



IMPROVE SOIL HEALTH &
THE BOTTOM LINE WITH
COVER CROPS

PENNINGTON[®]

FIELD GUARD™
**COVER
CROP**
Seed Mixtures

PenningtonCoverCrops.com
1-844-SOIL-911

Who is Pennington Seed?

Pennington has a long history in the farming industry starting with the first members of the Pennington family that moved from Europe to Morgan County Georgia in the 1700's. The Penningtons have always farmed the land and since 1945 they have provided farmers with the seed they need to grow their own healthy crops.

Now with over 70 years of experience in developing, testing and offering the highest quality seed available, Pennington has become one of the largest seed companies in the United States. We package over 200 million pounds of seed annually and ship these products throughout the country and around the world.

Pennington's commitment to U.S. agriculture continues with the current offering of our proprietary cover crop products. Cover crops not only benefit the soil but also the bottom line of every farmer that uses them. This helps keep our agricultural industry strong and growing so farmers like you can keep feeding America.



Why use a Cover Crop?

In today's farming community, everyone understands much more about soil health than in years past. More acres are in conservation or no-till systems than ever before and those farmers are seeing the benefits of a healthier soil. Many are taking the next step by planting cover crops and keeping their soil's natural cycles intact through the winter. Higher yields, lower production costs, increased water retention, weed

suppression, improved tilth, nitrogen fixation and nutrient recycling are just a few benefits from growing a cover crop. American farmers are making a positive impact in their communities through land stewardship practices like planting cover crops. In this way, farmers are leading the way to protect our natural resources for future generations.

Conventional Tillage



Conventional Tillage leaves less than 15% residue on the soil surface.

Conservation Tillage



Conservation Tillage leaves at least 30% residue on the soil surface.

No-Till



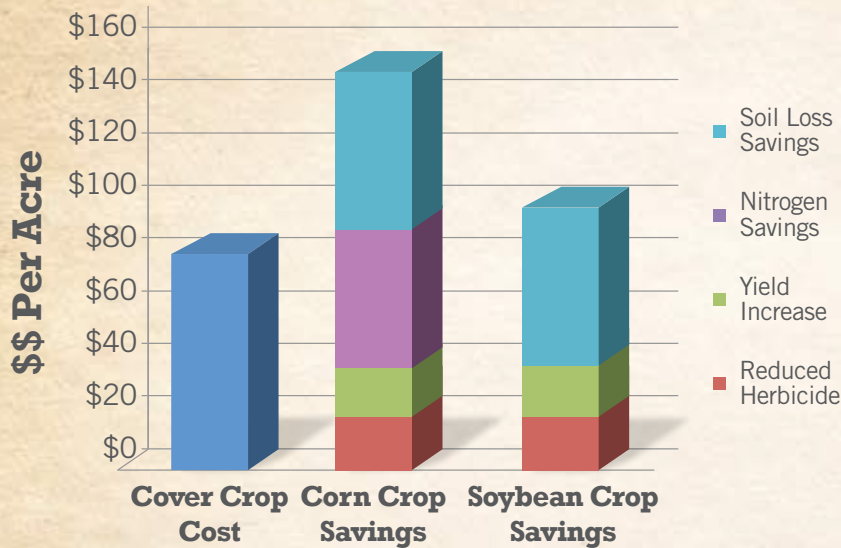
No-Till leaves the soil covered 100% of the time.

Cover Crops...

