QUACKGRASS — A SERIOUS PROBLEM WEED

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Quackgrass, *Elymus repens* (L.) Gould, a perennial grass weed that is native to Europe, can be found growing in cool temperate regions of the world. Quackgrass is one of the most serious perennial weeds of the cooler regions of the northern hemisphere.

The vegetative growth of the plant is stimulated by exposure to cold temperatures, while quackgrass growth is suppressed by high temperatures combined with a short photoperiod. The suppression of growth by warm temperatures may explain why quackgrass is not a serious weed problem in warm regions.

How Quackgrass Reproduces and Spreads

Quackgrass reproduces both by seed and by the development of new aerial shoots from lateral buds on rhizomes. The introduction of the weed to new areas occurs through the establishment of plants from seed and through quackgrass rhizomes brought into previously uninfested landscape areas in soil that is used for grading, in topsoil, in the soil of balled and burlapped nursery stock, or from the installation of quackgrass-infested sod.

Although seed reproduction is not the major means of quackgrass reproduction, its importance may be underestimated. The spread of quackgrass through the planting of quackgrass-infested grain seed is a major means of dispersal to new areas. An average of 25 seeds are produced on each spike and the seed is viable as early as 8 days after flower formation, although the highest germination percentages are obtained from seeds that are approximately 6 months old. Seed viability varies with the seed source, with reports of germination percentages ranging from less than 5 percent to a maximum of 70 percent.

Once quackgrass has become established, the main method of propagation occurs via the production of new aerial shoots from rhizomes. The persistence of quackgrass in an area is through the development of new shoots from rhizomes. The rhizomes usually grow in the upper 8-10 in. of the soil and are produced by seedling plants 2-3 months after germination. The average life span of an individual rhizome is approximately 1 1/2 years, but since new rhizomes are produced annually, the rhizome system can survive indefinitely.

At the end of the growing season the rhizome ceases to grow horizontally and begins growing upward, eventually reaching the soil surface and producing a new aerial shoot. Aerial shoots may also develop from lateral buds located on the rhizome. The rhizome system has a great potential for new aerial shoot production. The rhizome of an individual plant can make up more than 50 percent of the total dry matter of the plant and a single plant can produce over 450 ft. of rhizomes in a single season. Quackgrass rhizomes generally vary in length from 8-12 in., and a single plant can produce as many as 150-200 rhizomes or rhizome branches.

Competition With Crop Plants

Quackgrass grows best in cultivated areas, such as field and nursery crops, since tillage operations break up the rhizome system and may move some of the rhizome fragments to uninfested sections of the field. The isolated rhizome fragments created by severing the rhizome from the parent plant are able to produce new shoots.

When the rhizome system of a quackgrass plant remains undisturbed, over 90 percent of the lateral buds are prevented from developing into shoots by apical dominance and by the production of inhibitors by the parent plant. Cultivation practices separate the rhizomes from the inhibition of the parent plant and release many of the buds from apical dominance.

Quackgrass interferes with the growth of crop plants by competing for light, nutrients, and water, and can also inhibit nodulation and nitrogen fixation of legumes. When the crop is taller than the quackgrass and since nutrient levels are often not a limiting factor on cultivated soils, competition for water may be the most important factor in the reduction of crop yield by quackgrass.

