Pest Control in Crops Grown in Northwestern New Mexico, 2012

Annual Data Report 100-2012

Richard N. Arnold, Michael K. O'Neill, Daniel Smeal, Kevin A. Lombard, and Margaret M. West[1]

Cooperative Extension Service • College of Agricultural, Consumer and Environmental Sciences

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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

[1]Respectively, College Professor, Department of Entomology, Plant Pathology and Weed Science, and Superintendent, Agricultural Science Center at Farmington; Professor, Department of Plant and Environmental Sciences; College Professor, Department of Plant and Environmental Sciences; Assistant Professor, Agricultural Science Center at Farmington; and Research Assistant, Agricultural Science Center at Farmington, all of New Mexico State University.

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 CropScience, BASF, E.I. DuPont, Gowan, BLM/FFO, FMC, Monsanto, Dow AgroSciences, Navajo Agricultural Products Industry, Pioneer Hi-Bred, Syngenta Crop Protection, and Southwest Seed.

PEST CONTROL GRANT FUND

Pest Control Management Objectives

Determine efficacy of registered and non-registered pesticides for control of weeds in agricultural crops grown in northwestern New Mexico.

Monsanto, Broadleaf Weed Control in Spring-Seeded Roundup Ready Alfalfa

Introduction

Seedling alfalfa requires effective broad-spectrum weed control for successful establishment. However, few herbicides are registered for postemergence broadleaf weed control. Pursuit, Raptor, and, recently, Roundup applied to Roundup Ready alfalfa have been registered for broadleaf weed control in seedling alfalfa. Field trials were conducted to evaluate broadleaf weed control and Roundup applied alone or in combination with other selected herbicides.

Objectives

- Determine herbicide efficacy of Roundup applied alone or in combination for control of broadleaf weeds in Roundup Ready spring-seeded alfalfa.
- Determine Roundup Ready spring-seeded alfalfa tolerance to applied selected herbicides and yield.

Materials and methods

A field experiment was conducted in 2012 at Farmington, NM, to evaluate the response of Roundup Ready alfalfa (DeKalb DKA41-18RR) and annual broadleaf weeds to postemergence applications of Roundup applied alone or in combination with other selected herbicides. Soils were a Doak silt loam with a pH of 7.4 and an organic matter content of less than 0.3%. 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 10 ft wide by 30 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 35 psi. Alfalfa was planted on May 14 at 20 lb/ac using a Massey Ferguson grain drill. Preemergence treatments were applied on May 15 and immediately incorporated with 0.75 in. of sprinkler-applied water. Soils had a maximum and minimum temperature of 76 and 60°F. Postemergence treatments were applied on June 12 when seedling alfalfa was in the 2nd to 3rd trifoliate leaf stage and weeds were small (less than 2 in.). Air temperature maximum and minimum during postemergence applications was 85 and 70°F. One late postemergence treatment of Roundup PowerMAX was applied on June 26 when seedling alfalfa was in the 5th to 6th trifoliate leaf stage and weeds were 4 to 6 in. tall. Air temperature maximum and minimum during this postemergence application was 92 and 81°F. Black nightshade and redroot and prostrate pigweed infestations were heavy and common lambsquarters and Russian thistle infestations were moderate throughout the experimental area. Preemergence treatments were rated visually for crop injury and weed control on June 12. Preemergence followed by sequential postemergence treatments were rated visually for weed control on July 26. Postemergence treatments were rated for crop injury and weed control on July 26. Alfalfa was harvested with an Almaco self-propelled plot harvester on August 21. A grab sample was taken from each plot 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. On June 12, both Sharpen and Warrant applied preemergence at 2.5 and 48 oz/ac caused crop injury ratings of 9 and 7, respectively (Table 1). All treatments except the weedy check gave excellent to good control of redroot and prostrate pigweed, black nightshade, and common lambsquarters. Russian thistle control was poor with Sharpen and Warrant applied preemergence at 2.5 and 48 oz/ac (Table 1). On July 26, Roundup PowerMAX plus AMS applied postemergence at 44 plus 48 oz/ac on June 26 at the 5th to 6th trifoliate leaf stage caused an injury rating (stunting) of 3. On July 26, all treatments except the weedy check and Raptor plus Select Max plus MSO plus AMS applied postemergence at 5 plus 9 plus 24 plus 48 oz/ac gave good to excellent control of all broadleaf weeds (Table 2).

Yield and protein content: Results of yield, protein content, and relative feed values are given in Table 3. The weedy check had the highest yield during the first cutting of 2.6 t/ac. The weedy check had the lowest protein content among treatments at 17.1. There was no significant difference among treatments for relative feed value (Table 3).

BASF, Headline SC Applications for Established Roundup Ready Alfalfa Production

Introduction

Headline SC, a fungicide, was introduced by BASF to help growers control diseases and improve overall plant health. Headline is fast-acting and delivers a high level of activity on more than 50 major diseases that can threaten yield and crop quality. Headline helps prevent diseases and provides protection for more than 90 crops. Field trials were conducted to evaluate Headline applications to established Roundup Ready alfalfa and yield potential at two different cutting schedules.

