

# Resource Guide

VOLUME 9



Advancing the Science of Cover Crops on Behalf  
of Farmers Everywhere



TILLAGE RADISH®

TILLAGE ROOTMAX™ COVER CROP RYEGRASS

TILLAGE SUNN™ SUNN HEMP

TILLAGEMAX™ MIXES-TILLAGE RADISH® INSIDE

CCS COVER CROP SELECTIONS



SEE BACK COVER

[CoverCropSolutions.com](http://CoverCropSolutions.com)

[TillageRadish.com](http://TillageRadish.com)

1-800-767-9441

# Benchmark of Quality in Cover Crops

Cover Crop Solutions is a specialty agricultural seed company focused solely on the use of cover crops as strategic farm management tools. Our main goal is to help the farmer achieve a better bottom line with their use.

Some of our seeds are unique varieties, like Tillage Radish® and RootMax™ Cover Crop Ryegrass, with attributes made highly reliable because they are sold only as certified seed, where every seed in every bag carries the same genetics.

We learn, measure and demonstrate how farmers can use cover crops to help build the biodiversity necessary to establish and maintain healthy soils.

On the practical side results include reduced input requirements, increased yields and better control over effects like erosion, nutrient leaching and a range of other farming and environmental challenges.

We know from experience that farming in harmony with nature is not only

sustainable but very profitable. In other words, healthier soil means a better bottom line. And we're happy to prove it.

There is so much more to learn, know and discover. Every participant in today's agriculture has a stake. That's why we partner with people and organizations in all disciplines interested in achieving and maintaining soil health.

It's the future of agriculture. Like many others, we would add, "the future is now."

*"No piece of steel can benefit the soil like the roots of a good cover crop."*



**Steve Groff**  
Farmer and cover crop innovator  
Cedar Meadow Farm, Holtwood, PA



*A shovel is one of our most important tools.*

## A Word from Steve Groff

We have fields at our farm that have not seen tillage equipment in 30 years. My interest in cover crops started with knowing that soil left uncovered easily erodes into places like our nearby Chesapeake Bay.

Working with university researchers like Dr. Ray Weil from the University of Maryland, however, gave me an even greater respect for what good management can mean in terms of the soil's response to practical, common sense approaches to building soil health.

From helping test and develop the Tillage Radish® – one of the most

remarkable advances in cover crops in recent memory, Cover Crop Solutions was founded on the idea of being one of the farmer's best friends.

As one of the new company's partners, I will always be a farmer first and foremost. Farmers are stewards of the land, the growers of food, and producers of many raw materials with all kinds of remarkable industrial applications.

Thank you for your commitment to learning how cover crops will help keep our soils healthy, productive and sustainable.



## Treat cover crops just like every other high value crop you plant

Steve Groff

*We must be both students and teachers when it comes to being a successful manager of cover crops for a better bottom line. Here are the basics I've learned from others and from my own experience.*

**Choose performance over price.** Use the same approach for cover crops that you use when buying seed for corn, soybeans or other high value crops. Be sure what you're trying to accomplish, then look for the seed genetics with the potential to deliver it. It helps to find a dealer who knows cover crops and can help you make the best choices for cover crops that will pay.

**Spread risk.** Follow the fundamentals of crop establishment. Plant as soon after harvest or prior to harvest as possible. Plant for diversity to reduce weather risks, break pest cycles and prevent erosion that some monoculture species are vulnerable to.

**Use test plots.** A cover crop test plot on your farm is the best way to really know how cover crops work for you. Have a check strip adjacent to your test plots to show a comparison to help determine benefits.

**Plan ahead.** The formula for success is simple. Improved cover crops equal improved cash crops. Be prepared. Know your planting window. Have your seed available, equipment calibrated, and your workers prepared to plant.

**Conduct your own research.** Collaborate with others, including Cover Crop Solutions, to replicate field scale research testing to give credible data for the real world. Follow up with a field day to show your neighbors and encourage what could work best for your area. Everyone will learn something.

**Follow a plan.** Be strategic in determining which species to plant in front of the next cash crop. Generally legumes before corn and grasses before beans. Tillage Radish® can be planted before both, and TillageMax Mixes™ are becoming more popular. Consider adding wheat on a few acres or short season corn or soybeans to expand planting window opportunities.

**Keep good records.** As with cash crops, keep a record of cover crop planting dates, seeding rates, and other important details. Incorporate this information into your crop management programs: crop consulting, conservation plans, fertility, soil testing, yield testing, moisture and nutrient availability data. Make notes comparing soil quality, harvestability, and any issues that may need to be addressed.

**Spread out harvest.** Make more of your fields available for cover cropping. Consider planting short season hybrids and varieties, planting wheat, or including grazing in your rotation.

**Manage fertility.** Legumes can add nitrogen while Tillage RootMax™ Certified Cover Crop Ryegrass™ and Tillage Radish® can keep nitrogen from leaching into tile lines and groundwater. Tillage Sunn™ is a warm season legume that can fix nitrogen during the growing season. These cover crops can be tools for planning nutrient management and for increasing soil biological activity.

**Utilize the best available resources.** Seek knowledgeable Cover Crop Solutions seed dealers, university extension teams, NRCS personnel and websites that provide credible cover crop information. Challenge yourself, your hired hands and the next generation to find ways to incorporate cover cropping into your operation. The reward is more than worth the effort.

Two Years Running!



## A Thing of Beauty

No other cover crop radish has the highly aggressive taproot that grows straight through compaction. Nutrients from deep in the soil are captured and stored over winter, released in spring. Air and water movement improves. Microbes, earthworms and other beneficials flourish. Restoration of soil health begins.



*If the seed isn't inside this bag, it isn't Tillage Radish®. Available only from authorized dealers.*



## Genetic Integrity in Every Bag

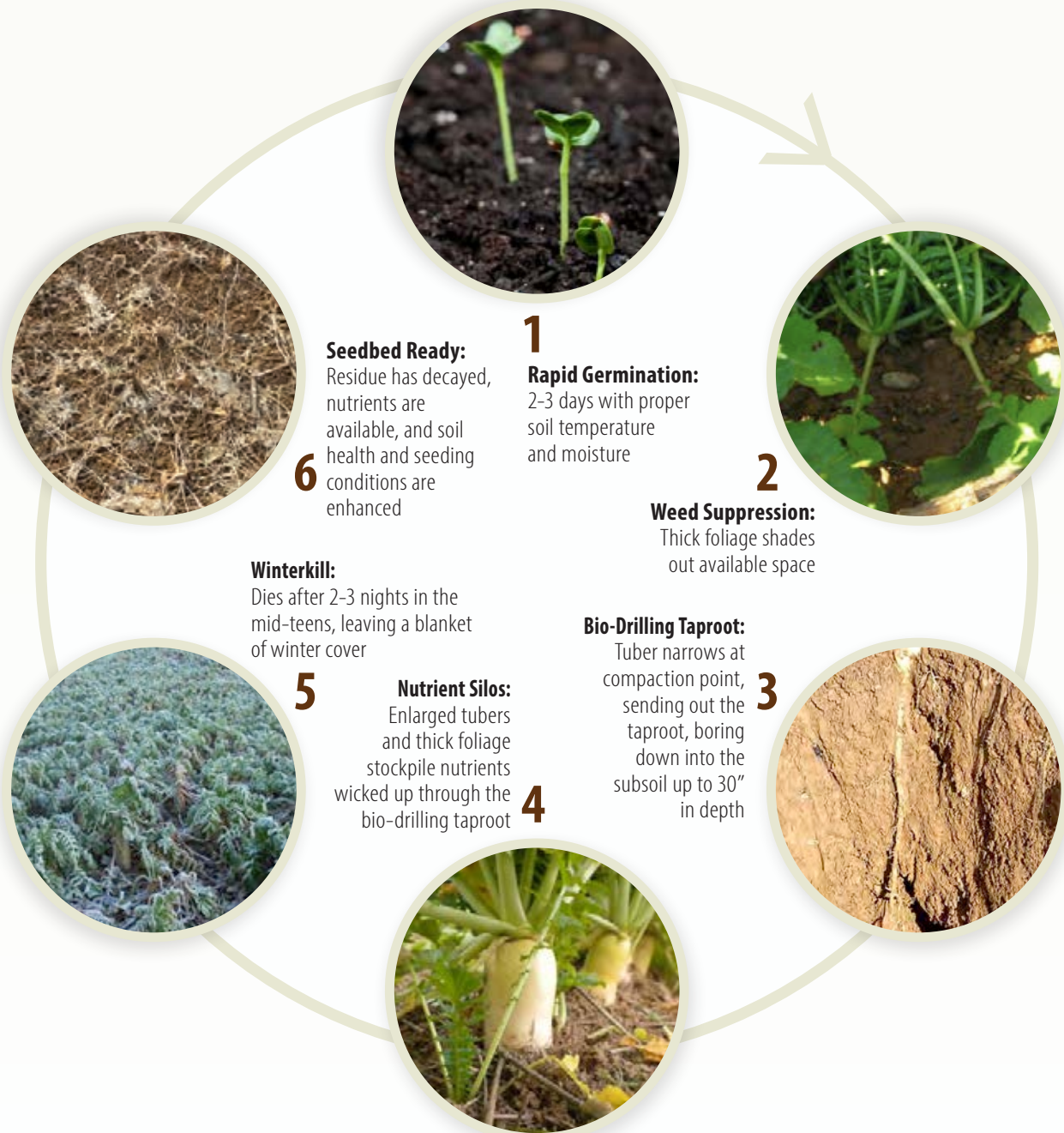


## Deep Fine Roots Revealed

Research specimens show the extensive network of fine roots spreading from the highly aggressive Tillage Radish® taproot. These fine roots are growing from the taproot over 50" deep under ideal conditions, demonstrating the Tillage Radish® genetic potential. It's one of the traits allowing Tillage Radish® to soak up large amounts of excess nutrients.



# Tillage Radish<sup>®</sup> Growth Stages





## EXCLUSIVE PLANT VARIETY PROTECTION

After more than a decade of research and development, Tillage Radish® has been awarded PVP pending status and is now recognized as a unique radish variety. This means the Tillage Radish® genetic profile is different from any other cover crop radish in the world.

This also means no unauthorized propagation is allowed, so that farmers know exactly what they are getting inside of every bag of Tillage Radish® seed.

- Superior genetics in every bag
- Unique variety with over a decade of university research
- Proven research data: Yield increases for corn, soybeans and winter wheat
- Industry-leading seed grower program assures highest purity and performance
- Reliable, dependable cover crop performance, no unpleasant surprises
- No early bolting

\* Tillage Radish® - Variety CCS-779, produced by Cover Crop Solutions, LLC, has U.S. PVP #201200292. Under the U.S. PVP Statute, unauthorized propagation is strictly prohibited. U.S. Variety Protection applied for.

*The **only** cover crop radish **proven** over years of university research to boost yields for corn and soybeans!*



DESIRABLE TRAITS	
Certified genetics in every bag	✓
Developed for aggressive single taproot	✓
Developed specifically for use as a cover crop by Dr. Ray Weil and Steve Groff	✓
Backed by 12 yrs+ research	✓
Documented yield increases	✓
Late maturity, no early bolting	✓
Drilled seeding rates 6 lb/ac	✓



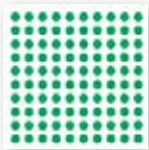
# Insist on Tillage Radish® Certified Seed

Tillage Radish® and Tillage RootMax™ Cover Crop Ryegrass are sold as certified seed, your assurance that the genetics for the variety you buy are consistent in every bag.



## GENETIC INTEGRITY

Tillage Radish® and RootMax™ Cover Crop Ryegrass give you genetic integrity in every bag.



With non-certified seed you don't know what's in the bag.

Good reasons to look for certified cover crop seed.

### Stringent standards, superb management

Cover Crop Solutions' certified seed is grown under the most intensively managed production conditions possible, and has minimal weed seeds or other matter.

### Varietal purity

Certified seed uses systems to maximize genetic purity making sure you get the variety you want. Off-types, other crop seeds, and weeds are guaranteed to be minimized.

### Guaranteed quality assurance

Third party inspections in the field and at the processing plant ensure that all quality assurance requirements have been met. You can enjoy peace of mind knowing your seed is what you expect it to be.

### New genetics

Improved traits like better performance, higher yields and others leading to easier management and greater profitability come to farmers in the form of certified seed. Years of research and development go into these traits. They are reliably obtained only through the use of certified seed.

### Maximum use of other inputs

For the best results, start with the best genetics that have a history of proven and dependable performance. This will ensure you're making the most of your input dollars. "Certified" means you're not wasting time and other inputs on a crop that won't make the grade.

### Key to better results

Proper inputs make for a good crop, but the genetic potential in the seed is the only input that can get you exceptional performance.

### Greater return for the dollar

The decision to use seed with the most desirable traits is a great choice. When you add into the equation that certified seed delivers more seeds with just those traits in every bag, that's a formula you might call 'more bang for the buck.'

### Value creation

The little bit more you pay for certified seed pays you back multiple times over. When others say their seed is as good as CERTIFIED, it makes you wonder, why can't they certify? Today more than ever the adage is true: Better seed, better return.



# The Cover Crop That Pays<sup>SM</sup>

## FALL

### PLANTING

Plant 3 to 10 weeks before the first killing frosts.

*Radish size depends on growth time, plant competition and available nutrients to scavenge.*

### NUTRIENT SCAVENGING

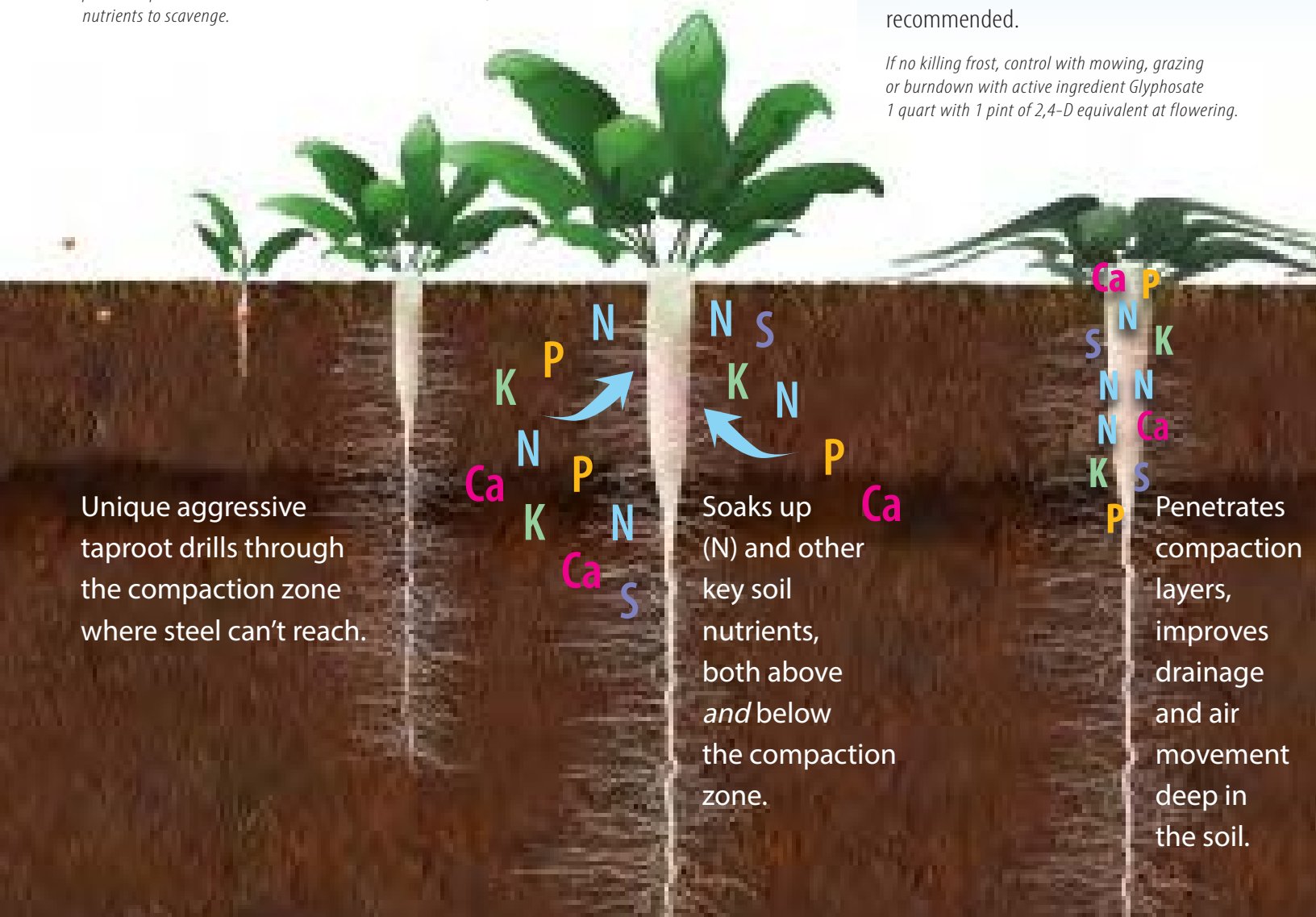
Tillage Radish<sup>®</sup> absorbs nitrogen (N) and other key nutrients, including that from manure, and releases them in spring when cash crops need it most.

