



ANNUAL RYEGRASS AS A COVER CROP MANAGEMENT GUIDE

Annual Ryegrass Benefits

Seeding of Annual Ryegrass

Burndown & Control of Annual Ryegrass

Weed Control Tips

Forage Production Using Annual Ryegrass

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ANNUAL RYEGRASS AS A COVER CROP: DEEPER ROOTS, BETTER SOIL, BIGGER YIELDS

Growers in the Midwest have found at least eight distinct benefits when planting Annual Ryegrass as a cover crop.

Note: Annual Ryegrass (*Iolium multiflorem*) is not the same plant as cereal rye (*secale cereale*).

1. BREAKING UP NATURAL HARDPAN (FRAGIPAN) OR MANMADE COMPACTION

Natural hardpan or fragipan soil is found predominately in southern Ohio, Indiana, and Illinois. Annual Ryegrass roots will develop macropores through that layer over time when combined with continuous no-till. Here's how:

Plant Annual Ryegrass every fall and combine with continuous no-till. During the winter, Annual Ryegrass roots grow through the hardpan layer, which is typically a 4-6 inch layer found about 16" deep. After two to three years, Annual Ryegrass roots can go down 3-4 feet deep between planting in the fall and the following spring. In soils with more favorable subsoil, Annual Ryegrass roots can go down 5-6 feet in one to two years.

Annual Ryegrass roots create channels, or macropores, in the soil. When planting corn or soybeans into Annual Ryegrass residue the following spring, crop roots follow these macropores deep into the subsoil, reaching moisture under the compacted layers that normally is not available. Corn and soybean roots will not penetrate these layers by themselves.



In a dry year, an Annual Ryegrass cover crop will enable significantly higher yields due to the additional moisture being available. Without deep rooting Annual Ryegrass, crops are more susceptible to moisture stress in drought conditions. Planting Annual Ryegrass for two years will do a better job of breaking up soils compacted by tillage or implement traffic than running a ripper through it. Running a ripper and then planting Annual Ryegrass will do a better and quicker job of breaking up compaction in one year than either alone. Results (depth of root penetration, increase of organic matter, increases in yields) will vary depending on location and soil type.

2. IMPROVING NUTRIENT CYCLING, PRIMARILY NITROGEN

The high price of nitrogen (N) has growers looking for ways to be more efficient and cut costs. Using Annual Ryegrass may provide up to 30-90 lbs/ac or more of N for the following crop (actual amount will depend on field history and burndown timing). N in the soil is recycled through the Annual Ryegrass and much of it is available for the following crop.

This benefit alone could more than pay for the cost of your Annual Ryegrass seed. Adding Annual Ryegrass to continuous no-till will also increase the rate which organic matter increases in the soil. An increase in organic matter will result in more N being available over time. Likewise, after several years, phosphorus that has been unavailable in the soil may become available as P_2 is transformed to P_1 due to increased soil biological activity.

3. IMPROVING NUTRIENT CYCLING AFTER MANURE APPLICATION

Growers applying manure need to keep these nutrients on their fields and out of water bodies. Annual Ryegrass helps keep the nitrogen and phosphorus in the soil profile and available for the crop the following year. The amount of N actually available will depend on a number of factors.

Field trials done on Midwest farms have documented 100 to 140 lbs/ac (actual amount will depend on growing conditions and time of burndown) of N being taken up by the Annual Ryegrass crop by early April, after application of 6,000 gallons/acre of liquid hog manure. Estimates are that between 70-80 percent of this N (under normal weather conditions) will be available around the first of July (time of maximum N uptake for corn). Total nitrogen uptake may vary from 300 to 700 lbs/ac by early June depending on growing conditions. Growers who empty their pits, lagoons or spread dry manure after wheat harvest or after corn silage are prime candidates for adding Annual Ryegrass to their manure management system.

4. GROUND COVER AFTER HARVESTING CORN SILAGE, WHEAT OR VEGETABLES

The earlier harvest and lack of field residue makes Annual Ryegrass a good fit after corn silage and vegetables. It will provide cover to reduce erosion, break up compaction and scavenge nitrogen in the soil profile. It is also a good fit after wheat harvest in the upper Midwest where it is too far north to plant double-crop soybeans.

