RATES, AND RESTRICTIONS.



**POTATOES**

READ AND FOLLOW LABEL DIRECTIONS

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HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
1. EPTAM/GENEP	3 TO 6 LBS	EPTAM SHOULD BE APPLIED PPI OR AFTER PLANTING BEFORE CROP AND WEEDS EMERGE. IT CAN ALSO BE APPLIED AT "DRAG-OFF" OR LAYBY TIME. IT MUST BE INCORPORATED 1 TO 2" IMMEDIATELY AFTER APPLICATION WITH A LILLISTON ROLLING CULTIVATOR OR POWER DRIVE EQUIPMENT. GRANULAR FORMULATIONS MAY BE APPLIED ON THE SURFACE OF FRESHLY WORKED SOIL IF FOLLOWED BY 0.5" OF RAIN OR SPRINKLER IRRIGATION.
2. EPTAM/GENEP + SENCOR/LEXONE	3 LBS 0.5 LB	APPLY THIS COMBINATION AT "DRAG-OFF" OR LAYBY TIME AND INCORPORATE 2 TO 3" DEEP IMMEDIATELY AFTER APPLICATION.
3. TREFLAN	0.5 TO 0.75 LB	APPLY AFTER PLANTING UP TO IMMEDIATELY FOLLOWING "DRAG-OFF". TAKE CARE THAT INCORPORATION EQUIPMENT DOES NOT DAMAGE THE SEED PIECES OR ELONGATING SPROUTS.
4. EPTAM/GENEP + TREFLAN	2 LBS 0.5 LB	A COMBINATION OF EPTAM AND TREFLAN CAN BE APPLIED POSTPLANT BUT PRIOR TO WEED EMERGENCE, TO BROADEN THE SPECTRUM OF WEED CONTROL. THOROUGHLY INCORPORATE 2 TO 3" IMMEDIATELY AFTER APPLICATION.
5. DUAL	1.5 TO 3 LBS FOLLOW LABEL DIRECTIONS	APPLY DUAL EITHER BEFORE PLANTING OR ANY TIME AFTER PLANTING TO DRAG-OFF TIME, BEFORE POTATOES EMERGE. A SECOND APPLICATION CAN BE MADE TO CONTROL LATE GERMINATING WEEDS.
6. DUAL + LOROX OR DUAL + SENCOR/LEXONE	FOLLOW LABEL DIRECTIONS	DUAL/LOROX SHOULD BE APPLIED AFTER PLANTING, BEFORE CROP EMERGENCE, OR AFTER DRAG-OFF. DUAL + SENCOR/LEXONE SHOULD BE APPLIED POSTPLANT THROUGH LAST HILLING.
7. LOROX	0.75 TO 1.5 LBS	DO NOT USE IN THE SAN LUIS VALLEY DUE TO RISK OF POTENTIAL INJURY ON SOIL TYPE. DO NOT USE LOROX ON SANDY SOILS OR SOILS WITH LESS THAN 1 % ORGANIC MATTER. MAKE A SINGLE APPLICATION OVER POTATOES PLANTED AT LEAST 2" DEEP. FOR BEST RESULTS, WEEDS SHOULD BE SMALL; APPLY BEFORE GRASSES ARE 2" AND BROADLEAF WEEDS 6" TALL. DO NOT INCORPORATE, AND DO NOT APPLY AFTER POTATOES HAVE EMERGED.
8. SENCOR/LEXONE	0.5 TO 1 LB 0.25 TO 0.5 LB	<b>PREEMERGE:</b> APPLY AFTER PLANTING AND BEFORE CROP EMERGENCE, OR AFTER DRAG-OFF. DO NOT INCORPORATE. USE LOWER RATE ON SANDY SOILS. <b>POSTEMERGE:</b> APPLY OVER THE TOP OF POTATOES WHEN THE POTATOES ARE 2 TO 4" TALL, AND WEEDS ARE LESS THAN 1" TALL, BY JUNE 30 AT THE LATEST. A SPLIT PREEMERGE AND POSTEMERGENCE APPLICATION MAY BE MADE. DO NOT REPLANT TO CROPS OTHER THAN POTATOES FOR 1 YEAR AFTER APPLICATION. DO NOT MAKE POSTEMERGENCE APPLICATION OF SENCOR/LEXONE TO THE FOLLOWING VARIETIES: ATLANTIC, CENTENNIAL, HI-PLAINS, OR WHITE ROSE. IT CAN BE APPLIED THROUGH CENTER PIVOT IRRIGATION SYSTEMS AS A SINGLE OR SPLIT APPLICATION. FOLLOW LABEL DIRECTIONS FOR INJECTION.
9. PROWL OR PROWL + SENCOR/LEXONE OR PROWL + EPTAM/GENEP	FOLLOW LABEL DIRECTIONS FOR RATES & MIXING	PROWL CAN BE APPLIED PPI OR POSTEMERGE, ALONE OR IN COMBINATIONS. IT MAY BE APPLIED IN WATER OR LIQUID FERTILIZER. FOR PREEMERGE INCORPORATED, APPLY AND INCORPORATE 1 TO 2" AFTER PLANTING, BUT BEFORE THE POTATOES AND WEEDS EMERGE. PROWL MAY BE APPLIED THROUGH SPRINKLER IRRIGATION SYSTEMS. FOR PREEMERGE USE, APPLY PLANTING, UP TO DRAG-OFF, BEFORE POTATOES AND WEEDS EMERGE. ADEQUATE RAINFALL OR IRRIGATION SHOULD OCCUR WITHIN 7 DAYS AFTER APPLICATION.
10. PARAQUAT (GRAMOXONE) OR DIQUAT	0.5 TO 1 LB 1 PINT	APPLY IN 30 TO 100 GPA OF WATER WITH GROUND EQUIPMENT, OR 5 TO 10 GPA WITH AERIAL EQUIPMENT TO OBTAIN GOOD COVERAGE. ADD 8 OZS OF X-77 SPREADER PER 100 GALLONS SPRAY SOLUTION. FOLLOW LABEL DIRECTIONS FOR RATE VARIATIONS AND TIMES OF APPLICATIONS.
<b>PREHARVEST VINE DESSICATION</b>		
11. EVIK	2 TO 2.4 LBS	APPLY TO MATURE GREEN VINES IN AT LEAST 100 GPA TO COMPLETELY COVER ALL VINE MATERIAL. FULL VINE KILL MAY NOT OCCUR UNTIL AFTER 14 TO 17 DAYS. COLD WEATHER CAN DELAY VINE KILL.
<b>PREHARVEST VINE DESSICATION</b>		

**SUNFLOWERS**

1. TREFLAN	0.5 TO 0.75 LBS	APPLY PPI ACCORDING TO LABEL DIRECTIONS.
2. PROWL	0.5 TO 1.5 LBS	APPLY PROWL IN WATER OR LIQUID FERTILIZER, AND SOIL INCORPORATE WITHIN 7 DAYS AFTER APPLICATION.

HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
3. LASSO	2 TO 3 LBS	LASSO CAN BE APPLIED PPI WITHIN 7 DAYS PRIOR TO PLANTING WITH A SHALLOW INCORPORATION 1 TO 2" DEEP, OR IT CAN BE APPLIED POSTPLANT (WITHIN 5 DAYS AFTER LAST PREPLANT TILLAGE) BEFORE CROP AND WEEDS EMERGE. IT CAN BE APPLIED WITH WATER OR LIQUID FERTILIZER.
4. LASSO + AMIBEN	2.5 + 3 LBS	THIS MIX CAN BE APPLIED PPI OR POSTPLANT, BEFORE CROP AND WEEDS EMERGE.
5. PROWL + AMIBEN	1 + 3 LBS	THIS MIX IS LABELED FOR USE IN SUNFLOWERS. SEE LABEL DIRECTIONS.
6. PARAQUAT (GRAMOXONE)	0.25 TO 0.5 LB	FOR DESICCATION OF SUNFLOWER PLANTS AND WEEDS TO FACILITATE HARVESTING. FOLLOW LABEL DIRECTIONS. <u>THIS IS A RESTRICTED USE HERBICIDE.</u>

**WHEAT AND BARLEY**

1. 2,4-D	0.5 TO 1 LB	SPRAY WHEAT OR BARLEY IN THE SPRING AFTER TILLING AND AS NEAR THE 5 LEAF STAGE AS POSSIBLE, BUT BEFORE THE BOOT OR FLOWERING STAGE. USE THE HIGHER RATE IF GROWING CONDITIONS ARE UNFAVORABLE, OR IF WEEDS ARE NEARING MATURITY. TANSY AND BLUE MUSTARD HAVE BEEN DIFFICULT TO CONTROL WITH 2,4-D. TREAT WHEN THESE PLANTS ARE 2 TO 3" TALL. LESS THAN 0.75 LB 2,4-D WILL NOT KILL CANADA THISTLE OR OTHER PERENNIAL WEEDS. THE HIGHER RATES REQUIRED FOR PERENNIAL WEED CONTROL WILL NOT SERIOUSLY INJURE WHEAT OR BARLEY <u>IF APPLIED AT THE RIGHT CROP STAGE OF GROWTH.</u> LOWER RATES MAY TEMPORARILY RETARD THE GROWTH OF PERENNIAL WEEDS, BUT LATER THEY WILL MATURE AND PRODUCE VIABLE SEED.
2. BROMINAL/BUCTRIL (BROMOXYNIL)	0.25 TO 0.5 LB	BROMOXYNIL IS A CONTACT HERBICIDE, AND APPEARS TO BE SUPERIOR TO 2,4-D FOR THE CONTROL OF SEVERAL WINTER ANNUAL WEEDS, INCLUDING TANSY AND BLUE MUSTARD; IT WILL ALSO CONTROL SUNFLOWERS AND WILD BUCKWHEAT. BROMOXYNIL CAN BE USED IN THE FALL OR EARLY SPRING ON WHEAT OR BARLEY, WITHOUT THE CROP INJURY ASSOCIATED WITH 2,4-D.
3. BANVEL + 2,4-D MCPA, BROMINAL/ BUCTRIL, OR GLEAN	FOLLOW LABEL DIRECTIONS	BANVEL WILL CONTROL WILD BUCKWHEAT, KOCHIA, NIGHTSHADE SPECIES, AND SEVERAL OTHER HARD-TO-KILL BROADLEAF WEEDS IN SMALL GRAINS THAT ARE SEMI-RESISTANT TO 2,4-D. ON FALL SEEDED WHEAT AND BARLEY, IT SHOULD BE APPLIED IN THE SPRING IMMEDIATELY AFTER WINTER DORMANCY BREAKS, BEFORE THE PLANT BEGINS TO JOINT. ON SPRING SEEDED WHEAT, APPLY UP TO 5 LEAF STAGE. ON SPRING SEEDED BARLEY, APPLY UP TO THE 2 TO 3 LEAF STAGE. <u>TIMING IS CRITICAL.</u> WITH AERIAL APPLICATIONS, APPLY 1 TO 5 GPA OF SPRAY SOLUTION, AND 3 TO 40 GPA WITH GROUND EQUIPMENT. APPLY WHEN THE WEEDS ARE ACTIVELY GROWING AND IN THE EARLY SEEDLING STAGE. COMBINATIONS OF BANVEL + 2,4-D OR BROMOXYNIL ON SPRING SEEDED BARLEY. DO NOT USE DICAMBA + BROMOXYNIL ON FALL SEEDED BARLEY.
4. GLEAN	0.25 TO 0.375 OZ FOLLOW LABEL DIRECTIONS	NOTICE THIS PRODUCT IS APPLIED IN OUNCES NOT POUNDS PER ACRE. GLEAN CAN BE USED TO CONTROL ANNUAL BROADLEAF WEEDS IN WHEAT AND BARLEY. DO NOT USE ON SOILS WITH pH ABOVE 7.9. IT MAY BE APPLIED IN THE FALL OR SPRING, PREEMERGE OR POSTEMERGE TO SMALL, ACTIVELY GROWING WEEDS. WEEDS MAY TAKE 1 TO 2 WEEKS TO SHOW SYMPTOMS OF TREATMENT AND DIE. GLEAN CAN PERSIST IN THE SOIL FOR UP TO 4 YEARS SO IT SHOULD NOT BE USED WHERE THE FIELD WILL BE PLANTED TO A CROP OTHER THAN WHEAT OR BARLEY. REFER TO LABEL FOR SPECIFIC CROP ROTATIONAL INTERVALS. SPRING OATS CAN BE PLANTED 10 MONTHS AFTER APPLICATIONS AT 1/6 TO 1/2 OUNCE OF PRODUCT PER ACRE. THE ADDITION OF A SURFACTANT AT 0.5% V/V IS RECOMMENDED. GLEAN PROVIDES GOOD CONTROL OF CANADA THISTLE WHEN USED AT .375 OZ ai/A.
5. ALLY	0.06 OZ	NOTE THIS PRODUCT IS APPLIED IN <u>OUNCES PER ACRE</u> , NOT POUNDS. POSTEMERGENCE APPLICATIONS TO THE MAIN FLUSH OF BROADLEAF WEEDS WHEN THEY ARE ACTIVELY GROWING. USE A GOOD QUALITY 80% ACTIVE SURFACTANT AT .25 TO .5% v/v. A TANK MIX OF SUITABLE COMPANION HERBICIDES, LIKE 2,4-D, IS RECOMMENDED WHEN THE WEEDS ARE STRESSED. SOIL RESIDUES CAN INJURE CROPS OTHER THAN CEREALS SO REFER TO LABEL FOR SPECIFIC INFORMATION.
6. LANDMASTER	40 - 50 OZ PER ACRE	MAY BE APPLIED FOR THE CONTROL OR SUPPRESSION OF EMERGED WEEDS PRIOR TO PLANTING OR EMERGENCE OF WHEAT, BARLEY, OATS, RYE OR SORGHUM.
7. FARGO	1.25 LBS	FARGO IS USED FOR WILD OAT CONTROL IN BARLEY AND WHEAT. IT MAY BE APPLIED UP TO 5 DAYS AFTER SEEDING, OR BEFORE SEEDING. IF APPLIED AFTER SEEDING, SEED 2 TO 3" DEEP, THEN APPLY THE HERBICIDE AND SOIL INCORPORATE IN THE SURFACE SOIL WITH TWO HARROWINGS AT RIGHT ANGLES, AS SOON AS POSSIBLE AFTER SPRAYING. IF APPLIED BEFORE SEEDING, SOIL INCORPORATE WITH A DISK TYPE IMPLEMENT TO A DEPTH OF 2" OR LESS, FOLLOWED BY A HARROW.



HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
8. AVENGE	0.625 TO 1 LB	AVENGE IS A SELECTIVE HERBICIDE FOR POSTEMERGENCE CONTROL OF WILD OATS IN BARLEY AND FALL SEEDED WHEAT. INJURY CAN OCCUR TO SOME WHEAT VARIETIES; SEE THE LABEL. APPLY AVENGE OR AVENGE TANK MIX COMBINATIONS WHEN THE MAJORITY OF WILD OAT PLANTS ARE IN THE 3 TO 5 LEAF STAGE OF GROWTH. PROPER TIMING IS VERY IMPORTANT. FOR BROADLEAF WEED CONTROL, AVENGE CAN BE TANK MIXED WITH 2,4-D AMINE OR ESTER FORMULATIONS, BROMOXYNIL, OR MCPA AMINE PLUS BROMOXYNIL. FOLLOW LABEL DIRECTIONS FOR MIXING.
9. HOELON	0.75 TO 1.25 LBS	HOELON IS A <u>RESTRICTED USE PESTICIDE</u> . APPLY HOELON WHEN THE MAJORITY OF ANNUAL GRASS WEEDS ARE IN THE 1 TO 3 LEAF STAGE. THE STAGE OF GROWTH IS IMPORTANT, AS WELL AS THE DENSITY OF INFESTATION. USE THE LOWER RATE ONLY WHEN WILD OATS OR ANNUAL GRASSES ARE IN THE 1 TO 2 LEAF STAGE AND GROWING CONDITIONS ARE OPTIMUM. THE HIGHER RATES SHOULD BE USED WHEN THE MAJORITY OF GRASS WEEDS ARE LARGER, OR IF THEY ARE GROWING UNDER DROUGHT STRESS. HOELON CAN BE TANK MIXED WITH BROMOXYNIL TO ADD BROADLEAF WEED CONTROL. FOLLOW LABEL DIRECTIONS FOR MIXING.
<b>OATS</b>		
1. 2,4-D	0.5 TO 0.75 LB	SOME OAT INJURY CAN BE EXPECTED FROM SPRAYING WITH 2,4-D AT ANY TIME. EARLY GROWTH STAGES ARE ESPECIALLY SENSITIVE. HOWEVER, WEED CONTROL GENERALLY MORE THAN OFFSETS THE LOSS RESULTING FROM 2,4-D INJURY. APPLY 2,4-D NEAR THE EARLY BOOT STAGE.
2. BANVEL + MCPA	FOLLOW LABEL DIRECTIONS	APPLY AS A TANK MIX BEFORE THE OATS ARE IN THE 5 LEAF STAGE, AND THE WEEDS ARE SMALL. <u>DO NOT TANK MIX BANVEL WITH 2,4-D ON OATS.</u>
3. MCPA AMINE OR ESTER	0.75 TO 1 LB	OATS ARE MORE TOLERANT OF MCPA BUT WEED CONTROL IS LESS EFFECTIVE THAN WITH 2,4-D ON SOME WEEDS. APPLY MCPA ANY TIME FOLLOWING COMPLETE TILLING. SEED WHEAT OR BARLEY ON FIELDS KNOWN TO BE ESPECIALLY WEEDY.
<b>PROSO MILLET</b>		
1. ATRAZINE	0.5 TO 2 LBS	THIS IS A SUPPLEMENTAL LABEL FOR USE IN COLORADO. USE PREPLANT OR PREEMERGE. USE LOWER RATES ON SOILS WITH LESS THAN 2% ORGANIC MATTER, AND HIGHER RATES ON SOILS WITH MORE THAN 2% ORGANIC MATTER. BE AWARE OF ATRAZINE CARRY OVER POTENTIAL WHEN PLANNING TO ROTATE TO OTHER CROPS.
<b>CHEMICAL OR REDUCED TILLAGE</b>		
<i>NOTICE: EVERYTHING IN THIS SECTION IS SUGGESTED ON A TRIAL BASIS ONLY. WE DO NOT HAVE ENOUGH RESEARCH DATA TO MAKE DEFINITIVE RECOMMENDATIONS; RATHER THIS INFORMATION IS INCLUDED TO ENCOURAGE EACH FARMER TO TRY REDUCED TILLAGE WHERE POSSIBLE ON A PORTION OF HIS LAND. WE WILL SEE MORE REDUCED TILLAGE ACTIVITY IN THE FUTURE.</i>		
1. ATRAZINE	0.5 TO 1 LB	APPLY TO STUBBLE GROUND AS SOON AS POSSIBLE AFTER WHEAT HARVEST. TANK MIX WITH PARAQUAT (GRAMOXONE) TO CONTROL EMERGED WEEDS. APPLY BY AIR OR WITH GROUND EQUIPMENT. TILL BEFORE PLANTING TO PROVIDE A GOOD SEEDBED.
2. GLEAN	0.33 TO 0.5 OZ	<i>NOTICE: THIS HERBICIDE IS APPLIED IN OUNCES PER ACRE. APPLY TO STUBBLE AS SOON AS POSSIBLE AFTER HARVEST. IF WEEDS ARE PRESENT, USE A SUITABLE "BURN-DOWN" HERBICIDE LIKE PARAQUAT (GRAMOXONE), 2,4-D OR LANDMASTER. WEEDS DIE SLOWLY. GLEAN MAY PERSIST IN THE SOIL FOR SEVERAL YEARS; DO NOT PLANT CROPS OTHER THAN WHEAT OR BARLEY UNTIL A TEST STRIP SHOWS THE SENSITIVE CROP WILL SURVIVE TO MATURITY. SPRING OATS CAN BE PLANTED 10 MONTHS AFTER APPLICATION OF 1/6 TO 0.5 OZ PRODUCT PER ACRE. DO NOT USE ON SOILS WITH A pH ABOVE 7.9. USE A SURFACTANT AT 0.5% V/V.</i>
3. ALLY	0.6 OZ	NOTE THIS PRODUCT IS APPLIED IN <u>OUNCES PER ACRE</u> NOT POUNDS. APPLY POST HARVEST DURING THE SPRING DURING FALLOW AND CEREAL, DRYLAND GRAIN SORGHUM, CORN OR SUNFLOWER STUBBLE. COMBINATIONS WITH "BURN-DOWN" HERBICIDES OR RESIDUAL HERBICIDES CAN BE USEFUL. ALWAYS INCLUDE A GOOD QUALITY SURFACTANT AT .25 - .5% v/v: WEEDS SHOULD BE ACTIVELY GROWING. SOIL RESIDUES CAN INJURE CROPS OTHER THAN CEREALS SO REFER TO THE LABEL FOR SPECIFIC INFORMATION.
3. IGRAN	1.6 TO 2 LBS	APPLY IN THE FALL AS A TANK MIX WITH ATRAZINE, OR IN THE SPRING AFTER A FALL APPLICATION OF ATRAZINE. APPLY WITH AIR OR GROUND EQUIPMENT. IGRAN CAN ALSO BE APPLIED ALONE IN THE FALL OR SPRING, OR IT CAN BE APPLIED WITH PARAQUAT (GRAMOXONE) (1 TO 2 PINTS), 2,4-D (0.5 TO 1 LB) OR WITH SENCOR (0.38 TO 0.5 LB). IS AVAILABLE AS AN 80 W AND 4 L.

HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
4. BLADEX EXTRAZINE	1.6 TO 2 LBS FOLLOW LABEL DIRECTIONS	APPLY BLADEX ALONE IN THE SPRING OR TANK MIXED WITH ATRAZINE FOR FALL APPLICATIONS. DO NOT PLANT CROPS LESS THAN 120 DAYS AFTER A SPRING OR SUMMER APPLICATION, OR 9 MONTHS AFTER A FALL APPLICATION. ADD PARAQUAT (GRAMOXONE) TO CONTROL EMERGED WEEDS.
5. SENCOR/LEXONE	0.375 TO 0.75 LB FOLLOW LABEL DIRECTIONS	SENCOR/LEXONE MAY BE USED TO CONTROL WEEDS DURING PART OF THE FALLOW PERIOD AFTER FALL HARVEST OR IN THE SPRING. MECHANICAL TILLAGE OR USE OF A CONTACT HERBICIDE MAY BE NEEDED TO CONTROL LATE SEASON WEEDS. IF WEEDS ARE PRESENT, APPLY WITH PARAQUAT (GRAMOXONE) OR ROUNDUP. FOR FALL APPLICATIONS, USE 0.625 TO 0.75 LB, AND FOR SPRING APPLICATIONS USE 0.375 TO 0.5 LB.
6. BANVEL OR BANVEL + ROUNDUP	0.8 TO 16 OZ + 12 TO 16 OZ	APPLY DURING FALLOW PERIODS OVER ACTIVELY GROWING BROADLEAF WEEDS. TO CONTROL GRASSES, TANK MIX WITH ROUNDUP. ADD 0.5% BY VOLUME OF X-77 SURFACTANT OR OTHER NON-IONIC SURFACTANT. APPLY BEFORE WEEDS ARE 6" HIGH.
7. PARAQUAT (GRAMOXONE)	0.25 TO 0.5 LB	PARAQUAT (GRAMOXONE) IS A RESTRICTED USE HERBICIDE. USE FOR DESSICATION OF EMERGED ANNUAL BROADLEAF AND GRASS WEEDS DURING FALLOW PERIODS. FOR AERIAL APPLICATIONS, USE 5 TO 10 GPA; FOR GROUND APPLICATIONS USE 20 TO 40 GPA. ADD X-77 SURFACTANT AT 1 QT/100 GALLONS SPRAY.
8. KERB	0.25 TO 0.38 LB	KERB WILL CONTROL CERTAIN WINTER ANNUAL GRASSES AND VOLUNTEER GRAINS (SEE LABEL FOR LISTINGS). IT IS A SOIL ACTIVE HERBICIDE WHICH NEEDS ADEQUATE MOISTURE FOR ACTIVATION. APPLY BETWEEN MID-OCTOBER AND MID-DECEMBER PRIOR TO SOIL FREEZE-UP. WINTER WHEAT, BARLEY, AND OATS CAN BE PLANTED BACK 9 MONTHS AFTER APPLICATION. KERB IS A RESTRICTED USE HERBICIDE.
9. ROUNDUP	12-16 OZ/ACRE FOLLOW LABEL DIRECTIONS	APPLY TO WEEDS NO TALLER THAN 6-12 INCHES. APPLY IN 3-10 GAL. OF WATER PER ACRE FOR THE CONTROL OR SUPPRESSION OF ANNUAL WEEDS PRIOR TO CROP EMERGENCE. TANK MIXTURES WITH BANVEL, 2,4-D AMINE AND GLEAN ARE LABELLED. THE ADDITION OF AMMONIUM SULFATE MAY INCREASE PERFORMANCE.
10. LANDMASTER	40-54 OZ/ACRE	MAY BE APPLIED FOR CONTROL OR SUPPRESSION OF EMERGED WEEDS PRIOR TO PLANTING OR EMERGENCE OF WHEAT, BARLEY, OATS, RYE, OR SORGHUM. TANK MIXES WITH ATRAZINE, BLADEX, OR GLEAN ARE LABELLED. APPLY IN 3-10 GAL. OF WATER PER ACRE. MAXIMUM WEED HEIGHT IS 6-12 INCHES. THE ADDITION OF AMMONIUM SULFATE MAY INCREASE PERFORMANCE.
11. BANVEL + LANDMASTER	4 TO 16 OZ PLUS 40 TO 54 OZ	USE 4-6 OZ. OF BANVEL FOR IMPROVED CONTROL OF HARD TO KILL ANNUAL BROADLEAF WEEDS. USE 16 OZ. OF BANVEL FOR IMPROVED CONTROL OF HARD TO CONTROL PRRRRNTAL WEEDS.

