

## TEN QUESTIONS ABOUT PASTURES AND BIODIVERSITY

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Traditionally, pasture management has emphasized balancing the quantity and quality of forage for livestock production purposes. Thus, producers have often planted monocultures of forages or simple grass-legume mixtures in their pastures. Currently, producers face new challenges in pasture management such as sustainability, reduced inputs of fertilizers and pesticides, soil protection, carbon sequestration, resistance to invasion by alien plants and insects, and the aesthetic value of the landscape. Some suggest that increased biodiversity may be one tool to aid producers in meeting these new challenges. This fact sheet addresses some common questions regarding biodiversity in pastures of the higher rainfall regions (i.e., the temperate humid pasture region of Canada and the eastern USA).

### 1. What is biodiversity?

In its broadest sense, biodiversity refers to all of the biological material including genetic material, species, and ecosystems that make up the natural world. The earth's biodiversity includes about 1.75 million described species of microbes, insects, plants, and animals.

### 2. How is biodiversity relevant to pastures?

Pastures can be very diverse ecosystems. For example, our research in the northeastern USA showed that pastures contain about 30 plant species on average along with hundreds of insect species. European pasture research revealed hundreds of insects, along with dozens of plants, birds, and other species that play different roles in things like nutrient cycles and food webs.

### 3. Can pastures be managed for increased biodiversity?

Some management practices affect pasture biodiversity indirectly. For example, using rotational grazing and managing pastures to leave more stubble and forage residue can influence beneficial insect and soil microbe populations and benefit some wildlife species. The most direct way a producer can affect pasture biodiversity is to plant and manage many different forage species in pastures. Some research shows that managing complex mixtures of forage plants can benefit forage production, nutrient cycling, and reduce weed populations.

### 4. How can biodiversity affect pasture production?

The limited amount of research in this area suggests that increased plant species diversity in pastures can increase forage yields, reduce weeds in pastures, and enhance nutrient cycling. Some view diversity as a sort of insurance policy where different species contribute in their own time or can take the place of species that die out from stress or mismanagement. Much of this research has been done in small plots—very little applied research on plant diversity has been done at the pasture or farm scale. One key piece of

information we lack is how complex mixtures of forages might influence animal production (e.g., milk or meat production) on pastures.

5. How many forage species should I plant in my pastures and which forage species should I choose?

There is no universal forage mixture or number of forage species that applies to all farms. The specific set of forages will depend on the farmer's goals, management, soil resources, weather, and many other factors. As a start, most producers should consider using grass-legume mixtures to reduce the cost and use of nitrogen fertilizer, improve the nutritive value of the pasture forage, and indirectly reduce the emission of greenhouse gases. If you are a beginning grazer, it may be best to stick with simple mixtures until your grazing management skills increase.

6. What about using so-called pasture mixtures from my local seed dealer?

Some seed companies package mixtures of forages for specific uses, such as "intensive grazing mixes", "highland mixtures", "lowland mixtures", etc. If a producer wants to use a commercial pasture mix, she/he should closely examine the forage species, variety, and percentages of each in the mixture to be sure that they fit the producer's goals and management. The producer should try to match the relative palatability of each forage species in the mixture and their time to maturity to reduce selective grazing by livestock. Seed companies may change the components of mixtures from year to year, which makes performance comparisons difficult. It also means that the "intensive grazing" mixture a farmer bought one year ago is probably not the same mix available this year.

7. Why not target species and mixtures for specific uses and specific areas on my farm?

Instead of taking a "shotgun" approach to planting mixtures (i.e., mixing in a little of a lot of forage species and planting it all together) some recommend targeting certain forages or combinations of forages for different parts of the farm and different uses. For example, most research shows that plant diversity is lowest on highly fertile sites because of dominance by a few highly productive species. Therefore, on a fertile, highly productive soil, it may make more sense to plant a simple mix of one grass and one legume (or perhaps just the grass) to take advantage of the site's productivity. On other areas of the farm that are less productive or have other limitations (droughty, poor drainage, etc.) a different mix or set of forage may work best. This is the idea behind using cool-season and warm-season forages in separate pastures for different times of the year.

8. What about grazing management for mixtures; which forage species should I focus on?

This is where a thorough knowledge of the soil and landscape of the farm along with a careful consideration of forage choice is important. For example, if a mixture of bluegrass, white clover, orchardgrass, and alfalfa were established and the producer managed the grazing to fit the bluegrass or white clover (i.e., relatively short grazing height and frequent grazing) the orchardgrass and alfalfa would not survive very long and vice versa.

9. How can I manage selective grazing by livestock in complex mixtures?

Selective grazing of “tasty” forages in complex mixtures may result in unstable mixtures and the loss of these tasty species from the pasture. Selective grazing of certain forage species by the livestock can be managed by using rotational grazing with relatively high stocking densities and short grazing periods. Another way to manage selective grazing is to move waterers, feed troughs, or shade areas to different pastures or parts of pastures to redistribute grazing animals. Or, producers might use different classes or species of livestock in a leader-follower grazing method to take advantage of differences in grazing animal preferences. Using separate pastures of different forage species or species combinations (as in question 7 above) can help to avoid this as well.

10. Are there new forage species available for use in diversifying pastures?

A few new forage species have become available in recent years for use in temperate pastures. Forage chicory has become popular in the last 10 years. Our research in the northeastern USA has shown that chicory produces large amounts of high quality forage; however, it is short-lived (3-4 years) and managing the growth of flower stalks (bolting) is difficult. A few years ago “grazing plantain” (a down-under cousin of the familiar buckhorn plantain in pastures) was touted in parts of the USA. Our research showed that it was not a good forage plant. Kura clover is a new legume with considerable potential for temperate pastures. Research in Wisconsin has shown that it is long-lived and drought-resistant, but it is very difficult to establish. Within forage species there are a number of new varieties available and producers should consult local advisors for local information on the performance and adaptation of individual varieties.

**Further Information:**

There are several sources of information on forage and pasture management that are useful in considering forages and forage mixtures including:

Advanced forage management: A production guide for coastal British Columbia and the Pacific Northwest. By Shabtai Bittman, O. Schmidt, and T.N. Cramer. Published by the Pacific Field Corn Association. This publication provides good information on forage and pasture management for the humid northwest of Canada and the USA. It also has a good discussion and description of individual forage species.

Pedigreed forage seed production. Distributed by the Canadian Seed Growers Association, Ottawa. Provides a good description of many cool-season grasses and legumes including those adapted to the prairie provinces of Canada. It is geared toward seed production but has good descriptions of the individual forage species.

Websites:

[www.foragebeef.ca/](http://www.foragebeef.ca/). A wide range of information on pasture, forage, and range management.

[www.forages.oregonstate.edu/](http://www.forages.oregonstate.edu/). The Forage Information System maintained by David Hannaway at Oregon State University. Contains a wealth of information on forage and pasture management for Canada and the USA.

<http://www.umaine.edu/grazingguide/>. Mainly for the northeastern USA, but also applicable to eastern Canada.

<http://www.forages.org/> and [www.forages.psu.edu/selection\\_tool/index.html](http://www.forages.psu.edu/selection_tool/index.html). Web-based forage species selection tools for New York and Pennsylvania. Some of the information is also applicable to eastern Canada.