The process of seed development

The productivity maximization is vital but not the decisive criteria in seed production scheme. The quality maximization is the basic in seed production for upcoming programme in respect of storage or to ascertain the next season crop. The quality is exaggerated due to indecent vegetative growth, environmental hassle during seed development, nutrient accessibility in soil etc. In the above, environmental stress is vital due to added interference of the other factors. The environmental stress creates barrier in different levels like pre or post sowing, pre or post flowering, pre harvest or at harvesting stages etc. To curtail the problem, the various studies are going on through application of treatments at different levels. These treatments may boost the association of source–sink to improvise the optimum quality of seed in qualitative or quantitative measure. Hence decisive facts on seed development stages under stress are inputs to appraise the effects of diverse treatments.

The process of seed development or maturation is controlled genetically and involves a sequence of transformation from ovule fertilization to creation of independent unit where environment plays a constructive role. But, there was no consistent mechanism to make out the maturation process due to its precise specificity to crop and environmental situation. Delouche (1971) specified that the maturation process comprises a series of morphological, physiological and biochemical changes from ovule fertilization to physiological independency to the parent. The seed development, from ovule fertilization to physiological maturity, is classified into four phases (Dure, 1975 and Adams and Rinne, 1980) viz. cell division and expansion in Phases I and II, accumulation of food mass in Phase III and rise the loss of seed moisture in Phase IV. Maximum effort was achieved by shaping diverse seed maturation parameters on crop performance instead of establishing the seed performance.

The present research is involved in seed sampling at pre-defined intervals of developmental stages related to specific seed characteristics in maturation route. This approach identifies the seed for physiological maturity, quality etc. during crop cultivation. The changes in association of metabolic and structural will ultimately indicate the production pattern where a desirable genotype as well as environmental constraints both play the key role.

The effort on this feature is inadequate especially in legume crop. In New Alluvial zone of West Bengal, the most common legume crops are Lentil (Lens culinaris Medik) and Field Pea (Pisum sativum L) which are good source of dietary proteins and energy.

Field pea (Pisum sativum L.), a native of southwest Asia, was among the first crops cultivated by man (Zohary and Hopf 2002). It is a cool-season herbaceous annual crop in the family

Fabaceae, grown many part in the world for its edible seeds. The pea is one of the oldest cultivated crops. European colonization introduced the crop to the New World and other regions throughout the globe. According to FAO statistics (2010), India is one of the largest producers of field pea in the world and stands at the 5th place. The production contributes of India is around 7% in the world's total produce with the production figures of 7.8 lakh tonnes. Field Peas are a good source of dietary proteins and energy. The starch content, which can vary from 30 to 50 per cent, is high. The fat content of Field pea is very low (approx. 1%) as are the levels of fibre and lignin, while the content of soluble carbohydrate (mostly starch) is high. Peas are actually an outstanding phyto-nutrient source. Flavanols (including catechin and epicatechin), phenolic acids (including caffeic and ferulic acid), and carotenoids (including alpha- and beta-carotene) are among the phyto-nutrients provided by peas. The polyphenol coumestrol is also provided in substantial amounts by this phytonutrient-rich food. Peas are a very good source of vitamin K, manganese, dietary fiber, vitamin B1, copper, vitamin C, phosphorus and folate. They are also a good source of vitamin B6, niacin, vitamin B2, molybdenum, zinc, protein, magnesium, iron, and potassium.

The other crop, lentil is locally known as "Masoor" and either whole grain or split seeds of it are used as "dhal". Lentil (Lens culinaris Medik.) is an edible pulse may have been one of the first agricultural crops grown more than 8,500 years ago. It is a bushy annual plant of the legume family, known for its lens-shaped seeds. Lentil is sown as a cool-season crop, and is highly inclined to mounting temperatures. It needs low temperatures at the time of its vegetative enlargement, although maturity needs warm temperature considering 18–30°C for its optimum growth (Sinsawat et al., 2004; Roy et al., 2012). Lentil is also grown in quite warmer regions in central and southern parts of India, wherever the yield potential can be reduced to supra-optimal temperatures (Verma et al., 2014).

Lentil is a highly protein rich crop. Protein content ranges from 22 to 35%, macro- and micronutrients, particularly Iron and Zinc and Vitamins, thus providing nutritional security to consumers though lentil is poor in the amino acids methionine and cystine. Lentil is an excellent supplement to cereal grain diets because of its good protein/carbohydrate content.

Lentil straw is a valuable animal feed as it has high digestibility, protein, calcium and phosphorous compared to wheat straw and is highly palatable as well. Its cultivation improves soil health by adding nitrogen, carbon and organic matter, thus provides sustainability to the cereal-based cropping systems. Lentil occupies 13.8 lakh hectares of area with the total production of 9.5 lakh tons. Lentils are rich in dietary fibre, manage blood-sugar disorders, low calories, have virtually no fat and reduce chances of many heart diseases.