

Brassicas for Forage

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Brassicas are fast-growing forages that make excellent grazing crops. They can be used to fill forage gaps in either fall or spring. Producers have found them to be particularly useful as an emergency forage for fall grazing. Brassicas complement winter annual forages such as ryegrass or small grains by providing earlier fall grazing for livestock when traditional winter annuals have limited forage production.

Characteristics

There are several types of brassica including forage turnips, forage rape, turnip/rape hybrids, radishes and kale. Although garden turnips can be used for forage, yields and palatability are generally higher for forage brassica varieties. Fall-planted brassica generally do not reach full maturity before winter, but provide high quality leafy forage. Plants that do overwinter will bolt and bloom in spring. Spring-planted brassica reach maturity and bloom in 75-90 days. Brassicas are high moisture and very low in fiber content. They are best suited for grazing and not well suited for hay or harvested forages such as silage.

Forage Turnip

Forage turnip produces a leafy top and a large bulb (turnip) that can be consumed by grazing livestock. Forage turnips have a vegetative height of 20 to 24 inches. Bulbs can be large or small and can be loosely or firmly anchored in soil depending on variety and growth. In Arkansas tests, Appin



Forage Turnip

produced a small, round bulb (<4") firmly anchored in the soil. Barkant produced a larger, elongated bulb (4-8"), with 50 percent of the bulb above the soil surface.

Seven-Top turnip is commonly used as a vegetable crop for leafy greens and produces few bulbs. It is often used as a forage crop for small ruminants and deer food plots in Arkansas. Seven-top produces fast, vigorous leaf growth. However, leaf yield from seven-top is often less than the forage brassicas due to less leaf area and more stems. Seven-top produces little re-growth after grazing and is more susceptible to frost injury than forage turnips.

Forage Rape

Forage rape produces large paddle-shaped leaves with excellent yield. The

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Forage Rape in the Field

bluish-green leaf color and odor of the plants resemble cabbage. Vegetative height is typically 24 to 26 inches. It produces a large taproot, with no bulb. Forage rape has limited re-growth ability, therefore is better suited for strip-grazing or stockpiling for a single grazing period. Bonar is more susceptible to frost injury than Winfred. Winfred had the highest leaf yield in Arkansas tests.

Forage Turnip Hybrids

Forage brassica hybrids have a high leaf-to-stem ratio and tend to be leafier than other brassicas. They have excellent yield and good regrowth potential for multiple grazings, making them suitable for rotational grazing. Hybrid brassicas have a vegetative height of 22 to 24 inches. Some varieties produce small bulbs and others do not.

Tillage and Grazing Radish:

Tillage radishes are commonly planted in cover crop mixtures and have been used in grazing situations. They produce a long bulb with a smaller taproot that



Tillage Radish

is reported to help reduce soil compaction. However, in most trials and demonstrations, the majority of the bulb growth is above ground. Soil penetration depth of the bulb tends to be at the depth of tillage during seedbed preparation with the smaller taproot penetrating deeper into the soil. Tillage radishes produce little regrowth after grazing because the bulbs are soft and are broken easily by grazing animals. Leaf and bulb yield is similar to that of forage turnips.

Grazing radishes should be considered for grazing because they do not produce a large bulb and have much better regrowth after being grazed. Radishes are more susceptible to frost injury than other brassicas.

Planting Methods

Brassica can be planted in a tilled seedbed, into a moderately disked grass sod or drilled into an existing sod that has been sprayed with a nonselective herbicide. Brassica seedlings are weak competitors so it is important to control the existing sod and weeds before planting to help insure good establishment. Once the plants reach 6-8" tall, they become more competitive and develop quickly. When planting brassica into bermudagrass sod from late August to early September, the bermudagrass sod must be suppressed with a nonselective herbicide such as glyphosate or by moderate disking at the time of planting. Disking can be shallow but should expose about 40-50 percent bare ground to reduce grass sod competition. For herbicide suppression, graze or cut the bermudagrass to 2-3" and allow time for the sod to "green up" before spraying the herbicide. If the bermudagrass is sprayed too soon after mowing, there will not be enough green leaf area to absorb the herbicide, resulting in poor suppression. A glyphosate rate of 1 pint/acre is often sufficient for sod suppression, but some producers have applied as much as 1 quart per



