Pest Control in Crops Grown in Northwestern New Mexico, 2002

Annual Data Report 100-2002

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Table of Contents **Page**

INTRODUCTION

Weeds cause more total crop losses than any other agricultural pest (Arnold, 1981–2008; Hall et al., 1995; Currie, 2004; Lorenzi and Jeffery, 1987). Weeds reduce crop yields and quality, harbor insects and plant diseases, and cause irrigation and harvesting problems (Chandler et al., 1984; Lorenzi and Jeffery, 1987; Currie, 2005; Massinga et al., 1999, 2003). As a result, weeds reduce the total value of agricultural products in the United States by 10 to 15% (Lorenzi and Jeffery, 1987). Estimated average losses during 1975 to 1979 in the potential production of field corn, potatoes, and onion ranged from 7 to 16% in the Mountain States Region, which includes New Mexico (Chandler et al., 1984). San Juan County ranks first in potato production, fourth in alfalfa production, and second in corn production among all New Mexico counties (New Mexico Agricultural Statistics, 2007).

An estimated 90% of all tillage operations are for weed control (J.G. Foster, personal communications, 2005–2007). Herbicides can reduce the number of required tillage operations and can be used where cultivation is not possible, such as within crop rows or in solid-seeded crops. With increasing fuel and labor costs, herbicides are often more economical than other methods of weed control.

Many herbicides are approved for use on crops grown on medium- and fine-textured, high-organic soils. Little information is available, however, regarding their effectiveness and safety on low-organic, coarse-textured soils that are common to northwestern New Mexico.

The Environmental Protection Agency (EPA) has become more stringent with regard to research data required for pesticide approval. Thus, it has become critical that state Agricultural Science Centers work closely with commercial companies developing new pesticides in order to obtain the research data required by the EPA. This cooperation will benefit the agricultural industry of the state and assist EPA pesticide registration.

Before 1980, the use of herbicides in northwestern New Mexico was limited. Most growers were still using 2,4-D in corn for broadleaf weed control, while annual grasses were left in check. In alfalfa, burning winter annual mustard and downy brome with propane was not uncommon. An herbicide field-screening program has provided essential information on the activity of new and old herbicides on crops grown in northwestern New Mexico (Arnold, 1981–2008).

As new land on the Navajo Indian Irrigation Project comes under cultivation, weed and insect problems are varied and may change with each successive crop. It is only through continued research that the demand for reliable information on the use of pesticides in northwestern New Mexico can be met.

I wish to express my sincere appreciation to the following companies for providing technical assistance, products, and/or financial assistance: Bayer CropSciences, BASF, E.I. DuPont, Gowan, BLM/FFO, FMC, Monsanto, Dow AgroSciences, Navajo Agricultural Products Industry, Pioneer Hi-Bred, Syngenta Crop Protection, and Southwest Seed.

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Broadleaf weed control in spring-seeded alfalfa

Introduction
Seedling alfalfa requires effective broad-spectrum weed control for successful establishment; however, few herbicides are registered for postemergence broadleaf weed control. Pursuit and now recently Raptor have been registered for broadleaf weed control in seedling alfalfa; field trials were conducted to evaluate broadleaf weed control and alfalfa tolerance to Raptor and Pursuit alone or in combination.

Objectives
- To determine herbicide efficacy of Raptor and Pursuit applied alone or in combination for control of broadleaf weeds in spring-seeded alfalfa.
- To determine alfalfa tolerance and yield to applied selected herbicides.

Materials and methods
A field experiment was conducted in 2002 on a Wall sandy loam (less than 1% organic matter) at Farmington to evaluate the response of springseeded alfalfa and annual broadleaf weeds to postemergence applications of Raptor and Pursuit applied alone or in combination. The experimental design was a randomized complete block with three replications. Individual plots were 10 ft wide by 30 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 30 psi. Alfalfa (var. RSC 451) was planted at 20 lbs/ac with a Massey Ferguson grain drill on May 15. Postemergence treatments were applied on June 4, when alfalfa was in the second trifoliolate leaf stage and weeds were small. Black nightshade, redroot and prostrate pigweed, and common lambsquarters infestations were heavy, and Russian thistle infestations were light throughout the experimental area. Crop injury and weed control evaluations were made on July 9. Alfalfa was harvested with an Almaco self-propelled plot harvester on July 29. A grab sample was taken from each treatment in one replication after harvest to determine protein content and relative feed value. Results obtained were subjected to analysis of variance at P = 0.05.

Results and discussion
Weed control and injury evaluations: Results of crop injury and weed control evaluations are given in Tables 1 and 2. Raptor applied at 0.063 lbs ai/ac caused the highest injury rating of 12. Russian thistle control was good to excellent with all treatments except Raptor applied alone at 0.032 lbs ai/ac, Raptor plus Pursuit both applied in combination at 0.024 lbs ai/ac, and Raptor plus Select applied at 0.04 plus 0.094 lbs ai/ac and the check. Redroot and prostrate pigweed, black nightshade, and common lambsquarters control were good to excellent with all treatments except the check. Infestations of kochia were sporadic throughout the experimental area and were controlled only with Raptor and Buctril combinations. It is possible that in northwestern New Mexico, kochia may be becoming resistant to Raptor and Pursuit when applied alone.

