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TOBACCO SEED STORAGE : 1. AN INEXPENSIVE METHOD FOR LONG TERM SEED STORAGE

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ABSTRACT

Flue cured tobacco seed var. CTRI Spl and White gold of crop season 1975-76 was stored at ambient temperature in 500g capacity container with and without desiccant, anhydrous calcium chloride. Seed stored with 5-6% and lower than 3% initial seed moisture with desiccant (dry storage) maintained viability and the moisture content was below 4.5% for a period of 24 years (March 2000) whereas seed stored without desiccant (control) contained seed moisture of 6-7% and lost viability in 24 months. To adopt this method for tobacco seed storage in large scale CTRI Spl (MR) of crop season 1982-83 was stored in 50 kg drums with desiccant (250 and 500g) at ambient temperature and the seed remained viable for 17 years (March 2000). Seed stored without desiccant lost viability in 24 months and its seed moisture was 6-7%. Stored seed was tested in nursery for seedling production and it was at par with fresh seed. It is concluded that storage of tobacco seed at ambient temperature using desiccant is reliable and inexpensive method as compared to traditional method of cold storage for long term tobacco seed storage.

INTRODUCTION

Maintenance of tobacco seed viability over long periods of time is a problem and it depends on the place and type of storage. Tobacco seed viability during storage is influenced by storage temperature and seed moisture. Tobacco seed stored dry, in the absence of air and light was viable for a period of 20 years (Schloesing and Leroux, 1943). Pal and Bangarayya (1976) showed detrimental effect of high (11.3% to 18.8%) and medium (6.5 to 9.5%) moisture contents of seed on its viability in storage at laboratory temperatures. Kincaid (1943) reported that seed viability was lost during storage at all the temperatures tested if seed moisture remains high. Later studies also showed that seed moisture plays more critical role than temperature during storage for maintenance of tobacco seed viability (Bangarayya and Ramam, 1979). Under our conditions seed produced for sale remains viable.(>90%) during first year, in second year germination comes down to below 80% and loses viability in 24 months. This necessitated initiation of studies on long term storage of tobacco seed adopting simpler and cost effective methods as compared to traditional cold storage method.

MATERIAL AND METHODS

Processed and cleaned tobacco seed of variety CTRI Spl. and White gold from the crop season 1975-76 was taken for the study. Initial seed moisture was above 5% in the two seed lots. Part of the seed (lot a) from the two varieties was dried at 60°C and the seed moisture was brought to below 3%. Other part of the seed (lot b) with initial seed moisture above 5% and seed with initial moisture of 3% was stored in 500g metal containers along with desiccant and the container was made air tight by sealing with cellophane tape all along the lid. In another set CTRI Spl. and White gold seed with above 5% moisture was stored in 500 g container without desiccant and kept as control. All the containers were kept in laboratory at ambient temperature. Seed samples were drawn at an interval of six months for testing seed moisture and germination (Anonymous,1985). When the desiccant became semi solid it was changed with fresh desiccant. Similar experiment with CTRI Spl. MR seed of crop season 1986-87 was stored with an initial seed moisture of 4.70%. Seed samples were drawn at an interval of six months for estimation of seed moisture and germination. To adopt this method for

large scale tobacco seed storage 50 kg capacity metal drums made of tin sheet were selected. Seed of CTRI Spl.MR from crop season 1982-83 was dried in the sun to an initial seed moisture of 4% and it was filled in the drums leaving 1/5 space in the drum vacant. Treatments include 250 and 500 g desiccant per drum along with control (without desiccant). Desiccant anhydrous calcium chloride was filled in a beaker and the mouth of the beaker was covered with a muslin cloth and tied with a twine thread. The beaker was half buried in the seed and the drums were closed and made airtight by sealing all along the lid with cellophane tape. Desiccant was changed when it became semi solid. Seed samples were drawn at an interval of six months and tested for moisture and germination. Viable stored seed from the big drums was taken and packed in 0.5 kg polyethylene packets and tested for moisture and germination at an interval of six months. CTRI Spl MR seed of crop season 1982-83 stored in big drums (50 kg) was tested in nursery during the year 1993-94 for seedling production and seedling vigor. Seedling vigor was determined as fresh and dry weight of 100 seedlings (Tsung-Dao Liou ,1985).

