SOUTH DAKOTA– Potential for Winter Annual Forage Grasses in a Semi-Arid Climate

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Winter rye (*Secale cereale*) has fallen out of use in wheat country due to the risk of volunteers and weed infestation. Feral rye has been shown to dramatically reduce winter wheat yields and could lead to a grain load rejection at point of sale. Additionally, rye is thought to maintain an extended dormancy in the soil, allowing potential rye infestations to persist across multiple growing seasons. While these are valid concerns, much of the concern from feral rye has arisen out of the traditional wheat-fallow rotation, which naturally limits herbicide options and cropping intervals. In recent years, crop rotations have expanded across the northern Great Plains, particularly with implementation of no-till practices. Longer cropping intervals allow for more diverse crop types and an expanded list of herbicides that can be utilized to control feral rye far more effectively than in a wheat-fallow rotation.

Table 1. Hay yield in western South Dakota from winter annual grasses planted on 10/3/2019, harvested 6/1/2020, rye was at anthesis, triticale at early heading, willow creek in boot.

Forage Crop	Total Dry Weight (lbs/ac)	Harvest Moisture (%)	Crude Protein (%)	ADF	TDN
3-Way Mix	3546bc	77	11.2a	40.3a	56.6a
Winter Rye	4092a	75	10.9a	41.5a	55.2a
Winter Wheat	2806c	76	14.0b	35.0c	62.6c
Winter Triticale	3631ab	80	10.8a	38.2b	59.0b

Letters next to columns denote statistical significance *($p<0.10$)*. Different letters = statistically significant difference.

Figure 1. Winter annual forages at harvest on June 1, 2020. Winter wheat in the boot stage is in the foreground with winter triticale (heads emerging) in the middle and winter rye at anthesis in the background.

Shown in Table 1 are results from the first year of replicated research comparing forage production of winter rye, winter wheat (*Triticum aestivum, cv Willow Creek*), and winter triticale (*Triticosecale*). All three were planted in western South Dakota on October 3, 2019, along with a three-way mixture of all three crops. All plots were harvested on June 1, 2020, when the rye was at anthesis, triticale was at early heading, and winter wheat was in the boot stage.

Harvest timing will have significant impacts to both forage production and quality. Despite being planted on the same day, rye was much farther along in growth stage (Figure 1).[1] Harvest date was chosen to ensure rye would not produce viable seed and increase risk of volunteer rye. Winter rye produced over two tons of dry matter, which was 30% more forage than winter wheat. Despite producing roughly 400 lbs less forage than rye, winter triticale yield was not statistically different from rye. Also, winter rye had lower crude protein and TDN and higher ADF (Table 1), which suggests a lower-quality forage. Again, given the differences in growth stage at harvest, this is not surprising as quality tends to decrease with growth stage. If either the winter triticale or the winter wheat had been left to grow, they would have certainly increased yield and likely would have decreased in quality. Further study is certainly warranted.

However, these data do suggest winter annual grasses offer unique opportunities for farmers looking to add forage options within their cropping systems. Where soil moisture is available, the ability to hay the crop early in the summer provides the potential to integrate a full-season cover crop to stockpile additional forage in the fall for livestock coming off of summer pastures. If water supply is short, this option utilizes winter precipitation and provides an extended soil moisture recharge period prior to the next crop. Irrespective of end-use, these results suggest winter annual forages provide numerous options and increased flexibility in semi-arid climates.

[1]It should be noted that Willow Creek winter wheat is a late-maturing variety