

Relative efficacy of straw bin and gunny bag to control ageing process in paddy seeds

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ABSTRACT

Freshly harvested seeds of paddy (var. Lalat) were stored in gunny bag and straw bin under ambient condition for 10 months. The initial values for seed moisture content, germination, vigour index, field emergence, conductivity of seed leachate, insect infestation and dehydrogenase activity were 8.98%, 93%, 1350, 91%, 0.36 mmhos cm⁻¹, 0% and 0.038 OD g⁻¹ dry weight of seed, respectively. The initial average temperature of stored seeds in both the containers was 27.2°C. After 4 months of storage, seed moisture content tended to increase in gunny bag due to rise in atmospheric relative humidity caused by onset of monsoon but less so in straw bin. Seed moisture content approached maximum values after 6 months and 8 months of storage in gunny bag (11.44%) and straw bin (10.32%), respectively. Seeds stored in straw bin maintained germinability above minimum seed certification standard (MSCS)(80%) for 8 months while in gunny bag the germination value fell below MSCS just after 5 months of storage.

Key words : rice, germinability, storability, storage container

Storage of crop seeds in straw bin is an indigenous method which has been developed by the farmers of Odisha since long. The farmers usually store cereal, pulse and millet seeds in specially designed straw bins of variable sizes. But with the advent of gunny (jute) bag, the use of straw bin has been reduced. However, straw bin has specific advantage for maintenance of seed viability under coastal agro-climatic condition (Sahoo and Swain, 1983). Although the gunny bag is convenient to handle for storage of crop seeds, it is highly moisture pervious and hence stored seeds lose germinability quickly, especially during rainy season. In order to assess the efficacy of indigenous and modern storage materials, the present study was undertaken at Orissa University of Agriculture and Technology, Bhubaneswar.

Freshly harvested and well dried (about 9% m.c.) seeds of paddy (var. Lalat) were stored in straw bin and gunny bag. During making of straw bin a thermometer was fitted so that inside temperature could be recorded as and when required. Similar method was adopted to record temperature in gunny bag. Seed

samples were collected by Nobbe trier at monthly intervals and observations on seed moisture content, germination (ISTA, 1985), vigour index (Abdul-Baki and Anderson, 1973), conductivity of seed leachate (Agrawal and Dadlani, 1984), dehydrogenase activity (Kittock and Law, 1968) and insect infestation were recorded in order to assess the relative storability of rice seeds in these two containers.

The extent of seed ageing was assessed by five parameters, viz. germination, field emergence, vigour, membrane damage (conductivity of seed leachate) and dehydrogenase activity. The observations on seed moisture content and temperature inside the container supplemented the data on ageing parameters to draw inference.

The initial seed moisture content was 8.98% in both the containers (Fig. 1). There was rapid increase in seed moisture content in gunny bag after 4 months of storage due to onset of monsoon and approached peak value (11.44%) after six months. Seed moisture content in the straw bin showed a slow increase indicating less moisture perviousness than the gunny

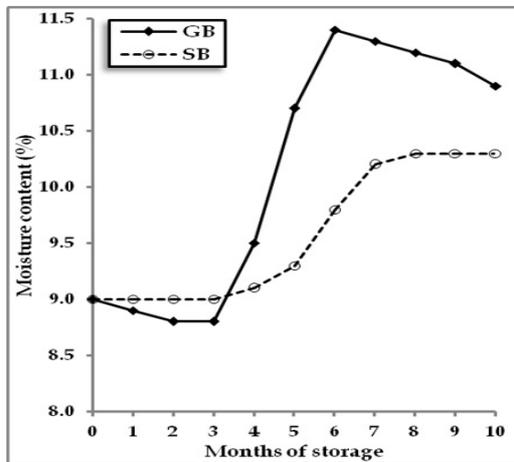


Fig. 1. Changes in moisture content of paddy seed during storage in gunny bag and straw bin

bag. However, after rainy season, there was slow decline in moisture content in straw bin.

The recorded temperature inside the container was 27.2°C at the time of storing the seeds (Fig.2). Since the seeds are poikilothermohydric in nature (Sahoo *et al.*, 1999), the temperature inside the container changes with atmospheric temperature, if the container is not insulated. There was less fluctuation of temperature inside the straw bin than inside the gunny bag. It is presumed that the pressed straw (out of which the bin has been prepared) could be partially insulating the seeds from external environment.

