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Efficacy of Pelleting Materials on Minimizing the Seed Deterioration during Storage in Green gram Var. VBN 2

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A B S T R A C T

Experiments were carried out to study the influence of post- harvest treatment on seed quality during storability of green gram seeds var. VBN 2. The seeds were treated with chemicals and plant products at different dosages to identify their efficacy towards seed quality on storage. Seeds pelleted with neem leaf powder @ 200g kg^{-1} of seed performed better for seed quality characters viz., germination percentage (90%), root length (14.29 cm), shoot length (17.02 cm), seedling dry matter production (17.86 mg / 10 seedling), vigour index I (2816.76) and vigour index II (559.12) as compared to all other treatments. This may be due to the neem product has anti-oxidant property like acetyl salicylic acid in reducing the lipid peroxidation, protein degradation and chromosomal aberrations and simultaneously controlling the deterioration process.

***Key words*:** Green gram, Pelleting, Seed deterioration, Storage

Green gram (*Vigna radiata* [L.] Wilczek) commonly known as mung bean is one of the most commonly cultivated pulse crop in India. It is an excellent source of easily digestible and high value protein in Indian diet. The dietary or nutritional value of green gram has been very popular from the ancient times. Like other pulses, the protein of green gram is rich in lysine, an essential amino acid which is absent in cereal grains. Besides their high nutritional value, they have unique characteristics of maintaining and restoring soil fertility through biological nitrogen fixation and thus play a vital role in sustainable agriculture. In Tamil Nadu, the low productivity of green gram is due to the cultivation of this crop in marginal, sub marginal lands and rainfed with poor management practices. The low productivity is also due to the lack of high yielding varieties / hybrids, poor management practices and keeping quality and lack of storage facilities [1].

In India, one of the most important basic needs for higher agricultural production is quality seeds, characterized by high viability and vigour. Maintenance of seed viability and vigour from harvest till the next growing season is of the almost importance in a seed production programme. During seed storage, qualitative and quantitative losses have been reported in India [2]. The poor seed quality may also be due to the poor storability which is very often being decided by the internal and external factors. In green gram major seed deterioration is occurring during storage. The seed deterioration is also hastened by adverse storage environment, seed moisture content and containers used for seed storage [3].

The farmer's practice of storing crop seeds in gunny bags as well as in cloth bags hastens up the seed quality deterioration process, thus resulting in poor seed quality. Many of synthetic chemical look effective but they are not readily degradable physically or biologically which yield more toxic residues. Hence, the feasible approach is the treatment of seeds with botanicals which are safe, economical, eco- friendly, cheap, easily locally available and non-harmful to seeds, animals and human beings. It will be of immense use to the farming community. Therefore, seed treatment with suitable chemicals and botanicals will reduce the quantitative and qualitative losses besides maintaining quality of seed for a longer period. Hence, the present investigation was carried out to study the influence of post-harvest seed treatment with plant products and chemicals on storage potential of green gram.

MATERIALS AND METHODS

The experiments were carried out to study the influence of post- harvest treatment on seed quality during storability of green gram seeds var. VBN 2. The storage study was carried out at the Department of Genetics and Plant Breeding, Faculty of Agriculture, Annamalai University, Annamalai Nagar. The seeds were treated with chemicals and plant products at different dosages to identify their efficacy towards seed quality on storage. Freshly

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harvested bulk seeds of green gram seeds var. VBN 2 were dried to 8 per cent moisture content and were imposed with the following seed treatments and under ambient condition for a period of 10 months.

Treatments details

T_1 - Control
T_2 - Pelleting with Carbendazim @ 2g kg^{-1} of seed
T_3 - Pelleting with Prosophis @ 200g kg^{-1} of seed
T_4 - Pelleting with Nochi leaf powder @ 200g kg^{-1} of seed
T_5 - Pelleting with Pungam leaf powder @ 200g kg^{-1} of seed
T_6 - Pelleting with Red soil @ 200g kg^{-1} of seed
T_7 - Pelleting with Neem leaf powder @ 200g kg^{-1} of seed
T_8 - Pelleting with Fly ash @ 300g kg^{-1} of seed

In pelleting treatment, the seeds were mixed with the common adhesive, Maida 10 per cent @ 200 ml kg^{-1} of seed and were sprinkled with the respective filler material @ 200 g kg^{-1} of seed and rolled for uniformity. The experiments was formulated by adopting CRD design with three replication and were evaluated for quality characters like Electrical conductivity, Seed moisture content (%), Speed of germination, Germination percentage, Root length (cm), Shoot length (cm), dry matter production (mg/ 10 seedlings), Vigour index I, Vigour index II and immediately after treatment at bi-monthly intervals.

The data from various experiments were analyzed statistically adopting the procedure described by Panse and Sukatmae [4] with required replications for laboratory experiment. Wherever necessary, the angular (arc sine) values were calculated, before carrying out the statistical analysis. The critical differences (CD) was worked out 5 per cent (p = 0.05) level and wherever F value is non-significant, it is denoted by NS.

RESULTS AND DISCUSSION

Seed being a biological entity and like any other biological material, the loss of seed viability and vigour during storage is a quite natural phenomenon occurring due to deterioration process which is inexorable, irreversible and inevitable. Maintenance of seed quality during storage has become most important part in the seed production programme. Since agriculture is season bound, the storage of seed has become inevitable important for farmers, seed producers, breeders and to all those concerned with the seed. The loss of seed viability during storage may range between 0 to 100 per cent under unhygienic storage condition. Although the complete control of seed deterioration is quite impossible but the vase of degenerative process could be slowed down to a certain extract. Green gram seeds pelleted with neem leaf powder shows less flexuation in moisture content than the untreated seeds. This may be due to the seed treating products, which act as a barrier over the seed coat, which prevent the invasion of moisture content from atmosphere to seed [5-6].

