# Storability of Primed Seeds of Brinjal (*Solanum melongena*)

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Studies were conducted to study the effect of priming on storability of brinjal variety Bagyamati. Four different priming methods *viz.*, hydro priming, halo priming, sand matrix priming and osmo priming were used. The storage studies were conducted for 11 months after imposing the priming treatment. The results revealed that viability of primed seeds were dependent on the method of priming. However, irrespective of method all the priming methods were superior to control seeds throughout the storage period. Among the protocols studied sand matrix priming (80% water holding capacity, three days) for both the varieties is established as best method of priming treatment for brinjal, capable of improving seed vigour as well as viability.

**Key Words: Brinjal, Priming methods, Seed priming, Storability**

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## Introduction

Brinjal or eggplant (*Solanum melongena* L.) is an important solanaceous crop of sub-tropics and tropics. Despite the high yielding potential of brinjal, the yield per unit area of the crop is low in India. Poor germination and low seed viability are among the serious problems limiting the production, as the use of stored seed is a common practice under tropical and subtropical conditions, leading to inadequate plant population in the field. Therefore, to improve seedling emergence by using the stored seed has been extensively studied in brinjal. Mc Donald (1999) expressed that seed priming is capable of reversing the causes of seed deterioration in storage. Mid-storage priming reduced physiological deterioration of carrot seeds in storage and ultimately showed better field emergence and yield (Dollypan and Basu, 1985).The benefits included increased germination rate, uniformity in emergence, and germination under a broader range of environments and improved seedling vigour and growth. Although, priming is acclaimed as a useful technique to invigourate the seed, yet it is also widely reported to cause detrimental effects on storage life of the subsequently dried seed (Argerich and Bradford, 1989; Tarquis and Bradford, 1992; Bruggink *et al.*, 1999). Against the popular opinion that priming reduces seed longevity, conflicting reports have been made about the viability of primed seeds during storage. In many species (e.g. *Allium cepa, Capsicum annum, Pisum sativum, Daucus carota*) improvement in seed storability after osmotic priming has been reported by Savino *et al.* (1979), Dearman *et al.* (1986) and Georghiou *et al.* (1987). In the biochemical front also contradictory arguments have been made on impact of priming on seed storability. Mc Donald (1999) reported better storability of primed seeds owing to reversal of seed deterioration due to priming but Saracco *et al.*, (1995) proposed increased sensitivity of primed seeds to deteriorative factors imposed during storage. However, the results obtained so far are few, limited and contradictory because of the varied response to treatments of cultivars and even seed lots (Bradford, 1986).

Against this background, in order to assess the storability as well as the efficacy period of the seed priming treatments, storage experiments were conducted on primed seeds of brinjal by investigating the physiological and biochemical indicators of seed vigour during storage.

## Materials and Methods

Brinjal seeds of Bagyamati variety obtained for the experiment were submitted to seed priming protocols standardized by Venkatasubramanium and Umarani, (2007) *viz.,* i) hydro priming (ii) halo priming iii) osmo priming under room temperature (26+2°C) and iv) sand matrix priming at 25 ± 2°C, 100 % RH. The moisture content of primed seeds at the end of the treatment was about 35%. After the soaking period,

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**Fig. 1. Effect of priming on germination percent in Bagyamati variety of brinjal**

