Pest Control in Crops Grown in Northwestern New Mexico, 2003

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

Materials and methods

A field experiment was conducted in 2003 on a Wall sandy loam (less than 1% organic matter) at Farmington, NM to evaluate the response of spring-seeded 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. WL 325) was planted at 20 lb/ac with a Massey Ferguson grain drill on May 14. Postemergence treatments were applied on June 5 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 10. Alfalfa was harvested with an Almaco self-propelled plot harvester on August 4. 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 Table 1. Raptor applied at 0.063 lb ai/ac caused the highest injury rating of 13. Russian thistle control was good to excellent with all treatments except Raptor applied alone at 0.032 lb ai/ac, Raptor plus Pursuit both applied in combination at 0.024 lb ai/ac, Raptor plus Select applied at 0.032 plus 0.094 lb 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 maybe 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 3.5 t/ac. Raptor plus Buctril applied at 0.032 plus 0.25 lb ai/ac had the lowest relative feed value of 147. Pursuit applied at 0.63 lb ai/ac had the highest protein content of 23.2%.

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 2003 at Farmington, NM, to evaluate the response of field corn (var. Pioneer 34N44) 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 12. Treatments were applied on May 14 and immediately incorporated with 0.75 in. of sprinkler-applied water. Black nightshade, common lambsquarters, and 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 17. 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 4 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 lb ai/ac and Dual II Mag plus Balance applied at 0.95 plus 0.024 lb 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 44 to 152 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. Theses 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 2003 at Farmington, NM, to evaluate the response of field corn (var. Pioneer 34N44) 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 12. The preemergence treatments were applied on May 14 and immediately incorporated with 0.75 in. of sprinkler-applied water. Sequential postemergence treatments were applied on June 2, when field corn was in the 4th leaf stage, and were evaluated July 3. Black nightshade and redroot and prostrate pigweed infestations were heavy and Russian thistle and common lambsquarters infestations were light throughout the experimental area. Preemergence and preemergence/sequential postemergence treatments were evaluated visually on June 12 and July 3. 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 4 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 lb 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 lb 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 101 to 151 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, they will become difficult to control, and corn growth being restricted. This trial examined the efficacy of postemergence herbicides applied when field corn and weeds were small, and evaluated 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 2003 at Farmington, NM, to evaluate the response of field corn (var. Pioneer 34N44) 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 flex-planters equipped with disk openers on May 14. Postemergence treatments were applied on June 2, when field corn was in the 4th leaf stage and weeds were small. Black nightshade and redroot and prostrate pigweed infestations were heavy, 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 17 and August 13. Stand counts were made on July 17 by counting individual plants per 10 ft of the third row of each plot. Field corn was harvested on December 4 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 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 lb ai/ac gave poor control of Russian thistle and black nightshade during both rating periods. Option applied at 0.033 lb 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 86 to 150 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 2003 at Farmington, NM, to evaluate the response of dry edible beans (var. Bill Z) and annual broadleaf weeds to preplant-incorporated applications of Outlook and Dual II Magnum in combination with Prowl, Prowl H_2O, and Sonalan, and preemergence application of Valor, all followed by a postemergence application of Raptor in combination with Basagran. Preplant incorporated treatments were made on May 28 and roto-tilled in at a depth of 3 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 24 after cultivation, when the beans were 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 180 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 25. 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 September 30 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 gave excellent control of broadleaf weeds except the check during both rating periods.

Crop yields: Yields are given in Table 10. Yields were 3,588 to 4,356 lb/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 2003 at Farmington, NM, to evaluate the response of sunflowers var. (NK 278) and annual broadleaf weeds to preemergence applications of Outlook, Dual II Mag, and Spartan applied alone or in combination. Sunflowers were planted on June 3 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 June 4 and immediately incorporated with 0.75 in. of sprinkler-applied water. Crop injury and weed control evaluations were made on July 7 and August 11. 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 September 29 using a John Deere 3300 combine equiped with a load cell.

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. Russian thistle control was poor with all treatments.

Crop yields: Yields are given in Table 12. Yields were 2,030 to 2,305 lb/ac higher in the herbicide treated plots as compared to the check.