- Can supply organic nitrogen that can be used by the subsequent crop lowering the amount of purchased N needed and cutting production costs.
- Increase soil organic matter resulting in improved soil tilth which leads to increased water infiltration, less soil compaction and higher populations of beneficial soil organisms – all key components of maximizing cash crop yields.
- Reduce soil erosion losses from wind and water; conserving soil and protecting water and air quality.
- Reduce soil nutrient leaching by capturing and holding nitrogen, phosphorus and potassium. These nutrients can then be used by the future cash crop which helps protect the quality of surface and underground water.
- Act as a mulch to increase and extend soil moisture retention resulting in less crop moisture stress and higher yield potential.
- Reduce the population of unwanted weeds through soil shading and competition. It can also serve as a mulch for the next cash crop, suppressing weeds and reducing herbicide usage and expense.
- Can help suppress disease and pest cycles.
- Can be used as both a cover crop and grazing forage which spreads costs and adds value to multiple farm enterprises.
- Benefit many wildlife species; promote beneficial insects and increase pollination activity
- Increase overall soil health and productivity

The Cover Crop Effect

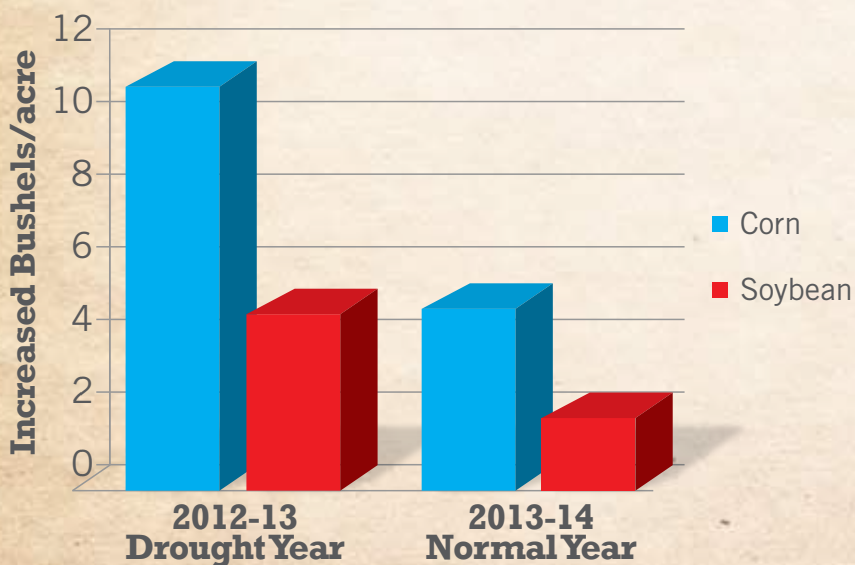
Saves Money



The benefits of planting cover crops far outweigh the cost. Yield increases, reduced herbicide use, nitrogen and other nutrient savings, plus reducing soil loss and water quality impairment all contribute to making your farm more sustainable and profitable.

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Increases Yields



Yields reported by farmers show increases in fields with cover crops. Drought years show even greater production gains when using a cover crop. **Note:** normal year gains using a cover crop vs drought year gains when compared to not using a cover crop at all.

The Quality of Our Seed:

As with all of Pennington's forage, wildlife and lawn seed products, only the finest quality seed are used in our Field Guard™ Cover Crop product line. The various plant species used in the Field Guard™ line-up offer high germination percent, excellent plant vigor and proven growth performance. This ensures uniformity across the field unlike some

commodity products that often yield inconsistent performance and questionable weed content. A number of our pre-formulated and custom blended mixes contain Pennington's university tested and farmer-proven proprietary plant species that offer characteristics uniquely suited for cover crop use. These include:



Wintergrazer 70 Rye

Wintergrazer 70 was selected for wider leaves, increased tillering and greater forage production. Wintergrazer 70 is known for consistently high yields, uniform growth and excellent coverage.

Nutrient Scavenger

Rye is the best cool-season cereal cover for scavenging unused soil N. Rye's quick-growing, fibrous root system can take up and hold as much as 100 lbs N/A until spring. A Georgia study estimated rye captured from 69 to 100 percent of the residual N after a corn crop. Rye also pulls potassium from deep in the soil profile to increase exchangeable K at the soil surface.

Soil Cover/Erosion Control

Used in a conservation till system, rye protects the soil surface from rainfall impact, reduces surface runoff erosion and increases water infiltration rates and soil tilth.

