

A photograph of a vast, lush green alfalfa field. The field is densely packed with green plants. In the background, there is a line of trees and a utility pole. A black rectangular box is superimposed on the upper part of the field, containing the title text.

WEED MANAGEMENT  
IN GLYPHOSATE  
RESISTANT ALFALFA

**Observations During  
Three Years**

# Background

- **CP4 gene is now in alfalfa: first perennial agronomic crop with this gene**
- **RR alfalfa varieties being developed by Forage Genetics and Monsanto**
- **Marketing in 2004 anticipated**

# Annual vs. Perennial Crop

- **Can use glyphosate in same crop for several seasons**
- **Brings new questions:**
  - ▶ Will this extend the stand life?
  - ▶ How often might glyphosate be applied?
  - ▶ Will all weeds (even dandelions) be controlled?

# Features of RR Alfalfa

- **No temperature restrictions**
- **Friendly harvest interval**
- **Can treat anytime in the growing season**
- **No risk of crop injury**
- **Can not be used if grass/alfalfa mix desired**

# This Trial

- **Used seed of event not being developed commercially**
- **Allowed for an early in-field evaluation**
- **Planted Apr. 19, 2000**
- **Glyphosate applied in 2000 and 2001**
- **Harvested through May 2002**

# Main Comparisons

## Three seeding methods

- ▶ Direct seeded with glyphosate resistant variety
- ▶ Companion seeded with glyphosate resistant variety
- ▶ Direct seeded with conventional variety

## Various times and rates of glyphosate applications and standard herbicides

# Direct Seeded Glyphosate Resistant Variety

	<u>lb ae/a</u>	<u>date</u>
1. Glyphosate 3 times	.75	6/15/00, 10/00, 10/01
2. Glyphosate 3 times	1.125	6/15/00, 10/00, 10/01
3. Pursuit	0.047	6/3/00
4. Check	----	----

# Companion Seeded Glyphosate Resistant Variety

	<b>lb ae/a</b>	<b>date</b>
<b>5. Check (oatlage)</b>	<b>----</b>	<b>6/13/00</b>
<b>    Glyphosate</b>	<b>0.75</b>	<b>10/01</b>
<b>6. Glyphosate twice</b>	<b>0.75</b>	<b>6/3/00, 10/00</b>
<b>    glyphosate once</b>	<b>1.125</b>	<b>10/01</b>
<b>7. Glyphosate twice</b>	<b>0.75</b>	<b>6/3/00, 10/01</b>
<b>8. Select</b>	<b>0.125</b>	<b>6/3/00</b>



# Direct Seeded – Conventional Variety

	<u>lb ae/a</u>	<u>date</u>
<b>9. Pursuit</b>	<b>0.047</b>	<b>6/3/00</b>
<b>10. Poast Plus</b>	<b>0.140</b>	<b>6/15/00</b>
<b>11. Pursuit +</b>	<b>0.047</b>	<b>6/15/00</b>
<b>    Poast Plus</b>	<b>0.140</b>	<b>6/15/00</b>

# Data Taken

## 2000

alfalfa population and height  
weed control ratings  
biomass in 1<sup>st</sup> and 2<sup>nd</sup> cuttings

## 2001 and 2002

alfalfa vigor  
weed pressure  
biomass

## Annual Weed Control\* - 2000 Gly. Resistant Variety

Treatment		bdleaf	grass
1. Gly	.75 lb	100	100
2. Gly	1.125 lb	100	99
3. Pursuit		100	96
4. Check		0	0
5. Oatlage		83	30
8. Poast Plus		0	100

\* At time of first cutting

# Quackgrass Pressure

## Direct Seeded – Gly. Resistant Variety

Treatment	2000	2001		2002
	Oct	May	Oct	May
1. Gly .75 lb 3x's	0	0	0	0
2. Gly 1.125 lb 3x's	0	0	0	0
3. Pursuit 2000	6	12	12	19
4. Check	3	7	12	12

# RR Alf - Check



2000



2001



2002

# RR Alf - Glyphosate 3 x's



2000



2001



2002

# RR Alf - Pursuit



2000



2001



2002

## Quackgrass Pressure Companion Seeded – Gly. Resistant Variety

Treatment	2000 Oct	2001		2002 May
		May	Oct	
5. Oatlage 2000 Gly .75lb 10/01	3	7	8	0
6. Gly .75 lb 3x's	4	1	3	0
7. Gly .75 lb 2 x's	4	8	9	0
8. Select 6/00	3	6	12	8