Hybrid Brassica

acre. Herbicide suppression of the bermudagrass sod in late summer seldom has any long-term negative effect. Bermudagrass stands normally grow back the following spring with no noticeable effect. Because brassica are usually planted for a quick forage crop, fertilizer should be applied at planting to support rapid growth. Normally nitrogen fertilizer rates should be 60 lbs/acre of N. Fertilizer P and K should be applied based on soil test recommendations for winter annual pasture.

Seeding Rate and Date

Seeding rate for brassica varieties is 5 lbs per acre when planted alone, or 3 lbs per acre when planted in mixture with small grains or ryegrass. In Arkansas, brassica can be planted in late August to the first week of September for grazing by late October through December. Forage growth is poor for plantings delayed past September 15.

Figure 1. Dry Matter Yield of 10 Forage Brassicas.
Planted August 26. Harvested November 25, 2014 WREC

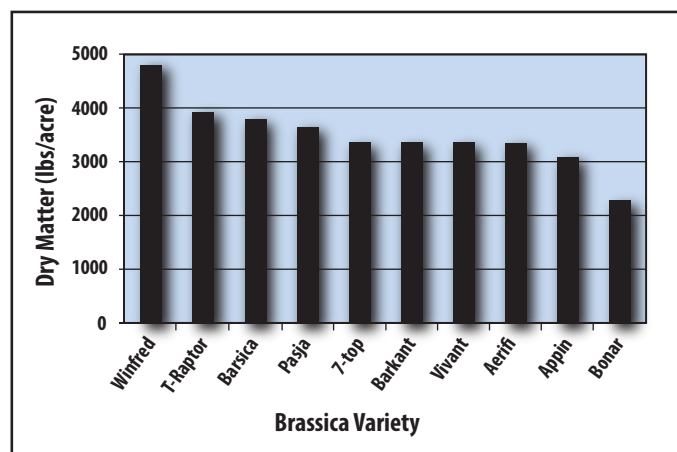


Figure 1. The test was planted in a tilled seedbed on August 25 and harvested November 25. WREC-Fayetteville-2014.

Brassica can be planted from mid-March to early-April in a tilled seedbed or in a suppressed grass sod. Spring-planted brassica is often planted with spring oat. Development of spring-planted stands is slower than for fall-planted stands and may not be sufficient to allow grazing until late May to early June.

Sod suppression is important when planting brassica into bermudagrass sod in March. Even though the bermudagrass is dormant in late winter, many small winter annual weeds are often present that, if left uncontrolled, can quickly overtake a developing stand of brassica. The weeds/sod can be suppressed by burning, if enough dry forage residue is present in late winter, or by spraying with a nonselective herbicide.