## WINT

### N WINTERS OVER

Tillage Radish<sup>®</sup> holds plant-available (N) and other soil nutrients. A few cold nights in the “mid-teens” kill them. If no killing frost, standard herbicide burndown is recommended.

*If no killing frost, control with mowing, grazing or burndown with active ingredient Glyphosate 1 quart with 1 pint of 2,4-D equivalent at flowering.*



Unique aggressive taproot drills through the compaction zone where steel can't reach.

Soaks up (N) and other key soil nutrients, both above *and* below the compaction zone.

Penetrates compaction layers, improves drainage and air movement deep in the soil.



- Corn yields up average **12** bu/ac
- Soybean yields up **8** bu/ac
- Winter Wheat yields up to **5-7** bu/ac increase\*
- Over 12 years of university R&D
- Tillage Radish® is genetically superior

\* When planting 2-3 lbs of Tillage Radish® with winter wheat.



**Tillage Radish®**  
The Original and Only

TillageRadish.com

## ER

### WHAT WEEDS?

The dense Tillage Radish® foliage forms a thick canopy so most winter annual weeds never see the light of day. Herbicide burndown can be reduced.

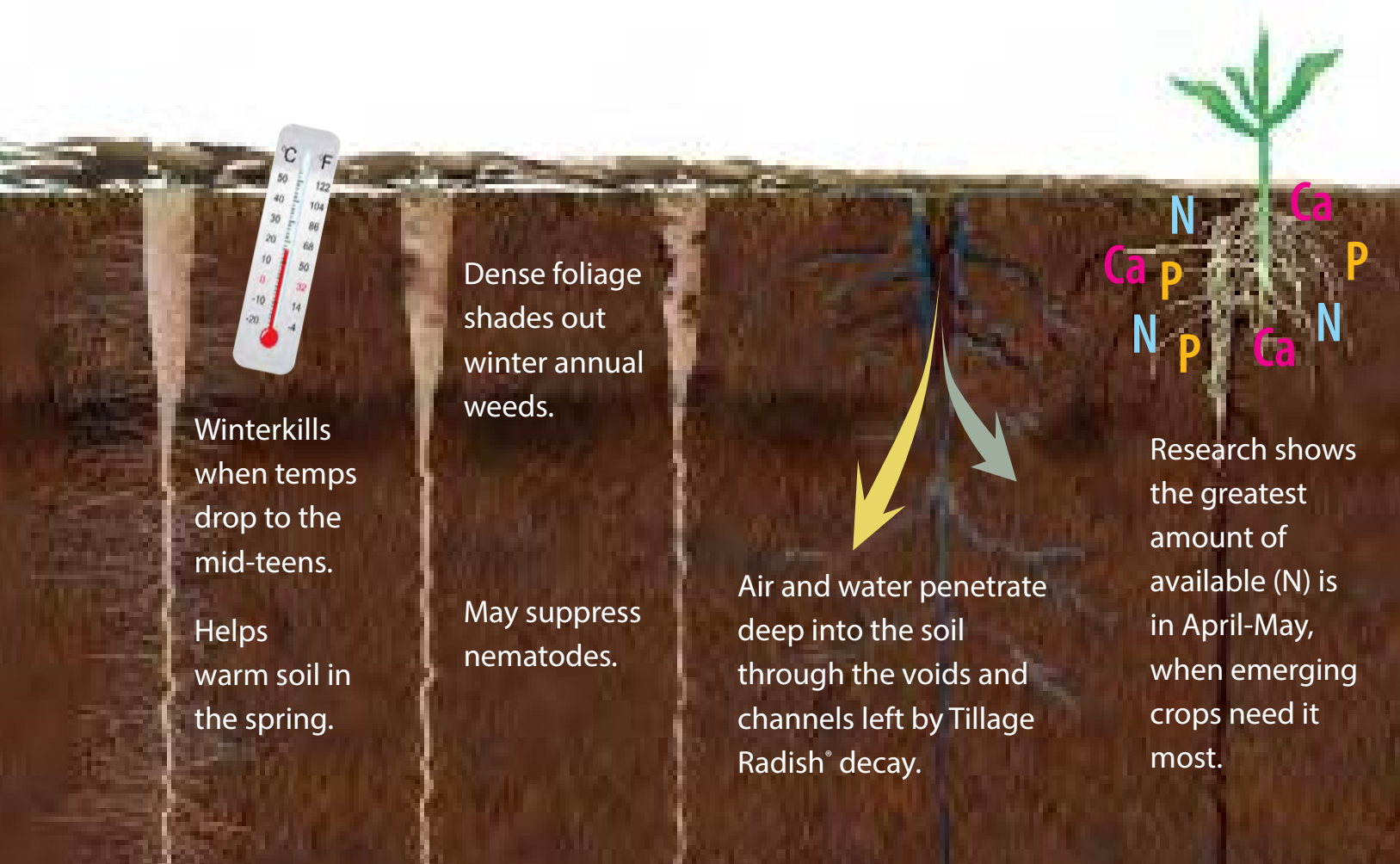
## SPRING

### SOIL CONDITIONING

As Tillage Radish® decays, voids are left in the soil, with holes in the compaction zone created by the taproot. This means greater air and water circulation in the soil, increased microbial activity, and much easier planting.

### DECAY AND RELEASE

As temperatures rise, the (N) is released back to the rhizosphere, the root zone, where it is available for the crop that follows Tillage Radish®.



Winterkills when temps drop to the mid-teens.

Helps warm soil in the spring.

Dense foliage shades out winter annual weeds.

May suppress nematodes.

Air and water penetrate deep into the soil through the voids and channels left by Tillage Radish® decay.

Research shows the greatest amount of available (N) is in April-May, when emerging crops need it most.

# How it pays: Increases yields

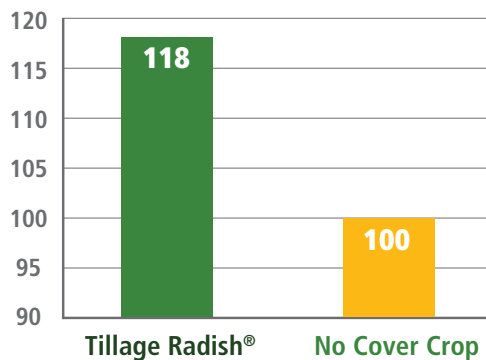
## YIELDS

Both research and farmers confirm significant increases in yield and bottom line profits when using Tillage Radish®.

### Corn & Soybean Yield Increases in Heavily Compacted Soils

#### CORN YIELD (BUSHEL / ACRE)\*

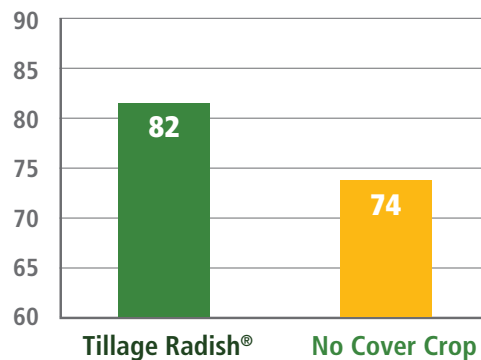
Dr. Ray Weil, University of Maryland  
Hayden 2005



\*Data taken in dry year

#### SOYBEAN YIELD (BUSHEL / ACRE)

Dr. Ray Weil, University of Maryland  
Hayden 2005



Yield with Tillage Radish® 82 bu/acre  
vs No Cover Crop 74 bu/acre

#### Tillage Radish® Benefit

10% yield increase or 18 bu/acre advantage  
18 bu/acre @ \$5.50/bu = \$99/acre advantage

#### Tillage Radish® Benefit

11% yield increase or 8 bu/acre advantage  
8 bu/acre @ \$12.50/bu = \$100/acre advantage



#### Results for Dan Magness of White Hall, MD

#### Tillage Radish® and Increased Corn Yields

No cover crop	180 bu/acre
Barley cover crop	193 bu/acre
Tillage Radish® cover crop	221 bu/acre
<b>TOTAL INCREASE</b>	<b>41 bu/acre</b>

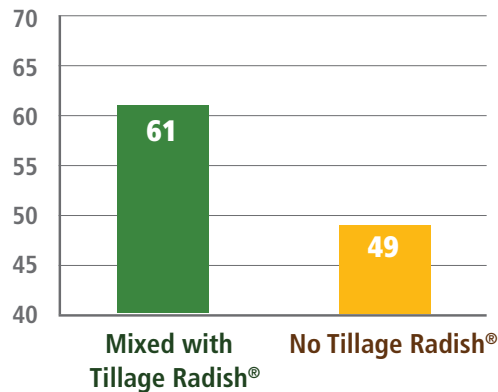
(Left) Dr. Ray Weil in a November Tillage Radish® field showing peak biomass, (N) uptake and fleshy development.\* Photo: Remsfeld

\*Size depends mainly on soil fertility, seeding rate and length of growth time.

## Finding the Ideal Tillage Radish® & Winter Wheat Ratio

### WHEAT YIELDS INCREASE (MIXED WITH Tillage Radish®)

BAAR Scientific LLC, Phelps NY



Yield with Tillage Radish® mixed with winter wheat



### ONGOING RESEARCH, IMPORTANT FINDINGS

Research (chart above) shows that mixing 2 lbs of Tillage Radish® with winter wheat seeding can result in significant yield increases with beneficial results.

- The USDA is currently looking at this practice as part of risk management and cost share program eligibility.
- Third party research in replicated plots indicate a 5-7 bu/acre increase in cash grain winter wheat yield when 2-3 lbs of Tillage Radish® was planted with the winter wheat.
- A \$6.90 investment in Tillage Radish® (2 lbs/acre) is hard to pass up at \$6.50 per bushel of cash grain winter wheat.

### Case Study: Winter Wheat with Tillage Radish® - Tony Kodesh of Red Rock, OK

I planted 3 lbs of Tillage Radish® into 400 acres of my winter wheat crop this past year to test it out. I had read about the benefit claims and considered it would be much like what my father did when he planted turnips with his wheat.

Unfortunately, this past year we had severe drought conditions that were comparable to that of the dust bowl period. The future of our crop looked grim and the Tillage Radish® tubers only got to be the size of pencils when they were winterkilled. Being so dry we were looking at the real possibility of needing to make a crop insurance claim.

Fortunately, we were blessed with rain a few weeks prior to harvesting - it saved the crop.

When we went to harvest, we were surprised to see that the fields where Tillage Radish® was planted showed yields of 9-15 bu more than any other of our wheat fields.

I am pleased with the results of using Tillage Radish® and appreciated the support I received from the Tillage Radish® team. I am looking forward to planting Tillage Radish® this year.

I agree that Tillage Radish® is a cover crop that pays!

## How it pays: Improves soil fertility

### THE AMAZING TILLAGE RADISH® TAPROOT

Because of its unique plant characteristics, the Tillage Radish® cover crop provides measurable benefits to the farmer, the soil, and the environment all while being easy to manage. Successful farmers find that Tillage Radish® is the cover crop that pays with tangible benefits.

One of these unique traits is the taproot, which reaches depths of 30" and beyond! When it hits the compaction zone (around 290 PSI), the tuber stops and the taproot begins to bio-drill deep down into the subsoil.



*(Top) Tillage Radish® 8 days after seeding showing developing taproot system. Within a month, the roots will reach depths of 30 inches and beyond.*

*(Bottom) Taken along plot boundary lines, the spinach on far left (see arrow) had no Tillage Radish®, while the spinach on far right was planted at the same time next to Tillage Radish® (decaying root visible; see arrow) and middle spinach in between.*



*Planted at same time, no cover*

*Decaying Tillage Radish®*

## How it pays: Reduces input

# Tillage Radish® — the Nutrient Scavenger

### TILLAGE RADISH® CAPTURES MOST AVAILABLE (N)

University of Maryland research supports up to 150 lbs of (N) per acre taken up in the fall, stored over winter and released in the spring (April-May). This particularly applies in a situation where a fall application of manure is spread.

### TAPROOT SCAVENGES HIGH LEVELS OF NUTRIENTS

Tillage Radish® taproot will scavenge significant levels of nutrients (N), (P), (Ca), and many other yield-advancing nutrients with a wicking effect up to 6 feet deep, making it available for the next crop!

### (N) IS AVAILABLE JUST WHEN CROPS NEEDS IT

Research shows the greatest amount of available (N) is in April-May which coincides with when cash crops need it!

### RESIDUE DECOMPOSES QUICKLY, RELEASES (N) EARLY

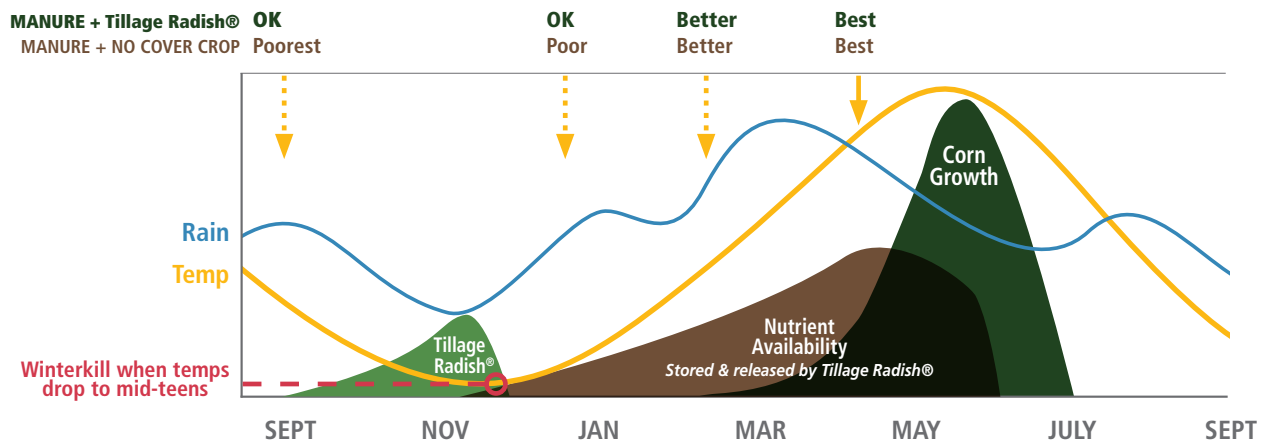
Unlike cereal rye and other cereal cover crops whose residues decompose slowly and immobilize (N) in the spring, Tillage Radish® residue decomposes rapidly and releases its (N) early.

## MINERALIZATION PEAKS IN APRIL-MAY

Tillage Radish® recycles large amounts of (N) taken up from the soil profile in fall, reducing the need for (N) fertilizer. Spring-planted crops often show an early boost in growth and (N) uptake similar to that caused by a planting time (N) application.

