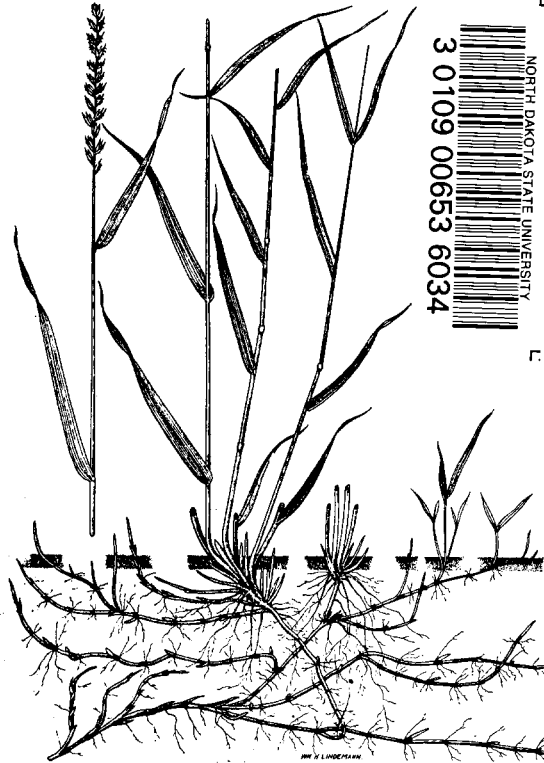


FIELD CONTROL OF QUACKGRASS



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FIELD CONTROL OF QUACKGRASS

INTRODUCTION

Quackgrass (*Agropyron repens* L.) is an introduced plant that was brought into the United States from Europe in the late 1830's. It has spread throughout North America but does not flourish in the southern states. Quackgrass is common in eastern and east central North Dakota but becomes less frequent westward in the state. It is found only occasionally in the extreme west. Even in areas where quackgrass is not common, it may be found along streets and in waste areas.

Infested hay or screenings often are responsible for spreading quackgrass to new areas. This plant also is spread by manure, by mud on implement wheels, on the feet of animals, and by improperly cleaned seeding and threshing equipment.

The rhizomes or rootstocks are a major source in spreading quackgrass. These may be transported on tillage implements and in mud sticking to the wheels of tractors and trucks. In such ways, quackgrass spreads to other fields or areas.

CHARACTERISTICS

Quackgrass is a perennial reproducing by seed and underground stems called rhizomes. The rhizomes are straw-colored and cordlike and may extend only 2 to 3 inches below the soil surface in sod but occur to plow depth on cultivated land. They extend 3 to 6 feet from the base of the plant. Since the rhizomes are capable of producing new plants at every joint or node, quackgrass spreads rapidly, forming a dense sod.

Ordinarily, the plants are 1 to 3 feet tall. The stems and leaves are a dark green color. The leaves are rather broad and soft. The lower dry sheaths, leaves and stems are distinctly hairy.

Quackgrass begins to flower about June 15. The seed heads are 2 to 4 inches long. Flowers are arranged in two vertical rows of spikelets as in wheat, each containing 3 to 7 florets.

This grass produces long, slender and spindle-shaped seeds which usually terminate with a short awn. Their color is yellow-brown. Seeds are produced in