Objective

- Determine Headline SC potential as a plant health fungicide applied in between cuttings at two different cutting schedules and effects on alfalfa yield and quality.

Materials and methods

A field experiment was conducted in 2012 at Farmington, NM, to evaluate the response of Headline fungicide applied to established alfalfa (DeKalb DKA41-18RR) in between cuttings and to evaluate Headline SC potential to increase yield and quality at two different cutting schedules. Soils were a Doak silt loam with a pH of 7.4 and an organic matter content of less than 0.5%. Soils were fertilized according to New Mexico State University recommendations based on soil tests. The experimental design was a two-way randomized block ANOVA with eight replications. Treatments were with or without Headline applied between cuttings and alfalfa cutting schedule. Individual plots were 4 ft wide by 26 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 35 psi. Table 4 indicates Headline SC application dates and cutting schedules. Alfalfa was harvested with an Almaco self-propelled plot harvester. A grab sample from each cutting was taken from each plot to determine protein content and relative feed value. A two-way randomized block ANOVA was used to determine statistical differences among treatment mean at P = 0.05.

Results and discussion

Headline application, yield, and protein and relative feed value: Alfalfa did show a significant yield response to Headline SC plus NIS applied at 6 plus 12 oz/ac between the 6th and 8th in. height range between the 2nd and 3rd cuttings. Further results show that alfalfa for maximum production should be cut on a 30-day schedule as compared to a 35-day schedule. Total yield of alfalfa cut on a 30-day schedule and comparing Headline SC application to no Headline application showed a significant increase in alfalfa production using Headline SC between cuttings of approximately 0.52 t/ac (Tables 5 and 6).

BASF, Broadleaf Weed Control in Field Corn with Preemergence Followed by Sequential Postemergence Herbicides with or without Headline SC, Headline AMP, and Priaxor Applied Alone or in Combination

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. Headline SC, Headline AMP, or Priaxor were added to some postemergence herbicides applied alone or in combination to determine if there would be an increase in corn production.

Objectives

- Determine efficacy of selected herbicides for control of annual broadleaf weeds in field corn.
- Determine corn tolerance to applied selected herbicides with or without Headline SC, Headline AMP, or Priaxor applied alone or in combination and yield.

Materials and methods

A field experiment was conducted in 2012 at Farmington, NM, to evaluate the response of field corn (Pioneer PO636HR) and annual broadleaf weeds to preemergence followed by sequential late postemergence herbicides with or without Headline SC, Headline AMP, or Priaxor applied alone or in combination. Soils were a Doak silt loam with a pH of 7.4 and an organic matter content of less than 0.3%. 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 30-in. rows 30 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 35 psi. Field corn was planted with flexi-planters equipped with disk openers on May 8. Preemergence herbicides were applied on May 9 and immediately incorporated with 0.75 in. of sprinkler-applied water. Soils had a maximum and minimum temperature of 74 and 61°F. Postemergence treatments were applied on June 15 when field corn was in the 5th to 6th stage and weeds were small (less than 4 in.). Air temperature maximum and minimum during postemergence applications was 89 and 57° F. Headline SC, Headline AMP, and Priaxor were added to postemergence herbicides alone or in combination on June 15, and without herbicides on July 24. Black nightshade and redroot and prostrate pigweed infestations were heavy and common lambsquarters and Russian thistle infestations were moderate throughout the experimental area. Preemergence treatments were rated visually for crop injury and weed control on June 11. Preemergence followed by sequential postemergence treatments were rated visually for weed control on July 16. Stand counts were made on June 11 by counting individual plants per 10 ft of the third row of each plot. Field corn was harvested on October 30 by combining the center two rows of each plot using a John Deere 4420 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: Crop injury evaluations and stand counts are given in Table 7. Weed control evaluations are given in Tables 7 and 8. There was no crop injury and there were no significant differences among treatments for stand count (Table 7). On June 11, all preemergence treatments gave excellent control of redroot and prostrate pigweed, black nightshade, and common lambsquarters. Russian thistle control was poor with Zidua applied at 1.5 oz/ac (Table 7). On July 16, all treatments except the weedy check and Roundup PowerMAX plus NIS plus AMS applied alone postemergence at 22 plus 10 plus 80 oz/ac gave excellent control of redroot and prostrate pigweed and common lambsquarters. Black nightshade control was excellent with all treatments except the weedy check, Roundup PowerMAX plus NIS plus AMS applied postemergence alone at 22 plus 10 plus 80 oz/ac, and Zidua plus Verdict applied preemergence at 1.5 plus 12 oz/ac followed by a sequential postemergence treatment of Roundup PowerMAX plus NIS plus AMS applied at 22 plus 10 plus 80 oz/ac. Russian thistle control was poor with Zidua applied preemergence at 1.5 oz/ac, followed by a sequential treatment of Roundup PowerMAX plus NIS plus AMS applied at 22 plus 10 plus 80 oz/ac and

Roundup PowerMAX plus NIS plus AMS applied postemergence alone at 22 plus 10 plus 80 oz/ac (Table 8).

