

# GROWING ORGANIC FORAGE CROPS

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Growing forage crops is a vital part of livestock production for two specific purposes: grazing by livestock or to help make up seasonal shortfalls between feed demand and supply.

Organic forage production is a significant component of the organic crop production system in Saskatchewan. According to the Canada Organic Trade Association (COTA), more than 500,000 acres (about 50 percent of the total certified organic acres in Saskatchewan) are dedicated to pasture, forage, and natural areas.

Growing alfalfa can be a good option for making the three-year transition to certified organic production. Alfalfa may produce equal or better returns than other grain crops in terms of weed control, building soil fertility, overall economics, and preparing the land for the first organic crop, such as wheat or flax.

## SELECTING APPROPRIATE PLANT SPECIES

When selecting appropriate forage species, a combination of factors should be considered. This includes soil type, salinity, flooding, desired season of use, species longevity, end-use quality, yield potential, and invasiveness. Forage can be planted as a single species or in a multi-species mixture. Although a monoculture forage crop is easier to manage, mixture forage crops provide several advantages including:

- better adaptation across fields that have diverse topography, soil types, or salinity levels;
- consistent production across the season as each species peaks production at different times;
- less susceptibility to insect and disease infestations;
- more efficient use of soil moisture and nutrients; and,
- greater animal gains due to a more nutritious and balanced diet.



*Cows grazing on spring pasture*

It is important to recognize the strengths and weaknesses of each forage species and combine them to achieve a more balanced and productive pasture. Pasture containing perennial legumes will produce higher yields and better forage quality than pasture stands of pure grass. Bloat is a potential hazard, however, when legumes are included in pasture mix. If the forage is grown for hay production, check with the potential buyers to determine appropriate species mixes based on their needs. Forage crops can be grown either as part of a crop rotation or as permanent pasture. As part of crop rotations, forage crops can establish uniform soil fertility particularly when legumes such as alfalfa and sweet clover are integrated. Additionally, permanent pastures provide stubble for winter pasture, help to control erosion, and are suitable for marginal lands.

## PASTURE AND HAY LAND RENOVATION AND NEW PASTURE ESTABLISHMENT

Pasture and hay land renovation is usually accomplished by introducing desired forage species into present plant stands, which can improve both forage yield and animal performance on low productivity pastures. It involves partially destroying sod, adding required nutrients, seeding a legume or legume-grass mixture, and controlling weeds. This needs to be done on a regular basis as legumes tend to be short-lived in a pasture when compared to grasses. In fact, they often disappear when soil nutrients become deficient, or because of disease, insect damage, overgrazing, drought, or competition from other grasses and weeds. To ensure the seeded legumes are successfully established in an existing sod, use tillage to knock down existing grasses or have livestock overgraze prior to seeding if tillage is not an option.

When starting a new pasture, a firm seedbed is essential. A roller should be used after cultivation and seeds should be spread evenly over the ground. Calculate seeding rates on a viable seed basis or percent germination and use certified seed. Inoculate legume seeds with the proper, viable rhizobia before planting (check with your certifier about approved inoculants). If you prefer a drill to seed pasture, use a lighter seeding rate in two directions to fill open areas instead of one pass. Avoid drilling seeds in wide rows, which can leave large areas open for weeds to establish.



*Late-season cattle grazing.*

## WEED CONTROL

Prior to starting a new pasture, an annual hay or green manure crop can be grown to help manage weeds and improve the seedbed. Forage barley or oats can be grown (oats yield more tonnage, barley produces better quality). Cereal crops can also be used for grain if residues won't interfere with seed emergence.

When renovating existing pasture, a light tillage can be used to control annuals and suppress perennials prior to the emergence of newly seeded legumes. Use mowing to control perennial weeds after emergence, but avoid mowing too low as it can damage forage seedlings. Perennial weeds such as quack grass and Canada thistle in forages are more difficult to control. A vigorous forage crop, however, will limit weed spread and reduce perennial weed pressure.

Proper management practices that maintain a healthy, competitive stand help reduce weed problems in established pastures. Proper soil moisture, fertility management, and allowing time for regrowth after each grazing or cutting contribute to a healthy, less weedy forage stand.

