

**Title of the thesis: Post-harvest seed invigoration treatments for improved storability and field performance of pea ( *Pisum sativum* L.)**

**ABSTRACT**

Harvest fresh field pea (cv. Rachna) seeds were stored in different types of containers viz. glass bottle, metal bin, polyethylene packet, cloth bag and gunny bag to compare the performance of those seeds in terms of germinability and vigour under different storage condition. It was noticed that the seed stored in the glass bottle and metal bin could retain the germinability and vigour satisfactorily than the seeds stored in polyethylene packet, cloth bag and gunny bag.

Dry dressing treatments were given to the harvest fresh properly dried field pea (cv. Rachna) seeds with pharmaceutical product viz. aspirin @ 50mg/kg, chemicals (bleaching powder, calcium carbonate and iodinated calcium carbonate @ 2g/kg of seed), crude plant materials (red chilli powder @ 1g/kg of seed and amla fruit powder @ 2gm / kg of seed). Wet treatment viz. soaking-drying, moist-sand conditioning drying, moist-sand conditioning soaking-drying were also employed simultaneously. After ageing it was found that pre-storage dry physiological treatment with red chilli powder @ 1g/kg of seed and amla fruit powder @ 2g/kg of seed were much effective in controlling seed deterioration. The field performance of the seeds treated with red chilli powder and amla fruit powder as seed dressing material proved to be best among the all.

Mid storage dry dressing and wet treatments were given to 4 months old seed employing chemicals pharmaceuticals and crude plant materials as formulated in the pre-storage seed treatment. After ageing mid storage dry dressing treatment with amla fruit powder @ 2gm/kg of seed and wet treatment viz. mid-storage moist sand conditioning soaking-drying treatment proved effective in maintaining germinability and vigour index than the untreated control. Crop raised from the mid storage treated and untreated seeds revealed that dry dressing with amla fruit powder @ 2g/kg of seed and moist-sand conditioning soaking-drying treatment significantly increased yield and yield attributes than the untreated control.

The compatibility of dry physiological treatment (red chilli powder, aspirin and amla fruit powder) with pesticidal formulations (thiram, *trichoderma viridii*, imidacloprid) on 15 days old field pea (var. Rachna) seed were studied with a view to check the physiological as well as pathological deterioration during storage. An additional beneficial effect on both germinability and field performance was recorded when seeds were formulated with red chilli powder and or amla fruit powder in combination with pesticide (thiram).

Different sized seeds were graded into large, medium and small size and dry dressed with red chilli powder, bleaching powder, aspirin and amla fruit powder to examine the beneficial effect on the storability and field performance. It has been noted that large sized seed performed extended germinability, vigour and increased productivity over the medium and small sized seed. Besides, large sized seed when treated with red chilli powder and amla fruit powder rendered further beneficial effects in terms of greater storability and field performance. It was also noticed that treatment effects are independent of seed sizes.

After accelerated ageing, most of the dry treated seeds and few wet treatments, especially moist sand conditioning soaking-drying has shown lower leaching of electrolytes, sugar, free amino acids and reduced lipid peroxidation activity and volatile aldehyde production than untreated control. The enzymatic activity viz. amylase, catalase, peroxidase and dehydrogenase and non-enzymatic anti-oxidant viz. total phenol and free phenol content and DPPH free radical scavenging activity were significantly higher in the red chilli powder and amla fruit powder treated seeds than untreated control. Studies on the soluble protein profile through SDS-PAGE reveals that pre-storage seed treatments, especially red chilli powder followed by amla fruit powder maintain higher number of polypeptide bands than the untreated control.

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