Crop Profile for Rye in Georgia

Prepared May 2006

General Production Information

Georgia ranked #2 in the United States for rye acreage planted and grain production in 2005.

Georgia accounted for 18.8% of the total rye acreage planted, 10.8% of acreage harvested for grain, and 10.7% of total rye grain produced in the United States in 2005.

Production data for rye in Georgia from 2002 – 2005 are listed in the following table:

<table>
<thead>
<tr>
<th>Year</th>
<th>Planted all purposes (Acres)</th>
<th>Harvested for grain (acres)</th>
<th>Grain yield (bushels/acre)</th>
<th>Total grain production (bushels)</th>
<th>Price per bushel ($/bu)</th>
<th>Value ($) of grain production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>240,000</td>
<td>35,000</td>
<td>16</td>
<td>560,000</td>
<td>6.00</td>
<td>3,360,000</td>
</tr>
<tr>
<td>2003</td>
<td>270,000</td>
<td>50,000</td>
<td>16</td>
<td>800,000</td>
<td>4.00</td>
<td>3,200,000</td>
</tr>
<tr>
<td>2004</td>
<td>250,000</td>
<td>25,000</td>
<td>24</td>
<td>600,000</td>
<td>4.00</td>
<td>2,400,000</td>
</tr>
<tr>
<td>2005</td>
<td>270,000</td>
<td>30,000</td>
<td>27</td>
<td>810,000</td>
<td>4.00</td>
<td>3,240,000</td>
</tr>
</tbody>
</table>

Rye is planted in Georgia for the following uses:

1. 75-80% is grown for temporary winter grazing by cattle, for cow/calf and stocker cattle operations. A small part of this is also planted as wildlife plots.
2. 5-15% is grown as a winter cover crop for winter erosion control which is then destroyed before strip tillage of cotton.
3. 10-20% is grown for grain production. All grain is used as seed for fall planting.

Production regions

Georgia has four production regions within the state. From north to south they are mountains, piedmont, coastal plain, and flatwoods. The main north south division between the piedmont and coastal plain regions is roughly marked by a line drawn between the cities of Columbus, Macon and Augusta.

Mountain region: The northern quarter of the state contains the southern portion of the Appalachian Mountains. Winter rye is grown on a very limited basis in some tilled fields in mountain valleys.

Piedmont region: This region is about 30% of the state between the mountains and the coastal plain region. The region has rolling hills with soils that are highly eroded, clayey and acidic with granite bedrock. Winter rye is
grown for livestock grazing in more rural areas of this region and is widely planted for erosion control during construction. Only two counties, Franklin and Hart Counties, had over 1000 acres of rye in 2004.

**Coastal Plain region.** This region accounts for about 35% of the state consisting of the area south of a line of Columbus, Macon and Augusta southward to the Alabama and Florida state lines and extending southeastward towards the Atlantic Ocean. The region has fairly flat terrain and accounts for most of the row-crop production within the state. Soils are acidic, sandy loams and loamy sands. Most years, over 80% of winter rye production is within the coastal plain region. In 2004 counties with over 4000 acres of rye from this region were Burke, Bulloch, Chandler, Coffee, Colquitt, Dodge, Emanuel, Jefferson, Jenkins, Laurens, Randolph, Screven, Tift, Turner, and Worth.

**Flatwood region:** The area within 50-70 miles of the ocean is often called the flatwoods region. It is characterized by low-lying wet and marshy soils that are generally not suitable for crop agriculture. Winter rye production is limited in this region.

**Cultural Practices**

Rye **for Grazing:** Rye is grown in Georgia as a winter crop mainly to provide temporary winter grazing for cattle. Rye can be grown in pure stands but often is planted in blends with winter oats, ryegrass and sometime winter annual clovers. Rye is favored for winter grazing because adapted varieties produce more forage during the coldest period from December through February when other winter forage plants are less productive. Ryegrass provides extra forage in the fall, whereas oats extends grazing during March and early April.

Rye is usually seeded to tilled soil that is typically disk harrowed before planting, although no-tillage planting is increasing. Rye is often double-cropped after corn, peanut, soybean, or tobacco. Cotton is harvested too late for rye for grazing, but rye is sometimes planted in these fields as a cover crop. Rye is very efficient in utilizing residual fertilizer, especially nitrogen, applied to the previous summer crop. It also produces an extensive root system and is more tolerant of acidic, light or sandy soils than other cereal crops. Warm-season grass pastures, such as burmudagrass, sometimes are overseeded in the fall with rye to supplement winter forage production.