**AQUATIC AND DITCH BANK WEEDS**

AQUATIC PLANT GROWTH CAN BE DIVIDED INTO THREE MAJOR GROUPINGS. (1) EMERSED: THESE WEEDS ARE USUALLY ROOTED IN SHALLOW WATER BUT THE LEAVES FLOAT ON OR EXTEND ABOVE THE SURFACE. MOST OF THE PLANT GROWS ABOVE WATER. EXAMPLES ARE CATTAIL, TULE, SEDGES, AND WATER LILY. SUCH PLANTS USUALLY START CLOSE TO SHORE AND WORK OUT TOWARD DEEPER WATER. (2) SUBMERSED: THESE ARE ROOTED WEEDS THAT MAKE MOST OF THEIR GROWTH UNDER WATER. EXAMPLES ARE COONTAIL MOSS, WATER MILFOIL AND SAGO PONDWEED, ALSO CALLED HORSETAIL MOSS. THESE ARE FREQUENTLY REFERRED TO AS JUST WATER WEEDS. THEY CAUSE TROUBLE BY REDUCING FLOW IN IRRIGATION DITCHES, ETC. (3) ALGAE: THESE ARE FREE FLOATING OR ATTACHED PLANTS THAT APPEAR AS SCUMS OR FLOATING MATS. THEY DO NOT HAVE ROOTS OR LEAVES. THEY ARE PRIMITIVE PLANTS WHICH REPRODUCE BY SPORES. WHEN THEY BECOME ABUNDANT, THEY GIVE WATER A SOUPY GREEN COLOR OFTEN CALLED "WATER BLOOM."

**EMERSED AQUATIC WEEDS:** CATTAILS, TULES, REED CANARY GRASS, OR JOHNSONGRASS

1. DALAPON (DOWPON M)	13.5 TO 30 LBS + SURFACTANT 2-4 PINTS/ 100 GALS	GOOD SPRAY COVERAGE OF HEALTHY FOLIAGE IS ESSENTIAL; RETREATMENT MAY BE NECESSARY. WITH SPRAY BOOM, USE AT LEAST 100 GPA. WITH HAND GUN USE UP TO 300 GPA. SPRAY CATTAILS WHEN 2 TO 3 FT TALL WHEN SEED HEADS ARE FULLY DEVELOPED, ABOUT 3 WEEKS BEFORE FROST. BEGIN SPRAYING DOWNSTREAM AND WORK UP. MINIMIZE SPRAY IN THE WATER. GRAZING MAY NOT NEED TO BE DISCONTINUED; FOLLOW LABEL DIRECTIONS.
2. GLYPHOSATE (RODEO)	0.75 TO 1.5 SOLUTION PLUS 0.5% APPROVED NON-IONIC SURFACTANT	RODEO IS REGISTERED FOR USE AS AN AQUATIC HERBICIDE AND CAN BE APPLIED DIRECTLY INTO WATER FOR CONTROL OF EMERSED AQUATIC WEEDS. APPROVED SURFACTANTS INCLUDE AGRI-DEX, INDUCE, LI-700, SPREAD 200, AND WIDESPREAD. THERE IS NO RESTRICTION ON THE USE OF TREATED WATER FOR IRRIGATION, RECREATION, OR DOMESTIC PURPOSES. CONSULT LABEL FOR ADDITIONAL INFORMATION. NOTE: DO NOT APPLY THIS PRODUCT WITHIN 1/2 MILE UPSTREAM OF POTABLE WATER INTAKES.
3. DIQUAT	1.0 GAL/100 GALS WATER PLUS NON-IONIC SURFACTANT	FOR TOP KILL OF CATTAILS, APPLY DIQUAT IN 100 GALS OF WATER PLUS X-77 SPREADER. COMPLETE PLANT COVERAGE IS IMPORTANT. REPEAT TREATMENT AS NECESSARY TO CONTROL RE-GROWTH. APPLY BEFORE FLOWERING.



HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
<b>SUBMERSED AQUATIC WEEDS: FLOWING WATER (AMERICAN PONDWEED, SAGO PONDWEED, WATERWEED AND OTHER SUBMERSED AQUATIC WEEDS - FREQUENTLY CALLED MOSSES OR PONDWEEDS)</b>		
1. XYLENE + EMULSIFIER 1.5% BY VOLUME	4 GALS PER SEC FT OF WATER FOR A DISTANCE OF 2 TO 4 MILES INJECTED OVER A 30 TO 35 MINUTE PERIOD	TIMELY APPLICATION IS ESSENTIAL FOR GOOD CONTROL. APPLY WHEN THE ROOTED PONDWEEDS HAVE REACHED A GROWTH OF 4 TO 6 INCHES. A GARDEN RAKE OR SIMILAR OBJECT CAN BE USED TO CHECK BOTTOM MUD FOR NEW GROWTH. RETREATMENT SHOULD THEN BE MADE EACH 2 WEEKS DURING THE IRRIGATION SEASON. EACH CHANNEL IS DIFFERENT IN ITS ECOLOGY AND GROWTH RATE OF ROOTED AQUATIC WEEDS. THEREFORE, A TREATMENT RATE OF XYLENE AS INDICATED CAN BE USED AND RETREATMENT CAN BE MADE WHERE THE EMULSION STARTS TO TURN A BLUE-GRAY COLOR. THIS IS USUALLY BETWEEN 3 TO 4 MILES, HOWEVER, AFTER EACH FULL TREATMENT OF THE CHANNEL IS MADE, OBSERVATIONS SHOULD BE MADE TO DETERMINE EFFECTIVENESS. FOR DITCHES LONGER THAN 3 TO 4 MILES, A BOOSTER APPLICATION SHOULD BE MADE USING ONE-HALF THE RATE (2 GALS PER SECOND FOOT).
2. XYLENE + EMULSIFIER 1.5% BY VOLUME	8 TO 10 GALS PER SEC FT OF WATER FOR A DISTANCE OF 2 TO 4 MILES, INJECTED OVER A 30 TO 40 MINUTE PERIOD	LATER APPLICATION PER SEASON USUALLY ENOUGH. APPLY WHEN WEEDS FIRST APPEAR TO BE IMPEDING WATER FLOW, BUT BEFORE THEY REACH THE WATER SURFACE. WEEDS ARE SOMEWHAT MORE SUSCEPTIBLE AT AN EARLIER STAGE OF GROWTH, BUT RECOVERY MAY BE MORE RAPID. NORMAL WATER CARRYING CAPACITY OF THE DITCH MAY BE REDUCED 30 TO 40 PERCENT, BUT ENOUGH WATER SHOULD BE LEFT IN THE DITCH TO COVER THE WEEDS. BEST RESULTS HAVE BEEN OBTAINED WHEN WATER WAS FLOWING 3/4 TO 1 1/4 FT PER SECOND. FOR DITCHES LONGER THAN 4 MILES, A BOOSTER APPLICATION SHOULD BE MADE USING ONE-HALF THE RATE (4 OR 5 GALS PER SEC FT). APPLY WITH A POWER SPRAYER WITH SUFFICIENT VOLUME TO DELIVER THE AMOUNT OF CHEMICAL IN THE PERIOD OF TIME SPECIFIED AND MAINTAIN 40 TO 50 LBS PRESSURE. A BOOM AND NOZZLE ARRANGEMENT PLACED UNDER THE WATER SURFACE TO GET EVEN DISTRIBUTION OVER THE CROSS-SECTION OF THE DITCH IS DESIRABLE. RESULTS MAY ALSO BE IMPROVED IF APPLICATIONS CAN BE MADE AT DROPS OR PLACES WHERE THE WATER IS TURBULENT. READ AND FOLLOW LABEL DIRECTIONS. FISH AND OTHER MARINE LIFE ARE KILLED BY CONTACT WITH TREATED WATER, BUT RESIDUAL EFFECT OF THE MATERIAL IS NOT LONG LASTING. TREATED WATER SHOULD NOT BE DUMPED INTO NATURAL STREAMS OR OTHER WATERS WHERE IT IS DESIRABLE TO PRESERVE FISH. TREATED WATER CAN BE USED ON ALFALFA FIELDS OR PASTURES, PROVIDED THEY ARE NOT IN THE SEEDLING STAGE. HIGHER CONCENTRATIONS OF SOLVENTS THAN THOSE COMMONLY USED FOR WATER WEED CONTROL USUALLY DOES NOT AFFECT FIELD OR GARDEN CROPS. XYLENE TREATED WATER IS VERY DISTASTEFUL TO LIVESTOCK, SO USUALLY STOCK WILL NOT DRINK IT. NO REPORTS OF ILL EFFECTS OF TREATED WATER TO LIVESTOCK HAVE BEEN RECEIVED. WHEN BUYING LARGE QUANTITIES OF XYLENE SOLVENTS, IT MAY BE LESS EXPENSIVE TO BUY THE XYLENE AND EMULSIFIERS SEPARATELY. 1.5% EMULSIFIER IS RECOMMENDED FOR MOST WATERS.
3. ACROLEIN (MAGNACIDE H)	FOLLOW LABEL DIRECTIONS	ACROLEIN IS A WATER SOLUBLE MATERIAL FOR CONTROL OF SUBMERGED AND FLOATING WEEDS AND ALGAE IN IRRIGATION CANALS. THIS MATERIAL IS SOLD ONLY TO APPLICATORS LICENSED BY MAGNA CORPORATION AND SHOULD BE APPLIED IN ACCORDANCE WITH DIRECTIONS IN MAGNA BULLETIN ACD 65-153 UNDER THE SUPERVISION OF THE TRAINED PERSONNEL OR LICENSED APPLICATORS. DO NOT USE WHERE WATERS WILL EITHER FLOW INTO OR BE TRANSFERRED VIA UNDERGROUND STREAMS TO POTENTIAL SOURCES OF DRINKING WATER. DO NOT RELEASE TREATED WATER FOR 6 DAYS AFTER APPLICATION INTO ANY FISH BEARING WATERS OR WHERE IT WILL DRAIN INTO THEM. READ LABEL FOR OTHER PRECAUTIONS. IT IS EXTREMELY FLAMMABLE; IT IS POISONOUS BY INHALATION, SKIN CONTACT, OR SWALLOWING. LD 50 OF APPROXIMATELY 50 MG/KG. THIS IS A RESTRICTED USE HERBICIDE.
4. COPPER SULFATE (SNOW CRYSTALS, LARGE CRYSTALS, GRANULAR CRYSTALS)	0.1 TO 2.4 LBS PER CFS PER DAY	TO CONTROL ALGAE AND LEAFY AND SAGO PONDWEEDS IN IRRIGATION CANALS, USE THE CONTINUOUS APPLICATION METHOD TO SUPPLY COPPER SULFATE. FOR ALGAE CONTROL, BEGIN APPLICATION WHEN WATER IS FIRST TURNED INTO THE SYSTEM AND CONTINUE THROUGHOUT THE IRRIGATION SEASON APPLYING 0.1 TO 0.2 LBS PER CFS PER DAY. FOLLOW LABEL DIRECTIONS FOR DIFFERENT SIZE CRYSTALS. THE DECAY OF DEAD PLANT MATERIAL CAN DEplete THE OXYGEN IN WATER AND CAUSE FISH SUFFOCATION. <b>SLUG TREATMENT:</b> COPPER SULFATE CRYSTALS MAY BE DUMPED DIRECTLY INTO THE WATER FROM BAGS, OR FROM DUMP TRUCKS IN THE CASE OF LARGE CANALS. THE DISSOLUTION RATE VARIES WITH CRYSTAL SIZES. DUMP AT THE RATE OF 0.25 TO 1.0 LB COPPER SULFATE PER CFS PER TREATMENT. REPEAT ABOUT EVERY 2 WEEKS AS NECESSARY. FOLLOW LABEL DIRECTIONS.
<b>SUBMERSED AQUATIC WEEDS: STATIC WATER OR PONDS (AMERICAN PONDWEED, SAGO PONDWEED, WATERWEED AND OTHER SUBMERSED SPECIES)</b>		
1. ENDOTHAL (AQUATHAL, HYDROTHAL-191)	RATES VARY FOR SPECIFIC WEEDS - FOLLOW LABEL DIRECTIONS	ENDOTHAL IS EFFECTIVE AGAINST A BROAD RANGE OF SUBMERSED AQUATIC PLANTS WITH A MARGIN OF SAFETY TO FISH. CONCENTRATIONS OF 0.5 TO 5 PPM ARE GENERALLY REQUIRED FOR AQUATIC WEED CONTROL, WHEREAS, SOME FISH SPECIES ARE TOLERANT UP TO 100 PPM OR OVER. ENDOTHAL IS A CONTACT HERBICIDE, THEREFORE, DO NOT APPLY BEFORE WEEDS ARE PRESENT, BUT AS EARLY AS POSSIBLE AFTER WEEDS ARE PRESENT. WATER TEMPERATURE SHOULD BE 65 DEGREES F OR ABOVE. IT IS SUGGESTED FOR USE IN STATIC WATER. ENDOTHAL IS AVAILABLE IN LIQUID OR GRANULAR FORM.

HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
		IF AN ENTIRE POND IS TREATED AT ONE TIME, DECAY OF WEEDS MAY REDUCE THE OXYGEN LEVEL CAUSING FISH TO SUFFOCATE. WATER CONTAINING HEAVY INFESTATIONS SHOULD BE TREATED IN SECTIONS, 5 TO 7 DAYS APART. NORMALLY TREATED AREAS WILL REMAIN FREE FOR AN ENTIRE SEASON. APPLY ENDOTHAL ON THE WATER SURFACE, OR INJECT IT BELOW THE SURFACE, DEPENDING WHETHER WEEDS ARE FLOATING OR SUBMERGED. IT SHOULD BE APPLIED EVENLY. IT MAY BE APPLIED DIRECTLY FROM THE CONTAINER, OR DILUTED. GOOD CONTACT COVERING IS IMPORTANT. BASED ON CURRENT REGISTRATIONS, ENDOTHAL TREATED WATER CAN BE USED FOR IRRIGATION ON FOOD CROPS AND FOR DOMESTIC PURPOSES 7 DAYS AFTER TREATMENT. FISH MAY BE USED FOR FOOD WITHIN 3 DAYS AFTER TREATMENT AND WATER MAY BE USED FOR SWIMMING 24 HOURS AFTER TREATMENT.
2. SIMAZINE (AQUAZINE)	SEE LABEL FOR TYPES OF ALGAE AND SUBMERGED WATER WEED SPECIES. ALGAE 1.7 TO 3.4 LBS. SUBMERGED WEEDS 3.4 TO 8.5 LBS PER ACRE FOOT	AQUAZINE MAY BE USED IN PONDS TO CONTROL SUBMERGED AQUATIC WEEDS AND ALGAE. SUBMERGED WEEDS ARE USUALLY CONTROLLED FOR ONE SEASON. ALGAE MAY BE CONTROLLED FOR 1 TO 3 MONTHS. AQUAZINE MAY BE USED IN PONDS CONTAINING FISH. USE ONLY IN PONDS WHICH HAVE LITTLE OR NO WATER RUNOFF AFTER TREATMENT. TREAT PONDS AFTER SEASONAL FLOW HAS CEASED, EARLY IN THE WEED GROWTH PERIOD; THIS MAY BE BETWEEN MAY 1 AND JUNE 15. APPLY AQUAZINE BEFORE WATER TEMPERATURES EXCEED 75 DEGREES F. DO NOT TREAT PONDS HAVING AN EXTREMELY HEAVY WEED INFESTATION AS IN MID OR LATE SUMMER, SINCE RAPID DECOMPOSITION GREATLY REDUCES OXYGEN IN THE WATER AND MAY CAUSE DEATH OF FISH. FISH MAY BE USED FROM TREATED PONDS FOR HUMAN CONSUMPTION. TREATED PONDS MAY BE USED FOR SWIMMING. TREATED WATER SHOULD NOT BE USED FOR IRRIGATING CROPS, LAWNS OR ORNAMENTAL PLANTINGS, OR FOR WATERING CATTLE, SHEEP, ETC., OR FOR HUMAN CONSUMPTION UNTIL 12 MONTHS AFTER TREATMENT.
3. DIQUAT	1 TO 2 GALS PER SURFACE ACRE	APPLY IN EARLY SEASON BEFORE SUBMERSED WEED GROWTH REACHES THE WATER SURFACE. APPLY BY POURING DIRECTLY FROM THE CONTAINER INTO THE WATER WHILE MOVING SLOWLY OVER THE WATER SURFACE IN A BOAT. DISTRIBUTE EVENLY OVER INFESTED AREAS IN STRIPS 40 FEET APART. IF APPLIED AFTER WEED GROWTH HAS REACHED THE SURFACE, A HIGHER RATE IS NECESSARY; FOLLOW LABEL DIRECTIONS FOR SPECIES AND RATES. DIQUAT MAY ALSO BE USED TO CONTROL CERTAIN FLOATING EMERSED WEED SPECIES AND ALGAE'S. DIQUAT MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. WASH IMMEDIATELY IN CASE OF SKIN CONTACT. WEAR WATERPROOF FOOTWEAR AND CLOTHING. DO NOT BREATHE SPRAY MIST IN. DO NOT USE TREATED WATER FOR ANIMAL CONSUMPTION, SPRAYING, OR IRRIGATION WITHIN 14 DAYS AFTER TREATMENT. DO NOT USE TREATED WATER FOR DRINKING FOR 14 DAYS. DO NOT APPLY TO MUDDY WATER. FOLLOW LABEL DIRECTIONS FOR OTHER PRECAUTIONS.
4. 2,4-D (GRANULAR FORM)	20 TO 40 LBS 2,4-D ACID PER ACRE (100 TO 200 LBS 20% GRANULAR)	SEVERAL PELLETED FORMS OF 2,4-D ARE MARKETED WHICH CAN BE USED FOR CONTROL OF SUBMERSED AQUATIC WEEDS. THESE MATERIALS ARE DESIGNED TO RESIST IMMEDIATE DISINTEGRATION UPON CONTACT WITH WATER SO THE 2,4-D WILL BE RELEASED SLOWLY. APPLY GRANULES WHEN WATER IS STILL, TO INSURE EVEN DISTRIBUTION ON THE BOTTOM. MATERIAL SHOULD BE APPLIED IN THE SPRING OR WINTER AS THE KILLING ACTION IS SLOW. 2,4-D TREATED WATER SHOULD NOT BE USED TO IRRIGATE BROADLEAF CROPS. 2,4-D IS RELATIVELY NON-TOXIC TO FISH. APPLICATION CAN BE MADE WITH A WHIRL-PLATE-TYPE SEEDER FROM A BOAT OR HAND BROADCAST. IT CAN ALSO BE APPLIED IN THE WINTER ON THE ICE SURFACE.

ALGAE: (PONDS, SCUMS AND FLOATING MATS IN LAKES AND PONDS)

1. COPPER SULFATE	.3 TO 1.0 PPM	FOR OPTIMUM CONTROL, APPLY DURING VERY EARLY STAGE OF DEVELOPMENT. DO NOT USE IN WATERS WHERE FISH ARE TO BE PRESERVED. CORRECT WATER VOLUME MUST BE KNOWN FOR EFFECTIVE CONTROL; SURFACE ACRES MULTIPLIED BY THE AVERAGE DEPTH IN FEET EQUALS THE ACRE FEET OF WATER TO BE TREATED. APPLY FROM SHORE OR BY DRAGGING COPPER SULFATE FILLED BURLAP BAGS BEHIND A BOAT. FOR BEST RESULTS, TREAT WHEN WATER TEMPERATURE IS 60 DEGREES F OR ABOVE.
	"SACK OR SLUG" METHOD	USE LARGE SIZE COPPER SULFATE CRYSTALS; 1" CRYSTALS ARE PREFERRED. SUSPEND THESE IN THE DITCH IN A BURLAP OR POROUS SACK; SUSPEND FROM A STRUCTURE WHERE THE WATER IS TURBULENT SUCH AS A DROP OR CHECK. IT WILL BE NECESSARY TO REPEAT THE TREATMENT AT SOME DISTANCE DOWN THE DITCH- 5 OR MORE MILES, DEPENDING ON WATER QUALITY.

WEEDS AND OTHER TYPES OF VEGETATION FREQUENTLY BECOME A PROBLEM IN IRRIGATION DITCHES AND ON DITCHBANKS. DITCHES AND DITCHBANKS ARE ALSO A SOURCE OF WEED SEEDS AND A CENTER FOR THE SPREAD OF WEEDS. OFTEN IT IS NOT PRACTICAL OR POSSIBLE TO EFFECTIVELY CONTROL WEEDS IN THESE AREAS BY MEANS OTHER THAN CHEMICALS, ESPECIALLY WITH LIMITATIONS ON AGRICULTURAL BURNING. UNDER THESE CONDITIONS, CHEMICAL CONTROL SHOULD BE CONSIDERED.



## VEGETATION CONTROL ON DITCHBANKS AND NON-CROPPED AREAS.

HERBICIDES	RATE (LBS AI/ACRE)	READ AND FOLLOW LABEL DIRECTIONS REMARKS
1. LINURON (LOROX, LINURON 50WDG)	1 TO 3 LBS	FOR SHORT TERM CONTROL OF ANNUAL WEEDS ON NON-CROPLAND AREAS SUCH AS ROADSIDES AND FENCE ROWS, APPLY LINURON SHORTLY BEFORE WEED GROWTH BEGINS OR AT EARLY SEEDLING STAGE OF GROWTH. FOR CONTROL OF ESTABLISHED ANNUAL WEEDS, ADD A GOOD SURFACTANT AT 2 QUARTS PER 100 GALLONS SPRAY SOLUTION AND APPLY AS A THOROUGH COVERAGE SPRAY DURING PERIODS WHEN DAILY TEMPERATURES EXCEED 70 DEGREES F, AND BEFORE WEED GROWTH EXCEEDS 8". DO NOT CONTAMINATE DOMESTIC OR IRRIGATION WATER, LAKES, STREAMS, OR PONDS.
2. PARAQUAT (GRAMOXONE SUPER)	0.5 LB	APPLY FOR FULL COVERAGE AND THOROUGH WEED CONTACT, WHEN VEGETATION IS YOUNG AND SUCCULENT. REPEAT AS NEEDED. ADD X-77 OR OTHER NON-IONIC SURFACTANT AT 8 OUNCES PER 100 GALLONS. <u>PARAQUAT (GRAMOXONE) RESTRICTED USE HERBICIDE.</u>

## OTHER DITCHBANK WEED PROBLEMS.

1. DALAPON (DOWPON M)	10 LBS	FOR SINGLE SEASON CONTROL OF REED CANARY GRASS, APPLY DALAPON IN THE SPRING WHEN GRASS WEEDS ARE SMALL; REPEAT IN MID-SUMMER IF GRASSES CONTINUE TO BE A PROBLEM. TREATED AREAS SHOULD NOT BE GRAZED. GOOD SPRAY COVERAGE OF HEALTHY PLANT TISSUE IS ESSENTIAL. BEGIN SPRAYING DOWNSTREAM, AND WORK UP, TAKING CARE NOT TO CONTAMINATE ANY IRRIGATION WATER. NO WAITING PERIOD IS NECESSARY BEFORE WATER CAN BE USED FOR IRRIGATION. DALAPON WILL ALSO CONTROL CATTAILS AND OTHER PHRAGMITES (GIANT REED).
2. GLYPHOSATE (ROUNDUP)	1 TO 2% SOLUTION + 0.5 TO 1% NON-IONIC SURFACTANT	ROUNDUP CAN BE USED ON DRY IRRIGATION DITCHES OR DRAIN DITCHES TO CONTROL MOST GRASS AND BROADLEAF WEEDS AS WELL AS BRUSH SPECIES. IT SHOULD NOT BE USED WHERE IT CAN CONTAMINATE WATER, AND SHOULD BE ON THE WEEDS AT LEAST 6 HOURS BEFORE ANY RAIN FALLS FOR BEST RESULTS. FOR SPRAY APPLICATIONS MADE ON A SPRAY-TO-WET BASIS. SPRAY COVERAGE SHOULD BE UNIFORM AND COMPLETE. DO NOT SPRAY TO THE POINT OF RUN-OFF.
3. DIURON (KARMEX, DIURON SN 80)	5 TO 60 LBS	APPLY 5 TO 20 LBS OF DIURON TO CONTROL MOST ANNUAL WEEDS; 20 TO 60 LBS MAY BE REQUIRED TO CONTROL BOTH ANNUAL AND PERENNIAL WEEDS. APPLY ON IRRIGATION DITCHBANKS DURING THE NON-CROP SEASON, WHEN THE DITCH IS NOT IN USE. TO MINIMIZE MOVEMENT OF DIURON WITH IRRIGATION WATER, IT IS ESSENTIAL THAT THE HERBICIDE BE FIXED IN THE SOIL BY MOISTURE. APPLY IN THE FALL OR EARLY SPRING SO MOISTURE WILL FIX THE HERBICIDE IN THE SOIL BEFORE THE IRRIGATION SEASON. IF MOISTURE HAS NOT TOTALED AT LEAST 4", FILL DITCH WITH WATER AND ALLOW TO STAND FOR 72 HOURS; DRAIN OFF AND WASTE REMAINING WATER BEFORE USING DITCH. DO NOT TREAT ANY DITCH INTO WHICH TREE ROOTS OR OTHER DESIRABLE PLANTS EXTEND; DIURON IS HIGHLY PHYTOTOXIC TO TREES AND SHRUBS. APPLY IN 60 TO 80 GPA.
4. 2,4-D AMINE (MANY TRADE NAMES)	2 LBS	APPLY IN 20 TO 40 GPA IN LATE SPRING OR EARLY SUMMER WHEN WEEDS ARE ACTIVELY GROWING. PREVENT SPRAY FROM GETTING INTO THE WATER. AT PRESENT, ONLY WEEDAR 64 DMA SALT IS REGISTERED FOR BROADLEAF WEED CONTROL ON THE INSIDE SLOPES OF WATERED IRRIGATION CHANNELS. OTHER 2,4-D FORMULATIONS ARE CLEARED FOR USE ON DRAIN DITCH BANKS OR PLACES WHERE IRRIGATION WATER IS NOT INVOLVED.

