

FACTORS INFLUENCING COVER CROP SELECTION

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There is a renewed interest in utilizing cover crops to improve soil health and profitability of crop production in the US. There are many benefits to using cover crops, but a producer must zero in on exactly what the expectations are and the reasons for growing a cover crop. This focus on the expected outcomes will influence what will be used for the cover and how it will be selected and managed.

The progressive farm manager must make the determination on what he wants from the cover crop. Is it soil improvement, erosion control, weed, insect, and disease suppression, nitrogen fixation, nutrient retention, green manure, livestock grazing, or just satisfying the government requirements for certain agricultural programs? Maybe the expected outcomes are a combination of needs? Will this be a winter cover crop or a summer cover? Does the cover crop need to be a perennial cover, or will summer or winter annuals be used? Is the cropping program permanent like vineyards and orchards, or is it for annual crops like corn, soybeans, cotton, or vegetable crops? Let's explore some characteristics that are important for proper selection of a cover crop.

Fast establishment: Not only does the seed need to germinate quickly, sometimes in adverse conditions, but it must also establish quickly. Establishment is a relationship between seed germination, seedling vigor, and ground cover. The idea for a cover crop is to cover the surface with vegetation for weed suppression and erosion control. Timing of planting is crucial at this phase, and should be considered when choosing the species.

High dry matter production: This is the total amount of growth, both above the ground and below the surface. This is especially important for grazing, but also for adding organic matter to the soil. The total root mass is critical for soil health improvement.

Deep or fibrous roots: Besides adding organic matter to the soil, deep roots help break up tillage pans and create channels for water, air, and crops roots to follow deeper into the soil profile. This is most important in no-till corn and soybeans. Deeper crop roots will seek out deeper moisture reserves during those times of moisture stress. Fibrous roots help with nutrient uptake, erosion control, and adding organic matter.

Easy burndown: Chemical burndown of the cover crop before no-till planting must be factored in. Type of cover crop species used will influence the type of chemical and the timing of the application in regards to cover crop maturity, weather, and the proposed no-till planting date. There is no recipe for this, as conditions constantly change. This requires the most management skills in utilizing cover crops.

Easy incorporation: In conventional tillage operations, the species, maturity, and soil conditions will dictate the method and ease of reducing the cover crop to organic material that is mixed with the soil. Mowing the cover crop, chopping, and grazing might be needed for efficient incorporation.

Easy vegetation management: In operations that rely on a perennial cover crop, the management of the cover crop so that it does not compete for nutrients, as well as encroaching on the desired crop, is extremely important. Mowing, grazing, or utilizing growth regulators are all methods of vegetation management, and should be accomplished with a minimum of inputs.

High nitrogen fixation (legumes): There is a wide choice of legumes, such as clover, vetch, and peas, that will fix large quantities of nitrogen from the atmosphere. All seed should be inoculated with the proper Rhizobium strain of bacteria for the species used. Timing of burndown or incorporation is important to maximize the amount of N that is fixed.

Insect/disease suppression: Care must be taken when selecting species as to the efficacy of its ability to break the insect and disease cycles. Some species are known for reducing nematode populations and disrupting host plants that may harbor diseases and insect.

Crop rotation: Crop rotation on the farm is very important. Some cover crops are not suitable in some rotations, as they can become weeds if not managed correctly. A case in point would be not using a grass in a wheat rotation, as the chemicals available may not do a good job of managing cover crop escapes in the wheat crop.

Winter factors: Winter hardiness, cold temperature tolerance, and frost tolerance are three factors to consider for a winter cover crop. All three are slightly related, but are different as to the plants' mechanism for coping with the problem. **Winter hardiness** is often related to the ability of the plant to go dormant before the harsh winter conditions hit. This is especially true of perennials. **Cold temperature tolerance** is the ability of the plant to withstand very cold temperatures, while not necessarily going dormant. The plants' physiology and chemistry changes within the plant cell to tolerate the cold temperatures. **Frost tolerance** is exactly that...the plant's ability to withstand going from 60° to 16° in a very short period of time. This is especially important when the "Polar Express" reaches down out of Canada and drops the temperature, sometimes in a matter of hours. Leaf tip burn is the most common effect on the plants.