5. REDUCE SOYBEAN CYST NEMATODE POPULATION

Results over the past five years, in university field trials and on farms, indicate that Annual Ryegrass may significantly reduce soybean cyst nematode populations.

Annual Ryegrass roots produce a chemical which causes soybean cyst nematode eggs to hatch in the fall. As Annual Ryegrass is not a suitable “host” plant, the nematodes then starve. Additional research is needed to determine the interaction with soil temperature and days of Annual Ryegrass growth in the fall to determine effectiveness. Some growers with known high soybean cyst populations have reported a “significant” yield increase (8-10 bu/ac) but replicated research is needed to confirm this.

6. SPEEDING UP THE SOIL'S TRANSITION TO CONTINUOUS NO-TILL

When converting to no-till or acquiring a farm that is new to no-till, it often takes about five years to change some key soil properties, for example: aggregate stability, organic matter, infiltration rate, pore space, fungi populations, etc. Adding Annual Ryegrass as a cover crop may reduce this transition period by two or three years. Again, your results will depend on where you farm and your soil type.

7. USE ANNUAL RYEGRASS AS A FORAGE AND AS A COVER CROP

Growers who plant early (in August) after wheat or corn silage may be able to graze or take a cutting of haylage in the fall and possibly in the spring and then plant directly into the Annual Ryegrass (after it has been burned down).

This will provide high quality forage - 1.5 to 4 tons/ac - and over 20 percent protein if manure has been applied. Growers in southern Ohio, Indiana, Illinois, Kentucky and Missouri may be able to graze the Annual Ryegrass over much of the winter or take a cutting of haylage in the spring.

8. INCREASED CORN AND SOYBEAN YIELDS

Results on farms, especially in years of dry weather, show that use of Annual Ryegrass as a cover crop increases yields if properly managed. Results will vary depending on soil type and weather conditions. More information on this benefit is covered as a separate topic elsewhere in this guide.



Annual Ryegrass reduces the need for tilling, thus reducing tractor hours and the amount of fuel used.



Growers who plant after wheat or corn silage may be able to graze or take a cutting of haylage in the fall or spring.



With Annual Ryegrass, corn production more than doubled that planted with no cover crop in a dry year.

SEEDING OF ANNUAL RYEGRASS AS A MIDWEST COVER CROP

Planting Annual Ryegrass as a cover crop is relatively easy... but, there are variables you must consider to optimize success. A flexible strategy that may vary from year to year may reduce risk and increase the likelihood of a successful experience.

SEEDING DATE

The ideal time to plant Annual Ryegrass is from mid-August to the end of September. Seeding in southern Indiana, Illinois, and Ohio can be pushed to mid-October in most years. A September planting is preferred in the central Midwest (generally speaking, between I-80 and I-70), where winter comes earlier and where snow cover is inconsistent. In the northern Midwest, north of I-80, snow cover generally protects the Annual Ryegrass.

Annual Ryegrass will germinate in 7-10 days with sufficient soil moisture. Dry soil conditions will delay germination and early growth. Ideally, **Annual Ryegrass needs 60 days of growth before a hard killing frost.** Snow cover over the winter reduces winterkill.

SEEDING METHODS

1. A **no-till drill** (main box works fine) is the preferred seeding method as it provides optimal seed-to-soil contact. It should be planted about ¼-½ inch.

2. **Aerial** seeding into a standing crop just prior to leaf drop (moist soils and/or rainfall is needed for germination). Seeding with airplane or helicopter, you may see skips due to the light seed weight. Annual Ryegrass seed only weighs 27 lbs/bu.

3. **Airflow** - seed mixed with fertilizer (provides even distribution).

4. Broadcasting

A. Using a fertilizer truck with spinner may result in an uneven seeding pattern. The Annual Ryegrass seed will only spread half the distance as fertilizer because of the seed weight. To get uniform seed distribution, you'll need to split the middles.