Crop yields: Yields are given in Table 8. Yields were 206 to 268 bu/ac higher in the treated plots as compared to the weedy check. The addition of Headline SC to Verdict applied preemergence at 12 oz/ac followed the sequential postemergence treatment of Roundup PowerMAX plus NIS plus AMS applied at 22 plus 10 plus 80 oz/ac in combination with Headline SC applied at 6 oz/ac and followed by a postemergence treatment of Headline AMP plus NIS applied at 10 plus 10 oz/ac at the R-1 silk stage had the highest yield of 312 bu/ac (Table 8).

Bayer CropScience, Broadleaf Weed Control in Field Corn with 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

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

Materials and methods

A field experiment was conducted in 2012 at Farmington, NM, to evaluate the response of field corn (Pioneer PO636HR) and annual broadleaf weeds to preemergence and preemergence followed by sequential postemergence herbicides. Soils were a Doak silt loam with a pH of 7.4 and an organic matter content of less than 0.3%. 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 30-in. rows 30 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 35 psi. Field corn was planted with flexi-planters equipped with disk openers on May 8. Preemergence herbicides were applied on May 9 and immediately incorporated with 0.75 in. of sprinkler-applied water. Soil had a maximum and minimum temperature of 74 and 61°F. Postemergence treatments were applied on June 12 when field corn was in the 3rd to 5th leaf stage and weeds were small (less than 2 in.). Air temperature maximum and minimum during postemergence applications was 84 and 50°F. Black nightshade and redroot and prostrate pigweed infestations were heavy and common lambsquarters and Russian thistle infestations were moderate throughout the experimental area. Preemergence treatments were rated visually for crop injury and weed control on June 12. Preemergence followed by sequential postemergence treatments were rated visually for weed control on July 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 October 30 by combining the center two rows of each plot using a John Deere 4420 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: Crop injury evaluations and stand counts are given in Table 9. Weed control evaluations are given in Tables 9 and 10. There was no crop injury and there were no significant differences among treatments for stand count (Table 9). On June 12, all preemergence treatments gave excellent control of prostrate pigweed, black nightshade, and common lambsquarters. Verdict and Sharpen applied preemergence at 12, 15, and 2.5 oz/ac gave poor control of Russian thistle (Table 9). All preemergence and preemergence followed by sequential postemergence treatments gave excellent control of redroot and prostrate pigweed, black nightshade, Russian thistle, and common lambsquarters (Table 10).

Crop yields: Yields are given in Table 10. Yields were 217 to 256 bu/ac higher in the herbicide-treated plots as compared to the weedy check (Table 10).

DuPont Crop Protection, Broadleaf Weed Control in Field Corn with 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

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

Materials and methods

A field experiment was conducted in 2012 at Farmington, NM, to evaluate the response of field corn (Pioneer PO636HR) and annual broadleaf weeds to preemergence and preemergence followed by sequential postemergence herbicides. Soils were a Doak silt loam with a pH of 7.4 and an organic matter content of less than 0.3%. Soils were fertilized according to New Mexico State University recommendations based on soil tests. The experimental design was a randomized complete block with four replications. Individual plots were four 30-in. rows 30 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 35 psi. Field corn was planted with flexi-planters equipped with disk openers on May 8. Preemergence herbicides were applied on May 9 and immediately incorporated with 0.75 in. of sprinkler-applied water. Soil had a maximum and minimum temperature of 74 and 61°F. Postemergence treatments were applied on June 12 when field corn was in the 3rd to 5th leaf stage and weeds were small (less than 2 in.). Air temperature maximum and minimum during postemergence application were 84 and 50°F. Black nightshade and redroot and prostrate pigweed infestations were heavy and common lambsquarters and Russian thistle infestations were moderate throughout the experimental area. Preemergence treatments were rated visually for crop injury and weed control on June 12. Preemergence followed by sequential postemergence treatments were rated visually for weed control on July 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 October 29 by combining the center two rows of each plot using a John Deere 4420 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: Crop injury evaluations and stand counts are given in Table 11. Weed control evaluations are given in Tables 11 and 12. There was no crop injury and there were no significant differences among treatments for stand count. On June 12, all preemergence treatments gave excellent control of redroot and prostrate pigweed, black nightshade, and common lambsquarters. Zemax applied preemergence at 64 oz/ac gave poor control of Russian thistle (Table 11). On July 12, all treatments except the weedy check gave excellent control of redroot and prostrate pigweed, black nightshade, and common lambsquarters. Zemax applied preemergence at 64 oz/ac and Zemax applied preemergence at 64 oz/ac followed by a sequential postemergence treatment of Roundup PowerMAX plus NIS plus AMS at 22 plus 10 plus 80 oz/ac gave poor control of Russian thistle (Table 12).

Crop yields: Yields are given in Table 12. Yields were192 to 233 bu/ac higher in the herbicide-treated plots as compared to the weedy check (Table 12).