Optimal planting dates for rye for grazing are September 1, October 1, and October 15 in the Mountain, Piedmont, and coastal plain regions, respectively. Recommended seeding rates for grazing are 2 – 2.5 bushels/acre (110 – 140 lbs/acre). One pound of rye seed contains about 24,000 seed. Seed are planted with a grain drill in 6-8 inch row spacing with 40 – 50 seeds per foot of row. Rye also may be broadcast and incorporated by disk harrowing.

Optimal soil pH for rye is 5.6 to 6.0, which is more tolerant of low soil pH than other cereal grains. Fertilizer application should be based on soil testing. For grazing 120 – 180 lbs of nitrogen per acre is recommended with one half at planting and one-half in late January, or 1/3 in three applications at planting, December, and in late January-early February.

Rye can furnish 120 – 140 days of winter grazing and normally begins when plants reach 6 inches high. Rye forage contains about 24% protein and 70% total digestible nutrients early in the season. Grazing should leave at least 2-3 inches of growth. Rye pastures typically can carry 1 cow-calf unit per acre or 1.0 – 1.5 stockers per acre.
**Rye as a Cover Crop:** Rye can be planted as a winter crop after summer crop harvest. Planting occurs in October – November. Seed is planted at the rate of 1 bushel per acre in 7 to 10 inch rows using a grain drill. No fertilizer is applied and plants rely on residual nutrients from the soil. Furthermore, pesticides usually are not applied after planting, but most fields are treated with an herbicide to control weeds before planting. Rye cover crop generally is strip-tilled with little mowing and incorporation. In no-tillage or strip-tillage systems, a ‘burndown’ type herbicide, such as paraquat or glyphosate, is used to kill the rye and other weeds before planting a summer crop.

**Rye for Grain:** Virtually all rye grown for grain in Georgia is used for seed for fall planting. Rye for grain is planted in conventionally tilled fields. Optimal planting dates are later than for grazing: October 15 in the mountain region, November 1 – 15 in the Piedmont region, and November 7 – December 1 in the Coastal Plain region. Seed is planted at 1 to 1.5 bushels per acre (56 – 80 lbs/acre) using a grain drill with 20 - 24 seed per foot or row. Recommended nitrogen fertility for grain is 60 to 80 lbs of N per acre with 20 to 40 lbs per acre at planting and the remainder broadcast applied in mid-February. Nitrogen rates at planting can be reduced by 20 lbs per acre when rye is planted following a legume crop such as peanut or soybean.

Rye is harvested in the Coastal plain region in May using a combine when grain moisture is below 14%. Grain should be dried to 12% moisture for long-term storage. After harvest, rye straw often is baled and sold for use in soil erosion control in Atlanta and other urban areas.

**Potential Worker Exposure**

**Rye for Grazing**

**September-October:** Worker on a tractor makes one or more passes over the field to till and prepare soil. Another pass is made to apply fertilizer. A final trip is made to plant seed using a grain drill. For no-till production, one trip to apply a broad spectrum herbicide such as glyphosate to kill weed before planting. A second trip is to apply fertilizer and third trip to plant seed. Many growers have lime and fertilizer custom applied by a worker with a fertilizer dealer using a large enclosed fertilizer truck before or after tillage.

**November – March:** Farm worker will manage cattle during the grazing period typically 120 – 140 days. Worker may periodically move cattle from field to field and will maintain water and salt/nutrient supplements. Split nitrogen fertilizer applications are applied as described under cultural practices. Rye grown for grain may be treated with an herbicide to control broadleaf weeds.

**April:** When crop matures or stops producing good quality forage, one worker may mow and/or disk harrow the field in preparation for summer crop planting.

**May-August:** Rye is not present in the field and no worker exposure occurs.

**Rye for Grain Production**

**October-November:** Worker on a tractor makes one or more passes over the field to till and prepare soil. Another pass is made to apply fertilizer. A final trip is made to plant seed using a grain drill. For no-till production, one trip to apply a broad spectrum herbicide such as glyphosate to kill weed before planting. A second trip is to apply fertilizer and third trip to plant seed. Many growers have lime and fertilizer custom applied by a worker with a
fertilizer dealer using a large enclosed fertilizer truck before or after tillage.

November – March: Farm worker or custom applicator applies split nitrogen fertilizer applications are applied as described under cultural practices. Fields almost always are treated once with an herbicide to control broadleaf weeds, usually before March.

May: When rye for grain matures, one worker will harvest grain with a combine and load it in a truck. A second worker may drive the truck. Some farmers or custom balers may bale straw after harvest and remove it.

