Effect of Planting Method, Harvesting Frequency, and Cultivars on Yield of Bird’s-foot Trefoil

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Introduction
Bird’s-foot trefoil (BFT) is a promising forage legume that has the potential to increase quality and production of livestock forage in the U.S., including Wyoming. It can be used as an alternative to alfalfa due to its non-bloating properties, high persistence, and improved forage quality. Literature suggests that it can be grown and grazed as a monocrop as well as in mixture with grasses, and it has shown to increase feed-use efficiency and both milk and meat quality of cattle. BFT planted with a companion crop, such as oats, has lesser weed competition compared to monocropping. BFT can also be seeded into stubble of a previous crop to help prevent weeds and save resources on farm activities like tillage for seed-bed preparation. Some studies suggest that fewer harvests can be economical for BFT as the total yield remains the same by the end of growing season. Being a slow establishing crop, BFT is less competitive against weeds; however, production information in Wyoming is limited due to lack of information on its agronomic- and weed-management practices.

Objectives
The objectives were to determine the effects of planting method, harvesting frequency, and cultivars on yield of bird’s-foot trefoil.

Materials and Methods
The study was conducted at the James C. Hageman Sustainable Agriculture Research and Extension Center (SAREC). Planting took place in June 2015; the 81 plots were arranged in a randomized complete block design. All the plots received uniform irrigation every two weeks. Each plot had a combination of three distinct treatments. The first treatment was three different BFT cultivars: ‘Leo’, ‘Norcen’, and ‘Bruce’. The second treatment involved different planting methods: planting in actively growing winter wheat planted previous year, planting in wheat stubble, and clean-tilled planting. The third treatment was harvesting frequency, which included either harvesting once (H1), twice (H2), or three times (H3) during the growing season. Harvesting in 2016 included: August 23 (H1); August 23 and October 7 (H2); June 3, August 23, and October 7 (H3). Plant samples were clipped from each plot, and weeds were manually removed. The BFT remaining after weed removal were used to calculate dry matter (DM) yield by adding the yields from the whole season of each plot.

Results and Discussion
Variations in DM yield were observed among treatments (Figure 1). In general, total DM production increased as the number of harvests increased. Except planting with actively growing wheat, plots with three harvests had the greatest DM yield across the planting methods and cultivars (Figure 1). On average, however, the difference between two and three harvests was minimal, indicating that harvesting twice in a season might be an economically viable option. The planting with standing wheat had the lowest yield because the standing wheat out-competed BFT seedlings for sunlight and water, and most of the seedlings died during the establishment year. Planting trefoil into a clean-tilled field generally produced a higher yield than planting into stubble; however, planting into wheat stubble could be the preferred method as this will reduce field preparation costs. Among the cultivars, Bruce performed the best in the clean-tilled planting; whereas, in wheat stubble, Norcen performed similarly to or marginally better (e.g., in three harvests) than Bruce. This can be attributed to the fact that Bruce is of semi-erect nature and, therefore, had an advantage over weeds. Norcen, a native North American, high-yielding cultivar, consistently performed in all planting methods. Early results are promising in terms of planting method
(clean tilled) and harvesting frequency (three harvests in a season). The study is ongoing, and data is being collected and analyzed.

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**Figure 1.** Dry matter (DM) yield of bird’s-foot trefoil cultivars under different planting methods and harvests at SAREC in 2016.

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