Table 1. Control of Annual Broadleaf Weeds with Postemergence Applications of Raptor and Pursuit Applied Alone or in Combination in Spring-Seeded Alfalfa, July 10, 2003; 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	97	96	97
Raptor	0.04	0	91	98	98	99	99
Raptor	0.047	0	92	100	100	100	98
Raptor + Pursuit	0.024 + 0.024	0	85	100	100	96	95
Raptor + Pursuit	0.032 + 0.032	0	89	100	99	100	96
Raptor	0.063	13	93	100	99	100	98
Raptor + Buctril	0.032 + 0.25	1	99	99	100	99	99
Raptor + Buctril	0.04 + 0.25	2	100	100	100	100	99
Raptor + Buctril	0.047 + 0.25	1	100	100	100	100	100
Raptor + Select	0.032 + 0.094	0	88	99	98	96	98
Raptor + Select	0.04 + 0.094	0	90	100	99	99	98
Raptor + Select	0.047 + 0.094	0	91	99	100	100	97
Pursuit	0.047	0	84	98	100	98	96
Pursuit	0.063	0	88	99	100	99	98
Pursuit + Select	0.063 + 0.094	0	89	100	100	99	98
Weedy check		0	0	0	0	0	0
LSD 0.05		1	4	1	1	1	2

[a]Treatments applied with COC and 32-0-0 at 0.5% and 1.0% v/v, respectively.
[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 WL 325 Alfalfa Sprayed with Postemergence Applications of Raptor and Pursuit Applied Alone or in Combination in Spring-Seeded Alfalfa, August 4, 2003; at Farmington, NM

Treatments[a]	Rate (lb/ac)	Yield t/ac	RFV[b] (no.)	Protein Content (%)
Raptor	0.032	2.3	170	20.3
Raptor	0.04	2.3	139	19.3
Raptor	0.047	2.2	196	20.8
Raptor + Pursuit	0.024 + 0.024	2.6	160	19.7
Raptor + Pursuit	0.032 + 0.032	2.3	152	19.5
Raptor	0.063	2.0	155	20.3
Raptor + Buctril	0.032 + 0.25	2.1	147	18.3
Raptor + Buctril	0.04 + 0.25	2.0	175	19.4
Raptor + Buctril	0.047 + 0.25	2.0	188	23.0
Raptor + Select	0.032 + 0.094	2.2	189	20.1
Raptor + Select	0.04 + 0.094	2.4	185	17.5
Raptor + Select	0.047 + 0.094	1.9	183	20.3
Pursuit	0.047	2.5	172	19.9
Pursuit	0.063	2.2	173	23.2
Pursuit + Select	0.063 + 0.094	2.4	173	20.5
Weedy check		3.5	168	17.2
LSD 0.05		0.3		

[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 Herbicides in Field Corn on June 12, 2003; at Farmington, NM

		Crop	Stand	Weed Control[b,c]				
	Rate	Injury[b]	Count	Cheal	Amare	Amabl	Solni	Saskr
Treatments[a]	(lb/ac)	(%)	(no.)	(%)				
Axiom (pm) + AAtrex	0.17 + 0.66	0	24	100	100	98	98	99
Define + Epic (pm)	0.20 + 0.16	1	24	100	100	99	99	100
Define + AAtrex	0.45 + 0.66	1	23	99	100	99	100	100
Define + Balance	0.45 + 0.024	5	22	100	100	100	100	100
Define + Callisto	0.45 + 0.15	2	24	99	100	99	99	96
Define + Epic (pm)	0.158 + 0.13	1	24	98	100	100	100	100
Define + AAtrex + Balance	0.20 + 0.66 + 0.024	7	21	100	100	99	99	100
Outlook + Balance	0.56 + 0.024	4	23	100	100	100	100	100
Outlook + Callisto	0.56 + 0.15	4	23	99	100	98	100	100
Outlook + AAtrex	0.56 + 0.66	2	23	100	100	100	98	100
Outlook + AAtrex + Balance	0.56 + 0.66 + 0.024	4	22	100	100	100	98	100
Outlook + AAtrex + Callisto	0.56 + 0.66 + 0.15	4	23	99	100	99	100	99
Dual II Mag +Balance	0.95 + 0.024	7	21	98	100	98	100	100
Dual II Mag + Calisto	0.95 + 0.15	0	23	100	100	99	99	97
Bicep Lite II Mag	2.25	0	23	99	100	100	100	100
Weedy check		0	23	0	0	0	0	0
LSD 0.05		2	ns	1	1	1	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 17, 2003; Farmington, NM

