SNOBELEN FARMS

www.snobelenfarms.com

COVER CROP GUIDE

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The Benefits of Worms

Worm populations thrive in cover crop environments. Worms are perhaps the most under-appreciated benefit of using cover crops. They are a vital component of healthy soils, and many middens (worm mounds at the soil surface) are a strong indicator of biologically active soils.

THEY EAT

Worms eat dead plant parts, fallen leaves, fungi, bacteria and even dead animals. Deep burrowing worms can ingest up to 750 lbs/acre of corn residues per year. Surface living worms and deep burrowing worms feed almost exclusively on surface litter, and top-soil worms feed on soil organic matter at various stages of decomposition.

NUTRIENT RICH

Worm castings are rich in organic matter. Soils rich with castings contain 5X more nitrogen, 7X more phosphorus and 1000X more beneficial bacteria than soil without . Castings also increase the CEC (cation exchange capacity) of soils

ROOTS

A vibrant worm population creates numerous worm channels that allow crop roots to grow deeper and access moisture and nutrients that would otherwise not be available to the crop. Worm channels also increase water infiltration rates resulting in soils being less saturated and for a shorter period of time, reducing the stress of a significant rain event.

Worms have the ability to increase soil stability, improve soil structure and repair damaged soils. Worms are a key component in making soils more climate resilient.

Soil Erosion

We have known for a generation or more that soil erosion, from wind and water, has a huge impact on field productivity over time. However, with a pass of some tillage the scars disappear, but not the impact. Reduced tillage, no-till, strip till, grassed waterways, soil surface residues and the increasing use of cover crops have all had a positive impact on reducing the effects of soil erosion.

We also know, it's the good soil that erodes first. One tonne of eroded soil (a medium sized loader tractor bucket full) consists of 2 pounds of nitrogen, 9 pounds of phosphorus and 31 pounds of potassium (on average) - a value of about $27.00 at today's fertilizer prices. It is not uncommon to lose 3-5 tonnes per acre from unprotected soil after a major rain event (3" or so) or $81.00 - $135.00 per acre. This calculation does not include the loss of future productivity.

Cover crops protect soils from strong winds, acting as a wind barrier as well as a trap to capture moving particles. Cover crops also lessen the physical impact of rain drops, especially from a heavy downpour. Even the stubble of a terminated cover crop provides resistance to soil particles moved by wind and rain.

Using a specific cover crop strategy (species, planting date, termination date) along with a tillage strategy is an effective way to keep the good soil where it is and improve the susceptibility of soil particles moving off the field.

Water Infiltration and Soil Moisture Conservation

Though these two terms seem to contradict each other, they actually work together in the context of using cover crops.

Cover crops are highly effective in supporting and increasing a worm population, improving soil structure and aggregation. They also support increasing soil porosity - the ability of surface moisture to get away during and after a significant rain event - is noticeably increased. Improved water infiltration reduces soil erosion. Well aggregated soils contain large pores and small pores. The large pores let the water through the soil helping to reduce ponding typical with a heavy rainfall on poor soil structure. The small pores within aggregates hold water tightly enough to keep it around but loosely enough for plant roots to take it up.

Organic matter and water retention is also important benefit. Cover crops aid in building soil organic matter levels. Organic matter has the ability to retain moisture and absorb soluble nutrients. An increase of 1% organic matter is approximately equivalent to the retention of an additional 3400 gallons of water per acre. In a drought year this can be significant. Water infiltration and soil moisture conservation reduces surface runoff and potentially improves yield.

Compaction

With yield monitors on combines we have been able to quantify the impact of compaction on production. Soil compaction destroys soil structure which can cause anywhere from a 6-34% reduction in yield (depending on severity, soil type, ect.). The average yield loss is approximately 15%. Even up to 10 years later the effect of compaction can still be measured and calculated to decrease yield by up to 3%. In addition to huge yield implications, compaction also increases surface runoff and erosion, increases nutrient loss, increases drought susceptibility, restricts root growth, reduces worm populations, reduces biological activity of soils, and challenges the health of the crop.

