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UW – Madison Weed Science Renz Lab

Evaluation of Fungicide, Insecticide, and Plant-Growth Regulator Application Timing for One-Pass Applications in Interseeded Corn-Alfalfa

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Summary:

We evaluated single-pass applications of Kudos (prohexadione-calcium) and Priaxor (fungicide) on alfalfa seedlings at an early or late timing. Additional plots treated at the late timing with Kudos and Priaxor also received a very late application of Warrior II (insecticide) when potato leafhopper numbers reached thresholds known to damage alfalfa. Kudos applied with or without Priaxor at the late timing was most effective for enhancing alfalfa survival (Fig. 1). Subsequent data analyses focused on the late timing revealed a 3-way interaction between alfalfa variety, Kudos rate, and pesticide application ($P <$ 0.05). For alfalfa variety 55H94 (known to have relatively good survival under corn), marginal stand densities were obtained if 8 or 16 ounces per acre of Kudos were applied without pesticides (Fig. 2). Addition of Priaxor or Priaxor followed by Warrior II further increased plant survival, but stand density was still below levels considered optimal for subsequent forage production by alfalfa. For alfalfa variety 3420 (known to have moderate survival under corn), stand density only reached marginal levels if 16 ounces per acre of Kudos was applied with pesticides. Application of Priaxor or Priaxor followed by Warrior II significantly increased the percentage of green leaves retained on both alfalfa varieties (Fig. 3). Kudos improved alfalfa survival by boosting root mass and root carbohydrate storage in alfalfa (Grabber et al., unpublished work). We expect pesticides further improved alfalfa survival under corn by allowing alfalfa to continue photosynthesis and carbohydrate accumulation late into the growing season. For comparative purposes, benchmark treatment of 26 ounces per acre Kudos (applied early on June 9) followed by Priaxor plus Warrior II (both applied very late on June 29 at the onset of disease and leafhopper pressure) resulted in superior alfalfa stand densities that were at or above the optimal level needed for forage production.

Research Plot Information:

Plot Dimensions: 5 feet by 20 feet

Design: Randomized Complete Block, 4 blocks

Soil Type: 100% Plano silt loam, 2 – 6 percent slopes

Notes:

- General agronomic practices and observations:

Following fertilization with 200 pounds per acre N and ample P and K, corn at 37,000 seed per acre and alfalfa at 16 pounds per acre were planted on May 8, 2018. Two alfalfa varieties were sown in 5 ft wide by 20 feet long subplots. An additional 50 pounds per acre N was side dressed at the V5 stage to alleviate visual signs of N deficiency in corn. Factorial combinations of Kudos and pesticides were applied to whole plots as described below for each experiment. Due to cool spring temperatures and ample precipitation, initial alfalfa growth was unusually vigorous and corn development was delayed compared to experiments performed over the past 10 years. Final dry matter yields of corn silage harvested on 14 September were, however, close to normal for this location (10.4 tons per acre). Alfalfa defoliation was evaluated on 2 August and stand density was evaluated on 17 October. Due to high corn plant density and excessive precipitation throughout the growing season, stress on alfalfa seedlings during the second half of the growing season was among the most severe we've observed in over 10 years of interseeding work. As a result, stand density of interseeded alfalfa following corn harvest averaged only 0.8 plants per square foot in untreated controls.

Treatments:

Trt. No.	Alfalfa Variety	Treatment	Rate	Timing
1	55H94	Untreated Control (UTC)	-	-
2	3420	UTC	-	-
3	55H94	Piaxor	4 ounces/Acre (oz/A)	Early
4	3420	Piaxor	4 oz/A	Early
5	55H94	Kudos	8 ounces of dry weight/Acre (oz wt/A)	Early
6	3420	Kudos	8 oz wt/A	Early
7	55H94	Piaxor Kudos	4 oz/A 8 oz wt/A	Early
8	3420	Piaxor Kudos	4 oz/A 8 oz wt/A	Early
9	55H94	Kudos	16 oz wt/A	Early
10	3420	Kudos	16 oz wt/A	Early
11	55H94	Piaxor Kudos	4 oz/A 16 oz wt/A	Early

12	3420	Piaxor Kudos	4 oz/A 16 oz wt/A	Early
13	55H94	Priaxor	4 oz/A	Late
14	3420	Priaxor	4 oz/A	Late
15	55H94	Warrior II	1 oz/A	Late
16	3420	Warrior II	1 oz/A	Late
17	55H94	Priaxor Warrior II	4 oz/A 1 oz/A	Late
18	3420	Priaxor Warrior II	4 oz/A 1 oz/A	Late
19	55H94	Kudos	8 oz wt/A	Late
20	3420	Kudos	8 oz wt/A	Late
21	55H94	Kudos Priaxor	8 oz wt/A 4 oz/A	Late
22	3420	Kudos Priaxor	8 oz wt/A 4 oz/A	Late
23	55H94	Kudos Priaxor Warrior II	8 oz wt/A 4 oz/A 1 oz/A	Late
24	3420	Kudos Priaxor Warrior II	8 oz wt/A 4 oz/A 1 oz/A	Late
25	55H94	Kudos	16 oz wt/A	Late
26	3420	Kudos	16 oz wt/A	Late
27	55H94	Kudos Priaxor	16 oz wt/A 4 oz/A	Late
28	3420	Kudos Priaxor	16 oz wt/A 4 oz/A	Late
29	55H94	Kudos Priaxor Warrior II	16 oz wt/A 4 oz/A 1 oz/A	Late
30	3420	Kudos Priaxor Warrior II	16 oz wt/A 4 oz/A 1 oz/A	Late
31	55H94	Kudos Priaxor Warrior II	26 oz wt/A 4 oz/A 1 oz/A	Early Late Late
32	3420	Kudos Priaxor Warrior II	26 oz wt/A 4 oz/A 1 oz/A	Early Late Late

Application:

- Early Timing: June 9th, 2018
- Late Timing: June 17th, 2018
- Insecticide (Warrior II) Treatments: June 29th, 2018

Applications were applied with drop nozzles to maximize cover on alfalfa and minimize cover to corn.

