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Short Review Paper

Potentiation of crop seeds under ambient storage condition

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Abstract

Deterioration of seed is a natural catabolic process which results in serious impairment of seed viability and consequent termination of life span of the seed. This may because of some pathogenic attack or by adverse environmental conditions. Retention of vigour and viability of seeds in tropical and subtropical countries like India is a matter of serious concern to the crop growers because of high temperature and high relative humidity (RH) prevailing in major parts of the country almost throughout the year. The present study is to find out the effective method to enhance the storage life of crop seed species having viability problems.

Keywords: Seed storage, seed potentiation, seed deterioration, seed germination, crop seed, storage life.

Introduction

The seed potentiation means the quality of the seed responsible for uniform germination, storability, and ability to perform good field emergence. The storability of seed is an important aspect of seed vigour. Deterioration of seed is recognized as a major problem contributing to increased cost of production[1-3]. Unfortunately, seed storing under the environmental factors *viz.* high temperature and high relative humidity (RH) particularly in tropical/subtropical countries strongly accelerated the phenomenon of seed ageing which subsequently cause to reduce percent seed germination, seedling health and plant performance[4-7].

In the backdrop of the above problem, some modern strategies are being adopted all over the world for devising ecofriendly techniques on storage potentiation of crop seeds with a view to maintaining high vigour seeds for a long period as well as conservation of germplasm so that genetic diversity is not at all lost by any means[8,9].

Techniques for seed potentiation under storage

The recent techniques for seed potentiation and prolonged seeds storage are: cryopreservation of genetically engineered and costly seeds for a long period, pre-treatment of seeds with chemicals like growth retardants, anti-oxidants, volatile oils etc. or with some physical treatment like x-irradiation, exposure to UV-rays for a short period depending upon seed species[10,11]. However, effective treatments available in literature for seed storage are:

Cryogenic storage treatment: This is the technique to store the seeds at low temperature. Ideally, temperatures less than about –130°C are desired. This is done by storing the seeds in liquid Nitrogen (LN, –196°C) or in the vapour above LN (Ca – 150°C to –180°C)[12,13].

Growth retardant, inhibitor, anti-oxidant and antibiotic treatment: ISTA (International Seed Testing Association) as well as many seed technologists have identified some chemical manipulants which can check seed deterioration process and enhance storage potential of crop seeds. These include some growth retarding chemicals like chlorocholine chloride, SADH etc., anti-oxidants like ascorbic acid, α-tocopherol, vitamin E, etc. Seeds after surface sterilization (0.1% $HgCl_2$ for 30 seconds), are presoaked with aqueous solution of Na-dikegulac, chlormequat, cinnamic acid, ascorbic acid or penicillin for certain prescribed hours (2/4/6 hours) and then dried back to their original weight. This is repeated two times (1+1/2+2/3+3 hours) in close succession and then stored under ambient condition. Responsive seeds are sunflower, jute, rice, gram, soyabean, French bean, pea, lentil, millet, black gram, grass pea etc.[14-16].

Volatile oil treatment: After surface sterilization seeds are treated with vapour of basil, eucalyptus oil, citronella oils for few days and then stored under ambient condition. Responsive seeds are French beans, lentil, mustard, *Dolichos*, gram, safflower etc.[17,18].

Seed storage for future generations

Now-a-days, synthetic seeds are also being prepared by employing appropriate techniques and Na-alginate is commonly used as encapsulating agent for synthetic seed preparation.

Many research institutes have been established with the objective for safe seed conservation.

The National Bureau of Plant Genetic Resources (NBPGR) and International Plant Genetic Resources Institute (IPGRI) are the research institute at national and international level respectively with an aiming to safer conservation and use of genetic diversity of seeds for both present and future generations[19,20].

Conclusion

It is a challenge to the new generation researchers working in this field to find out more efficient methods as well as to devise newer strategies for potentiation of crop seeds so that agriculturists can safely cultivate using elite seed quality for maximizing crop productivity. However, in future researches, further exploitation of these seed pretreating agents may be achieved by optimizing their suitable doses depending on seed species/plant species, determining ideal stage and / or mode of treatment on seeds during different storage levels as well as determining the ideal growth stage of plants for foliar application.

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