Solutions to compacted soil include: avoiding wheel traffic on wet soil, reduce axle loads, decrease contact pressure, and increasing soil life. Cover crops are an essential component of increasing soil life and remediating the cause and effects of compaction. As mentioned previously, cover crops support worm populations, increases water infiltration, builds soil structure, restores porosity, reduces erosion, and improves many other factors required for productive soil. A combination of deep rooted tap root species and fibrous rooted grass species make for a powerful combination in repairing soil.

Mycorrhizal Fungi

Mycorrhiza means “fungus-root”. They offer a symbiotic relationship between the fungus and the roots of the host plant. This relationship is a natural infection of a plant’s root system in which the plant supplies the fungus with sugars and carbon and receives water and nutrients in return. Since mycorrhizal hyphae (microscopic rooting structure of the fungus) increases the root surface around the crop, they increase the availability of water and nutrients, particularly nitrogen, phosphorus, zinc, manganese, and copper. Several cover crop species, especially oats, support a mycorrhizal fungi population and once again becomes integral in improving soil’s ability to resist weather challenges.

Winter Barley

Snobelen Farms carries two types of winter barley. Common winter barley is a 6-row variety that runs about 12,000 seeds per pound. We also have Calypso, a pedigreed variety, which is a two row variety and runs about 10,000 seeds per pound.
Winter barley should be planted earlier than winter wheat for optimal winter survival. It produces an excellent fibrous root system that prevents surface erosion, builds soil structure, and supports mycorrhizal fungi (beneficial to enhancing soil aggregate stability). Winter barley is early maturing (comes out in head well before winter wheat does) and can be used as green feed or taken to full maturity and harvested for grain. For those harvesting as green feed, there is opportunity to plant an early maturing soybean variety. This would allow for a double crop income (if weather allows). Yields of winter barley typically exceed those of spring barley.

Cereal Rye [Fall Rye]

Cereal rye is the hardiest of cereals and can be planted later than winter wheat with excellent results. It requires a soil temperature of 1-2 degrees Celsius to germinate. It produces excellent ground cover and a deep fibrous root system to reduce erosion and build soil structure.