# RR Alf - Temporary Cover Crop

2000

7 DAA

24 DAA



Glyphosate

Select

Glyphosate

Select

# RR Alf - Temporary Cover Crop

2002



Gly 6/00 and 10/01



Select 6/00

# Quackgrass Pressure Direct Seeded – Conventional Variety

Treatment	2000	2001		2002
	Oct	May	Oct	May
<b>9. Pursuit 6/00</b>	<b>3</b>	<b>9</b>	<b>14</b>	<b>18</b>
<b>10. Poast + 6/00</b>	<b>9</b>	<b>9</b>	<b>14</b>	<b>20</b>
<b>11. Pursuit + Poast Plus 6/00</b>	<b>6</b>	<b>12</b>	<b>18</b>	<b>14</b>

# Conv. Alf - Standard Treatments

imazethapyr 6/00



2000



2002

# Dandelion Pressure

## Direct Seeded – Gly. Resistant Variety

Treatment	2001		2002
	June*	Oct	May
1. Gly .75 lb 3x's	0	9	0
2. Gly 1.125 lb 3x's	1	12	0
3. Pursuit 00	1	8	5
4. Check	3	5	6

\* Prior to second cutting

# Dandelion Pressure

## Companion Seeded – Gly. Resistant Variety

Treatment	2001		2002
	June*	Oct	May
5. Oatlage 2000 Gly .75lb 10/01	18	8	0
6. Gly .75 lb 3x's	0	6	0
7. Gly .75 lb 2 x's	8	5	0
8. Select 6/00	15	10	10

\* Prior to second cutting

## Relative Alfalfa Yields Direct Seeded – Gly. Resistant Variety

Treatment	2000	2001	2002
1. Gly .75 lb 3x's	78	95	100
2. Gly 1.125 lb 3x's	100	100	88
3. Pursuit 00	88	83	84
4. Check	45	87	77

## Relative Alfalfa Yields Companion Seeded – Gly. Resistant Variety

Treatment	2000	2001	2002
5. Oatlage 6/00 Gly .75lb 10/01	24	79	54
6. Gly .75 lb 3x's	67	91	78
7. Gly .75 lb 2 x's	--	86	75
8. Select 6/00	48	91	83



## Relative Alfalfa Yields Direct Seeded – Conventional Variety

Treatment	2000	2001	2002
9. Pursuit 6/00	72	92	71
10. Poast + 6/00	--	85	69
11. Pursuit + Poast Plus 6/00	--	91	72

# Conclusions

- **No injury symptoms nor yield reduction with any glyphosate treatment**
- **Weed control was excellent following any glyphosate application**
- **Quicker oat kill with glyphosate**
- **Dandelions were controlled with fall-applied glyphosate**

# Questions That Remain

- **Will glyphosate resistant varieties increase alfalfa stand life?**
- **How often and when might glyphosate be used in alfalfa?**
  - ▶ Low rates annually?
  - ▶ Normal rates less frequently?
  - ▶ More than once a year?
  - ▶ Single fall application the best way?

# Possible Scenario


- **Apply glyphosate after seeding to weeds 3 to 4 inches tall**
- **Should not see weeds of consequence the rest of seeding year nor in following year**
- **Can use “treat as needed” strategy**
- **Fall apply glyphosate in third year and every fall thereafter until stand thins**

# Other Aspects of This Technology

- **Should see an increase in no-till seedings**
- **Not feasible for forage/grass mixes**
- **May increase use of companion seeding as temporary cover crop**
- **Will have excellent way to kill volunteer wheat**

# Other Aspects of This Technology

- **Will generate questions of how to kill these varieties**
- **Will it impact development of herbicide resistant weeds?**
  - ▶ Not if they do not produce seeds
  - ▶ What about weeds that can flower in hay fields?  
Dandelion? Shepherd's purse? Chickweeds?  
Crabgrass?
  - ▶ Quack biotype shifts?



Is Alfalfa Greener on the Other  
Side of the Fence?

**Time Will Tell**