RESULTS AND DISCUSSION

Under optimum conditions, viable tobacco seed germinates to above 90% in 5-6 days. Tobacco seed viability during storage is affected by seed moisture content and storage temperature but seed moisture plays more critical role (Kincaid 1943). Storing the seed in an airtight container along with a desiccant anhydrous calcium chloride controlled seed moisture during storage. Results obtained from the present study shows that seed of two varieties CTRI Spl. and White gold of crop season 1975-76 stored at ambient temperature in small tins (500 g) with an initial moisture of 5-6% and less than 3% under dry storage reached a moisture content of 3.0 to 3.5% with in a period of 12 months and in control where seed was stored without desiccant remained at a moisture content of 5-6%. Seed moisture and germination tests were conducted at an interval of six months during the entire period of study. Seed moisture during the entire storage period of 24 years remained below 4% for both the varieties (Fig. 1 and Fig. 2) except in a few instances where it was above 4.5% but sooner it was brought below 4% by changing the desiccant with fresh one. But in control it gradually increased to 6.5-7.0% in a period of 3 to 4 years. Seed germination in both the varieties was above 90% for a period of 18 years (Fig. 1 and Fig. 2) irrespective of their initial seed moisture and later there was slight reduction but remained above 80% for a period of 24 years in dry storage. In control where the seed stored without desiccant, viability was lost in 24 months. Kincaid (1943) also reported viability of tobacco seed up to 11 years when stored over calcium chloride but without desiccant the viability was lost within two years. Bangarayya *et al.* (1984) reported tobacco seed viability up to 78 months using calcium chloride as desiccant. Seed moisture of CTRI Spl. MR seed of crop season 1986-87 stored in small tins at ambient temperature with desiccant reached below 3% within a period of six months and then remained below 4% and germination was above 90% during the entire period of study (Fig. 3). In control, seed moisture increased from 4.75% to 6.7% and viability was lost with in 24 months. Results obtained from the study with bigger containers of 50 kg capacity shows that in dry storage seed moisture reached below 4% in a period of 18 months irrespective of the quantity of desiccant used (250 or 500 g) whereas in control it increased to a maximum of 7.69%. Germination remained above 90% for a period of 10 years and then it declined slowly but remained above 80% for 16 years, but in control, the viability was lost in 24 months (Fig. 4). Per cent germination was not affected by the quantity of desiccant used