Source: *Multiple Benefits from Brassicaceous Cover Crops & Cover Crop Mixtures: Making Cover Crops Pay in the Chesapeake Bay Region.* Submitted to the Maryland Center for Agro-Ecology, August 2007. Performance period: 7/01/03 - 4/30/07. FRS#s 01-5-25031 & 01-5-25036. Principal Investigator: Ray Weil, Professor, Dept of Environmental Science & Technology, University of Maryland. Co-Investigator: Sandra Sardanelli

### Tillage Radish® & NUTRIENT APPLICATION (N) or Manure Application



# How it pays: Reduces compaction

## TILLAGE RADISH® VS A STEEL RIPPER

The Tillage Radish® taproot does all the hard work so you don't have to. It acts as a Ripper or strip tiller, easily reaching subsoil depth to bring up nutrients instead of rocks. It will work for you even when the soil is too wet to till. That means less work for you and less fuel consumption. Improved soil fertility is a result of Tillage Radish® storing nutrients including (N), (P), (Ca), and more, then making them available for your next crop.



**HOLES WHERE TILLAGE RADISH® USED TO BE!**

**Who needs to till soil that looks like this!**

Those huge holes are where Tillage Radish® used to be. This shot taken in the spring also shows a virtually weed-free surface

*"No piece of steel can benefit the soil like the roots of a good cover crop."*

Steve Groff, farmer & cover crop innovator

### COST OF V-RIPPER PER ACRE

LinderFarmNetwork.com

2012 Farm Custom Rates

**\$25.00**

### WHAT THIS MEANS FOR YOUR BOTTOM LINE:

Tillage Radish® gives you more than savings on the cost of using steel. The bio-drilling traits of the amazing Tillage Radish® taproot breaks up your compaction with long term benefits that add up.

- Vital nutrients held & released = higher crop yields
- Long taproot breaks up soil much deeper than a V-Ripper can
- Less work in field, less fuel used = reduced operating costs
- Improved water infiltration = more efficient tile lines, and possibly eliminating the need for new ones

### TILLAGE DEPTH COMPARISON

Tillage Radish®

Steel Ripper

**Up to 32"**

**Approx 12"**



# How it pays: Weed control

## FEWER WEEDS, LESS HERBICIDE

Tillage Radish® has an amazing ability to out-compete winter annual weeds. Some farmers have eliminated a spring burndown herbicide application. This is not an allopathic effect but rather that they grow faster and shade out weeds that would otherwise germinate and grow. Here's what experts and farmers alike have to say...

*"A good stand of early-planted Tillage Radish® produces a dense canopy that all but eliminates weed emergence in the fall and winter. This will produce a virtually weed-free seedbed in early spring. To obtain this near-complete weed suppression, Tillage Radish® should be planted at least 3 weeks before killing frosts with a stand of 5 to 8 plants per square foot."*

*"Several dairy farmers in Maryland and Pennsylvania have successfully no-till planted directly onto the virtually weed-free and almost completely decomposed Tillage Radish® residue without any burndown herbicide."*

Source: Weil, R., C. White and A. Kremen. 2009.  
Forage Radish: New Multi-Purpose Cover Crop for the Mid-Atlantic.  
Dept. of Agriculture, University of Maryland. Fact Sheet 824

*"The Tillage Radish® has done its bio-drilling and seems to leave a kind of film over the top of the ground that inhibits the spring weed flush."*

Furmano Foods

**"There were no weeds in the Tillage Radish® plot in the spring so we didn't need a burndown herbicide."**

— Brian Hearn, University of Delaware



Tillage Radish® in late February in Maryland. Notice weed suppression compared to no cover plot behind it (which went unweeded after late August tillage). Photo: Ray Weil

### Compare the growth!

Corn is off to a faster start in Tillage Radish® residue (rows on right) than in Cereal Rye residue (row on left) due to better (N) availability and warmer soil.



Planted into Cereal Rye

Planted into Tillage Radish®



# How it pays: Enhances seed bed

## EARLIER PLANTING & GERMINATION

Unlike most other cover crops commonly used, Tillage Radish® won't complicate or delay spring field operations. Because it winterkills in most areas, it does not need to be killed or incorporated to prepare a spring seedbed. When conditions are favorable, the field will be ready for direct planting.

Because Tillage Radish® leaves the soil surface weed free, punctured by large root holes, and covered by very thin and sparse residue, the seedbed soil warms up and dries out considerably faster in early spring than do soils covered by either winter weeds or a growing cover crop. The warmer, drier soil and the elimination of the need for tillage can allow for earlier spring planting.

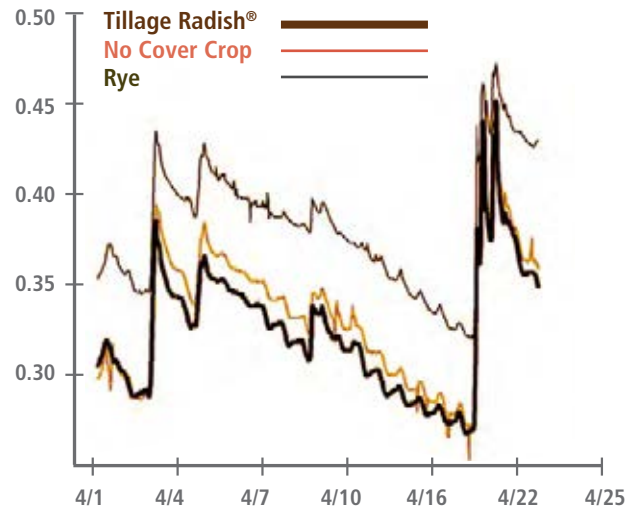


No-till planted Peas emerge in minimal spring residue of the Tillage Radish®.

Tillage Radish® soils are drier for earlier planting...

### VOLUMETRIC MOISTURE CONTENT

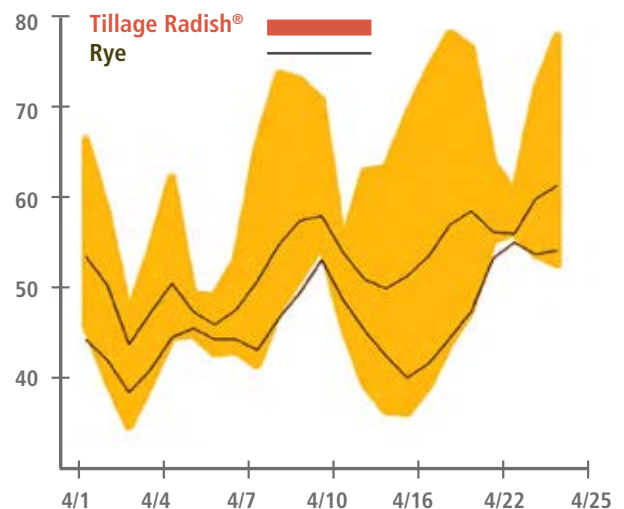
University of Maryland



Tillage Radish® soils are warmer for earlier germination...

### DAILY RANGE OF SOIL TEMPS AT 2" DEPTH (°F)

University of Maryland





# How it pays: Attracts earthworms like a magnet!



## EARTHWORM POPULATIONS EXPLODE!

Tillage Radish® attracts earthworms like nothing else we've seen. As they thrive in fields with Tillage Radish® they create innumerable new aeration channels that increase air and water movement in the soil. Microbial populations flourish in these conditions. When plant roots appear, the complex biological exchanges that fuel plant growth operate at full throttle.



*This young worm found a one-week old Tillage Radish® just his size.*



*During a grazing trial a steer had nipped off the top of a Tillage Radish® tuber. That's when we found this voracious earthworm already wrapped around the tuber. That's fast response!*



*Notice how robust these earthworms appear as they feast on the remains of a decomposing Tillage Radish®.*



# Tillage Radish® Genetics

## Superior Genetics for Dependable, Consistent Results

The superior genetics of Tillage Radish® are the secret weapons behind the dependable, consistent results that deliver a better bottom line.

### EXTREMELY RAPID GERMINATION AND GROWTH

- Germinates in 2 to 3 days if adequate moisture is available
- Foliage spreads out to fill the given space and shade out weeds
- The tuber and thick foliage are the storehouse for nutrients
- Grows to a height of 12–24" depending on when it was planted

### BIOACTIVE PLANT CHEMICALS (GLUCOSINOLATES)

- Studies show Tillage Radish® increases the soil's bacteriophages who FEED ON NEMATODES and increases the (N) cycling process mineralizing available (N), (P), (Ca) and (S)
- Weed-suppressive effect that helps shade out competition
- High levels of the compound glucosinolate, when decomposed, produces isothiocyanate (ITC) which has FUNGICIDAL AND NEMATOCIDAL properties. Some studies say it can also help INHIBIT WEED SEED GERMINATION

### LARGE, DEEPLY PENETRATING TAPROOT

- Pulls up nutrients, allows increased water infiltration, establishes a root trail for the next crop, stores water in the soil profile
- The Tillage Radish® bio-drilling taproot forms when soil compaction reaches around 290 psi, boring into the subsoil to wick up nutrients
- Taproot has been reported to go 40 inches and beyond

### WINTERKILLS & QUICKLY DECOMPOSING RESIDUES

- Usually after three nights with temperatures in the mid-teens
- Residue is very sparse at planting time
- Low C:N ratio making for a fast mineralization
- Releases stored nutrients at the time the next crop needs it

### HIGH NUTRIENT (N, P, Ca, S, B) CONTENT

- A nutrient scavenger taking up nutrients throughout the soil profile
- A Calcium film is left on the soil surface as part of decomposition
- Sulfur is concentrated in the roots and gives off an odor when decomposing, just like the additive mercaptan that is added to natural gas.

As a warning, you may want to inform neighbors to the possibility of this odor. You do not want the gas company digging up your fields

- Tillage Radish® mineralizes available (N), (P), (Ca) and (S)
- Tillage Radish® pulls up twice the amount of (Ca) than cereal rye

Source: Forage Radish Cover Crop Effects on Mycorrhizal Colonization & Phosphorus Soil Test. Charles Macaulay White, Master of Science, 2009.

# Grazing Tillage Radish®

Many farmers with livestock\* have used Tillage Radish® as part of their grazing program. It is preferred that a companion forage crop, such as TillageMax DOVER™ (Tillage Radish® + CCS Oats) or TillageMax BRISTOL™ (Tillage Radish® + Tillage RootMax™ Certified Cover Crop Ryegrass), be included to better balance the ration. It is important to understand the dynamics of the two main reasons for using Tillage Radish® in a grazing situation: forage for cattle and compaction alleviation.

Careful management is needed to not allow the cattle to graze in very wet conditions as that will negate the compaction benefits Tillage Radish® has to offer. Also, the cattle cannot be allowed to graze the Tillage Radish® to the point where they can't express their genetic potential of deep rooting (if that aspect is desired).

Tillage Radish® has been proven to bring up many nutrients from deep in the soil profile that can greatly benefit the cattle's diet.

**\*Not recommended for lactating dairy cows.**



## PLANTING TIPS FOR GRAZING

- Always mix a grass species with Tillage Radish® planted at 4 lbs/acre
- Provides a high protein diet into early winter
- Allow the cattle to only graze off the top one-third in order for adequate re-growth

## PLANTING TIPS FOR ESTABLISHED PASTURES

Tillage Radish® seed needs a chance to get started in pastures, and it's ideal to have the grass grazed low or cut low with adequate moisture prior to planting. Have the soil (N) content at least between 40-60 lbs.

### Seeding Rate:

- **Drilled:** 4 lbs/acre
- **Broadcast:** 6 lbs/acre with adequate seed-to-soil contact

The radish is very digestible and provides many nutrients. Having other species established provides a balanced diet.

- Plant Tillage Radish® at 4 lbs/acre when direct drilling into pastureland
- Plant Tillage Radish® at 6 lbs/acre when broadcast seeding into pastureland
- Follow soil test recommendations
- Nitrogen available between 40-60 lbs
- Allow 3-4 weeks growth time before grazing
- Re-graze approximately on a monthly interval
- Graze no lower than 4" if you desire multiple grazing
- For best palatability, graze before it flowers

# Planting Tips

You will have success with Tillage Radish® wherever agricultural crops are grown. pH range 5.5-7.5



## TIPS FOR SUCCESSFUL TILLAGE RADISH® PLANTING

- For best results, plant in late summer to early fall, at least 3 weeks (typically 30–60 days) prior to the average first killing frost date.
- Tillage Radish® will germinate rapidly and typically start appearing within days. If using a burndown herbicide to clean up existing weeds, wait no longer than 2 days after planting Tillage Radish®.
- Green growth starts in less than 1 week in normal conditions. The size of the Tillage Radish® depends on soil fertility, length of growth time, plant competition and available nutrients to scavenge.
- Tillage Radish® begins to winterkill when temperatures fall to the mid-teens for 2 or 3 nights, similar to fall-planted spring oats.
- In most areas, Tillage Radish® will decompose in time for spring planting, preparing the field for planting conditions and enhancing the availability of nutrients already in your soil.
- Tillage Radish® is a broad leaf plant. Consider this when planning your herbicide program.
- Fertilizer input needs are significantly reduced; available leftover (N) has been held and herbicide is reduced due to Tillage Radish® suppression of winter annuals.

### NITROGEN

In order to grow to their fullest potential they will need 40-60 lbs of (N) – accumulated or residual. Most fields have enough (N) left over from the previous crop. Upon decomposition in the spring, Tillage Radish® will give (N) back in time to utilize in the spring crop.

Applying manure or chicken litter is preferred before planting but can be done just prior to emergence. Liquid manure can only be spread after plant leaves are 4” in size. The practice may cause some burning of the leaves and will have plant damage along tire tracks.

The Tillage Radish® tuber and foliage will take up to 150 lbs/acre of (N) from the manure, so it is a great benefit to store nutrients when there is a need to spread manure after crop harvesting in the fall.

### PLANTING DEPTH

Plant 1/4 to 1/2 inch deep. Can be planted 1” in light soils if necessary to reach moisture

- When using a high clearance seeder, germination rate will be improved by using drop tubes to improve seed-soil contact.

### SEEDING RATES (Tillage Radish® Planted Alone)

#### Precision Planter - 4 lbs/acre

- 15” rows using 60-cell small milo or small sugar beet plates with 4” in-row spacing
- See page 21 for precision planting guidelines

#### Drill Seeder - 6 lbs/acre

- Using small grass box, use alfalfa setting as a guide to set seeding rate. A large seed box can be used but the setting is very low and somewhat difficult to establish. Use Alfalfa as comparable seed on drill charts, reducing by 10%. It’s important to calibrate your drill to determine correct seeding rate.

#### Broadcasting (High Boy) /Aerial Seeding - 8-10 lbs/acre

- Strive for good soil and moisture contact. If fields are moist, fly seeds on. If fields are dry, push seeds in.
- Corn seeding indicator is when 1” patches of sunlight on soil surface are seen or approximately 4 weeks prior to anticipated harvest time.
- Soybean seeding indicator is at leaf yellowing, prior to leaf drop.
- Cotton seeding indicator is right before defoliation.

### CONTROL

- Tillage Radish® winterkills with 3 nights in the mid-teens.
- If Tillage Radish® is planted very early as a cover crop, flowering can develop before they are winterkilled. This can be controlled with mowing, grazing or burndown of one quart of glyphosate along with one pint of 2,4-D equivalent at flowering.

# Precision Planting

## GET THE BEST PRECISION PLANTING PERFORMANCE

### Precision Planting can reduce seeding rates of Tillage Radish® by half

For precision planting, use a small sugar beet seed disk to plant Tillage Radish® and set to plant 4" in-row spacing. Utilizing a precision planter set up for 15" rows is ideal and many farmers plant Tillage Radish® in alternating rows with CCS Winter Pea. A standard soybean disk can be used at the same 4" in-row spacing on alternating rows using CCS Winter Pea.

Some farmers with 30" planters equip one side of the planter to plant Tillage Radish® and the other side to plant CCS Winter Pea. They then double back and split the rows creating an alternating row effect.

With a precision planter set to plant at a 4" in-row spacing approximately 4 lbs/acre of Tillage Radish® is the resulting seeding rate in 15" rows. If alternating every other row with peas, the approximate seeding rate is 2 lbs/acre of Tillage Radish® and 13 lbs/acre of CCS Winter Pea.

