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CEREAL RYE *(Secale cereale L.)*

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Cereal rye is an erect annual grass with greenish blue, flat blades and an extensive fibrous root system. It resembles wheat, but usually is taller (3–5 ft) and tillers less. Flowering is induced by 14 hours of light in spring. Vegetative growth stops when reproduction begins.

Compared to other cereal grains, cereal rye grows faster in fall and winter and produces more dry matter per unit area as a winter cover crop. Mature residues tend to have high C:N ratios and high percentages of lignin and cellulose that are slow to decompose.

Environmental preferences and limitations

Cereal rye grows best on well-drained loamy soils but is tolerant of both heavy clays and droughty, sandy soils. It often grows in infertile soils where other cereal grains fail. Optimum soil pH is 5.0–7.0, but pH in the range of 4.5–8.0 is tolerated.

Cereal rye is the most winter-hardy of all cereal grains, enduring temperatures as low as -30°F once established. It can germinate and grow at temperatures as low as 33°F; however, optimal temperatures are much higher.

Cereal rye tolerates drought better than do the other cereal grains, in part because of its extensive root system. It grows best with ample moisture, but excessive moisture during the fall and winter suppresses vegetative growth. Cereal rye does not tolerate flooding.

Snow is readily trapped by the cereal rye plant, providing insulation from cold weather and increasing water availability in dry climates.

Uses

Cereal rye may be used as a cover crop, grain, hay, or pasture. It is one of the best cover crops where soil fertility is low and/or winter temperatures are extreme. Cereal rye is an excellent choice as a late-sown cover crop. In western Oregon it may be planted any time of the year.

Because it establishes rapidly in cool weather and grows throughout the winter, cereal rye is excellent for protecting the soil from wind and water erosion, scavenging soil-N before it is leached below the root zone, and suppressing weeds.

Cereal rye's extensive root system makes it among the best cover crops for improving soil structure. Incorporating mature residues can improve water infiltration and aeration and add substantial quantities of organic matter to the soil.

Cereal rye has been used successfully in Oregon as a relay-interplanted cover crop in short-statured crops such as broccoli and cauliflower.

Dry matter and N accumulation

In a mid-Willamette Valley replicated trial over 4 years, cereal rye planted in mid-September accumulated a maximum of 5.3, minimum of 1.3, and average of 3.6 tons dry matter/acre and a maximum of 125, minimum of 29, and average of 86 lb N/acre by mid-April.

Due to cereal rye's relatively high carbon:nitrogen (C:N) ratio, very little or none of the accumulated N is available to the following crop.

Management

Suggested seeding rates vary from 60 to 100 lb/acre. Use higher rates when drilling into a rough seedbed, broadcasting, seeding late in the fall, relay interplanting, or controlling erosion. In general, seed is drilled into a prepared seedbed, or broadcast and tilled lightly. Seed is inexpensive and readily available.

Excessive amounts of spring residue produced by cereal rye can delay planting and actually decrease the availability of N to subsequent crops. To avoid these problems, cereal rye often is killed with an herbicide or incorporated when less than 18 inches high and still somewhat succulent. However, wet

Quick facts: Cereal rye

Common names	Cereal rye, rye
Hardiness zone	3 (see Figure 1)
pH tolerance	4.5–8.0; optimum is 5.0–7.0
Best soil type	Wide range, tolerates poor fertility
Flood tolerance	Low
Drought tolerance	High
Shade tolerance	Moderate
Mowing tolerance	High until maturity
Dry matter accumulation	Kill at 2–3 tons/acre
N accumulation	70 lb/acre at 3 tons/acre
N to following crop	None
Uses	Survives in cold, droughty, and/or infertile soils. Use to protect soil, smother weeds, scavenge N, and improve tilth. Often planted with legumes.
Cautions	Do not use in fields where conditions do not allow early spring field operations to kill cereal rye, or there may be excessive dry matter accumulation.

weather may prevent timely field operations, resulting in larger amounts of spring residue than desired.

If cereal rye is incorporated when less than 12 inches tall, or if incorporation is not thorough, an application of herbicide may be needed to prevent grow-back.

Cereal rye can be killed with an appropriate herbicide. Consult your county agent of the OSU Extension Service for recommendations. Follow all herbicide label instructions and restrictions.

In general, cereal rye cannot be killed by mowing except when nearly mature, and it rarely is allowed to grow that long.

Cereal rye has performed well when planted in mixtures with legumes. During the fall and winter, cereal rye protects the soil, scavenges soil-N, and acts as a nurse crop for legumes. In spring, cereal rye provides structural support for climbing legumes. The relatively high N content of legumes reduces the overall C:N ratio of cereal rye/legume mixtures, and minimizes problems involving nitrogen availability to the following crop.

When used for weed suppression in berries, cereal rye planted between the rows may be mowed before seed matures and then blown into the row to suppress weeds there as well. This practice is referred to as "mow and blow." In Willamette Valley raspberry trials, cereal rye provided better weed suppression than Amity oats.

Cereal rye can become a volunteer weed and should be used with caution in rotations with other grains to avoid contamination.

There is evidence in Oregon that a pure stand of cereal rye causes a 5–10 percent decrease in sweet corn and broccoli yield (only crops tested). However, this effect disappears when cereal rye and a legume are planted in a mix.

Pest interactions

Cereal rye produces several compounds in its plant tissues and root exudates that apparently inhibit germination and growth of weeds and crops. These allelopathic effects, together with cereal rye's ability to smother other plants with cool weather growth, make it an ideal choice for weed control.

However, allelopathic compounds may suppress germination of small-seeded vegetable crops as well if they are planted shortly after the incorporation of cereal rye residue. Large-seeded crops and transplants rarely are affected. There is some evidence that the amount of allelopathic compounds in tillering plants is lower than in seedlings.

High densities of Bird Cherry oat aphids have been observed in cereal rye during late winter and early spring. These aphids carry viruses and may cause a problem if other grains are grown nearby.

However, Bird Cherry oat aphids do not affect vegetable plantings. Generalist predators thrive in the spring using these grain aphids as a food source, then move to other nearby crops as cereal rye approaches maturity.

Varieties/cultivars

New short-statured and late-maturing varieties produce less dry matter and allow more flexibility in the scheduling of spring field residue management operations.

An alternative to cereal rye is short-statured triticale, which has the hardiness of rye but produces less dry matter.

For more information

World Wide Web

Orchard floor management information—http://www.orst.edu/dept/hort/weeds/floormgt.htm

OSU Extension Service publications—eesc.orst.edu

The University of California, Davis cover crop information—http://www.sarep.ucdavis.edu/sarep/ccrop/

OSU Extension cereals Web page—http://www.css.orst.edu/crops/cereals/home.htm

Oregon Cover Crop Handbook

This publication also is part of *Using Cover Crops in Oregon*, EM 8704, which contains an overview of cover crop usage and descriptions of 13 individual cover crops. To order copies of EM 8704, send your request and $5.50 per copy to:

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Figure 1.—Oregon plant hardiness zone map. Cereal rye normally will survive in ***Zone 3*** *or any warmer zone. (Extracted from the USDA's national plant hardiness zone map, based on average annual minimum temperature in °F.)*
Zone 4 = -30 to -20; Zone 5 = -20 to -10
Zone 6 = -10 to 0; Zone 7 = 0 to 10
Zone 8 = 10 to 20; Zone 9 = 20 to 30

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