Summer: No worker exposure occurs in the field during this time. Rye for grain is temporarily stored, cleaned, bagged, and placed in cold storage for sale as seed the following fall.

### Pesticide Use Summary

<table>
<thead>
<tr>
<th>Rye end use</th>
<th>Pesticide category*</th>
<th>Target pest(s)</th>
<th>Type of Application</th>
<th>% of acreage treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazing</td>
<td>Insecticide</td>
<td>Fall armyworm, aphids, others</td>
<td>Ground foliar</td>
<td>0-5%</td>
</tr>
<tr>
<td>Grazing</td>
<td>Herbicides</td>
<td>Wild radish, henbit, chickweed</td>
<td>Ground foliar</td>
<td>40</td>
</tr>
<tr>
<td>Grazing</td>
<td>Fungicides</td>
<td>Seed/seedling blights</td>
<td>Seed treatment</td>
<td>15</td>
</tr>
<tr>
<td>Grazing</td>
<td>Fungicides</td>
<td>Leaf rust, other fungal diseases</td>
<td>Ground foliar</td>
<td>0</td>
</tr>
<tr>
<td>Grain</td>
<td>Insecticides</td>
<td>Aphids, armyworm</td>
<td>Ground or aerial foliar</td>
<td>2-3</td>
</tr>
<tr>
<td>Grain</td>
<td>Herbicides</td>
<td>Wild radish, henbit, chickweed</td>
<td>Ground foliar</td>
<td>100</td>
</tr>
<tr>
<td>Grain</td>
<td>Fungicides</td>
<td>Seed/seedling blights</td>
<td>Seed treatment</td>
<td>15</td>
</tr>
<tr>
<td>Grain</td>
<td>Fungicides</td>
<td>Leaf rust, other fungal diseases</td>
<td>Ground or aerial foliar</td>
<td>2-3</td>
</tr>
<tr>
<td>Cover crop</td>
<td>Herbicides</td>
<td>Wild radish, primrose</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Cover crop</td>
<td>Insecticides, Fungicides</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>

*No nematicides are registered for use on rye.

### Insect/Mite Pests

Insect pests occasionally cause significant damage to rye. Rye planted in early fall for grazing is affected most by insects that damage and kill stands. These are fall armyworm, Green June beetle grubs, and aphids. Other minor
insects that may affect early-planted rye include grasshoppers, Hessian fly, and chinch bugs. Rye for grain typically is sown late enough to avoid damaging infestations of seedling pests. The main insect pests of rye for grain production are aphids and true armyworm during the late winter and spring. Cereal leaf beetle is a new emerging pest that may impact rye for grain. Mites are not a pest of rye in Georgia.

Only a handful of insecticides are registered for use on rye and no pyrethroid insecticides are currently registered. Register insecticides are listed in the following table:

*OP = organophosphate, Cyc = cyclodiene, SP = spinosyn, Bt = Bt endotoxin, Bot = botanical.

**microencapsulated methyl parathion marketed as Penncap-M is not registered for use on rye.

**Armyworms**

*Fall armyworm (Spodoptera frugiperda)* is probably the most serious insect pest of winter rye planted for grazing. During high population or outbreak years fall armyworms can infest and destroy stands of newly planted rye. Fall armyworm does not overwinter in Georgia; it migrates northward each summer from southern Florida, the Caribbean region and Central America. The insect attacks numerous grass crops such as corn, sorghum, millets, and turf and pasture grasses. Populations reach a peak in late August and September. Fall armyworms often will lay eggs in newly planted field of rye during this period. Young larvae defoliate leaves. Larger larvae can completely consume seedlings and will feed on the plant below the soil surface often killing the plant. Large larvae can be identified by four black dots on the back of the tip of the abdomen, and a pale, inverted Y pattern on the head.

High populations and outbreaks occur every 2-4 years and are favored by hot, dry conditions. During these years fall armyworm infestation may destroy rye stands in all or part of a field with about 5-10% of fields being treated and replanted. Scouting before planting and immediately after planting will help detect infestations. The treatment threshold is 3 larvae (1/2 inch or longer) per square foot. However, scouting is rarely done and infestations are only noticed when stands look thin or absent. A foliar insecticide typically is applied to the area
before seed is replanted. Recommended insecticides for fall armyworm control in rye are:

**Insecticides:**

Methyl parathion (Methyl 4EC): least expensive, but very toxic. Application and personal protective equipment requirements limit use.