Figure 2A. Dry Matter Yield of Brassica Managed for Re-growth. 2013 – WREC

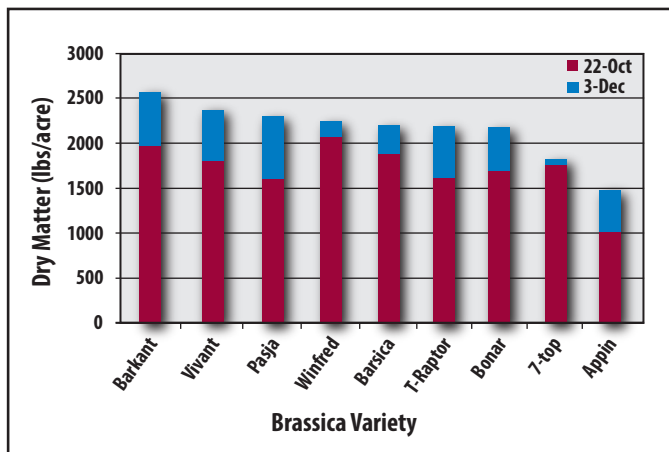
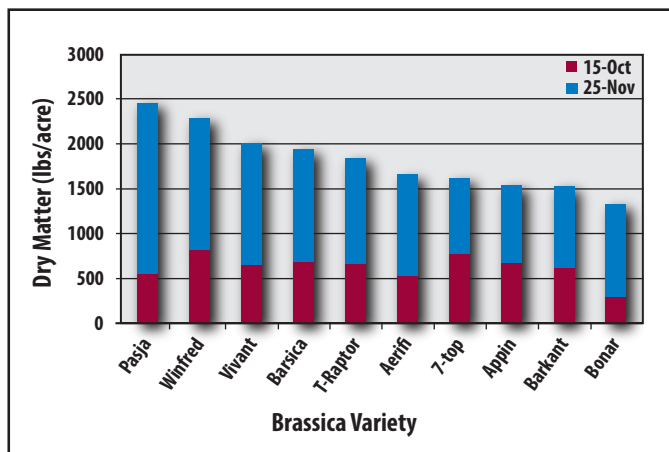


Figure 2B. Dry Matter Yield of Brassica Managed for Re-growth. 2014 – WREC



Figures 2A and 2B. 2013 and 2014 Brassica trials managed for fall regrowth. In 2013, yield in October (gray portion of bars) was adequate for grazing, but regrowth (black portion of bars) after October harvest was very low. The reverse was true in 2014.

Forage Yield

The decision of when to start grazing the brassica can be complicated. Although the leafy tops may reach a size adequate for grazing in 40 days after planting in fall, highest leaf yield and bulb production occur after 60 days. Early-planted stands produce highest dry matter yield when allowed to grow until late November to early December. Dry matter yield in University of Arkansas tests in 2013 on tilled seedbeds ranged from 3,200 up to 5,500 lbs of forage dry matter per acre by early December. In 2014, dry matter yield ranged from 2,289 to 4,796 lbs per acre by late November (Figure 1). Resistance to frost damage varies among varieties with tillage radishes showing the lowest tolerance to freezing weather and Winfred rape showing the highest freeze tolerance among those tested. Cold tolerance is increased when temperatures cool gradually during fall allowing the plants to harden.

Table 1. Average Forage Quality for 10 Brassica Varieties for Oct. and Nov. harvests. WREC, Fayetteville, 2014

	CP	TDN	NDF
	-----%-----		
October	28.3	81.7	22.9
November	19.6	72.3	27.6

Sudden freezing temperatures without a cold acclimation period can cause serious injury to brassica forage. Studies in other states indicate that with cold conditioning, radishes can survive down to 23°F, turnip down to 15-20°F and rape or kale down to 10°F.

Brassica are often planted for a quick emergency forage crop, so grazing in October can be desirable. However, if brassica stands are grazed in October, a common question is “How much regrowth can be expected after grazing?”. Results in figures 2A and 2B show that the answer is variable and likely depends on when freezing temperatures occur in fall. In 2013, initial growth in late October was sufficient for grazing for most varieties, but regrowth was low for all varieties after October harvest. Freezing temperatures occurred after October harvest, thus limiting regrowth. In 2014, dry conditions occurred before October harvest, which limited growth to levels that were not sufficient for early grazing. But regrowth after October harvest was greater for all varieties than yield before October harvest, likely due to above freezing temperatures in late October and November.

Grazing Management

Some producers have observed that livestock refuse to graze brassica forage at first turn-in. This is common with livestock that have never been exposed to brassica forage. To train the animals, allow access to a small area of brassica forage until they begin grazing. Provide hay or other feed to insure adequate nutrition. During the training period, livestock tended to consume all other available forage before grazing the brassica. This transition period may take up to 4-5 days. Afterward the livestock will consume the brassica normally.

