



GROWERS GUIDE
to Soil Health



Feed Your Soil

“One percent organic matter contains about 1,200 pounds of nitrogen, 345 pounds of phosphorus and 150 pounds of sulfur per acre.”

—Dr. Ray Ward, Ward Laboratories Inc.


Soil Health comes by understanding the microbial diversity and functional capabilities of soil. Prairie ecosystems should be used to guide your soil reconstruction efforts and assessment of the health of agricultural land.

Your soil is alive – filled with microorganisms like bacteria, actinomycetes, fungi, protozoa, and arthropods, plus a wide variety of larger soil fauna. These all work together to naturally cycle nutrients and develop soil organic matter, further enriching the soil and providing a perfect place for your crops to thrive.

This microbial activity is fed by roots of growing plants – and the longer these beneficial soil organisms are fed, the richer the soil becomes. This is where SoilBuilder™ cover crops from ARROW SEED shine – they lengthen your soil's growing season and provide a mechanism by which nutrients are made available to plants. Through their decomposition, organic carbon and organic matter increase in the soil.

Soil carbon is the key; it's tied directly to all measures of soil quality. If you build soil organic matter, you'll see the difference in your soil's appearance, texture, structure and performance. You'll see reduced erosion, improved water handling capabilities and an ideal seedbed for the next crop.

Grass plant species, along with broadleaf, legume, and other flowering plant species, increase the diversity of the mixes. This diversity of annual species mimics nature's best example from our native prairies!



Our goal is for you to have the best crop yield and economic return on future crops. Soil building, through diverse crop rotations and cover cropping, along with grazing programs, are ways to accomplish this goal. Cover crops grow beyond the annual cropping season and will hold soil in place throughout the winter while capturing snow, encouraging water infiltration, and providing a grazing resource.

“We have made the decision to incorporate cover crops into our operation and have planted an ARROW SEED SoilBuilder mix for the past three years. The economic return has been beneficial and we have increased the acres planted each year.”

***—Brad Quadhammer
Hildreth, Neb.***

“I have planted an ARROW SEED SoilBuilder mix for the past two years and we have been able to graze 35 pairs of cattle on 35 acres for seven weeks with rotational grazing. The corn crop on the following year showed a 10-15-bushel yield increase over conventional eco-fallow fields.”

—Steve L’Heureux, Upland, Neb.

The right mix.

Our mix design for multiple species and diversity includes the four key plant species.

Use, if possible, all four plant types

- Warm-season grass plants
- Cool-season grass plants
- Warm-season broadleaves
- Cool-season broadleaves

SoilBuilder cover crops include a diverse mix of grass plants, brassicas and legumes that are known for establishing themselves quickly. The mix of seeds matters because cover crops perform and grow better when multiple plant types are included to create a balanced stand.

SoilBuilder cover crop benefits:

- Contain a plant mix that features a variety of leaf types and root structures to enhance the soil building effort
- Provide a balanced stand that creates the most efficient canopy structure
- Maximize snow retention, erosion control, soil coverage
- Act as a grazing resource
- Designed to provide the maximum benefit to the soil and to the next planted crop
- Saves you time and effort by having ARROW SEED recommend the right mix for your situation and offering guidance on planting methods for your operation

Flown on in early September, this mix was well established by the end of October before corn harvest, as shown here. Cover crops such as this will hold soil in place throughout the winter, while capturing snow and encouraging water infiltration into spring.

This winter annual mix was drilled in late summer and will provide a boost in nitrogen for next spring's corn while breaking up compaction, capturing moisture through the fall and into spring when the soil firms up more quickly because the soil's structure is improved.



SoilBuilder Cover Crop Options

Our mix designs follow the seasons in which you choose to seed the cover crop. We start with cool-season species for the early spring planting dates of March through April. Warm-season species are the best choice for planting in May through August. Cool-season species with winter annuals are used from Mid-August through October.

SoilBuilder Spring Mix

Planting date: March through April, for growth through early spring and early summer months.

Cropping rotation: Corn, soybeans or wheat

SoilBuilder Spring Mix Includes these cool season species*:

Spring Oats, Spring Triticale, Spring Barley, Forage Rape-seed, Forage and Field Peas

*Flax added west of US Hwy 83

Grasses: 60% Brassica: 30% Legume: 10%

Seeding Rate:

50 lbs per acre for ground cover

100 lbs or more for a grazing resource or hay crop

Benefits of the SoilBuilder Spring Mix:

- Perfect for seeding following corn or soybeans and ahead of planting winter wheat
- Features an ideal ratio of grasses, brassicas and legumes to keep the soil covered, intact, and in good condition
- Stimulates microbial activity, conserves soil moisture and prepares the seed bed for fall wheat seeding
- Works well in a corn rotation provided it can be seeded in very early spring and corn planting is later

A separate spring mix for a soybean rotation features grasses and brassicas that get beneficial soil organisms off to a good start and prepare the soil ahead of soybean planting. Contact your ARROW SEED dealer for details.

