



Vegetable Fodder & Forage Crops for Livestock Production:

Rutabagas

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There is interest among farmers in western Washington and many other regions of the United States to grow forage and fodder crops to meet their own production needs. Forage is defined here as feedstuff that animals search for and consume and commonly refers to the non-reproductive portions of plants (seed or overwintering plant portions), while fodder refers to all plant portions which are harvested, stored, and fed to animals (Barnes et al., 1995). Successful local production requires a review of past practices and the latest research on crop varieties, as it applies to specific growing conditions.

Historically, livestock production relied on a large diversity of crops to sustain animals year-round, including vegetable root crops such as fodder beets, turnips, rutabagas, carrots, and sugar beets (Delwiche, 1924). Vegetable fodder crops were produced in significant amounts in the maritime Pacific Northwest until 1935, but by 1955 production was limited to a few acres (Schoth, 1957). As the scale of livestock production increased and intensified, livestock and fodder production became separate operations, each located in regions that were most conducive to optimizing production and minimizing costs. New cropping systems arose to best fit large-scale livestock production needs.

Now, new varieties of vegetable forage and fodder crops are available that promise larger yields, better storability, and greater flexibility in use. These new varieties offer the potential for western Washington livestock producers to grow an increasing amount of their own livestock feed that is well-adapted to the growing environment, affordable to produce, and a good source of livestock nutrition.

This fact sheet is part of a series that presents production information for carrots, fodder beets, turnips, rutabagas, kale, and chicory in western Washington. More information can be found at <http://whatcom.wsu.edu/ag>.

Family, genus, and species: Brassicaceae *Brassica napus* L. (Napobrassica Group) or *Brassica*.

Common name synonyms: Swede, Swedish turnip, turnip-rooted cabbage, Laurentian turnip, Russian turnip.

Historic varieties: Garton's Monarch, Holborn Elephant, Imperial Purple Top, Kangaroo, Monarch, Thoroughbred (Fraser et al., 1907).

Current varieties: American Purple Top, American Yellow, Doon Major (Fig. 1), Helenor, Joan, Laurentian, Major Plus (Fig. 2), Marian, Winton.

Seed sources: Ampac Seed Company, Johnny's Selected Seeds, Osborne Seed Company, Seeds of Change, Territorial Seed Company, Vermont Bean Seed Company, West Coast Seeds.



Figure 1. Doon Major (aka Major Dunne). Photo courtesy of Adaptive Seeds.



Figure 2. Major Plus.

Background

There is some debate as to whether rutabagas were cultivated from wild *Brassica napus* or hybridized between wild turnip (*Brassica rapa* var. *rapa*) and wild cabbage (Dixon, 2007; Undersander et al., 1992). Regardless of the way rutabagas originated, they are considered cultigens; that is, species that exist only in cultivation. However, they readily naturalize in pastures and abandoned fields (Duke, 1997). Rutabagas and turnips were historically grouped together within the now defunct *Brassica campestris*, but are currently considered two distinct species.

The culture and management of rutabagas and turnips is very similar, except that rutabagas require a longer growing season to reach maturity (Ware and McCollum, 1980; Benedict et al., 2012). Rutabagas are a summer season crop and are not suitable for winter production. Like many vegetable fodder root crops, rutabagas were eaten by humans during times of famine.

In the early 1900s, researchers in the United States advocated the use of rutabagas as fodder for young livestock. However, farmers were not convinced because at that time root fodder crops required as much as three times the labor for both cultivation and livestock feeding compared to corn silage. In the 1970s, researchers again advocated rutabaga cultivation for livestock use, this time as a forage crop. Foraging eliminated the extra labor needed for harvest and storage. Experiments showed that rutabagas and other root brassica crops were high quality and high yielding forage crops that could easily be broadcast seeded into existing pastures with little or no tillage (Undersander et al., 1992).

