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Need of Breeding Programmes in Wheat Crop

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INTRODUCTION

Wheat (*Triticum aestivum*L.) belonging to the family *Poaceae* earlier known as *Gramineae* of tribe *Triticeae* is the most important cereal crop and staple food for nearly 35% of the world population. Wheat, which is the leading grain crop of temperate regions, is grown almost across the world. India has the largest area under wheat cultivation and second largest producer after China in the world. It is the second most important food crop of India after rice, both in terms of area and production. It covers 32 per cent of the world's total acreage under cereal crops. It is grown in an area of 30.23 million ha in India and 2.57 million ha in Haryana with a production of 93.50 and 11.36 million tones, respectively (Anonymous, 2016). Around 80 per cent of total wheat production comes from North West Plain Zone (NWPZ) of India. Due to its wide adaptability, it can be grown under different agro-climatic conditions between 11°N to 35°S latitudes, 72°E to 92°W longitude and from sea level to very high elevations. Although it is cultivated under a wide range of climatic conditions but most extensive production of wheat is in areas where the winters are cool and the summers comparatively hot. Wheat is used for preparation of food like bread, pasta, macaroni, noodles, etc., due to its taste, unique baking qualities and long shelf life.

Genetic diversity is essential to meet the diversified goals of plant breeding such as breeding for increasing yield, wider adaptation, desirable quality, pest and disease resistance. The source of genetic variation is essential for the next breeding stages. If variation is present in the tactical gene pool, the materials can be used directly to develop competitive varieties. Genetic diversity is the basis for launching an efficient breeding programme that aimed for the improvement of wheat productivity.

Wheat breeding through hybridization also requires the selection of diverse genotypes, irrespective of whether the product is a pure line or a hybrid variety. Bread wheat (*Triticum aestivum*) evolved through two polyploidization events between *Triticum urartu* (AA genome) and an *Aegilopsspeltoides*-related species (BB genome), forming *Triticum turgidum* ssp. diccocoides, and between *Triticum turgidum* ssp. durum (AABB genome) and *Aegilopstauschii* (DD genome), forming the modern hexaploid bread wheat (AABBDD) genome (Feldman et al.,1995; & Huang et al., 2002).

Food grain production in recent years has not kept pace with growth in population and demand that has lead to price rise, which is a serious threat to food security in India and other developing countries. There is an urgent need to increase the production of food grain to combat this adverse situation *vis-a-vis* to ensure food availability in India. Grain yield is an important trait as it measures the economic productivity in wheat. Morpho-physiological characteristics of the plant greatly influence the breeding progress since the grain yield depends upon different morphological and physiological traits. The impact of variation in seed vigour on both total and marketable yield differs between species and the specific production practices and market requirements of the crop. The major impacts of variation in seed vigour manifest through a negative direct effect on seedling emergence and therefore an indirect effect on yield (Tekrony & Egli, 1991; & Finch-Savage, 1995). For this purpose the genotypes with suitable plant type are needed to be selected from a diverse gene pool for their future use as parents in hybridization programme. Grain yield is the end product of interaction of many factors known as yield contributing components and is a complex trait. Effective selection programme depends on the existing genetic variability available in the breeding material for studying genetic divergence in crop plants.

Wheat yield is mainly influenced by three yield components *viz.*, tillers per unit area, grains per spike and kernel mass (weight). The vegetative period may also affect grain yield. Grain growth rate (GGR) is a trait with substantial genetic potential to increase wheat yield. It is defined as a period between flowering (anthesis in the middle spike) and physiological maturity (yellowing of peduncle). Different genotypes interact differently with prevailing temperature, which forms the basis for difference in the expression of potential traits, which may contribute to high temperature stress tolerance in specific wheat genotypes (Tripathi & Chaudhary, 2007). Phenotypic and genotypic coefficients of variations, heritability and genetic advance have been used to assess the magnitude of variance in wheat breeding material. Since the correlation coefficients generally show linear relationships among independent variables that may not sufficiently describe the association when a clear cause-effect relationship is required between the variables. Therefore, the direct and indirect effects between yield and yield components should be known in breeding programs (Albayrak et al., 2003). Path coefficients analysis partitioned the correlation coefficient into direct and indirect effects on yield. Therefore, this technique provides a critical examination of specific factors producing a given correlation and can be successfully employed in formulating a selection strategy.

A well known fact is that the highly vigorous seed performs better under wide range of environmental conditions, particularly stress conditions. For genetic amelioration of wheat crop, precise information on the nature and degree of genetic diversity helps in making choice of desirable parents in crossing programme. Study of its genetic variability and correlation is pre-requisite since variability in crop plants provides an opportunity for selecting desirable genotypes. Correlation on the other hand gives an idea about various associations existing between yield and other characters. Another goal for wheat breeding is quality improvement which includes milling characters, gluten content, amylase content and fibre as well as protein quality. So, these are the reason due to which we do wheat breeding.