Methomyl (Lannate 2.4LV)): expensive, probably most used.

Spinosad (Tracer 4SC): least toxic, most effective against small armyworms, less effective against large armyworms.

Bt (Condor, Lepinox, others): rarely used in rye; most effective against smaller larvae.

**True armyworm** (*Pseudaletia unipuncta*) attacks rye mainly grown for grain during the stem-elongation and heading stages in late winter and early spring. Larvae rest during the day under leaf litter on the soil surface. Larvae climb stalks and defoliate rye at night by consuming the lowest leaves first. They also sometimes eat spike glumes and cut seed heads. Damage usually occurs during cool wet springs, with rank and lodged areas of a field often being most severely damaged. Severe outbreaks of true armyworm historically occur every 10 years. Thresholds are 4 or more larvae per square foot before pollen shed and 8 larvae per square ft during rain fill. Because ground sprayer would damage sanding rye, insecticide applications are usually aerially applied. Rye seldom is treated, but if treatment is required, methyl parathion typically is used.

**Green June Beetle**

Larvae of the Green June beetle may infest fields in the fall before planting. Larvae feed on emerging and seedling plants killing stands. Poultry litter applied to fields before planting attracts egg-laying adults. Rye overseeded into warm-season perennial pastures is at greatest risk. There are no registered insecticides for control of Green June beetle larvae in rye at or after planting. Carbaryl (Sevin) can be applied to soil or grass pastures before planting. Carbaryl is not registered for use in rye.

**Aphids**

Several species of aphids feed on rye. They are the same species that attack other winter cereal grains (wheat, oats, and barley) in the Southeastern U.S. The main species are greenbug (*Schizaphis graminum*), English grain aphid (*Sitobion avenae*), bird cherry-oat aphid (*Rhopalosiphum padi*), and corn leaf aphid (*Rhopalosiphum maidis*). Aphids suck sap thereby reducing plant vigor and greenbug and to lesser extent English grain aphid produce a localized phytotoxic response at the site of feeding. Aphids also transmit the viral pathogen barley yellow dwarf virus and cereal yellow dwarf virus. If infection occurs before heading, these viruses can cause significant stunting, loss of vigor and plant death in wheat, oats and barley. However, although rye may be host for the viral pathogens, rye is not known to be damaged by barley and cereal yellow dwarf viruses. Therefore aphid damage in rye is due to direct feeding injury. Treatment thresholds for aphids are not well defined for rye.

Greenbug, bird-cherry oat aphid and corn leaf aphid usually are most important in the fall. For rye planted early for grazing, aphid populations can reach high levels and cause damage. Populations decline after the first hard freeze. Aphids may be present the winter during warm periods in the winter. Rye grown for grain usually is
planted too late for serve seedling infestations, but aphids particularly English grain aphid can reach high levels before and during grain fill in early spring.

**Greenbug** occurs mostly in the fall. They such sap and cause a noticeable and severe phytotoxic reaction when feeding. Large infestations may cause plants to turn yellow and severely stunt and kill seedling plants. Infestation are aggregated consequently damage often occurs in localized spots in the field. Treatment thresholds are 10 greenbugs per foot of row in seedlings and 20 per foot of row during tillering stage.

**Corn leaf aphid, bird cherry-oat aphid** and a related species the **rice root aphid** (*Rhopalosiphum rufiabdominalis*) do not cause a phytotoxic reaction when feeding. Bird cherry-oat and rice root aphids are the main vectors of barley and cereal yellow dwarf virus in the fall and winter. These aphids occur mainly in the fall and winter before heading but rarely reach damaging levels. Corn leaf aphid sometimes reach large numbers in late fall in rye planted for grazing. Aphid feeding may reduce rye vigor, but these aphids rarely are controlled using an insecticide.

**English Grain Aphid** is slightly larger than the other species and varies in color from yellow to green to reddish brown. Unlike the other species, English grain aphid occurs during the late winter and spring and is more of a problem on rye for grain than for grazing. English grain aphid populations can reach very high levels on rye during the heading and early grain-fill periods. English grain aphids normally occur on the uppermost leaf and grain heads. Feeding by large populations reduces grain fill causing lightweight seed and reduced seed viability. Thresholds for treatment are 10 per grain head at heading and anthesis. Treatment is not needed after soft dough stage. Natural enemies mainly lady beetles often will move in and eventually control infestations of aphids in the spring.

Rye is rarely treated (<2% in most years) to control aphids. Severe damage by greenbugs in the fall may prompt an insecticide application. Grazing by cattle tends to reduce infestations, once grazing begins.