Running a fluffing harrow (like a Salford, Phillips, Phoenix, TurboTill, or To the Max) after the airflow (or broadcasting the seed with an airflow mounted on the tool) will cover some of the seed with soil and residue. However, dry soil conditions will delay germination and early growth. Running a cultipacker with these tools, or after seeding, will improve seed-to-soil contact.

B. sprayer with spinner boxes added.

5. **Mix the Annual Ryegrass seed with liquid manure** and use a rolling tine aerator (AerWay) to provide some incorporation.

All of these seeding methods will work (with rain) and some are more efficient. For example, in dry soil conditions or if seeding in early October, it is **highly recommended** that a drill or cultipacker be used to provide good seed-to-soil contact. Evaluate current and upcoming weather conditions, soil moisture conditions and recommended seeding dates to increase your odds of success.

6. Dormant Seeding

Using a no-till drill (preferred) or other methods, dormant seed in late November through early February. Some growers have had good stands in the spring using a dormant seeding, whereas an October seeding resulted in germination but left the Annual Ryegrass too small to overcome harsh winter weather. Snow cover helps. However, burndown of a dormant Annual Ryegrass



Growers who plant after wheat or corn silage may be able to graze or take a cutting of haylage in the fall or spring.



Overseeding soybean.

seeding may need to be delayed until late April in order to obtain the desired benefits; deeper rooting, N uptake and, perhaps, a spring forage crop. (See Benefits section of this guide.)

SEEDING RATE

Annual Ryegrass is normally seeded at 12-20 lbs/ac but increase the rate to 20-35 lbs/ac if aerial or broadcast seeding, seeding in October or using a dormant seeding. If drilling, the lower application rate can be used if seeding early. Use the higher seeding rate if forage is desired. Note: Drill setting for Annual Ryegrass at 20 lb/ac is the equivalent drill setting for tall fescue at 15 lbs/ac.

FALL BURNDOWN

If winter annuals are present at planting time, or if the field has a history of winter annuals, then a burndown herbicide (glyphosate and/or 2,4-D) should be applied prior to planting the Annual Ryegrass. Or 2,4-D can be applied after the Annual Ryegrass has reached the 2-leaf stage. Winter annuals will compete aggressively with the Annual Ryegrass the following spring if allowed to have a head start in the fall. A burndown should also be applied before planting wheat in a field that has had Annual Ryegrass in it, to eliminate any possibility of volunteer Annual Ryegrass.

NITROGEN

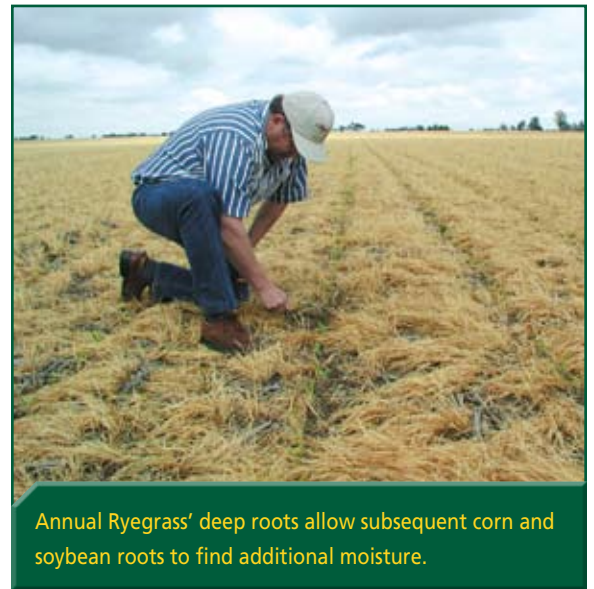
Apply 30-50 lb/ac of nitrogen (N) to stimulate fall growth unless the field has been in continuous no-till over five years or has had manure applied in the last 2-3 years. Broadcasting 150-200 lbs/ac of DAP is one option to do this. Apply at the higher rate if Annual Ryegrass is to be used as forage. Fall growth of Annual Ryegrass will double if N is applied and the N will still be available to the crop the following spring. This is especially important if seeding in October.