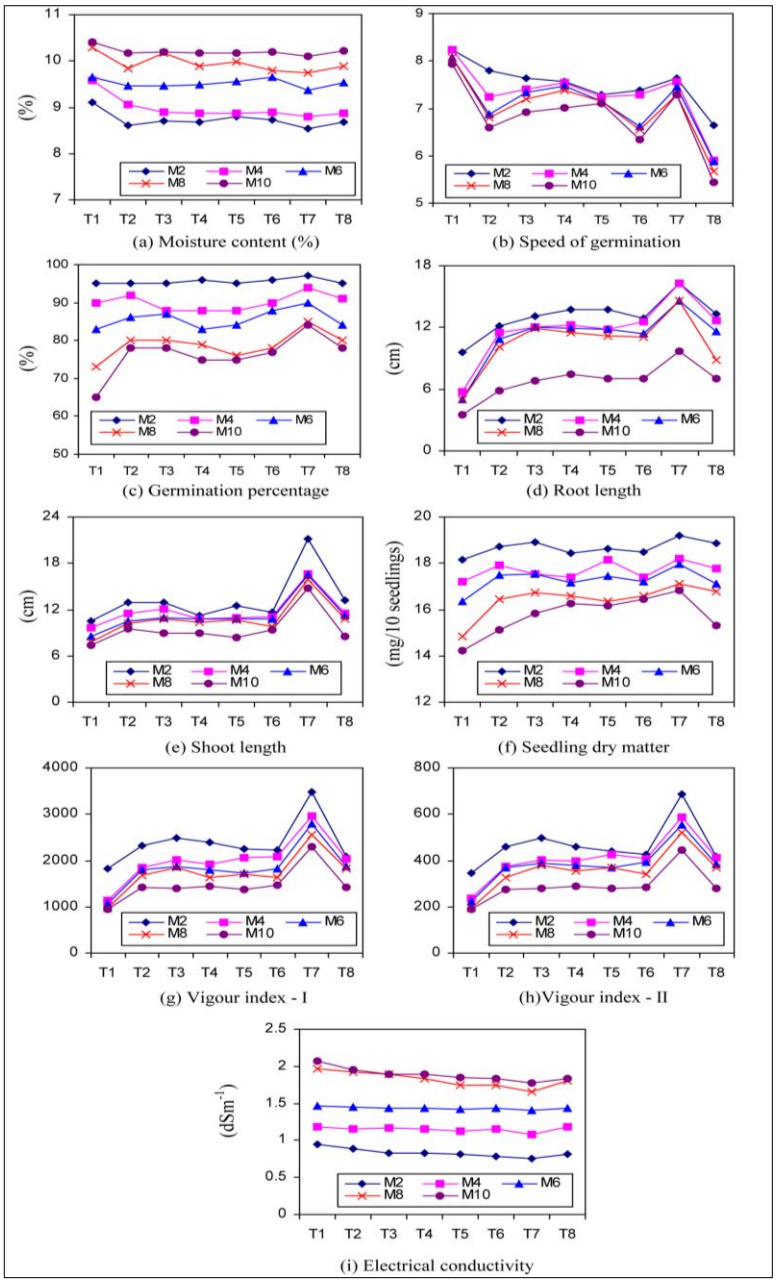

Fig 1 Effect of seed treatment and storage period on seed quality parameters in green gram var VBN 2

Seeds pelleted with neem leaf powder @ 200g kg^{-1} of seed performed better for seed quality characters viz., germination percentage (90%), root length (14.29 cm), shoot length (17.02 cm), seedling dry matter production (17.86 mg / 10 seedling), vigour index I (2816.76) and vigour index II (559.12) as compared to all other treatments (Fig 1). But untreated seeds recorded lower seed quality characters after 10 month of storage. This may be due to the neem product has anti-oxidant property like acetyl salicylic acid in reducing the lipid peroxidation, protein degradation and chromosomal aberrations and simultaneously controlling the deterioration process [7-13].

Electrical conductivity of seed leachate is normally recorded as an important bio-chemical manifestation and this measurement in the present study increased gradually over the period of storage starting from 0.75 dsm^{-1} to 1.53 dsm^{-1} irrespective of treatments (Fig 1). The cases for increase in the electrical conductivity of the seeds could have focused to loss of cell membrane integrity with the

advancement in storage period [14]. Electrical conductivity of neem leaf pelleted seeds recorded very low electrical conductivity value (1.33 dsm^{-1}), whereas untreated seeds recorded highest electrical conductivity value (1.53 dsm^{-1}) [15]. In the present study, increased trend was observed for electrical conductivity seeds treated with neem leaf powder which registered less value for electrical conductivity compared to control seeds stored in cloth bag (C_2T_1). This may be due to the degradation of protein into amino acids during the storage period, which leads to loss of physiological vigour during storage [16-17].

CONCLUSION

From the above discussion of the results, it is concluded that green gram var. VBN 2 pelleted with neem leaf powder @ 200g kg^{-1} of seed able to maintain all the seed quality parameters at the end of ten months storage life. Hence, it is recommended to the farmers for safe guarding the green gram seeds without loss in longevity.

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