Uses

Livestock will readily graze on the stems, leaves, and roots of rutabaga plants (Fig. 3). Rutabagas can be used in combination with existing pasture, as part of pasture renovation by acting as an intermediate crop prior to re-seeding pasture, or as a fodder crop when the root systems are harvested and fed to livestock.



Figure 3. Beef cattle grazing rutabagas.

Nutritive value. Rutabagas are high in protein and digestible nutrients. Above-ground parts average 20–25% protein and 65–80% total digestible nutrients (TDN). The roots have 10–14% crude protein and 80–85% TDN. Heading or removing the seed stalk helps to maintain rutabaga palatability late into the fall (Undersander et al., 1992). Ensminger and Olentine (1980) estimated the dry matter of rutabagas at 12%.

Rutabaga forage quality is high due to high TDN and crude protein contents, which make it similar to concentrate feeds. In order to break down protein, livestock must first build up healthy rumen microbial populations. If livestock are hungry or have been subsisting on low quality feed when put into a field of high quality feed such as rutabaga, they will not be able to completely digest the new feed and may become sick. Instead, gradually introduce rutabaga into their diets before turning them into a rutabaga field and provide limited (1–2 hrs/day initially, then increasing portions over the course of a week) access. Always feed hay or allow access to pasture in the field where livestock are grazing rutabagas (or any brassica forage crop) to provide animals with adequate amounts of fiber (Undersander et al., 1992).

Do not feed livestock rutabagas during breeding season or after plants have begun to flower (Undersander et al., 1992). All brassicas are at least mildly goitrogenic, meaning they suppress thyroid function, thereby inhibiting iodine uptake and causing goiter formation. It is important to note that while rutabagas, which are classified as *Brassica napus* var. *napobrassica*, are suitable for livestock fodder, *Brassica napus* (also known as winter or summer rape) is considered poisonous to livestock due to its interference with normal thyroid function (Lewis, 1998). However, livestock that feed on large amounts of rutabagas could also develop thyroid problems. Researchers are breeding varieties of brassica root crops to decrease goitrogenic compounds (Bradshaw et al., 2006).

Production

Rutabagas are cold hardy and drought tolerant. They can be grazed 150–180 days after planting and provide forage through late fall. Root development occurs during low temperatures and leaves will persist through multiple frosts. Earlier sowing and the resulting longer growing season may increase the digestibility of the roots (Kalmbacher et al., 1982).

Rutabaga plants are biennials, storing carbohydrates and nutrients from the first year of growth in the enlarged root tissue to provide energy for seed production the second year. Rutabaga leaves are hairless and bluish-green compared to turnip leaves, which are hairy and bright green. Rutabagas can further be distinguished from turnips by the location of their leaves above the root structure. Rutabagas form a tapered neck at the top of the root from which the leaves arise, whereas turnips lack necks and their leaves form in a rosette atop the root (Fraser et al., 1907). Rutabagas are both self-pollinating and cross-pollinating with other *Brassica napus* varieties and some *Brassica rapa* varieties (Ashworth, 2002; Duke, 1997).

Varieties. Major Plus and Doon Major can be found through a variety of seed suppliers and has been specifically bred for grazing. Undersander et al. (1992) list Calder and Sensation as promising cultivars, but seed can be difficult to find.

Soil characteristics. For optimum root production, rutabagas require a minimum amount of tillage to ensure good seed germination and seedling establishment. If you are using conventional tillage seedbed preparation techniques, plow at least 6 weeks before planting, and then disc and harrow to create a fine-textured seed bed. Fine soil texture will lead to optimum germination (Undersander et al., 1992).

Rutabagas require moderately deep, well-drained soil (Undersander et al., 1992). Maintain soil pH at 6.0. Applying fertilizer at the time of seeding will give rutabaga a competitive edge on weeds. Fertilizer guidelines vary by region and soil type. Suggested fertilizer rates are 100 pounds of nitrogen (N) per acre for soils with 2–5% organic matter and greater amounts for soil with lower organic matter. Apply 20–100 pounds phosphorus (P_2O_5) and 120 pounds potassium (K_2O) per acre, depending on existing soil conditions and total amounts of organic matter. If soil is low in sulfur, apply 15–25 pounds of sulfur (S) per acre (Department of Horticulture, 2004; Undersander et al., 1992). To avoid pest buildup, do not plant rutabagas after other brassicas (Duke, 1997; Fraser et al., 1907).