EXPECTED GROWTH

If seeded after harvest but within suggested dates (see above) you can expect 2-4 inches of top growth before a freeze, and more than that in southern Indiana, Illinois and Ohio. An earlier planting date (especially if manure was applied) may see 10-16 inches of growth (high quality forage). Snow cover in northern areas will help protect Annual Ryegrass from winterkill.

SPRING: depending on location, spring weather conditions and amount of nitrogen applied, Annual Ryegrass typically will be 6-12 inches tall in early to mid-April. Even a thin stand of Annual Ryegrass with minimal fall growth may tiller and, with good early spring weather conditions, may be 4-8 inches tall at the time for the burndown to be applied. However, poor fall growth may increase the chances of winterkill and, if the late winter/early spring weather is not favorable, then you may be disappointed by the Annual Ryegrass stand and amount of growth.

Annual Ryegrass doesn't go truly dormant in the winter. However, top growth basically stops at about 37 degrees F. Meanwhile, root growth – depending on weather, soil type and geographic location – can be substantial – sometimes growing throughout the winter to depths of 48-60 inches.



BURNDOWN & CONTROL OF ANNUAL RYEGRASS; WEED CONTROL TIPS

Decisions about burndown need to consider: calendar date, Annual Ryegrass height, air temperature, and soil moisture. Complete burndown may take two to three weeks if it occurs at a time when there is cool and cloudy weather and the Annual Ryegrass has reached the joint stage. Expect two burndown applications to kill all Annual Ryegrass under these conditions.

Burndown Guidelines

TIME OF APPLICATION

COOL CONDITIONS – Lows in the 30s/40s and daytime highs in the 40s/50s

- Glyphosate doesn't translocate very well in Annual Ryegrass in cool temperatures. It may take 2-3 weeks to completely kill Annual Ryegrass (if it completely dies). Don't be surprised if you need a second burndown application if initially applied under cool conditions.
- Spray after the dew is dry and stop by mid-afternoon in order to allow a minimum of 3-5 hours of sunlight to improve herbicide translocation.
- Spray on a sunny day if possible.
- **Reduce carrier from a normal 15-20 gal/ac to 7-10 gal/ac.**

WARM CONDITIONS

- Warmer day and night temperatures will improve the performance of glyphosate - **ONE APPLICATION SHOULD TAKE IT OUT!**
- A minimum daytime temperature in the 50s and nighttime temperature in the 40s is needed for decent translocation of glyphosate.
- One night of mid-30s should not drastically affect performance.
- Cloudy and cool weather may slow glyphosate translocation.

APPLICATION RATE

- **Glyphosate** (Roundup) – use full rate or 32 oz/ac. (Check glyphosate formulation and label instructions).
- Add 8 oz/ac of 2,4-D to help control winter annuals.
- Carrier – **only apply 7-10 gals/ac with cool conditions**; applying more than that dilutes the glyphosate and reduces performance under cool temperatures.
- Add appropriate amount of AMS to adjust the water's pH.
- Add 0.25 percent more surfactant if using generic glyphosate.
- Adding crop oil decreases glyphosate uptake.

FOR MORE INFORMATION:

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OTHER HERBICIDES

- **Simazine** or **Princep** can be added to the glyphosate tank mix:
 - Simazine requires at least two inches of rainfall for full activation.
 - Annual Ryegrass will tiller and start growing again if insufficient rainfall occurs to fully activate the Simazine.
 - Simazine is absorbed by the new shoots and prevents them from growing.
- **Basis** – 1/3 oz may provide additional residual control.
- Neither **Atrazine** nor **28 percent N** should be added to the glyphosate tank mix. These products cause leaf burn and reduce glyphosate absorption.
- **Atrazine** can be applied 14-21 days after glyphosate. Application at a rate of 2-2 ½ lbs/ac plus crop oil. **Atrazine** needs 1-2 inches of rainfall for activation.

NOZZLES

- Flat fan nozzles should be used at 20-40 psi.
- **DO NOT** use flood jet nozzles.
- Do not use an air induction sprayer.
- Excessive boom bounce can cause improper overlap and result in “streaks.”