		Weed Control[b,c]					
	Rate	Cheal	Amare	Amabl	Solni	Saskr	Yield
Treatments[a]	(lb/ac)			(%)			(bu/ac)
Axiom (pm) + AAtrex	0.17 + 0.66	98	98	98	95	97	275
Define + Epic (pm)	0.20 + 0.16	100	98	98	95	98	242
Define + AAtrex	0.45 + 0.66	97	99	97	98	100	259
Define + Balance	0.45 + 0.024	100	100	100	99	99	264
Define + Callisto	0.45 + 0.15	98	98	99	98	95	250
Define + Epic (pm)	0.158 + 0.13	96	100	98	99	99	253
Define + Atrex + Balance	0.20 + 0.66 + 0.024	99	98	100	98	100	261
Outlook + Balance	0.56 + 0.024	100	100	98	100	100	175
Outlook + Callisto	0.56 + 0.15	98	98	98	100	99	194
Outlook + AAtrex	0.56 + 0.66	99	99	98	96	98	171
Outlook + AAtrex + Balance	0.56 + 0.66 + 0.024	100	100	99	98	100	184
Outlook + AAtrex + Callisto	0.56 + 0.66+ 0.15	97	98	99	100	98	240
Dual II Mag + Balance	0.95 + 0.024	97	100	96	100	100	265
Dual II Mag + Callisto	0.95 + 0.15	99	99	99	98	96	254
Bicep Lite II Mag	2.25	97	98	98	99	98	279
Weedy check		0	0	0	0	0	127
LSD 0.05		1	1	1	1	1	34

[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, 2003; 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	24	100	100	100	100	100
Callisto + Dual (pm) 2- way mix	2.2	0	24	100	100	100	100	100
Callisto + Dual + AAtrex (pm) 3-way mix	2.4	0	24	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	1.9 + 0.035	10	23	100	100	100	100	100
Dual II Mag + Balance	1.1 + 0.035	9	24	100	100	100	100	100
Outlook + AAtrex + Balance	0.66 + 0.8 + 0.035	16	23	100	100	100	100	100
Outlook + Balance	0.66 + 0.035	13	22	100	100	100	100	100
Bicep Lite II Mag (pm) /Callisto[b]	2.0/0.094	0	24	100	100	100	100	100
Dual II Mag/Callisto + AAtrex[b]	0.95/0.094 + 0.25	0	23	98	97	97	98	56
Outlook/Marksman[b] (pm)	0.66/0.8	4	24	100	98	96	100	58
Outlook/Distinct (pm) + AAtrex[b,c]	0.66/0.18 + 0.5	3	23	100	98	98	100	56
Outlook + AAtrex/Distinct[b, c] (pm)	0.66 + 0.8/0.18	1	23	100	100	100	100	100
Outlook + Prowl H_2O/Marksman[b] (pm)	0.66 + 1.0/0.8	6	24	100	100	100	100	96
Outlook + Prowl H_2O /Distinct (pm) + AAtrex[b,c]	0.66 + 1.0/0.18 + 0.5	4	23	100	100	100	100	96
Weedy check		0	24	0	0	0	0	0
LSD 0.05		2	ns	1	1	1	1	6

[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, respectively.
[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 3, 2003; at Farmington, NM

		Weed Control[h,i]					
	Rate	Amare	Amabl	Solni	Cheal	Saskr	Yield
Treatments[a]	(lb/ac)			(%)			(bu/ac)
Callisto + Dual (pm) 2-way mix	1.83	96	94	95	93	94	257
Callisto + Dual (pm) 2- way mix	2.2	98	96	96	98	97	263
Callisto + Dual + AAtrex (pm) 3-way mix	2.4	98	98	98	100	99	253
Outlook + AAtrex + Prowl H_20	0.66 + 0.8 + 1.0	100	100	100	99	100	263
Bicep Lite II Mag (pm) + Balance	1.9 + 0.035	99	98	99	98	99	233
Dual II Mag + Balance	1.1 + 0.035	98	100	98	100	100	265
Outlook + AAtrex + Balance	0.66 + 0.8 + 0.035	100	100	100	100	100	262
Outlook + Balance	0.66 + 0.035	97	98	98	97	97	259
Bicep Lite II Mag (pm) /Callisto[b]	2.0/0.094	100	100	96	99	98	261
Dual II Mag/Callisto + AAtrex[b]	0.95/0.094 + 0.25	98	98	100	98	63	257
Outlook/Marksman[b] (pm)	0.66/0.8	100	100	100	100	96	257
Outlook/Distinct (pm) + AAtrex[b,c]	0.66/0.18 + 0.5	99	100	99	100	100	250
Outlook + AAtrex /Distinct[b,c] (pm)	0.66 + 0.8/0.18	98	100	100	99	99	257
Outlook + Prowl H_2O /Marksman[b] (pm)	0.66 + 1.0/0.8	100	100	100	100	100	246
Outlook + Prowl H_2O /Distinct (pm) + AAtrex[b,c]	0.66 + 1.0/0.18 + 0.5	100	100	100	100	99	283
Weedy check		0	0	0	0	0	132
LSD 0.05		2	1	1	2	2	28

