

ANNUAL RYEGRASS AS A COVER CROP

in Midwest Corn and Soybean Production

MANAGEMENT RECOMMENDATIONS

Mike Plumer, Agronomist and Cover Crop Specialist, Illinois ◦ *Mark Mellbye, Agronomist, Oregon Seed Industry*
Dan Towery, Conservation Cropping Systems Specialist, Indiana ◦ *Andy Hulting, Weed Scientist, Oregon State University*



Annual ryegrass is a vigorous cool-season grass with an extensive root system. As a cover crop, annual ryegrass helps prevent erosion, builds soil organic matter, improves soil tilth, captures residual nitrogen and can significantly increase the rooting depth of corn and soybeans. This guide covers the management practices essential to growing a successful annual ryegrass cover crop – time-tested strategies from more than 13 years of on-farm testing in the Midwest.

Using annual ryegrass as a cover crop requires proper management. It must be seeded in a timely manner, at the proper rates and it must be controlled on time so that it does not compete with corn or soybeans.

When to Seed Annual Ryegrass

Seeding date is an extremely important factor to ensure establishment and growth of annual ryegrass before winter. Annual ryegrass establishes and grows rapidly when late summer temperatures exceed 55°F, but it is slower to establish than winter wheat or cereal rye when soil and air temperatures are cooler in late-September and October. Annual ryegrass may need to be seeded aurally or with a high clearance seeder before harvest. It can be seeded into green corn but harvest should occur within 6 weeks of seeding. If ryegrass is seeded after harvesting corn and soybeans, do so as soon as possible.

- From I-70 south, seed between September 10 and October 1.
- From I-70 north, seed between late August and September 15.



Annual ryegrass adds forage value and is an excellent spring ground cover.

Herbicide carryover concerns

Damage to fall planted cover crops from herbicide carryover has become a major issue. The problem is due to the increasing weed resistance problems, use of higher herbicide rates and more residual herbicides. Many cover crop establishment and over wintering failures were due to corn/soybean residual herbicides. Check product labels - some herbicides have 12-24 month restrictions to planting cover crops. (For more information go to RyegrassCovercrop.com/publications).

SUMMARY

PLAN AHEAD: In the spring, select corn and soybean herbicides based on what cover crops you intend to plant that fall. Residual herbicide carryover can damage fall seeded cover crops.

PLANTING DATE: An early fall planting date is very important. Annual ryegrass is fast to emerge while the weather is still warm, but slower than cereal rye or winter wheat later in the fall as soil temperatures cool.

SEEDING RATE: 12-25 lb/acre depending on planting date, method, and location. Use higher rates with broadcast or aerial seeding, with later planting dates or for forage.

VARIETY: Seed an annual ryegrass variety that has been tested in the Midwest and is suitable for cover crop plantings.

CONTROL TIMING: Apply burn-down herbicide when plants are actively growing, usually late March to mid-April. Thorough coverage is important.

HERBICIDE: Use an adequate rate of glyphosate (1.25 - 1.5 lb a.e./acre) and a medium spray pattern. Spray at least 4 hours before sunset and when soil and air temperatures are warm enough for good herbicide activity.

Variety Selection

Select a variety that has been tested in the Midwest and is suitable for cover crop production. Annual ryegrass varieties vary in how fast they emerge and in how winter hardy they are. As a species, annual ryegrass is less tolerant of cold weather than cereal rye or winter wheat. Even if a variety is marketed as “winter hardy,” it may not survive winter as well as cereal rye. Snow cover generally aids winter survival.

Annual ryegrass varieties have not shown any allelopathic effects on corn or soybeans. Rooting depth varies among varieties, but all have a fibrous root system that is an excellent soil builder and nutrient scavenger. Annual ryegrass produces less above ground biomass compared to cereal rye and is easier to establish using broadcast and aerial methods of seeding.

Seeding Methods

No-till drilling provides good seed-to-soil contact and is a dependable method to establish an annual ryegrass cover crop. The seed should be planted at a rate of 12-15 lb/a at a depth of ¼” to ½”. Another method that can be used is broadcast seeding, using a higher seeding rate of 20-25 lb/a. Experienced growers in



Seeding annual ryegrass into standing corn with an interseeder.

the southern corn belt have found that a lower seeding rate also works well under good growing conditions. Use the higher rate of seeding on fields new to annual ryegrass or if you are new to using this species as a cover crop.

Broadcast seeding with an airflow spreader results in a uniform spread of seed and allows annual ryegrass to be mixed with fertilizer, typically 100 lb of 0-0-60. This reduces the time and expense that no-till drilling requires.

