Pest Control in Crops Grown in Northwestern New Mexico, 2014

Annual Data Report 100-2014

Richard N. Arnold, Michael K. O'Neill, Daniel Smeal, Kevin Lombard, and Margaret 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 (Lorenzi and Jeffery, 1987). Weeds reduce crop yields and quality, harbor insects and plant diseases, and cause irrigation and harvesting problems (Anonymous, 1986; Chandler et al., 1984; Lorenzi and Jeffery, 1987), reducing the total value of agricultural products by 10–15% in the United States (Lorenzi and Jeffery, 1987). Estimated average losses during 1975–1979 in the potential production of field corn, potatoes, and onion ranged from 7–16% in the Mountain States Region, which includes New Mexico (Chandler et al., 1984). San Juan County ranks first in potato production, second in alfalfa production, and fourth in corn production (USDA and New Mexico Agricultural Statistic Service, 1998). An estimated 90% of all tillage operations are for weed control (Anonymous, 1986). Herbicides can reduce the number of tillage operations necessary, and can be used where cultivation is not possible, such as within crop rows or in solid-seeded crops. Due to increasing fuel and labor costs, herbicides are often more economical than other methods of weed control.

Many herbicides are approved for use on agronomic crops grown on medium- and fine-textured, high-organic soils. Little information, however, is available 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 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.

As new land on the Navajo Indian Irrigation Project comes under cultivation, weed 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.

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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.

[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; Associate Professor, Agricultural Science Center at Farmington; and Agricultural Research Scientist, Agricultural Science Center at Farmington, New Mexico State University.

BASF, Priaxor Applications for Established Roundup Ready Alfalfa Production

Introduction

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

Objective

- Determine Priaxor potential as a plant health fungicide when applied in between cuttings and effect on alfalfa yield and quality.

Materials and methods

A field experiment was conducted in 2014 at Farmington, NM, to evaluate the response of Priaxor fungicide applied to established Roundup Ready alfalfa (DeKalb DKA41-18RR) in between cuttings and to evaluate Priaxor potential to increase yield. 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 randomized complete block with six replications. Individual plots were 4 ft wide by 30 ft long. Treatments were applied with a compressed air backpack sprayer calibrated to deliver 30 gal/ac at 35 psi. Table 1 indicates Priaxor application dates and cutting schedules. Alfalfa was harvested with an Almaco self-propelled plot harvester. Results obtained were subjected to analysis of variance at P = 0.05.

Results and discussion

Priaxor application and yield: There were no significant differences among treatments for yield of any cutting schedule. Applying Priaxor at 4 oz/ac before the 1st, 2nd, and 3rd; 2nd and, 3rd; and just before 1st and 3rd cuttings yielded 0.3 to 0.5 t/ac more alfalfa than the no Priaxor treatment (Table 2). These research plots contained a tremendous amount of gopher damage.

BASF, 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 selected herbicides and yield.

Materials and methods

A field experiment was conducted in 2014 at Farmington, NM, to evaluate the response of field corn (Pioneer PO365AM) and annual broadleaf weeds to preemergence followed by sequential late 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 six 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 13. The preemergence herbicide was applied on May 14 and immediately incorporated with 0.75 inch of sprinkler-applied water. Soils had a maximum and minimum temperature of 70 and 54°F. Postemergence treatments were applied on June 10 at the V-4 or V-5 leaf stage and weeds were small (less than 2 to 4 in.). Air temperature maximum and minimum during postemergence applications were 81 and 53°F. Black nightshade, Palmer amaranth, and prostrate pigweed infestations were heavy and common lambsquarters, black nightshade, and Russian thistle infestations were moderate throughout the experimental area. Preemergence treatments were rated visually for crop injury and weed control on June 10. Preemergence followed by sequential postemergence treatments were rated visually for weed control on July 10. Stand counts were made on June 10 by counting individual plants per 10 ft of the third row of each plot. Field corn was harvested on November 10 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 3. Weed control evaluations are given in Tables 3 and 4. There was no crop injury and there were no significant differences among treatments for stand count (Table 3). On June 10, Verdict plus atrazine plus Roundup PowerMAX plus AMS plus MSO applied preemergence at

12 plus 16 plus 22 plus 38 plus 80 oz/ac gave excellent control of all weeds. On July 10, all treatments except the weedy check gave excellent control of Palmer amaranth, prostrate pigweed, common lambsquarters, and black nightshade. Armezon plus MSO plus AMS applied postemergence at 0.5 plus 38 and 80 oz/ac only gave 86% control of Russian thistle (Table 4).