SoilBuilder Warm Season Mix

Planting date: Primarily after wheat harvest May through early August for growth through the warm season into the winter. Mixes can be designed to self-terminate in winter or have longer growth into the following spring.

SoilBuilder Warm Season Mix options can include the following: Summer Annual Forage Sorghum and Milo, Spring Oats, Annual Ryegrass, Turnip, Radish, Forage Rapeseed, Flax, Other oil seeds, Soybeans, Forage and Field Peas, Hairy Vetch, clover, alfalfa

Grasses: 10% Brassica: 25% Other: 15% Legume: 50%

Seeding Rate Range:

15 lbs per acre low density for ground cover

30 lbs for a late summer to winter grazing resource


Our SoilBuilder Warm Season Mix is beefed up with legumes to fix as much nitrogen as possible ahead of the following spring's corn planting. When combined with grasses and brassicas, this cover crop is outstanding at holding soil in place. Brassicas break up compaction and the mix's roots dive deep, creating channels that corn roots can easily follow. This mix performs well through fall – so you know your soil is active and being fed for a longer period of time. The extra boost of nitrogen – 50-100 pounds per acre average – will help your corn crop perform.

Come spring, the soil will firm up quicker after a rain because it is able to hold more water in the soil profile, allowing corn planting to get underway sooner than on bare ground. When compared to eco-fallow, this cover crop saves fuel and chemical costs while reducing compaction and helping to rebuild the moisture profile over winter and into spring.

Forage option: Some growers seed up to 1.5 times the regular planting rate and allow livestock to graze the cover crop in the fall. The SoilBuilder Warm Season Mix provides excellent nutrition for livestock with solid protein and total digestible nutrient figures. Grazing does, however, reduce some of the soil benefits the cover crop provides. Grazing is an option with all ARROW SEED SoilBuilder mixes.

An alternative SoilBuilder mix is also available for a soybean rotation. This mix includes a summer annual forage, oats, turnips and oilseed radish that invigorate the soil while reducing erosion. Contact your ARROW SEED dealer for details on this mix option.





Quality seeds in SoilBuilder mixes germinate quickly and establish a solid cover crop that feed microbial activity in the soil. As the cover crop's biomass decomposes, organic carbon and organic matter increase in the soil, improving the soil's texture, structure and performance.

SoilBuilder Cool Season Mixes

We offer Mix options through the season to match your goals and needs. As we move into late-season plantings, the mix is adjusted to include winter annuals.

Cropping rotation: Corn or crop of your choice

Planting Date: August, September, and into October

SoilBuilder Cool Season Mix can include the following:

Winter Wheat, Winter Barley, Winter Rye, Annual Ryegrass, Spring Oats, Spring Triticale, Turnip, Radish, Forage Rape-seed, Flax, Other oil seeds, Forage or Winter Peas, Hairy Vetch, Balansa Clover, Alfalfa

Seeding rate:

Depends on your goals. Used at early planting date for an early winter grazing resource or ground cover. Seeding rates increase for late plantings that can be used for spring grazing.

This Cool Season Mix greens up quickly to get well established ahead of a hard freeze, which keeps beneficial organisms active into late fall. Additional biomass and root structure helps hold soil in place and capture moisture through the fall and into spring. Brassicas combat compaction while the mix as a whole encourages stover to break down more quickly. Legumes provide a helpful shot of nitrogen. This mix is typically drilled on silage ground or air seeded over mature corn prior to the final irrigation. It can be air seeded on soybean ground prior to leaf drop or immediately after soybean harvest.

Ground Points

- The nearly four tons of biomass per acre on average, cover crops shade the soil heading into winter, then capture and hold a great deal of snow over the winter months. When combined with the improved water handling and holding capabilities of soil resulting from improved soil texture and structure, cover crops protect, and can improve, your soil's water profile.
- Some producers utilize custom seeders who have the appropriate equipment to get cover crops planted – freeing up their time to complete harvest and other fall activities. ARROW SEED can help connect you to custom seeders if this option makes sense for your operation.
- Clean, quality seeds with high germination rates in mixes designed for your area establish themselves quickly. Hardy, healthy, and well-adapted plants develop root structures rapidly, reducing compaction while providing greater total biomass.
- The value of increasing your soil's organic matter has been proven across the region. Rising corn yields, improved soil quality, and adding pounds of beef to your herd are rewards for including a SoilBuilder mix on your farm.