### RECOMMENDED SEED DISCS

**John Deere Pro** or **MaxEmerge Vacuum** – A51712  
(Increase speed by 35%)

**Kinze Edge Vac** – D17050

**Kinze Brush Meter** – GA5795

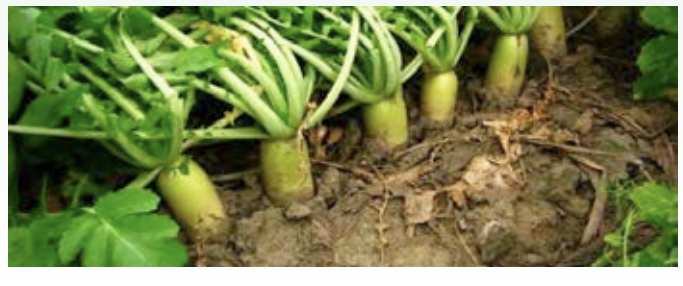
**White** – 854047

**Case/IH 1200 series** – 236027A2  
(Old Milo Drums improve population)

**Precision Planting (eSet disc)** – 720220  
(Run vacuum at 15 psi)

**Monosem** – 6020

## PRECISION PLANTING EXAMPLES



*Precision Planted with wheat using a Kinze 60-cell Small Milo plate with 4" spacing in-row*

*Tillage Radish® 2 lbs/acre Precision Planted with CCS Winter Pea (13 lbs/acre; 60-cell soybean plates) with a 15" White Planter using 60-cell sugar beet plates at 4" in-row spacing*



# Tillage RootMax™

COVER CROP RYEGRASS



### Certified uniformity

Tillage RootMax™ has outstanding uniformity at emergence and throughout growth and maturity, which makes it different than other ryegrass varieties. In the spring Tillage RootMax™ has significantly more top leaf tiller growth than other

ryegrass varieties. Plant energy is designed to be directed to the roots, resulting in a much deeper root zone.

### Easier control

Where some ryegrass varieties cause problems in the spring by irregular growth and early heading out, requiring more than one control treatment, Tillage RootMax™ is much more suited to farming practices where efficiency and productivity are critical. The easier control that Tillage RootMax™ provides is based on a combination of shorter and more desired dense leaf tillering, uniform growth, and preferred later maturity.

The common control is applying two quarts of glyphosate before jointing in spring. Best burndown is achieved spraying on a warm day between 9am - 4PM with water adjusted to 5.5 pH.

### Deeper root mass, better soil structure

The fine root mass of Tillage RootMax™ grows especially deep to build soil structure through the addition of organic matter, opening of macro pore spaces, introduction of air and water to deeper layers in the soil profile, enhanced soil biological activity, increased water infiltration and water holding capacity after control, and better soil particle aggregation. It all adds up to healthier soil that supports crop growth while reducing input requirements.

### Later maturity – a certified advantage

- Compared to other ryegrass varieties, Tillage RootMax™ is easier to control in the spring.
- You have at least three more weeks of denser tiller leaf growth.
- You have three more weeks to burn down Tillage RootMax™ than other varieties.
- The preferred late 'heading out' is a big help when fields are wet in the spring and conditions require greater flexibility for the herbicide application.

## UNIFORM GROWTH EASIER CONTROL

The only certified ryegrass developed especially for cover crops and superior forage quality

Visit our dedicated website: [RootMax.com](http://RootMax.com)

### Excellent nitrogen (N) scavenging

This is why most farmers look to ryegrass to plant over winter to keep the soil covered, help improve soil structure, and store significant amounts of nutrients in addition to N.

What makes Tillage RootMax™ different is its noticeably deeper roots. That means it grows deeper in to the soil to extract and hold nutrients. At termination before row crops are planted, these nutrients are plant available, helping reduce input requirements.

### Reduced soil loss

Soil erosion conditions are minimized when fields are effectively planted with Tillage RootMax™ as a cover crop, eliminating exposed soil that would otherwise become crusted and "sealed" when rain drops cause surface compaction on bare soil. Tillage RootMax™ encourages water to infiltrate the soil profile instead of washing downstream. This cover also prevents wind blown particles from forming dust clouds.

### Water management

Tillage RootMax™ planted as a cover crop is a simple way to improve water infiltration as a potential hedge against drought. Its dense top growth protects the soil from rain drop compaction, the exceptionally deep roots provide channels for water to infiltrate deeper than ever, and when terminated, the loosened channels left in the soil by its roots let crop roots grow deeper to reach that stored moisture. Think of RootMax™ as helping you build and fill an underground moisture reservoir.

### Research is showing other benefits

Current research on Tillage RootMax™ shows a significant reduction in soybean cyst nematode populations. Other research includes forage trials and winter hardiness. Meanwhile, Tillage RootMax™ has already set new standards by providing the needed benefits when planted as a cover crop and added value to your cover crop mixes.

## KEY BENEFITS

- Certified genetic purity
- Uniform stand maturity for easier burndown
- Very deep soil-building roots
- Late heading out, longer spring window
- Winter hardy
- Unique morphology
- High vegetative tillering
- Outstanding nutritional value
- Breaks up hardpan & compaction
- Scavenges nutrients, especially nitrogen
- Speeds up transition to continuous no-till
- Increases crop yields and profits



MORE UNIFORM EMERGENCE SUPPORTS EASIER CONTROL



## Now available after 13 years in development

Tillage RootMax™ Certified Cover Crop Ryegrass is the only variety certified for genetic purity for use as a cover crop and forage. The certified genetic purity assures maximum performance of unique properties of this new cover crop ryegrass, including:

- Uniform emergence leads to more even growth
- Even growth makes for easier control in the spring; one trip in most cases
- Roots go deeper than most other ryegrass varieties
- Improved soil structure goes deeper in the soil profile, providing enhanced growing conditions for following cash crops
- Outstanding nutritional value for forage
- Excellent for grazing or haylage production

*Massive tillering – More foliage, less stem – Outstanding deep root growth*

## PLANTING TIPS &amp; SEEDING RATE

**Planting:** Plant 3-10 weeks prior to the first killing frost

**Seeding Depth:** 3/8 - 0.5"

**Seeding Rate:**

– **For Cover Crop by Drill (7.5" rows):** 12 lbs/acre

Comparable seed on Drill chart is **Tall Fescue** (reduce by 20%),

**Crested Wheat Grass** (reduce by 10%), **Annual Ryegrass**

– **Broadcast / Aerial Seeding:** 15-18 lbs/acre

– **For Forage by Drill or Broadcast:** 18-30 lbs/acre

– **Precision Planting (15" with 1.5" in-row):** 10 lbs/acre

(Kinze Brush Meter with Backing Plate – 60 Cell Milo Plate)

Suggested source for after market backing plate *Larry Hak 419-749-4021*

**Control:** Applying two quarts of glyphosate before jointing in spring. Best burndown is achieved by spraying on a warm day between 9 am – 4 PM with water adjusted to 5.5 pH.

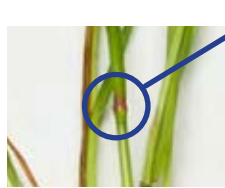
# Burndown & Control of Tillage RootMax™ Certified Cover Crop Ryegrass™

Following these management steps will help increase successful burndown and control of Tillage RootMax™ Certified Cover Crop Ryegrass™.

**TIP** If this is your first time managing a cover crop ryegrass, for peace of mind it can be helpful to take photos each day for a week to document the burndown.

## THE PLANT

- Control Tillage RootMax™ before the first node appears when possible.



**First node / joint**

Control is most effective before the first node/joint appears. Once the third node/joint appears control is poor because of limited translocation, because active growth in the plant goes to reproduction.



UNCERTIFIED CERTIFIED

Uncultivated Annual Ryegrass seed may grow at different rates, making control more difficult because of uneven maturity. Certified seed grows at a uniform rate, which makes control with a single application easier to achieve.

## THE CHEMISTRY

- Remove all traces of atrazine or mesotrione (Calisto,\* Lumax, Lexar) in the spray tank when using glyphosate.
- Glyphosate recommendations are now 2 qts per acre.
- Inconsistent control has been experienced using Accent (nicosulfuron) or Steadfast post emergence on corn. Follow the label even with adding fertilizer, AMS and crop oil to improve herbicide absorption efficiency.
- Glyphosate works effectively alone or with 2,4-D. MAINTAIN the 2 qt. rate of glyphosate IF adding Princep, Balance Pro (isoxaflutole), Prowl H2O (pendimethalin), Resolve (rimsulfuron), Basis (rimsulfuron & thifensulfuron), Corvus (Thiencarbazone-methyl & Isoxaflutole) or Axiom (flufenacet + metribuzin) to the glyphosate application.

## TECHNIQUE

- Make sure the spray tank water is between 4.5 to 5.5 pH. Make sure to add AMS (ammonium sulfate) or citric acid, with 3-5 minutes of agitation for pH adjustment. This step is critical when water is high in calcium, magnesium, iron and other minerals that interfere with glyphosate activity. Agitation of the mixture is cheap insurance.
- Don't pull your punches. Use the full strength of the suggested control rate. The goal is complete control on the first pass.
- If you use a generic brand of control, make sure to adjust the rate.
- Plant contact is critical. Use a medium spray droplet size or moderate spray pressure. Spray application volume should be 8 to 12 gallons per acre, so spray strength is important.

## TIMING

- Warm temperatures are essential to translocate glyphosate throughout the plant so that it is absorbed into the roots for control.

## CONTROL IS BEST WHEN THE PLANT IS ACTIVELY GROWING (HIGH TRANSLOCATION)

Key trigger points to consider when controlling with glyphosate.

1. Top Growth should be more than 7 inches
2. Sunlight – the more the better
3. Soil Temperatures – above 45 degrees F
4. Air Temperatures – above 60 degrees F
5. Moisture – growing conditions should be good

If night temperatures go below 38 degrees wait 3 days before spraying. This is due to a protection mechanism by the plant to prevent freezing tissue.

- Spray at least 4-5 hours prior to sunset to allow translocation time.
- If a second pass is needed, there should be a minimum of three weeks after the first control application. The regrowth and retillering will allow for more herbicide to get to the roots for final control.

## FOR ROUNDUP READY CORN OR SOYBEANS

When planting Roundup Ready corn or soybeans after emergence use a full rate of glyphosate – up to 2 quarts per acre. On Roundup Ready soybeans you can add SelectMax (clethodim), Poast Plus (sethoxydim) or Fusilade DX (fluzifop), using label instructions on the use of fertilizer, AMS or crop oil.

## FOR LIBERTY LINK CORN OR SOYBEANS AFTER EMERGENCE

**CORN** Liberty does not control annual ryegrass very well. Products with Accent (nicosulfuron) have been inconsistent. Use label recommendations of adding fertilizer, AMS or crop oil to improve performance.

**SOYBEANS** Add SelectMax (clethodim), Poast Plus (sethoxydim) or Fusilade DX (fluzifop), using instructions from the Liberty/Ignite label for any needed additives.

## FOLLOW THROUGH

- Don't repeat mistakes that may have happened on the first application.
- If managing for the first time, take photos on the first day of control, then again every 4-7 days after to see progression as plant goes from deep green to brown.
- Inspect fields 7-10 days after control application. Be alert for regrowth or missed areas that need further control.
- The following year, scout these areas for volunteer ARG.

SOURCES: Annual Ryegrass Cover Crop Management for Corn and Soybean Production 2012; management recommendations by Mike Plumer, Cover Crop Specialist; Mark Melbye, OSU Ext. Agronomist; Andy Hulting, OSU Ext. Weed Management Specialist

\* Herbicide brands mentioned here are recognized as the property of their respective manufacturers.





# Forage Production Using Tillage RootMax™ Certified Cover Crop Ryegrass™

## TIMING FOR FORAGE

Tillage RootMax™ is one of the highest quality cool-season grasses available. When planted in the early fall (August or the first week in September), it can be grazed or cut for haylage in the fall and possibly in the spring.

Using Tillage RootMax™ leads to healthier livestock production, at a lower cost compared to stored forage. In the leafy stage it is highly digestible and is preferred by grazing animals over other forages.

Tillage RootMax™ is high in protein and contains significant amounts of vitamins and minerals. See the forage data below. After jointing, protein level will decrease as the amount of biomass increases.

## SEEDING DETAILS FOR FORAGE POTENTIAL

Follow general recommendations for using Tillage RootMax™ as a cover crop. However, make the following adjustments:

### SEEDING DATE – THE EARLIER THE BETTER

- Seeding in August or early September is critical if you expect fall forage.
- Seeding after wheat, vegetables or corn silage, with manure applied, provides an excellent opportunity to produce some very high quality forage.
- A later seeding in late September may allow early spring grazing or greenchop.
- A dormant seeding in late November/December (soil temperature less than 40° F) may provide late spring forage (too late for corn, leaving soybeans the preferred crop to no-till).

### SEEDING RATE – HIGHER SEEDING RATE NEEDED COMPARED TO USE AS A COVER CROP

- 18-30 lbs/ac drill and broadcast.

## NITROGEN – A MUST

- Tillage RootMax™ is a nitrogen scavenger but needs an adequate amount of nitrogen in order to produce high quality forage.
- Planting Tillage RootMax™ after manure has been applied is ideal.
- Apply 40-50 lbs/ac of nitrogen (DAP, urea, ammonia sulfate, etc.) before planting, if manure is not applied.
- If forage is harvested in the fall and spring forage is desired, then apply another 40-50 lbs/ac of nitrogen or manure in early spring.
- Do not apply manure to Tillage RootMax™ seedlings as it may be smothered or burned by the manure's salts.

## HARVEST MANAGEMENT

- Tillage RootMax™ can be harvested for haylage, green chop, or it can be grazed. Two to six tons/ac can be expected, depending on seeding date, fertility and weather conditions.
- Tillage RootMax™ does not present toxicity as do some tall fescues.
- For optimum yield and haylage quality (TDN, protein content, digestibility, etc.) cut Tillage RootMax™ when the plant is between the boot and early head stage.
- For grazing and greenchop, start when Tillage RootMax™ is 8-10 inches tall. Light grazing when Tillage RootMax™ is 4-5 inches tall (60 days after planting).
- If regrowth is desired, graze or chop it no lower than three inches.
- If ungrazed, or undergrazed Tillage RootMax™ can grow to seed head stage too quickly, resulting in lower quality and lower overall production.
- Good dry hay usually takes an extra day or two of drying time along with aggressive tedding of the swath as Tillage RootMax™ has a waxy leaf coat and it makes a dense swath that is difficult to get air through, thus slowing the drying process.

If Tillage RootMax™ vegetation is removed, then little, if any, nitrogen can be expected for the following corn crop.

VARIETY	% Moisture	% CP	% ADF	% NDF	NDFd	% Sugar	TDNNEL	RFV	
RootMax™ 1	79.4	12.2	22.2	36.7	85.3	16.4	73.4	.77	180
RootMax™ 2	81.1	16.7	23.4	42.2	78.6	14.9	71.7	.75	162
RootMax™ 3	78.6	11.9	20.7	34.6	84.0	19.7	75.5	.79	193

REPLICATED PLOTS

CP Crude protein

NDF Neutral detergent fiber

TDN Total digestible nutrients

RFV Relative feed value

ADF Acid detergent fiber

NDFd 30 hour in-vitro neutral detergent fiber digestibility

NEL Net energy lactation



Sunn Hemp Warm Season Legume

KEY BENEFITS

- Fast growing cover crop
- Suppresses nematodes
- Significant N in 60 days
- Fast biomass production
- Suppresses weeds
- Builds soil health
- Helps conserve soil moisture
- Tolerant of dry conditions
- Up to 2.5 tons biomass / acre
- Large roots, strong taproot



VEGETABLES

Tillage Sunn™ suppresses nematodes like few other cover crops. Outstanding nitrogen and biomass production in a short growing window makes Tillage Sunn™ a valuable addition to rotations.



SMALL GRAINS

Tillage Sunn™ is ideal for planting after small grain harvest. The soil cover and shade in warm weather helps reduce soil and moisture loss while adding large amounts of nitrogen and biomass.



Nodules like those shown above can add 125 lbs of plant available nitrogen to the soil for the next crop.



SUGAR CANE

Tillage Sunn™ is ideal for planting after sugar cane harvest to revitalize soil, add nitrogen, and help suppress weeds.



CORN SILAGE

Following corn silage harvest, especially in southern regions, Tillage Sunn™ competes with pigweed with its rapid growth and dense shading foliage.



