Evaluation of Roundup Ready alfalfa for adaptability to Wyoming conditions

Anowar Islam[1], Mohammed Munkaila[1], Michael Baidoo[1], and Chandan Shilpakar[1]

[1]Department of Plant Sciences, University of Wyoming

Introduction

Alfalfa (*Medicago sativa* L.) is the most important forage crop and the third most valuable (over $9.3 billion) crop in the United States. Often alfalfa is called the "queen of forages" due to its superior high yielding and nutritive value. Furthermore, alfalfa is an important component of livestock rations. In Wyoming, it is the leading crop in terms of economic contribution ($330 million) and production (2,479,000 tons). The establishment of dense vigorous stands of alfalfa is essential for long-term profitability, but establishment can be challenging as the seedling alfalfa is vulnerable to competition from annual weeds. Effective weed management is necessary for good stand establishment and high forage production. Glyphosate-resistant (Roundup Ready, RR) technology is one of the strategies to effectively manage weeds on alfalfa fields. It is there necessary to evaluate the yield potential of Roundup Ready alfalfa cultivars.

Objective

Evaluate forage yield and adaptability of RR alfalfa cultivars under irrigated conditions.

Materials and Methods

The experiment was established at the University of Wyoming James C. Hageman Sustainable Agriculture Research and Extension Center (SAREC) in 2013. Treatments included 25 RR alfalfa cultivars. Each cultivar was replicated four times in a randomized complete block design. Seeds of each cultivar were planted at a seeding rate of 20 pounds of pure live seed per acre. Glyphosate was uniformly applied to all plots at the 3-trifoliate seedling stage to control weeds during the establishment stage. Three cuts at 30 to 45 days intervals (depending on plant growth) were made each year. Forage samples were oven-dried at 140°F for 72 hours to determine forage yield on a dry matter (DM) basis. The results shown are data from 2021 only.

Results and Discussion

Cultivars did not vary for forage yield during the first and third harvest. However, numerically, forage yield was highest (2677 pounds per acre) for RR Stratica, and lowest (2213 pounds per acre) for WL 355RR during the first harvest (Table 1). During the third harvest, the highest forage yield (2070 pounds per acre) was obtained in Consistency 4.10RR and the lowest (1517 pounds per acre) was obtained in R49W215 (Table 1). Significant variation in forage DM yield was observed among cultivars during the second harvest. Consistency 4.10RR again produced the highest (2659 pounds per acre) forage DM yield while WL 367RR/HQ produced the lowest (1891 pounds per acre) during the second harvest. Weed-free RR alfalfa plots were achieved from the early application of glyphosate. The cultivars have similar ability to maintain higher or comparable forage yields while improving weed control in alfalfa production systems. Average forage yield was highest during the first harvest (2471 pounds per acre) and lowest in the third harvest (1740 pounds per acre) (Table 1). Total forage DM yield also varied significantly among cultivars. Consistency 4.10RR produced the highest (7280 pounds per acre) seasonal total yield whereas Ameristand 415NT RR produced the lowest (6013 pounds per acre) seasonal total

forage yield. Overall, results from 2021 (after 8 years of establishment) suggest that RR alfalfa cultivars are adaptable to conditions of Wyoming with potential for high yield and weed control.

Table 1. Forage dry matter yield of Roundup Ready alfalfa cultivars at SAREC in 2021.

	Forage dry matter yield (pounds per acre)			
Cultivar	**Harvest 1**	**Harvest 2**	**Harvest 3**	**Total**
6497R	2302	2284	1891	6477
6516R	2641	2195	1624	6459
6547R	2409	2088	1606	6103
Ameristand 415NT RR	2284	2088	1642	6013
Ameristand 433T RR	2569	2587	1624	6781
Ameristand 455TQ RR	2427	2338	1784	6549
Consistency 4.10RR	2552	2659	2070	7280
Denali 4.10RR	2462	2302	1552	6317
DKA46-16 RR	2659	2462	1838	6959
Integra 8444 RR	2605	2159	1874	6638
Mutiny	2480	2623	1749	6852
R312W244	2284	2123	1802	6210
R49W215	2641	2534	1517	6691
R570K217	2338	2373	1900	6611
R58W235	2320	2302	1767	6388
R59Hg217	2462	2373	1998	6834
RR Apha Tron	2498	2373	1642	6513
RR Nema Star	2516	2320	1713	6549
RR Presteez	2498	2445	1820	6763
RR Stratica	2677	2320	1588	6584
RR Tunnica	2462	2016	1749	6227
WL 355RR	2213	2284	1802	6299
WL 367RR/HQ	2516	1891	1749	6156
WL 372HQ.RR	2480	2445	1588	6513
WL356HQ.RR	2480	2552	1606	6638
Mean	2471	2325	1740	6536
LSD (0.05)	NS	598	NS	740

Acknowledgments
We thank SAREC crew for study assistance and FGI for providing seeds and funding.

Contact: Anowar Islam, mislam@uwyo.edu, 307-766-4151.