**Insecticides** for aphid control are:

Methyl parathion: least expensive and thus most commonly used; but very toxic.

Malathion: much less toxic and product of choice for smaller farmers and farmers who do not want to handle methyl parathion.

**Minor Insect pests**

**Hessian fly** (*Mayetiola destructor*) is a severe pest of wheat, but is only a very occasional pest of rye. Indeed, rye is not preferred and damaging infestations rarely occur. Hessian fly larvae are maggot-type larvae and feed inside the vegetative stem between the leaf sheath and pseudo-stem. Their feeding completely stunts tillers, which eventually dies. Early planted rye may be attacked in the fall in years of severe Hessian fly outbreak. This has not occurred in Georgia since about 1989-1990. Rye is rarely attacked and is recommended as an alternative to wheat for winter grazing. There are no registered insecticides that are effective against Hessian fly in rye. Crop rotation and destruction of crop residue will help minimize the risk of infestation. Later planting date also minimizes the risk of infestation, thus rye grown for grain is almost never infested.

**Insecticides:** No effective insecticide registered.
Grasshoppers (*Melanoplus* spp.) may occur in early-planted rye where they defoliate seedling and vegetative stage plants. Grasshoppers are most abundant during years with hot, dry conditions. Damage is highly variable and sporadic, but early-plantings are more likely to be attacked than later plantings. Grasshoppers typically move in from fence rows and unmanaged areas and usually only cause damage along the edges of fields. Therefore, a foliar insecticide applied to the field margins is effective in most situations.

**Insecticides:** Malathion is the only recommended insecticide.

Chinch bug (*Blissus leucopterus leucopterus*) is a true bug. They are small black with a white X-pattern on the back of adults. Nymphs usually are reddish-brown. Chinch bugs suck plant sap on stems and leaf veins. Their feeding can cause stunting and yellowing of plants. They may occur in the fall in rye for grazing or in early spring in rye for grain. In Georgia, populations in rye rarely are large enough to cause economic damage that justifies control. Chinch bugs may buildup in rye in early spring and move to summer grass crops such as corn where they can cause significant damage.

**Insecticides:** Methyl parathion is the only registered insecticide with chinch bug on the label. However, rye is almost never treated to control chinch bugs.

Cereal leaf beetle (*Oulema melanopus*) is a small leaf beetle that attacks cereal crops and other grasses. There is one generation per year. Adults and larvae feed in upper leaves causing blotch-type defoliation. The insect was accidentally introduced into Michigan in the late 1950’s and has been slowly moving southward since. It is located in north Georgia and the upper coastal Plain region of the state. Cereal leaf beetle is more consistently a pest of wheat and oats, but the insect also will feed on rye grown for grain. Currently cereal leaf beetle does not cause enough damage in rye to warrant insecticidal control.

**Insecticides:** Malathion is the most effective registered compound. Spinosad (Tracer) and methomyl (Lannate) also are registered for cereal leaf beetle on rye but both are more expensive and less effective than malathion.

**Insecticide use Patterns:**

**Rye for grazing:**
- Every 2-3 years: 5% of acreage treated for fall armyworms in seedling stage rye - 90% of treatment with methomyl (Lannate), remainder methyl parathion.
- Every 2-3 years, about 3% of acreage treated for aphids in fall/early winter – 100% methyl parathion.

**Rye for Grain production:**
- Every 3 years, 10% of acreage treated for aphids – 100% methyl parathion.
- Once every 10 years, 20% of acreage treated by air at heading stage for true armyworm – 100% methyl parathion.
- About 1% of acreage treated after heading for cereal leaf beetle – 100% malathion.
Rye for cover crop:

- No insecticide use.

**Cultural Control Practices:**

Crop rotation: may help control Hessian fly.

Stubble destruction and tillage: will help control green June beetle, fall armyworm, and Hessian fly.

Planting date: late planting for grain production usually avoids damaging infestations by fall armyworms, green June beetles, aphids, grasshoppers, and chinch bugs.

Plant resistance is not available for any insect pest of rye.

**Biological Controls:**

There are no active biological control programs for insect pests of rye in Georgia. Two parasitoids were released for control of cereal leaf beetle in the mid 1990s. Parasitoids were provided by the North Carolina Dept. of Agriculture Biological Control program. These were an egg parasitoid, *Anaphes flavips*, and a parasitoid of larvae, *Tetrastichus julis*. Both were released in north Georgia but neither failed to establish.

