MANAGING VOLUNTEER WHEAT IN LATE SUMMER SEEDED ALFALFA

College of Agricultural & Life Sciences
UNIVERSITY OF WISCONSIN–MADISON

Mark Renz and **Chris Bloomingdale**,
University of Wisconsin-Madison,
Department of Agronomy

Richard Proost,
Nutrient and Pest Management Program,
University of Wisconsin-Madison

Mike Ballweg,
University of Wisconsin-Extension

UW Extension
University of Wisconsin-Extension

NPM

Wheat is an important agronomic crop in the rotations of many Midwestern states and is often followed by a late summer seeding of alfalfa. In this situation, wheat seed not collected in the combine becomes a weed and impacts alfalfa establishment and productivity, especially in no and reduced till fields. Previous research in Wisconsin has shown that volunteer wheat can reduce alfalfa density by up to 50%, resulting in shorter alfalfa stand life and reducing forage quality the following spring. This past research documented a well-timed application of sethoxydim (Poast Plus) during establishment in the fall when wheat is less 6 inches tall can alleviate this impact and provide excellent control (see photo below).

This research (done between 2008-2010) led to further questions about managing volunteer wheat in alfalfa:

Does glyphosate (Roundup) in Roundup Ready Alfalfa or imazamox (Raptor) provide similar control as sethoxydim (Poast Plus) ?

Is performance maximized when applied to volunteer wheat that is less than or equal to 6 to 6-½ inch tall ?

What level of volunteer wheat control is needed to prevent impact on alfalfa establishment while maximizing forage productivity and quality for dairy-based systems?

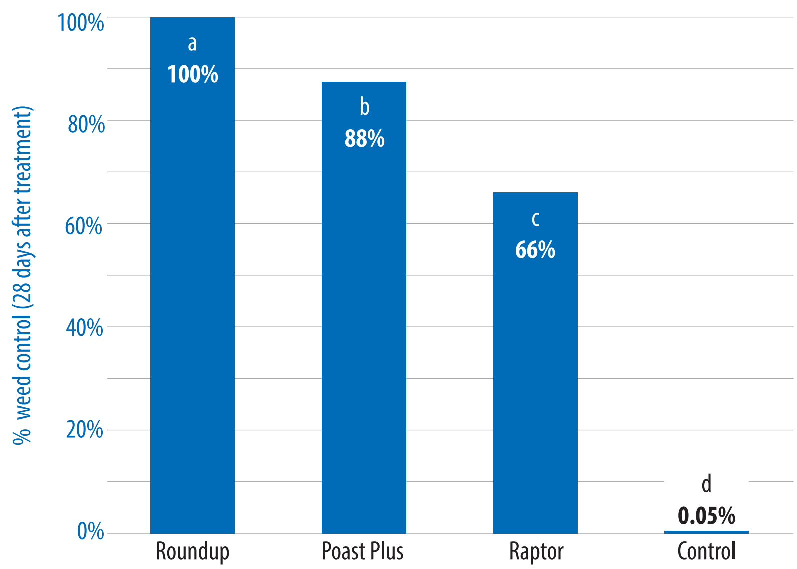
METHODS

To address these questions, a study was initiated in 2015 at three locations across Wisconsin to compare the effectiveness of Roundup (glyphosate), Raptor (imazamox) and Poast Plus (sethoxydim) in controlling volunteer wheat in alfalfa. Research sites were located in central, eastern and southwestern parts of the state. Roundup Ready alfalfa was seeded into fields where winter wheat was harvested earlier that summer. Roundup WeatherMAX at 22 fl oz/acre, Poast Plus at 2.25 pt/acre and Raptor at 4 fl oz/acre were compared to an untreated control at all three locations. Adjuvants were used per label recommendations for each product. Early applications were made when wheat was 4-6 inches tall, and alfalfa was at the 2-3 trifoliate leaf stage; the later application was made 12-20 days later, when wheat was 6-12 inches tall. Results are averaged across all three locations.

A well-timed herbicide application during alfalfa establishment in the fall can provide excellent control of volunteer winter wheat.