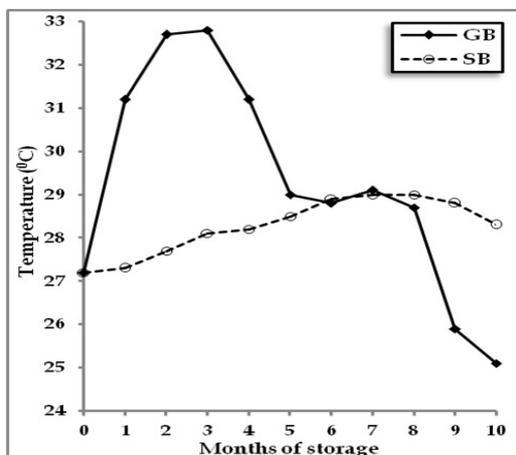


Fig. 2. Changes in internal temperature of paddy seed during storage in gunny bag and straw bin

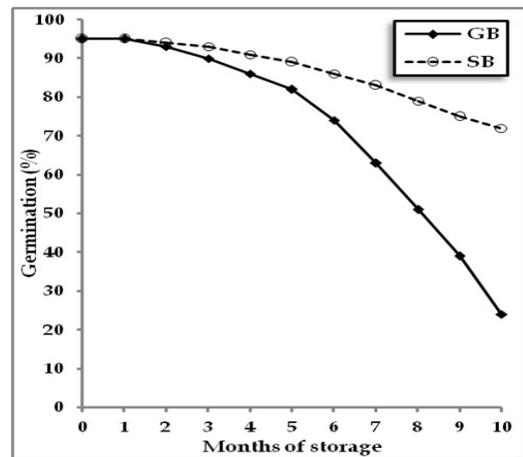


Fig. 3. Changes in germination of paddy seed during storage in gunny bag and straw bin

Since the seeds are freshly harvested the initial germination and vigour index values were 93% (Fig. 3) and 1350 (Fig. 4), respectively. Such high values showed small decline indicating slower ageing process till onset of monsoon. With the progress of storage period during monsoon months, the ageing process became faster in seed lot stored in gunny bag and exhibited rapid decline

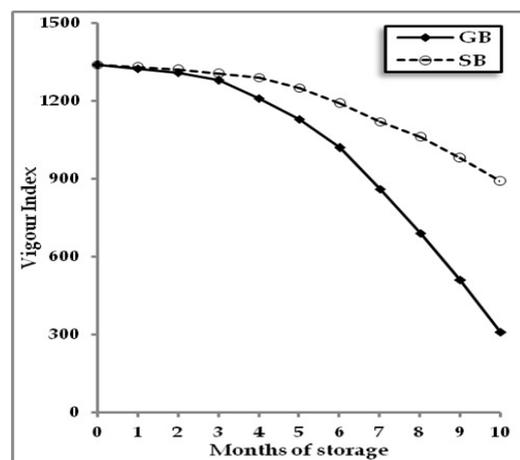


Fig. 4. Changes in vigour index of paddy seed during storage in gunny bag and straw bin

in all the above parameters. On the contrary, in straw bin the ageing process was slower even during monsoon months and the germinability was maintained above MSCS (80%) for 8 months as against 5 months in gunny bag. Seed vigour also showed slow decline during

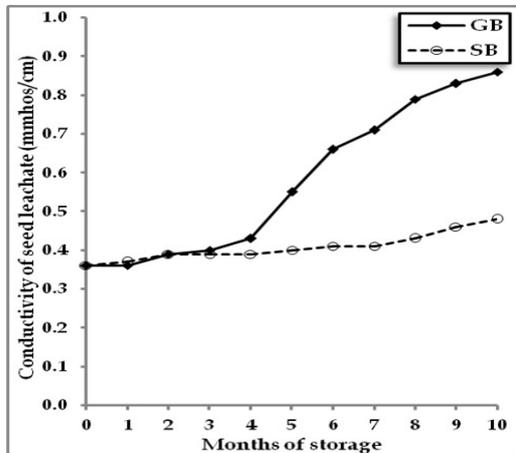


Fig. 5. Changes in leachate conductivity of paddy seed during storage in gunny bag and straw bin

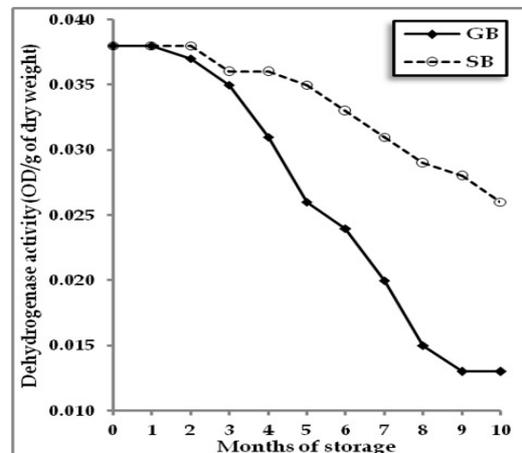


Fig. 6. Changes in Dehydrogenase activity of paddy seed during storage in gunny bag and straw bin

storage period. The possible reasons for such slower ageing process in seeds stored in straw bin as compared to those stored in gunny bag were ascribed to less fluctuation in seed moisture and internal temperature, less membrane damage as observed from conductivity of seed leachate (Fig. 5) and maintenance of higher dehydrogenase activity (Fig. 6). Thus seed ageing process was slower in straw bin as compared to gunny bag.

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