Cocktails 101

When we think about what's under our feet, what comes to mind? Dirt? Asphalt? Soil? It has been said that the soil beneath our feet is far more than just dirt, but it supports and drives all of life on earth. So when we think about how to manage production on our farms and ranches, our soil should be the first thing that comes to mind, a living, breathing thing! Soil is not an industrial commodity, and if not taken care of, it can be "used up." Soil is an ecosystem that we can learn about and work with to have healthy and productive land with minimal inputs.

There are many tools and ways to improve and take care of our soil, and one of them includes *cocktail cover crops.* Cocktail cover crops have many functions, but a few of the most important include:

- Increasing soil organic carbon by keeping the soil covered at all times; the organic carbon in soil is feeding the soil biota which in turn feed the plants.
- Increasing the diversity of species in our crop rotations and forages by seeding multiple species. Plant root diversity is very important for good soil health. (WCCA Conference, 2014, Winnipeg)
- Always having live roots growing in the soil (Jay Fuhrer, NRSC).

There has been ever increasing interest and excitement around cocktail cover crops in the Peace Country over the past few years. There have been producers in the area who have been growing some excellent quality forages for grazing, silage and hay while helping improve the overall health of their soil while doing so! There are a number of benefits beyond quality feed that we can reap from planting cover crops including but not limited to: breaking up soil compaction, capturing and increasing soil available nutrients, increasing soil organic matter, increasing soil biodiversity, and creating ground cover.

The Basics

Cocktails do not have a recipe. Cocktail cover crops can range from only a few species to very complex mixes with several species; what you plant is determined by your end-goal. Pre-planning what you ultimately want to get out of your cocktail will help in determining what kind of mix will work the best for you!

Determining the End Goal

What are you looking to achieve from planting a cocktail cover crop? Quality grazing, extending the grazing season, hay, silage, improved soil health, weed suppression, improving field water infiltration, nutrient cycling, and erosion control are all potential reasons for growing a cover crop. More questions to ask yourself include: what is your soil type, when and how will the crop be seeded, what kind of moisture are you expecting to be available to the crop, and when are you intending to harvest or use the crop.

Species Considerations

There are many forage species that can be selected for a cocktail cover crop mixture. It is important to know the characteristics of the various species that are available! It is also important to consider the climate conditions for species, such as whether they are warm or cool season species. Cool season crops can be seeded later in the spring and early summer months, whereas warm season crops should be seeded late spring through mid-summer when the soil is warmer.

A cocktail cover crop mixture can be selected from a diversity of plant families (i.e., broadleaf, brassicas, grasses, and legumes), corresponding to different plant functional groups (e.g. nitrogen-fixers; N scavengers, weed suppression). Thus, a cover crop mixture that contains a diversity of species, each differing in functional traits could be expected to provide a greater diversity of services relative to a monoculture or a two-species cover crop mixture. Each crop species in a cocktail may reach maturity at slightly different times, therefore providing green forage continuously through the growing season.

Grass Species – Grass species produce high biomass in most blends. They have a fibrous root system that helps in preventing erosion by stabilizing the soil, and they are excellent hosts for mycorrhizal fungi. Grasses use lots of nitrogen in their growth. There are warm and cool season grass species. Cool season species include spring cereals, winter cereals, and species like annual ryegrass. Warm season species include millet, sorghum, and corn.

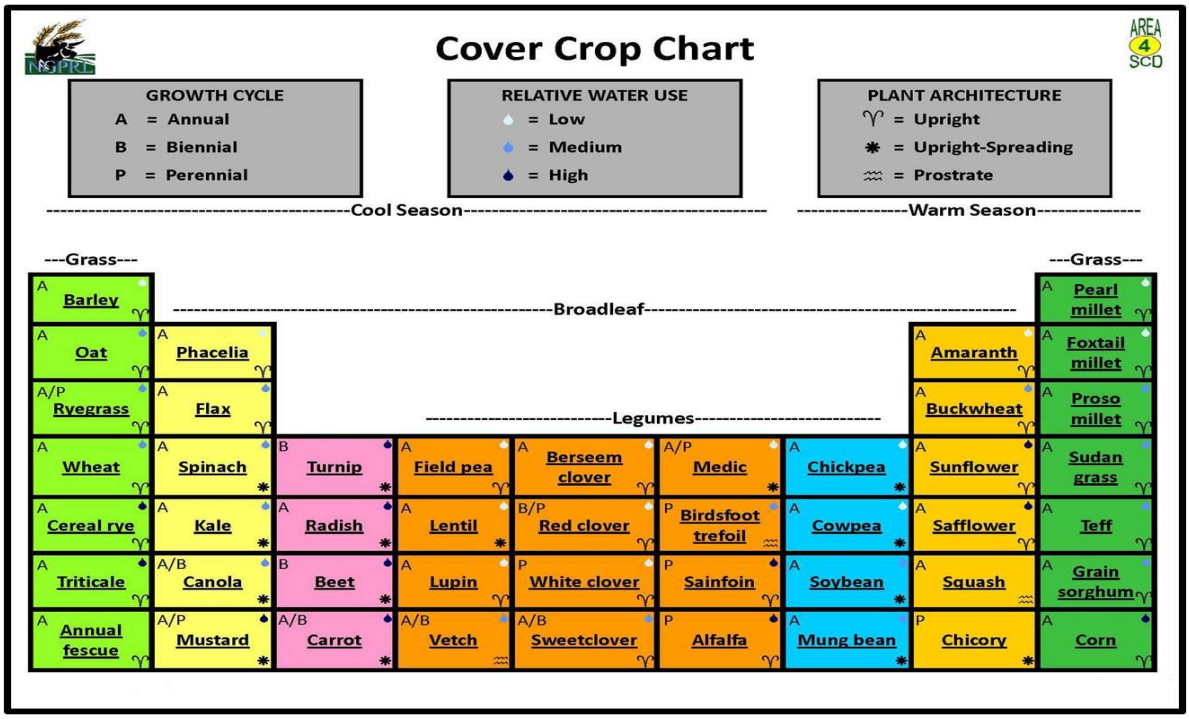
Broadleaf Species – Broadleaf species are producers of high quality residue as they are quick to rot at the end of the season. Many broadleaf species are nitrogen scavengers, with roots that vary with the species – some fibrous and some with sizeable taproots. These species vary in the soil with some that break up hardpans, smother weeds, support mycorrhizae, or acidify the rhizosphere. These species typically require high amounts of nitrogen and sulphur. Cool season species include: turnips, radishes, forage brassica, kale, and forage rape. Warm season options include: okra, cowpeas, and buckwheat.

