Chapter-I

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Among all the cereals, Wheat is the indispensable crop nurtured in temperate expanses offering food for more than 40% of the earth inhabitants. As India has to fulfill the needs of its second highest population in the world and Turkey, is serving as a core country of origin of wheat domestication since an era, wheat is considered as an imperative staple crop for both the countries. Domestication of wheat initiated in Middle east area around 10,000 years ago. Aiming towards the increase in production and development of the energy crop, constant attempts have been made identifying physiological and molecular processes. Innovative researches in the field of molecular genetics and prehistoric information led to the modernization of conceivable domestication states directing towards the modern cultivars. With the insistent requirement to speed up the genetic evolution to face the threats of environmental fluctuations and imperishable agriculture, new breeding strategies can be employed to utilize the less exploited genetic variability present in landraces and wild ancestors. Identification of new approaches can be aided by understanding the domestication procedure. This study was carried out to reveal the genetic variability of selected wheat varieties of different ploidy levels (6x, 4x, 2x) collected from India and Turkey. In addition to genetic variability, bread wheat cultivars differ greatly in the seed elemental concentrations.

For increasing the production efficiency in agriculture, the evaluation of elemental content in the crops is an important prerequisite now days. Amendments of the nutritional value of wheat have become a major concern due to its high utilization in the population. Conventional supplementation and fortification programs have been overcome by optional approaches utilizing genetic diversity to hybridize the crops with appropriate mineral content and having the capability to fortify them. Wild wheat are prospective genetic resources in comparison with the cultivated wheat for augmenting the elemental content in grain. Analysis of this genetic variation for elemental content in the grains of Indian and Turkish wheat germplasm is a significant strategy to lessen the degree of
macro- and micro- element deficiencies in human beings especially in the developing countries.

**Justification of the Research problem:**

A swift increase in the population and revolutionized picture of contemporary living pattern has put aims in front of wheat breeders for expanding the advanced wheat varieties with better yield and quality. For the effective employment of genetic variability in plant breeding, considerate idea of its level and distribution plays an important role. Deficiencies or small concentrations of macro- and micro- nutrients in cereal food negatively influence a huge percentage of the world's population. These nutrient deficiencies could be addressed by increasing the elemental content in cereal grains. In this context, a large range of genotypic variation is known to exist in the element composition in wheat grains. Hence, the identification of natural variation on the element contents of wheat grains is important for developing wheat cultivars rich in nutrient content. Persistent efforts are needed to search innovative genetic resources of wheat species that are augmented with essential minerals. The selected wheat germplasm resources from different countries may be utilized in the future to attain more nutritionally rich wheat food. Objectives of the study were as follows:

**Objectives:**

1. To analyze the DNA profile of different germplasm collections of *Triticum* species by employing DNA markers (viz., RAPD and ISSR markers) and assessment of relative informativeness of the DNA marker systems

2. To interpret the genetic divergence among various species of wheat differing in ploidy levels and geographical regions of India and Turkey

3. To find out the correlations among different macroelements and microelements in wheat varieties of India and Turkey

4. To understand the level of crucial macroelements (Ca, P, Mg, S, K, Na) and microelements (Cu, Mn, Zn, Fe) in Indian and Turkish wheat varieties