Brassicas may be managed for multiple grazings or managed for stockpiling. When managing for multiple grazings, it is important to leave tall stubble after the initial grazing. Re-growth is initiated from the crown. Grazing can begin when the plants have reached 14 - 16 inches tall and should end when the forage is grazed down to 6 - 8 inches in height. Re-growth may be

Table 2. Dry Matter Yield and Forage Quality of Bulbs for Forage Turnip and Tillage Radish. 2013-2014 – WREC, Fayetteville.

VARIETY	BULB YIELD	CP	TDN
2013	lbs DM/ac	-----%-----	
Appin	2,882	10.9	78.3
Barkant	2,884	10	80
2014			
Appin	1,809	11.2	65.5
Barkant	1,965	10.2	69.5
Aerifi	2,373	14.3	66.3

grazed in as few as four weeks after the first grazing. During the second or final grazing, allow the livestock to consume the entire plant including the bulbs (for turnip and radish varieties). When managing for stockpiling, allow the brassica to accumulate growth until the first frost. Minimum growth will occur during the winter. Due to the high moisture content of the plants, brassica need to be consumed by early January to prevent significant yield loss from freeze damage.

Controlled grazing management is more important when grazing brassicas compared to grasses. Grazing large areas at a low stock density will increase trampling and waste of the available forage. Strip grazing, by using single-strand temporary electric wire, provides efficient utilization. A back wire is not needed when grazing after freezing weather since the forage is dormant and not growing. The concept is similar to feeding hay but using an electric wire to control access to the forage. The fence protects the ungrazed forage and can double the grazing days per acre. Many producers prefer to move the electric wire to a new strip of pasture twice a week, but the interval can be as long or short as needed for the operation. It is best to start strip-grazing nearest the water source then advance the wire across the field.

Forage Quality

Forage quality of brassicas is very good. In 2014, crude protein ranged between 18-32 percent and TDN was 66-83 percent (Table 1). However, brassicas are too low in fiber (NDF) for maintenance of proper rumen activity, therefore ruminant diets should not contain more than 75 percent brassica forage. Planting brassica with small grains can provide more fiber from the grass in the mixture. Alternatively, dry hay can be kept available free-choice or access can be provided to a stockpiled grass pasture while animals are grazing brassica pasture.

Can Bulbs be Grazed?

Turnip bulbs can provide a significant feed source. Arkansas tests showed dry matter yield of bulbs of approximately 2,000 to nearly 3,000 lbs per acre with excellent crude protein and TDN content (Table 2). Grazing livestock usually learn to graze bulbs as well as tops in late fall and winter.

Brassica crops can cause health disorders such as bloat, acidosis, or trace mineral deficiency in grazing animals if not managed properly. Risk from these disorders can be reduced by adhering to these basic management rules:

1. Introduce grazing animals to brassica pastures slowly. Avoid abrupt changes from dry summer pastures to lush brassica pastures. Don't turn hungry animals that are not adapted to brassicas into a brassica pasture.
2. Brassica crops should not constitute more than 75 percent of the animal's diet. Supplement with dry hay, plant brassica in mixture with small grains, or allow access to a stockpiled grass paddock if continually grazing brassicas.
3. Livestock grazing brassicas should always have access to a complete trace mineral salt supplement containing iodine.

Summary

1. Forage brassicas can produce high yields of palatable and nutritious forage for livestock during periods when perennial forages have limited production. The digestibility of the forage remains high over a relatively longer period than perennial crops.
2. To improve forage yield potential, apply fertilizer according to soil test recommendations.
3. Strip-grazing management can double the number of grazing days over continuous grazing.
4. Plan for a transition and adjustment period to allow livestock time to accept this new forage.
5. Planting winter annual grasses in mixture with brassica greatly extends the grazing period after the brassica forage is consumed because the grasses produce most of their growth in late winter through spring.

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