Yield and protein content: Results of yield, protein content, and relative feed values are given in Table 2. The weedy check had the highest yield of 3.8 t/ac. Raptor applied at 0.063 lbs ai/ac had the lowest relative feed value and protein content of 145 and 15%, respectively. This can possibly be attributed to the lack of kochia control in the plot area.

Broadleaf weed control in field corn with preemergence herbicides

Introduction
Weeds affect corn by competing for nutrients, light, and moisture. Season-long interference from weeds can reduce corn yields dramatically. Many preemergence herbicides are approved for use on field corn grown on medium- or fine-textured, high organic soils. However, little information is available regarding the effectiveness and safety of herbicides for field corn grown under sprinkler irrigation on low organic matter, coarse-textured soils. These preemergence tests will indicate those herbicides that when applied at normal use rates are effective for season-long weed control in field corn without decreasing yields.

Objectives
- To determine efficacy of selected herbicides for control of annual broadleaf weeds in field corn.
- To determine corn yield and tolerance to applied selected herbicides.

Materials and methods
A field experiment was conducted in 2002 at Farmington to evaluate the response of field corn (var. Pioneer 34M95) and annual broadleaf weeds to preemergence herbicides. Soils were fertilized according to New Mexico State University recommendations based on soil tests. The experimental design was a randomized complete block with three replications. Individual plots were four 34-in. rows 30 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 30 psi. Field corn was planted with flexi-planters equipped with disk openers on May 13. Treatments were applied on May 15 and immediately incorporated with 0.75 in. of sprinkler-applied water. Black nightshade, common lambsquarters, prostrate and redroot pigweed infestations were heavy and Russian thistle infestations were light throughout the experimental area. Visual evaluations of crop injury and weed control were made June 12 and July 12. Standcounts were made on June 12 by counting individual plants per 10 ft of the third row of each plot. Field corn was harvested on December 10 by combining the center two rows

of each plot using a John Deere 3300 combine equipped with a load cell. Results obtained were subjected to analysis of variance at P = 0.05.

Results and discussion

Weed control and injury evaluations: Weed control and crop injury evaluations are given in Tables 3 and 4. Stand counts are given in Table 3. Define plus AAtrex plus Balance applied at 0.20 plus 0.66 plus 0.024 lbs ai/ac and Outlook plus AAtrex plus Balance applied at 0.56 plus 0.66 plus 0.024 lbs ai/ac had the highest injury rating of 7. All treatments except the check gave good to excellent control of broadleaf weeds during both rating periods.

Crop yields: Yields are given in Table 4. Yields were 123 to 171 bu/ac higher in herbicide-treated plots as compared to the check.

Broadleaf weed control in field corn with preemergence and preemergence followed by sequential postemergence herbicides

Introduction

Many herbicides can be used in sequential treatments. These trials are preemergence herbicides followed by sequential postemergence treatments. If weeds escape the preemergence treatment, a postemergence treatment may then be used to assist in weed control.

Objectives

- To determine efficacy of selected herbicides for control of annual broadleaf weeds in field corn.
- To determine corn yield and tolerance to applied selected herbicides.

Materials and methods

A field experiment was conducted in 2002 at Farmington to evaluate the response of field corn (var. Pioneer 34M95) and annual broadleaf weeds to preemergence and preemergence followed by sequential postemergence herbicides. Soils were fertilized according to New Mexico State University recommendations based on soil tests. The experimental design was a randomized complete block with three replications. Individual plots were four 34-in. rows 30 ft long.Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 30 psi. Field corn was planted with flexi-planters equipped with disk openers on May 13. The preemergence treatments were applied on May 15 and immediately incorporated with 0.75 in. of sprinkler-applied water. Sequential postemergence treatments were applied on June 5, when field corn was in the 4th leaf stage, and were evaluated July 8. Black nightshade, redroot and prostrate pigweed infestations were heavy, and Russian thistle and common lambsquarters infestations were light throughout the experimental area. Preemergence, preemergence/sequential postemergence treatments were evaluated visually on June 12 and July 8. Crop injury was evaluated on June 12. Stand counts were made on June 12 by counting individual plants per 10 ft of the third row of each plot. Field corn was harvested on December 10 by combining the center two rows of each plot using a John Deere 3300 combine equipped with a load cell. Results obtained were subjected to analysis of variance at P = 0.05.

Results and discussion

Weed control and injury evaluations: Weed control and crop injury evaluations are given in Tables 5 and 6. Stand counts are given in Table 5. Outlook plus AAtrex plus Balance applied at 0.66 plus 0.8 plus 0.035 lbs ai/ac had the highest injury rating of 16. All treatments except the check gave good to excellent control of redroot and prostrate pigweed, black nightshade, and common lambsquarters. Outlook and Dual II Mag applied preemergence at 0.66 and 0.95 lbs ai/ac gave poor control of Russian thistle. However, when the sequential postemergence treatments were applied, Russian thistle control increased significantly.