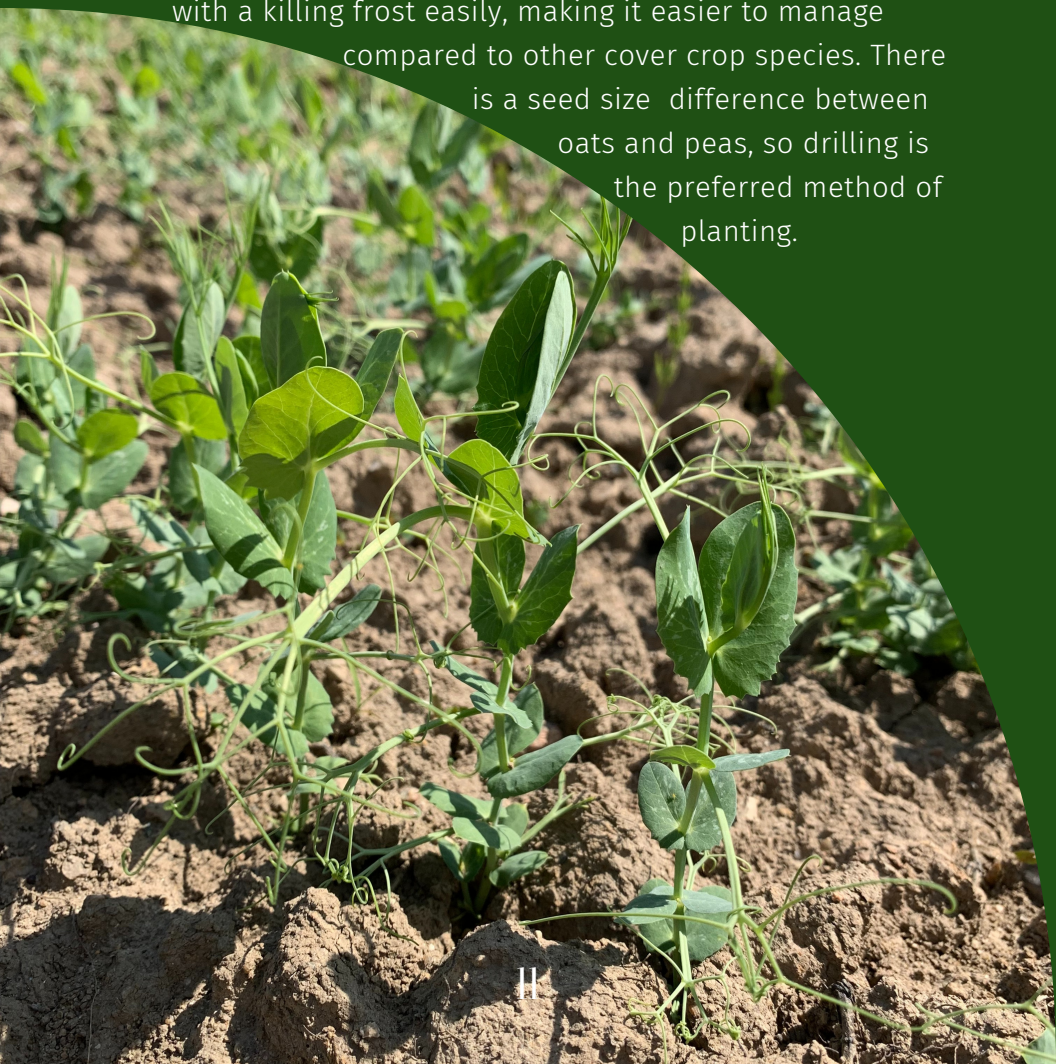
Cereal rye also has some allelopathic properties and can suppress the growth of some weed species. It is an excellent scavenger of unused soil nitrogen and is well suited for soils low in fertility and challenging soil environments. Cereal rye does require a termination strategy to make sure it does not become a weed to the succeeding crop. Cereal rye is also used as a green feed but typically not taken to grain maturity except for seed. There is about 15,000 seeds in a pound of cereal rye. We recommend common cereal rye as a more cost effective option.

Oats

Common oats are typically used for cover crops. They are perhaps the most common cover crop species. Seed size runs about 11,000 seeds per pound. Oats are a fast growing spring cereal that requires a soil temperature of 3-4 degrees Celsius to germinate. They produce an excellent fibrous root system that builds soil structure and protects against soil erosion. Oats are more tolerant of saturated soils and soils with low fertility as compared to spring barley. Oats are highly supportive of mycorrhizal populations and as such, increase the biological activity of the soil - essential in aggregate stability, soil structure and climate resilience.

Oats & Peas

Snobelen Farms offers a blend of common oats and field peas as another cover crop option. In addition to the benefits of oats in a cover crop, peas add a legume to an otherwise grassy cover crop. Legumes, like peas have the ability to fix atmospheric nitrogen and provide a source of nitrogen to the succeeding crop. Oats and peas typically germinate quickly, grow rapidly and establish well with adequate moisture. This combination adds diversity to the cover crop and terminates with a killing frost easily, making it easier to manage compared to other cover crop species. There is a seed size difference between oats and peas, so drilling is the preferred method of planting.



Suggested Seeding Rates

Cover Crop Species	Seeds /lb.	Drilled	Broadcast	Aerial Seeding
Oats	11, 000 - 12,000	50 - 90*	60 - 95*	80 - 110*
Winter Barley	10,000 - 12,000	50 - 80*	60 - 100*	80 - 120*
Cereal Rye	15,000 - 18,000	55 - 70*	80 - 100*	90 - 120*
Oats & Peas	Depends on mix	60 - 100*	70 - 105*	90 - 120*
		*Lbs./Acre		

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