## FORAGE AND SEED ALFALFA - NEW SEEDING

## RECOMMENDATIONS FOR NEW ALFALFA SEEDINGS RAISED FOR FORAGE OR SEED

1. EPTC (EPTAM/GENEP)	3 LBS (APPROX. 3.5 PTS)	<u>PPI TREATMENT</u> FOR ANNUAL GRASSES AND BROADLEAF WEEDS. EPTAM/GENEP MUST BE INCORPORATED INTO THE SOIL WITHIN MINUTES AFTER APPLICATION. WHENEVER POSSIBLE, SPRAY AND SOIL INCORPORATE IN THE SAME OPERATION. PLANT IMMEDIATELY AFTER APPLICATION.
2. BENEFIN (BALAN)	1.12 TO 1.5 LB	<u>PPI TREATMENT</u> FOR ANNUAL GRASSES AND BROADLEAF WEEDS. APPLY AND INCORPORATE BALAN BEFORE SEEDING. DO NOT APPLY AFTER SEEDING. USE THE LOWER RATE ON COARSE AND MEDIUM SOILS AND THE HIGHER RATE ON FINE SOILS. FOLLOW LABEL DIRECTIONS FOR PLANTING CROPS AFTER APPLICATION.

## RECOMMENDATIONS FOR ESTABLISHED ALFALFA STANDS RAISED FOR FORAGE OR SEED

1. METRIBUZIN (SENCOR)	0.375 TO 0.75 LB	<u>DORMANT TREATMENT</u> FOR ANNUAL GRASSES AND BROADLEAF WEEDS. APPLY SENCOR ON DORMANT ESTABLISHED STANDS OF ALFALFA AS A BROADCAST APPLICATION. APPLY IN THE FALL AFTER ALFALFA BECOMES DORMANT, OR IN THE SPRING BEFORE NEW GROWTH STARTS. DO NOT APPLY TO ALFALFA DURING THE FIRST SEASON AFTER SEEDING. SENCOR HAS GOOD CROP TOLERANCE AND WILL CONTROL MANY OF THE BROADLEAF ANNUAL WEEDS IN ALFALFA, INCLUDING TANSY AND BLUE MUSTARD. IT WILL CONTROL A PERCENTAGE OF ANNUAL GRASSES BUT IS WEAKER ON GRASSES THAN BROADLEAF WEEDS. USE THE LOWER RATE RANGE ON SANDY LOAM OR LOAMY SAND SOIL. DO NOT USE ON SAND SOILS. FOLLOW LABEL DIRECTIONS FOR RATES AND CROPS TO FOLLOW SENCOR. NOTE: DO NOT USE <u>LEXONE</u> ON ALFALFA RAISED FOR SEED.
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HERBICIDE	RATE (LBS AI/ACRE)	READ AND FOLLOW LABEL DIRECTIONS REMARKS
2. PRONAMIDE (KERB)	1 TO 2 LBS	<u>DORMANT TREATMENT.</u> KERB WILL CONTROL DOWNY BROME, GREEN AND YELLOW FOXTAIL, WILD OAT, AND SOME PERENNIAL GRASSES. APPLY KERB IN THE FALL AFTER LOW MOWING OR IN EARLY WINTER BEFORE SOIL FREEZE-UP. FOLLOW LABEL DIRECTIONS.
3. CHLORPROPHAM (FURLOE)	FOLLOW LABEL DIRECTIONS FOR THE AREA	<u>PRE-EMERGENCE (TO WEEDS) SURFACE TREATMENT.</u> FOR DODDER SEEDLINGS. USE THE GRANULAR FORMULATION. APPLY BEFORE DODDER SEEDLINGS BECOME ATTACHED TO THE ALFALFA. SOIL SURFACE SHOULD BE MOIST WHEN FURLOE IS APPLIED. FURLOE HAS A SHORT RESIDUAL LIFE IN THE SOIL, ABOUT 4 WEEKS. RETREATMENT MAY BE NECESSARY.
4. PROPHAM (CHEM-HOE FL4)	5 TO 6 LBS	<u>POSTEMERGENCE TREATMENT</u> FOR ANNUAL GRASSES. APPLY IN LATE WINTER OR EARLY SPRING, WHEN WEEDS ARE SMALL. USE THE LOWER RATES ON COARSE AND MEDIUM TEXTURED SOILS. RAINFALL OR IRRIGATION IS NEEDED SOON AFTER APPLICATION - WITHIN 5 DAYS. THIS CONTROLS ONLY ANNUAL GRASSES.
5. PARAQUAT (GRAMOXONE SUPER)	0.5 TO 0.75 LB + 0.06 TO 0.25% NON-IONIC SURFACTANT	<u>DORMANT TREATMENT</u> FOR THE CONTROL OF ANNUAL GRASSES AND SOME BROADLEAF WEEDS IN ALFALFA STANDS ESTABLISHED FOR ONE OR MORE YEARS. APPLY AFTER LAST CUTTING IN FALL WHEN CROP IS DORMANT OR BEFORE SPRING GROWTH IS ONE INCH. WEEDS SHOULD BE GROWING AND SUCCULENT AT THE TIME OF SPRAYING. ALFALFA FOLIAGE PRESENT AT THE TIME OF APPLICATION WILL BE BURNED. CONSULT LABEL FOR ADDITIONAL INFORMATION AND GRAZING AND HARVEST RESTRICTIONS.

**FORAGE ALFALFA - ESTABLISHED STANDS**

RECOMMENDATIONS FOR ESTABLISHED ALFALFA STANDS RAISED FOR FORAGE ONLY; DO NOT USE ON ALFALFA RAISED FOR SEED.

1. HEXAZINONE (VELPAR)	0.5 TO 1.5 LBS	<u>DORMANT TREATMENT</u> FOR ANNUAL GRASSES AND BROADLEAF WEEDS. TREAT ONLY STANDS ESTABLISHED FOR ONE YEAR OR MORE. APPLY IN THE FALL OR SPRING WHEN ALFALFA IS DORMANT OR BEFORE NEW GROWTH STARTS. FOLLOW LABEL DIRECTIONS FOR RATES VS SOIL TYPES AND WEED SPECIES. NOTE: DO NOT USE ON ALFALFA RAISED FOR SEED.
2. HEXAZINONE (VELPAR L)	0.25 TO 0.5 LB	<u>DORMANT TREATMENT</u> FOR PREEMERGENCE OR EARLY POSTEMERGENCE TANSYMUSTARD OR FLAXWEED CONTROL. TREAT ONLY STANDS ESTABLISHED FOR ONE YEAR OR MORE. APPLY IN FALL WHEN ALFALFA IS DORMANT AND WEEDS ARE SMALL. NOTE: DO NOT USE ON ALFALFA RAISED FOR SEED.
3. TERBACIL (SINBAR)	0.5 TO 0.75 LB	<u>DORMANT TREATMENT</u> USE SINBAR ON ALFALFA ESTABLISHED FOR AT LEAST ONE YEAR FOR CONTROL OF SEVERAL ANNUAL GRASS AND BROADLEAF WEEDS - SEE LABEL FOR LIST. SINBAR DOES NOT CONTROL PERENNIAL WEEDS. APPLY IN THE FALL AFTER PLANTS BECOME DORMANT, OR IN THE SPRING BEFORE NEW GROWTH STARTS. DO NOT USE ON SAND, LOAMY SAND OR GRAVELLY SOILS, NOR SOILS WITH LESS THAN 1% ORGANIC MATTER. NOTE: DO NOT USE ON ALFALFA RAISED FOR SEED.
4. METRIBUZIN (LEXONE)	0.375 TO 0.75 LB	<u>DORMANT TREATMENT</u> FOR ANNUAL GRASSES AND BROADLEAF WEEDS. APPLY LEXONE ON DORMANT ESTABLISHED STANDS OF ALFALFA AS A BROADCAST APPLICATION. APPLY IN THE FALL AFTER ALFALFA BECOMES DORMANT, OR IN THE SPRING BEFORE NEW GROWTH STARTS. DO NOT APPLY TO ALFALFA DURING THE FIRST SEASON AFTER SEEDING. LEXONE HAS GOOD CROP TOLERANCE AND WILL CONTROL MANY OF THE BROADLEAF ANNUAL WEEDS IN ALFALFA, INCLUDING TANSY AND BLUE MUSTARD. IT WILL CONTROL A PERCENTAGE OF ANNUAL GRASSES BUT IS WEAKER ON GRASSES THAN BROADLEAF WEEDS. USE THE LOWER RATE RANGE ON SANDY LOAM OR LOAMY SAND SOIL. DO NOT USE ON SAND SOILS. FOLLOW LABEL DIRECTIONS FOR RATES AND CROPS TO FOLLOW LEXONE. NOTE: DO NOT USE LEXONE ON ALFALFA RAISED FOR SEED.

**SEED ALFALFA ONLY**

1. DCPA (DACTHAL)	7.5 TO 10 LBS	<u>PRE-EMERGENCE (TO WEEDS) SURFACE TREATMENT</u> FOR DODDER SEEDLINGS. APPLY DACTHAL TO THE SOIL IN THE SPRING OR AFTER THE FIRST CUTTING, BEFORE DODDER SEEDLINGS GERMINATE. DACTHAL WILL NOT CONTROL GERMINATED WEEDS.
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**ESTABLISHED LAWNS AND TURF**