Crop yields: Yields are given in Table 6. Yields were 106 to 157 bu/ac higher in herbicide-treated plots as compared to the check.

Broadleaf weed control in field corn with postemergence herbicides

Introduction

Postemergence herbicides are most effective if applied when the weeds and field corn are small. If weeds are not controlled, weeds will become difficult to control with corn growth being restricted. This trial was to examine the efficacy of postemergence herbicides applied when field corn and weeds were small, and to evaluate their effect on crop injury and field corn yields.

Objectives

- To determine efficacy of selected herbicides for control of annual broadleaf weeds in field corn.
- To determine corn yield and tolerance to applied selected herbicides

Materials and methods

A field experiment was conducted in 2002 at Farmington to evaluate the response of field corn (Pioneer 34M95) and annual broadleaf weeds to postemergence herbicides. Soils were fertilized according to New Mexico State University recommendations based on soil tests. The experimental design was a randomized complete block with three replications. Individual plots were four 34-in. rows 30 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 30 psi. Field corn was planted with flexi-planters equipped with disk openers on May 13. Postemergence treatments were applied on June 4, when field corn was in the 4th leaf stage and weeds were small. Black nightshade, redroot and prostrate pigweed infestations were heavy and common lambsquarters infestations were moderate and Russian thistle infestations were light throughout the experimental area. Visual evaluations of crop injury and weed control were made July 8 and August 8. Stand counts were made on July 8 by counting individual plants per 10 ft of the third row of each plot. Field corn was harvested on December 10 by combining the center two rows of each plot using a John Deere 3300 combine equipped with a load cell. Results obtained were subjected to analysis of variance at P = 0.05.

Results and discussion

Weed control and injury evaluations: Weed control and crop injury evaluations are given in Tables 7 and 8. Stand counts are given in Table 7. None of the herbicides caused any noticeable crop injury. Redroot pigweed and prostrate pigweed and common lambsquarters control were good to excellent with all treatments except the check during both rating periods. Steadfast and DPX 79406 applied at 0.035 and 0.023 lbs ai/ac gave poor control of prostrate pigweed and black nightshade during both rating periods. Option applied at 0.033 lbs ai/ac gave poor control of Russian thistle. When Steadfast, DPX 79406, and Option were combined with the other postemergence treatments, broadleaf weed control increased.

Crop yields: Yields are given in Table 8. Yields were 109 to 152 bu/ac higher in herbicide-treated plots as compared to the check.

A demonstration trial involving broadleaf weed control in dry beans

Introduction

Approximately 97% of New Mexico's dry bean production occurs in northwestern New Mexico. Most of this production occurs under sprinkler irrigation on coarse-textured soils. Pinto bean growers usually preplant incorporate one or two herbicides in combination and then follow with one mechanical cultivation for annual weed control. Weeds compete vigorously with dry beans and yield reductions exceeding 70% have been recorded. Many growers are not achieving effective full-season weed control, which has led to the development of Pursuit and Raptor for weed control in dry edible beans.

Objectives

- To determine broadleaf weed control to applied selected herbicides.
- To determine dry bean yield and tolerance to applied selected herbicides.

Materials and methods

A field demonstration trial was conducted in 2002 at Farmington to evaluate the response of dry edible beans (var. Vision) and annual broadleaf weeds to preplant applications of Sonalan, followed by a preemergence application of Valor or in combination with Outlook and Dual II Mag and followed by postemergence applications of Raptor in combination with Basagran. Preplant applications of Sonalan in combination with Outlook or Dual II Mag were made on May 29 and rototilled in at a depth of three in. Valor was applied on May 29 and immediately incorporated with 0.75 in. of sprinkler-applied water. Postemergence applications of Raptor plus Basagran were made on June 26 after cultivation and to the beans in the 3rd trifoliate leaf stage. Soils were fertilized according to New Mexico State University recommendations based on soil tests. Individual plots were four 34-in. rows 360 ft long.Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 30 psi. Dry beans were planted with flexi-planters equipped with disk openers on May 29. Black nightshade and prostrate and redroot pigweed infestations were heavy and common lambsquarters and Russian thistle infestations were light throughout the experimental area. Preplant and preemergence treatments were evaluated on June 26. Postemergence treatments were evaluated on July 29. Dry beans were cut and left in the field one week before thrashing. Dry beans were harvested on August 22 by combining the two center rows of each plot.

Results and discussion

Weed control evaluations: Weed control evaluations are given in Tables 9 and 10. All treatments except the check gave excellent control of broadleaf weeds during both rating periods.

Crop yields: Yields are given in Table 10. Yields were 2,914 to 3,260 lbs/ac higher in the herbicide treated plots as compared to the check.

Broadleaf weed control in sunflowers

Introduction

Sunflower is a crop that is usually planted in dry land situations under limited rainfall. Sunflower seed is mainly harvested for its oil content. The sunflower is adapted for seed production where corn is successful in the northern two-thirds of the U.S. Little information is available on the use of herbicides for control of broadleaf weeds in sunflower on coarse-textured soils.

Objectives

- To determine efficacy of selected herbicides for control of annual broadleaf weeds in sunflowers.
- To determine sunflower yield and tolerance to applied selected herbicides.