The main drawback with broadcast seeding is that annual ryegrass emergence is weather dependent and requires additional seed. Drilling the ryegrass ensures quicker germination and emergence (7-10 days) compared to broadcast methods which rely on rainfall. Drilling also results in better root development and allows for a later planting date.

A variation of the airflow broadcast seeding method is the use of a fan spreader buggy or truck. Annual ryegrass weighs only 26 lb/bu and will not spread as far as fertilizer. Fan spreaders require that everything be applied at half the rate and double spread to ensure that the ryegrass seed is uniformly distributed. Mixing a quart of crop oil with the fertilizer and annual ryegrass helps the seed stick to the fertilizer and improve spread pattern.



Loading annual ryegrass seed for aerial seeding.

Aerial Seeding

Aerial seeding is one way to get annual ryegrass established earlier in the growing season. Use a rate of 20-25 lb/a when aerial seeding. In standing corn, aerial seeding can be done in green corn but is ideally done 4-6 weeks ahead of harvest. Seed after the leaves have turned yellow and 50% sunlight passes through the canopy. Make sure the pilot has calibrated his plane so the width of the spread pattern does not leave streaks or gaps.

Aerial seeding into standing corn is a standard practice north of I-70 to ensure timely emergence and increased winter survival. Although aerial seeding does not provide the good seed-to-soil contact obtained with a drill, planting the ryegrass 4-6 weeks before corn harvest (typically mid-August to mid-September) may provide more total fall growth and better root development. However, too long of a time between germination and corn harvest may cause loss of the stand.

In soybeans, aerial seeding has been somewhat more inconsistent than in standing corn. Generally it needs to be done when the

soybeans are turning yellow and the first leaves are falling off the plants. The soybean leaves then act as a mulch on top of the seed. However, too heavy a layer of leaves may suppress the emerging seedlings. Bottom line – aerial seeding into soybeans works most of the time but not always.

Annual ryegrass has been seeded into standing corn and soybeans with excellent results using high clearance seeders (e.g. modified “Hi-Boy” sprayer retrofitted to be a seeder). Seeding just before a rain generally results in a very good stand using these types of seeders.

Seed Into Weed Free Fields

Fields need to be free of established weeds when annual ryegrass is seeded. During the fall, winter annuals are becoming established and are very difficult to detect. Henbit, purple deadnettle, chickweed, cheat, downy brome and winter barley can become very competitive with the germinating annual ryegrass. If the field has a history of winter annuals, a herbicide application before planting will ensure a clean field and quick start for the annual ryegrass.

In fields where marehail is a problem, a late fall application of 2,4-D ester or Banvel when the annual ryegrass has reached the 3-leaf stage is effective. .

Growth and Rooting Depth

If planted in a timely manner, annual ryegrass top growth can reach 6” before winter, with root growth much deeper. If seeded later, the cover crop plants may not develop more than 2 or 3 leaves prior to cold conditions in winter. The stand may look thin and poor, but will develop roots during warm periods over the winter and will grow rapidly in the spring. Annual ryegrass in NW Indiana only 2” tall has had roots measuring 21” deep.

There is a potential for winterkill if wind chills of -20° to -30°F occur without snow cover. Even if dieback occurs, the deep rooting of annual ryegrass will still be beneficial.

Annual ryegrass with only 2 leaves by December has had measured root development 10-14” deep in fragipan soils and deeper in less restrictive soils. By mid-April and sometimes earlier, most of the annual ryegrass root growth has occurred. Annual ryegrass top growth is normally 8-12” when these rooting depths have been measured:

- Rooting depths in first year no-till fields has been 28-31” for fragipan and claypan soils and 36-48” in better soils.
- After 3 years of no-till crops and ryegrass cover crops each year, the rooting depth of the crop and ryegrass has been increased to 45-60” deep.

Soybean Production

The use of Roundup Ready soybeans makes controlling an annual ryegrass cover crop much easier. However, in conventional soybean production or after the soybean crop emerges, escapes can also be controlled by applying full rates of SelectMax (clethodim), Poast Plus (sethoxydim) or Fusilade DX (fluazifop) making sure to use fertilizer and surfactant or crop oil (COC) concentrate as per label instructions. These products have shown some lack of control if applied in cold temperatures.