COMPETES WITH PALMER AMARANTH

Exceptionally rapid growth and dense foliage of Tillage Sunn™ can shade out and help suppress pigweed.



For dealer information 1-888-255-8410 TillageSunn.com



## Tillage Sunn™ makes the benefits of Sunn Hemp more widely available in North America

**Vegetable growers** appreciate the natural nematode suppression and warm weather nitrogen production of Tillage Sunn™. The short 8-week growth window fits into many crop rotations, depending on the individual grower program. Tillage Sunn™ adds up to 2.5 tons per acre of biomass, which is especially helpful in sandy soils.

**Sugar cane growers** can rejuvenate soil following sugar cane harvest by planting Tillage Sunn™ in the spring to early summer.

**Small grain growers** can restore N following harvest by planting Tillage Sunn™. The warm season legume produces nitrogen in the root zone. Tillage Sunn™ grows quickly and achieves peak benefit potential after 8 weeks growth in warm weather, based on conditions.

**Corn silage growers** in warmer growing zones fight pigweed, a challenging weed and prolific seed producer that is hard to control. Tillage Sunn™ planted as a cover crop immediately following corn silage harvest grows fast and can help suppress pigweed by shading it out with its tall growth habit and dense foliage. An annual program based on planting Tillage Sunn™ immediately following corn silage harvest can help reduce pigweed over time while adding nitrogen, large amounts of biomass, and good soil cover on an annual basis.

**Other uses** benefit from Tillage Sunn™ based on its rapid growth, large biomass, warm weather nitrogen production, nematode suppression, and effectiveness as a ground cover when rolled down. Tillage Sunn™ is killed with the first killing frost.

### KEY FACTS AND CULTIVATION TIPS

- Tillage Sunn™ is proven to suppress nematodes
- Tillage Sunn™ requires an inoculant; a cowpea type is recommended
- Control (terminate) at first flower for maximum benefit, and before it becomes fibrous and difficult to manage
- Produces significant amounts of nitrogen within 60 days, depending on conditions
- Tillage Sunn™ is *Crotalaria juncea* L. and is unrelated to the Cannabis family. It is legal to grow in all 50 states.

### PLANTING TIPS & SEEDING RATE

**Planting:** Anytime after the last threat of spring frost. For maximum benefit, plant a minimum of 8 weeks before average first frost in the fall.

**Seeding Depth:** 0.5" - 1" as required for good seed-to-soil contact with adequate moisture present on a weed-free seed bed. Soil pH 5.5 to 7.5

#### Seeding Rate:

- **Drilling (7.5" rows):** 15 lbs/acre
- **Broadcast / Aerial:** Not recommended
- **Precision Planting (15" row with 4" in-row):** 9 lbs/acre  
**(30" row with 4" in-row):** 5 lbs/acre

(Kinze Brush Meter with Backing Plate - 60 Cell Sugar Beet Plate)

Suggested source for after market backing plate:

Larry Hak 419-749-4021

**Control:** Control (terminate) at first flower for maximum benefit, and before it becomes fibrous and difficult to manage.



**KEY BENEFITS**

- Easy to grow and control
- Excellent for grazing
- High silage value
- Rapid early season growth
- Excellent weed suppression
- Quickly established cover crop
- Outstanding erosion control
- Excellent winter survival
- Excellent control
- Excellent lodging resistance



CCS Winter Forage Triticale is a hybrid crossed between cereal rye and durum wheat, combining the best qualities of both. It is later maturing than other small grains, has high protein content, high lysene content and provides excellent biomass production.



**CORN-SOYBEAN ROTATION**

When harvest runs late, CCS Winter Forage Triticale performs with rapid early growth. It provides the cover needed for superior erosion control and weed suppression. It scavenges nutrients and adds significant biomass, adding to soil health. CCS Winter Forage Triticale is easy to control in the spring due to its later maturity.



**SILAGE AND GRAZING OPTION**

When you need another source of nutrition for livestock CCS Winter Forage Triticale is a strong performer producing high quality forage. It produces more tillers if planted before vernalization, has soft leaves, regrows quickly, has soft straw and water soluble lignite, which make it easy to manage as a forage. Cuttings have protein levels higher than cereal rye or durum wheat. If forage is desired plan to seed accordingly.

**MIXES: EXPONENTIAL BENEFITS**

CCS Winter Forage Triticale is featured in high performance mixes such as TillageMax™ CHARLOTTE and TillageMax™ TALLADEGA. Mixing CCS Winter Forage Triticale with species like Tillage Radish® and CCS Crimson Clover adds to the benefits. Tillage Radish® grows through compaction, soaks up nitrogen and other nutrients and stores them over winter after being winter killed.

Winter hardy CCS Winter Forage Triticale is excellent at soaking up nitrogen released by Tillage Radish® in the spring, and captures N left over from previous crops, manure applications, or N generated by CCS Crimson Clover. CCS Winter Forage Triticale can be used for forage in the spring by doubling the seeding rate or by including Tillage RootMax™ Cover Crop Ryegrass to balance the ration.



*CCS Winter Forage Triticale is mixed with Tillage Radish® and CCS Crimson Clover in the CHARLOTTE Mix.*



*CCS Winter Forage Triticale, southeast Pennsylvania, early May, 20" tall.*



*CCS Winter Forage Triticale is easy to grow—a highly versatile cover crop and early spring forage*

## CCS WINTER FORAGE TRITICALE AS FORAGE

CCS Winter Forage Triticale has been chosen by Cover Crop Solutions as another great variety to use as a cover crop. Its outstanding features include aggressive root system, winter hardiness, and early season prostrate growth – which gives it superior ground covering, weed suppressing abilities. Other noticeable features are its deep, dark-green color, wide leaves and healthy plant. All of these features point to its attractiveness as a cover crop.

These features also lead to its being investigated for its potential as a forage in dairy rations. This information was gathered in Southeast PA on 2 farms that applied manure in the fall of 2012 before planting and top-dressed with 60 units of Nitrogen early March of 2013.

Samples were pulled twice in the first trial, at early boot – which would be applicable timing for grazing, and a week later at harvest in the boot stage. Forage analysis were done both times, with the addition of yield data at harvest time.

VARIETY	% Crude Protein	% ADF	% NDF	30 hr NDFd	RFV	RFQ	DM tons/ac
<i>Farm #1 Test #1</i>							
<b>CCS W.F. Trit</b>	22.5	24.4	45.5	79.7	159	NA	NA
<b>Comp.1</b>	18.6	25.0	47.5	75.7	150	NA	NA
<b>Comp.2</b>	19.2	25.8	46.6	76.7	146	NA	NA
<b>Comp.3</b>	18.0	25.8	50.0	71.9	143	NA	NA

<i>Farm #1 Test #2</i>							
<b>CCS W.F. Trit</b>	16.9	30.1	50.6	79.9	120	229	3.13
<b>Comp.1</b>	16.6	30.3	51.1	76.5	119	220	2.74
<b>Comp.2</b>	14.9	29.2	48.1	77.0	128	227	2.34
<b>Comp.3</b>	16.1	30.8	51.0	75.6	119	216	2.37

*Farm #2— samples taken at early boot stage.*

<b>CCS W.F. Trit</b>	22.0	23.1	41.7	71.3	158	NA	NA
<b>Competitor</b>	19.6	25.3	43.8	79.0	147	NA	NA

This initial data would suggest that not only is CCS Winter Forage Triticale a superior cover crop, but has excellent forage qualities, both in yield and in quality, standing up extremely well against varieties that have been known for their forage value.

**CP** Crude protein  
**ADF** Acid detergent fiber  
**NDF** Neutral detergent fiber  
**NDFd** 30 hour in-vitro neutral detergent fiber digestibility  
**TDN** Total digestible nutrients  
**NEL** Net energy lactation  
**RFV** Relative feed value

All samples analyzed by CVAS Hagerstown, MD. Trial #1 was conducted by Homestead Nutrition, New Holland, PA.

## KEY FACTS AND CULTIVATION TIPS

- **Low nitrogen requirement for grain production**  
 CCS Winter Forage Triticale requires from 1/2 to 2/3 the amount of nitrogen required on winter wheat to prevent lodging.
- **Additional copper is encouraged to reduce ergot level**

### PLANTING TIPS & SEEDING RATE

**Planting:** Plant 4-8 weeks prior to first average killing frost, and as late as 6 weeks after the frost. Planting is similar to Cereal Rye

**Seeding Depth:** 1" - 1.5" as required for good seed-to-soil contact. Comparable seed on drill chart is **Wheat**. Soil pH 5.5 to 7.5

#### Seeding Rate as Cover Crop:

- **Drilling:** 50 lbs/acre
- **Broadcast / Aerial:** 70-80 lbs/acre
- **Precision Planting:**\* 40 lbs/acre

\* Precision settings: 15" with 2" in-row

(Kinze Brush Meter with Backing Plate - 60 Cell

Source for after market backing plate: Larry Hak 419-749-4021

Soybean Plate; With White Planter, use Wheat Plate)

#### Seeding Rate as Forage:

- **Drilling:** 100 lbs/acre
- **Broadcast / Aerial:** 120 lbs/acre
- **Precision Planting:**\* 80 lbs/acre

**Control:** Requires a burndown of one quart glyphosate herbicide prior to boot stage. Can also be mechanically controlled by mowing or flattening with a roller or crimper in the milk or dough stage.



# Cover Crops as Forage

Cover crops can serve as forage even though forage is not the primary reason they are grown. Tillage Radish® and most of the seven TillageMax™ mixes that include it have shown promising results in recent trials designed to begin measuring the forage value in TillageMax™ mixes. Early results are presented here as more extensive trials are underway.

## REPLICATED PLOTS

VARIETY	% Moisture	% CP	% ADF	% NDF	NDFd	% Sugar	TDNNEL	RFV	
RootMax™ 1	79.4	12.2	22.2	36.7	85.3	16.4	73.4	.77	180
RootMax™ 2	81.1	16.7	23.4	42.2	78.6	14.9	71.7	.75	162
RootMax™ 3	78.6	11.9	20.7	34.6	84.0	19.7	75.5	.79	193
TALLADEGA 1	82.4	19.2	22.4	46.8	76.7	15.4	73.9	.78	162
TALLADEGA 2	82.7	14.9	26.5	47.5	80.5	13.9	71.1	.74	133
CHARLOTTE 1	83.0	18.6	22.2	35.9	78.7	15.9	74.0	.78	193
CHARLOTTE 2	86.3	19.6	24.8	41.5	72.2	12.0	69.6	.73	176
BRISTOL 1	81.5	15.2	21.5	36.7	86.8	14.7	73.5	.77	189
BRISTOL 2	77.4	11.4	20.5	34.5	81.5	19.3	74.6	.78	200
INDY 1	81.7	16.7	19.9	33.4	74.1	15.6	73.9	.77	228
INDY 2	81.6	16.3	19.6	32.6	73.3	16.6	74.9	.79	237
DAYTONA	87.9	18.8	21.8	30.3	50.6	13.8	69.2	.72	221

## Impact of Tillage Radish®

The addition of Tillage Radish® appears to have the impact expected of a nitrogen application. Notice the increase of crude protein <sup>1</sup> and the increase in the digestibility <sup>2</sup> in BRISTOL, which is RootMax™ Cover Crop Ryegrass with Tillage Radish® added. Adding CCS Crimson Clover, the INDY mix, increased the protein even more <sup>3</sup>, and increased the Relative Feed Value <sup>4</sup> considerably. Digestibility decreased somewhat <sup>5</sup> but is a desirable result.

VARIETY	% Moisture	% CP	% ADF	% NDF	NDFd	% Sugar	TDNNEL	RFV	
RootMax™ 1	79.4	12.2	22.2	36.7	85.3	16.4	73.4	.77	180
BRISTOL 1	81.5	15.2 <sup>1</sup>	21.5	36.7	86.8 <sup>2</sup>	14.7	73.5	.77	189
INDY 1	81.7	16.7 <sup>3</sup>	19.9	33.4	74.1 <sup>5</sup>	15.6	73.9	.77	228 <sup>4</sup>

CP Crude protein

ADF Acid detergent fiber

NDF Neutral detergent fiber

NDFd 30 hour in-vitro neutral detergent fiber digestibility

TDN Total digestible nutrients

NEL Net energy lactation

RFV Relative feed value

These observations are based on reliable research, testing and verification. Data available on request. CoverCropSolutions.com



## 2012 Cover Crop Research

## Forage Trials

Steve Groff Farm-Scale Cover Crop Research Results ■ Conducted at Cedar Meadow Farms, Holtwood, PA, by Steve Groff and staff

### Nutritional Composition of Tillage RootMax™ Certified Cover Crop Ryegrass™

Feed Description	TDN %	DE	ME (Mcal/kg)			CP (%)	Ca (%)	P (%)
			←		→			
Fresh vegetative	60	2.65	2.17	1.31	0.74	15.0	0.65	0.41
Fresh mature	58	2.56	2.10	1.24	0.68	5.8	—	—
Hay early vegetative	60	2.65	2.17	1.31	0.74	15.2	0.62	0.34
Hay early bloom	57	2.51	2.06	1.21	0.64	12.9	—	—
Hay full bloom	55	2.43	1.99	1.14	0/58	6.6	—	—

All values expressed on a dry matter basis.

TDN values listed are for ruminants.  
Values for horses generally are lower.

TDN = Total Digestible Nutrients

DE = Digestible Energy

ME = Metabolizable Energy

NEm = Net Energy for Maintenance

NEg = Net Energy for Gain

CP = Crude Protein

Ca = Calcium

P = Phosphorous

**At recent Penn State trials, Tillage RootMax™ Deep Cover Crop Ryegrass™ showed these great results compared to other ryegrasses in the trial.**

- Consistently higher crude protein & 30 hr NDFd (2) while giving competitive yields
- Higher milk per ton when evaluated with Milk2006 (1) standards
- TillageMax BRISTOL™ mix (Tillage Radish® + Tillage RootMax™) increased both yields and 30 hr NDFd (indicating higher milk potential for forage)

**Notes:**

(1) Milk2006 is a measurement developed by the University of Wisconsin to evaluate milk producing potential of forages

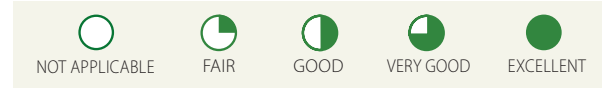
(2) Oba and Allen, 1996 Michigan State University, reported that an increase in NDFd by 1 percent increased Fat Corrected Milk by 0.55 lbs.



In a recent trial conducted by Mike Plumer, recognized world expert in annual ryegrasses, TillageMax BRISTOL™ mix was the top yielder in that trial.



