4-1-1977

Application and Selection of Seed Treatment Materials

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APPLICATION AND SELECTION OF SEED TREATMENT MATERIALS

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Interest in and emphasis on the equipment and chemicals used for seed treatment varies seemingly in direct proportion to the outbreaks of disease in many crops. On the other hand, essentially all seed of hybrid corn, rice and vegetable crops are treated every year. Because of the EPA intridiction of the seed treatment market, today it is more important than ever that every seed processor apply the precise quantity of an EPA approved chemical fungicide and/or insecticide uniformly throughout the seed lot.

The objectives of this discussion are to discuss, in review form, the following: (a) the basic types of seed treaters; (b) the basic components of seed treaters; (c) seed treater calibration; and (d) summarize the fungicides and insecticides currently approved for application to seed by the E.P.A.

I. Seed Treaters

The four basic types of seed treaters currently available are; the true mist-o-matic, the true slurry type, the metered slurry type and the dry or dust type.

TRUE MIST-O-MATIC TYPE

The true Mist-O-Matic type seed treater uses the weight of seed to operate the seed dump and chemical measuring system of the treater. The amount of seed is measured by placement of a weight on the weigh pan arm while the amount of chemical applied to each batch of seed is determined by the size of the chemical cup (dipper cups) in the metering tank.

Each time the weighpan trips, seed flows to the retarding hopper, where it is gradually released to a dispersion cone. At the same time, chemical is delivered to the chemical cup receptacle and flows through a hose to a revolving disc which atomizes the chemical into a penetrating mist. As seed falls over a dispersion cone and through the treating chamber, it is enveloped by chemical mist that contacts even the hard to reach indentations of the seed.

The Mist-O-Matic treater is especially recommended when small amounts of chemical must be applied to relatively large quantities of seed.

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TRUE SLURRY TYPE

The true slurry type seed treater actually has the chemical metering tank and the premix or slurry tank combined as part of the treater. This tank must be filled at various intervals either by pouring by hand or pumnping from an auxiliary tank. Chemical measurement is accomplished by a chain of cups and seed measurement is by a one pan counterweight system. Each time a batch of seed is dumped, the chemical in one cup on the chain is dumped onto the seed. Blending of the chemical and seed together is accomplished in a film-coater unit.

METERED SLURRY TYPE

Like the Mist-O-Matic type treater, the metered slurry type treater uses the weight of seed to operate the seed and chemical measuring system. The amount of seed measured is controlled by placement of the counterweight while the amount of chemical measured at each trip of the weighpan is determined by the size of chemical cups used in the metering tank.

Each time the weighpan trips, seed flows through the measuring unit and into the coating chamber. At the same time, chemical is delivered to the chemical cup receptacle and flows through a tube to the coating chamber.

As the seed and chemical are conveyed through the coating chamber to the discharge, they tumble together, spreading an even coat of chemical on each seed. This mixing action, before final discharge, also allows some of the moisture in the chemical to evaporate from the seed which facilitates handling after treating.

DRY OR DUST TYPE

The dry or dust type treater is a specially designed treater for treating peanuts, beans, peas, and grass seed, and other commodities where a dry chemical must be applied or where the seed to be treated are very fragile in nature. With the dry type seed treater, measured amounts of powdered chemical are uniformly and continously applied to seed by the use of a vibrating feeder from a Syntron Control. Like the Mist-O-Matic and metered slurry type treaters, seed measurement is controlled by placement of a counterweight and the use of a double weighpan system. As with the slurry type treaters the blending of the chemical and seed together is accomplished in a film coater or coating chamber which normally contains a tampico brush or nylon brush for gentle movement of seed to the end of the coater.

II. Basic Components of All Seed Treaters

Every mechanical seed treater is the composite of four major compo-

nent parts. These components are: a feed control mechanism: a chemical reservoir and delivery system; a measuring or metering system, and a blending or mixing system.

Feed Control Mechanism

Regardless of the manufacturer, all seed treaters are equiped with a manually controlled feeding mechanism. One of the more important factors in effective, accuarate seed treatment is a continous and uniform flow of seed into the treater. The surging of seed into any treater, such as direct discharge from a cup-elevator, results in some seeds being over-treated and others under-treated since alternate dumps of the seed weighpan will differ in weight. A properly installed seed treater is placed under a holding or surge bin with the rate of feed controlled by the treater's feeding mechanism.

Chemical Reservoir and Delivery System

Most treaters have a small (few gallon capacity) chemical reservoir tank built-in, however, this permits only a few hours operation before refilling is required. Refilling is a time consuming and sometimes a difficult job when the treater is elevated or barely accessable. Many seedsmen have determined it to be much more economic and time saving to buy or build a large capacity holding receptacle for the chemical. This can vary from merely using the drum in which the chemical is shipped with a small centrifugal or diaphragm (piston) pump to an elaborate two hundred (200) gallon stainless steel premix or slurry tank with internal paddle agitation and a built-in high volume pump.