Materials and methods

A field demonstration trial was conducted in 2002 at Farmington to evaluate the response of sunflowers (NK 278) and annual broadleaf weeds to preemergence applications of Outlook, Dual II Mag, and Spartan applied alone or in combination with Dual II Mag. Sunflowers were planted on May 30 with flexi-planters equipped with disk openers. Soils were fertilized according to New Mexico State University recommendations based on soil tests. Plots were four 34-in. rows 360 ft long. Preemergence applications were applied on May 30 and immediately incorporated with 0.75 in. of sprinkler-applied water. Crop injury and weed control evaluations were made on June 27 and July 29. Black nightshade and prostrate and redroot pigweed infestations were heavy and common lambsquarters and Russian thistle infestations were light throughout the experimental area. Sunflowers were harvested for yield on October 8 by combining the two center rows from each plot using a John Deere 3300 combine equipped with a load cell.

Results and discussion

Weed control and injury evaluations: Weed control evaluations are given in Tables 11 and 12. All treatments except the check gave good to excellent control of redroot and prostrate pigweed and common lambsquarters during both rating periods.

Crop yields: Yields are given in Table 12. Yields were 1,561 to 1,629 lb/ac higher in the herbicide-treated plots as compared to the check.

Russian knapweed control in Montezuma County, Colorado

Introduction

Today over 100 million acres on the North American continent are struggling against invasive, non-native plants that have no respect for property boundaries. This invasion poses a serious threat to the integrity and productivity of our nation's landscape. One such invasive noxious weed is Russian knapweed, which has spread tremendously throughout San Juan County, New Mexico and Southwestern Colorado.

Objectives

- To determine efficacy of selected herbicides for control of Russian knapweed in Montezuma County, Colorado.

Materials and methods

Two field experiments were conducted in 2002 to evaluate the response of Russian knapweed at the Cortez Drive-In and of Canada thistle at Mr. Tom Colvert's ranch to selected postemergence herbicides. Both sites are located in Montezuma County, Colorado, and experiments were conducted in cooperation with Mr. Kenny Smith, Colorado State University, Montezuma County Cooperative Extension Agent. The experimental design was a randomized complete block with three replications. Individual plots were 12 ft wide by 25 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 30 psi. Treatments were applied on September 19, 2001 when Russian knapweed and Canada thistle were in the pre-bloom to bloom stage. All treatments were applied with a COC at 1% v/v. Treatments were rated approximately one year after treatment on October 1, 2002.

Results and discussion

Weed control evaluations: Weed control evaluations for Russian knapweed and Canada thistle are given in Tables 13 and 14. Russian knapweed control was poor with all treatments. Canada thistle control was poor with all treatments except Tordon 101 and Transline applied postemergence at 2.54 and 0.5 lb ai/ac. Control of both these weeds was poor in 2002 as compared to 2001 with most products tested; this may be attributed possibly to the low winter moisture received in 2001.

Table 1. Control of Annual Broadleaf Weeds with Postemergence Applications of Raptor and Pursuit Applied Alone or in Combination in Spring-Seeded Alfalfa, July 9, 2002; at Farmington, NM

		Crop	Weed Control[b,c]				
	Rate	Injury[b]	Saskr	Amare	Amabl	Solni	Cheal
Treatments[a]	(lb/ac)	(%)	(%)				
Raptor	0.032	0	88	98	98	97	96
Raptor	0.04	0	92	100	100	100	99
Raptor	0.047	0	93	100	100	100	98
Raptor + Pursuit	0.024 + 0.024	0	86	100	100	96	94
Raptor + Pursuit	0.032 + 0.032	0	92	100	100	100	99
Raptor	0.063	12	94	100	100	100	98
Raptor + Buctril	0.032 + 0.25	0	100	100	100	100	100
Raptor + Buctril	0.04 + 0.25	0	100	100	100	100	100
Raptor + Buctril	0.047 + 0.25	0	100	100	100	100	100
Raptor + Select	0.032 + 0.094	0	92	98	97	96	97
Raptor + Select	0.04 + 0.094	0	89	100	100	100	97
Raptor + Select	0.047 + 0.094	0	94	100	100	100	98
Pursuit	0.047	0	90	100	100	98	95
Pursuit	0.063	0	94	100	100	100	98
Pursuit + Select	0.063 + 0.094	0	93	100	100	99	97
Weedy check)		0	0	0	0	0	0
LSD 0.05		1	6	1	2	2	2

[a]Treatments applied with COC and 32-0-0 at 0.5% and 1.0% v/v.
[b]Based on visual scale from 0 to 100, where 0 = no control or crop injury and 100 = dead plants.
[c]Saskr = Russian thistle, Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, and Cheal = common lambsquarters.