# TillageMax Selection Guide



		Tillage Radish® CCS Oats	Tillage Radish® Tillage RootMax™	Tillage Radish® Tillage RootMax™ CCS Crimson Clover	Tillage Radish® CCS Winter Triticale	Tillage Radish® CCS Winter Triticale CCS Crimson Clover	Tillage Radish® CCS Crimson Clover	Tillage Radish® Tillage Sunn™ Sunn Hemp CCS Sorghum Sudangrass
WHAT DO YOU WANT TO ACCOMPLISH?		DOVER	BRISTOL	INDY	TALLADEGA	CHARLOTTE	DAYTONA	HOMESTEAD
NITROGEN	N fixation	○	○	◐	○	◐	◑	◑
	Scavenge and store N	●	●	●	●	●	◑	●
	Spring N production / availability	○	○	◐	○	◐	○	◑
	Summer N production / availability	○	○	◐	○	◐	◑	●
CONSERVATION	Reduce erosion (runoff, wind)	◑	◑	◑	◑	●	◑	●
	Improve water infiltration	◑	◑	◑	◑	◑	◑	◑
	Drought resistance <small>With proper management</small>	◑	◑	◑	◑	◑	◑	◑
SOIL HEALTH	Boost beneficial biologicals	◑	◑	◑	◑	◑	◑	◑
	Build soil structure	●	◑	●	◑	●	◑	◑
	Relieve compaction	◑	●	●	◑	◑	◑	◑
	Add biomass / organic matter	●	◑	◑	◑	●	◑	●
	Improve soil porosity	◑	◑	◑	◑	◑	◑	◑
	Enhance soil fertility	●	◑	●	◑	●	◑	●
FUNCTIONAL	Forage	●	◑	●	◑	●	◑	◑
	Fast growth	●	◑	●	◑	◑	◐	●
	Green manure	◑	◑	◑	◑	◑	◑	●
	Soil remediation	◑	◑	◑	◑	◑	◑	●
	Mulch for summer crops	◑	◐	◐	◑	◑	◐	◑
	Attract beneficial insects	◐	◐	◐	◐	◐	◐	◑
	Winter hardiness	◐	◑	◑	◑	◑	◑	◑
Winter kills	●	○	○	○	○	◑	●	
SOLUTIONS	Weed suppress / alleopathic	◐	◐	◐	◑	◑	◐	◐
	Weed suppress / choke-shade	●	◑	◑	◑	◑	◐	●
	Nematode suppression	◐	◐	◐	◐	◐	◑	◑
	Cover, Prevent Plant - dry	◑	◐	◐	◐	◐	◐	◑
	Cover, Prevent Plant - wet	◑	◐	◐	◑	◑	◐	◑
	Absorb manure nutrients	●	◑	◑	●	●	◑	●





Tillage Radish®

CCS Oats

### THIS MIX IS EXCELLENT FOR:

- ✓ Scavenging and storing N
- ✓ Building soil structure
- ✓ Generally restoring soil health
- ✓ Absorbing manure nutrients
- ✓ Adding biomass

### For Quick Fall Cover and Spring Ground Cover

DOVER combines two excellent N scavengers — Tillage Radish® and CCS Oats in this mix that grows rapidly in cool weather and is ideal for quick fall cover. Tillage Radish® breaks up soil, even in the compaction zone, with its long, singular taproot to create thick channels 30" or deeper. DOVER enhances seedbeds, provides more ground cover in spring, helps control erosion, works to help control harmful nematodes, and will winter kill for easy spring management.

### FORAGE POTENTIAL

TillageMax™ DOVER has the potential to produce high yields of high quality forage, and is excellent for grazing both dairy and beef animals.

It can be made as hay if there are adequate drying conditions, which can be a challenge late in the season. A better option would be wrap or ensile at the appropriate moisture for method of storage.

TillageMax™ DOVER will have crude protein levels in the low teens to mid twenties depending on fertility and maturity at harvest. When planted in early to mid August it will produce higher yields of higher quality forage than DOVER planted early to mid July. It is possible that the oats will head out if planted early in the season, and has the potential to produce viable seed if it is not controlled in a timely manner.

### PLANTING TIPS & SEEDING RATE

**Planting:** Plant 3-10 weeks prior to first killing frost

**Seeding Depth:** 0.5 - 1"

Comparable seed on Drill chart is Oats

**Seeding Rate:**

- **Drilling:** 25 lbs/acre

- **Broadcast / Aerial:** 30 lbs/acre

- **Precision Planting (15" with 5" in-row):** 20 lbs/acre

*(Kinze Brush Meter with Backing Plate - 60 Cell Soybean Plate)*

- **For Forage:** Increase rate to 40-50 lbs/acre

**Control:** Winter kills with 3 nights in the mid-teens. If Tillage Radish® or CCS Oats does not winter kill, apply a combination of one pint of 2,4-D type herbicide along with one quart of glyphosate at flowering or heading.



TillageMax™ DOVER will be able to be harvested at the ideal time for forage. In most areas this will be from late September to mid October, depending on planting date.

If forage production is the focus, seeding rates should be increased from the normal recommendation of 25 lbs. per acre to **40-50 lbs.** per acre.



Tillage Radish® Tillage RootMax™ Cover Crop Ryegrass

**THIS MIX IS EXCELLENT FOR:**

- ✓ Scavenging and storing N
- ✓ Improving water infiltration
- ✓ Relieving compaction
- ✓ Absorbing manure nutrients

**PLANTING TIPS & SEEDING RATE**

**Planting:** Plant 3-10 weeks prior to first killing frost

**Seeding Depth:** 0.25 - 1"

Comparable seed on Drill chart is Tall Fescue (reduce by 25%), Crested Wheat Grass (reduce by 15%), Annual Ryegrass

**Seeding Rate:**

- **Drilling:** 12 lbs/acre
- **Broadcast / Aerial:** 15 lbs/acre
- **Precision Planting (15" with 1.75" in-row):** 10 lbs/acre  
*(Kinze Brush Meter with Backing Plate - 60 Cell Milo Plate)*
- **For Forage:** Increase rate to 17 lbs/acre

**Control:** Tillage Radish® winter kills with 3 nights in the mid-teens. If it does not winter kill, add one pint of 2,4-D type herbicide.

Tillage RootMax™ requires a burndown of two quarts of glyphosate. Best control is achieved spraying on a warm day between 9 am - 4 PM with water adjusted to 5.5 pH.

**For Deepest Rooting, Soil Structure & N Capture**

In the BRISTOL mix, Tillage Radish® breaks up soil compaction with its aggressive taproot, creating thick channels 30" or deeper. This unique nitrogen storage tank holds N and other nutrients over winter and releases them as needed by following cash crops.

Tillage RootMax™ Cover Crop Ryegrass builds soil structure deeper than many ARG varieties. In combination, this outstanding cover crop mixture provides added cover in the spring prior to burndown.

When used for forage increase seeding rate to 17 lb /acre. Compared with RootMax™ alone, the addition of Tillage Radish® significantly increases protein content (%CP) and digestibility (NDFd) and overall feed value (RFV).

**FORAGE POTENTIAL**

Seeding rate 17 lbs. To maximize forage potential, harvest at early bloom.

Variety	% Moisture	%CP	% ADF	% NDF	NDFd	% Sugar	TDN	Nel	RFV
RootMax™ alone	79.4	12.2	22.2	36.7	85.3	16.4	73.4	.77	180
<b>BRISTOL</b> <small>Tillage Radish® added</small>	81.5	15.2	21.5	36.7	86.8	14.7	73.5	.77	189

**CP** Crude protein  
**ADF** Acid detergent fiber  
**NDF** Neutral detergent fiber  
**NDFd** 30 hour in-vitro neutral detergent fiber digestibility  
**TDN** Total digestible nutrients  
**NEL** Net energy lactation  
**RFV** Relative feed value

These observations are based on reliable research, testing and verification. Data available on request. CoverCropSolutions.com





Tillage Radish®

Tillage RootMax™  
Cover Crop Ryegrass™CCS Crimson  
Clover*Coated and preinoculated***THIS MIX IS EXCELLENT FOR:**

- ✓ Scavenging and storing N
- ✓ Building soil structure
- ✓ Generally restoring soil health
- ✓ Relieving compaction

**PLANTING TIPS & SEEDING RATE****Planting:** Plant 3-10 weeks prior to first killing frost**Seeding Depth:** 0.25 - 1"

Comparable seed on Drill chart is Tall Fescue (reduce by 25%), Crested Wheat Grass (reduce by 15%), Annual Ryegrass

**Seeding Rate:**- **Drilling:** 15 lbs/acre- **Broadcast / Aerial:** 17 lbs/acre- **Precision Planting (15" with 2" in-row):** 12 lbs/acre*(Kinze Brush Meter with Backing Plate - 60 Cell Milo Plate)*- **For Forage:** Increase rate to 20 lbs/acre**Control:** Tillage Radish® winter kills with 3 nights in the mid-teens. Tillage RootMax™ and CCS Crimson Clover require a burndown of two quarts of glyphosate with one pint of 2,4-D.

Best control is achieved spraying on a warm day between 9 am - 4 PM with water adjusted to 5.5 pH.

**For Deep Rooting and Proven Yield Improvements**

INDY delivers a bundle of benefits, starting with the amazing Tillage Radish® taproot that drills right through tough compaction, and Tillage RootMax™ Cover Crop Ryegrass™ with its fibrous roots that are renowned for building soil structure. Add the nitrogen fixing advantages of CCS Crimson Clover and you have an outstanding option for getting more out of your cover crop program.

To maximize forage potential increase seeding rate to **20 lb /acre**. INDY includes RootMax™ Cover Crop Ryegrass, and adding clover increases the protein content. Adding Tillage Radish® adds protein content and digestibility. The addition of clover can slow down rate of digestion to help extract maximum nutrition.

**FORAGE POTENTIAL**

Seeding rate 20 lbs. To maximize forage potential, harvest at early bloom.

Variety	% Moisture	%CP	% ADF	% NDF	NDFd	% Sugar	TDN	Nel	RFV
RootMax alone	79.4	12.2	22.2	36.7	85.3	16.4	73.4	.77	180
<b>INDY 1</b>	81.7	16.7	19.9	33.4	74.1	15.6	73.9	.77	228
<b>INDY 2</b>	81.6	16.3	19.6	32.6	73.3	16.6	74.9	.79	237

RootMax™ Cover Crop Ryegrass, Tillage Radish®, CCS Crimson Clover

**CP** Crude protein**ADF** Acid detergent fiber**NDF** Neutral detergent fiber**NDFd** 30 hour in-vitro neutral detergent fiber digestibility**TDN** Total digestible nutrients**NEL** Net energy lactation**RFV** Relative feed value

These observations are based on reliable research, testing and verification. Data available on request. CoverCropSolutions.com

REPLICATED PLOTS





Tillage Radish® CCS Winter Forage Triticale

**THIS MIX IS EXCELLENT FOR:**

- ✓ Scavenging and storing N
- ✓ Absorbing manure nutrients
- ✓ Improving water infiltration

**PLANTING TIPS & SEEDING RATE**

**Planting:** Plant 3-10 weeks prior to first killing frost

**Seeding Depth:** 1" Comparable seed on Drill chart is Wheat

**Seeding Rate:**

- **Drilling:** 40 lbs/acre

- **Broadcast / Aerial:** 50 lbs/acre

- **Precision Planting (15" with 5" in-row):** 30 lbs/acre

*(Kinze Brush Meter with Backing Plate - 60 Cell Soybean Plate)*

- **For Forage:** Increase rate to 40-50 lbs/acre

**Control:** It is recommended to control when CCS Winter Forage Triticale reaches 18" in height. Use one quart of glyphosate and one pint of a 2,4-D product which will control any Tillage Radish® that may not have been winter killed.

**For Easy Control and Aggressive Spring Biomass**

TALLADEGA provides a bundle of benefits, starting with the amazing Tillage Radish® taproot that drills right through tough compaction.

The winter hardy CCS Winter Forage Triticale excels at soaking up any leftover N from a previous crops or manure application. Can be used as a forage by doubling the seeding rates. This is the mix you need where it is certain there is plenty of N or you have nutrients in manure you want to catch in the fall and release in the spring.

**FORAGE POTENTIAL**

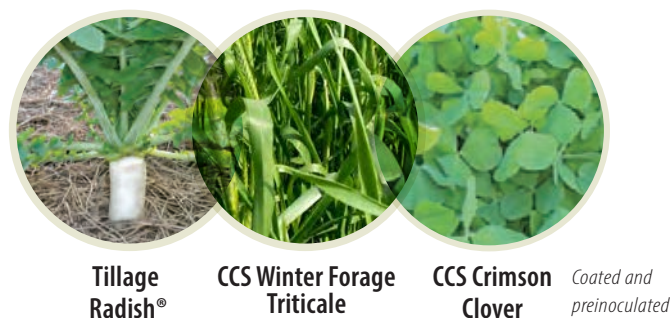
Seeding rate 40-50 lbs. To maximize forage potential, harvest at early bloom.

REPLICATED PLOTS

Variety	% Moisture	%CP	% ADF	% NDF	NDFd	% Sugar	TDN	Nel	RFV
<b>TALLADEGA 1</b>	82.4	19.2	22.4	46.8	76.7	15.4	73.9	.78	162
<b>TALLADEGA 2</b>	82.7	14.9	26.5	47.5	80.5	13.9	71.1	.74	133

- CP** Crude protein
- ADF** Acid detergent fiber
- NDF** Neutral detergent fiber
- NDFd** 30 hour in-vitro neutral detergent fiber digestibility
- TDN** Total digestible nutrients
- NEL** Net energy lactation
- RFV** Relative feed value

These observations are based on reliable research, testing and verification. Data available on request. CoverCropSolutions.com



### THIS MIX IS EXCELLENT FOR:

- ✓ Scavenging and storing N
- ✓ Generally restoring soil health
- ✓ Reducing erosion (runoff, wind)
- ✓ Adding biomass

### PLANTING TIPS & SEEDING RATE

**Planting:** Plant 3-10 weeks prior to first killing frost

**Seeding Depth:** 1"    Comparable seed on Drill chart is Wheat

**Seeding Rate:**

- **Drilling:** 40 lbs/acre

- **Broadcast / Aerial:** 50 lbs/acre

- **Precision Planting (15" with 5" in-row):** 30 lbs/acre

*(Kinze Brush Meter with Backing Plate - 60 Cell Soybean Plate)*

- **For Forage:** Increase rate to 40-50 lbs/acre

**Control:** It is recommended to control when CCS Winter Forage Triticale reaches 18" in height. Use one quart of glyphosate and one pint of a 2,4-D product which will control CCS Winter Forage Triticale, CCS Crimson Clover and any Tillage Radish® that may not have been winter killed.

## For Building Soil Structure and Adding Nitrogen

In the CHARLOTTE cover crop mix, Tillage Radish® breaks up soil compaction with its aggressive taproot, creating soil channels 30" or deeper. This unique nitrogen storage tank holds N and other nutrients over winter and releases them as needed by following cash crops. CCS Winter Forage Triticale soaks up additional N in the fall as well as in the spring, keeping any N from leaching until a cash crop can utilize it. CCS Crimson Clover add up to 50 lbs of additional N in the spring.

### FORAGE POTENTIAL

Seeding rate 40-50 lbs. To maximize forage potential, harvest at early bloom.

Variety	% Moisture	%CP	% ADF	% NDF	NDFd	% Sugar	TDN	Nel	RFV
<b>CHARLOTTE 1</b>	83.0	18.6	22.2	35.9	78.7	15.9	74.0	.78	193
<b>CHARLOTTE 2</b>	86.3	19.6	24.8	41.5	72.2	12.0	69.6	.73	176

REPLICATED PLOTS

**CP** Crude protein

**ADF** Acid detergent fiber

**NDF** Neutral detergent fiber

**NDFd** 30 hour in-vitro neutral detergent fiber digestibility

**TDN** Total digestible nutrients

**NEL** Net energy lactation

**RFV** Relative feed value

These observations are based on reliable research, testing and verification. Data available on request. CoverCropSolutions.com



Tillage Radish®

CCS Crimson Clover

*Coated and preinoculated*

**THIS MIX IS EXCELLENT FOR:**

- ✓ Spring N production
- ✓ Generally restoring soil health
- ✓ Relieving compaction

**PLANTING TIPS & SEEDING RATE**

**Planting:** Plant 3-10 weeks prior to first killing frost

**Seeding Depth:** 0.25" - 1"

Comparable seed on Drill chart is **Alfalfa**.

Small seed box can be used

**Seeding Rate:**

- **Drilling:** 10 lbs/acre

- **Broadcast / Aerial:** 13 lbs/acre

- **Precision Planting (15" with 1.5" in-row):** 8 lbs/acre

*(Kinze Brush Meter with Backing Plate - 60 Cell Milo Plate)*

- **For Forage:** Increase rate to 13 lbs/acre

**Control:** Tillage Radish® winter kills with 3 nights in the mid-teens. CCS Crimson Clover can be controlled by a spring burndown with one pint of 2,4-D type herbicide along with one quart glyphosate.

**Excellent N Scavenging and Fertilizer Reduction**

The high performance DAYTONA mix delivers benefits of Tillage Radish®, the only proven yield-boosting cover crop radish, and absorbs soil nitrogen and other key nutrients with its unique taproot that grows 30" and deeper. CCS Crimson Clover converts atmospheric nitrogen into plant available nitrogen, helping reduce fertilizer input while improving soil health by adding organic matter. Maximum N is achieved at the first flowering of CCS Crimson Clover.

**FORAGE POTENTIAL**

Seeding rate 13 lbs. To maximize forage potential, harvest at early bloom.