Bayer CropScience, Broadleaf Weed Control in Grain Sorghum with Preemergence Followed by Sequential Postemergence Herbicides

Introduction

Postemergence herbicides are most effective if applied when the weeds and grain sorghum are small. If weeds are not controlled, they become difficult to control and grain sorghum growth is restricted. This trial was to examine the efficacy of preemergence followed by sequential postemergence herbicides applied to grain sorghum and weeds, and to evaluate their effect on crop injury and grain sorghum yields.

Objectives

- Determine efficacy of selected herbicides for control of annual broadleaf weeds in grain sorghum.
- Determine grain sorghum tolerance to applied herbicides and yield.

Materials and methods

A field experiment was conducted in 2012 at Farmington, NM, to evaluate the response of grain sorghum (Pioneer, DKS 44-20) and annual broadleaf weeds to preemergence followed by sequential postemergence herbicides. Soils were a Doak silt loam with a pH of 7.4 and an organic matter content of less than 0.3%. Soils were fertilized according to New Mexico State University recommendations based on soil tests. The experimental design was a randomized complete block with four replications. Individual plots were four 30-in. rows 30 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 35 psi. Grain sorghum was planted with flexi-planters equipped with disk openers on May 29. Preemergence treatments were applied on May 30 and immediately incorporated with 0.75 in. of sprinkler-applied water. Soil temperature maximum and minimum during application were 81 and 66°F. Postemergence treatments were applied on June 28 when grain sorghum was in the V5 leaf stage and weeds were less than 4 in. in height. Air temperature maximum and miminum for postemergence applications were 89 and 63 °F. Black nightshade and redroot and prostrate pigweed infestations were heavy and common lambsquarters and Russian thistle infestations were moderate throughout the experimental area. Preemergence treatments were evaluated for crop injury and weed control on June 26. Preemergence followed by a sequential postemergence treatment were evaluated for weed control on July 26. Grain sorghum was harvested on November 14 by combining the center four rows of each plot using a John Deere 4420 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: Crop injury evaluations are given in Table 13. Weed control evaluations are given in Tables 13 and 14. There were no crop injury symptoms from any of the treatments for both rating periods. On June 26, all treatments except the weedy check gave excellent control of redroot and prostrate pigweed, black nightshade, Russian thistle, and common lambsquarters (Table 13). On July 26, all treatments except the weedy check gave excellent control of redroot and prostrate pigweed, black nightshade, and common lambsquarters. Russian thistle control was good with the preemergence application of Guardsman Max applied at 48 oz/ac (Table 14).

Crop yields: Yields are given in Table 14. Yields were 91 to 118 bu/ac higher in the herbicide-treated plots as compared to the weedy check.

Table 1. Control of Annual Broadleaf Weeds with Preemergence Herbicides in Spring-Seeded Roundup Ready Alfalfa on June 12; NMSU Agricultural Science Center at Farmington, NM, 2012

Treatments	Rate (oz/ac)	Crop Injury[a] (%)	Weed Control[a,b] (%) Amare	Amabl	Solni	Saskr	Cheal
Sharpen	2.5	9	91	92	89	43	98
Warrant	48	7	99	99	95	43	94
Weedy check		0	0	0	0	0	0
LSD 0.05		3	4	3	3	5	3

[a]Based on visual scale from 0–100, where 0 = no control or crop injury and 100 = dead plants.

[b]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 2. Control of Annual Broadleaf Weeds with Preemergence, Preemergence Followed by Sequential Postemergence, and Postemergence Herbicides in Spring-Seeded Roundup Ready Alfalfa on July 26; NMSU Agricultural Science Center at Farmington, NM, 2012

Treatments[a]	Rate (oz/ac)	Crop Injury[c] (%)	Weed Control[c,d] (%) Amare	Amabl	Solni	Saskr	Cheal
Roundup PowerMAX + AMS	22 + 48	0	95	98	100	95	87
Roundup PowerMAX + AMS[b]	44 + 48	3	100	100	100	99	100
Sharpen/Roundup PowerMAX + AMS	2.5/22 + 48	7	85	100	100	86	100
Raptor + Select Max + MSO + AMS	5 + 9 + 24 + 48	0	100	100	100	82	100
Butyrac + Roundup PowerMAX + AMS	64 + 22 + 48	0	100	100	100	100	100
Raptor + Roundup PowerMAX + MSO + AMS	5 + 22 + 24 + 48	0	100	98	100	97	98
Pursuit + Roundup PowerMAX + MSO + AMS	4 + 22 + 24 + 48	0	100	100	100	98	100
Prowl H_20 + Roundup PowerMAX + AMS	32 + 22 + 48	0	100	100	100	91	94
Roundup PowerMAX + Select Max + MSO + AMS	22 + 9 + 24 + 48	0	87	100	100	98	97
Warrant/Roundup PowerMAX + AMS	48/22 + 48	2	100	100	100	97	100
Warrant + Roundup PowerMAX + AMS	48 + 22 + 48	0	98	100	100	98	86
Raptor + Prowl H_20 + MSO + AMS	6 + 32 + 24 + 48	0	100	100	100	99	100
Pursuit + Prowl H_20 + MSO + AMS	6 + 32 + 24 + 48	0	100	100	100	97	100
Raptor + Prowl H_20 + Roundup PowerMAX + MSO + AMS	6 + 32 + 22 + 24 + 48	0	100	100	100	100	100
Pursuit + Prowl H_20 + Roundup PowerMAX + MSO + AMS	6 + 32 + 22 + 24 + 48	0	100	100	100	98	100
Weedy check		0	0	0	0	0	0
LSD 0.05		1	4	1	1	3	2

[a]First treatment applied preemergence followed by a sequential postemergence treatment and AMS (ammonium sulfate), MSO (methylated seed oil).