Measuring or Metering System

This is the system that accurately measures and delivers an exact amount of chemical to specific quantity (weight) of seed. All major types of seed treaters use the weight of seed to actuate both the seed dump and the chemical delivery system. The Mist-O-Matic type, metered slurry type, and dry type treaters utilize a double weighpan seed dump system, the true slurry treater uses a one-pan seed dump system. The true slurry treater employs "slurry" cups on a revolving chain or belt that dip into the chemical holding tank on the treater and dumps chemical on seed in unison with each seed dump. The Mist-O-Matic and metered slurry types of treaters employ two (2) chemical cups inside the metering tank of the treater that alternately dump chemical onto the seed in unison with each seed dump of the weighpan. The dry type seed treater employs a vibrating feeder system controlled by a Sytron Control which is activated by each dump of the weighpan, thus continually vibrating dry chemical onto measured amounts of seed.

Blending or Mixing System

The final step in seed treatment is to distribute the chemical applied uniformly over the surface of each seed. The importance of obtaining a uniform distribution of the chemical over every seed can not be overemphasized. The removal of the "vaporizing" mercurals and increasing stringency of EPA regulations greatly increases the importance of uniform distribution.

On the true Mist-O-Matic treater, this system is the mist chamber. The true slurry treater, metered slurry and dry dust treater may employ various kinds of blending systems; a film coater or coating chamber with brush blending element; flighting, paddle or auger blending element, or a revolving cylindrical or hexagonal drum.

III. SEED TREATMENT CALIBRATION

1. Basic Facts To Know Before Calibrating a Seed Treater.

   (a) All seed treatment materials are quoted in either dry or fluid ounces per 100 pounds or per bushel. Remember, there is a difference between dry and fluid ounces!

   16 dry ounces = 1 lb.
   128 fluid ounces = 1 gal.

   1 fluid ounce = 30 cc's. Example: At a rate of 3 fluid ounces per cwt, you are actually applying 90 cc's per cwt.

   (b) When slurries are made by mixing wetable powder chemicals with water, the treater then applies the slurry in fluid ounces of the slurry mix.

   (c) Chemical cup sizes are measured in cc's. Example: Setting the dump weight to apply 3 fluid ounces (90 cc's) per cwt.

15 cc	16 pound dump
10 cc	11 pound dump
7.5 cc	8 pound dump
5 cc	5.5 pound dump
2.5 cc	3 pound dump

2. Accurate Calibration of a Seed Treater.

   (a) With no chemical in the metering tank, run 100 pounds of seed through the treater and count the number of times the weighpan dumps. Divide 100 pounds by the number of times the weight trips. This gives you the number of pounds of seed per dump of the weighpan. Record the numerical setting of the weight on the weighpan arm for future use.

(b) Determine how much liquid the treater metering cups or buckets will dump onto the seed each time the weighpan arm trips by manually tripping (without seed) the weighpan arm a specific number of times catching the chemical that is dumped in a measuring cup.

Divide the amount of chemical caught by the number of times you tripped the weighpan. This gives the amount of chemical delivered per dump of the weighpan. Record for future use.

After completing operations (a) and (b), you know exactly how the treater is presently set.

Remember there are two ways to vary the dosage of chemical to seed, either change the setting of the weight on the weighpan arm . . . raise weight to increase amount of seed dumped or lower it to decrease OR replace the chemical measuring cups with another cup size to deliver more or less chemical per dump as necessary. For additional information on calibration, use the calibration instruction manual furnished with each machine by the manufacturer.

(c) Using a slurry prepared by mixing a wettable powder with water requires special consideration. Most wettable powders are applied at the rate of one to five dry ounces per 100 pounds of seed. Normally, a chemical to water mixing rate is not quoted on the label, so you will have to experiment to suit yourself.

Example:

A chemical is to be applied at the rate of two dry ounces per 100 pounds of seed. The seedsman has found that mixing five pounds of chemical (80 dry ounces) with one gallon of water, gives him the slurry consistency that he desires.
Then, it must be kept in mind that the total volume of slurry (in this case, approximate 1.2 gallons) is enough to treat 40 cwts (4,000 lbs.) of seed.
So . . . 128 fl. oz/gal x 1.2 gal of slurry = 153.6 fl. oz. of slurry
And. . . $\frac{153.6 \text{ fl. ozs.}}{40 \text{ cwt seed}}$ = 3.84 fl. oz/per cwt. seed

After making this determination i.e. the number of fl. oz. of slurry to apply to each cwt. of seed, then follow the instructions given in steps (a) and (b) above.

IV. CHEMICAL SEED TREATMENT FUNGICIDES AND INSECTICIDES

Before listing the more important seed treatment fungicides and insecticides, I emphasize the importance of (a) reading the entire label before using any chemical and (b) following the instructions exactly. All of the following chemicals are prepared for killing disease organisms or insects, however, they can also kill you!

1. Inorganics

   a. BASIC COPPER SULFATE (TRIBASIC) -
   controls certain seed rots of wheat and vegetables.
   b. 2. COPPER OXIDE (KOCIDE) -
   controls blights and certain seed rots of peas.
   c. COPPER CARBONATE (BASIC) -
   controls surface smuts, bunt, and certain seed rots of grain sorghum and wheat.