Legume Species – Legumes are nitrogen fixers, therefore a great option for adding to a cocktail mixture. With an appropriate population and the proper inoculants in a mix, we can effectively fix free nitrogen from the air to feed the crop. Legumes form great associations with mycorrhizal fungi, which is the mechanism by which legumes share their nitrogen with grass species. They have a variety of root structures from shallow, fibrous roots to deep tap roots. They do require phosphate and potassium to grow. Popular legume species include; hairy vetch, crimson clover, peas, and lentils.

Forbs – herbaceous, flowering plant without significant woody tissue above or at the ground. It is not a grass or a tree/shrub, but can be described as something in between. It's a word commonly associated with rangeland ecology. Examples of forbs include

phacelia and sunflowers (www.plants.usda.gov). Adding forbs adds another dimension to diversity and are also great for attracting pollinators!

For more information on the different categories of cover crops, please see the chart below:



Establishment

To ensure good establishment of your cocktail, ensure that your seedbed is relatively weed-free and good seed-to-soil contact is achievable. For best stand establishment, try direct seeding the crop rather than broadcasting if possible. Be sure to take into account recommended seeding rates, depth, and dates for each species you are looking at seeding to ensure that crop will work for your seeding strategy. Some cover crop species are very sensitive to herbicide residue. If the field has had a fall or spring burn down, you may face some challenges in crop stand establishment.

When making decisions about which cover crop species to include in a cocktail, producers need to be aware of the adaptation, potential forage productivity and ecological stability of any newly introduced crop species to the Peace Country region. Cool season annual forage-type cereal crop varieties such as those of barley, oats, triticale and field peas are well suited to western Canadian growing conditions and provide acceptable forage yield and quality for winter grazing. Therefore, it is important to include such crops in a cocktail. Certain warm season crop species have performed poorly in the region and they have not been recommended for inclusion in a cocktail. On the other hand, other warm season crop species such as sunflower, crown/proso millets and foxtail millets have done well and have been suggested for use in a cocktail.

Other Considerations

Grazing – As with swath grazing or bale grazing, it is recommended that fields be divided into sections based on the number of cattle grazing to limit their grazing. Limiting grazing allows cattle to be the most efficient in utilizing forage and spreading nutrients via their manure.

Frost – We deal with this issue lots here in the Peace Country. When we get an early frost on crop that is still green there is a risk of nitrate toxicity, especially if there is regrowth after the frost. Brassicas have been found to accumulate high levels of nitrates, so be very cautious including them in a mixture. Other grassy species like sorghum and sudangrass are susceptible to prussic acid toxicity following a frost. After a frost, it is recommended to let the crop stand for 10 days-2 weeks to allow the toxicity risk to decrease before harvesting or turning cattle out to graze. If you are concerned about nitrate or prussic acid toxicity, be sure to get your feed tested before feeding.

Brassicas – Brassica species can be high in glucosinolates, which can potentially cause thyroid problems in cattle if fed in high concentrations. Therefore, it is important to have brassica species in a mix to mitigate this issue. Also, brassicas are susceptible to pests that affect common brassicas in the Peace Country, like canola. Therefore, pests such as flea beetles may be an issue.

Feed Testing – Testing our feed for nutrient levels is always important, and is especially important when we're growing species and mixes that we're not familiar with. Feed testing of a cocktail can help us all learn what mixes work well together in the Peace Country, and they can also prevent issues such as nitrate poisoning and nutrient deficiencies.

Remember

Cocktail cover crops are one tool that can be used to improve and maintain soil health. Building soil health is a long-term commitment and there is much work to be done on learning about this topic and what are the best ways to do so in our unique Peace Country conditions. Advice from producers who have implemented cocktail cover crops into their management includes starting with basic mixes, doing small acres at a time, and not being afraid to try something new! Keep in touch with PCBFA as we continue to do applied research and extension on this topic to share ideas, learnings and success stories!

Producer cocktail near Fairview August 2018

Soil profile of a cocktail mix at the High Prairie Plot Site Summer 2018