[b]Treatment applied postemergence on June 28.

[c]Based on a visual scale from 0–100, where 0 = no control or crop injury and 100 = dead plants.

[d]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 3. Yield, Protein and Relative Feed Value of Spring-Seeded Roundup Ready Alfalfa, from Herbicide Applications of Preemergence, Preemergence Followed by Sequential Postemergence, and Postemergence Herbicides on August 21; NMSU Agricultural Science Center at Farmington, NM, 2012

Treatments[a]	Rate (oz/ac)	Yield[c] (t/ac)	RFV[d] (no.)	Protein Content (%)
Roundup PowerMAX + AMS	22 + 48	2.1	177	22.9
Roundup PowerMAX + AMS[b]	44 + 48	2.1	195	22.9
Sharpen/Roundup PowerMAX + AMS	2.5/22 + 48	2.0	171	19.3
Raptor + Select Max + MSO + AMS	5 + 9 + 24 + 48	2.3	171	19.6
Butyrac + Roundup PowerMAX + AMS	64 + 22 + 48	2.2	167	19.0
Raptor + Roundup PowerMAX + MSO + AMS	5 + 22 + 24 + 48	2.1	169	21.3
Pursuit + Roundup PowerMAX + MSO + AMS	4 + 22 + 24 + 48	2.1	168	21.3
Prowl H_20 + Roundup PowerMAX + AMS	32 + 22 + 48	2.1	171	20.3
Roundup PowerMAX + Select Max + MSO + AMS	22 + 9 + 24 + 48	2.2	187	20.8
Warrant/Roundup PowerMAX + AMS	48/22 + 48	2.2	165	19.2
Warrant + Roundup PowerMAX + AMS	48 + 22 + 48	2.1	160	20.2
Raptor + Prowl H_20 + MSO + AMS	6 + 32 + 24 + 48	2.0	165	20.0
Pursuit + Prowl H_20 + MSO + AMS	6 + 32 + 24 + 48	2.2	160	19.7
Raptor + Prowl H_20 + Roundup PowerMAX + MSO + AMS	6 + 32 + 22 + 24 + 48	2.0	173	20.8
Pursuit + Prowl H_20 + Roundup PowerMAX + MSO + AMS	6 + 32 + 22 + 24 + 48	2.1	177	21.7
Weedy check		2.6	159	17.1
LSD 0.05		ns	ns	3

[a]First treatment applied preemergence followed by a sequential postemergence treatment and AMS (ammonium sulfate), MSO (methylated seed oil).

[b]Treatment applied postemergence on June 28.

[c]Ton/ac based on a 20% moisture basis.

[d]RFV = relative feed value.

Table 4. Headline SC Application Dates and Cutting Schedule of DKA41-18RR Roundup Ready Alfalfa; NMSU Agricultural Science Center at Farmington, NM, 2012

Cutting	Headline SC application at 6 oz/ac when alfalfa was 6–8 inch in height[a]	Cutting schedule in days	Date Headline SC applied at 6 oz/ac to 6–8 inch alfalfa, 2012	Cutting date, 2012
1	none	35		6-6
2	none	70		7-11
3	none	105		8-15
4	none	140		9-20
1	none	30		6-1
2	none	60		7-1
3	none	90		8-1
4	none	120		9-1
1	6	35	4-12	6-6
2	6	70	6-15	7-11
3	6	105	7-23	8-15
4	6	140	8-27	9-20
1	6	30	4-12	6-1
2	6	60	6-11	7-1
3	6	90	7-9	8-1
4	6	120	8-14	9-1

[a]Headline SC was applied with a non-ionic surfactant at 12 oz/ac.

Table 5. Yield of Roundup Ready Alfalfa Applied with or without Headline SC at Different Cutting Schedules (Cut 1 and Cut 2); NMSU Agricultural Science Center at Farmington, NM, 2012

Headline SC[a] (oz/ac)	Cutting Schedule (days)	Yield Cut 1 (t/ac)	Protein (%)	RFV[b] (no.)	Yield Cut 2 (t/ac)	Protein (%)	RFV[b] (no.)
None	35	2.90	17.56	156	2.40	21.33	161
None	30	2.97	17.98	165	2.45	22.93	156
6	35	3.21	16.40	153	2.56	21.21	162
6	30	2.97	18.20	168	2.58	22.80	155
Headline SC		ns	ns	ns	0.10	ns	ns
Cutting schedule		ns	0.80	6	ns	0.67	6
Headline by cutting schedule		ns	ns	ns	ns	ns	ns

[a]Headline SC was applied with a non-ionic surfactant at 12 oz/ac.

