A LABORATORY-SCALE SEED TREATER

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A device is described for the application of liquid seed dressings to small quantities of seed. Uniformity of application is better than that achieved by conventional treatment equipment.

INTRODUCTION

In plant breeding operations it is frequently necessary to apply seed dressings to a large number of seeds in small batches.

Dry (powdered) dressings are easily applied by adding the required amount of chemical to an envelope containing the seed, sealing the envelope and shaking. While coverage may be somewhat variable, adequate coverage can be achieved by using a slight excess of dressing, since any excess material will separate from the seed at the time of planting.

Liquid treatments are more difficult to handle. Excess material cannot be added to ensure adequate coverage as is done with dry dressings. Liquid dressings must be applied uniformly in as small a volume of liquid as possible in order to avoid unnecessary wetting of the seed and the clumping or damage which could ensue. This usually requires either spray application to seed laid out in a pan or drip application into a mixer. The former can achieve uniform coverage but exposes the operator to concentrated pesticide aerosols. The latter method is safer for the operator, but frequently suffers from non-uniformity of application.

The seed treater described herein is designed to provide a means of achieving uniform coating of 20-g to 25-g batches of seeds while minimizing operator exposure.

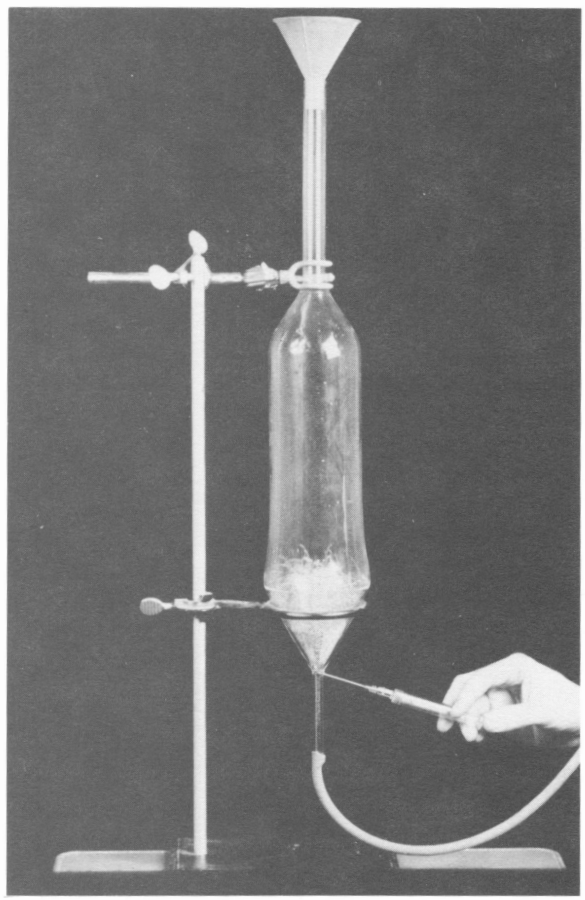

Figure 1. Laboratory-scale seed treater in operation.

EQUIPMENT AND METHODS

The treater consists of a cylindrical glass chamber with a conical bottom (Fig. 1). The tube at the bottom is connected to a source of low-pressure air. An opening in the side of the inlet tube admits the end of a hypodermic needle which injects the dressing material into the airstream. The seed to be treated is dumped into the chamber. The airflow through the inlet tube is adjusted to a rate which results in the smooth circulation of the seeds. The material to be applied is then injected into the airstream, which atomizes the material.

To evaluate the uniformity of treatment, two series of tests were carried out. In the first series, 25-g samples of rapeseed were treated with 2 mL of water containing 1% Wt/vol Brilliant Sulphaflavine dye. Individual seeds were washed in 10 mL of distilled water and the washings were then analyzed with a fluorometer to determine the relative amounts of dye picked up by each seed.

In the second series, five 22-g samples of seed were treated with a mixture of 0.5 mL of Vitavax RS Flowable (Uniroyal Ltd.) seed dressing and 0.5 mL of the dye solution. Ten seeds from each sample were washed individually in 5-mL aliquots of distilled water and the washings were analyzed as before.

The coefficient of variation was calculated for the individual seeds within each sample.

RESULTS AND DISCUSSION

The seeds treated with 2 mL of 1% dye solution showed a coefficient of variation of 16%. Those treated with 1 mL of the seed dressing mixture showed a coefficient of variation of 32%.

Since the spray is completely covered by the seed bed, there is likely to be no overspray. Escaping aerosols from conventional spray applications are greatly reduced if not entirely eliminated. The air blast entering at the bottom of the conical section of the treater causes the seeds to circulate up in the middle and down around the edges of the bed. This circulation of the seed bed ensures that each seed is exposed to the spray, provided that the injection occurs over a sufficiently long period for the seed bed to complete one or more complete circulations. Generally, for the seed quantities used in these tests, this is in the order of a few seconds.

The coefficients of variation determined for the amount of dye on individual seeds compare favorably with conventional liquid treatments applied with an auger, for which coefficients of variation approaching 100% seem typical (Dodds 1962). The difference between the two coefficients of variation in this study is likely due to the effects of the reduced volume used with the seed dressing as well as its greater viscosity, which would result in a coarser aerosol being formed.

CONCLUSION

The treatment method outlined above provides relatively uniform application of liquid seed dressings to small quantities of seeds with less operator exposure than is likely with other methods.

REFERENCE

DODDS, M.E. 1962. Fungicidal application by farm-type seed treaters. Agric. Eng. 43(6): 340–343, 350.