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STRUCTURAL CHANGES IN AMYLOPLAST DURING STORAGE OF BIOPRIMED CORH 4 RICE HYBRID

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In all cereal grains, starch is synthesized and stored in the form of granules in amyloplast. In rice endosperm each amyloplast contains more than one starch granule. The rice amyloplasts produce compound granules comprising of several dozen polyhedral, sharp-edged and easily separable granules (Mares *et al*., 2002). The polyhedral shape of rice starch is due to the compression of starch granules during seed development. Seed priming is controlled hydration of seed which permit all metabolic activities to occur inside the seed but restricts the actual radicle protrusion (Farooq *et al*., 2005). In biopriming, the seed are hydrated in bioagent solution and the bioagent may be a biofertilizer or a biocontrol agent (Nayaka *et al*., 2010). *Pseudomonas fluorescens* is a biocontrol agent involved in plant growth promoting activities and control of pathogenic infection. Now-a-days many contrasting reports are available for the storage potential of primed seeds. Pitting on starch granule is evident for starch degradation (Watson and Dikeman, 1977). Hence, the present experiment was aimed to analyze the storage potential of bioprimed (*P. fluorescens*) CORH 4 rice seeds through examination of amyloplast degradation under scanning electron microscope.

The histological study of rice hybrid CORH 4 was conducted in the Department of Nano-Science & Technology, Tamil Nadu Agricultural University (TNAU), Coimbatore (India) during the year 2015. Genetically pure seeds of rice hybrid CORH 4 and the bioagent, *Pseudomonas fluorescens* was procured from the Department of Rice and Department of Plant Pathology, TNAU, Coimbatore respectively. The CORH 4 rice seeds were imbibed in equal volume of 4% *P. fluorescens* bioagent solution for 12 h. The seeds were then shade dried at room temperature till the seeds attained safe moisture content (12%). The endosperm of bioprimed (4% *P. fluorescens* for 12 h) and non-primed seeds were scanned at adjacent to scutellum crease region by using scanning electron microscope (SEM), immediately after biopriming treatment and after 12 months of storage period, with attention to identify the changes in amyloplast and starch structure.

The undamaged amyloplasts were observed in fresh unprimed rice seeds while the seeds bio-primed with 4% *P. fluorescens* for 12 h showed initiation of amyloplast envelope degradation (Fig. I) as evidenced by the presence of scattered batches on envelope. Interestingly, after one year storage the degradation of amyloplast envelope was minimum in bio-primed CORH 4 rice seeds as compared to non-primed seeds (Fig. 2). It confirmed that reduced starch degradation in bio-primed seed after one year of storage. During bio-priming treatment, there was a chance of amylase enzyme synthesis in the seed due to imbibitions. If there was any damage to stored starch by amylase activity then we would expect more number of pitting or erosion on the surface of starch (Simsek *et al*., 2014). But in stored bio-primed seeds, less pitting was noticed in amyloplast. The inability of amylase enzyme on starch granule of stored bio-primed seed was unclear. In stored non-primed seed, maximum number of pitting was observed on surface of amyloplast than the stored bio-primed seed. Starch degradation was controlled in bio-primed seed than the non-primed seed during storage. So, the rate of starch degradation was less in stored bio-primed seeds. The SEM revealed that the rate of starch deterioration during seed storage was reduced by pre-sowing seed treatment with 4% *P. fluorescens* for 12 h. The bio-primed rice seeds had more storage potential than non-primed rice seeds.

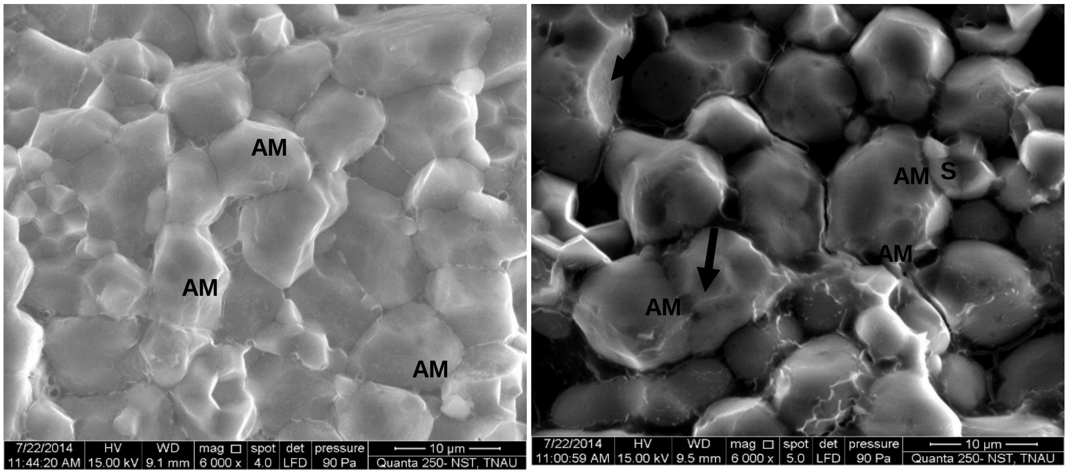

Fig. I: Scanning electron microscope image analysis in amyloplast of fresh CORH 4 rice hybrid seed at 6000X magnification; left: non-primed seeds; right: seeds bioprimed with 4% *P. fluorescens* for 12 h [Arrows indicate pitting on amyloplast (AM) as degradation of amyloplast (AM)]

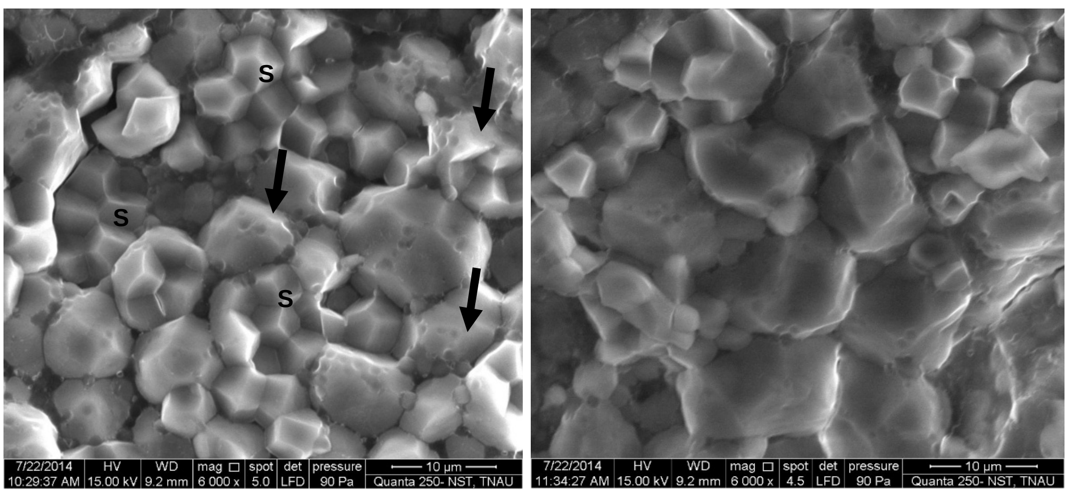

Fig. 2: Scanning electron microscope image analysis in amyloplast of stored (12 months) CORH 4 rice hybrid seed at 6000X magnification; left: non-primed seeds; right: seeds bioprimed with 4% *P. fluorescens* for one year

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