Ancient Forage, New System

Turnips offer quick growth, nutritional benefits.

Story & photos by
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There is a reason turnips have been favored as livestock forage for at least 600 years. With growing interest in low-input field feeding, the queen of forages is making a comeback. Chris Penrose, who has been working with the *Brassica* since 1989, believes it is long overdue.

"Turnips are the lowest-cost feed around here, next to stockpiling grasses," says the Ohio State University associate professor and Extension educator. "They can yield up to five tons of dry matter (DM) per acre in 90 days."

His research shows that the cost to feed turnips in the field runs 17¢ per head per day. "We have done some stocker studies at Ripley Research Station that show [cattle] can gain a couple of pounds a day on turnips," Penrose says. "That is an excellent return for the cost."

John Kugler, Washington State University Extension agent, grows turnips for seed and then turns his cattle out on the volunteer turnips during fall and winter. He says he is impressed at how well cattle can adapt to grazing turnips. He notes that they will first eat the more nutritious tops and then go back and eat the bulbs.

"Even when the ground is frozen, they manage to pry the bulbs out of the ground," Kugler says. "You walk through a field after the cattle have grazed it, and all you see are these hollowed-out turnip holes."

Penrose points out that up to 90% of a turnip plant is utilized by beef cattle as high-quality forage if harvested before heading. Livestock eat the stems, leaves and roots of turnip plants. Above-ground parts normally contain 14%-16% crude protein (CP), 65%-80% in vitro digestible dry matter (IV DDM), about 20% neutral detergent fiber (NDF) and about 23% acid detergent fiber (ADF). The roots contain 8%-10% CP and 80%-85% IV DDM.

"Our common purple-top turnips normally are 40% tops and 60% bulbs," Penrose says. "When we get into the other cultivars developed for grazing, we get a lot higher in the leaves and less in the bulbs."

Illustrious history

Even though 18th century English livestock farmers didn't have the technical know-how to confirm that the turnip plant was well-suited to its role as cattle forage, it didn't stop these resourceful pioneer beef producers from taking full advantage of the fact. In the early 1700s, turnips proved to be one of those crops that played a pivotal role in the development of modern animal husbandry.

Up until the 18th century, most cattle and sheep in Britain were harvested before winter set in, since there wasn't enough forage to get them through the entire solstice. With the invention of the seed drill and its application in planting turnips in manageable rows, livestock producers were finally able to increase their forage yields to consistently carry over more breeding animals. This increase also allowed these same livestock producers to winter their market animals, thus allowing them to reach their full weight potential.

Turnips continued as a major livestock forage in Britain and North America until the middle 20th century, when the hand labor required in the production of the large-rooted crop proved too costly. Studies comparing popular forages showed that, on a nutrient basis, turnip production — primarily harvesting — required three times more labor than was required for corn silage production.

While the turnip might have been down as a beef forage crop, it was far from out. In the 1980s, with a growing interest in diversified grazing programs, researchers began to explore the plant's potential as

Above: Washington State University Extension agent John Kugler's advice to those planning on grazing turnips: "Grow them big."

Left: Common purple-top turnips are about 40% top and 60% bulb.

an in-field fall and winter forage. The development of new varieties, which grew with a portion of their root mass above ground, made the entire plant more accessible to livestock, while the grazing aspect of the new system eliminated any need for manual labor related to harvesting and storing.

Short-season crop

For Penrose, one of the great advantages of planting the turnip as a forage crop is its ability to produce high volume during a short period of time late in the growing season.

"In Ohio the recommended planting time for turnips is late July," he says. "This means that if you discover after your first cutting that you are going to be short on hay or that you are going into a drought, turnips can get you back on track in less than 90 days."

Turnips are definitely warm-season plants and do not germinate well in cold soil. They should be planted at about the same time as most corn, but not until the soil has reached at least 50° F. Once the soil is sufficiently warm, turnips can be planted any time during the summer until about 70 days before a killing frost. Planting with fewer than 70 frost-free days risks insufficient time to produce good forage growth.

Once a stand is mature, Penrose notes that the plants are exceptionally winter-hardy. "Turnips can tolerate temperatures down to 20 degrees on the tops and 15 degrees on the bulbs," he says. "That makes them ideal for fall and early winter grazing."

For Penrose, one major consideration when raising turnips is having adequate moisture at planting time. "They do need moisture to get started. But, once they are established, turnips will do well," Penrose says. "That is why we recommend planting just before a rain."