2. Metalic Organics

   a. METHYLARSENIC SULFIDE (RHIZOCTOL^{R}) -
   controls certain seed rots, water molds, blights, and damping off of cotton, rice, vegetables. Not sold or registered in U.S.
   b. PHENYL MERCURIC ACETATE (PMA MIST-O-MATIC^{R}) -
   controls certain seed rots and seed borne blights of wheat, barley, oats, sorghums, cotton, flax, etc.

3. Antibiotics

   a. STREPTOMYCIN (AGRI-STREP^{R}) -
   controls certain bacterial decay problems (potato seed piece decay) of potato seed pieces.
   b. CYCLOHEXIMIDE (ACTI-DIONE^{R}) -
   controls certain seed borne diseases of vegetables, especially onions. Not sold or registered in U.S. for seed treatment purposes.

4. Caramates

   a. MANEB (MANZATE^{R}, GRANOX^{R}, AGROSOL^{R}) -
   controls certain seed rots and blights of peanuts, soybeans, and corn. Controls certain seed born diseases such as bunt, surface borne smuts, and rots of small grains.
   b. ZINEB -
   controls certain seed borne diseases of small grains certain rots of potato seed pieces.

R = Registered trade mark or name - no endorsement implied.

c. MANEB & ZINC COMBINATION (DITHANE^{R}) -
controls certain seed borne diseases of small grains and rice.
d. NABAM -
controls certain seed borne diseases of cotton, onions, and potato seed pieces.
e. BENOMYL (BENLATE^{R}) -
controls certain seed borne blights, rots, and smuts as well as internally borne smuts of small grains. Not sold or registered in U.S. for seed treatment purposes.

5. Chlorinated Hydrocarbons

a. PCNB (TERRACHLOR^{R}) -
controls certain surface borne seed and seedling diseases of cotton, small grains, vegetables, and rice.
b. HEXACLOBENZENE (HCB) -
controls surface borne smuts and blights of small grains and seed borne diseases of cotton, peanuts, soybeans and vegetables.
c. CAPTAN (ORTHOCIDE^{R}, CAPTAN^{R}) -
controls a broad spectrum of seed borne and seedling diseases of many crops.
d. DIFOLATAN^{R} (CAPTAFOL) -
controls seed borne and seedling diseases of cotton and rice.
e. DEMOSAN^{R} (GHLORONEB) -
controls seed borne and seedling diseases and damping off of cotton and certain beans. Systemic in action.

6. Miscellaneous Organics

a. VITAVAX^{R} (CARBOXIN) -
controls seed borne and internally borne smuts, bunts, blights, and seedling diseases including damping off of small grains. Controls seed borne and seedling diseases of cotton, rice and peanuts. Systemic in action.
b. THIRAM (ARASAN^{R}) -
controls seed borne diseases of many crops.
c. DEXON -
controls certain seed rots and seed borne diseases of cotton, sorghum and vegetables.
d. BOTRAN -
controls certain seed borne diseases and seed rots and blights of peanuts.
e. THIABENDOZOLE^{R} (TBZ: MERTECT^{R}) -
controls seed borne and seedling diseases of small grains and cotton. Not sold or registered in U.S. for seed treatment purposes. Systemic in action.
f. BUSAN^{R} (TCMTB) -
controls seed rots, seedling diseases, damping off, and surface borne smut of small grains, cotton and corn.

The insecticides normally applied to seed are grouped into three groups based upon their chemical composition. These three groups are: chlorinated hydrocarbons, organic phosphates and carbamates.

1. Chlorinated Hydrocarbons

   a. ALDRIN, DIELDRIN, ENDRIN, CHLORDANE -
      all registrations for seed treatment recently cancelled by EPA.
   b. HEPTACHLOR, BHC, LINDANE -
      wireworms, seed corn beetle, seed corn maggot.
   c. METHOXYCHLOR -
      storage insects only, no soil insect activity.

2. Organic Phosphates

   a. AZODRIN -
      registered for treatment of cottonseed only under tradename Go-Better. Systemic and provides control of early season insects attacking young cotton seedlings such as thrips, fleahoppers, etc.
   b. DI-SYSTON -
      same as Azordin.
   c. THIMET -
      same as Azordin.
   d. DIAZINON -
      used on peas, beans, soybeans, corn to control seed and seedling attack of seed corn maggots and seed corn beetles. No claim for wireworm or false wireworm made.
   e. LORSBAN -
      recently registered for treatment of seed corn.
   f. MALATHION -
      registered to treat many types of seed - for control of storage insects such as weevils, ants, etc. No soil insect control.

3. Carbamates

No carbamate insecticides are currently registered for seed treatment use in the U.S., but there are two important ones currently being tested that show much promise.

   a. DACAMOX -
      a product of Diamond-Shamrock Corp. being investigated as a systemic cottonseed treatment to control early insects such as thrips, fleahoppers, mites on young cotton seed lings.
   b. MEASUROL -
      a product of Chemagro Chemical being investigated as a treatment for rice seed for control of rice water weevil and as a bird repellent. This product is not systemic and seems to have a very long residual.