Crop yields: Yields are given in Table 4. Yields were 243 to 264 bu/ac higher in the herbicide-treated plots as compared to the weedy check (Table 4).

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 select herbicides and yield.

Materials and methods
A field experiment was conducted in 2014 at Farmington, NM, to evaluate the response of field corn (Pioneer PO365AM) 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 13. Preemergence herbicides were applied on May 14 and immediately incorporated with 0.75 in. of sprinkler-applied water. Soil had a maximum and minimum temperature of 70 and 54°F. Postemergence treatments were applied on June 10 when field corn was in the third to fifth leaf stage and weeds were small (less than 2 in.). Air temperature maximum and minimum during postemergence applications was 81 and 53°F. Black nightshade, Palmer amaranth, 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 10. Preemergence followed by sequential postemergence treatments were rated visually for weed control on July 11. Stand counts were made on June 10 by counting individual plants per 10 ft of the third row of each plot. Field corn was harvested on November 5 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 5. Weed control evaluations are given in Tables 5 and 6. There was no crop injury and there were no significant differences among treatments for stand count (Table 5). On June 10, all preemergence treatments except the weedy check gave excellent control of broadleaf weeds (Table 5). All preemergence followed by sequential postemergence treatments gave excellent control of Palmer amaranth, prostrate pigweed, black nightshade, Russian thistle, and common lambsquarters (Table 6).

Crop yields: Yields are given in Table 6. Yields were 227 to 244 bu/ac higher in the herbicide-treated plots as compared to the weedy check (Table 6).

Table 1. Application of Priaxor Applied to Cuttings of DKA41-18RR Roundup Ready Alfalfa; NMSU Agricultural Science Center at Farmington, NM, 2014					
		Cutting Date			
Treatments[a]	**Application Date**	**1**	**2**	**3**	**4**
Priaxor cut 1	April 23	June 6	July 10	August 15	September 19
Priaxor cut 2	June 30	June 6	July 10	August 15	September 19
Priaxor cut 3	July 24	June 6	July 10	August 15	September 19
Priaxor cuts 1 and 2	April 23, June 30	June 6	July 10	August 15	September 19
Priaxor cuts 1 and 3	April 23, July 24	June 6	July 10	August 15	September 19
Priaxor cuts 2 and 3	June 30, July 24	June 6	July 10	August 15	September 19
Priaxor cuts 1, 2, and 3	April 23, June 30, July 24	June 6	July 10	August 15	September 19
No Priaxor		June 6	July 10	August 15	September 19

[a]Priaxor applied at 4 oz/ac with an non-ionic surfactant at 12 oz/ac.

Table 2. Yield of DKA41-18RR Roundup Ready Alfalfa from Priaxor Applied at Different Cuttings; NMSU Agricultural Science Center at Farmington, NM, 2014					
	Yield (t/ac)[b] Per Cutting				**Total**
Treatments[a]	**1**	**2**	**3**	**4**	**(t/ac)**
Priaxor cut 1	2.9	2.4	2.1	1.5	8.9
Priaxor cut 2	3.1	2.4	2.2	1.6	9.3
Priaxor cut 3	2.9	2.5	2.1	1.6	9.1
Priaxor cuts 1 and 2	2.7	2.4	2.1	1.5	8.7
Priaxor cuts 1 and 3	3.0	2.5	2.1	1.6	9.2
Priaxor cuts 2 and 3	2.8	2.4	2.1	1.5	8.8
Priaxor cuts 1, 2, and 3	2.9	2.5	2.2	1.6	9.2
No Priaxor	2.6	2.5	2.1	1.6	8.8
LSD 0.05	ns	ns	ns	ns	

[a]Priaxor applied at 6 oz/ac with an non-ionic surfactant at 12 oz/ac.