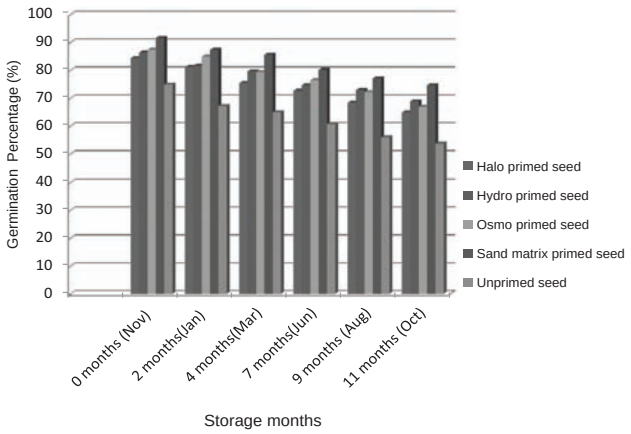
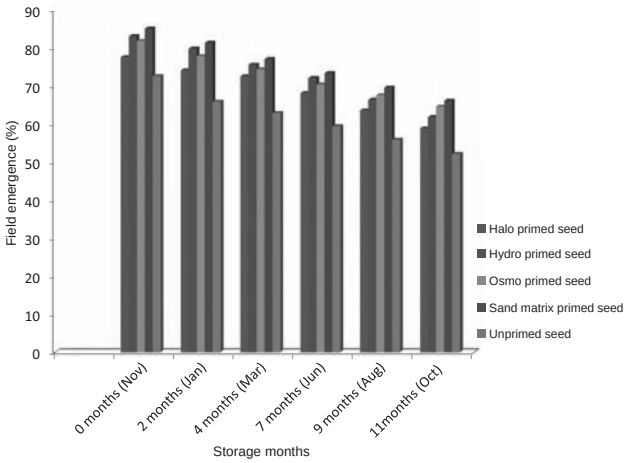



**Fig. 2. Effect of priming on field emergence in Bagyamati variety of brinjal**




seeds were air-dried to original moisture content under shade for three days at room temperature (26±2°C).

### *Storage*

The seed primed with different priming solutions, after drying were packed in separate aluminium pouches along with untreated seed (control) and stored at ambient conditions (33°C and 57% RH). Seed samples from the respective treatments were drawn at bimonthly intervals and subjected to to germination test with four replicates of 100 seeds in between paper towels. The test conditions were 25±2°C and 95±5% RH. The number of normal seedlings were counted after 14 days and expressed as germination percentage.

$$\text{Germination (\%)} = \frac{\text{Number of seeds germinated}}{\text{Number of seeds used for germination}} \times 100$$

Field emergence count was taken on the 14$^{th}$ day after sowing in the pots and the per cent emergence was calculated taking into account the number of seedlings emerged three centimeter above the soil surface. The seeds were also analysed for electrical conductivity (Presley, 1958), dehydrogenase activity (Kittock and Law, 1968) and lipid peroxidation (Heath and Packer, 1968).

### *Statistical Analysis*

The laboratory experiment was conducted in completely Randomized Block Design with factorial concept (FCRD). The data were statistically analysed as per the statistical methods outlined by Panse and Sukhatme, (1967).

## Results and Discussion

The results revealed that significant variations were observed in all the parameters observed among the priming treatments during the storage. Brinjal seeds, showed maximum improvement in seed quality parameters due to sand matrix priming immediately after priming and even after 11 months of storage. However, the other methods of priming were also found to be better than the control. Germination percentage was 91.75, immediately after priming with the moist sand and after 11 months, it came down to 74.75 whereas, it was only 53.75 percent in control. All other priming methods *viz.*, halo priming, osmo priming and hydro priming exhibited higher germination compared to control. The field emergence of the sand matrix primed seeds was above all the other priming methods for the entire period of storage. The field emergence of the unprimed seed was inferior throughout the storage. The enzyme dehydrogenase (OD value) activity (0.117) was found to be the highest in sand matrix priming (80 WHC% 3days) while the lipid peroxidation was lowest (0.047, 0.07, 0.086, 0.106, 0.135, 0.139). The corresponding values recorded by control seeds for lipid peroxidation were 0.083, 0.16, 0.165, 0.174, 0.183, 0.186, respectively.The measure of membrane integrity i.e., electrical conductivity (dsm$^{-1}$), in sand matrix primed seeds, after eleven months was also lowest (0.106) compared to control (0.123).