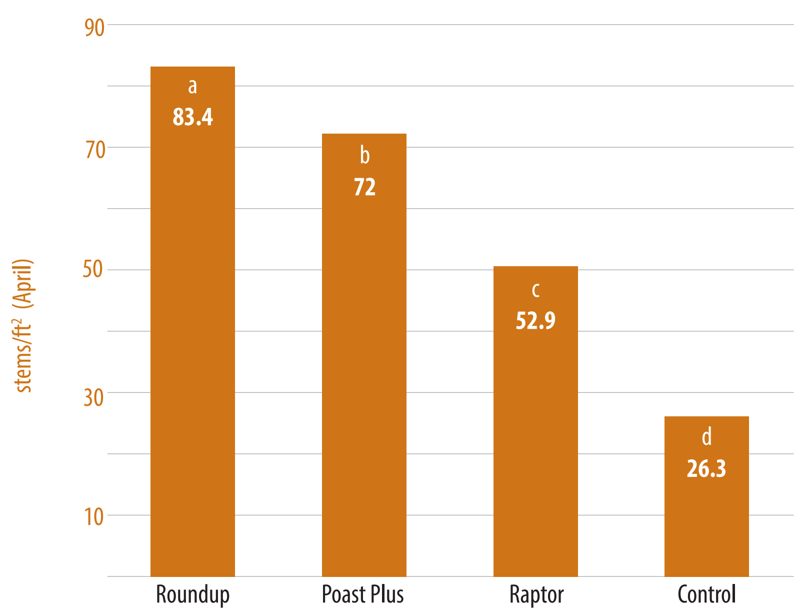
VOLUNTEER WHEAT CONTROL

By 28 days after treatment (late October – early November), both herbicide treatments and timings of application affected control of volunteer wheat ($P < 0.05$). Roundup controlled volunteer wheat the best (100%), followed by Poast Plus (88%) and Raptor (66%). Roundup and Poast Plus control was maintained through spring as cover of volunteer wheat was less than 5% present. Raptor treated plots had on average half the cover of untreated plots (65%) [data not shown]. Although an earlier application timing provided better volunteer wheat control, it averaged less than 10% improvement versus the later timing [data not shown].



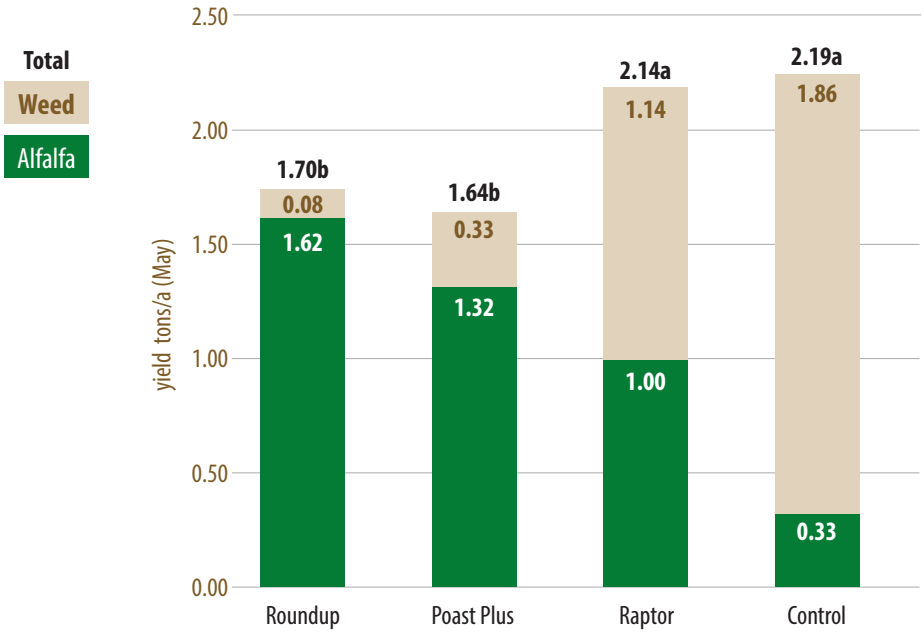
ALFALFA STEM DENSITY

April alfalfa stem density increased with herbicide and the early application timing compared to the untreated areas ($P < 0.05$). Stem density was greatest with Roundup resulting in the highest stem density (83 stems/ft^2) followed by Poast Plus applied early (72 stems/ft^2). Stem density from Raptor treatments and untreated areas were, on average, unacceptable as stem density was below the recommended levels for established alfalfa fields of 55 stems/ft^2. Low stem density from Raptor treatments was likely due to the variable and poor volunteer wheat control and could be improved if higher rates and/or an earlier application timing is used. Application timing also influenced stem density, with early application timings providing 22% greater stem density compared to later timings [data not shown].