Table 2. Yield of RSC 451 Alfalfa Sprayed with Postemergence Applications of Raptor and Pursuit Applied Alone or in Combination in Spring-Seeded Alfalfa, July 29, 2002; at Farmington, NM

	Rate	Yield	RFV[b]	Protein Content
Treatments[a]	(lb/ac)	T/ac	(no.)	(%)
Raptor	0.032	2.7	170	18.6
Raptor	0.04	2.7	179	20.3
Raptor	0.047	2.5	177	19.7
Raptor + Pursuit	0.024 + 0.024	2.8	157	18.9
Raptor + Pursuit	0.032 + 0.032	2.5	160	19.5
Raptor	0.063	2.6	145	15.0
Raptor + Buctril	0.032 + 0.25	2.5	188	22.5
Raptor + Buctril	0.04 + 0.25	2.5	190	23.9
Raptor + Buctril	0.047 + 0.25	2.3	189	22.7
Raptor + Select	0.032 + 0.094	2.5	147	16.9
Raptor + Select	0.04 + 0.094	2.5	207	23.1
Raptor + Select	0.047 + 0.094	2.7	172	20.1
Pursuit	0.047	2.5	207	22.4
Pursuit	0.063	2.6	185	22.1
Pursuit + Select	0.063 + 0.094	3.1	164	19.3
Weedy check		3.8	160	17.2
LSD 0.05		0.4		

[a]Treatments applied with a COC at 1.0% v/v and AMS at 5 lb/ac.
[b]RFV = relative feed value.

Table 3. Control of Annual Broadleaf Weeds with Preemergence Perbicides in Field Corn on June 12, 2002; at Farmington, NM

Treatments[a]	Rate (lbs/ac)	Crop Injury[b] (%)	Stand Count (no.)	Weed Control[b,c] (%) Cheal	Amare	Amabl	Solni	Saskr
Axiom (pm) + AAtrex	0.17 + 0.66	0	23	100	100	100	100	100
Define + Epic (pm)	0.20 + 0.16	0	23	100	100	100	100	100
Define + AAtrex	0.45 + 0.66	0	23	100	100	100	100	100
Define + Balance	0.45 + 0.024	6	21	100	100	100	100	100
Define + Callisto	0.45 + 0.15	4	23	100	100	99	100	100
Define + Epic (pm)	0.158 + 0.13	0	23	100	100	99	100	100
Define + AAtrex + Balance	0.20 + 0.66 + 0.024	7	22	100	100	100	100	100
Outlook + Balance	0.56 + 0.024	6	22	100	100	100	100	100
Outlook + Callisto	0.56 + 0.15	4	23	100	100	100	100	100
Outlook + AAtrex	0.56 + 0.66	3	24	100	100	100	100	100
Outlook + AAtrex + Balance	0.56 + 0.66 + 0.024	7	22	100	100	100	100	100
Outlook + AAtrex +Callisto	0.56 + 0.66 + 0.15	3	24	100	100	100	100	100
Dual II Mag + Balance	0.95 + 0.024	6	21	100	100	100	100	100
Dual II Mag + Callisto	0.95 + 0.15	0	23	100	100	100	100	100
Bicep Lite II Mag	2.25	0	24	100	100	100	100	100
Weedy check		0	23	0	0	0	0	0
LSD 0.05		3	ns	1	1	0.5	1	1

[a]pm = packaged mix.
[b]Based on a visual scale from 0 to 100, where 0 = no control or crop injury and 100 = dead plants.
[c]Cheal = common lambsquarters, Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, and Saskr = Russian thistle.

Table 4. Control of Annual Broadleaf Weeds with Preemergence Herbicides in Field Corn on July 12, 2002; at Farmington, NM

Treatments[a]	Rate (lb/ac)	Weed Control[b,c] (%) Cheal	Amare	Amabl	Solni	Saskr	Yield (bu/ac)
Axiom (pm) + AAtrex	0.17 +0.66	100	97	100	98	98	235
Define + Epic (pm)	0.20 + 0.16	100	97	100	94	98	228
Define + AAtrex	0.45 + 0.66	100	100	100	99	100	210
Define + Balance	0.45 + 0.024	100	100	100	100	95	226
Define + Callisto	0.45 + 0.15	100	100	100	97	99	244
Define + Epic (pm)	0.158 + 0.13	100	100	100	100	99	231
Define + AAtrex + Balance	0.20 + 0.66 + 0.024	100	100	100	100	100	243
Outlook + Balance	0.56 + 0.024	100	99	100	100	94	219
Outlook + Callisto	0.56 + 0.15	97	100	100	99	90	215
Outlook + AAtrex	0.56 + 0.66	98	99	100	100	99	220
Outlook + AAtrex + Balance	0.56 + 0.66 + 0.024	99	100	100	100	100	227
Outlook + AAtrex + Callisto	0.56 + 0.66 + 0.15	100	100	100	100	99	214
Dual II Mag + Balance	0.95 + 0.024	99	100	100	100	92	227
Dual II Mag + Callisto	0.95 + 0.15	98	98	100	99	95	258
Bicep Lite II Mag	2.25	100	98	100	98	98	240
Weedy check		0	0	0	0	0	87
LSD 0.05		2	2	1	2	3	57

[a]pm = packaged mix.
[b]Based on a visual scale from 0 to 100, where 0 = no control and 100 = dead plants.
[c]Cheal = common lambsquarters, Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle.