Corn Production

Never tank-mix atrazine or Callisto (mesotrione) with glyphosate or annual ryegrass control can be reduced as much as 40% due to antagonism. If planting corn, adding 1 lb a.i./a Princep (simazine) improves weed control, but may be a concern on sandy soils. Adding Princep, Balance Pro (isoflutole), Prowl H₂O (pendimethalin), Resolve Q (rimsulfuron) or Basis Blend (rimsulfuron + thifensulfuron), 2,4-D, Zidua (pyroxasulfone) or Axiom (flufenacet + metribuzin) at full label rates has shown good activity for increased ryegrass and general weed control. Herbicide efficacy trials have not shown any antagonisms between these products and glyphosate in the control of annual ryegrass.

Full rates of Ignite or Liberty (glufosinate-ammonium) and Gramoxone (paraquat) have provided 70-85% control of ryegrass before nodes are formed and less control after the 1-2 node growth stage. Two applications of these products 3 weeks apart (allowing for regrowth and retillering) have provided much better control. After the crop emerges, escapes can be controlled in corn with labeled rates of Accent Q (nicosulfuron) or Option (foramsulfuron), but best control is obtained with these products when temperatures are above 70 degrees. Glyphosate can be used in Roundup Ready crops.

Winter Wheat Production

Annual ryegrass can be very competitive in winter wheat. Some ryegrass seed may remain in the soil for several years after using it as a cover crop for corn or soybeans. If winter wheat is grown, growers should be prepared to use a burn-down and soil residual herbicide, followed by a selective post-emergence grass herbicide.

- If annual ryegrass has emerged before planting winter wheat, use a burn-down herbicide application of glyphosate, paraquat, or clethodim.
- Consider the use of a residual herbicide to control annual ryegrass that emerges with the winter wheat. Pre-emergence or early-postemergence applications of Axiom (flufenacet + metribuzin), Zidua (pyroxasulfone), Anthem Flex (pyroxasulfone + carfentrzone) or diuron are effective on annual ryegrass.
- Plan on using a selective post-emergence grass herbicide. PowerFlex HL® (pyroxsulam), Osprey (mesosulfuron), or Axial XL® (pinoxaden) can be used to control annual ryegrass when it is in the 2-3 leaf growth stage. All three of these herbicides may be tank-mixed with broadleaf herbicides and provide excellent control of annual ryegrass.

If the crop rotation plan is to double-crop soybeans following winter wheat harvest, pay close attention to the plant-back intervals for these herbicides. Use fall or late winter application timings in the winter wheat to limit the potential for herbicide carryover in the double-crop soybeans. (For more information go to RyegrassCovercrop.com/publications).



Mike Plumer measuring root depth

Management Summary

The use of annual ryegrass as a cover crop requires fine-tuned and timely management, but can result in some significant benefits to the corn and soybean grower. Poor management of this cover crop increases the potential for reduction in subsoil moisture, negative effects on crop yields or increased costs. A well-managed annual ryegrass cover crop allows for greater crop rooting depth, improved soil aggregation, scavenged nitrogen, reduced erosion and increased moisture holding capacity. Annual ryegrass helps maintain or increase soil organic matter. The effect on yields of corn and soybeans depends on the soil type and year. In years of drought or low summer rainfall, however, crop yield responses have been significant because of adding annual ryegrass to the rotation.

AUTHOR BIOGRAPHIES

Mike Plumer. Mike has worked with no-till production and cover crops, including annual ryegrass, for over 30 years as a industry consultant and an Extension field crops agent with the University of Illinois.

Mark Mellbye. As an Extension field crops agent with Oregon State University, Mark has worked with annual ryegrass in the seed production region of Oregon for 25 years.

Dan Towery. Based in Indiana, Dan has extensive experience in conservation farming practices in the Midwest, including work with the Conservation Cropping Systems Initiative.

Andy Hulting. Dr. Hulting is the Extension Weed Management Specialist with Oregon State University. His research includes work on annual ryegrass control.



P.O. Box 3336, Salem, OR 97302

Ph: (503) 364-2944 • Fax: (503) 581-6819

ryegrasscovercrop.com

Paid for by the Oregon Ryegrass Growers Seed Commission, an agency of the State of Oregon.



Annual Ryegrass Cover Crop Control

Control of the annual ryegrass cover crop is best done when the plant is small, 6-9" in height, and preferably before the first node has developed. Typically, this has corresponded to late March to late-April depending on weather and farm location. Annual ryegrass can be more difficult to control after the first node has developed, although control through heading is not difficult with good management. Warm temperatures and actively growing plants are a must for effective control.