Because he plants his turnips on irrigated ground, Kugler is more interested in maximizing his options than he is in catching rains at the right time. He points out that the purple-top turnips he originally planted last year were grown for seed production.

"The volunteers were so heavy I thought I would fertilize them and water them and graze them off," he says.

Both Penrose and Kugler have a preference for the common variety of purple-top turnips. "The seed is easily available at your local hardware [store], and it has proven itself over a wide range of conditions," Penrose says. "There are some great improved cultivars out there, but they don't have the consistency of purple-tops, especially when it comes to germination."

For those who want to try new varieties, Penrose recommends mixing cultivars as an insurance policy against the failure of one type to germinate.

Penrose says the key to raising turnips is good soil contact. The seed is small, and it is essential that it be drilled into a fine, firm seedbed with adequate moisture for germination. He adds that the final bed should be firm and free of weeds and clods.

"It is no different from preparing a seedbed for alfalfa," Penrose says. "Everything that applies to alfalfa applies to turnips."

Turnips, like other members of the *Brassica* family, are well-suited for direct seeding into sod or into stubble of another crop with minimum tillage required, provided the previous crop is suppressed or killed. Turnip seedlings do not compete well with established grasses.

To prepare a grass sod such as orchard grass for planting turnips, Penrose recommends applying Roundup® at a rate of 0.5 quarts per acre at least three days before seeding. He notes that one of the advantages of direct-drilling turnip seed into sod is that the original root mass will reduce erosion while the turnips are in their early growth stage, and it will provide a firm base for the cattle to stand on during fall and winter grazing.

Penrose explains that suppressing and not killing the grass sod has advantages. "We have seen situations where turnips were seeded directly into orchard grass, and after intensive fall and winter grazing, the grass came back the next spring stronger than ever," he says.

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Seeding rate and soil fertility

Penrose had his best success planting turnip seed using a no-till drill with an alfalfa seed box, spacing his rows 7 inches (in.) apart.

"Although you really don't need more than 2 pounds (lb.) to the acre, it is practically impossible to get the rate down to that," he says. "The best we have done is to get it down to 4 pounds to the acre on a drill."

Kugler says there is another reason to keep the rows at least 7 in. apart and the rate as close to 2 lb. to the acre as possible. "You want enough space between the plants so that the bulbs can get 4 to 6 inches in diameter," he says. "If they are smaller, say the size of a small potato, the cattle can choke on them."

In conventionally prepared seedbeds, turnip seed can be drilled, applied with a forage crop seeder or broadcast, then cultipacked. Like alfalfa, turnip seed should not be covered with more than ½ in. of soil. A plant population of five to six plants per square foot (sq. ft.) is ideal.

Penrose notes that one way to dilute the seed to reduce the application rate is to mix fertilizer with the seed. Penrose recommends applying 60 lb. of nitrogen (N) during seeding or within three days of planting.

"That is another reason to suppress any grass you are direct-seeding into," he says. "If you don't knock it back enough, the grass will get the nitrogen, and you will come up with a great stand of grass and no turnips."

Up to 90% of a turnip plant is utilized by beef cattle as high-quality forage if harvested before heading, says Chris Penrose, Ohio State University associate professor and Extension educator.

Pest, disease control

For Penrose, one of the best ways to prevent disease problems in turnips is to avoid growing them in the same site more than two years in a row. Some of the more common diseases that can infect turnips are clubroot, root knot, leaf spot, white rust, scab, anthracnose, turnip mosaic virus and rhizoctonia rot.

This also applies to insect pressure, Penrose says. "It is just like in a garden. If you plant the same varieties over and over, you will help build up the pest population," he says, adding that turnips are particularly susceptible to cabbage and striped flea beetles, especially when the plants are grown under conventional tillage.

Even though the advantages of grazing turnips are numerous, Penrose says feeding turnips exclusively does have limitations.

"Turnips are very high in crude protein and very low in fiber," he notes. "That is why we recommend feeding some rough hay or some stockpiled grass along with it to improve utilization."

One way to deal with this issue is to plant turnips with a small grain such as oats or cereal rye. The University of Nebraska Extension recommends a per-acre seed mix of 120 lb. of oats to 2 lb. of turnip seed. Penrose notes that oats and turnips work particularly well together because both plants have excellent tolerance for the cold.