

## FINAL PROJECT REPORT TO THE NYS IPM PROGRAM, AGRICULTURAL IPM 2003-2004

**Title:** Roughstalk Bluegrass Suppression in Alfalfa-Grass Seedings

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**Cooperators:** None

**Type of Grant:** Cultural methods; sanitation; physical controls

**Project locations:** Findings might be applied throughout the Northeast

### Abstract:

A field experiment was established April 30, 2001 at Caldwell Field, Tompkins County, NY to determine the value of using recommended and double seeding rates of timothy or orchardgrass for suppression of roughstalk bluegrass (*Poa trivialis* L.) in alfalfa/timothy and alfalfa/orchardgrass seedings. No data on treatment effectiveness was collected in 2001 since the bluegrass was not present during the establishment year. Bluegrass did invade the plot area in the fall of 2001. The plots were harvested four times in 2002 and three times in 2003. Total forage yields and the percent of the botanical components (alfalfa, timothy or orchardgrass, bluegrass, and other weeds) were determined for each harvest date. In the alfalfa check plots, roughstalk bluegrass was responsible for 46, 12, 3, and 5% of the total forage yield for the first, second, third, and fourth cuttings respectively in 2002 and for 30, 18, and 13% of the total forage yield for the first, second, and third cuttings respectively in 2003. Since bluegrass was mainly a problem in the first cutting, forage quality analysis was conducted on the botanical components for those cuttings only. In 2002, first cutting forage yield from the alfalfa check was 2.51 tons dry matter/acre (T DM/A) with 46% of that yield from bluegrass. In 2003, first cutting forage yield from the alfalfa check was 1.68 T DM/A with 30% of that yield from bluegrass. The use of Select herbicide provided 100% bluegrass control both years but reduced forage yield to 1.39 and 1.11 T DM/A in 2002 and 2003 respectively. Forage yields for the alfalfa/timothy and alfalfa/orchardgrass treatments ranged from 2.36 to 2.97 T DM/A and were similar to the alfalfa check in 2002. In 2003, the alfalfa/timothy yields averaged 1.71 T DM/A and were similar to the alfalfa check. The alfalfa/orchardgrass mixtures yielded more than the alfalfa check and averaged 2.08 T DM/A. Each of these alfalfa/grass mixtures effectively suppressed the bluegrass. There was no bluegrass in either of the alfalfa/orchardgrass treatments in either year and bluegrass made up no more than 8% of the first cutting yield for either of the alfalfa/timothy treatments either year. Forage from the alfalfa check, which had 40 and 55% alfalfa in 2002 and 2003 respectively had a crude protein (CP) value of 16.6% in 2002 and 17.4% in 2003 due to the bluegrass in this treatment, while the alfalfa/Select herbicide treatment, had 77% alfalfa and 22.1% CP in 2002 and had 82% alfalfa and 19.3% CP in 2003. The alfalfa/timothy treatments averaged 14.8% CP in 2002 and 16.9% CP in 2003. Alfalfa/orchardgrass treatments averaged 12.8% CP in 2002 and 11.1% CP in 2003. Milk yield in lb/T DM and in lb/A were calculated using the yield and forage quality

data. Although the milk yield/T DM was among the highest for the alfalfa/Select herbicide treatment both years, this treatment would have produced less milk/acre than the alfalfa/timothy mixtures in either year. These alfalfa/timothy treatments were favored by higher yields and moderate CP values. In 2002, the alfalfa check and the alfalfa/orchardgrass treatments would have produced milk yields/acre between the low for the alfalfa Select herbicide treatment and the high yield for the alfalfa/timothy treatments but not statistically different from either. Results from 2003 showed all of the alfalfa/timothy and alfalfa/orchardgrass mixtures, as well as the alfalfa check, would have produced more milk/acre than the alfalfa/Select treatment. The results demonstrate the value of perennial forage grasses, either timothy or orchardgrass, for suppression of roughstalk bluegrass compared with chemical control of this weedy grass. They also suggest that the "recommended" seeding rate of 5 lb/A of timothy or orchardgrass in alfalfa/grass seedings is adequate for suppression of the bluegrass and suggest that even lower seeding rates might be adequate. A new experiment using 2.5 and 5 lb/A of timothy or orchardgrass was established in August 2003.

## **Background and Justification**

It is estimated that at least two-thirds of the alfalfa seedings in New York State include a perennial forage grass, most often timothy. Alfalfa producers make these mixed seedings for a couple of reasons. Clear seeded alfalfa will not persist on moderately to poorly drained soils that are common in New York. In addition, many producers include a grass in the mixture to speed hay drying. Roughstalk bluegrass is increasingly problematic in perennial forage seedings, especially in clear seeded alfalfa. This weedy grass is problematic because it matures prior to first cutting harvest and the woody stems reduce the palatability and quality of the first cutting hay. Postemergence grass herbicides such as Select (clethodim) can be used to suppress/control this weedy grass in clear alfalfa seedings. Unfortunately, Select applications will also control the desirable perennial grasses in mixed seedings. It was not clear that recommended seeding rates (4-6 lb/A) of timothy or orchardgrass would be adequate to prevent this weedy grass from infesting alfalfa/grass seedings and that increased seeding rates of these forage grasses might minimize these bluegrass infestations by eliminating the niche that this invasive species occupies.