HERBICIDES	RATE (LBS AI/ACRE)	READ AND FOLLOW LABEL DIRECTIONS REMARKS
1. 2,4-D (MANY TRADE NAMES)	1 TO 2 LBS	<u>POSTEMERGENCE TREATMENT</u> FOR DANDELIONS, PLANTAINS, AND OTHER EASY TO KILL BROADLEAF WEEDS. DANDELIONS AND PLANTAIN CAN BE CONTROLLED BY 2,4-D AMINE IF APPLIED JUST BEFORE AND DURING THE EARLY BLOSSOM PERIOD WHEN THEY ARE ACTIVELY GROWING. DO NOT MOW THE LAWN FOR 5 DAYS BEFORE SPRAYING OR 2 DAYS AFTER SPRAYING. KEEP SPRAY OFF A NEW LAWN UNTIL IT IS AT LEAST 60 DAYS OLD. AMINES AND LOW VOLATILE ESTERS ARE SAFEST TO USE NEAR SUSCEPTIBLE PLANTS.
2. DICAMBA (BANVEL) OR DICAMBA PLUS 2,4-D AND/OR PLUS MCPA	1 LB OR 1.5 TBSP OF 49% ACTIVE BANVEL IN 2 GAL WATER PER 1000 SQ FT	<u>POSTEMERGENCE TREATMENT</u> FOR CHICKWEED, BLACK MEDIC, PROSTRATE KNOTWEED, SPURGE, HEALALL, GROUND IVY, CAMPANULA, CLOVERS AND OTHERS. APPLY WHEN PLANTS ARE GROWING VIGOROUSLY. DO NOT USE OVER THE ROOT ZONE OR DRIPLINE OF TREES OR SHRUBS. BANVEL MAY BE INJURIOUS TO STOLONIFEROUS GRASSES SUCH AS BENTGRASS. KENTUCKY BLUEGRASS HAS SHOWN A TOLERANCE TO BANVEL UP TO 4 LBS PER ACRE WITHOUT GRASS INJURY.
3. BENEFIN (BALAN)	1.5 TO 2 LBS OR 1.75 LB PER 1000 SQ FT OF 2.5% GRANULES	<u>PRE-EMERGENCE (TO WEEDS) SURFACE TREATMENT</u> FOR CRABGRASS, ANNUAL BLUEGRASS, AND OTHER ANNUAL GRASS SPECIES. APPLY BALAN GRANULES TO ESTABLISHED TURF BEFORE UNDESIRABLE GRASSES SPROUT. FOR EVEN APPLICATION, APPLY HALF THE REQUIRED AMOUNT OF GRANULES IN ONE DIRECTION, THE OTHER HALF AT RIGHT ANGLES.
4. DCPA (DACTHAL)	10 LBS OR 5 OZ OF 75 WP PER 1000 SQ FT	<u>PRE-EMERGENCE (TO WEEDS) SURFACE TREATMENT</u> FOR CRABGRASS, ANNUAL BLUEGRASS, AND OTHER ANNUAL GRASS SPECIES. APPLY DACTHAL IN EARLY SPRING BY APRIL 1 OR NOT LATER THAN MAY 1 IN SOUTHERN COLORADO TO MAY 15 IN CENTRAL AND NORTHERN COUNTIES ON ESTABLISHED LAWNS. THIS MATERIAL HAS LITTLE EFFECT ON EMERGED WEEDS. TWO APPLICATIONS OF DACTHAL WILL BE NEEDED TO CONTROL ANNUAL BLUEGRASS; THE SECOND APPLICATION SHOULD BE MADE NEAR JULY 1.
5. SIDURON (TUPERSAN)	16 TO 24 LBS OR 6 TO 9 OZ PER 1000 SQ FT	<u>PRE-EMERGENCE (TO WEEDS) SURFACE TREATMENT</u> FOR CRABGRASS, ANNUAL BLUEGRASS, AND OTHER ANNUAL GRASS SPECIES. APPLY IN EARLY SPRING BEFORE CRABGRASS GERMINATES. TUPERSAN IS A WETTABLE POWDER; MIX IN WATER AND APPLY AS A SPRAY. AT LEAST 0.5" OF WATER (RAINFALL OR IRRIGATION) IS NEEDED WITHIN THREE DAYS AFTER APPLICATION, TO CARRY THE CHEMICAL DOWN. TUPERSAN IS REPORTED BY THE MANUFACTURER TO KILL OTHER ANNUAL WEEDY GRASSES IN TURF; ALSO, THAT IT MAY BE USED ON NEWLY SEEDED AREAS WITHOUT INJURY TO BLUEGRASS, BENTGRASS AND FESCUES.
6. BENSULIDE (BETASAN, PRE-SAN)	FOLLOW LABEL DIRECTIONS FOR DIFFERENT FORMULATIONS	<u>PRE-EMERGENCE (TO WEEDS) SURFACE TREATMENT</u> FOR CRABGRASS, ANNUAL BLUEGRASS, AND OTHER ANNUAL GRASS SPECIES. BETASAN MUST BE APPLIED PRIOR TO GRASS OR OTHER WEED EMERGENCE. IT WILL CONTROL CRABGRASS, ANNUAL BLUEGRASS AND SEVERAL OTHER ANNUAL WEEDS (SEE LABEL). APPLY ONLY ON WELL ESTABLISHED LAWNS. IT CAN ALSO BE USED AROUND SOME ORNAMENTALS AND GROUND COVERS. DO NOT SEED DESIRABLE GRASSES WITHIN FOUR MONTHS AFTER APPLICATION. BETASAN IS AVAILABLE IN LIQUID AND GRANULE FORMS.
7. MSMA (BUENO 6, DACONATE 6, AND OTHERS)	2 LBS OR 2 TBSP IN 5 GAL WATER PER 1000 SQ FT	<u>POSTEMERGENCE TREATMENT</u> FOR CRABGRASS, OTHER ANNUAL GRASSES AND SOME BROADLEAF WEEDS. FOR SELECTIVE CONTROL OF CRABGRASS AND OTHER ANNUAL GRASSES IN TURFGRASS. MOW TURFGRASS 1 TO 1.5" HIGH. APPLY UNIFORMLY IN 5 GALS OF WATER PER 1000 SQ FT. TWO OR MORE REPEAT TREATMENTS AT 14-DAY INTERVALS MAY BE NECESSARY. MAKE APPLICATIONS WHEN TEMPERATURE IS BETWEEN 80 AND 90 F. DO NOT WATER TURF FOR AT LEAST 24 HOURS. TURFGRASS MAY BE TEMPORARILY DISCOLORED. READ LABEL FOR PRECAUTIONS.
8. DALAPON (DOWPON M)	1 LB IN 10 GAL OR 1.5 OZ PER GAL WATER	FOR SPOT TREATMENT OF UNDESIRABLE PERENNIAL GRASSES IN KENTUCKY BLUEGRASS TURF. MOW TO 1.5 INCHES ON ABOUT JUNE 10, ALLOW THE GRASS TO GROW UNTIL ABOUT JUNE 20 (2.5 - 3" HIGH) SO SPOTS ARE EVIDENT. SPRAY COARSE GRASS SPOTS TO WETNESS WITH ONE OF THESE HERBICIDES. THESE HERBICIDES KILL DESIRABLE AS WELL AS UNDESIRABLE GRASSES; TREATED SPOTS WILL BE CONSPICUOUS ABOUT 7 TO 10 DAYS AFTER APPLICATION. IF THE SPOTS ARE SMALL, BLUEGRASS WILL FILL IN BY THE FOLLOWING SPRING; OR IF THE SPOTS ARE LARGER, THE DEAD SOD CAN BE DUG OUT AND REPLACED WITH CLEAN SOD. DIG 2 TO 3" DEEP. TREATED SPOTS CAN ALSO BE DUG OUT, CLEAN SOIL FILLED IN THE HOLE AND THE AREA RE-SEEDED. DOWPON TREATED SPOTS SHOULD NOT BE RE-SODDED OR RE-SEEDED UNTIL MID-AUGUST AFTER A JUNE APPLICATION OF THE HERBICIDE.
9. GLYPHOSATE (ROUNDUP)	2 TBSP PER GAL WATER	ROUNDUP TREATED SPOTS CAN BE RE-SODDED OR RE-SEEDED 14 DAYS AFTER APPLICATION.

**ESTABLISHED LAWNS AND TURF**

READ AND FOLLOW LABEL DIRECTIONS

HERBICIDES	RATE (LBS AI/ACRE)	REMARKS
10. OXADIAZON (RONSTAR 2% GRANULES)	2 TO 4 LBS OR 2.25 TO 4.5 LBS OF PRODUCT/1000 SQ FT	APPLY PREEMERGENCE TO WEEDS FOR THE CONTROL OF MANY ANNUAL GRASS AND BROADLEAF WEEDS INCLUDING CRABGRASS, GREEN FOXTAIL, BARNYARDGRASS, YELLOW WOODSORREL (OXALIS SPP.) AND LAMBSQUARTERS IN ESTABLISHED TURF. DO NOT APPLY TO WET TURF. IF RAIN IS NOT EXPECTED SOON AFTER APPLICATION, SPRINKLING TURF THOROUGHLY (FOR INCORPORATION) WILL INCREASE EFFECTIVENESS. CONSULT LABEL FOR ADDITIONAL INFORMATION.
11. BROMOXYNIL (BUCTRIL, BROMINAL)	0.38 TO 0.5 LB; 0.6 TO 0.75 FL OZ OF PRODUCT/ 1000 SQ FT	APPLY POSTEMERGENCE TO WEEDS IN LAWNS OR TURF FOR THE CONTROL OF MANY ANNUAL BROADLEAF WEEDS. APPLY WHEN WEEDS ARE SMALL. REGISTERED FOR USE IN NEWLY PLANTED OR ESTABLISHED GRASSES FOR SOD AND SEED PRODUCTION. SEE LABEL FOR TOLERANT TURF VARIETIES. NOTE: CAN USE UP TO 2.0 LB AI/A IN ESTABLISHED TURF.
12. 2,4-D + 2,4-DP (WEEDONE DPC)	AMINE FORMULATION: 1.85 TO 2.8 LB OR 1.5 TO 2.25 FL OZ OF PRODUCT/1000 SQ FT  ESTER FORMULATION: 1.4 TO 1.85 LB OR 1.12 TO 1.5 FL OZ OF PRODUCT/ 1000 SQ FT	APPLY POSTEMERGENCE TO WEEDS FOR CONTROL OF MANY ANNUAL, BIENNIAL, AND PERENNIAL BROADLEAF WEEDS IN ESTABLISHED AND SEEDLING TURF. CONSULT LABEL FOR LIST OF WEED SPECIES CONTROLLED AND ADDITIONAL INFORMATION.

**LAWN/TURF RENOVATION AND/OR ESTABLISHMENT**

1. GLYPHOSATE (ROUNDUP)	1 TO 4 LBS OR 1.5 TO 6 TBSP PER 1000 SQ FT	ROUNDUP CAN BE USED PRIOR TO THE ESTABLISHMENT OF NEW LAWNS OR FOR RENOVATION OF OLD LAWNS. ROUNDUP DOES NOT PERSIST IN SOIL. APPLY ROUNDUP TO ACTIVELY GROWING WEEDS. ALLOW SUFFICIENT GROWTH (2 TO 3") FOR GOOD INTERCEPTION OF THE SPRAY. WHEN USED AHEAD OF ESTABLISHING NEW TURF, ALLOW ENOUGH TIME AFTER APPLICATION TO DETERMINE IF ANY REGROWTH OCCURS. AVOID CONTACT OF SPRAY WITH FOLIAGE OF DESIRABLE GRASSES, TREES, OR SHRUBS. FOLLOW LABEL DIRECTIONS FOR RATES, WEED SPECIES, AND DENSITIES.
2. VAPAM	1.5 QTS IN 5 GALS OF WATER PER 100 SQ FT	FOR UNDESIRABLE ANNUAL AND PERENNIAL GRASSES AND BROADLEAF WEEDS. VAPAM IS NON-SELECTIVE AND WILL KILL LAWN GRASSES AS WELL AS UNDESIRABLE GRASSES. DO NOT USE OVER THE ROOT ZONE AREA OR DRIP LINE OF CONIFER TREES OR LARGE SHRUBS; APPLY VAPAM ON MOIST SOIL WITH A SPRAYER, SPRINKLING CAN, OR HOSE APPLICATOR. AFTER APPLYING, IMMEDIATELY SPRINKLE WITH ENOUGH WATER TO INSURE PENETRATION OF THE CHEMICAL TO THE DEPTH OF WEED ROOTS (1 TO 2" OF WATER). WAIT THREE WEEKS BEFORE RESEEDING THE TREATED AREAS.

**PASTURES, RANGELANDS, NON-CROPLANDS**

WEED	RATE (LBS AI/A)	REMARKS
WEEDS CONTROLLED WITH PICLORAM (TORDON 22K):		
1. DIFFUSE KNAPWEED SPOTTED KNAPWEED	0.25 LB	APPLY TO ACTIVELY GROWING WEEDS.
2. PRICKLYPEAR CACTUS	0.25-0.5 LB	APPLY TO ACTIVELY GROWING WEEDS.
3. CANADA THISTLE RUSSIAN KNAPWEED PERENNIAL SOWTHISTLE CHICORY COMMON TANSY BROOM SNAKEWEED DANDELION SHOWY MILKWEED WESTERN WHORLED MILKWEED	0.5 - 1 LB	APPLY TO IN THE SPRING TO ACTIVELY GROWING WEEDS OR DURING FALL REGROWTH.
4. FIELD BINDWEED SKELETONLEAF BURSAGE (SILVERLEAF POVERTYWEED) MOUSEEAR POVERTYWEED DALMATION TOADFLAX YELLOW TOADFLAX MULESEARS HOUNDSTONGUE	1 - 2 LBS	APPLY IN SPRING WHEN WEEDS ARE ACTIVELY GROWING OR DURING FALL REGROWTH.



WEED RATE (LBS AI/A) READ AND FOLLOW LABEL DIRECTIONS REMARKS

WEEDS CONTROLLED WITH PICLORAM (TORDON 22K):

- 5. LEAFY SPURGE 0.5 LB 1.0 LB 2.0 LBS FOR LARGE ACCESSIBLE AREAS, TREAT AT NOTED RATE FOR 3-4 CONSECUTIVE YEARS IN THE SPRING FOLLOWING THE APPEARANCE OF TRUE FLOWERS OR DURING FALL REGROWTH. FOR LESS ACCESSIBLE AREAS, TREAT AT NOTED RATE IN THE SPRING FOLLOWING THE APPEARANCE OF TRUE FLOWERS OR DURING FALL REGROWTH. WHEN TOP GROWTH CONTROL FALLS BELOW 75%, RETREAT WITH 0.5 LB AI/A. FOR SMALL, VERY INACCESSIBLE AREAS, TREAT AT NOTED RATE IN THE SPRING FOLLOWING THE APPEARANCE OF TRUE FLOWERS OR DURING FALL REGROWTH. WHEN CONTROL FALLS BELOW 75%, RETREAT WITH 0.5 LB AI/A.

NOTE: TORDON 22K IS A RESTRICTED USE HERBICIDE REGISTERED FOR BROADLEAF WEED CONTROL IN PERMANENT GRASS PASTURES, RANGELANDS, AND NON-CROPLANDS. DO NOT ALLOW TORDON TO CONTAMINATE WATER USED FOR DRINKING, IRRIGATION OR OTHER DOMESTIC PURPOSES. WHEN APPLICATION RATES EXCEED 0.5 LB AI/A (1 QT) DO NOT CUT GRASS FOR FEED WITHIN TWO WEEKS AFTER TREATMENT. MEAT ANIMALS GRAZING UP TO TWO WEEKS AFTER TREATMENT SHOULD BE REMOVED FROM TREATED AREAS THREE DAYS BEFORE SLAUGHTER. DO NOT GRAZE LACTATING DAIRY ANIMALS ON TREATED AREAS WITHIN TWO WEEKS OF TORDON APPLICATION. CONSULT TORDON LABEL AND COLORADO 24(C) REGISTRATION FOR FURTHER DIRECTIONS, RESTRICTIONS, AND USE PRECAUTIONS.