Summer factors; For those summer cover crops, three factors are most important...**drought tolerance, heat tolerance, and low water requirement.** Summer cover crops should not require a large amount of moisture to grow, as this will rob future crops of stored moisture, and irrigation costs money. Heat and drought tolerance are self explanatory. The ability to withstand high heat with little moisture available, while still providing the cover needed, is a vital characteristic of a summer cover crop.

Once the selection of the cover crop species is determined, the procurement of the seed needed becomes the focus for the progressive producer. In the past, field run seed, readily available and inexpensive, was the first choice. This created some unintended consequences, as this seed may have come from your neighbor's farm that has a weed or disease problem that you may not have. By using this seed, you are infesting your farm with your neighbor's problems. A wise farmer will insist on the proper species and varieties that have been inspected, cleaned, treated, and has an analysis test showing possible contaminants, as well as the germination percentage. What should you look for on a bag of seed?

Pure seed %: This will show the percentage of the pure seed of the crop that is supposed to be in the bag. Industry standards for high quality seed may put this percentage at 98% or 99%.

Other crop %: This figure will show the percentage of crops other than the base seed. It is important to have as little other crop contamination as possible, as this could possibly change your management of the cover crop. You must always management for the worst case scenario, and the other crop may not be suitable for use as a cover crop.

Inert material: This will show the percentage of chaff, stems, soil, insect parts, rodent damage, damaged kernals, etc. Lower is better, but because this is inert, as long as it is physically plantable, it should not change your management strategy.

Weed seed %: The percentage of weed seed in the sample. This should be as close to "0" as possible. You are trying to get rid of weeds, not bring new ones on to the farm. Also, the noxious weeds for the state the seed is being sold in must be listed by name and number per pound. Noxious free seed is always the most desirable.

Germination %: This is the percentage of seeds that are alive and have developed into seedlings during the test. This test is performed under optimum moisture, temperature, and light required by that particular species. Industry standards for most species is a minimum of 85% to 90% germination. The higher the germination percentage, the higher value to the farmer.

Seed dormancy/persistence: You may not find this on a seed analysis tag, but it important to understand **dormancy** and **hard seed** percentage and how that will affect the seed persistence in the soil. Dryland and native seeds are known to have a dormancy factor. This is a natural survival mechanism to ensure that all the seeds in the ground do not germinate at once, and then possibly die under adverse conditions. Hard seed is a mechanism used by legumes and some other species to mimic what dormancy does for the species. A hard seed coat allows the seed to persist in the soil until growing conditions are right, and the seed coat is compromised enough to allow moisture into the seed to start the germination process. Seed persistence in the soil is difficult to manage, so it is wise to ask questions about dormancy and hard seed factors of the seed you are purchasing so that you don't have problems in later years with a cover crop

becoming a weed. Seed viability in the soil seed bank has been studied, and some species may have viable seed 20 years after it had been planted.

When selecting a cover crop, it is wise to consult with your extension agent, seedsman, or chemical fieldman for recommendations on cover crop species that are adapted to your area and are suitable for your cropping system. They can direct you to research and trials that have been conducted near your location. They may also put you in contact with other farmers who have had success with using cover crops on their farm. Specific recommendations for seeding rates, timing, and management should all be available from these resources.

A reliable seed source is very important. The seed needs to be readily available when it's time to plant. Especially in the fall, timing is important for proper establishment of the cover crop. Waiting for seed to arrive is frustrating. A little advance planning should alleviate this problem. Also, your seed source should be able to help you with seed treatments and inoculation, if needed.

Selection of a cover cropping system, depending on the factors and conditions on your farm, will require doing some homework and talking to those resources that have the knowledge and experience. With proper selection, cover cropping can take a farm closer to sustainable, profitable crop production, while protecting the environment.