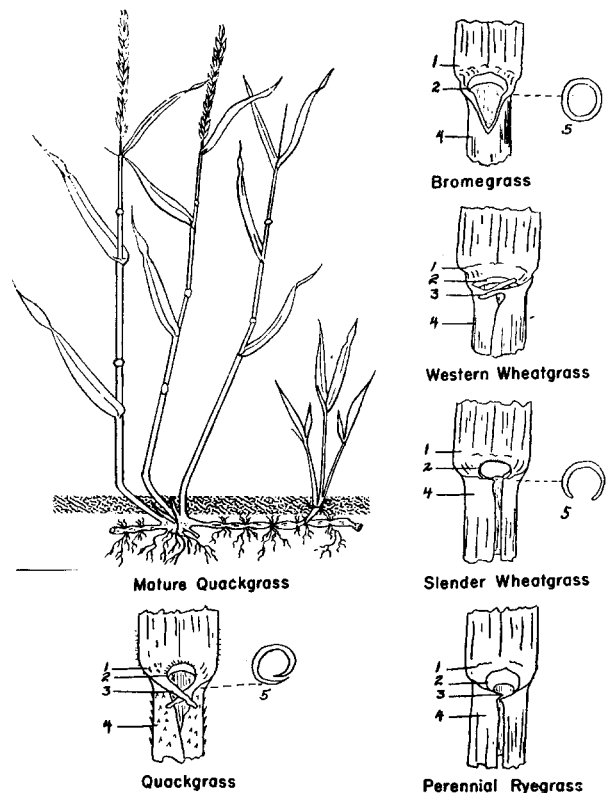
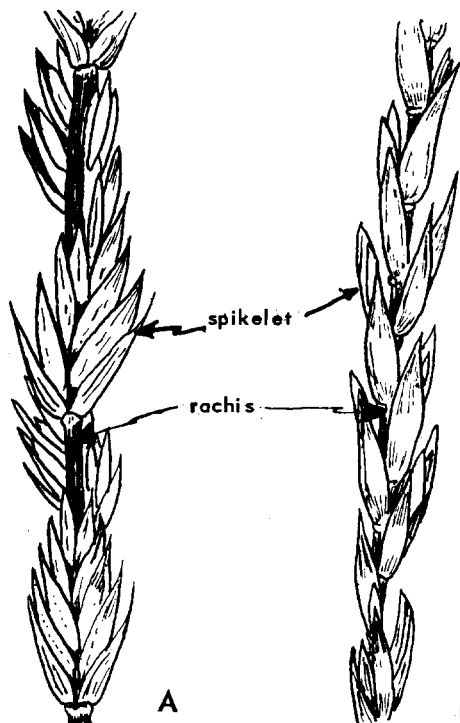


Fig. 1. A mature quackgrass plant, with a young plant growing from the same rhizome. The detailed drawings of the young leaves of Quackgrass, Bromegrass, Western Wheatgrass, Slender Wheatgrass, and Perennial Ryegrass show the difference in (1) base of the leaf blade, (2) ligule, (3) auricles, (4) leaf sheath, and (5) the cross-section of the leaf sheath.

abundance and retain their ability to germinate under field conditions for at least 4 years. Quackgrass seed is difficult, if not impossible, to separate from the seed of many common grasses such as brome grass and crested wheatgrass.

Quackgrass is often confused with western wheatgrass but in the field they can be distinguished by the differences in their leaves. Quackgrass leaves are soft, but those of western wheatgrass are stiff and are commonly clustered near the ground, leaving the upper part of the stem bare. Quackgrass is compared with four common pasture grasses in fig. 1.



Portions of spikes of quackgrass (A) Side view of quackgrass showing how flat side of spikelet is attached to the rachis. (B) A view of the same spike of quackgrass shown in A after it was turned one-fourth turn.

USES

Quackgrass is fairly palatable and frequently is pastured and used for hay. However, it is a persistent weed in cultivated fields where it seriously interferes with cultivation and crop production.

CULTURAL CONTROL

Cultivation is the only practical way to control an extensive infestation of quackgrass. To be effective, cultivation must destroy the rhizomes or rootstocks as well as the top growth. This is accomplished by:

1. Starving the plant by reducing its root reserves of food.
2. Drying the rhizomes and top growth so that they die.
3. Occasionally exposing the rhizomes to freezing.

Control of quackgrass by cultivation depends on one of these three factors or on a combination of them. The procedure selected depends upon the time of year the control work is to be done.

The root reserves of food can be reduced during the entire growing season, but dry summer weather is required for drying the rhizomes, and cold fall weather is necessary for freezing them. Quackgrass growing on fertile soil or receiving an application of nitrogen will have its root reserves depleted more rapidly than plants growing on less fertile soil. Heavy grazing for a year before cultivation also will assist in killing this grass.

FALL CULTIVATION

Generally, one entire season is required to eliminate quackgrass. After harvest is a good time to begin a quackgrass eradication program. Cultivation during late summer and fall following small grain harvest will thin stands of quackgrass, especially during dry years.