Seeding. Drill rutabaga seed in rows spaced 16–20 inches apart, with in-row spacing at 2–8 inches. The recommended seeding rate is 1–2 pounds per acre (Department of Horticulture, 2004; Duke, 1997). Seeds are very small and can be mixed with some inert material such as cracked grain when using a drill (Duke, 1997). Alternatively, seed can be broadcast or sown with a forage crop seeder and harrowed and disked lightly. Sow seed 1/2 inch deep and avoid soil crusting for best emergence and stand establishment (Duke, 1997; Undersander et al., 1992).



Figure 4. Flea beetle damage (often described as “shot holes”) on rutabaga leaves.

Germination rates will be lower in cool weather, so do not seed rutabagas until temperatures reach at least 50°F. Once soil temperatures are warm enough, seed can be sown at any point up to 70 days before the first hard frost. If planted too late, plants may not reach optimal leaf production for forage (Undersander et al., 1992).

Irrigation. Rutabagas require up to 1.5 inches of water per week for high quality root production (Sanders, 2001). In lighter soils, irrigate more frequently but with less water during each application than in heavier soils. Uniform irrigation will ensure adequate moisture for crop growth and nutrient uptake from the soil (Department of Horticulture, 2004).

Weed control. Rutabaga seedlings develop slowly and can be easily overwhelmed by weeds (Duke, 1997). If you are planting into pastures using minimum tillage, suppress or kill the grass, as it will out-compete the rutabaga seedlings. Once established, rutabagas will readily compete with weeds (Undersander et al., 1992). Cultivate lightly (i.e., no deeper than 2 inches) for weed control (Sanders, 2001).

Pests. Pests that attack rutabaga are similar to those that attack turnips (Benedict et al., 2012). Two types of flea beetles, the cabbage flea beetle (*Psylliodes luridipennis*) and the striped flea beetle (*Phyllotreta striolata*), feed exclusively on brassicas. These pests attack the cotyledons and first true leaves of rutabaga plants, causing extensive loss (Undersander et al., 1992; Fig. 4). Club root (*Plasmodiophora brassicae*) is a problematic fungal disease of most brassicas and is commonly found worldwide. Symptoms include abnormally large, distorted roots that can result in significant yield quantity and quality reduction.

Crop rotation along with proper pH management will help control diseases (du Toit, 2004). To avoid pests, do not grow rutabagas in soil that was used in the previous 4–5 years to grow root or brassica crops (Duke, 1997; Fraser et al., 1907). Rotate rutabagas with clover, beans, peas, or grain crops (Duke, 1997).

Yield

Rutabaga will produce 15 tons in fresh weight per acre or about 6 tons of dry matter per acre (Department of Horticulture, 2004; Undersander et al., 1992).

Harvest

For leaf forage, rutabagas are ready for grazing when about 12 inches tall. If grazed to 5 inches, plants may be grazed up to four times, depending on weather conditions, after allowing plants to re-grow to 12 inches tall. Rutabagas can be grazed into late fall (Undersander et al., 1992).

Roots may be harvested either by hand or using a mechanical beet lifter approximately 90–100 days after seeding. Harvest when soil is as dry as possible to minimize soil adhering to roots. Roots that are injured during harvesting are susceptible to rot in storage (Department of Horticulture, 2004).

Storage

Rutabagas have better long-term storability than turnips. Rutabagas require high relative humidity levels (95–100%) to maintain superior storage quality. Stored at 32°F, rutabagas should keep in good condition for up to 6 months. They will tolerate freezing without injury, but temperatures well below freezing can cause significant damage and rot (Department of Horticulture, 2004).

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Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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