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Intercropping of winter - spring cereals and stubble effects on forage yield

Introduction: Seeding two crops together (intercropping) that can utilize soil resources and sunlight during different parts of the growing season may improve forage production in terms of yield, quality and, and utilization. When grown together, the spring cereal can be cut for silage, usually shortly after heading (about 65% moisture), and the winter cereal may grow quickly in the absence of competition from the spring cereal for grazing later in the fall. The silage crops may suffer some yield loss but the silage and pasture yields may add up to produce more forage per acre than either one grown separately. The cereal combinations that can be useful for such purposes in the Peace region include spring seeding of spring barley or spring triticale intercropped with fall rye or winter triticale.

One obstacle to integrating winter cereals into a silage production system in the northern Peace region is the winter survival. Past research done at the AAFC Experimental Farm in Fort Vermilion, AB showed better winter survival from the winter cereals seeded into stubble rather than summer fallow.

Objectives: To determine if intercropping winter and spring cereals increases overall forage production compared to winter and spring cereals seeded alone, and the impact of stubble on winter survival of fall seeded winter cereals.

Materials and Methods: The trial was conducted at the experimental farm in Fort Vermilion, using a randomized complete block design with 2 factors and 2 replicates. Factor A had following cropping systems: Intercropping of spring barley + fall rye, spring barley + winter triticale, and spring triticale + fall rye; and sole crops of spring triticale (AC Alta), spring barley (Metcalf), winter triticale (Pika and Bobcat), and fall rye (Musketeer). Factor B was seeding on stubble vs. summer fallow.

The sole crop winter triticale and fall rye plots were seeded on August 16, 2004. Other treatments were seeded on May 17, 2005. The intercrop treatments were seeded at $\frac{3}{4}$ normal seeding rates for each crop. Fertilizers (63.5 lbs/ac of actual nitrogen and 29 lbs/ac of actual phosphorous) were applied at seeding. Each plot was 12 feet wide and 30 feet long. Silage was cut at about dough stage and yields adjusted to 65% moisture. Weeds were controlled using Buctril M® at the recommended rate. All the plots suffered from severe grass hoppers damage.

Results and Discussion: There was no interaction between the cropping system and seeding on stubble vs. summer fallow. There were significant differences in yield among cropping system treatments (Table 1). In general, winter cereals produced lower yield than the spring cereals as well as the intercrop treatments.

Table 1. Forage yield (tons/ac) for treatments.

Treatment	Yield
Barley + Fall Rye	5.65
Barley + Winter triticale (Pika)	6.03
Spring triticale + Fall rye	7.05
Spring triticale (AC Alta)	6.73
Barley (Metcalf)	7.78
Winter triticale (Pika)	4.48
Winter triticale (Bobcat)	4.48
Fall rye (Musketeer)	4.71
<i>LSD</i> _{0.05}	1.58
<i>Probability, %</i>	0.05

Among all the cropping systems, sole barley had the highest silage yield followed by spring triticale + fall rye (Table 1). Fall rye produced the lowest amount of forage as compared to the other cereals. When barley was intercropped with fall rye or winter triticale, total silage production was lower compared to sole crop of

barley but was higher than the sole crops of their winter cereals. Intercropping spring triticale + fall rye tended to increase yield compared to either of the sole crops.

There were no significant differences between seeding on stubble (5.80 ton/ac) vs. summer fallow (5.92 tons/ac) treatments (probability value of 75.4%). However, there was a trend for higher silage yield of the fall seeded cereals with the seeding on summer fallow than stubble, while no consistent trend was observed for the spring seeded treatments (Fig.1).

Conclusions: Compared with seeding spring cereals alone, total forage production may not always be increased when spring and winter cereals are intercropped. However, intercropping

winter cereals with spring cereals may enhance forage quality and provide limited quantities of high quality forage that could be used to extend the fall grazing period. Thus total yield, forage quality and utilization objectives needs to be considered together to decide whether to intercrop spring seeding of winter and spring cereals.

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Figure 1: Yield in Mean Tons/acre on Stubble and Summer Fallow