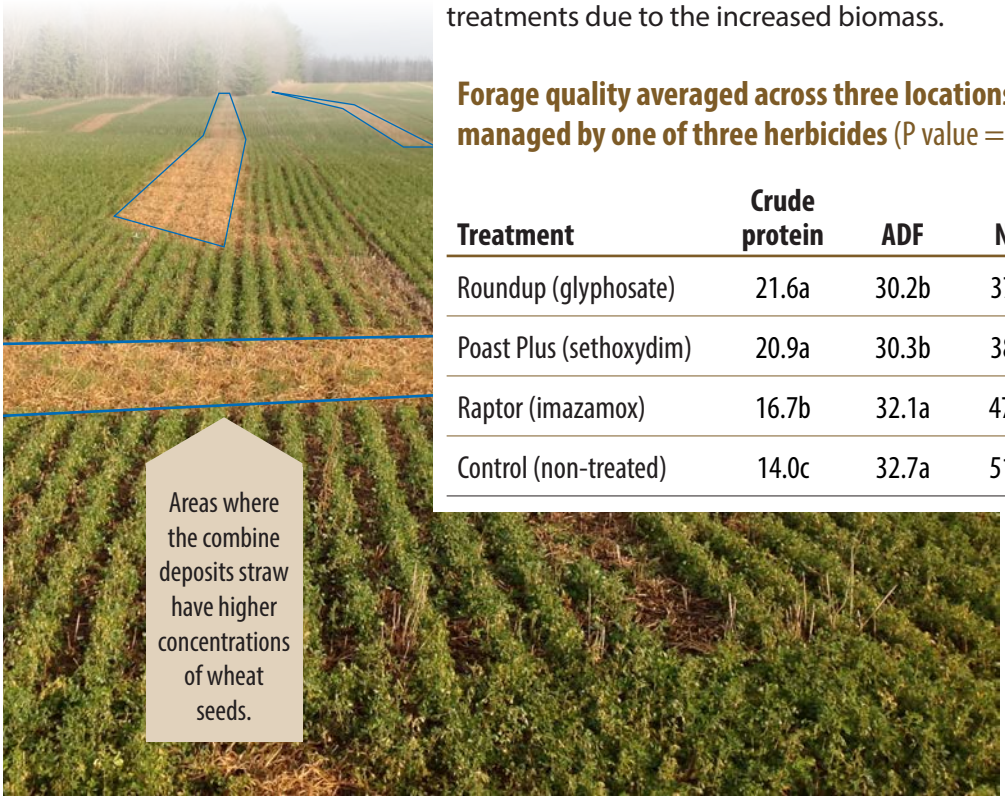
FORAGE YIELD

Yield in May was 0.5-0.6 tons dry matter/acre higher in the Raptor and untreated treated plots compared to Poast Plus and Roundup ($P < 0.05$). Increased forage in the Raptor and untreated plots was from volunteer wheat biomass, as it averaged 84% and 53% of the total forage biomass. Forage biomass from the Roundup and Poast Plus treatments, in contrast, were mostly alfalfa with on average 5% and 16% wheat biomass, respectively.



FORAGE QUALITY

Crude protein and relative feed quality (RFQ) were maximized, and acid detergent fiber (ADF) and neutral detergent fiber (NDF) minimized when Roundup or Poast Plus were utilized, regardless of timing. Due to these differences, milk/ton of forage calculated used the 2016 MILK* model was highest in Roundup and Poast Plus treatments. In contrast, milk/acre was highest in non-treated and Raptor treatments due to the increased biomass.



Forage quality averaged across three locations when volunteer wheat was managed by one of three herbicides (P value = <0.01)

Treatment	Crude protein	ADF	NDF	RFQ	Milk/ton forage	Milk/acre forage
Roundup (glyphosate)	21.6a	30.2b	37.5c	184a	3,190a	5,405b
Poast Plus (sethoxydim)	20.9a	30.3b	38.9c	178a	3,169a	5,200b
Raptor (imazamox)	16.7b	32.1a	47.0b	152b	3,030b	6,412a
Control (non-treated)	14.0c	32.7a	51.5a	138c	3,010b	6,967a

* Dan Undersander (University of Wisconsin -Extension Agronomy Professor) developed a method for estimating milk per ton of forage dry matter (DM) as an index of forage quality of alfalfa and grasses. For more information, see https://fyi.uwex.edu/forage/milk2016-combining-yield-and-quality-into-a-single-term/

ACCEPTABLE THRESHOLD FOR VOLUNTEER WHEAT

In developing a threshold, one must consider the benefits of volunteer wheat to forage production as well as the reduction in forage quality and impact on alfalfa stand establishment. While yield and resulting milk/acre were highest in uncontrolled areas the following spring, the forage quality and resulting milk/ton of forage is reduced. Additionally stem density is reduced if volunteer wheat is not controlled, potentially impacting alfalfa stand life. We found at least 60% control of volunteer wheat was needed to, on average, meet the minimum alfalfa stand stem density that will allow for maximum yield (55 stems/ft^2). The relationship was linear and for every increase in control by 10%, an increase of 6 stems/ft^2 was observed. Thus, higher yields can be expected in the first harvest in spring if winter wheat is not controlled, but the forage quality will be reduced and wheat presence could reduce alfalfa stand life. To offset these conflicting results, we recommend producers aim to keep volunteer wheat less than 35% of the total forage. This translates to 70% or better control in the fall. To obtain these levels of control, several herbicides could be utilized at a range of timings.

SUMMARY

Results across three locations confirm that volunteer wheat can impact summer seedings of alfalfa. Applications of Roundup or Poast Plus to volunteer wheat that was 4-6 inches tall provided the best control in these experiments 28 days after treatment and the following spring with minimal amounts of volunteer wheat in the total forage. As the volunteer wheat does have value as a forage, its presence in the forage can increase milk production per acre; however this impacts the alfalfa stem density and long-term stand life of the alfalfa. ***Based on our results, we recommend that producers prevent volunteer wheat from becoming more than 35% of the total forage the following spring. This would translate to 70% control of volunteer wheat 28 days after application.***