[b]t/ac = tons/ac and is based on a 20% moisture content.

Table 3. Control of Annual Broadleaf Weeds with Preemergence Herbicides in Pioneer PO365AM Field Corn on June 10; NMSU Agricultural Science Center at Farmington, NM, 2014								
				Weed Control[b,c]				
		Stand	Crop	Amapa	Amabl	Solni	Saskr	Cheal
Treatments[a]	Rate (oz/ac)	Count (no.)	Injury[b] (%)	(%)				
Verdict + atrazine + Roundup PowerMAX + AMS + MSO	12 + 16 + 22 + 38 + 80	24	0	99	100	100	98	100
Weedy check		23	0	0	0	0	0	0
LSD 0.05		ns		1	1	1	2	1

[a]AMS = ammonium sulfate, MSO = methylated seed oil.

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

[c]Amapa = Palmer amaranth, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 4. Control of Annual Broadleaf Weeds with Preemergence Followed by Sequential Postemergence Herbicides in Pioneer PO365AM Field Corn on July 10; NMSU Agricultural Science Center at Farmington, NM, 2014							
		Weed Control[b,c]					
		Amapa	Amabl	Solni	Saskr	Cheal	
Treatments[a]	Rate (oz/ac)	(%)					Yield (bu/ac)
Verdict + atrazine + Roundup PowerMAX + AMS + MSO/ Status + Roundup PowerMAX + AMS + MSO	12 + 16 + 22 + 38 + 80/5 + 22 + 80 + 16	99	100	100	99	100	281
Armezon + MSO + AMS	0.5 + 38 + 80	98	99	100	86	100	292
Armezon + atrazine + MSO + AMS	0.5 + 16 + 38 + 80	99	100	100	99	100	302
Armezon + Clarity + MSO + AMS	0.5 + 8 + 38 + 80	99	99	100	99	100	290
Armezon + Basagran + MSO + AMS	0.5 + 12 + 38 + 80	100	99	100	99	100	295
Armezon + Basagran + MSO + AMS	0.5 + 18 + 38 + 80	100	100	100	99	100	287
Armezon + Basagran + MSO + AMS	0.5 + 24 + 38 + 80	98	99	100	100	100	285
Weedy check		0	0	0	0	100	38
LSD 0.05		1	1	1	2	1	29

[a]First treatment applied preemergence, then a slash followed by a sequential postemergence treatment. The rest of the treatments were applied postemergence. AMS = ammonium sulfate, MSO = methylated seed oil.

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

[c]Amapa = Palmer amaranth, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 5. Control of Annual Broadleaf Weeds with Preemergence Herbicides in Pioneer PO365AM Field Corn on June 10; NMSU Agricultural Science Center at Farmington, NM, 2014

Treatments	Rate (oz/ac)	Stand Count (no.)	Crop Injury[a] (%)	Weed Control[a,b] Amapa	Amabl	Solni	Saskr	Cheal
				(%)				
Corvus + atrazine	5.6 + 32	24	0	100	100	100	100	100
Balance Flexx + atrazine	6 + 32	25	0	100	100	100	100	100
Corvus + atrazine	3.3 + 16	23	0	100	100	100	100	100
Balance Flexx + atrazine	3 + 16	25	0	100	100	100	100	100
Lumax	48	24	0	100	100	100	100	100
Harness Xtra	48	24	0	100	100	100	100	100
Verdict	15	23	0	100	100	100	100	100
Weedy check		24	0	0	0	0	0	0
LSD 0.05		ns	0	1	1	1	1	1