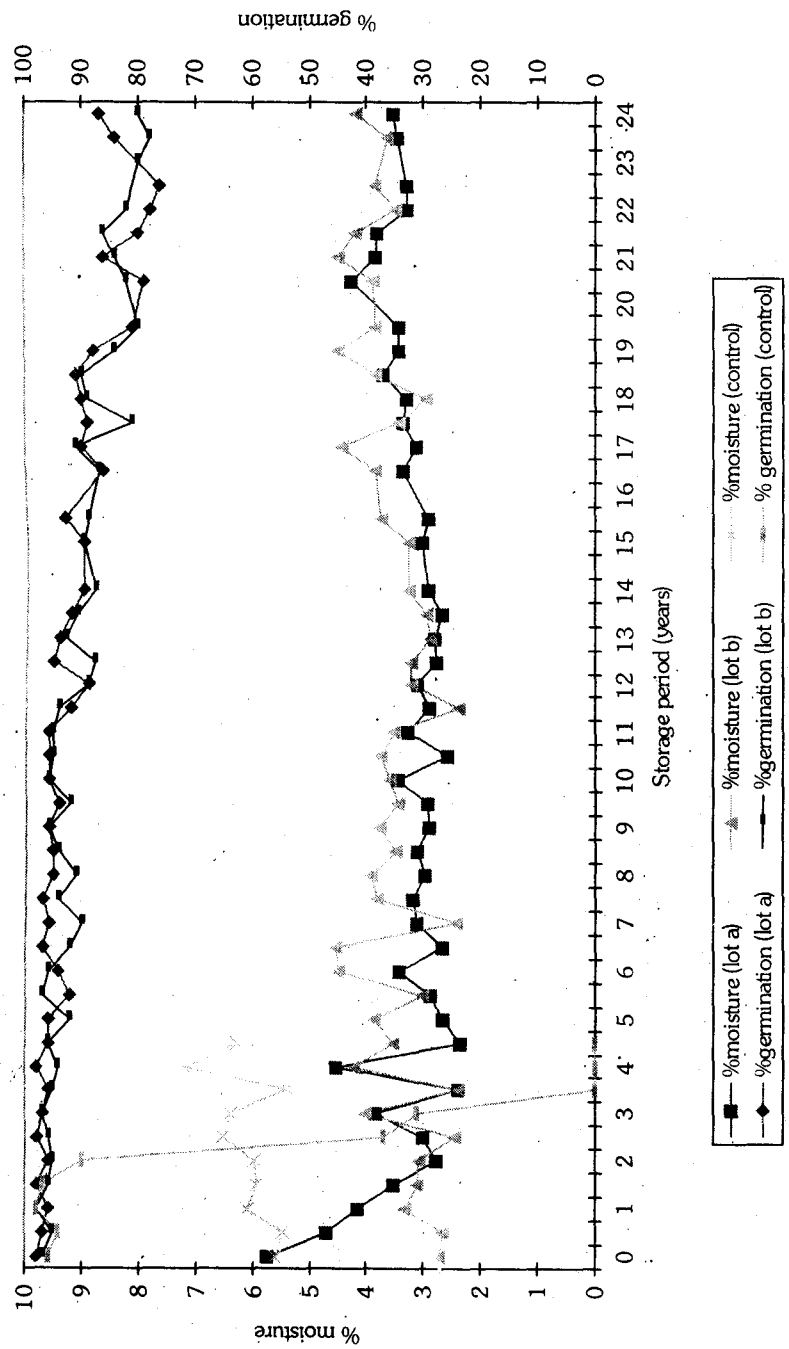

Fig. 1. Effect of desiccant on seed moisture and germination during storage (small tins) CTRI Spl. 1975-76