[b]RFV = relative feed value.

Table 6. Yield of Roundup Ready Alfalfa Applied with or without Headline SC at Different Cutting Schedules (Cut 3 and Cut 4); NMSU Agricultural Science Center at Farmington, NM, 2012

Headline SC[a] (oz/ac)	Cutting Schedule (days)	Yield Cut 3 (t/ac)	Protein (%)	RFV (no.)	Yield Cut 4 (t/ac)	Protein (%)	RFV[b] (no.)
None	35	1.86	21.71	162	1.28	23.20	8.44
None	30	2.07	21.94	160	1.62	23.51	9.11
6	35	2.02	21.79	167	1.36	23.13	9.15
6	30	2.32	22.45	164	1.76	24.41	9.63
Headline SC		0.08	ns	ns	ns	ns	0.06
Cutting schedule		0.08	ns	ns	0.11	0.53	0.06
Headline by cutting schedule		ns	ns	ns	ns	ns	ns

[a]Headline SC was applied with a non-ionic surfactant at 12 oz/ac.

[b]RFV = relative feed value.

Table 7. Control of Aannual Broadleaf Weeds with Preemergence Herbicides in Field Corn on June 11; NMSU Agricultural Science Center at Farmington, NM, 2012

Treatments	Rate (oz/ac)	Stand Count (no.)	Crop Injury[a] (%)	Weed Control[a,b] Amare (%)	Amabl	Solni	Saskr	Cheal
Gmax Lite	40	22	0	99	100	100	96	100
Verdict	12	24	0	100	100	100	96	100
Verdict	12	23	0	100	99	100	99	99
Verdict	12	23	0	100	100	100	98	99
Verdict	12	24	0	99	99	100	99	100
Zidua	1.5	25	0	99	99	98	33	100
Zidua + Verdict	1.5 + 12	23	0	100	100	100	99	100
Zidua	1.5	22	0	99	99	98	40	99
Zidua	1.5	23	0	99	100	99	43	99
Zidua + Verdict	1.5 + 12	24		100	100	100	100	100
Weedy check		23	0	0	0	0	0	0
LSD 0.05		ns		1	1	1	5	1

[a]Based on a visual scale from 0–100, where 0 = no control or crop injury and 100 = dead plants.

[b]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 8. Control of Annual Broadleaf Weeds with Preemergence Followed by Sequential Postemergence Herbicides with or without Headline SC, Headline AMP, and Priaxor Applied Alone or in Combination in Field Corn on July 16; NMSU Agricultural Science Center at Farmington, NM, 2012

		Weed Control[e,f]					
	Rate	Amare	Amabl	Solni	Saskr	Cheal	Yield
Treatments[a]	(oz/ac)	(%)					(bu/ac)
Roundup PowerMAX + NIS + AMS	22 + 10 + 80	71	69	80	36	77	250
Gmax Lite/Roundup PowerMAX + NIS + AMS	40/22 + 10 + 80	100	100	100	96	100	281
Verdict/Roundup PowerMAX + NIS + AMS	12/22 + 10 + 80	100	100	100	98	99	294
Verdict/Roundup PowerMAX + NIS + AMS/ Headline AMP + NIS[b]	12/22 + 10 + 80/10 + 10	99	99	99	98	100	290
Verdict/Roundup PowerMAX + NIS + AMS + Priaxor/Headline AMP + NIS[c]	12/22 + 10 + 80 + 4/10 + 10	100	99	99	97	99	295
Verdict/Roundup PowerMAX + NIS + AMS/ Headline SC + NIS/Headline AMP + NIS[d]	12/22 + 10 + 80/6 + 10/10 + 10	100	99	100	97	100	312
Zidua/Roundup PowerMAX + NIS + AMS	1.5/22 + 10 + 80	99	100	100	60	99	269
Zidua+Verdict/Roundup PowerMAX + NIS + AMS	1.5 + 12/22 + 10 + 80	99	100	77	98	100	290
Zidua/Roundup PowerMAX + NIS + AMS + Priaxor/Headline AMP + NIS[c]	1.5/22 + 10 + 80 + 4/10 + 10	100	99	100	52	99	271
Zidua/Roundup PowerMAX + NIS + AMS/ Headline SC + NIS/Headline AMP + NIS[d]	1.5/22 + 10 + 80/6 + 10/10 + 10	99	100	99	48	100	280
Zidua+Verdict/Roundup PowerMAX + NIS + AMS/ Headline AMP + NIS[b]	1.5 + 12/22 + 10 + 80/10 + 10	100	100	100	98	100	311
Weedy check		0	0	0	0	0	44
LSD 0.05		1	2	18	5	3	14

[a]First treatment applied preemergence then a slash followed by a sequential postemergence treatment; NIS = non-ionic surfactant, AMS = ammonium sulfate.