Many studies have established that seed priming reverses seed deterioration and these beneficial effects generally occur in the meristamatic axis or the radicle tip. Sivritepe and Dourado (1994) found that humidification of aged pea seeds decreased chromosomal aberrations. During the natural process of ageing, damage in membranes and DNA leads to a loss of seed quality, this damage can be repaired during a hydration (Villiers and Edgecumbe, 1975). Surand Basu (1990) found that hydration - dehydration treatment of wheat seeds

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**Table 1. Effect of priming on dehydrogenase activity, electrical conductivity and lipid peroxidation in Bagyamati variety of brinjal in storage**

| Treatments | Dehydrogenase activity ( OD Value) | | | | | |
|---|---|---|---|---|---|---|
| | 0 months (Nov) | 2 months (Jan) | 4 months (Mar) | 7 months (Jun) | 9 months (Aug) | 11 months (Oct) |
| Halo primed seed | 0.103 | 0.098 | 0.090 | 0.084 | 0.074 | 0.070 |
| Hydro primed seed | 0.124 | 0.117 | 0.113 | 0.107 | 0.104 | 0.098 |
| Osmo primed seed | 0.124 | 0.116 | 0.112 | 0.097 | 0.094 | 0.092 |
| Sand matrix primed seed | 0.143 | 0.136 | 0.130 | 0.125 | 0.122 | 0.117 |
| Unprimed seed | 0.087 | 0.081 | 0.076 | 0.072 | 0.066 | 0.064 |
| SEd± | 0.003 | 0.002 | 0.003 | 0.002 | 0.002 | 0.002 |
| C.D (0.05) | 0.006 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |
| Electrical conductivity ($dSm^{-1}$) | | | | | | |
| Haloprimed seed | 0.061 | 0.073 | 0.086 | 0.098 | 0.111 | 0.119 |
| Hydroprimed seed | 0.049 | 0.068 | 0.077 | 0.084 | 0.102 | 0.112 |
| Osmo primed seed | 0.060 | 0.075 | 0.084 | 0.097 | 0.111 | 0.118 |
| Sand matrix primed seed | 0.045 | 0.055 | 0.068 | 0.081 | 0.093 | 0.106 |
| Unprimed seed | 0.064 | 0.079 | 0.089 | 0.102 | 0.114 | 0.123 |
| SEd± | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 |
| C.D (0.05) | 0.004 | 0.0043 | 0.0035 | 0.0033 | 0.004 | 0.0034 |
| Lipid peroxidation (OD Value) | | | | | | |
| Halo primed seed | 0.067 | 0.085 | 0.105 | 0.127 | 0.146 | 0.179 |
| Hydroprimed seed | 0.059 | 0.072 | 0.086 | 0.112 | 0.125 | 0.146 |
| Osmo primed seed | 0.074 | 0.09 | 0.106 | 0.134 | 0.16 | 0.169 |
| Sand matrix primed seed | 0.047 | 0.07 | 0.086 | 0.106 | 0.135 | 0.139 |
| Unprimed seed | 0.083 | 0.160 | 0.165 | 0.174 | 0.183 | 0.186 |
| SEd± | 0.002 | 0.001 | 0.001 | 0.002 | 0.002 | 0.001 |
| C.D (0.05) | 0.003 | 0.003 | 0.003 | 0.004 | 0.006 | 0.004 |

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enhanced germination of stored seed and reduced the production of volatile aldehydes. In onion seed, Choudhuri and Basu (1988) demonstrated that hydration - dehydration treatments effectively slowed physiological deterioration under natural (5 months) and accelerated ageing conditions with the effect dependent on the level of seed vigour. The present study also established that, seeds primed by adopting crop specific protocol for optimum duration and drying back to original moisture content ensured the efficacy of the treatment is retained in the seed during storage, besides maintaining viability of primed seeds (Venkatasubramaniam and Umarani, 2010). These results corroborates that priming benefit seeds through rectification of DNA damage, decreased chromosomal aberration, reduced electrolyte leakage etc. The problem of reduced storability of primed seeds arises only if duration of seed priming extends to an advanced stage wherein seeds enter into the Synthetic phase leading increase in DNA content (Venkatasubramaniam and Umarani, 2010). Based on the results of the present study, it is recommended that, egg plant seeds can be subjected to sand matrix priming (80% water holding capacity) for 3 days. The seeds dried back to original moisture content can be stored in aluminium foil pouches for at least eleven months without losing the efficacy of the priming treatment.

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