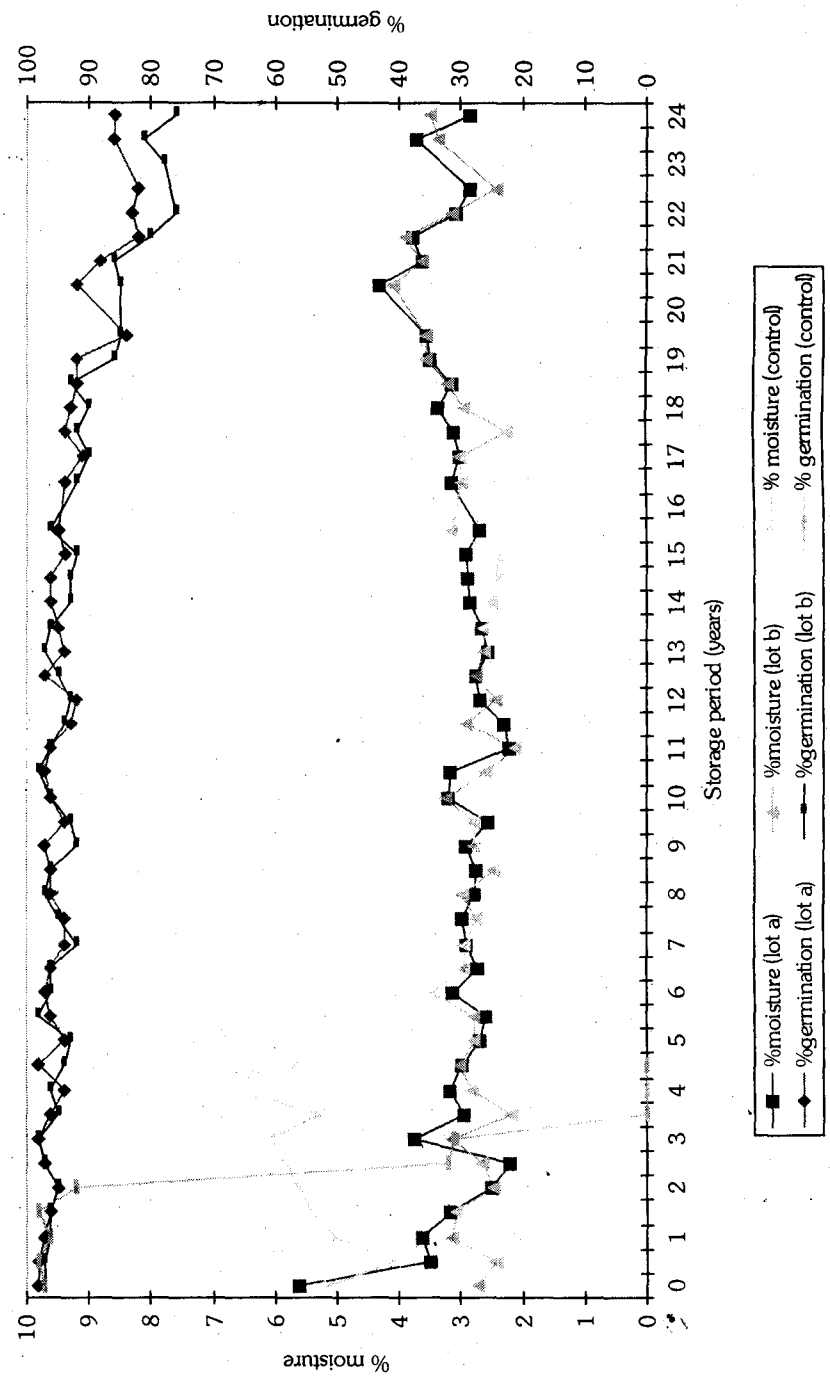

Fig. 2. Effect of desiccant on seed moisture and germination during storage (small tins)-White gold 1975-76

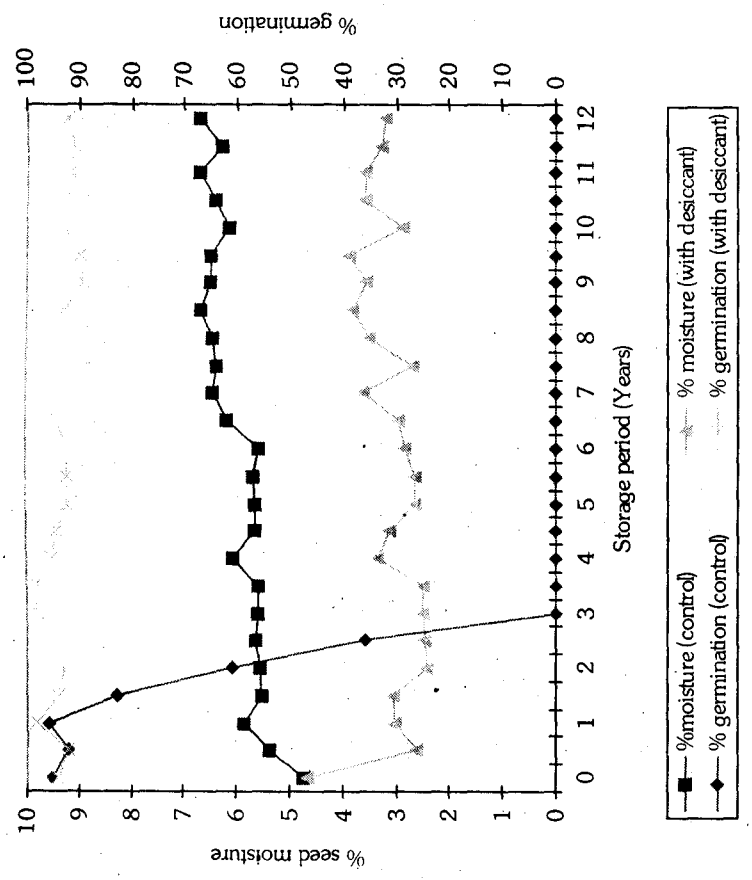

Fig. 3. Effect of desiccant on seed moisture and germination in storage (small tins) CTRI Spl. (MR) 1986-87