Thorough spray coverage using medium spray droplet sizes and moderate spray pressures is critical to achieving control. The use of air induction spray systems or nozzles that produce **coarse** droplets should be avoided. Reduce spray application volume to 8-12 gallons per acre.

While one burn-down herbicide application may provide control of the annual ryegrass, growers should plan for two applications. Even when annual ryegrass is small it requires full rates of herbicides to achieve control. Low rates will often stress the plant making it more difficult to control at a later date. In the spring, annual ryegrass has been established 7-8 months and has an extensive root system. It should be treated as if it were an established forage like tall fescue or smooth brome grass, not like a two week-old giant foxtail seedling.

Growers should be aware that some annual ryegrass seed may remain in the soil for several years after using it as a cover crop. Control as needed depending on crop rotation or let it grow as another cover crop, depending on weather and farm location.

Nitrogen Needs are Field Specific

Annual ryegrass is a very good nitrogen scavenger; however, there needs to be sufficient nitrogen available in the top 6" of soil for good fall growth. To increase plant growth and winter survival, especially for late plantings, use 30 lb/a of nitrogen fertilizer or a manure application at planting. Nitrogen may not be needed if the field is relatively high in organic matter, has had a cover crop the previous year, has been in continuous no-till for several years, or has had manure applied in the past 2-3 years. If using ryegrass as forage, add 30-40 lb/a of spring nitrogen to boost production.

The uptake of nitrogen in the soil by annual ryegrass varies from 20 to 80 lb/a, but can be higher. Uptake depends on how much growth occurs and on how much nitrogen is in the soil. A well-established annual ryegrass cover crop, planted on soil with a manure application or high rates of residual fertilizer, may take up in excess of 100 lb/a of nitrogen. Thus, annual ryegrass reduces or eliminates nitrogen leaching and runoff losses.

A well-established annual ryegrass cover crop can capture a significant portion of residual or unused fertilizer nitrogen, as well as other nutrients, for use in the coming crop year. Approximately 40-60% of the scavenged nitrogen may be available to the corn crop during the growing season, acting as a slow release nitrogen source.

Burn-Down Applications

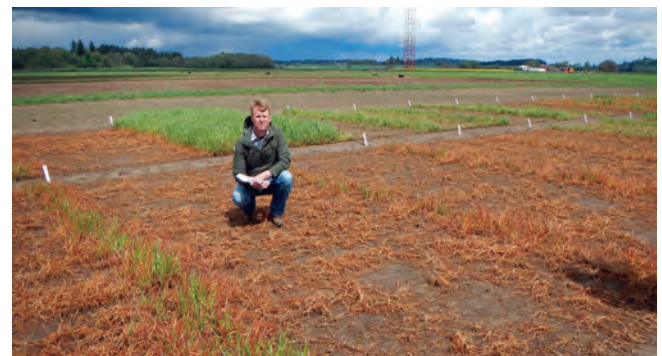
Achieving good control of annual ryegrass with glyphosate herbicides before planting corn or soybeans depends on timing, application rate and weather conditions. Apply glyphosate at 1.25-1.50 lb a.e./a with ammonium sulfate and surfactant in late March to late-April. Follow label directions carefully with respect to pH and mixing order. It is important when adding ammonium sulfate, buffering agents or water conditioners that they be added to the full spray tank of water and agitated for 3-5 minutes before adding the glyphosate. This is to ensure that the calcium, magnesium, iron and other dissolved minerals in the water do not interfere with the glyphosate activity. Additional NIS surfactant, if called for, is normally added last.

Weather conditions affect how well glyphosate controls annual ryegrass and a second application may be required.

- **Spray with a daytime minimum temperature of 55°F (above 60°F optimum).**
- **Wait until all the annual ryegrass is actively growing for best results (5-7 days).**
- **If night temperatures drop below 38°F, wait three days before spraying.**
- **Soil temperatures should be above 45°F.**
- **Spray at least 4 hours prior to sunset to allow for maximum translocation of the glyphosate within the plant.**

Early termination of the cover crop makes control easier and reduces the amount of residue into which you'll plant corn or soybeans. Early control also facilitates soil dry-down, allows for significant decomposition of annual ryegrass residue and release of nutrients for uptake by the corn or soybean crop.

Some growers have found it easier to plant into the annual ryegrass first and then apply a burndown. Warmer weather conditions improve glyphosate activity and planting into green vegetation has been successful, and is often easier than planting into a "half-dead" cover crop.



OSU weed scientist Andrew Hulting demonstrating effective annual ryegrass control using adequate rates of glyphosate and recommended spraying practices.