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

[b]Amapa = Palmer amaranth, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

Table 6. Control of Annual Broadleaf Weeds with Preemergence Followed by Sequential Postemergence Herbicides in Pioneer PO365AM Field Corn on July 11; NMSU Agricultural Science Center at Farmington, NM, 2014							
		Weed Control[b,c]					
Treatments[a]	Rate (oz/ac)	Amapa	Amabl	Solni	Saskr	Cheal	Yield (bu/ac)
		(%)					
Corvus + atrazine	5.6 + 32	100	100	100	100	100	268
Balance Flexx + atrazine	6 + 32	100	100	100	100	100	267
Corvus + atrazine/RR PowerMAX + AMS	3.3 + 16/22 + 48	100	100	100	100	100	272
Corvus + atrazine/ Liberty + AMS	3.3 + 16/22 + 41	100	100	100	100	100	276
Corvus + atrazine/ Laudis + RR PowerMAX + MSO + AMS	3.3 + 16/3 + 22 + 38 + 41	100	100	100	100	100	282
Corvus + atrazine/ Capreno + AMS	3.3 + 16/3 + 41	100	100	100	100	100	269
Balance Flexx + atrazine/Laudis + RR PowerMAX + MSO + AMS	3.3 + 16/3 + 22 + 38 + 41	100	100	100	100	100	277
Balance Flexx + atrazine/Liberty + AMS	3 + 16/22 + 41	100	100	100	100	100	284
Balance Flexx + atrazine/RR PowerMAX + AMS	3 + 16/22 + 41	100	100	100	100	100	269
Balance Flexx + atrazine/Capreno + COC + AMS	3 + 16/3 + 38 + 41	100	100	100	100	100	268
Lumax/Halex GT + NIS + AMS	48/58 + 12 + 41	100	100	100	100	100	272
Harness Xtra/RR PowerMAX + AMS	48/22 + 41	100	100	100	100	100	270
Verdict/Status + AMS	15/2.5 + 41	100	100	100	100	100	270
Verdict + atrazine/ Status + AMS	15 + 32/2.5 + 41	100	100	100	100	100	276
Verdict/Status + AMS	15 + 15/2.5 + 41	100	100	100	100	100	271
Weedy check		0	0	0	0	0	40
LSD 0.05							24

[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, AMS = ammonium sulfate.

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

[c]Amapa = Palmer amaranth, Amabl = prostrate pigweed, Solni = black nightshade, Saskr = Russian thistle, and Cheal = common lambsquarters.

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REFERENCES

Anonymous. 1986. Crop protection. *Crops and Soils*, 38(7), 29–30.

Chandler, J.M., A.S. Hamill, and A.G. Thomas. 1984. *Crop losses due to weeds in Canada and the United States*. Champaign, IL: Weed Science Society of America.

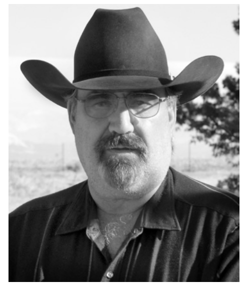
Lorenzi, H.J., and L.S. Jeffery. 1987. *Weeds of the United States and their control*. New York: Van Nostrand Reinhold Co. Inc.

National Academy of Sciences. 1969. *Insect-pest management and control*. Principles of plant and animal pest control series. Vol.3.

Peairs, F.B., L. Brooks, G. Hein, G. Johnson, B. Massey, D. McBride, P. Morrison, J.T. Schultz, and E. Spackman. 1989. *Economic impact of the Russian wheat aphid in the western United States: 1987–1988*. A report by the Russian Wheat Aphid Investigative committee to the Great Plains Agricultural Council (F. Peairs, Chairman, December 1989. *Great Plains Agricultural Council* Publ. No. 129.)

Richardson, L. 1986. Agrichemical anomie: Why it won't go away, In Proceedings of the Western Society of Weed Science, pp 3–4, San Diego, CA. March 18–20, 1986.

USDA and New Mexico Agricultural Statistics. 1998. United States Department of Agriculture and New Mexico Agricultural Statistics Service, Las Cruces, NM.



***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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Information in this report represents results from only one year's research. The reader is cautioned against drawing conclusions or making recommendations as a result of data in the report. In many instances, data in this report represents only one of several years of research results that will constitute the final formal report. It should be pointed out, however, that staff members have made every effort to check accuracy of the data presented.

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