Forage Brassica Variety Trial in Northwest Arkansas

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Materials and Methods

The research was conducted at the University of Arkansas Watershed Research and Education Center (WREC) in Fayetteville. In late July of 2013, an area of 0.5 acres was treated with glyphosate to kill the existing sod. In the middle of August, the area was disked twice and culti-packed to prepare a firm, well-settled seedbed. For our project, three turnips (Apin, Barkant, and Seven-Top), 3 rapeseeds (Barsica, Bonar, Winfred), 2 turnip × rapeseed crosses (Pasja, T-Raptor), and 1 turnip × mustard cross (Vivant) were tested in two studies regarding dry matter (DM) production, canopy heights, and seedling density after either 2 and 4 months (regrowth study = RG), or only 4 months (stockpile study = SP) of growth. All varieties were established at a rate of 5 lbs/acre into a conventionally tilled seedbed. A randomized complete block design with 4 replications was used for both studies. Prior to planting on August 26, 2013, biomass growth in a selected 5-acre field was suppressed with glyphosate, disked twice, and culti-packed. The plot size was 4.5 × 25 feet in accordance with the planned harvesting procedure for which a Wintersteiger Cibus S plot harvester was used. Immediately after planting, premixed NPK fertilizer was applied to each plot according to soil test recommendations. Number of plants per square foot measured 3 weeks after establishment ranged between 4 and 6 across all varieties. For RG, DM yields ranged from 1,034 to 2,112 lbs/acre at the Oct 22 harvest date, with Winfred yielding numerically highest yields and Appin numerically lowest yields ($P$ = 0.2). At the second harvest for RG on Dec 3, Winfred showed the lowest amount of regrowth along with Seven-Top of less than 250 lbs DM/acre. Dry matter production of Pasja with 699 lbs/acre was the highest observed for that date ($P$ < 0.01). Yields for SP (harvested only on Dec 3) ranged from approximately 3,300 to over 5,500 lbs DM/acre. Winfred (5,536 lbs DM/acre) was similar to Bonar and Barsica, but out-yielded all other varieties ($P$ = 0.05).

Results and Discussion

For RG, DM yields ranged from 1,034 to 2,112 lbs/acre at the Oct 22 harvest date, with Winfred yielding numerically highest and Appin numerically lowest yields ($P$ = 0.2; Fig. 1). At the second harvest for RG on Dec 3, Winfred showed the lowest amount of regrowth along with Seven-Top of less than 250 lbs DM/acre. Dry matter production of Pasja with 699 lbs/acre was the highest observed for that date ($P$ < 0.01). Yields for SP (harvested only on Dec 3) ranged from approximately 3,300 to over 5,500 lbs DM/acre. Winfred (5,536 lbs DM/acre) was similar to Bonar and Barsica, but out-yielded all other cultivars ($P$ = 0.05).

The effect of each cultivar on its canopy height throughout the experimental duration strongly interacted ($P$ < 0.001) with date. This appeared to be a result of proportionally large differences in a 60-foot wide alleyway was used to separate the two studies in the north-south direction of the field. Seeding rates were 5lbs/acre for all cultivars. Pre-formulated NPK fertilizer was applied to each plot using soil test reports and recommendation for brassica production.

Plots were harvested on October 22 (RG only) and Dec 3 (SP and RG) using a commercial forage harvesting machine (Wintersteiger, Inc., Salt Lake City, Utah) equipped with a 5-foot wide rotary cutting head and a built-in scale able to weigh fresh forage matter upon harvest. Subsamples from each plot were transferred to paper bags and dried at 130 °F until no further weight loss was detected. Because the material was low in DM, forage mass in each bag was carefully stirred several times to facilitate drying. Canopy heights were recorded on a weekly basis between September 11 and November 13, 2013.

Data were analyzed using the Proc GLM procedure of SAS (SAS Inc., Cary, N.C.); Fisher's least significant difference (LSD) as t-test statistic was used for separating means.

