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Review

A review on seed physiological maturity

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Good quality seeds of improved varieties are the milestone for green revolution, carrier and catalyst of agro - technologies. A successful and profitable crop production is possible only through quality seeds. Its production, availability and quality play a significant role in achieving the higher agricultural production. The quality of the seed is basically dependent on the metabolic and synthetic efficiency during seed development and maturation, which in turn is reflected upon the germination and vigorous growth of the resultant seedlings.

Seed maturation refers to the physiological and functional changes that occur from time of anthesis until the seeds are ready for harvest. Maturity is the critical and the most important factor that determines the size and the quality of the seed. Physiological maturity is defined as the occurrence of maximum seed dry weight and represents the end of dry weight accumulation and seed filling period. It has been widely adopted as an important growth stage and used by researchers and producers because it represents the end of active plant growth and the production of yield. Widely used indicators of maturity that relate to the harvestability of the crop is termed as harvestable maturity which occur after physiological maturity.

The production of the yield occurs before physiological maturity, so plant and environmental factors that affect yield can do so only before physiological maturity. Yield to the commercial producer is harvested yield, which can be reduced by weather damage, disease or other problems occurring between physiological maturity and harvestable maturity. The production of yield is complete at physiological maturity.

Planting value and storability of the seed are directly related to the level of maturity of the seed at the time of collection Hence, information on optimum stage of maturity based on physical and physiological indices will enable the seed producer to harvest the seed crop in time. Thus, the decision when to harvest is important and assumes greater significance.

In view of above said reasons determination of physiological and harvestable maturity in different crop plants are reviewed and tabulated.

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PHYSIOLOGICAL AND BIOCHEMICAL BASIS

During seed development and maturation, maximum seed fresh weight, dry weight, germination, seedling length, dry matter and vigour occur. At the same time seed moisture content is relatively high and loose water rapidly after physiological maturity.

After sexual fusion, the developing seed begins to increase in weight as a result of nutrient and water intake associated with rapidly accelerating cell division and elongation. The fresh weight of developing seed may be increased continuously upto physiological maturity indicated the cessation of cell division during seed maturity (Noggle and Fritz, 1991).

The rapid increase in seed dry weight during development stages might be due to synthesis and deposition of storage materials like starch, protein and oil bodies in endosperm or colyledonary tissues.

In fully developed seed, germination is to be maximum and it not only depended upon the nutritional status of plant but also on several other factors, besides the biochemical and physiological process during seed development and maturation.

At physiological maturity, the seedlings produce relative length of root and shoot with more dry weight indicated that the amount of nutrients or storage materials present in seed existed significant role. At maturity, the seed no longer has a functional connection to the vascular system to the mother plant and assimilate no longer moves into the seed. Seed moisture rapidly reduced after physiological maturity because the seed is no longer attached to the vascular system of the plant and no longer receives water to replace the lost environment.

Murphy (1993) studied the relationship between storage protein and lipid accumulation and observed that lipid related m-RNA found at an early stage of embryo development was degraded at the same protein synthesis and started to synthesis protein. In completion of protein the same was again encoded for oil body formation. Accumulation of oil would start at the end of storage protein accumulation and at the beginning of seed dehydration.

The enzymes namely polyphenol oxidase (PPO), a-