[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, respectively.
[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 17, 2003; at Farmington, NM

		Crop	Stand	Weed Control[b,c]				
	Rate	Injury[b]	Count	Amare	Amabl	Solni	Saskr	Cheal
Treatments[a]	(lb/ac)	(%)	(no.)			(%)		
Steadfast (pm)	0.035	0	24	100	100	58	43	100
Steadfast (pm) + Clarity	0.035 + 0.25	0	24	100	100	99	98	100
Steadfast (pm) + Marksman (pm)	0.035 + 0.4	0	24	100	100	98	98	100
Steadfast (pm) + Distinct (pm)	0.035 + 0.09	0	25	100	100	62	98	100
Steadfast (pm) + Callisto	0.035 + 0.06	0	25	100	100	98	65	100
DPX 79406 (pm)	0.023	0	24	100	100	42	42	100
DPX 79406 (pm) + Clarity	0.023 + 0.25	0	25	100	100	93	98	100
DPX 79406 (pm) + Marksman (pm)	0.023 + 0.4	0	25	100	100	98	97	100
DPX 79406 (pm) + Distinct (pm)	0.023 + 0.09	0	24	100	100	96	98	100
DPX 79406 (pm) + Callisto	0.023 + 0.06	0	25	100	100	98	68	100
Option (pm)	0.033	0	25	100	100	86	40	100
Option (pm) + Clarity	0.033 + 0.25	0	24	100	100	96	98	100
Option (pm) + Distinct (pm)	0.033 + 0.09	0	24	100	100	96	98	100
Option (pm) + Marksman (pm)	0.033 + 0.4	0	25	100	100	98	98	100
Option (pm) + Callisto	0.033 + 0.060	25	100	100	98	66	100	
Weedy check		0	24	0	0	0	0	0
LSD 0.05		ns	ns	1	1	6	5	1

[a]All treatments were applied with 32-0-0 and COC at 1% and 0.5 v/v, respectively, 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 13, 2003; at Farmington, NM

		Weed Control[b,c]					
	Rate	Amare	Amabl	Solni	Saskr	Cheal	Yield
Treatments[a]	(lb/ac)			(%)			(bu/ac)
Steadfast (pm)	0.035	98	94	50	40	96	229
Steadfast (pm) + Clarity	0.035 + 0.25	99	96	90	97	97	264
Steadfast (pm) + Marksman (pm)	0.035 + 0.4	97	98	95	96	99	253
Steadfast (pm) + Distinct (pm)	0.035 + 0.09	98	97	58	97	96	277
Steadfast (pm) + Callisto	0.035 + 0.06	98	98	98	63	98	267
DPX 79406 (pm)	0.023	98	95	38	38	95	233
DPX 79406 (pm) + Clarity	0.023 + 0.25	98	97	90	98	97	264
DPX 79406 (pm) + Marksman (pm)	0.023 + 0.4	99	98	97	96	98	264
DPX 79406 (pm) + Distinct (pm)	0.023 + 0.09	98	98	96	96	98	267
DPX 79406 (pm) + Callisto	0.023 + 0.06	97	98	97	66	98	266
Option (pm)	0.033	98	97	84	38	96	234
Option (pm) + Clarity	0.033 + 0.25	97	98	96	98	96	267
Option (pm) + Distinct (pm)	0.033 + 0.09	98	98	95	96	100	260
Option (pm) + Marksman (pm)	0.033 + 0.4	98	98	98	97	97	264
Option (pm) + Callisto	0.033 + 0.06	98	98	96	65	97	293
Weedy check		0	0	0	0	0	143
LSD 0.05		2	3	6	5	2	28