Weed Suppression

Wintergrazer 70 consistently produces 2-3 tons of dry matter per acre and its quick fall growth can outcompete and shade out many annual weeds. After mowing or chemical burndown, rye residue and allelochemicals (natural herbicides) can suppress annual weed populations 75 to 90%.

AU Sunrise Crimson Clover

AU Sunrise is an improved reseeding type crimson clover variety newly released from the USDA Plant Materials Center and Auburn University. It is more winter hardy than Dixie and heads a week earlier than AU Robin and up to three weeks earlier than Dixie. AU Sunrise's fast establishment and early blooming make it an excellent choice for cover crop use.

Nitrogen Source

Crimson clover is a nutrient scavenger and a nitrogen producer. A crop of crimson clover will produce up to 125 lbs of N and 5000 lbs of dry matter/Acre.

Weed Suppression

Crimson clover's fast fall growth and aggressive growth habit make it an excellent weed suppressor.



ARG - 1 Annual Ryegrass

ARG-1 was selected for extended root growth to penetrate deeper into the soil profile to capture and hold excess nutrients. ARG-1 is a uniformly late maturing variety allowing for a longer termination window if spring conditions delay seeding of the summer crop. ARG-1 also makes excellent grazing, hay or silage for livestock with high digestibility, good crude protein levels and excellent palatability.

Nutrient Scavenger

ARG-1 is a heavy nitrogen user and its deeper root system will capture large amounts of excess nitrogen unused by the previous cash crop and made available to the next cash crop.

Soil Cover/Erosion Control

ARG-1's quick emergence and coverage protects the soil surface increasing soil tilth and water infiltration while reducing soil crusting and erosion.

Weed Suppression

ARG-1's dense root system and aboveground biomass production help suppress early season weeds. On no-till ground, killed ARG-1 foliage makes excellent mulch that conserves moisture and suppresses spring weeds well into the growing season.

Root Plow™ Radish

Root Plow™ Radish establishes quickly and produces a large taproot up to 3 feet long with feeder roots up to 6 feet deep. These deep roots capture excess nitrogen and other nutrients and bring them back to the surface to be released for cash crop use when the radish is winter-killed or sprayed-out.

Soil Conditioner

Root Plow™ Radish's large taproot and many branch roots create many channels in the soil allowing for better water infiltration and helping to loosen compacted soil.

Nutrient Scavenger

Root Plow™ Radish's deep roots and high biomass production have been shown to capture up to 170 lbs/acre of nitrogen in university studies.

Soil Cover/Erosion Control

Root Plow™ Radish germinates quickly and produces a quick canopy controlling runoff and protecting the soil surface from rainfall impact.



Let Pennington Supply Your Custom Cover Crop Seed Mix

Are there soil types, production issues and/or environmental conditions unique to your farm requiring a specialized blend of cover crop plant species? Are certain cover crop mixtures only eligible for cost-share in your area? No problem! Pennington can custom blend virtually any requested cover crop seed mixture in bags or totes. Simply contact the nearest Pennington dealer to obtain a price quote.

Cover Crop Benefit Guide by Species

Characteristics of some cover crop species and mixes available from Pennington Seed. Use this guide to determine which species or mixture of species will be the best fit for your soil health goals.