WEEDS CONTROLLED WITH DICAMBA (BANVEL):

- 1. SKELETONLEAF BURSAGE (SILVERLEAF POVERTYWEED) DANDELION HOUNDSTONGUE WOOLLYLEAF BURSAGE (WOOLLYLEAF POVERTYWEED) MOUSEEAR POVERTYWEED 1 - 2 LB APPLY WHEN WEEDS ARE ACTIVELY GROWING.
2. CANADA THISTLE FIELD BINDWEED RUSSIAN KNAWEED DALMATION TOADFLAX YELLOW TOADFLAX PERENNIAL SOWTHISTLE GROUNDCHERRY SILVERLEAF NIGHTSHADE (WHITE HORSENETTLE) TEXAS BLUEWEED BLUE LETTUCE CHICORY COMMON TANSY MULSEARS BROOM SNAKEWEED 2 - 4 LBS APPLY WHEN WEEDS ARE ACTIVELY GROWING. USE UP TO 6.0 LB AI/A FOR DENSE STANDS.

- 3. LEAFY SPURGE 2 - 6 LBS MAKE AN INITIAL APPLICATION WITH 2 LB OF DICAMBA AND REPEAT THIS TREATMENT ANNUALLY FOR 3-4 YEARS. MAKE AN INITIAL APPLICATION WITH 4 LB OF DICAMBA AND RETREAT THE FOLLOWING SEASON WITH 2 LB OF DICAMBA. MAKE AN INITIAL APPLICATION WITH 6 LB OF DICAMBA. RETREATMENT WILL BE NECESSARY IN SUBSEQUENT GROWING SEASONS WITH REDUCED RATES OF DICAMBA, 2,4-D OR PICLORAM. MAKE ALL APPLICATIONS IN THE SPRING AT APPROXIMATELY 1/3 BLOOM OR IN THE FALL IF LEAFY SPURGE IS ACTIVELY GROWING.

AFTER 6 LB OF DICAMBA HAS BEEN APPLIED, A MAINTENANCE PROGRAM WITH REDUCED RATES OF DICAMBA, 2,4-D OR PICLORAM, OR COMBINATIONS OF DICAMBA AND 2,4-D OR 2,4-D AND PICLORAM CAN BE USED.

NOTE: DICAMBA APPLIED AT RATES EXCEEDING 2.0 LB AI/A MAY CAUSE TEMPORARY INJURY TO MANY GRASS SPECIES. REMOVE MEAT ANIMALS FROM TREATED AREAS 30 DAYS BEFORE SLAUGHTER.

TIMING RESTRICTION FOR LACTATING DAIRY ANIMALS

Table with 4 columns: RATE (LB AI/A), DAYS BEFORE GRAZING, DAYS BEFORE HAY HARVEST. Rows include rates up to 0.5, 1.0, 2.0, and 8.0 with corresponding days before grazing and hay harvest.

DO NOT EXCEED 8.0 LB AI/A IN ANY YEAR. CONSULT BANVEL LABEL FOR FURTHER DIRECTIONS, RESTRICTIONS, AND USE PRECAUTIONS.

WEED	RATE (LBS AI/A)	READ AND FOLLOW LABEL DIRECTIONS REMARKS
WEEDS CONTROLLED WITH <u>GLYPHOSATE</u> (ROUNDUP):		
1. QUACKGRASS	1 - 3 LBS	SPRAY WHEN QUACKGRASS IS GREATER THAN EIGHT INCHES TALL AND ACTIVELY GROWING.
2. CANADA THISTLE	2 - 3 LBS	APPLY TO ACTIVELY GROWING PLANTS, WHEN AT OR BEYOND THE BUD STAGE OF GROWTH.
3. SHOWY MILKWEED WESTERN WHORLED MILKWEED	3 LBS	APPLY TO ACTIVELY GROWING WEEDS, WHEN MOST HAVE REACHED LATE BUD TO FLOWER STAGE OF GROWTH.
4. BLUE LETTUCE	3 - 5 LBS	APPLY WHEN WEEDS ARE ACTIVELY GROWING AND MOST HAVE REACHED LATE BUD TO FLOWER STAGE OF GROWTH.
5. RUSSIAN KNAPWEED	4 LBS	APPLY WHEN WEEDS ARE ACTIVELY GROWING AND HAVE REACHED THE LATE BUD TO FLOWER STAGE OF GROWTH.
6. FIELD BINDWEED TEXAS BLUEWEED SILVER NIGHTSHADE (WHITE HORSENETTLE)	4 - 5 LBS	APPLY WHEN WEEDS ARE ACTIVELY GROWING AND AT OR BEYOND FULL BLOOM.
7. WOOLLYLEAF BURSAGE (WOOLLYLEAF POVERTYWEED)	7 LBS	APPLY IN COMBINATION WITH DICAMBA (BANVEL) ONLY. APPLY GLYPHOSATE (ROUNDUP) AT 2.0 LB + DICAMBA AT 0.5 LB WHEN WEEDS ARE PRODUCING NEW ACTIVE GROWTH INITIATED BY MOISTURE FOR AT LEAST TWO WEEKS AND WHEN WEEDS ARE AT OR BEYOND FLOWERING.

NOTE: GLYPHOSATE IS A NON-SELECTIVE HERBICIDE FOR USE IN PASTURES AND NON-CROPLANDS, DO NOT SPRAY WHEN WEEDS TO BE CONTROLLED ARE MOISTURE STRESSED. CONSULT ROUNDUP LABEL FOR FURTHER DIRECTIONS INCLUDING SURFACTANT USAGE, GRAZING RESTRICTIONS, AND PRECAUTIONS.

WEEDS CONTROLLED WITH <u>2,4-D</u> (MANY TRADE NAMES):		
1. TEXAS BLUEWEED CHICORY DANDELION	1 - 2 LBS	APPLY IN SPRING WHEN TEXAS BLUEWEED AND CHICORY ARE ACTIVELY GROWING AND IN EARLY BUD STAGE OF GROWTH. TREATMENT OF TEXAS BLUEWEED FALL REGROWTH MAY BE NECESSARY. TREAT DANDELION ANYTIME WHEN ACTIVELY GROWING; 2-3 TREATMENTS PER YEAR MAY BE NECESSARY.
2. LEAFY SPURGE	1 - 2 LBS	APPLY IN SPRING WHEN WEEDS ARE ACTIVELY GROWING AND AFTER APPEARANCE OF TRUE FLOWERS. TREAT AGAIN IN FALL AFTER REGROWTH OCCURS. 2,4-D WILL PROVIDE ONLY SHORT-TERM TOP-GROWTH CONTROL.
3. CANADA THISTLE PERENNIAL SOWTHISTLE SHOWY MILKWEED HOARY CRESS (WHITETOP) TALL WHITETOP	2 - 3 LBS	APPLY IN SPRING TO EARLY SUMMER WHEN WEEDS ARE ACTIVELY GROWING AND IN EARLY BUD STAGE OF GROWTH. TREATMENT OF FALL REGROWTH MAY BE NECESSARY. FOR HOARY CRESS AND TALL WHITETOP, THREE 1.0 LB APPLICATIONS MAY BE NECESSARY; APPLY FIRST TREATMENT IN EARLY BLOOM STAGE, SECOND TREATMENT IN MID-SUMMER (JULY) AND A THIRD TREATMENT TO ANY FALL REGROWTH. APPLICATIONS FOR 3 YEARS MAY BE NECESSARY.
4. MOUSEEAR POVERTYWEED	3 LBS	APPLY WHEN ACTIVELY GROWING AT EARLY BLOOM STAGE OF GROWTH. TREATMENT OF FALL REGROWTH MAY BE NECESSARY.

NOTE: DO NOT GRAZE DAIRY ANIMALS WITHIN 7 DAYS AFTER 2,4-D APPLICATION. CONSULT 2,4-D LABEL FOR FURTHER DIRECTIONS, RESTRICTIONS, AND USE PRECAUTIONS.

POISONOUS WEEDS CONTROLLED WITH <u>PICLORAM</u> (TORDON 22K):		
1. GEYER LARKSPUR TALL LARKSPUR LOCOWEED ( <u>OXYTROPIS</u> SPP.) LUPINES	0.25-0.5 LB	APPLY WHEN WEEDS ARE ACTIVELY GROWING AND GOOD SOIL MOISTURE IS PRESENT.
2. ST. JOHNSWORT ORANGE SNEEZEWEED	0.5 - 1 LB	APPLY WHEN WEEDS ARE ACTIVELY GROWING AND GOOD SOIL MOISTURE IS PRESENT.
3. LOCO AND MILKVETCH ( <u>ASTRAGALUS</u> SPP.)	1 - 2 LBS	APPLY WHEN WEEDS ARE ACTIVELY GROWING AND GOOD SOIL MOISTURE PRESENT.

NOTE: RESTRICTED USE HERBICIDE FOR BROADLEAF WEED CONTROL IN PERMANENT GRASS PASTURES, RANGELANDS, AND NON-CROPLANDS. DO NOT ALLOW TORDON TO CONTAMINATE WATER USED FOR DRINKING, IRRIGATION OR OTHER DOMESTIC PURPOSES. WHEN RATE EXCEEDS 0.5 LB/A (1 QT) DO NOT CUT GRASS FOR FEED WITHIN 2 WEEKS AFTER TREATMENT. MEAT ANIMALS GRAZING UP TO 2 WEEKS AFTER TREATMENT SHOULD BE REMOVED FROM TREATED AREAS 3 DAYS BEFORE SLAUGHTER. DO NOT GRAZE LACTATING DAIRY ANIMALS ON TREATED AREAS WITHIN 2 WEEKS OF TORDON APPLICATION. CONSULT TORDON LABEL AND COLORADO 24(C) REGISTRATION FOR FURTHER DIRECTIONS, RESTRICTIONS, AND USE PRECAUTIONS.