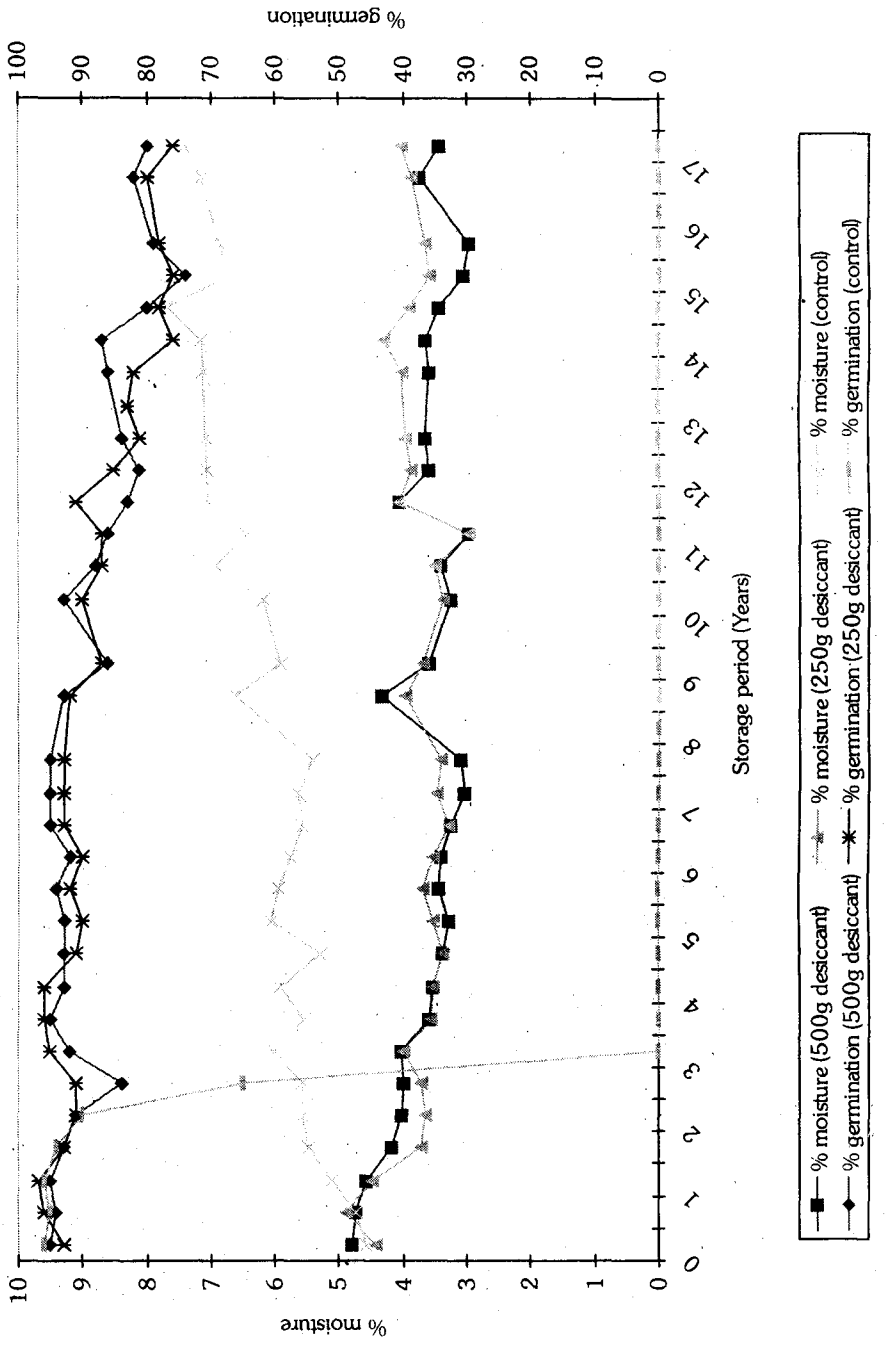

Fig. 4. Effect of desiccant on seed moisture and germination in storage (Big drums) CTRI Spl. (MR) 1982-83

