FUNGICIDES USED FOR THE STORAGE OF MOIST GRAIN

The deterioration of grain from molding when stored at too high a moisture content results each year in considerable economic loss. This problem has been intensified in recent years with the advent of combine-harvesting of grain and bulk-storing for periods of two to five years. A laboratory evaluation of approximately 100 chemicals for preserving moist hay by Schenk and Kennedy indicated that several of the compounds prevented the appearance of visible mold growth for a period of 11 weeks. The use of fungicides to prevent mold growth on grain which is not dried to a safe level in the field has recently been studied as a possible method of storing such grain.

Samples of shelled corn weighing 150 grams and containing 20 to 28% moisture were treated with a large number of chemicals, both alone and in combination, and stored in 8-ounce screw-top bottles for 105 to 107 days. At the end of the storage period the amount of mold growth was estimated visually.

About one-third of the 46 chemicals used in preliminary laboratory screening tests prevented the appearance of visible mold growth for 107 days at the rates tested. The chemicals which prevented mold growth when applied alone also were tested in combination. Of 112 combinations of chemicals, only 22 were effective in preventing mold growth for 105 days. Many of these mixtures of compounds were effective only at heavy rates of application and did not warrant further testing.

Continued laboratory tests were conducted with the most effective fungicides on moist shelled corn. These were studied in two groups: chemicals applied alone and chemicals applied in combination. The chemicals most effective when applied alone were 2,4,6-trichlorophenol, 1(2,3)-chloro-4-methyl-2-pentanone, 1-chloro-2-butanone, ethyl 2,3-dibromopropionate, and methyl 2,3-dibromopropionate. The first 2 chemicals controlled mold growth at a rate of application of 0.25% and the latter 3 at 0.30% for a period of 108 days. 2,4,6-trichlorophenol and 3,5-dimethyl-tetrahydro-1,3,5,2H-thiadiazine-2-thione both prevented mold growth when applied in combination with the above listed chemicals at rates as low as 0.20% for the mixture.

Visible mold growth was closely correlated to total loss of dry matter and final percent moisture of the grain. A negative correlation was found for time of first appearance of mold and total mold growth.

Several fungicides which had been effective under laboratory conditions were tested on 20-pound lots of wheat, ear corn, and shelled corn stored in polyethylene bags. Trichlorophenol was the only chemical that consistently prevented molding in corn and wheat containing 24 to 28% moisture at rates of application of 0.30 to 0.40% for periods of storage up to 168 days.

The work to date indicates that safe storage of moist grain in the laboratory and in small scale field experiments is possible with the aid of fungicides. At the present time the use of fungicides is not economically feasible as their cost is too high when compared with other methods of preserving grain.—W. M. KLIEWER and W. K. KENNEDY, Dept. of Agronomy, Cornell University.

RHIZOMES IN TALL FESCUE

Tall fescue (Festuca arundinacea Schreb.) is generally described as taller and more robust than meadow fescue (F. elatior L.). Although meadow fescue has been described as having somewhat creeping roots, short creeping rootstocks, or short rootstocks, no such characteristic has been attributed to tall fescue. The species was first described and named by Schreber in 1771. Subsequent descriptions by Beal, Piper, and Armstrong do not mention rhizomes. Hitchcock's Manual lists it as an unnumbered species and definitely states that it is without rhizomes. It has been assumed by some that Gray, Flint, and others included what we now call tall fescue under taller or meadow fescue (F. elatior L.). This assumption does not seem to be justified by either their descriptions or the range and distribution they indicated.

Tall fescue in various conservation plantings in New York and Pennsylvania has shown a very definite "thickening" in ground cover the second and third years after seeding. This, plus the spreading appearance of a few volunteer tall fescue plants in bluegrass sod, led to more careful examination of the underground parts of these plants. In August 1957 several tall fescue plants on the United States Soil Conservation Service Plant Materials Center at Big Flats, N. Y. were dug and examined. In the bluegrass sod where these plants had volunteered they exhibited spreading without clumpiness. All plants that had this characteristic were found to have rhizomes. The rhizomes of most of the plants which were examined had short internodes, but there was enough variation to indicate that selection might result in a more rapidly creeping type (see figure 1).

Notes

1 Contribution from Dept. of Agronomy, New York State College of Agriculture, Cornell University, Ithaca. Received Feb. 10, 1958.
4 Received Feb. 15, 1958.
5 Beal, W. J. Grasses of North America. 1887.
6 Piper, C. V. Forage Plants and Their Culture. 1939.
7 Armstrong, S. F. British Grasses. 1937.
10 Flint, C. L. Grasses and Forage Plants. 1860.