Unprotected rhizomes exposed to the elements over winter generally are killed by freezing. Temperatures below 20 degrees F. cause extensive damage to unprotected roots. For successful control, it is essential to expose as many rhizomes as possible by cultivation in late fall.

Make the fall cultivation a deep one and leave the surface rough. This helps reduce erosion and also promotes additional control by freezing.

SPRING CULTIVATION

The objective of cultivation is to reduce the root reserves of food. Quackgrass rhizomes normally contain a considerable quantity of stored food which enables the plant to start growth in the spring as well as following cultivation. Production of new top growth uses some of the stored food reserve. Continually cutting off the new shoot growth by tillage will deplete the stored food reserves, causing the rhizomes to weaken and die.

To starve the plants successfully, the new growth must be cut off by cultivation whenever the leaves become 2 to 3 inches long (about every 3 weeks). Avoid plowing any deeper than necessary to prevent burying the roots too deeply.

Timely cultivation is the most practical method of controlling quackgrass during spring or cool fall months when the plants are growing actively and the weather conditions are not favorable for killing them by drying.

Any implement which shears off the new leaf growth is effective in controlling quackgrass. A sharp, one-way disk operated at a depth of 2 or 3 inches is excellent. A double disk or cultivator equipped with sharp sweeps also is satisfactory.



New quackgrass shoots arise from rhizomes growing laterally beneath the soil surface.

SUMMER CULTIVATION

Exposing quackgrass roots and rhizomes to the sun and wind is another means of control. Drying is most successful in the summer and early fall when temperatures are high and the humidity is low. Under such conditions quackgrass goes partially dormant and is easier to kill than when actively growing.

During dry weather, exposed plants will die within 4 or 5 days. The frequency of cultivation depends upon the weather. Under good drying conditions, cultivate the infested area weekly. This is necessary to bring to the soil surface all fragments of rhizomes that have been buried. Pieces of quackgrass enclosed by clods of soil, partially covered with soil, or anchored to the soil often are not dried enough to be killed.

A heavy duty spring tooth field cultivator with teeth 1 to 2 inches wide is excellent for bringing the rhizomes to the surface. When extreme infestations occur the rhizomes are sometimes raked together and burned or removed from the field.

CONTROL IN PASTURE OR HAY FIELDS

Grazing on infested field or cutting it for hay for 2 to 3 years prior to cultivation results in the quackgrass rhizomes becoming concentrated in the top 3 or 4 inches of soil. Under such conditions cultivations can be rather shallow and the quackgrass will be easier to control. Cultivation with a one-way disk give excellent results. This disk cuts deep enough to contact all of the rhizomes, which are turned over and exposed to the drying action of the sun and wind. This method controls quackgrass by starving and dehydrating the plant.

FOLLOW-UP TREATMENT

The treatment to use the second year depends upon the degree of control obtained the first season. If the per cent kill was not satisfactory, repeat the tillage operation through another season. An alternative is to cultivate early, then either plant a row crop or sow a late crop of flax, millet or sudangrass.

CHEMICAL CONTROL FOR SMALL AREAS

Chemicals are effective in eradicating quackgrass but generally are not practical for large scale application because they are expensive and prevent the use of treated areas for crops for at least one growing season. However, quackgrass can be controlled economically with atrazine and the field kept in production if the rotation allows corn to be grown for 2 consecutive years. Generally it is not practical to rely on chemicals alone for controlling large infestations of quackgrass. Any herbicide should be used in conjunction with cultivation.

Selective chemical control of quackgrass in small grains and on lawns is not possible.

Amitrole-T

Amitrole-T is an effective chemical for controlling and eliminating quackgrass. It is used much the same as dalapon but generally does not leave a residue in the soil. Amitrole-T is a liquid mixture of amitrole and ammonium thiocyanate added to increase the chemical's effectiveness on quackgrass and other grasses.

Apply 8 pounds of amitrole-T per acre in 20 gallons of water in the spring when the quackgrass is growing actively. Cultivate after 3 weeks. Keep livestock off the treated areas for 8 months.

Better quackgrass control is obtained if clean tillage follows chemical application during the remainder of the growing season.