Table 5. Control of Annual Broadleaf Weeds with Preemergence and Preemergence Followed by Sequential Postemergence Herbicides in Field Corn on June 12, 2002; at Farmington, NM

		Crop	Stand	Weed Control[d,e]				
	Rate	Injury[d]	Count	Amare	Amabl	Solni	Cheal	Saskr
Treatments[a]	(lb/ac)	(%)	(no.)	(%)				
Callisto + Dual (pm) 2-way mix	1.83	0	23	100	100	100	100	100
Callisto + Dual (pm) 2-way mix	2.2	0	23	100	100	100	100	100
Callisto + Dual + AAtrex (pm) 3-way mix	2.4	0	23	100	100	100	100	100
Outlook + AAtrex + Prowl H_20	0.66 + 0.8 + 1.0	5	23	100	100	100	100	100
Bicep Lite II Mag (pm) + Balance	.9 +0.035	10	23	100	100	99	100	100
Dual II Mag + Balance	1.1 + 0.035	11	24	100	100	99	100	100
Outlook + AAtrex + Balance	0.66 + 0.8 + 0.035	16	22	100	100	100	100	100
Outlook + Balance	0.66 + 0.035	14	23	100	100	100	100	100
Bicep Lite II Mag (pm)/Callisto[b]	2.0/0.094	0	23	100	100	100	100	100
Dual II Mag/Callisto +AAtrex[b]	0.95 + 0.094 + 0.25	0	23	100	100	100	100	55
Outlook/Marksman[b] (pm)	0.66 + 0.8	6	22	100	100	100	100	61
Outlook/Distinct (pm) + AAtrex[b,c]	0.66/0.18 + 0.5	5	23	100	100	100	100	53
Outlook + AAtrex/Distinct[b,c] (pm)	0.66 + 0.8/0.18	3	23	100	100	100	100	100
Outlook + Prowl H_2O/Marksman[b] (pm)	0.66 + 1.0/0.8	6	23	100	100	100	100	100
Outlook + Prowl H_2O/Distinct (pm) + AAtrex[b,c]	0.66 + 1.0/0.18 + 0.5	0	23	100	100	100	100	100
Weedy check		0	24	0	0	0	0	0
LSD 0.05		3	ns	1	1	1	1	5

[a]pm = packaged mix.
[b]First treatment applied preemergence followed by a sequential postemergence treatment.
[c]Sequential postemergence treatment applied with NIS and 32-0-0 at 0.25% and 1.0% v/v.
[d]Based on a visual scale from 0 to 100, where 0 = no control or crop injury and 100 = dead plants.
[e]Amare = redroot pigweed, Amabl =prostrate pigweed, Solni = black nightshade, Cheal = common lambsquarters, and Saskr = Russian thistle.

Table 6. Control of Annual Broadleaf Weeds with Preemergence and Preemergence Followed by Sequential Postemergence Herbicides in Field Corn on July 8, 2002; at Farmington, NM 2002

		Weed Control[h,l]					
	Rate	Amare	Amabl	Solni	Cheal	Saskr	Yield
Treatments[a]	(lb/ac)	(%)					(bu/ac)
Callisto + Dual (pm) 2-way mix	1.83	95	98	96	96	94	232
Callisto + Dual (pm) 2-way mix	2.2	96	100	97	98	96	220
Callisto + Dual + AAtrex (pm) 3-way mix	2.4	98	100	99	99	98	232
Outlook + AAtrex + Prowl H_20	0.66 + 0.8 + 1.0	98	98	99	100	100	228
Bicep Lite II Mag (pm) + Balance	1.9 + 0.035	99	100	100	100	100	203
Dual II Mag + Balance	1.1 + 0.035	97	98	98	98	99	206
Outlook + AAtrex + Balance	0.66 + 0.8 + 0.035	99	100	100	100	100	195
Outlook + Balance	0.66 + 0.035	98	97	100	98	100	198
Bicep Lite II Mag (pm)/Callisto[b]	2.0/0.094	100	98	97	100	99	240
Dual II Mag/ Callisto + AAtrex[b]	0.95/0.094 + 0.25	100	100	98	99	71	246
Outlook/Marksman[b] (pm)	0.66 + 0.8	99	100	100	99	95	212
Outlook/Distinct (pm) + AAtrex[b,c]	0.66/0.18 + 0.5	99	99	100	99	99	217
Outlook + AAtrex/Distinct[b,c] (pm)	0.66 + 0.8/0.18	99	99	100	100	98	245
Outlook + Prowl H_2O/Marksman[b] (pm)	0.66 + 1.0/0.8	100	98	100	100	100	213
Outlook + Prowl H_2O/Distinct (pm) + AAtrex[b,c]	0.66 + 1.0/0.18 + 0.5	95	97	100	100	99	219
Weedy check		0	0	0	0	0	89
LSD 0.05		3	2	3	2	5	46

[a]pm = packaged mix.
[b]First treatment applied preemergence followed by a sequential postemergence treatment.
[c]Sequential postemergence treatment applied with NIS and 32-0-0 at 0.25% and 1.0% v/v.
[d]Based on a visual scale from 0 to 100, where 0 = no control or crop injury and 100 = dead plants.
[e]Amare = redroot pigweed, Amabl =prostrate pigweed, Solni = black nightshade, Cheal = common lambsquarters, and Saskr = Russian thistle.