[b]Headline AMP plus NIS applied with herbicide treatment on June 15.

[c]Priaxor applied with herbicide treatment on June 15, Headline AMP plus NIS applied alone on July 24 at R-1 silk.

[d]Headline SC applied with herbicide treatment on June 15, Headline AMP plus NIS applied alone on July 24 at R-1 silk.

[e]Based on a visual scale from 0–100, where 0 = no control and 100 = dead plants.

[f]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 9. Control of Annual Broadleaf Weeds with Preemergence Herbicides in Field Corn on June 12; NMSU Agricultural Science Center at Farmington, NM, 2012

		Stand	Crop	Weed Control[a,b]				
	Rate	Count	Injury[a]	Amare	Amabl	Solni	Saskr	Cheal
Treatments	(oz/ac)	(no.)	(%)	(%)				
Corvus + atrazine	3 + 16	23	0	100	100	100	100	100
Balance Flexx + atrazine	3 + 16	25	0	100	100	100	100	100
Lumax	48	23	0	100	100	100	100	100
Harness Xtra	48	25	0	100	100	100	100	100
Verdict	15	24	0	99	100	100	83	100
Verdict	12	25	0	99	98	100	77	100
G-Max Lite	48	23	0	100	100	100	98	98
Sharpen	2.5	24	0	98	98	98	84	98
Weedy check		24	0	0	0	0	0	0
LSD 0.05		ns		1	1	1	5	1

[a]Based on a visual scale from 0–100, where 0 = no control or crop injury and 100 = dead plants.

[b]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 10. Control of Annual Broadleaf Weeds with Preemergence Followed by Sequential Postemergence Herbicides in Field Corn on July 12; NMSU Agricultural Science Center at Farmington, NM, 2012

		Weed Control[b,c]					
	Rate	Amare	Amabl	Solni	Saskr	Cheal	Yield
Treatments[a]	(oz/ac)	(%)					(bu/ac)
Corvus + atrazine/Laudis + MSO + AMS	3 + 16/3 + 38 + 40	100	100	100	100	100	281
Corvus + atrazine/Ignite + AMS	3 + 16/22 + 48	100	100	100	100	100	272
Corvus + atrazine/Roundup PowerMAX + AMS	3 + 16/22 + 48	100	100	100	100	100	296
Corvus + atrazine/Capreno + COC + AMS	3 + 16/3 + 38 + 40	100	100	100	100	100	297
Balance Flexx + atrazine/Laudis + MSO + AMS	3 + 16/3 + 38 + 40	100	100	100	100	100	304
Balance Flexx + atrazine/Ignite + AMS	3 + 16/22 + 48	100	100	100	100	100	289
Balance Flex + atrazine/Roundup PowerMAX + AMS	3 + 16/22 + 48	100	100	100	100	100	276
Balance Flex + atrazine/Capreno + COC + AMS	3 + 16/3 + 38 + 40	100	100	100	100	100	278
Lumax/Touchdown Total + AMS	48/24 + 40	100	100	100	100	100	296
Lumax/Halex GT + NIS + AMS	48/58 + 10 + 40	100	100	100	100	100	286
Harness Xtra/Roundup PowerMAX + AMS	48/22 + 40	100	100	100	100	100	283
Verdict/Status + AMS	15/2.5 + 40	97	100	100	96	100	273
Verdict/Status + AMS	12/2.5 + 40	98	98	100	96	100	282
G-Max Lite/Status + AMS	48/2.5 + 40	100	99	100	96	100	290
Sharpen/Status + AMS	2.5/2.5 + 40	98	100	100	96	100	265
Weedy check		0	0	0	0	0	48
LSD 0.05		1	1	1	1	1	20

[a]First treatment applied preemergence, then a slash followed by a sequential postemergence treatment; MSO = methylated seed oil, COC = crop oil concentrate, NIS = non-ionic surfactant, and AMS = ammonium sulfate.

[b]Based on a visual scale from 0–100, 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 11. Control of Annual Broadleaf Weeds with Preemergence Herbicides in Field Corn on June 12; NMSU Agricultural Science Center at Farmington, NM, 2012

		Stand	Crop	Weed Control[a,b]				
	Rate	Count	Injury[a]	Amare	Amabl	Solni	Saskr	Cheal
Treatments	(oz/ac)	(no.)	(%)	(%)				
Rimsulfuron + Isoxaflutole + Breakfree ATZ	1.2 + 0.8 + 48	24	0	100	100	100	100	100
Rimsulfuron + Isoxaflutole + Breakfree ATZ	1.0 + 0.67 + 64	23	0	100	100	100	100	100
Rimsulfuron + Isoxaflutole + Cinch ATZ	1.0 + 0.67 + 64	25	0	100	100	100	100	100
Corvus	5.6	24	0	100	100	100	100	100
Corvus + atrazine	5.6 + 32	25	0	100	100	100	100	100
Zemax	64	24	0	100	100	100	45	100
Weedy check		24	0	0	0	0	0	0
LSD 0.05		ns		1	1	1	3	1

[a]Based on a visual scale from 0–100, where 0 = no control or crop injury and 100 = dead plants.