Naturally occurring parasitoids and pathogens provide considerable natural control of armyworms, Hessian fly, grasshoppers, aphids, and chinch bugs. Predators, mainly lady beetles, also provide significant regulation of aphids in the spring.

**Post Harvest Control Practices:**

No practices specifically for rye. Commercial seed dealers dry, clean and bag seed. Seed bags are placed in storage for sale the following fall. Many farmers save harvested seed for fall planting.

**Weeds**

Effective weed management is one of many critical components of successful rye production. Weeds compete with rye for light, nutrients, water, and space. Additionally, weeds can harbor deleterious insects and diseases and decrease harvest efficiency. The presence of weedy plant fragments may also reduce value. These factors result in dockage and lower yields thereby reducing profits.

Weeds that most often cause problems in rye are winter annual broadleaf weeds such as wild radish, common chickweed, and henbit; perennials such as wild garlic and curly dock; and Italian ryegrass. One of the best tools for suppressing weeds in rye is a healthy, vigorous crop. Good crop management practices that result in rapid stand establishment and canopy development minimize the effects of weeds.
Cultural Control Methods

Weeds are often controlled most effectively through cultural practices that result in rapid stand establishment and canopy development, thus providing an undesirable environment for weed growth. Cultural practices include the following:

1. Planting certified seed (free of weed seeds and garlic bulblets)
2. Good seedbed preparation including free of weeds
3. Proper fertilization
4. Seeding at the proper rate and time
5. Management of diseases and insects

Site selection also can play a significant role in weed management. Rotation away from fields infested with troublesome weed species, such as Italian ryegrass and wild radish, may reduce the presence of these weeds and allow for the use of alternative crops and control methods. Additionally, so as to prevent weed spread from field to field during harvest, equipment should be cleaned when moving from infested areas. This precaution can be of significant consequence in preventing or minimizing the introduction of new weed species into ‘clean areas’ when commercial combine operators who travel long distances are used for harvest.

Herbicidal Control Options

Only three herbicides are registered for use in rye: 2,4-D, MCPA, and Peak (prosulfuron).

<table>
<thead>
<tr>
<th>Common name</th>
<th>Brand name</th>
<th>Formulation</th>
<th>lbs ai/acre</th>
<th>Rye growth stage for application</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-D amine</td>
<td>Numerous brands</td>
<td>3.8 SL</td>
<td>0.48</td>
<td>4 tiller to joint</td>
</tr>
<tr>
<td>2,4-D ester</td>
<td>Numerous brands</td>
<td>3.8 SL, 5.7 SL</td>
<td>0.48</td>
<td>4 tiller to joint</td>
</tr>
<tr>
<td>MCPA</td>
<td>Numerous brands</td>
<td>3.7, 4.0 SL</td>
<td>0.23 – 0.50</td>
<td>2 tiller to joint</td>
</tr>
<tr>
<td>prosulfuron</td>
<td>Peak</td>
<td>57 WDG</td>
<td>0.0135 – 0.0178</td>
<td>3 leaf to 2nd node stage</td>
</tr>
</tbody>
</table>

**Phenoxy herbicides**, 2,4-D and MCPA are to control broadleaf weeds. These herbicides will provide good control of wild radish and cutleaf eveningprimrose but only marginal control of chickweed and henbit. For 2,4-D, the recommended rate for the 3.8 SL formulation is 1.0 pint/acre and 0.67 pint/acre for the 5.7 SL formulation. For MCPA, application rates range from 0.5 to 1 pint/acre. Application timing is critical for these herbicides to achieve weed control and prevent crop injury. Generally, MCPA is less injurious to rye but also slightly less effective on weeds when compared to 2,4-D. Neither product should be applied with liquid nitrogen.

**Prosulfuron** is a sulfonylurea herbicide and is marketed as Peak 57 WDG. It has good activity on wild radish, cutleaf eveningprimrose, wild garlic/onion and partial suppression of henbit. It should be applied with a non-ionic surfactant and can be tank mixed with 2,4-D, MCPA, or liquid nitrogen. Prosulfuron has a 10 month restriction after application for planting cotton, peanut, soybean, and tobacco.