## SOIL FERTILITY

A balanced nutrient supply is important for organic forage production. Nutrient budgeting can be used to evaluate inputs and outputs, and assess nutrient efficiency and better resource distribution. A year-by-year budget is useful to decide whether to apply supplements to a field while a long-term or multiple-year assessment is more appropriate at the scale of a whole operation.

### *Nitrogen (N)*

Adequate N supports forage growth or hay production. Nitrogen levels in the soil also affect the protein content of the grass. Legumes included in pasture mixes help gain N through their biological N fixation (BNF) from the air and produce high quality forages. Only small quantities of the BNF can be transferred from legumes to grasses, however, through the hyphae of symbiotic mycorrhizal fungi connecting their root systems. Organic N in legume plant tissues must first be broken down to NH<sub>4</sub> or NO<sub>3</sub> by animal digestion or by decomposition in the soil before it can be used by plants. Applying approved N sources such as manure and other organic compost can also help replenish N shortage resulting from hay exported from the field.

### *Phosphorus (P)*

Phosphorus requirement depends on soil P availability and forage crop uptake capacity. Uptake by forage varies from nine to over 70 pounds/acre, depending on crop varieties. Most available P in soil originates from mineralization of soil organic matter and plant residues, plus the breakdown of P-bearing minerals. Common sources of P include animal manures, on-farm compost, and rock phosphate. Phosphorus in livestock and poultry manure and on-farm compost is largely in organic form and only becomes available after the organic matter is mineralized. While rock phosphate is allowed for use in organic cropping systems, only very small portions dissolve and become available for crops each year when it is added to soil.

### *Other Nutrients*

In addition to N and P, forage crops also require potassium (K), sulfur(S), and micronutrients to maintain productivity. Some Saskatchewan soils are low in these nutrients. A fall soil test will provide a snapshot of soil fertility status showing which nutrients are deficient. It also allows time for the application of manure or soil amendments to meet the needs for forages to grow in the next grazing season.

## MANAGE LIVESTOCK GRAZING, FORAGE CUTTING, AND BALING

The goal during the livestock grazing period is to maximize animal performance from a complete forage diet. Rotational grazing on established grass-legume pastures from spring to fall will favour legumes. Using several fields or paddocks with an electric fence and adjusting the stocking rate per field or paddock to graze grass-legumes within a seven- to 10-day period will keep the pastures healthy. Do not overgraze and plan on providing plenty of recovery time (usually 21 to 35 days depending on time of season and rate of regrowth). A seven-day grazing period and 28-day rest period will require five fields. A 10-day grazing period will require four fields.

To maintain efficient forage production, consider the following: (a) harvest one or two hay crops in the spring and early summer; (b) allow 30 to 35 days for recovery; (c) graze off in seven to 10 days; (d) repeat the resting-grazing cycle; and, (e) allow four weeks of plant recovery before the first killing frost.

Harvest time is critical for maximum tonnage of hay with high protein and nutrient content. In general, dry matter accumulates during the growing season and maximizes late in the season. On the other hand, forage quality is very high early in the season and declines as the season continues. The goal is to determine the point in time where these two lines cross. In Saskatchewan, this point usually occurs in the third week of June, but this date may vary depending on the species of forage and the growing conditions. In the case of alfalfa, the point at which 10 percent of the flowers on the plant are blooming is the best time to cut for maximum quality and yield. In the case of most grasses, it is best to cut after the boot stage, but before heading.

It is better to choose a dry day with low humidity to harvest hay, allowing it to dry quickly and evenly. After the hay is cut, it should be spread out and given time to dry before baling. In humid conditions, you might need to prop it up for air circulation to speed up the process. Raking and turning also helps the drying process.

Once the forage is baled, stack the bales while leaving some space in between for air circulation. Bales of hay should always be protected from precipitation, whether with a tarp outdoors or in an enclosed space with roofing.



## FURTHER READING

1. Establishing and maintaining productive pasture on organic dairy farms. <http://eorganic.org/node%201639>
2. Organic Alfalfa Management Guide, Washington State University Extension. <http://pubs.cahnrs.wsu.edu/publications/wp-content/uploads/sites/2/publications/eb2039e.pdf>
3. Forage Crop Production Guide, Saskatchewan Ministry of Agriculture. <https://publications.saskatchewan.ca/#/products/75246>