VARIETY	% Moisture	%CP	% ADF	% NDF	NDFd	% Sugar	TDN	Nel	RFV
<b>DAYTONA</b>	87.9	18.8	21.8	30.3	---	13.8	69.2	.72	221

**CP** Crude protein

**ADF** Acid detergent fiber

**NDF** Neutral detergent fiber

**NDFd** 30 hour in-vitro neutral detergent fiber digestibility

**TDN** Total digestible nutrients

**NEL** Net energy lactation

**RFV** Relative feed value

These observations are based on reliable research, testing and verification. Data available on request. CoverCropSolutions.com



Tillage Radish®

Tillage Sunn™

CCS Sorghum  
Sudangrass

### THIS MIX IS EXCELLENT FOR:

- ✓ Reducing erosion (runoff, wind)
- ✓ Adding biomass
- ✓ Mulching for summer crops
- ✓ Summer N production
- ✓ Prevent plant acres
- ✓ Drought resistance

### Helps Restore Soil Health, Nematode Suppression, Biomass Production, Forage

HOMESTEAD is a true soil builder, helping restore soil health following challenging conditions like extended drought or flood. Tillage Sunn™ is a tropical warm weather legume that thrives in dry conditions and poor soil, and suppresses nematodes.

It can produce over 60 lbs of N in 6 weeks. CCS Sorghum Sudangrass adds plenty of biomass both in above ground and with its roots. Tillage Radish® is shaded by the two taller species during the summer and then springs to life at the first sign of cooler weather, soaking up massive amounts of N the Tillage Sunn™ produced and storing it for when the newly planted spring cash crop needs it most. Ideal for planting during the summer after small grains, prevent planting acres, or early harvested vegetable crops.

### PLANTING TIPS & SEEDING RATE

#### Planting:

Late spring after last frost to 8 weeks before first frost in fall

**Seeding Depth:** 1" Comparable seed on Drill chart is Wheat

#### Seeding Rate:

- **Drilling:** 15 lbs/acre

- **Broadcast / Aerial:** Not recommended

- **Precision Planting (15" with 4" in-row):** 12 lbs/acre

*(Kinze Brush Meter with Backing Plate - 60 Cell Soybean Plate)*

- **For Forage:** Increase rate to 30 lbs/acre

**Control:** Tillage Sunn™ and CCS Sorghum Sudangrass kill with the first frost. Tillage Radish® is winter killed with a few nights in the mid-teens. A quart of glyphosate and one pint of a 2,4-D product will control any Tillage Radish® that may not have been winter killed.

### FORAGE POTENTIAL

- To maximize forage potential seed at 30 lbs/acre.
- Can be used for grazing, multiple cut baleage or single cut silage.
- Cutting height minimum height of 6" if regrowth is desired
- First grazing or cutting should be approximately 45 days after seeding.
- For single cut silage moisture must be managed based on plant maturity or wilting.
- Ideal moisture content is 65% to 68%.
- Sudangrass should not be used as forage for grazing or silage if it has been frosted.
- **BE ALERT** To avoid potential toxicity, a crop suffering frost must not be utilized until at least two weeks of frost free weather have passed.

# Cover Crop Solutions Research Programs

At Cover Crop Solutions, the leader in cover crop seed varieties like the famous Tillage Radish®, we are conducting multi-year research focused on quantifying the economics of planting a shorter season corn in order to get cover crops planted earlier. The project is focused on a corn-bean rotation.

In 2011, we found that we could successfully grow shorter season corn hybrids. In fact, with a 103 day variety from T.A. Seeds we achieved strong yields, 194 bu/ac, compared with a 111 day variety yielding 163 bu/ac when grown under the identical conditions in the same field. This proved to us that some of today's short season (or early maturity) corn hybrids could be used to allow a longer growing window for fall-planted cover crops.

We already know how cover crops build soil health and provide myriad benefits. With cover crops and short season corn, just how short is short?

So, in 2012, we wanted to see just how early we could harvest a short season hybrid corn. Would yields and quality be respectable? What happens to cover crops when you give them more days to establish and mature? How does that affect soil health?

This year we were again surprised by the findings, with a couple of short season hybrids, an 83 day and an 92 day variety each showing strong yields. To us, this proves that it can be practical to harvest much earlier and spread out the harvest as farmers say. The idea is to plant your cover crops immediately after the corn harvest, giving those cover crops a great start.

Also, when corn prices are in flux, like they have been this year, you have a wider window when you can make your selling decision.

In 2012 we were able to take advantage of high corn prices in mid September, which then dropped over a dollar per bushel over the next few weeks.

*Special thanks to T.A. Seeds for letting us use their weigh wagon to measure these plots.*





## 2010-2011 Cover Crop Research

# Cover Crop Economics & Fertilizer Savings

Steve Groff Farm-Scale Cover Crop Research Results ■ Conducted at Cedar Meadow Farms, Holtwood, PA, by Steve Groff and staff



All data is per acre except where noted

	190.8 bu/ac 0 Units/N N Cost	205.6 bu/ac 60 Units/N N Cost	198.1 bu/ac 90 Units/N N Cost	196.9 bu/ac 120 Units/N N Cost
<b>Cover Crop</b> (N fertilizer; Seed + \$17.60 drill cost)	<b>\$46.80</b>	-	-	-
<b>Nitrogen</b> (Cost + \$12.00 application cost)	-	<b>\$59.70</b>	<b>\$83.55</b>	<b>\$107.40</b>
<b>Gross Profit / Acre</b> At \$7.00/bu Corn	<b>\$1,288.80</b>	<b>\$1,379.50</b>	<b>\$1,303.15</b>	<b>\$1,270.90</b>

Nitrogen input: 60/40 blend of Super U and Ammonium Sulfate, at \$0.795/lb

## Timing of Planting Tillage Radish® & Effect on Corn Yield

All data is bushels per acre



### OBJECTIVE:

Attempt to determine the latest practical planting date for Tillage Radish® (TR) to have a positive effect on yield for corn planting following Tillage Radish® grown as a cover crop.

Tillage Radish® Planted	Corn Yield bu/ac	Difference bu/ac
<b>Control</b> (no Tillage Radish®)	<b>136.75</b>	-
<b>Sept 20, 2010</b>	<b>149.21</b>	<b>+ 12.46</b>
<b>Oct 9, 2010</b>	<b>145.11</b>	<b>+ 8.36</b>

## 2012 Cover Crop Research

# Early Season Corn Hybrids & Earlier Cover Crop Planting

Steve Groff Farm-Scale Cover Crop Research Results ■ Conducted at Cedar Meadow Farms, Holtwood, PA, by Steve Groff and staff

### Research background and notes

### Short Season Corn Yield Research Results

- Fields were planted between April 16th and April 25th. Each direct comparison (field) was planted the same day.
- Each yield data point represents 3 replications of 4-30" rows 500 to 1,000 feet in length. Plant population at planting was 32,000 seeds per acre for each hybrid.
- Each field was fertilized according to need.
- Field moisture was adequate until the middle of June when it turned dry for 5 weeks. Then from the middle of July through harvest, moisture was adequate.
- All bushels are dry bushels. Each hybrid was harvested at optimal maturity between Sept 9 and Oct 1, targeting moisture around 21%.
- Research was conducted at Cedar Meadow Farm, in Southeastern PA. - USDA Plant Hardiness Zone 6B.

Field #	Shorter Season	YIELD	Mid Season	YIELD	Longer Season	YIELD	Avg. Yield in field
Field 1	83 day	207.41	95 day	212.12	107 day	178.47	199.33
Field 2	89 day	164.81	102 day	153.45	110 day	177.93	165.39
Field 3	92 day	155.74	102 day	144.25	111 day	158.07	152.69
Field 5	97 day	195.24	108 day	164.71	111 day	189.55	183.17
<b>Avg. Yield by Maturity</b>		<b>180.79</b>		<b>168.63</b>		<b>176.01</b>	
<b>Bu. Difference vs Longer Season Hybrid</b>		<b>+ 4.78</b>		<b>- 7.38</b>			

### Total Gross Value on Harvest Day

Local price of corn was \$8.40 at first harvest date of Sept 10th and dropped to \$7.78 the last harvest date of Oct 1st.

Field #	Shorter Season	YIELD	Mid Season	YIELD	Longer Season	YIELD
Field 1	83 day	\$1,742.16	95 day	\$1,781.64	107 day	\$1,388.73
Field 2	89 day	\$1,321.70	102 day	\$1,231.07	110 day	\$1,384.06
Field 3	92 day	\$1,248.71	102 day	\$1,157.29	111 day	\$1,230.02
Field 5	97 day	\$1,606.50	108 day	\$1,281.37	111 day	\$1,475.09
<b>Profit by Maturity</b>		<b>\$1,479.77</b>		<b>\$1,362.84</b>		<b>\$1,369.48</b>
<b>Difference in Gross Profit vs Longer Season Maturity</b>		<b>+ \$110.29</b>				

### Summary

- All costs associated with trial are the same for each replication except the cost of the seed, which does not necessarily correspond to each maturity and varies little.
- After each plot was harvested, a cover crop was planted within 1-3 days. In 2013, a single hybrid will be planted in each field.
- The previous replications will be used again to determine if the earlier established cover crop will effect the succeeding corn crop yield.
- 2011 results showed a 32 bu advantage of a replicated trial of a 103 day hybrid vs a 111 day hybrid.

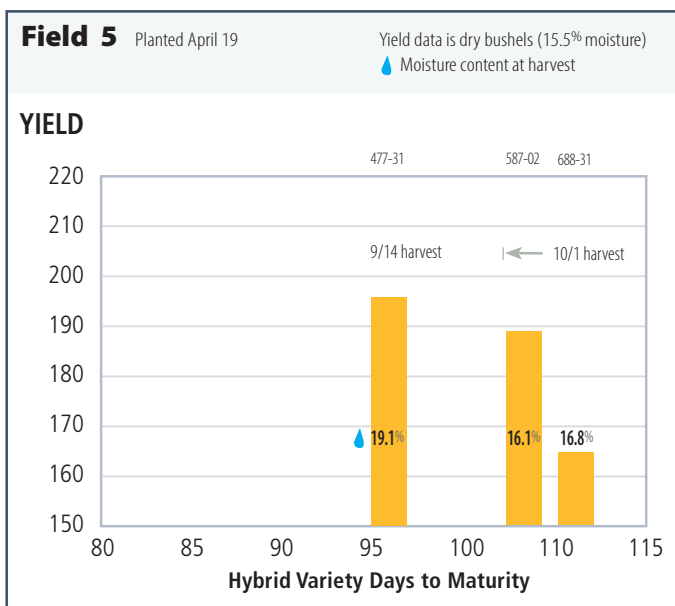
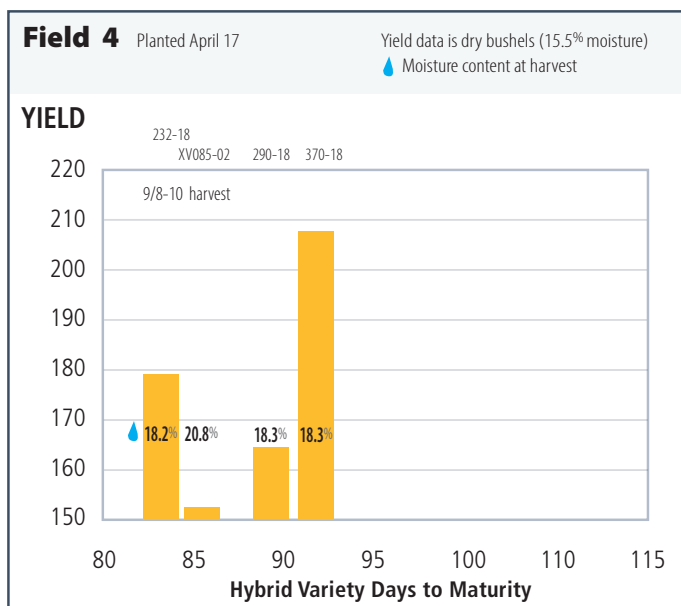
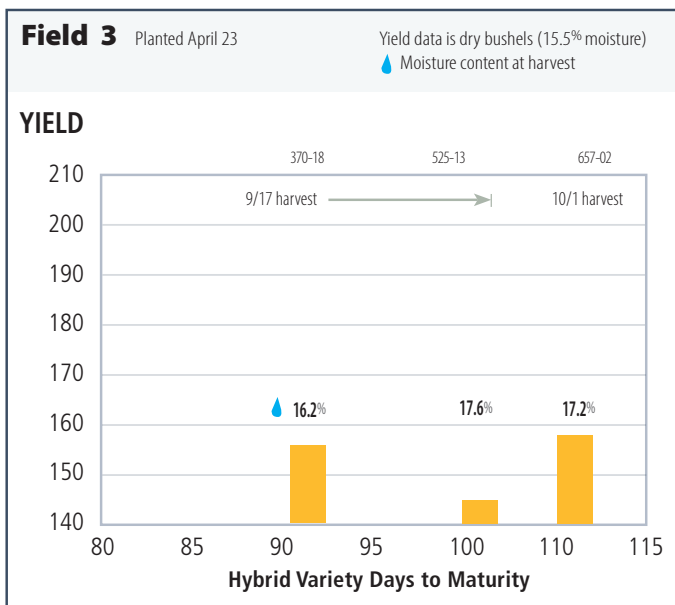
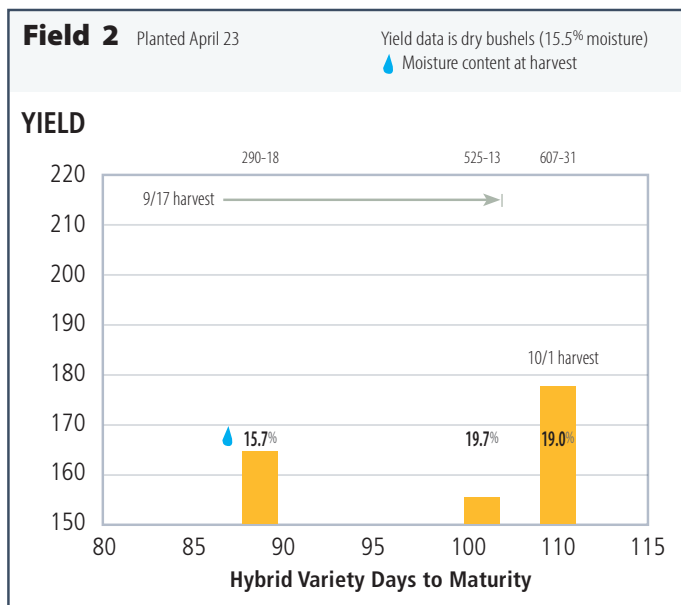
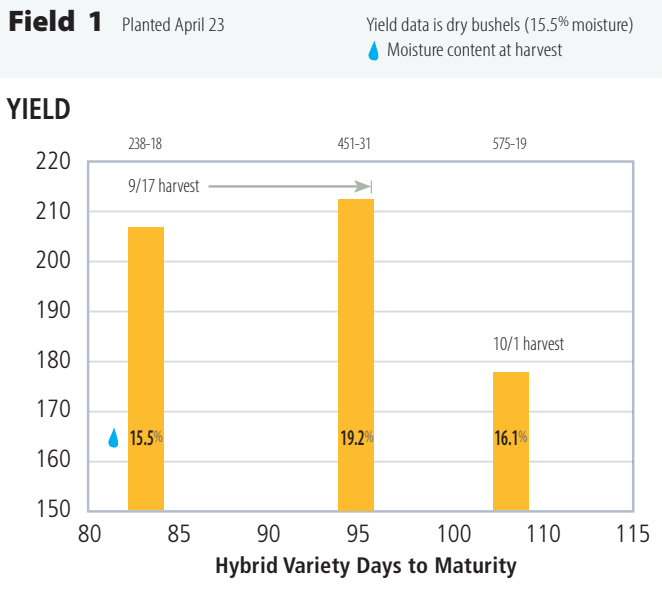


# 2012 Cover Crop Research Early Season Corn Hybrids & Earlier Cover Crop Planting

## Steve Groff Farm-Scale Cover Crop Research Results

Conducted at Cedar Meadow Farms, Holtwood, PA, by Steve Groff and staff

- Background: Cover crops provide more benefit, including building soil health, if they are planted earlier in the fall, immediately following corn harvest.
- The research objective was to determine if it is possible to allow earlier planting of cover crops following corn by the use of certain short season corn hybrids.
- Research was conducted at Cedar Meadow Farm, in Southeastern PA.
- Trials used only hybrid corn varieties (reference # above each bar) from T. A. Seeds.
- Each plot included three (3) separate replications; results are averaged.