An 18-20 bushel per acre corn yield increase following a single cover crop planting on long-term quality, no-till ground was reported by Cronin Farms, Gettysburg, S.D. Plots were replicated six times on the farm.

Mid Summer Mix Cover Crop Bio-Mass

Planted July through August

Pounds of Nutrient per acre

| | Yield | Ton/Ac Lbs/A | Data 2008 to 2015 | Range High | Low |
|-----------------|-----------|-----------------|----------------------|---------------|-------|
| | | | | | |
| Nutrient | | | | | |
| Carbon | C | | 2337 | 6611 | 1042 |
| Nitrogen | N | | 108 | 390 | 38 |
| Phosphorus | P2O5 | | 33 | 43 | 14 |
| Potassium | K2O | | 173 | 300 | 42 |
| | C:N Ratio | | 23 | 17 | 26 |
| Calcium | Ca | | 54 | 186 | 22 |
| Magnesium | Mg | | 13 | 42 | 6 |
| Sulfur | S | | 15 | 54 | 6 |
| Chloride | Cl | | 16 | 28.7 | 3 |
| Zinc | Zn | | 0.25 | 0.42 | 0.06 |
| Iron | Fe | | 2.54 | 5.50 | 0.78 |
| Manganese | Mn | | 0.38 | 1.31 | 0.17 |
| Copper | Cu | | 0.03 | 0.09 | 0.01 |
| Boron | B | | 0.10 | 0.60 | 0.08 |
| Molybdenum | Mo | | 0.01 | 0.019 | 0.003 |
| | #Tests | | 34 | | |

Late Summer Cover Crop Bio-Mass

All Cover Crops Planted Late August through September

| Test Dates | Spring Avg | Winter Avg | Year/Combined Avg |
|------------|---------------|---------------|----------------------|
| Yield | 1.47 | 1.92 | 1.70 |

Pounds of Nutrient per acre

| | | | | |
|------------|------|---------------|---------------|---------------|
| Carbon | C | 1156 | 1365 | 1260 |
| Nitrogen | N | 85 | 117 | 101 |
| Phosphorus | P2O5 | 23 | 41 | 32 |
| Potassium | K2O | 73 | 134 | 104 |
| Calcium | Ca | 16 | 44 | 30 |
| Magnesium | Mg | 4.0 | 9.9 | 6.9 |
| Sulfur | S | 5.9 | 12.1 | 9.0 |
| Chloride | Cl | 9.1 | 53.7 | 31.4 |
| Zinc | Zn | 0.0714 | 0.1557 | 0.1136 |
| Iron | Fe | 2.86 | 8.15 | 5.51 |
| Manganese | Mn | 0.2987 | 0.3590 | 0.3288 |
| Copper | Cu | 0.0157 | 0.0260 | 0.0209 |
| Boron | B | 0.0694 | 0.0333 | 0.0514 |
| Molybdenum | Mo | 0.0026 | 0.0053 | 0.0040 |
| Ratio | C:N | 19.80 | 16.7 | 18.25 |

*Good soil starts
with good seed*

ARROW SEED developed its SoilBuilder™ cover crop blends to provide the most benefit to the soil, its biological system, and to the next crop in your rotation. We are big on performance and believe that clean, quality seed, with blends matched to the growing season, provides the most benefit to our customers.

Our SoilBuilder cover crop mixes are rigorously examined at leading labs for noxious weeds to ensure they are free from those and other impurities found in “bin run” seed. Each variety in our mixes is tested for outstanding germination rates and combined they provide a tremendous boost in the water handling capabilities of your soil. The soil holds more water yet firms up faster than bare ground so it is more quickly ready for planting – all while reducing soil erosion.

Since it was founded in Nebraska in 1946, ARROW SEED has put a priority on seed quality and the science and know-how behind the products we offer. For SoilBuilder cover crops, our knowledge, experience and network of dealer locations are there to assist you beyond the SoilBuilder mix selection to ensure the success of your efforts to protect and improve your soil.



For more information on all our
SoilBuilder cover crop mixes,
including assistance selecting
cover crops appropriate for your
specific situation, go to
www.ArrowSeed.com or contact
your local ARROW SEED dealer.



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