Persistence of thiophanate-methyl on stored soybean seed

B. SANTHA LAKSHMI* and J.P. GUPTA

Nuclear Research Laboratory, Indian Agricultural Research Institute, New Delhi 110 012

Abstract: There was significant reduction in the quantity of thiophanate-methyl on soybean seed with extended period of storage. Maximum persistence of fungicide was found on seeds stored in polythene lined jute bag followed by polypropylene polyethylene (PP + PE) bag. Storage at 30°C resulted in more degradation as compared to at 20°C. The interactions between different factors of temperature, period of storage and type of containers for persistence of thiophanate-methyl was significant.

Keywords: Thiophanate methyl, soybean seed, storage, spectrophotometer

Soybean seed of variety 'Bragg' having an initial moisture content of 7.1 per cent as measured by Marconi moisture meter (TF-933A) was dressed with a 70 per cent formulation of thiophanate-methyl (Topsin-M) at the rate of 0.2 per cent w/w by shaking the seeds with fungicide powder in a conical flask on a rotary shaker for 20 minutes. Seed treated with fungicide were kept in three types of containers viz. cloth bag, polythene lined jute bag and polyproplene polyethylene (PP + PE) bag and stored at different temperature of 20° and 30° ± 1°C in the incubator. There were three replications for each treatment. In all cases, suitable untreated checks were kept.

Extraction of thiophanate-methyl from the treated seed was done by shaking 3 seeds in a conical flask having 2 ml ethyl acetate on a rotary shaker for 5 minutes. The process was repeated 4 times, extracts pooled and final volume was made to 10 ml with ethyl acetate in a volumetric flask. For quantitative estimation of thiophanate-methyl in the extract, the absorbance of samples was measured in one cm silica cells of Pye-Unicam SP 8-
RESULTS AND DISCUSSION

The analysed data on the quantity of thiophanate-methyl present on dressed soybean seed after storage for different periods under different conditions of temperature and type of containers show that all the three storage factors, viz., temperature, type of container and period of storage have a significant influence on persistence of thiophanate-methyl on soybean seed and interactions between them are significant. The persistence of thiophanate-methyl was maximum on seeds stored in polythene lined jute bag followed by PP + PE bag and least in cloth bag (Table 1). There was reduction in the quantity of the fungicide on seed with increase in storage period. Workers have reported similar trend in case of thiram on wheat (Raju and Chatrath, 1978) and soybean (Gupta and Chatrath, 1993), carbendazim on wheat (Sastry and Chatrath, 1984). The results on interaction between container indicate that the quantity of the fungicide reduced within 15 days of storage and period of storage in all containers which was more prominent after 150 days. Loss
of fungicide was gradual in all containers and only about 27 per cent of the fungicide was lost after 180 days of storage in polythene lined jute bag whereas in cloth bag about 69 percent of fungicide was lost. The high persistence of fungicide in polythene lined jute bag compared to other containers may be due to the possibility of minimum interaction with the environment. Lal (1975) reported that use of polythene bags keep grains hermetically sealed with little change in the moisture content. In polythene lined jute bags, the moisture content of seeds was low (8.6 per cent) as compared to other bags which may be responsible for slow degradation of fungicide.

The results on the effect of temperature on degradation of thiophanate-methyl show that the quantity of fungicide was maximum on seed stored at 20°C which was significantly higher than that obtained at 30°C (Table 2). A low temperature like 20°C was found to retard the degradation of the fungicide. While rapid degradation at 30°C may be due to high relative humidity (76-78 per cent) coupled with high temperature. Interaction between temperature and container indicate that seed stored in polythene lined jute bag at 20°C retained significantly more quantity of the fungicide (1088.52 µg/g) followed by PP ± PE bag at 20°C (1045.33 µg/g). Among all containers, quantity of fungicide was less (644.96 µg/g) on seed stored in cloth bag at 30°C after 180 days storage.

The viability tests revealed that treated seed always showed better germination as compared to untreated ones under similar conditions of storage.

ACKNOWLEDGEMENT

Authors are thankful to the Project Director, Nuclear Research Laboratory, I.A.R.I. New Delhi for providing the facilities.

REFERENCES