### **Objectives:**

- 1) Determine the value of increasing the seeding rate of timothy and orchardgrass in alfalfa/grass seedings as a cultural suppression/control measure for roughstalk bluegrass from plots established in 2001.
- 2) Project evaluation was done by analyzing forage quality on botanical separates from first cuttings in 2002 and 2003. Forage quality parameters and yield data were used to calculate milk yield per T DM and in lb/A. This information should provide an estimate of the value of the various treatments.

### **Procedures:**

A field experiment was established at Caldwell Field in Tompkins County, NY on April 30, 2001. Alfalfa 'Pioneer 5347 LH', timothy 'Mariposa', and orchardgrass 'Shawnee' were the varieties selected for this experiment. The following treatments were included:

1. Alfalfa at 12 lb/A as an untreated check.
2. Alfalfa at 12 lb/A for Select herbicide control of bluegrass.
3. Alfalfa at 12 lb/A plus timothy at 5 lb/A.
4. Alfalfa at 12 lb/A plus timothy at 10 lb/A.
5. Alfalfa at 12 lb/A plus orchardgrass at 5 lb/A.
6. Alfalfa at 12 lb/A plus orchardgrass at 10 lb/A.

The treatments were established in a randomized complete block design with four replications. The entire plot area was sprayed with 2 qt/A of Butyrac 200 (2,4-DB) on June 25, 2001 to control annual broadleaf weeds. Individual plots were harvested on September 5. On April 16, 2002, the entire plot area was once again sprayed with 2 qt/A of Butyrac to control a variety of broadleaf weeds. On that same date, 12 fluid oz/A of Select (clethodim) herbicide was applied to the alfalfa/Select herbicide plots for roughstalk bluegrass control. These Butyrac and Select treatments were repeated on May 9, 2003. The plots were harvested four times during the 2002 growing season with cuttings on May 29, July 11, August 28, and October 24 and three times during the 2003 growing season with cuttings on May 28, July 22, and September 9. In addition to measuring total forage yield in tons dry matter per acre (T DM/A), botanical separation of representative samples was done to determine the percent alfalfa, perennial forage grass (timothy or orchardgrass), roughstalk bluegrass, and other weeds in each plot. Forage quality analysis and milk yield calculations for each botanical component were done by Dairy One Forage Laboratory. The University of Wisconsin Alfalfa/Grass Evaluation System - MILK 2000 was used to calculate milk yield/T DM, and milk yield in lb/A for each treatment. The results were subjected to an analysis of variance.

## Results and Discussion:

The percent of roughstalk bluegrass in the alfalfa check ranged from 3 to 46% for the four cuttings in 2002 and from 13 to 30% for the three cuttings in 2003. Since roughstalk bluegrass was mainly a problem in the first cutting (46 and 30% of the total yield in the alfalfa check in 2002 and 2003 respectively), forage quality analysis was conducted on the botanical components for first cuttings only. Total forage yields and the percent of the botanical components for the first cuttings are shown in Table 1. First cutting forage yield from the alfalfa check in 2002 was 2.51 tons dry matter/acre (T DM/A) with 40, 4, 46, and 10% of that yield from alfalfa, timothy, bluegrass and other weeds respectively. In 2003, first cutting yield from the check was 1.68 T DM/A with 55, 0, 30, and 15% of that yield from alfalfa, timothy, bluegrass and other weeds respectively. The use of Select herbicide provided 100% bluegrass control but reduced forage yield to 1.39 T DM/A (77% alfalfa and 23% weeds) in 2002 and to 1.11 T DM/A (82% alfalfa and 18% weeds) in 2003. In both cases the alfalfa/Select yield was less than the yield from the alfalfa check. Forage yields for the two alfalfa/timothy and the two alfalfa/orchardgrass treatments ranged from 2.36 to 2.97 T DM/A and were similar to the alfalfa check in 2002. In 2003, yields for the alfalfa/timothy treatments averaged 1.71 T DM/A and were similar to the alfalfa check. The alfalfa/orchardgrass mixtures yielded more than the alfalfa check and averaged 2.08 T DM/A. Each of the alfalfa/grass mixtures was effective in suppressing the roughstalk bluegrass with an average of 5% bluegrass with the two alfalfa/timothy treatments over the 2 years and no bluegrass with the two alfalfa/orchardgrass treatments over the 2 years. Unfortunately, the orchardgrass also suppressed the alfalfa more than the timothy. Alfalfa contributed an average of 15% of the total forage in the two alfalfa/timothy treatments in 2002 and an average of 53% of total forage in 2003. In the alfalfa/orchardgrass treatments, alfalfa contributed less than 12% of the total forage in either year.

