SEED TREATMENTS FOR SMALL GRAINS

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The role of seed treatments in controlling diseases and insects has been an important factor responsible for the tremendous advances made in crop production. Production of small grains and rice, as we know it today, would be unrealistic without the application of seed treatment pesticides. Although we have made many technological advances, seed and seedling diseases annually account for millions of dollars in losses. In our confrontation with increased production costs and the conservation of our energy resources, our dependence on seed treatment application is increasing.

Seed treatments are efficient and effective in controlling seed-borne diseases and protecting the seed from seed rots, seedling blights, and storage and soil insects. The benefits are so numerous that it is easy to justify treating seed. It has often been said that no other agricultural practice returns more for the investment than seed protectants, because the producer is protecting his potential crop so that the genetic potentials of the variety can be manifest to their maximum.

In 1969, the USDA decision to cancel the use of organic mercurials as seed protectants proved to be significant legislation affecting the seed industry. These materials performed dual activity by disinfecting and protecting the treated seed. The volatility of the mercurials made disinfection possible for seed parts, including unhulled, accessory parts which could not be reached by powder or liquid formulations. Therefore, external and some internal seed-borne diseases were controlled. Due to low costs of these materials and low rates required, many chemical companies were not conducting research for screening potential compounds for use as seed protectants. Therefore, the seed industry had to shift, almost without warning to non-mercurial "protectants" which required higher use rates and were considerably more expensive. Modifications of treating equipment also had to be made, since the effectiveness of these non-volatile protectants is largely dependent upon complete seed coverage.

Small grains were perhaps affected more than any other crop, since these had been highly dependent on the volatile mercurials as seed protectants for controlling seed-borne diseases. There are basically three types of seed-borne diseases commonly found on small grain and may be grouped as follows:

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Seed Borne Diseases

I. Systemic diseases that infect the seed during the flowering stage and become established within the resulting seed. These include the loose smuts of barley and wheat. Chemical treatments containing systemic fungicides are the only effective, registered means of control.

II. Systemic diseases that infect the seed during the harvest and/or storage period which result in infection of the developing seedlings following planting. These include bunt (stinking smut) of wheat, loose kernel and covered kernel smuts of oats, and head and kernel smuts of rye. Available treatment materials are quite effective in controlling these diseases.

III. Non-systemic diseases that infect the seed during the harvest or storage period, which upon planting, attack the seed or seedling to kill it before emergence, or produce a blighted plant from which the disease spreads to neighboring plants. These include many Helminthosporium blotches or blights and Fusarium scab or blight on barley, oats, rye, sorghum, and wheat.

One may ask the question, "With all of the potential diseases, aren't all small grains treated?" The answer to this question is, "No." There are many factors involved which have influenced processors to withdraw the service of custom treating or treating at all. Some of these reasons are:

I. Approximately 60-70% of the total seed required for planting is saved by the farmer and may or may not be cleaned at local elevators or processors.

II. The processor's viewpoint

(A) Investment in new equipment to handle the non-mercurial treatments is too great.
(B) Facilities for handling or segregating treated and non-treated seed are very expensive.
(C) Disposal of carry-over, treated seed is a problem and sometimes very costly.
(D) No competitive replacement for the organic mercuries. The cost of treatment materials is considered too high.

Presently it is estimated that only 50% of the small grains planted are treated with a fungicidal material - either commercially applied or by hopper box application. In 1974, an estimated 100 million acres were planted in small grains and required approximately 150 million bushels of planting seed.

The percent of acreage for each crop is:

Crop	% Acres Planted
Wheat	70
Oats	18
Barley	9
Rye	4

Through advanced technology and other events occurring presently or in the near future, we shall see a dramatic increase in the use and acceptance of seed treatments. I would like to speculate momentarily on what I believe are and will in the near future become important trends.

I. Hybrid wheats and proprietory varieties are becoming a reality and will have a tremendous influence in seed marketing.

   (A) Farmers will have to re-establish their seed stocks each year.

   (B) Seed costs will be greater; therefore, farmers will require and demand better quality seed permitting planting rates to be reduced - a seed fully protected with a fungicidal and insecticidal treatment will be desired.

   (C) Seed treatment will benefit the companies with entries in the various varietal testing programs to permit the genetic potentials to be exhibited to their fullest.

   (D) Treatment will permit product identification with a particular company.

II. The present market price of grains has made farmers more aware of seed quality and vigor. Seed protectants enhance both of these characteristics.

III. Recent advances in seed treater applicators and chemical formulations will help solve many of the problems confronting processors. These are:

   (A) Auger treaters for both commercial and on-farm applications.
      (1) Solve the problem of treated seed being carried over.
      (2) Remove the possibility of contaminating food grains with treated seed.
      (3) Permit bulk handling of treated seed.

   (B) Treaters attachable to both grain drills and planter units will make it possible to accurately apply dust materials to the seed during planting.

   (C) Chemical companies are presently making available flowable formulations of treatment combinations designed for

specific protection needs - seedling blights, systemic diseases and soil insects. Hopper box treatments are also being improved to include many of the same treatment combinations for added protection against specific problems.

Now that we have discussed wheat, oats, barley, and rye, I would like to talk briefly about rice seed treatments. This crop has been separated from the other small grains because of the complex production practices involved in rice farming.

In 1974, the rice acreage in the United States was approximately 2,400,000 acres and required approximately 7.5 million bushels of planting seed. In January 1974, the rice allotment program was removed by congress. Therefore, acreage increases are occurring rapidly in those states with land available for production. Here in Mississipi, the rice acreage for 1975 will be approximately 150% the 1973 alloted acreage.

Because of the production practices and disease pressures on rice, it is necessary to treat every bushel of planting seed. Two methods of planting, drill-seeded and water seeded , expose the seed to two totally different environments - each possessing distinct pathogenic pressures. Seed rots and seedling blights of Helminthosporium, Fusarium, and Rhizoctonia attack both drill and water seeded rice. Water mold, Achyla is usually the predominate pathogen found in water seeded rice. Anyone of these diseases can result in a drastic stand reduction. Therefore, the seeding rates for both planting methods is approximately 135 pounds or 3 bushels per acre; two to three times the amount really needed to produce a satisfactory stand.

The majority of the seed is commercially treated, particularly in the Southeast, but some larger producers and grower associations make use of auger treaters located at the bin site. This rice is treated while being with drawn from the bin and then conveyed to tanks where the seed is soaked and pre-sprouted for water seeding and then flown on the field. Pre-spouting the seed prevents the seed from floating on the water surface and helps to establish uniform seed distribution and stands.

Since the loss of the organic mercuries, the phenyl mercuries have not proven as effective, therefore, the search for new rice treatments has become a major project of many researchers and chemical companies. The various production practices and many diciplines involved complicate the research required. Examples of variables involved are:

I. Fungicide, insecticide and herbicide interactions
II. Toxicity to fish, crayfish, tadpole, shrimp and birds
III. Varietial succeptability to phytotoxicity
IV. Geographic distribution of pathogens

The data required for seed treatment registration by the EPA has increased, therefore, product registration is accomplished only after

years of research and at a tremendous expense.

I suggest that you consider treating small grains. Treatment selection should be based on specific needs since many chemicals have activity on only a few pathogens and/or insects. Treatment prices will vary from ten cents to fifty cents per bushel. Therefore, only buy the protection you need.

There are several registered products available for use on small grains, and because of the vast geographical areas represented here today, I would suggest consulting your state extension service for treatment recommendations.