WEED	RATE (LBS AI/A)	READ AND FOLLOW LABEL DIRECTIONS REMARKS
<u>POISONOUS WEEDS CONTROLLED WITH 2,4-D LVE (MANY TRADE NAMES):</u>		
1. LUPINES DEATHCAMAS POISON HEMLOCK WESTERN WATERHEMLOCK	2 LBS	APPLY TO LUPINES WHEN IN THE ROSETTE TO PRE-BLOOM STAGE; TO POISON HEMLOCK IN THE EARLY BLOOM STAGE; TO DEATHCAMAS AND WESTERN WATERHEMLOCK IN THE EARLY BUD STAGE.  <b>NOTE:</b> THE PALATABILITY OF WATERHEMLOCK INCREASES IMMEDIATELY AFTER TREATMENT WITH 2,4-D.
2. LOCOWEED (OXYTROPIS SPP.) LOCO AND MILKVETCH (ASTRAGALUS SPP.)  HALOGETON WESTERN FALSE HELLEBORE	2 - 3 LBS	APPLY TO OXYTROPIS SPP., ASTRAGALUS SPP., AND HALOGETON IN THE EARLY BUD STAGE OF GROWTH. TREAT WESTERN FALSE HELLEBORE PRIOR TO THE BUD STAGE AND USE A 2,4-D ESTER OR AMINE FORMULATION.
3. LARKSPURS CHOKECHERRY	4 LBS	APPLY TO LARKSPURS WHEN PLANTS ARE FULLY EMERGED BUT BEFORE THE BUD STAGE OF GROWTH; REPEAT ANNUALLY. TREAT CHOKECHERRY IN EARLY SUMMER WHEN LEAVES ARE FULLY FORMED; TWO OR MORE ANNUAL TREATMENTS MAY BE NECESSARY TO CONTROL CHOKECHERRY.
<u>WEEDS CONTROLLED WITH CHLORSULFURON (TELAR):</u>		
1. CANADA THISTLE	0.75 TO 2.25 OZ AI/A + 2.25% NON-IONIC SURFACTANT	APPLY IN LATE SUMMER TO FALL. USE A NON-IONIC SURFACTANT WITH 80% ACTIVE INGREDIENT SUCH AS ORTHO X-77. CHLORSULFURON IS RELATIVELY SLOW ACTING AND WILL KILL THISTLE OVER A PERIOD OF TIME. DO NOT LOOK FOR THE SAME PLANT SYMPTOMS THAT APPEAR AFTER A 2,4-D, DICAMBA, OR SIMILAR TREATMENT. PLANTS WILL BECOME CHLOROTIC, STOP GROWING AND EVENTUALLY DIE.
<u>WEEDS CONTROLLED WITH ATRAZINE (AATREX, ATRAZINE 80W):</u>		
	0.5 TO 1 LB	APPLY IN FALL BEFORE SOIL FREEZES FOR THE CONTROL OF CERTAIN WEEDS SUCH AS DOWNY BROME, TUMBLE MUSTARD, TANSYMUSTARD, COCKLEBUR, AND OTHER MUSTARDS. CONSULT LABEL FOR ADDITIONAL INFORMATION.
<u>WOODY PLANTS CONTROLLED WITH PICLORAM (TORDON 22K):</u>		
1. FRINGED SAGEBRUSH RABBITBRUSH	0.25 LB	APPLY WHEN WEEDS ARE ACTIVELY GROWING.
2. GAMBEL OAK	2 LBS	APPLY PICLORAM WHEN GAMBEL OAK IS ACTIVELY GROWING. RETREATMENT MAY BE NECESSARY.  <b>NOTE:</b> RESTRICTED USE HERBICIDE FOR BROADLEAF WEED CONTROL IN PERMANENT GRASS PASTURES, RANGELANDS, AND NON-CROPLANDS. DO NOT ALLOW TORDON TO CONTAMINATE WATER USED FOR DRINKING, IRRIGATION, OR OTHER DOMESTIC PURPOSES. WHEN RATES EXCEED 0.5 LB AI/A, DO NOT CUT GRASS FOR FEED WITHIN 2 WEEKS AFTER TREATMENT. MEAT ANIMALS GRAZING UP TO 2 WEEKS AFTER TREATMENT SHOULD BE REMOVED FROM TREATED AREAS 3 DAYS BEFORE SLAUGHTER. DO NOT GRAZE LACTATING DAIRY ANIMALS ON TREATED AREAS WITHIN 2 WEEKS OF TORDON APPLICATION. CONSULT TORDON LABEL AND COLORADO 24(C) REGISTRATION FOR FURTHER DIRECTIONS, RESTRICTIONS, AND USE PRECAUTIONS.
<u>WOODY PLANTS CONTROLLED WITH 2,4-D LVE (MANY TRADE NAMES):</u>		
1. GREASEWOOD	1 - 2 LBS	APPLY 2,4-D ESTER OR AMINE TO GREASEWOOD WHEN ACTIVELY GROWING.
2. BIG SAGEBRUSH SAND SAGEBRUSH	1.5 - 2 LBS	APPLY 2,4-D ESTER (ISOPROPYL OR BUTYL) TO SAGEBRUSH DURING PERIODS OF ACTIVE GROWTH; SHOOTS SHOULD BE SHOWING NEW GROWTH AND THERE SHOULD BE GOOD SOIL MOISTURE. USE NON-IONIC SURFACTANT (0.25-0.5% V/V) IN SPRAY SOLUTION OR A DIESEL OIL-WATER EMULSION. CONSULT LABEL FOR MORE INFORMATION.  <b>NOTE:</b> DO NOT GRAZE DAIRY ANIMALS ON TREATED AREAS WITHIN 7 DAYS AFTER 2,4-D APPLICATION.
<u>WOODY PLANTS CONTROLLED WITH TEBUTHIURON (SPIKE):</u>		
1. BIG SAGEBRUSH	0.6 - 0.75 LB	APPLY AT ANYTIME, BUT INJURY TO DESIRABLE GRASSES CAN BE MINIMIZED BY APPLYING TEBUTHIURON WHEN GRASSES ARE DORMANT. TREATMENTS WILL BECOME EFFECTIVE AFTER SUFFICIENT RAINFALL HAS MOVED TEBUTHIURON INTO THE ROOT ZONE. TEBUTHIURON WORKS SLOWLY OVER SEVERAL GROWING SEASONS TO CONTROL UNDESIRABLE WOODY PLANTS.  <b>NOTE:</b> APPLY TEBUTHIURON ONLY ONCE PER YEAR. DO NOT CUT FORAGE GRASS FOR HAY FROM TREATED AREAS WITHIN 2 YEARS AFTER APPLICATION. DO NOT ALLOW LACTATING DAIRY ANIMALS TO GRAZE TREATED AREAS OR CONSUME HAY HARVESTED FROM TREATED AREAS WITHIN 2 YEARS AFTER APPLICATION. CONSULT TEBUTHIURON LABEL FOR FURTHER DIRECTIONS, RESTRICTIONS, AND USE PRECAUTIONS.

WEED	RATE (LBS AI/A)	REMARKS
<b>GRASS SUPPRESSION AND WEEDS CONTROLLED WITH SULFOMETURON (OUST):</b>		
1. SMOOTH BROME CRESTED WHEATGRASS SUPPRESSED	0.75 OZ AI/A	APPLY SULFOMETURON IN SPRING FOR GRASS SUPPRESSION AND SELECTIVE CONTROL OF DOWNY BROME, FOXTAIL, RUSSIAN THISTLE, KOCHIA, AND SWEET CLOVER. SPRING APPLICATION OF SULFOMETURON WILL REDUCE THE NUMBER OF ROADSIDE MOWINGS NECESSARY IN A GROWING SEASON BY SUPPRESSING GRASS VIGOR AND SEEDHEAD FORMATION. DO NOT ADD A SURFACTANT TO SPRAY SOLUTION.

<b>WEEDS CONTROLLED WITH ATRAZINE (AATREX, ATRAZINE 80W):</b>		
1. DOWNY BROME CHEATGRASS TUMBLE MUSTARD	1 LB	APPLY IN FALL BEFORE SOIL FREEZES OR IN SPRING AFTER THAWING IN A MINIMUM OF 10 GALLONS OF WATER PER ACRE. CONSULT LABEL FOR TOLERANT GRASSES.

**HERBICIDE TRADE AND COMMON NAMES**

TRADE NAME	COMMON NAME	FORMULATION	TRADE NAME	COMMON NAME	FORMULATION
AATREX	ATRAZINE	80% WP	FURLOE	CHLORPROPHAM	4 LBS/GAL EC
AQUAZINE	SIMAZINE	80% WP	GENATE+/SUTAN+	BUTYLATE+SAFENER	6.7 LBS/GAL EC
AMIBEN	CHLORAMBEN	2 LBS/GAL WS	GLEAN	CHLORSULFURON	75% DF
ANTOR	DIETHATYL ETHYL	4 LBS/GAL EC	GRAMOXONE	PARAQUAT	2 LBS/GAL WS
BALAN	BENEFIN	1.5 LBS/GAL EC	HOELON	DICLOFOP	3 LBS/GAL EC
BANVEL	DICAMBA	4 LBS/GAL WS	KERB	PRONAMIDE	50% WP
BASAGRAN	BENTAZON	4 LBS/GAL WS	LASSO	ALACHLOR	4 LBS/GAL EC
BETAMIX	PHENMEDIPHAM + DESMEDIPHAM	1.3 LBS/GAL EC	LEXONE/ SENCOR	METRIBUZIN	50% WP; 75% DF 4 LBS/GAL FL
BETANEX	DESMEDIPHAM	1.3 LBS/GAL EC	LOROX	LINURON	50% WP
BETASAN	BENSULIDE	4 LBS/GAL EC	MILOGARD	PROPAZINE	90% WP; 80% WP; 4 LBS/GAL FL
BICEP	ATRAZINE + METOLACHLOR	2 LBS + 2.5 LBS/GAL EC	MODOWN	BIFENOX	4 LBS/GAL FL
BLADEX 4L	CYANAZINE	4 LBS/GAL FL	GRAMOXONE SUPER	PARAQUAT	4 LBS/GAL WS
BROMINAL/BUCTRIL	BROMOXYNIL	2 LBS/GAL EC	POAST	SETHOXYDIM	1.53 LBS/GAL EC
BROMINAL ME4	BROMOXYNIL	4 LBS/GAL EC	PROWL	PENDIMETHALIN	4 LBS/GAL EC
CARBYNE	BARBAN	2 LBS/GAL EC	RAMROD	PROPACHLOR	4 LBS/GAL FL
DACTHAL	DCPA	75% WP; 5% GRANULES	RO-NEET	CYCLOATE	6 LBS/GAL EC
DOWPON M	DALAPON	85% WP	ROUNDUP	GLYPHOSATE	4 LBS/GAL WS
DUAL	METOLACHLOR	8 LBS/GAL EC	SINBAR	TERBACIL	80% WP
EPTAM, GENEP	EPTC	7 LBS/GAL EC	SONALAN	ETHALFLURALIN	3 LBS/GAL EC
ERADICANE EXTRA	EPTC + SAFENER + EXTENDER	6.7 LBS/GAL EC	SPIKE	TEBUTHIURON	80% WP; 40 P; 20 P
EVIK	AMETRYNE	80% WP	TORDON	PICLORAM	2 LBS/GAL WS
			TREFLAN	TRIFLURALIN	1 LBS/GAL EC
			TUPERSAN	SIDURON	50% WP
			VELPAR	HEXAZINONE	2 LBS/GAL WS

EC=EMULSIFIABLE CONCENTRATE; WS=WATER SOLUBLE; WP=WETTABLE POWDER; FL=FLOWABLE LIQUID; DF=DRY FLOWABLE; P=PELLETS



	PICLORAM			
	DICAMBA		GLYPHOSATE	
	+	+	2,4-D	+
	+	+	+	+
FIELD BINDWEED	G	G	G	G
SKELETON LEAF BURSAGE	E	G	G	F
WOOLLYLEAF BURSAGE	F	F*	F	F
TEXAS BLUEWEED	E	E	G	G
CHICORY	E	E	G	G
CLAMMY GROUNDCHERRY	E	E	-	N
SILVERLEAF NIGHTSHADE	E	G	E	P
HOUNDSTONGUE	E	G	-	F
DIFFUSE KNAWEED	E	E	-	E
RUSSIAN KNAWEED	G	G	G	P
BLUE LETTUCE	E	G	G	F
SHOWY MILKWEED	E	F	G	N
WESTERN WHORLED MILKWEED	E	-	-	-
MULSEARS	E	G	F	G
MOUSEEAR POVERTYWEED	G	G	G	G
QUACKGRASS	N	N	G	N
BROOM SNAKEWEED	E	G	F	F
PERENNIAL SOWTHISTLE	G	G	G	F
LEAFY SPURGE	G	F	F	P
COMMON TANSY	E	G	E	F
CANADA THISTLE	E	E	G	F
DALMATION TOADFLAX	G	G	G	F
YELLOW TOADFLAX	G	F	G	N
HOARY CRESS	P	F*	G	F
ARROWGRASS	E	G	E	F
DEATHCAMAS	E	E	G	F
HALOGETON	-	-	-	F
WESTERN FALSE HELLEBORE	-	P	-	G
POISON HEMLOCK	E	E	G	G
TALL LARKSPUR	E	P*	G	N
WHITE LOCOWEED (OXYTROPIS SPP.)	E	G	-	F
SILVER LUPINE	E	E	F	F
BLUE LOCO (ASTRAGALUS SPP.)	E	G	E	G
WOOLLY LOCO (ASTRAGALUS SPP.)	E	G	E	G

- E = EXCELLENT - >95% WEED POPULATION KILLED BY A SINGLE APPLICATION.
- G = GOOD - ONE TREATMENT/YEAR MAINTAINS 84-95% TOP GROWTH SUPPRESSION; OR >95% WEEDS KILLED IN 2-3 TREATMENTS.
- F = FAIR - 60-85% OF THE WEED POPULATION KILLED BY A SINGLE TREATMENT; OR 2-3 TREATMENTS/YEAR MAINTAINS 85-94% TOP GROWTH SUPPRESSION.
- P = POOR - 10-59% OF WEED POPULATION KILLED BY A SINGLE TREATMENT; OR 2-3 TREATMENTS/YEAR MAINTAINS 60-84% TOP GROWTH SUPPRESSION.
- N = NONE - LITTLE OR NO EFFECT FROM TREATMENT.
- = - INFORMATION NOT AVAILABLE.

(FROM USDA PUBLICATION AD-BU-2281)

\*NOTE: SANDOZ, MANUFACTURER OF BANVEL (DICAMBA), RATES CONTROL OF WOOLLYLEAF BURSAGE AS GOOD, HOARY CRESS AS FAIR AND OXYTROPIS SPP. AS POOR.



POISON INFORMATION CENTER

There is a Poison Information Center in Colorado which is equipped to provide up-to-date information on cases involving all types of poisonings, including pesticides. They are staffed on a 24-hour basis, every day of the year.

CALL THIS DENVER NUMBER: (Toll Free in Colorado)

(800) 332-3073

For calls from outside Colorado:

(303) 629-1123

Insecticide poisonings almost always require treatment by a physician. You should bring him these numbers and the name of the insecticide. If possible bring a container.

PESTICIDE SAFETY TEAM NETWORK

The National Agricultural Chemicals Association has organized a number of safety teams which may be called in case of a serious accident or spillage involving agricultural chemicals. For information, call this toll-free number:

(800) 424-9300



**Read and Follow Label Instructions Before Using Any Insecticide or Miticide.**

- Store chemicals under lock and key, away from children, pets, food and feed.
- Keep chemicals in their original container.
- Do not eat or smoke while applying pesticides.
- Wear protective clothing and masks as specified on the label.
- Bathe and change clothing immediately after applying insecticide.
- Wash contaminated clothing, separately from noncontaminated, before reuse.
- If chemicals are spilled on skin or clothing, immediately change clothes and wash thoroughly.

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**LEARN THE SYMPTOMS OF PESTICIDE POISONING**

If symptoms develop during or after an application, call a physician and/or take patient to a hospital.

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