Dalapon (Dowpon)

An application of dalapon at 7 to 10 pounds per acre (3/4 to 1 ounce per square rod) followed by cultivation gives effective quackgrass control during a fallow year.

Dalapon is a wettable powder. Apply in 10 to 20 gallons of water per acre in the spring when the quackgrass is 4 to 6 inches high. This treatment must be followed in 2 to 3 weeks by plowing or other tillage. Usual tillage operations should continue through the balance of the fallow season.

This combination of chemical treatment and regular summerfallow is practical even for relatively large patches of quackgrass. There will be no chemical residue to affect crops planted the following year.

To treat infested areas where cultivation is not possible after chemical application, apply 20 to 25 pounds of dalapon per acre. The quackgrass should be 4 to 10 inches high before the treatment is made. There will be a residual effect in the soil during the growing season.

A single application of 10 pounds of dalapon per acre in the spring will give seasonal control for areas that cannot be cultivated. However, retreating the following year at the same rate will be necessary to eliminate the quackgrass.

Atrazine (AAtrex)

Atrazine is marketed as a wettable powder to be mixed with water and applied as a spray. Apply at the rate of 4 pounds of active ingredient (5 pounds of 80 per cent wettable powder) per acre during fall. Plow the following spring and plant corn.

Atrazine also can be applied 2 to 3 weeks before plowing in the spring. The land should be left undisturbed until it is to be prepared for planting. Application at planting, however, is less satisfactory because the chemical acts very slowly. It does not kill the quackgrass until July, which is too late to benefit the corn crop.

A split application of atrazine also can be used. Apply 2 pounds either in fall or early spring and 2 additional pounds at the time of planting corn. The early application will retard the quackgrass sufficiently to lower its competition with corn. The 2 pounds applied at planting time will further aid in controlling the quackgrass and should also help in controlling annual weeds in the corn.

Atrazine has a residual or carryover effect for a minimum of 12 months after application. Corn is the only crop that can be planted safely in a field treated with atrazine the year before. The residual effect of the chemical is especially pronounced in heavy clay soils high in organic matter. If atrazine is used on Fargo clay, corn should be grown for at least two consecutive years after the first treatment.

TCA

TCA gives effective quackgrass control when applied during late summer or early fall. Best results are obtained when 20 to 40 pounds acid equivalent per acre (1/8 to 1/4 pound per square rod) of TCA are applied after the infested area is plowed or thoroughly cultivated.

This chemical is available as a liquid and also as a powder or granules which must be dissolved in water

and applied as a spray. Apply TCA immediately after plowing. It is absorbed by the plant roots. Thus, a shallow plowing will bring a maximum number of rhizomes to the soil surface and in contact with the TCA. This chemical rarely kills more than 90 to 95 per cent of the quackgrass.

The residual effects of TCA may cause injury to certain crops planted the following spring. Soybeans, corn and red clover may be injured severely and wheat and barley are likely to be injured. If large areas have been treated, plant flax, sugarbeets, potatoes, oats, alfalfa or birdsfoot trefoil as these crops are rarely injured.

A higher rate of 100 pounds of TCA acid equivalent per acre (5/8 pounds per square rod) is required for control of undisturbed quackgrass sod. Make the application of TCA during late summer or early fall. A better kill will result if the top growth is removed and a light disking is made before treatment.

Effects from fall application will carry over into the next growing season and affect small grains, corn and soybeans.

COST OF CHEMICALS

The cost of chemicals varies slightly from one locality to another and even from one year to the next. Table 1 gives the average approximate cost of treating a square rod or an acre with the chemicals mentioned in this circular.

Table 1. The average approximate cost of herbicides used on quackgrass control.

Herbicide	Active ingredient pounds per acre	Cost per acre	Cost per square rod
Amitrole-T	8	\$44.00	\$0.28
Atrazine	4	\$13.75	\$0.09
Dalapon	7	\$ 6.65	\$0.04
	10	\$ 9.50	\$0.06
TCA Liquid	20	\$12.60	\$0.08
	40	\$25.20	\$0.16
	100	\$63.00	\$0.39
TCA Pellets	20	\$ 7.60	\$0.05
	40	\$15.20	\$0.10
	100	\$38.00	\$0.24



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