Crude protein (CP) and calculated milk yields as the pounds of milk per ton of dry matter (lb/T DM) and as pounds of milk per acre (lb/A) for the treatments are shown in Table 2. Forage from the alfalfa check had a CP value of 16.6% in 2002 and 17.4% in 2003, while the alfalfa/Select herbicide treatment had 22.1% CP in 2002 and 19.3% CP in 2003. The alfalfa/timothy treatments averaged 14.8% CP and the alfalfa/orchardgrass treatments averaged 12.8% CP in 2002. In 2003, the alfalfa timothy treatments averaged 16.9% CP while the alfalfa/orchardgrass treatments averaged only 11.1% CP. Although these values are of interest, expected/calculated milk yields are of greater interest to Northeast dairy farmers. The alfalfa/Select treatment, with 77% of the forage from alfalfa with a CP of 22.1% would have

produced 3159 lb of milk/T DM in 2002. This was significantly greater than the expected production from all other treatments. There was no difference in the expected milk yield/T DM among the alfalfa check (2871 lb) and the two alfalfa/timothy treatments with an average of 2833 lb. The alfalfa/orchardgrass treatments not only had the lowest % CP, they were the lowest in expected milk/T DM in 2002. In 2003, the alfalfa/Select treatment had 82% of the yield from alfalfa with a CP% of 19.3% and would have produced 2979 lb of milk/T DM. This was similar to the lb/T DM from the alfalfa check and the alfalfa/timothy treatments but greater than that from the alfalfa/orchardgrass treatments.

Although the expected milk yields/ T DM are of interest and are a reflection of forage quality, the expected milk yield/ A is the measure that combines forage yield as well as quality and is perhaps of greatest interest. Although the alfalfa/Select herbicide treatment had the highest CP (22.1% and 19.3%) both years, it also had the lowest forage yield (1.39 and 1.11 T DM/ A) both years because the herbicide effectively removed the grass component. As a result, the calculated milk yield was only 4382 lb/ A in 2002. This was not significantly less than the milk yield from the alfalfa check which had 16.6% CP and an expected milk yield of 7198 lb/ A or less than the two alfalfa/orchardgrass treatments. The two alfalfa/timothy treatments did produce an expected milk yield greater than the alfalfa/Select herbicide treatment. In 2003, the calculated milk yield in lb/ A for the alfalfa/Select treatment was less than that of any other treatment with only 3302 lb/ A (Table 2). The alfalfa/orchardgrass would have produced the most milk per acre with an average of 5625 lb/ A, even though they had the lowest CP (average of 11.1%). As is so often the case, the milk yield per acre was a reflection of the forage yield per acre.

These results demonstrate the value of using a perennial forage grass, either timothy or orchardgrass, for suppression of roughstalk bluegrass compared with chemical control of this weedy grass. The results also showed there was no advantage of using the double seeding rate recommended for the grasses in the "Cornell Guide for Integrated Field Crop Management" and that orchardgrass is more effective than timothy in suppressing the roughstalk bluegrass.

Table 1. Total forage yields and percent composition of alfalfa, timothy/orchardgrass, roughstalk bluegrass, and weeds from first cuttings on May 29, 2002 and May 28, 2003.

Forage Treatments	Yield		Botanical Components (%)									
	(T DM/A)		Alfalfa		Timothy		Orchard		Bluegrass		Weeds	
	'02	'03	'02	'03	'02	'03	'02	'03	'02	'03	'02	'03
1. Alfalfa 12 lb/A Check	2.51	1.68	40	55	4	0	0	0	46	30	10	15
2. Alfalfa 12 lb/A Select	1.39	1.11	77	82	0	0	0	0	0	0	23	18
3. Alfalfa 12 lb/A Timothy 5 lb/A	2.97	1.70	13	55	82	34	0	0	5	8	0	3
4. Alfalfa 12 lb/A Timothy 10 lb/A	2.81	1.73	17	52	79	42	0	0	3	5	1	1
5. Alfalfa 12 lb/A Orchard 5 lb/A	2.72	2.14	5	12	0	0	94	88	0	0	0	0
6. Alfalfa 12 lb/A Orchard 10 lb/A	2.36	2.03	2	6	0	0	98	94	0	0	0	0
LSD (P = 0.05)	1.1	0.2	18	19	7	13	1	1	9	3	13	13

Table 2. Crude protein (CP) and calculated milk yields per ton of dry matter (lb/T DM) and per acre (lb/ A) for the first cuttings on May 29, 2002 and May 28, 2003..

Forage Treatments	Crude Protein		Milk Yield			
	(%)		lb/T DM		lb/ A	
	'02	'03	'02	'03	'02	'03
1. Alfalfa 12 lb/ A Check	16.6	17.4	2871	2955	7198	4969
2. Alfalfa 12 lb/ A Select	22.1	19.3	3159	2979	4382	3302
3. Alfalfa 12 lb/ A Timothy 5 lb/ A	14.7	17.1	2844	2879	8460	4910
4. Alfalfa 12 lb/ A Timothy 10 lb/ A	15.0	16.6	2822	2851	7946	4949
5. Alfalfa 12 lb/ A Orchard 5 lb/ A	13.0	11.4	2729	2704	7424	5777
6. Alfalfa 12 lb/ A Orchard 10 lb/ A	12.7	10.8	2719	2701	6338	5473
LSD (P = 0.05)	2.3	1.4	124	170	3071	533