Species	Type	Nitrogen Source	Nutrient Scavenger	Soil Conditioner	Weed Suppression	Grazing	Quick Cover	Erosion Control
Oat	Grass		***	**	***	***	***	***
Cereal Rye	Grass		***	***	***	***	***	***
Wheat	Grass		**	**	**	***	**	***
Triticale	Grass		**	**	**	***	**	**
Barley	Grass		***	***	***	**	**	***
Annual Ryegrass	Grass		**	**	**	***	**	**
Rape	Brassica		**	***	**	*	**	**
Turnips	Brassica		**	***	*	**	**	**
Radish	Brassica		***	***	**	**	***	**
Austrian Winter Peas	Legume	***	*	**	**	***	**	**
Crimson Clover	Legume	***	**	**	**	***	**	**
Red Clover	Legume	***	**	**	**	***	*	**
Arrowleaf Clover	Legume	***	*	**	**	**	*	**
Hairy Vetch	Legume	***	*	**	**	**	*	**
Mixes								
Cover Star	Grass/Legume	**	***	**	***	***	***	***
Cover Star WR	Grass/Legume/Brassica	**	***	***	***	***	***	***
Yield Up	Grass/Legume	***	**	**	**	***	***	***
6 Way All Purpose	Grass/Legume/Brassica	*	***	***	***	***	***	***
5 Way All Purpose	Grass/Legume/Brassica	**	***	***	***	***	***	***
3 Way Cover Lover	Grass/Legume/Brassica	*	***	***	***	***	***	***
2 Way Cover	Grass/Brassica		***	***	**	***	***	***

Rating: * = Fair; ** = Good; *** = Excellent

General Establishment and Management Guidelines for Cover Crops

- Follow recommended planting times for cover crop species in your specific geographic region
- Seed may be drilled or broadcast using a variety of methods – aerially applied or with ground equipment
 - If drilling, special attention should be given to drilling seed at the recommended depth
 - Care should be taken to ensure seed makes soil contact through any crop residue
 - Stand establishment will be more successful where broadcast seed is lightly incorporated or cultipacked into the soil to improve seed to soil contact
- If weeds become an issue requiring the use of an herbicide, carefully read and follow herbicide label guidelines for crop tolerance and crop rotation restrictions.
- If the cover crop is to be used for forage, grazing can begin when growth reaches 6-8 inches in height and roots are well anchored. Remove livestock when 3-4 inches of forage growth remains. Do not graze when fields are wet and soggy as it can result in excessive field compaction and plant damage.

Why Buy Pennington® Cover Crop Seed?

- Increase yields/decrease cost equals higher profits
- High quality seed
- Clovers are pre-inoculated and coated
- Formulated to meet specific agronomic needs
- Superior seed varieties within the mixtures
- Integrity in every bag from a company you can trust
- Providing quality seed products for over 70 years

Trust Pennington to provide you with the highest quality cover crop mixtures so you can help protect one of your most valuable resources, the soil, and become a leader in environmental stewardship.

Cover Crop Species Profile:

Grasses

- **Annual Ryegrass** – Easily established, fast growing and widely adapted cool season annual bunch grass; Not as cold tolerant as small grains; High yields of excellent quality forage. **Uses:** prevent erosion, improve soil structure and drainage, increase organic matter, suppress weeds, scavenge nutrients, forage.
- **Barley** – Upright growing winter annual; Easily grown; Prefers cool, dry growing areas; Produces large amount of biomass in a relatively short period of time; Excellent nutrient scavenger. **Uses:** prevent erosion, increase organic matter, suppress weeds and scavenge nutrients.
- **Oats** – An upright growing cool season annual grass with excellent nutrient scavenging capability; Quickly establishes to provide soil cover and to smother weeds; Produces good amounts of high quality forage for hay, grazing or green manure; Subject to winter kill in some areas. **Uses:** suppress weeds, control erosion, scavenge nutrients, nurse crop, green manure, forage.
- **Cereal Rye** – A cool season plant considered to be the hardiest of all cereal grains; Cold tolerant and more adapted to poor soils than other cover crops; An early maturing and easily terminated plant; Excellent nitrogen scavenger. **Uses:** scavenge excess N, prevent erosion, add organic matter, suppress weeds, forage.
- **Wheat** – Versatile and widely adapted cool season cereal grain; Upright growing; Good cold tolerance; Easier to terminate than rye or barley; Slower to mature than other cereal grains; Excellent soil builder; Improves soil tilth. **Uses:** prevent erosion, build organic matter, suppress weeds, scavenge nutrients, forage.
- **Triticale** – A cool season cereal grain cross of wheat and rye; Cold tolerant and adapted to poor soil sites; Early maturing; Good biomass production; Excellent nitrogen scavenger. **Uses:** prevent erosion, build organic matter, suppress weeds, scavenge nitrogen, build soil, forage.