## 2010-2011 Cover Crop Research

# Tillage Radish® and Timing

Steve Groff Farm-Scale Cover Crop Research Results ■ Conducted at Cedar Meadow Farms, Holtwood, PA, by Steve Groff and staff

### Research on Timing of Tillage Radish® Planting and Effect on Corn Yield

#### Objective:

Attempt to determine the latest practical planting date for Tillage Radish® (TR) to have a positive effect on yield for corn planting following Tillage Radish® grown as a cover crop.

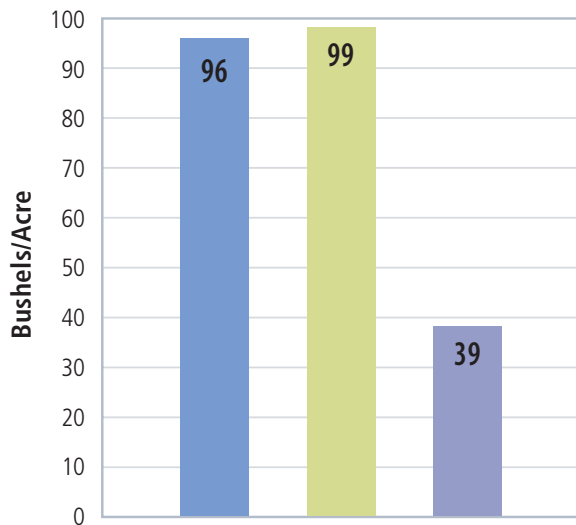
Tillage Radish® Planted	Corn Yield b/a	Difference b/a
Control (no TR)	136.75	–
September 20, 2010	149.21	+ 12.46
October 9, 2010	145.11	+ 8.36

## 2012 Evaluation for Cover Crops in a Dry Year (Illinois)

*All plots received normal fertility*

### Field Corn

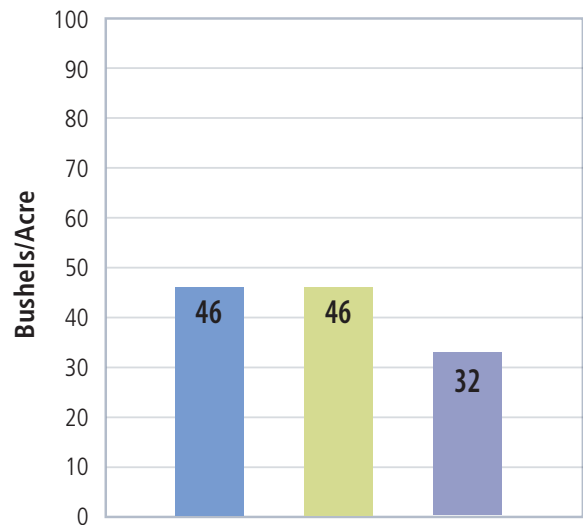
YIELD



■ Tillage Radish®  
■ TillageMax INDY™ Mix  
■ Control



### Soybeans

YIELD



■ Tillage Radish®  
■ TillageMax INDY™ Mix  
■ Control

2012 Cover Crop Research  
**2012 Soybean Yield Research**  
**(Dry Year - Illinois)**

	<b>Bare Field</b>	<b>23.5 bu/ac</b>
	<b>Tillage RootMax™</b> Certified Cover Crop Ryegrass™	<b>42.9 bu/ac</b>
	<b>TillageMax BRISTOL™ Mix</b> Tillage Radish® + Tillage RootMax™	<b>42.7 bu/ac</b>
	<b>TillageMax INDY™ Mix</b> Tillage Radish® + Tillage RootMax™ + CCS Crimson Clover	<b>54.3 bu/ac</b>

**2012 Corn Yield Research**  
**(Extreme Dry Year - Illinois)**

*Treatment yield bu/acre*

<b>Bare Corn Stalks</b>	<b>43.4 bu/ac</b>
<b>Tillage RootMax™</b> Certified Cover Crop Ryegrass™	<b>95.8 bu/ac</b>

**2012 Corn Yield Research**  
**(Extreme Dry Year - Illinois)**

<b>Tillage RootMax™ / Crimson Clover</b> Certified Cover Crop Ryegrass™ Late killed - poor management in dry spring	<b>25.6 bu/ac</b>
<b>TillageMax INDY™ Mix</b>	<b>139.0 bu/ac</b>
<b>Tillage RootMax™ / Tillage Radish® / Hairy Vetch</b> Certified Cover Crop Ryegrass™	<b>147.1 bu/ac</b>
<b>Tillage RootMax™ / Tillage Radish® / Hairy Vetch</b> Certified Cover Crop Ryegrass™ Early killed - planted on 30" radish row	<b>180.4 bu/ac</b>
	<b>Lsd .05 12</b>



## Farmers say, “It pays to use Tillage Radish®”

“Tillage Radish® is a bio sub-soiler. They are a good reason to park the steel!” — **Mike Phillips, Virginia**

“The ground where I’d planted Tillage Radish® in the fall was the mellowest I had this spring. I am tickled-to-death with them.”

— **Brian Melvin, Delaware**

“Real good stand last fall; this spring the field worked up just like it had been gone over with a rototiller. We disced twice and planted corn. The field looks lovely, even and green.”

— **Mike Steevers, Gadshill, ON**

“So much better than Oilseed Radish!”

— **Rod Secord, Secord Farms, Thamesville, ON**

“Last fall I used 2 pounds of Tillage Radish® when I planted the wheat. In the States, they are claiming a yield increase.”

— **Dave Van Raay, Charing Cross, ON**

“Tillage Radish® worked really well and I want more seed for this year.”

— **Dan Jantzi, Baden, ON**

“We absolutely loved what Tillage Radish® did to our mostly clay soils. We won’t need to subsoil as much anymore – the radishes really do the trick! Our best looking corn is where Tillage Radish® was planted.”

— **Lyle Tabb, West Virginia**

“Tillage Radish® was everything I expected. You can literally see a difference in the soil... Unbelievable!”

— **Gary Sweet, Ohio**

“It looks like it did the job!”

— **Gardiner Farm Inc., Kirkton, ON**

“In one pass, with Tillage Radish® at a reasonable cost, I got aeration, compaction reduction, erosion control, carbon addition, organic matter and a bio-stimulant. Corn on the field this year looks excellent.”

— **Dan Breen, Putnam, ON**

“We have been using Tillage Radish® as a cover crop for the past 4 years. The radish has done its bio-drilling, and seems to leave a “film” over the top of the ground that inhibits the spring weed flush. The field looks as if you have run an AerWay over the ground from the decaying radish holes. We feel the radish does help to reduce the compaction because of the aggressive root growth. We have seen roots in excess of 3 feet on our farms. We plan to plant over 500 acres of Tillage Radish® this year.”

— **Furmano Foods, Pennsylvania**

“It’s a keeper! We noticed right to the row the difference in how mellow the soil was where the plot of Tillage Radish® was planted.”

— **Eugene Lapp, Pennsylvania**

“We didn’t have to strip-till where Tillage Radish® was planted. They really softened up our clay soil! Also, our pre-side-dress nitrate testing indicated we didn’t need as much nitrogen where Tillage Radish® was planted.”

— **Patterson Farms, New York**

“I’ve planted Tillage Radish® for the last four years. They are a great addition for a diversified cover crop mix.”

— **Ray Styer, North Carolina**

“There were no winter annual weeds or crusting where Tillage Radish® was planted. We direct seeded our organic beets and had a great stand. For early spring planting there’s nothing like it!”

— **One Straw Farm, Maryland**



# Seed Planting Guide

800-767-9441

See CoverCropSolutions.com for latest Planting Tips



Scan for more planting info

Home of the Tillage Radish®

	Planting Window Weeks before Avg. First Killing Frost	Seeding Depth Inches	Drilled (7.5" rows) Seeding Rate Lbs/Acre	Comparable Seed on Drill Chart	Can use small seed box?	Broadcast Seeding Rate Lbs/Acre	Precision Planting (PP) 4" in-row spacing. Refer to bag label for seeds per lb.	(PP) 15" rows 4" in-row Lbs/Acre *
<b>Tillage Radish®</b>	3 to 10	.25 to 1	6	Alfalfa (reduce by 10%)	Yes	8-10	Small Sugar Beet Plate	4
<b>Tillage RootMax™</b> Certified Cover Crop Ryegrass	3 to 10	3/8 to .5	12	Tall Fescue (reduce by 20%), Crested Wheat Grass (reduce by 10%) or Annual Ryegrass	Yes	15	Kinze Brush Meter with Backing Plate (60 Cell Milo Plate)	10 (1.5" in-row)
<b>Phacelia</b>	March to May, Aug. to Sept.	.5	7	Alfalfa	Yes	Not Rec.	Not Rec.	Not Rec.
<b>Winter Forage Triticale</b>	4 weeks prior to first killing frost to 6 weeks after	1 to 1.5	60	Wheat	No	70	Kinze Brush Meter - 60 cell Soybean Plate (2" in-row) White - Wheat Plate	50
<b>CCS Sorghum Sudangrass</b>	Anytime after frost free date in Spring/8 weeks prior to killing in Fall	.75 to 1	25	Sudangrass	Yes	30	Kinze Brush Meter with Backing Plate	20
<b>Nitrogen Producing Cover Crop Legumes (Specific inoculants required)</b>								
<b>Tillage Sunn™ Sunn Hemp</b>	Anytime after last frost in Spring 8 weeks prior to first-frost date in Fall	.5 to 1	15	Wheat	No	Not Rec.	Small Sugar Beet Plate	9
<b>CCS Winter Pea</b>	3 to 10	1 to 1.5	40	Soybean	No	Not Rec.	Soybean Plate	26
<b>CCS Hairy Vetch</b>	2 to 10	.5 to 1.5	15	Vetch or Sorghum	No	20	Small Sugar Beet Plate	9
<b>CCS Crimson Clover</b>	3 to 10	.25 to .5	12	Crimson Clover	Yes	15	Not Rec.	Not Rec.
<b>CCS Lupin</b> Sweet Blue Lupin	3 to 10	1 to 1.5	40	Soybean	No	Not Rec.	Soybean Plate	30
<b>Exclusive TillageMax Cover Crop Mixes</b>								
<b>TillageMax INDY™ Mix</b> Tillage Radish® + Tillage RootMax™ + CCS Crimson Clover	3 to 10	.25 to 1	15	Tall Fescue (reduce by 25%), Crested Wheat Grass (reduce by 15%) or Annual Ryegrass	No	17	Kinze Brush Meter with Backing Plate (60 Cell Milo Plate)	12 (2" in-row)
<b>TillageMax BRISTOL™ Mix</b> Tillage Radish® + Tillage RootMax™	3 to 10	.25 to 1	12	Tall Fescue (reduce by 25%), Crested Wheat Grass (reduce by 15%) or Annual Ryegrass	No	15	Kinze Brush Meter with Backing Plate (60 Cell Milo Plate)	10 (1.75" in-row)
<b>TillageMax DAYTONA™ Mix</b> Tillage Radish® + CCS Crimson Clover	3 to 10	.25 to 1	10	Alfalfa	Yes	13	Kinze Brush Meter with Backing Plate (60 Cell Milo Plate)	8 (1.5" in-row)
<b>TillageMax DOVER™ Mix</b> Tillage Radish® + CCS Oats	3 to 10	.5 to 1	25	Oats	No	30	Kinze Brush Meter with Backing Plate (60 Cell Soybean Plate)	20 (5" in-row)
<b>TillageMax CHARLOTTE™ Mix</b> Tillage Radish® + Winter Forage Triticale + CCS Crimson Clover	3 to 10	1	40	Wheat	No	50	Kinze Brush Meter with Backing Plate (60 Cell Soybean Plate)	30 (5" in-row)
<b>TillageMax TALLADEGA™ Mix</b> Tillage Radish® + CCS Winter Forage Triticale	3 to 10	1	40	Wheat	No	50	Kinze Brush Meter with Backing Plate (60 Cell Soybean Plate)	30 (5" in-row)
<b>TillageMax HOMESTEAD™ Mix</b> Tillage Radish® + Tillage Sunn™ + CCS Sorghum Sudangrass	Anytime after last frost in Spring 8 weeks prior to first-frost date in Fall	1	15	Wheat	No	Not Rec.	Kinze Brush Meter with Backing Plate (60 Cell Soybean Plate)	12 (4" in-row)

**NOTE** CHARTS ARE ONLY A GUIDE. RATES ARE AFFECTED BY SEED SIZE AND QUALITY, EQUIPMENT CALIBRATION, WHEEL SLIPPAGE, SOIL FERTILITY AND RAINFALL, ETC.  
Not Rec. = Not Recommended

\* Reference 15" rows for alternating rows

Kinze Brush Meter\*\*- 7878 Milo Plate, D7879 Soybean Plate

\*\* Currently TillageMax Mixes™ can only be precision planted with the Kinze Brush Meter.

Kinze Brush Meters can be modified to fit other precision planters. Contact Kinze dealer for info.

Backing Plates for Kinze Brush Meters are currently off the market. Contact Larry Hak at 419-749-4021 for details.

Small Sugar Beet Plate - John Deere Pro or MaxEmerge Vacuum-A51712 (increase speed by 35%), Kinze Edge Vac-D17050, Kinze Brush Meter-GA5795, White-854047, Case/IH 1200 Series-236027A2 (Old Milo Drums improve population), Monosem-6020, Precision Planting (eSet Disc-720220 (run vacuum at 15"))

The Kinze Brush Meter is a precision planter engineered for mixes. Kinze has two numbers for each plate. One for ordering, another on the plate. While Kinze simplifies the system, use this reference when ordering.

Small Sugar Beet Plate Kinze Edge Vac **GD17050 (Yellow-D17050)**  
Milo/Sugar Beet Plate **GA5795 (Red-D7879)**  
Soybean Plate **GA5794 (Black-D7879)**

<p><b>GUIDELINES TO AERIAL SEEDING</b> When fields moist, fly seeds on. When fields dry, push seeds in.</p> <p><b>SEEDING RATE ADJUSTMENTS FOR DIFFERENT TECHNIQUES, BASED ON THE DRILLING RATE</b></p> <p><b>Broadcasting</b> Increase rate by <b>25%</b> <b>Aerial Seeding</b> Increase rate by <b>30%</b> <b>Forage Seeding</b> Increase rate by <b>50%</b> <b>Precision Planting</b> Decrease rate <b>10%-50%</b> <b>Late Planting</b> Increase rate <b>10-20%</b> <b>Weed Control</b> Increase rate by <b>50% or more</b> when weed control is the primary objective</p>	<p><b>GOVERNMENT FUNDING</b> Refer to program seeding guidelines</p> <p><b>FOR SEED BLENDS AND MIXTURES</b> To calculate a setting for seed blends and mixtures, add index settings for quantity of each seed to be sown.</p> <p><b>Example:</b> To sow 2 lbs of Tillage Radish® and 10 lbs of Tillage RootMax™ Cover Crop Ryegrass, use the index setting for each seed, add them together. Set shifter on the proper notch.</p> <p>Smaller seeds like CCS Crimson Clover require no adjustments.</p>	<p><b>FOR SEED BLENDS AND MIXTURES</b></p> <p><b>ADJUST CALIBRATION BASED ON APPARENT SEED WEIGHT</b></p> <p><b>INCREASE</b> index setting for seed lighter than average seed. <b>DECREASE</b> index setting for seed heavier than average seed.</p> <p>Approximate guide for ideal seeding depth is <b>6 to 8 times</b> the thickness of the seed. Refer to seed bag label for seeds per lb.</p>
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For more information or to find a dealer, call **800-767-9441** or visit **CoverCropSolutions.com**

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