Weather Data:

Weather Station	KWIARLIN2
Temperature	76°F / 90°F / 92° F
Wind Speed and Direction	3 mph SE / 3 mph SW / 0 mph
Relative Humidity	92% / 82% / 92%
Previous Rain Event Within 48 Hours	06.08.18 – 0.5 inches / 06.15.18 – 1.1 inches / -
When ≥ 0.25 inches of precipitation occurred after treatment	06.10.18 – 0.66 inches / 06.18.18 – 0.47 inches / 07.13.18 – 0.80 inches

Results:

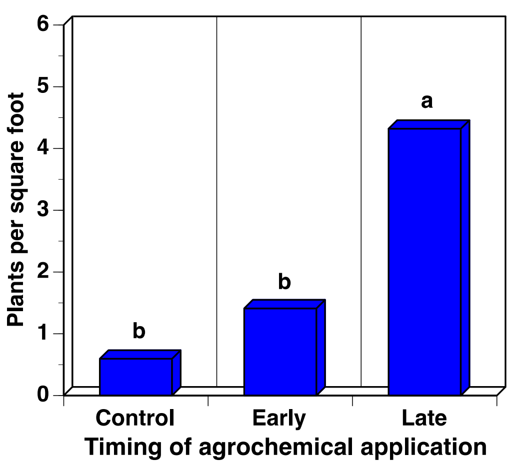

Fig. 1. Fall stand density of alfalfa interseeded into silage corn in response to agrichemical treatments applied early on 0.9 ft tall alfalfa growing in 1.5 ft tall corn or late on 1.4 ft tall alfalfa growing in 2.3 ft tall corn. Data are averaged across alfalfa varieties and agrichemical applications of 8 or 16 oz/a of Kudos prohexadione-calcium applied with 0 or 1 oz/a Priaxor fungicide. Means with unlike letters differ at *P* = 0.05.

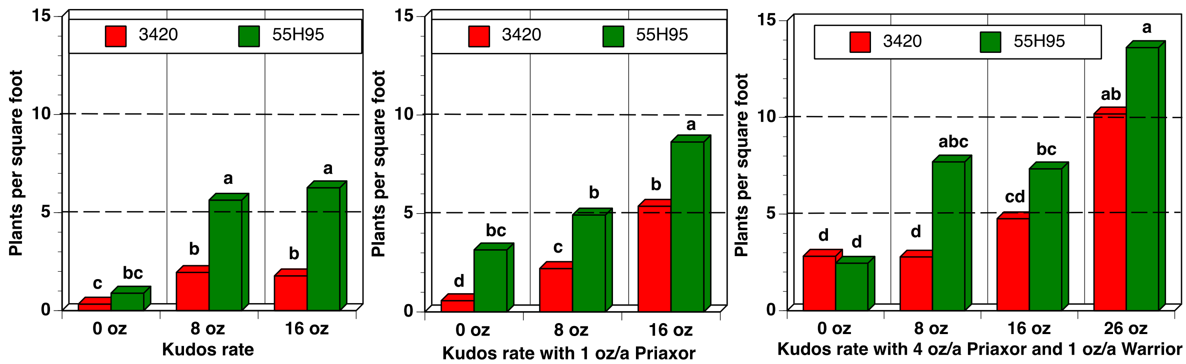

Fig. 2. Fall stand density of two alfalfa varieties interseeded into silage corn in response to late applications of Kudos prohexadione-calcium (left), Kudos plus Priaxor fungicide (center), or Kudos plus Priaxor and Warrior insecticide (right). Dashed lines at 5 and 10 plants per square foot in turn indicate marginal and optimal stand densities for subsequent alfalfa forage production. Means within each panel with unlike letters differ at *P* = 0.05.

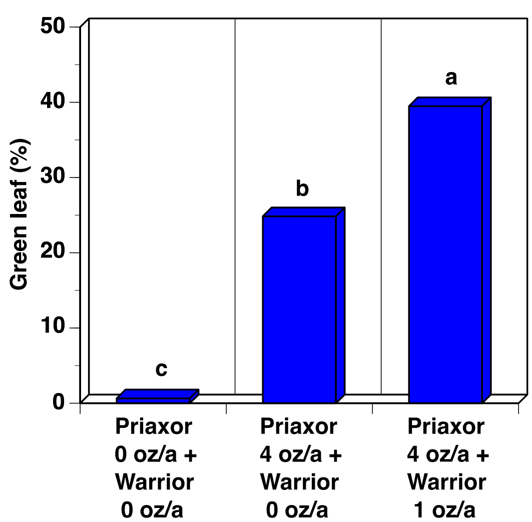

Fig. 3. Retention of green leaves in early August on alfalfa interseeded into silage corn in response to Priaxor fungicide and Warrior insecticide treatments. Data are averaged across alfalfa varieties and Kudos prohexadione-calcium treatments. Treatments with unlike letters differ at *P* = 0.05.