Legumes

- **Arrowleaf Clover** – A vigorous, high yielding late season winter annual legume; Primarily adapted to areas of the southern U.S.; Fixes 75-125 lbs/A nitrogen; Improves soil porosity and tilth; Performs best on well drained, fertile soils with a pH of 5.8-6.5. **Uses:** Nitrogen source, weed suppression, soil builder, forage.
- **Crimson Clover** – A widely adapted and versatile annual legume; Rapid emergence and good early growth; Produces 1.5 to 2.5 tons of dry matter; fixes 75-125 lbs/A nitrogen; Excellent for use in mixes with cereal grains, ryegrass and other legumes; Good reseeding capability. **Uses:** Nitrogen source, build soil, prevent erosion, improve soil tilth, forage.
- **Hairy Vetch** – A widely adapted, winter hardy legume with sprawling vine growth; Fixes large amounts of readily available nitrogen; Residue deteriorates rapidly; Excellent in mixes with small grains and other legumes. **Uses:** Nitrogen source, build soil, prevent erosion, suppress weeds, improve soil tilth, forage.
- **Red Clover** – A widely adapted, dependable and high yielding legume; Excellent for improving soil porosity and tilth; Produces 2-4 tons dry matter/A and fixes 75-150 lbs. nitrogen/A; Works well in mixes with small grains; Attracts beneficial insects. **Uses:** Nitrogen source, build and condition soil, suppress weeds, attract beneficial insects, forage.
- **White Clover** – A widely adapted, versatile legume suitable for a wide range of soil types; Drought and heat tolerant; Tolerant of pH levels down to 5.5; Intermediate types well suited for “living mulch” production system; Plants rapidly decompose to release large amounts of available nitrogen; Profuse flowering habit attracts pollinators and beneficial insects. **Uses:** Green manure, nitrogen production, erosion prevention, living mulch, beneficial insect attraction, forage.
- **Winter Pea** – A climbing/spreading cool season annual legume; Well suited in mixes with cool season grasses; Prefers well drained, fertile soils. **Uses:** Nitrogen source, soil conditioner, forage.

Brassicas

- **Rape** – Combines rapid fall growth and high biomass production with excellent nutrient scavenging capability; Has shown to have biological activity against both parasitic nematodes and certain weeds; Scavenges 75-125 lbs/A nitrogen. **Uses:** erosion prevention, nutrient scavenging, suppression of weeds and soil-borne insects, soil organic matter and tilth improvement.
- **Mustard** – Combines rapid fall growth and high biomass production with excellent nutrient scavenging capability; Has shown to have biological activity against certain soil-borne insects and pathogens as well as some weeds; Readily winter kills. **Uses:** erosion prevention, nutrient scavenging, suppression of weeds and soil-borne insects and pathogens, soil organic matter and tilth improvement.
- **Radish** – Combines rapid fall growth and high biomass production with excellent nutrient scavenging capability; Oilseed and forage types; Attainable biomass amounts of up to 4 tons per acre above ground and 2 tons per acre below ground; Large roots penetrate deep into the soil profile to reduce compaction, capture nutrients and improve water infiltration. **Uses:** prevent erosion, scavenge nutrients, suppress weeds, reduce soil compaction, add organic matter, improve soil tilth and water penetration.
- **Turnips** – Combines rapid fall growth and good biomass production with excellent nutrient scavenging capability; Not as productive as other brassica species; Large roots penetrate deep into the soil to reduce compaction, capture nutrients and improve water infiltration. **Uses:** prevent erosion, scavenge nutrients, suppress weeds, reduce soil compaction, add organic matter, improve soil tilth and water penetration, forage.



Winter Pea



Red Clover



Arrowleaf Clover



Radish



Vetch