Introduction

Brassica species are being used as livestock fodder around the world and have been predominantly used in temperate zones such as New Zealand as sheep fodder. In the southern U.S., brassicas are an attractive choice of fall and early winter grazing for beef cattle, as brassicas are fast-growing and high in nutritive value, and thus complement the existing forage base and can close gaps in forage production. Forage brassicas are a general term for a group of species, including kale, rape, swede, and turnips that can be all used to a larger or lesser extend as forage. For our study, the objective was to test turnip, rape, and hybrid cultivars for dry matter (DM) yield and canopy heights. Selected data are presented in this report.

Story in Brief

Utilization of Brassica species as livestock fodder has enjoyed renewed interest among cattle producers. Three turnips (Apin, Barkant, and Seven-Top), 3 rapeseeds (Barsica, Bonar, Winfred), 2 turnip × rapeseed crosses (Pasja, T-Raptor), and 1 turnip × mustard cross (Vivant) were tested in two studies regarding dry matter (DM) production, canopy heights, and seedling density after either 2 and 4 months (regrowth study = RG), or only 4 months (stockpile study = SP) of growth. All varieties were established at a rate of 5 lbs/acre into a conventionally tilled seedbed. A randomized complete block design with 4 replications was used for both studies. Prior to planting on August 26, 2013, biomass growth in a selected 5-acre field was suppressed with glyphosate, disked twice, and culti-packed. The plot size was 4.5 × 25 feet in accordance with the planned harvesting procedure for which a Wintersteiger Cibus S plot harvester was used. Immediately after planting, premixed NPK fertilizer was applied to each plot according to soil test recommendations. Number of plants per square foot measured 3 weeks after establishment ranged between 4 and 6 across all varieties. For RG, DM yields ranged from 1,034 to 2,112 lbs/acre at the Oct 22 harvest date, with Winfred yielding numerically highest yields and Appin numerically lowest yields ($P$ = 0.2). At the second harvest for RG on Dec 3, Winfred showed the lowest amount of regrowth along with Seven-Top of less than 250 lbs DM/acre. Dry matter production of Pasja with 699 lbs/acre was the highest observed for that date ($P$ < 0.01). Yields for SP (harvested only on Dec 3) ranged from approximately 3,300 to over 5,500 lbs DM/acre. Winfred (5,536 lbs DM/acre) was similar to Bonar and Barsica, but out-yielded all other varieties ($P$ = 0.05).
height rather than variety effects. Canopy heights ranged from less than 5 inches in early September to almost 30 inches in the stockpile study by mid-November (Figs. 3 and 4). Canopy heights declined somewhat towards the end of the study as leaves aged and bent over. Regrowth after the Oct 23 harvest barely reached 10 inches for some cultivars.

Our variety trial indicated that the yield differences observed in both RG and SP were large enough to pay close attention to the selection of brassica species and cultivar. Some of the cultivars that showed high yields in the SP study, such as Winfred, showed relatively little regrowth when cut earlier in the season, while the variety Pasja for example showed the reverse. It should be stressed here that the quality of site preparation is of utmost importance for successful stand establishment and growth. Some of the plots became infested with pigweed a few weeks after planting which could only be remediated through hand-pulling the weeds.

**Implications**

Relatively large differences exist among brassica species and cultivars in terms of DM production. High yields from stockpiling over several months may not be indicative of high regrowth potential and visa-versa. Producers should carefully select varieties and consult yield test data for optimum growth and performance of forage brassicas on their operations.

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**Fig. 1.** Dry matter (DM) yield results for brassica varieties harvested initially on October 22, then again as regrowth on December 3 (regrowth study). The least significant difference (LSD) to separate variety means is calculated based on simple t-test comparisons. For Oct 22, \( P = 0.2 \), for Dec 3, \( P < 0.01 \).

**Fig. 2.** Dry matter (DM) yield results for brassica varieties (stockpile study) from single harvest date on Dec 3, 2013. For variety effects, \( P < 0.01 \).
Fig. 3. Canopy heights recorded from the regrowth study. The first harvest date was Oct 22, 2013. The interaction between variety and date was highly significant ($P < 0.001$), although this appeared to be based on the magnitude of response rather than direction.

Fig. 4. Canopy heights recorded from the stockpile study. The interaction between variety and date was highly significant ($P < 0.001$), although this appeared to be based on the proportional large differences in canopy heights rather than variety effects.