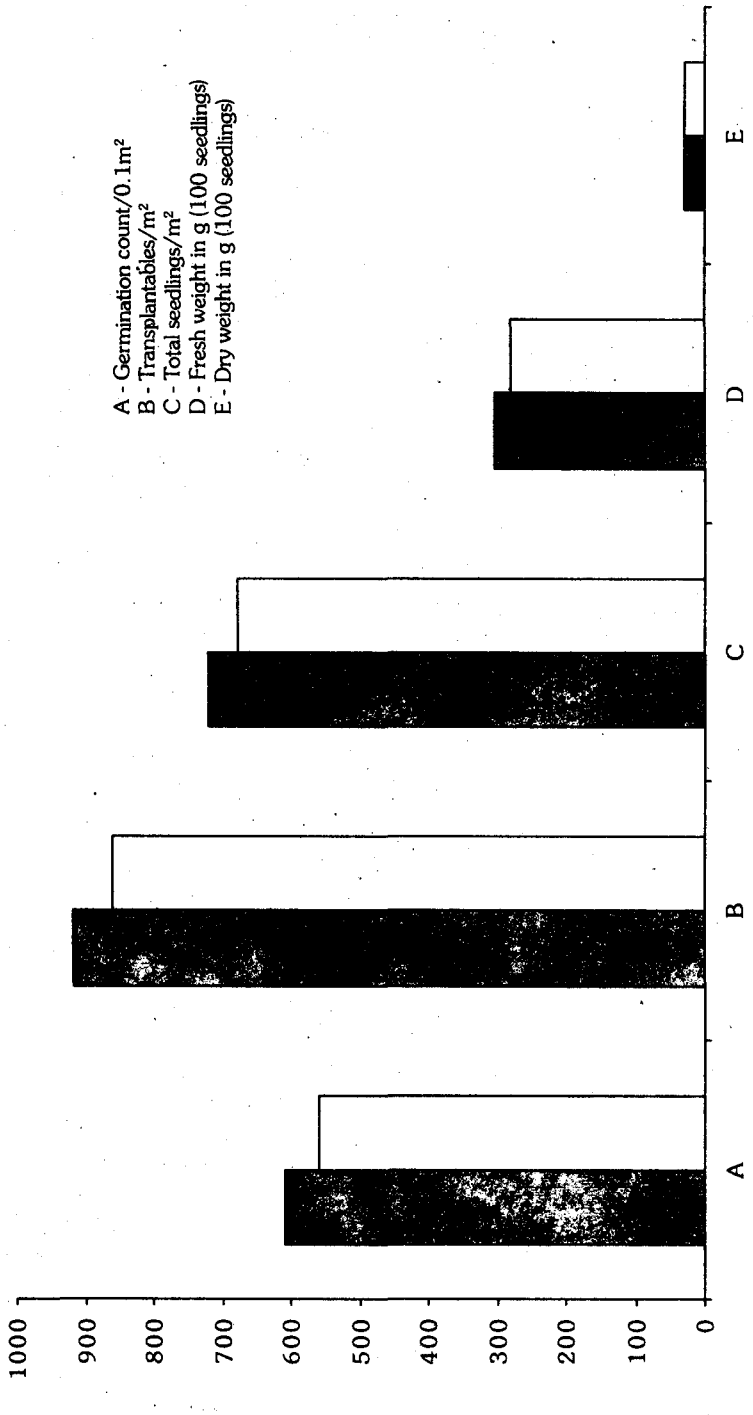

Fig. 5. Effect of seed storage on seedling growth and vigour

in dry storage. Desiccant in both the treatments was changed once in a year. This method can be adopted for large-scale tobacco seed storage. It is simple and does not need big infrastructure as in cold storage and does not depend on the uncertain power supply under our conditions. Seed stored in big drums can be drawn any time for packing in 0.5 kg polyethylene packets for sale. Stored seed packed in polythene packets remained viable for 12 months and its moisture increased from 3.36 to 6.05% during that period. This shows that seed from storage drum when packed in 0.5 kg polythene packets for sale should be utilized within 12 months. Stored seed was tested along with fresh seed in nursery beds for production of transplantable seedlings and seedling vigor and it was found that stored seed is on a par with fresh seed (Fig. 5). From this, it is concluded that tobacco seed can be stored safely at room temperature for long periods without loss of viability and seedling vigor if the seed moisture during storage is kept below 4.0%. Seed producers can adopt this simple and inexpensive storage method for safe storage of tobacco seed lots for sale.

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