[b]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 12. Control of Annual Broadleaf Weeds with Preemergence Followed by Sequential Postemergence Herbicides in Field Corn on July 12; NMSU Agricultural Science Center at Farmington, NM, 2012

		Weed Control[b,c]					
	Rate	Amare	Amabl	Solni	Saskr	Cheal	Yield
Treatments[a]	(oz/ac)	(%)					(bu/ac)
Rimsulfuron + Isoxaflutole + Breakfree ATZ	1.2 + 0.8 + 48	100	100	100	100	100	273
Rimsulfuron + Isoxaflutole + Breakfree ATZ	1.0 + 0.67 + 64	100	100	100	100	100	273
Rimsulfuron + Isoxaflutole + Cinch ATZ	1.0 + 0.67 + 64	100	100	100	99	100	291
Corvus	5.6	100	100	100	100	100	280
Corvus + atrazine	5.6 + 32	100	100	100	100	100	289
Zemax	64	99	100	100	43	100	252
Rimsulfuron + Isoxaflutole + Breakfree ATZ/ Roundup PowerMAX + NIS + AMS	1.0 + 0.67 + 64/22 + 10 + 80	100	100	100	100	100	284
Rimsulfuron + Isoxaflutole + Cinch ATZ/ Roundup PowerMAX + NIS + AMS	1.0 + 0.67 + 64/22 + 10 + 80	100	100	100	100	100	290
Corvus/Roundup PowerMAX + NIS + AMS	5.6/22 + 10 + 80	100	100	100	100	100	293
Corvus + atrazine/Roundup PowerMAX + NIS + AMS	5.6 + 32/22 + 10 + 80	100	100	100	100	100	284
Zemax/Roundup PowerMAX + NIS + AMS	64/22 + 10 + 80	100	100	100	68	100	274
Weedy check		0	0	0	0	0	60
LSD 0.05		1	1	1	2	1	17

[a]First treatment applied preemergence, then a slash followed by a sequential postemergence treatment; AMS = ammonium sulfate, NIS = non-ionic surfactant.

[b]Based on a visual scale from 0–100, 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 13. Control of Annual Broadleaf Weeds with Preemergence Herbicides in Grain Sorghum on June 26; NMSU Agricultural Science Center at Farmington, NM, 2012

		Crop	Weed Control[a,b]				
	Rate	Injury[a]	Amare	Amabl	Solni	Saskr	Cheal
Treatments	(oz/ac)	(%)	(%)				
Guardsman Max	48	0	99	99	100	98	100
Cinch ATZ	48	0	100	99	100	97	100
Atrazine	32	0	99	99	100	97	100
Weedy check		0	0	0	0	0	0
LSD 0.05		ns	1	1	1	3	1

[a]Based on a visual scale from 0–100, where 0 = no control or crop injury and 100 = dead plants.

[b]Amare = redroot pigweed, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 14. Control of Annual Broadleaf Weeds with Preemergence Followed by Sequential Postemergence Herbicides in Grain Sorghum on July 26; NMSU Agricultural Science Center at Farmington, NM, 2012

Treatments[a]	Rate (oz/ac)	Weed Control[b] Amare (%)	Amabl	Solni	Saskr	Cheal	Yield (bu/ac)
Huskie + atrazine + AMS	13 + 16 + 16	100	100	100	100	100	127
Huskie + atrazine + AMS	16 + 16 + 16	100	100	100	100	100	118
Huskie + AMS	13 + 16	98	97	100	96	100	124
Atrazine + Buctril	16 + 16	100	100	100	100	100	119
Huskie + atrazine + AMS	16 + 16 + 32	100	100	100	100	100	129
Huskie + atrazine + AMS	10 + 16 + 32	100	100	100	100	100	129
Guardsman Max	48	100	100	100	89	100	126
Guardsman Max/Huskie + AMS	48/13 + 16	100	100	100	100	100	134
Cinch ATZ	48	100	100	100	100	100	126
Cinch ATZ/Huskie + AMS	48/13 + 16	100	100	100	100	100	145
Atrazine/Huskie + AMS	32/13 + 16	100	100	100	100	100	144
Weedy check		0	0	0	0	0	27
LSD 0.05		1	1	1	1	1	20

[a]First treatment applied preemergence, then a slash followed by a sequential postemergence treatment; AMS = ammonium sulfate.

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

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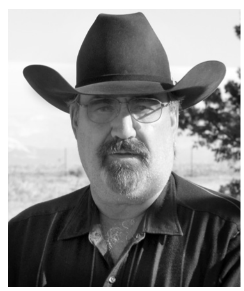

***Richard N. Arnold** is a College Professor in the Department of Entomology, Plant Pathology and Weed Science and Superintendent of New Mexico State University's Agricultural Science Center at Farmington. He earned his M.S. from New Mexico State University in 1980. His research interests include weed science and pest control management in crop and non-crop areas.*

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