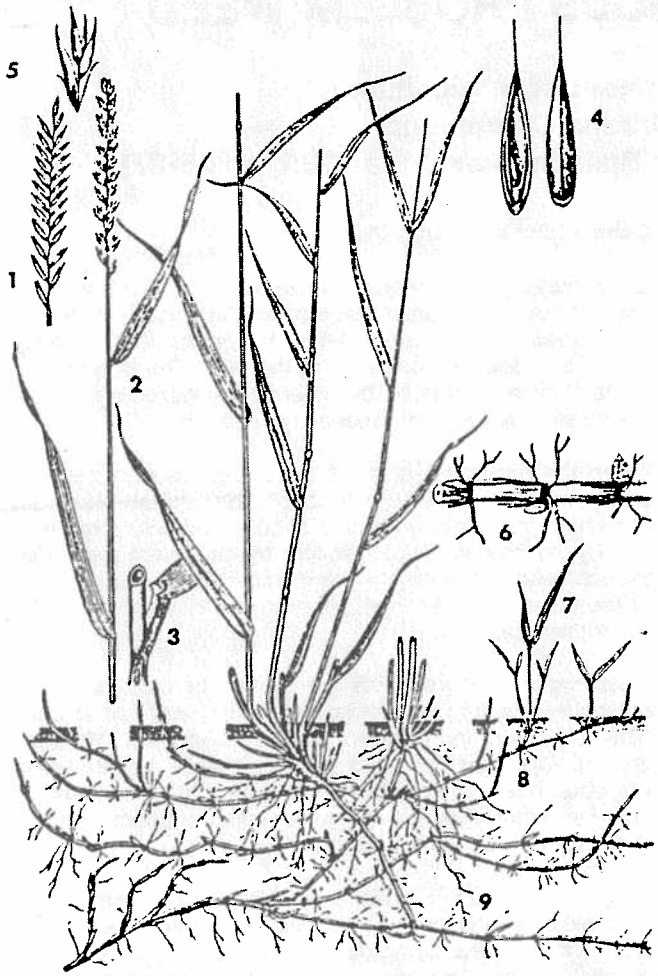
In areas with heavy quackgrass infestations, crop plants may exhibit signs of poor germination, nutrient deficiency, and wilting. These symptoms are sometimes attributed to an allelopathic effect of quackgrass on certain crop plants. However, even though positive bioassays for allelopathic effects from quackgrass have been obtained, allelopathy has not been demonstrated under field conditions and the adverse effects of heavy quackgrass infestations can often be explained by the more common types of plant competition.

Quackgrass creates additional problems for the nursery industry. Besides reducing crop growth through competition, quackgrass also interferes with the interstate shipping of nursery stock since it is illegal to ship quackgrass-infested balled and burlapped nursery stock into states where the weed is considered noxious.

Quackgrass Control

Tillage practices were once the primary method of quackgrass control, where rhizomes that were brought to the surface by the tillage operation were killed by desiccation. Repeated tillage operations could kill the rhizomes through the exhaustion of their carbohydrate reserves, which were expended in the production of new shoots by the rhizome pieces. However, the additional cultivations must be performed before the new shoots produce rhizomes.

The cultivation process usually must be performed several times in order to control quackgrass. Otherwise, cultivation can actually increase the density of the quackgrass stand by stimulating the growth of the lateral rhizome buds. The additional cultivations require an increased expenditure of fuel and labor and therefore add to the cost of crop production.



Cultivation alone for the control of quackgrass in turf and in landscape beds is not effective. Cultivation is also unsuitable for controlling quackgrass when the crop remains in the field for several years (e.g., many nursery crops), since it is almost impossible to till the quackgrass growing in the row without damaging the crop plants.

Herbicide applications provide an alternative method of quackgrass control. Many preemergence herbicides can be used to control quackgrass plants germinating from seed; however, they are ineffective in controlling new aerial shoots that develop from rhizomes. Postemergence herbicides such as glyphosate (Roundup, Kleenup), dichlobenil (Casoron), fluazifop-butyl (Fusilade), and sethoxydim (Poast) are used to control established quackgrass.

Glyphosate is nonselective and must be applied as a spot treatment or as a directed application. In turf, glyphosate is often used to kill quackgrass infestations, followed by a reseeding of the treated areas.

Dichlobenil is commonly used as a preemergence herbicide, but also controls newly initiated aerial shoots of quackgrass developing from rhizomes. Dichlobenil is recommended for quackgrass control in landscape beds where woody perennial plants are growing.

Fluazifop-butyl and sethoxydim are selective grass herbicides. Many broad-leaved crops are tolerant to fluazifop-butyl and sethoxydim and these herbicides show promise for controlling quackgrass in numerous crops. However, all graminaceous crops are susceptible to these two herbicides, so practical use of fluazifop-butyl and sethoxydim in turf may be limited to spot treatments of undesirable grass weeds.

Figure 1: Quackgrass, Couchgrass *(Agropyron repens).* Quackgrass varies in height from 1 1/2 to 3 feet. The morphological features that aid in distinguishing quackgrass from other grass species include the frequent presence of leaf auricles that partially encircle the stem, an extensive rhizome system, and flower spikelets that are oriented such that the broader, flat edge of the spikelet lies against the spike axis. Major plant structures are identified on the illustration: **1,** spike. **2,** stems, leaves, and flower. **3,** auricle and ligule. **4,** seed. **5,** spikelets. **6,** buds on rootstock. **7,** new shoots. **8,** origin of new shoots. **9,** rootstocks and roots. Individual rootstocks live only two summers and one winter, but new ones develop from buds in the axils of reduced leaves. Roots arise only at nodes. — (Illustration from: Weeds of the North Central States, University of Illinois Agricultural Expmt. Stat. Circular 718, p9).

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