[a]All treatments were applied with 32-0-0 and COC at 1% and 0.5 % v/v, respectively, 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 Outlook and Dual II Magnum in Combination with Prowl, Prowl H_2O, and Sonalan, and Preemergence Application of Valor, all Followed by a Postemergence Application of Raptor in Combination with Basagran, June 25, 2003; at Farmington, NM

		Weed Control[a,b]				
	Rate	Cheal	Amare	Amabl	Solni	Saskr
Treatments	(lb/ac)			%		
Outlook + Prowl/Raptor + Basagran[c]	0.56 + 0.8/ 0.032 + 0.25	96	100	98	92	85
Outlook + Prowl H_2O/Raptor + Basagran[c]	0.56 + 0.85/ 0.032 + 0.25	97	98	96	92	87
Outlook + Sonalan/Raptor + Basagran[c]	0.56 + 1.0/ 0.032 + 0.25	100	100	98	96	98
Dual II Mag + Sonalan/Raptor + Basagran[c]	1.25 + 1.0/ 0.032 + 0.25	98	100	100	96	98
Dual II Mag + Prowl/Raptor + Basagran[c]	1.25 + 0.8/ 0.032 + 0.25	98	100	96	90	86
Valor[d]/Raptor + Basagran[c]	0.063/ 0.032 + 0.25	96	100	98	98	89
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, respectively.
[d]Valor applied preemergence.

Table 10. Control of Annual Broadleaf Weeds with Preplant Applications of Outlook and Dual II Magnum in Combination with Prowl, Prowl H_2O, and Sonalan, and Preemergence Application of Valor, all Followed by a Postemergence Application of Raptor in Combination with Basagran, July 29, 2003; at Farmington, NM

		Weed Control[a,b]					Bill Z
	Rate	Cheal	Amare	Amabl	Solni	Saskr	Yield
Treatments	(lb/ac)			%			(lb/ac)
Outlook + Prowl/Raptor + Basagran[c]	0.56 + 0.8/ 0.032 + 0.25	100	100	100	99	96	3,996
Outlook + Prowl H²O/Raptor + Basagran[c]	0.56 + 0.85/ 0.032 + 0.25	99	99	99	99	96	4,764
Outlook + Sonalan/Raptor + Basagran[c]	0.56 + 1.0/ 0.032 + 0.25	100	100	100	100	99	4,303
Dual II Mag + Sonalan/ Raptor + Basagran[c]	1.25 + 1.0/ 0.032 + 0.25	100	100	100	100	99	4,764
Dual II Mag + Prowl/ Raptor + Basagran[c]	1.25 + 0.8/ 0.032 + 0.25	100	100	100	100	96	4,457
Valor[d]/Raptor + Basagran[c]	0.063/ 0.032 + 0.25	100	100	100	100	97	4,611
Weedy check		0	0	0	0	0	408

[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, respectively.
[d]Valor applied preemergence.

Table 11. Control of Annual Broadleaf Weeds in Sunflowers with Preemergence Applications of Outlook, Dual II Mag, and Spartan Applied Alone or in Combination with Dual II Mag, July 7, 2003.

		Weed Control[a,b]				
	Rate	Amare	Amabl	Solni	Cheal	Saskr
Treatments	(lb/ac)			(%)		
Outlook	0.65	97	94	96	98	50
Dual II Mag	1.25	95	96	92	98	54
Outlook + Spartan	0.65 + 0.094	98	98	100	98	53
Dual II Mag + Spartan	1.25 + 0.094	99	96	98	98	50
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 Outlook, Dual II Mag, and Spartan Applied Alone or in Combination with Dual II Mag, August 11, 2003.

		Weed Control[a,b]					
	Rate	Amare	Amabl	Solni	Cheal	Saskr	Yield
Treatments	(lb/ac)			(%)			(lb/ac)
Outlook	0.65	96	94	82	92	50	2,950
Dual II Mag	1.25	90	92	86	94	52	2,875
Outlook + Spartan	0.65 + 0.094	95	97	96	96	50	3,150
Dual II Mag + Spartan	1.25 + 0.094	98	95	94	94	50	3,110
Check		0	0	0	0	0	845

[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.

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