Table 7. Control of Annual Broadleaf Weeds with Postemergence Herbicides in Field Corn on July 8, 2002; at Farmington, NM

		Crop	Stand	Weed Control[b,c]				
	Rate	Injury[b]	Count	Cheal	Amare	Amabl	Solni	Saskr
Treatments[a]	(lb/ac)	(%)	(no.)	(%)				
Steadfast (pm)	0.035	0	23	100	100	56	46	100
Steadfast (pm) + Clarity	0.035 + 0.25	0	23	100	100	98	98	100
Steadfast (pm) + Marksman (pm)	0.035 + 0.4	0	23	100	100	99	99	100
Steadfast (pm) + Distinct (pm)	0.035 + 0.09	0	23	100	100	73	98	100
Steadfast (pm) + Callisto	0.035 + 0.06	0	23	100	100	98	71	100
DPX 79406 (pm)	0.023	0	23	100	100	52	43	100
DPX 79406 (pm) + Clarity	0.023 + 0.25	0	24	100	100	93	98	100
DPX 79406 (pm) + Marksman (pm)	0.023 + 0.4	0	24	100	100	96	98	100
DPX 79406 (pm) + Distinct (pm)	0.023 + 0.09	0	23	100	100	98	98	100
DPX 79406 (pm) + Callisto	0.023 + 0.06	0	24	100	100	99	70	100
Option (pm)	0.033	0	23	100	100	89	36	100
Option (pm) + Clarity	0.033 + 0.25	0	23	100	100	98	98	100
Option (pm) + Distinct (pm)	0.033 + 0.09	0	23	100	100	98	98	100
Option (pm) + Marksman (pm)	0.033 + 0.4	0	23	100	100	100	98	100
Option (pm) + Callisto	0.033 + 0.06	0	23	100	100	98	73	100
Weedy check		0	23	0	0	0	0	0
LSD 0.05		ns	ns	1	1	8	9	1

[a]All treatments were applied with 32-0-0 and COC at 1% and 0.5 v/v, and pm = packaged mix .
[b]Based on a visual scale from 0 to 100, where 0 = no control or crop injury and 100 = dead plants.
[c]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 8. Control of Annual Broadleaf Weeds with Postemergence Herbicides in Field Corn on August 8, 2002; at Farmington, NM

		Weed Control[b,c]					
	Rate	Amare	Amabl	Solni	Cheal	Saskr	Yield
Treatments[a]	(lb/ac)	(%)					(bu/ac)
Steadfast (pm)	0.035	96	95	48	40	99	219
Steadfast (pm) + Clarity	0.035 + 0.25	97	97	91	97	99	249
Steadfast (pm) + Marksman (pm)	0.035 + 0.4	97	99	95	97	97	244
Steadfast (pm) + Distinct (pm)	0.035 + 0.09	92	96	68	97	98	256
Steadfast (pm) + Callisto	0.035 + 0.06	96	95	97	70	98	262
DPX 79406 (pm)	0.023	97	97	33	46	97	229
DPX 79406 (pm) + Clarity	0.023 + 0.25	98	97	91	97	96	247
DPX 79406 (pm) + Marksman (pm)	0.023 + 0.4	96	99	96	96	98	246
DPX 79406 (pm) + Distinct (pm)	0.023 + 0.09	95	97	92	97	97	255
DPX 79406 (pm) + Callisto	0.023 + 0.06	94	96	98	73	98	238
Option (pm)	0.033	98	94	86	36	98	225
Option (pm) + Clarity	0.033 + 0.25	97	99	97	97	96	243
Option (pm) + Distinct (pm)	0.033 + 0.09	99	98	96	96	98	258
Option (pm) + Marksman (pm)	0.033 + 0.4	98	98	96	96	98	240
Option (pm) + Callisto	0.033 + 0.06	97	98	96	70	97	248
Weedy check		0	0	0	0	0	110
LSD 0.05		4	3	8	6	3	36

[a]All treatments were applied with 32-0-0 and COC at 1% and 0.5 % v/v, and pm = packaged mix.
[b]Based on a visual scale from 0 to 100, where 0 = no control and 100 = dead plants.
[c]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 9. Control of Annual Broadleaf Weeds with Preplant Applications of Sonalan Followed by a Preemergence Application of Valor or in Combination with Outlook and Dual II Mag and Followed by Postemergence Applications of Raptor in Combination with Basagran June 26, 2002; at Farmington, NM

		Weed Control[b,c]				
	Rate	Cheal	Amare	Amabl	Solni	Saskr
Treatments[a]	(lb/ac)			(%)		
Sonalan + Outlook/Raptor + Basagran[c]	0.94 + 0.65/0.032 + 0.5	100	100	100	98	98
Sonalan + Duall II Mag/Raptor +Basagran[c]	0.94 + 1.25/0.032 + 0.5	100	100	100	99	100
Sonalan/Valor/Raptor + Basagran[c]	0.94/0.063/0.032 + 0.5	100	100	100	100	100
Valor[d]/Raptor + Basagran[c]	0.063/0.032 + 0.5	100	100	98	100	90
Weedy check		0	0	0	0	0

[a]Based on a visual scale from 0 to 100, where 0 = no control and 100 = dead plants.
[b]Cheal = common lambsquarters, Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, and Saskr = Russian thistle.
[c]Treatments applied postemergence after cultivation with COC and 32-0-0 applied at 0.5% and 1.0% v/v.
[d]Valor applied preemergence.