**Common and Troublesome Weeds and Their Control**
Weed species

The most common and troublesome weeds in Georgia winter rye are ranked in the following table:

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Commonness</th>
<th>Troublesomeness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wild radish</td>
<td>Raphanus raphanistrum</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Italian ryegrass</td>
<td>Lolium multiflorum</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Henbit</td>
<td>Lamium amplexicaule</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Common chickweed</td>
<td>Stellaria media</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Cutleaf eveningprimrose</td>
<td>Oenthera lacunata</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Swinecress</td>
<td>Coronpus didymus</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Curly dock</td>
<td>Rumex crispus</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

Wild radish is a winter annual broadleaf weed infesting most Georgia fields. In the past, wild radish germinated in the fall; however in recent years, wild radish has been germinating during the fall, winter, and spring months. 2,4-D or MCPA are effective management options assuming timely applications follow labeled directions.

Annual Ryegrass is also known as Italian ryegrass and is ubiquitous in Georgia. It is also planted as a winter forage crop. As such, annual ryegrass is not considered a weed in rye for forage production and sometimes is planted with rye in mixtures. Annual ryegrass is very competitive and can reduce yield of rye grown for grain. No herbicides are available to control this pest in rye, thus, rotating to land not infested with this pest is suggested. Ryegrass must be managed before planting or in other cropping systems.

Henbit and common chickweed are present in most fields. These weeds are not as competitive as radish or ryegrass because of their growth stature but severe populations are often present in Georgia fields and yield reduction is inevitable. 2,4-D and MCPA will only suppress these weeds, therefore it is critical to maintain a healthy growing crop to shade out these weeds.

Perennial weeds, mainly curly dock and wild garlic/onion, can be important weeds in rye. These weeds regrow from bulb or roots and are difficult to control. Typically they are a localized problem in certain fields but are not problem in most rye fields. Wild garlic/onion generally does not reduce yield of rye for grain production, but seeds can contaminate rye grain and are difficult to separate. Wild garlic can be managed with Peak while curly dock can only be suppressed with 2,4-D in rye.

Cutleaf evening primrose is very common in rye fields but can be managed very effectively with 2,4-D.

Herbicide use Patterns:

2,4-D accounts for 95% of herbicide use on rye in Georgia.

MCPA alone and in combination account for the remaining herbicide use (5%).
**Prosulfuron** is almost never used on rye in Georgia, because of rotational restrictions.

**Rye for grazing:** About 40% of fields are treated to control broadleaf weeds.

**Rye for grain:** Virtually 100% of fields are treated to control broadleaf weeds.

**Rye for cover crop:** About 20% of fields are treated to eliminate wild radish and cutleaf eveningprimrose from being problematic in a conservation tillage cotton or peanut crop.

**Biological Controls:**

No active biological control programs are in effect against weeds of rye in Georgia.

**Diseases**

The end use and planting date of rye have a major impact on the severity of specific diseases. The main disease problem in rye planted early for grazing is seed and seedling blight. In rye grown for grain the main diseases include leaf rust, halo blight and Helminthosporium.

*Seed and Seedling Blights* are caused mainly by the fungal pathogens *Pythium* spp., *Phytophthora* spp., and occasionally *Helminthosporium* spp. Seed and seedling blights usually are the most economically damaging diseases of rye in Georgia. They are associated with planting in hot soils typically with rye planted early for grazing. Rye planted for grain normally is planted late enough to avoid serious infection. When infection occurs, it can cause serious stand loss. Seed may rot before or soon after germination and seedlings may emerge but suddenly die. Some plants may become established only to wilt and die several weeks after planting. These plants will have brown lesions at the soil line and/or root rot. A seed treatment with metalaxyl will reduce infection by *Pythium* and improve stand survival and are highly recommended for rye planting in August and September in the Coastal Plain region. Metalaxyl is effective for a short time and may not prevent damage to seedlings several weeks after planting. Newer product such as mefenoxam and fludioxonil may provide systemic control for longer periods.

**Foliar Diseases**

Foliar diseases are most important during stem elongation, heading and grain filling stages of rye grown for grain. A few foliar diseases can be problematic under in specific conditions on rye grown for grazing. Occasionally they can damage rye for grazing in warm periods during the fall and late winter.

*Halo Blight* is caused by the bacterium *Pseudomonas syringae* pv. *coronafaciens*. The pathogen occasionally attacks rye during cool wet conditions. On leaves it causes sunken lesions with a bright yellow halo. If infection occurs when grain heads are in the whorl, the entire head may be blighted. Although damaging infection is sporadic, the disease is difficult to control. No pesticides are available for its control. The disease survives on crop residue, and crop rotation is the most effective management tactic.
Leaf rust \((Puccinia recondita\ f. \text{sp. } secalis)\) is a fungus that attacks rye foliage producing distinct rust colored pustules. Leaf rust incidence and severity on rye varies greatly from year to year. Foliar fungicides are available for control and can provide effective control is applied at the proper time. However, timing is difficult and yield responses are inconsistent. Rye is not typically treated with a fungicide. Effective genetic plant resistance is available and is the primary means for control of leaf rust.