WATER

- Water should be free of any clay particles (pond water) which will tie up the glyphosate.
- A softening agent may enhance performance if hard water is being used.

TIPS FOR USING GRAMOXONE AS A BURNDOWN

- Provides a quicker burndown but does not translocate.
- Apply at 30-40 psi with 20-40 gal/ac of **carrier** using flat fan nozzles:
 - Larger volume is needed for taller Annual Ryegrass.
 - Use clean water as a carrier, free of clay particles.
 - 28 percent N or other clear liquid fertilizer can be used as a carrier.
- Add non-ionic surfactant.
- Simazine or Atrazine added to the tank mix reduces uptake and results in a slower kill.
- Add crop oil to mixture and 8 oz/ac of 2,4-D to help kill winter annuals.

ORDER OF MIXING

- Fill spray tank one half full of carrier.
- Begin tank agitation and continue while mixing and spraying.
- Add any dry and then liquid formulations.
- Add either Glyphosate or Gramoxone to tank.
- Then add non-ionic surfactant.
- Fill remainder of tank.

OPTIONS FOR A SECOND APPLICATION OF HERBICIDE, IF NEEDED

- If glyphosate tolerant crops were planted, wait until there is 2-4 inches of Annual Ryegrass re-growth before spraying glyphosate again.
- Conventional corn options - Annual Ryegrass should be less than 6 inches in height with a temperature at least 70 degrees.
 - **Atrazine** (2 to 2 ½ lb/ac) and crop oil.
 - **Steadfast** - ¾ oz/ac, include 1 percent adjuvant, 2.0 qts/ac of 28 percent N, crop oil concentrate, and 15 gal/ac water; apply at 20-40 psi with flat fan nozzles.
 - **Option** - 1.5 oz/ac; include 1.5 pts adjuvant, 1.5-2.0 qts/ac 28 percent N. Yellowing of corn may occur; use of organophosphate insecticide may increase crop injury - see label.
 - **Accent** – 2/3 oz/ac; can be used on bigger corn; include 1.0 percent adjuvant, 2.0 to 4.0 qts/ac of 28 percent N, crop oil concentrate.



Flat fan nozzles are best for burndown application on Annual Ryegrass.



Converting to no-till with cover crops requires new management know-how.

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FORAGE PRODUCTION USING ANNUAL RYEGRASS

Annual Ryegrass 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 Annual Ryegrass 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. Annual Ryegrass is also high in protein and contains significant amounts of vitamins and minerals. Annual Ryegrass harvested before the joint stage (with sufficient N applied) can have **protein levels from 20-28 percent**. After jointing, protein level will decrease as the amount of biomass increases.

SEEDING DETAILS

Follow general recommendations for using Annual Ryegrass 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 ARG AS A COVER CROP

- 20-25 lbs/ac if drilled early.
- 25-30 lbs/ac if seeded later.
- 25-35 lbs/ac if broadcast.

NITROGEN – A MUST

- Annual Ryegrass is a nitrogen scavenger but needs an adequate amount of nitrogen in order to produce high quality forage.
- Planting Annual Ryegrass 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 Annual Ryegrass seedlings as it may be smothered or burned by the manure's salts.

HARVEST MANAGEMENT

- Annual Ryegrass can be harvested for haylage, greenchop, or it can be grazed. Two to six tons/ac can be expected, depending on seeding date, fertility and weather conditions.
- It does not present endophyte fungus problems as do some tall fescues.
- For optimum yield and haylage quality (TDN, protein content, digestibility, etc.) cut the Annual Ryegrass when the plant is between the boot and early head stage.
- For grazing and greenchop, start when the Annual Ryegrass is 8-10 inches tall (light grazing when Annual Ryegrass 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 Annual Ryegrass 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 Annual Ryegrass has a waxy leaf coat and it makes a dense swath that is difficult to get air through, thus slowing the drying process.

If Annual Ryegrass vegetation is removed, then little, if any, nitrogen can be expected for the following corn crop.

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