Table 10. Control of Annual Broadleaf Weeds with Preplant Applications of Sonalan Followed by a Preemergence Application of Valor or in Combination with Outlook and Dual II Mag and Followed by Postemergence Applications of Raptor in Combination with Basagran July 29, 2002; at Farmington, NM

		Weed Control[b,c]					Vision
	Rate	Cheal	Amare	Amabl	Solni	Saskr	Yield
Treatments[a]	(lbs/ac)			(%)			(bu/ac)
Sonalan + Outlook/Raptor + Basagran[c]	0.94 + 0.65/0.032 + 0.5	100	100	100	100	100	3,560
Sonalan + Duall II Mag/Raptor + Basagran[c]	0.94 + 1.25/0.032 + 0.5	100	100	100	100	100	3,234
Sonalan/Valor/Raptor + Basagran[c]	0.94/0.063/0.032 + 0.5	100	100	100	99	100	3,580
Valor[d]/Raptor + Basagran[c]	0.063/0.032 + 0.5	98	100	100	99	95	3,542
Weedy check		0	0	0	0	0	320

[a]Based on a visual scale from 0 to 100, where 0 = no control and 100 = dead plants.
[b]Cheal = common lambsquarters, Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, and Saskr = Russian thistle.
[c]Treatments applied postemergence after cultivation with COC and 32-0-0 applied at 0.5% and 1.0% v/v.
[d]Valor applied preemergence.

Table 11. Control of Annual Broadleaf Weeds in Sunflowers with Preemergence Applications of Frontier, Dual II Mag and Spartan Applied Alone or in Combination with Dual II Mag, June 27, 2002

		Weed Control[b,c]				
	Rate	Cheal	Amare	Amabl	Solni	Saskr
Treatments[a]	(lb/ac)			(%)		
Outlook	0.65	98	96	94	98	60
Dual II Mag	1.25	95	96	89	95	55
Spartan	0.094	98	97	83	88	44
Dual II Mag + Spartan	1.0 + 0.094	100	100	99	100	85
Check		0	0	0	0	0

[a]Based on a scale from 0 to 100 where 0 = no control and 100 = dead plants.
[b]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Cheal = common lambsquarters, and Saskr = Russian thistle.

Table 12. Control of Annual Broadleaf Weeds in Sunflowers with Preemergence Applications of Frontier, Dual II Mag and Spartan Applied Alone or in Combination with Dual II Mag, July 29, 2002

		Weed Control[b,c]					
	Rate	Cheal	Amare	Amabl	Solni	Saskr	Yield
Treatments[a]	(lb/ac)	(%)					(bu/ac)
Frontier	0.65	97	92	85	94	50	2,275
Dual II Mag	1.25	91	90	77	93	55	2,217
Spartan	0.094	94	92	65	85	35	2,492
Dual II Mag + Spartan	1.0 + 0.094	97	97	94	95	68	2,285
Check		0	0	0	0	0	656

[a]Based on a visual scale from 0 to 100 where 0 = no control and 100 = dead plants.
[b]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Cheal = common lambsquarters, and Saskr = Russian thistle.

Table 13. Control of Russian Knapweed at the Cortez Drive-in with Selected Herbicides Applied Postemergence on September 19, 2001 and Rated Approximately One Year After Treatment on October 1, 2002

Treatments[a]	Rate (lb/ac)	Weed Control Centre[b] (%)
Tordon 101	1.27	16
Tordon 101	2.54	50
Transline	0.25	7
Transline	0.50	50
Remedy	0.65	16
Remedy	1.25	1
Crossbow	1.50	2
Crossbow	3.00	5
Curtail	1.20	18
Curtail	2.40	65
Banvel	2.00	6
Weedy check	0.00	0
LSD 0.05		36

[a]Treatments applied postemergence on September 19, 2001.
[b] Cenre = Russian knapweed and rated approximately one year after treatment on October 1, 2002.

Table 14. Control of Canada Thistle at Tom Culvert's Ranch with Selected Herbicides Applied Postemergence on September 19, 2002 and Rated Approximately One Year After Treatment on October 1, 2002

Treatments[a]	Rate (lb/ac)	Weed Control Centre[b] (%)
Tordon 101	1.27	58
Tordon 101	2.54	94
Transline	0.25	71
Transline	0.50	95
Remedy	0.65	48
Remedy	1.25	40
Crossbow	1.50	45
Crossbow	3.00	45
Curtail	1.20	73
Curtail	2.40	69
Banvel	2.00	73
Weedy check	0.00	0
LSD 0.05		42

[a]Treatments applied postemergence on September 19, 2001.
[b]Cirar = Canada thistle and rated approximately one year after treatment on October 1, 2002.

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