Helminthosporium spot blotch \((Helminthosporium\ spp.)\) can cause root rot and various foliage disorders. It occasionally can cause economic damage to rye.

Other minor diseases of leaves and grain heads in rye are **Septoria leaf and glume blotch, tan spot, smuts** and **powdery mildew**. These diseases are very sporadic and rarely cause serious damage to rye. Powdery mildew may be important on rye in cool, wet winters. Smuts can be controlled by certain fungicide seed treatments including fludioxonil and tridimenol.

**Chemical controls**

A limited number of fungicides are registered for use on rye as seed treatments or as foliar applications.

<table>
<thead>
<tr>
<th>Common name</th>
<th>Brand name</th>
<th>Rate (fl oz per 100 lbs of seed)</th>
<th>Restricted Entry Interval (hours)</th>
<th>Grazing interval (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>thiram</td>
<td>Thiram 50WP</td>
<td>3.7</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>captan</td>
<td>Captan 400</td>
<td>2 – 3</td>
<td>Not listed</td>
<td>0</td>
</tr>
<tr>
<td>metalaxyl</td>
<td>Allegiance FL</td>
<td>0.75</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>tridimenol</td>
<td>Baytan 30</td>
<td>0.75 - 1.5</td>
<td>Not listed</td>
<td>40</td>
</tr>
<tr>
<td>mefenoxam</td>
<td>Apron XL LS</td>
<td>0.32 – 0.64</td>
<td>48</td>
<td>0</td>
</tr>
<tr>
<td>fludioxonil</td>
<td>Maxim 4FS</td>
<td>0.08 – 0.16</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>maneb</td>
<td>Manex</td>
<td>3.6 – 5.7</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>mancozeb</td>
<td>Dithane M45</td>
<td>2.5 – 3.8</td>
<td>24</td>
<td>0</td>
</tr>
</tbody>
</table>

All seed treatments are effective against Pythium seed blight to various degrees. Other seed treatments are more expensive which discourages use. Baytan also will control smuts. Maxim is systemic and will also control smuts and mildew. Vitavax 200 (carboxin + thiram) commonly used on wheat in Georgia is not registered for use on rye.

Despite their potential benefit, only about 15% of seed sown each year is treated with a fungicide seed treatment. Most seed treatments for rye are metalaxyl for Pythium control.

**Foliar fungicides:** Three are registered for control of Helminthosporium, leaf rust, Septoria leaf and glume blotch, and tan spot. Yield responses of rye for grain from foliar fungicides are inconsistent and not recommended. Typically about 2% of field for grain production are treated once with a fungicide. Foliar fungicide use on rye by
end use is:

- Rye for grazing: 0%
- Rye for grain: 2%
- Rye for cover crop: 0%

Mancozeb marketed as Dithane M45 is applied at 2 lbs / acre from tillering and joint (stem elongation) stage to heading. Treatment is not permitted after heading and grazing is not allowed. Dithane is the least expensive alternative but also has very short activity period and is the least effective compound.

Propiconizole is marketed as Tilt and PropiMax. It is applied at 4 fl oz / acre from jointing to heading stage. Application after heading is not permitted and grazing is not permitted. Currently, propiconizole accounts for virtually 100% the foliar fungicide applied to rye.

Pryaclastrobin is marketed as Headline. Maximum application rate is 9 fl oz/acre with two applications allowed per crop. Headline cannot be applied after 50% head emergence but grazing is allowed. Headline and propiconizole are similar in efficacy against rye foliar diseases.

Cultural Practices

Crop rotation is the main tactic used to manage halo blight. Planting date has a large impact on the incidence and severity of seed and seedling blights. For grazing production, later plantings after September in cooler soils can reduce the severity of seed and seedling blights. But planting after September also reduces forage yields and normally is not done specifically to prevent seedling blights.

Effective plant resistance is not available in rye for most diseases with the exception of leaf rust. Effective resistance in rye is known, but normally is not an important factor when farmers select rye varieties. Variety selection is based mostly on yield performance, forage distribution during the season, seed cost, and availability.

Biological Controls: None available for use in rye.

Post Harvest Control Practices: Drying rye grain to proper moisture levels will prevent growth of fungi in storage.

Nematodes

Nematodes are not known to be significant pests of rye in Georgia. No chemicals are registered for nematode control in rye.
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