**Associations between seed dormancy, α-amylase activity, colorimetric traits and pre-harvest sprouting in Iranian wheat landraces and cultivars**

**Ehsan Rabieyan1, Mohammad Reza Bihamta1, Mohsen Esmaeilzadeh Moghaddam2, Valiollah Mohammadi1, Hadi Alipour3**

1Department of Agronomy and Plant Breeding, Faculty of Agriculture, University of Tehran, Karaj, Iran

2Seed and Plant Improvement Institute, Agricultural Research Education and Extension Organization (AREEO), Karaj, Iran

3Department of Plant Production and Genetics, Faculty of Agriculture, Urmia University, Iran

**ha.alipour@urmia.ac.ir**

**Abstract**

Pre-harvest sprouting (PHS) has been a serious production constraint for over two decades. PHS resistance is affected by environmental factors such as temperature and humidity and is also modulated by molecular and biophysiological mechanisms such as the morphological structure of the spike, germination suppressors in the grain coat, specifically those related to red grain color, low activity of alpha-amylase in the grains, and seed dormancy. To evaluate the PHS, a total of 298 bread wheat genotypes (208 native landraces and 90 cultivars) were cultured in the form of alpha-lattice design in two repeats in three crop seasons (2017-18, 2018-19, and 2019-20) under normal conditions. Then, pre-harvest sprouting, seed dormancy, alpha-amylase, and colorimetric traits were monitored. There was considerable variation in Iranian wheat landraces and cultivars based on the measured traits. Based on the results of descriptive statistics, the highest seed dormancy, sprouting score, sprouting index, and brightness index were 100, 9, 100, 16.59, and 65.04, respectively; while; the lowest values were 0.27, 1, 0, 0.11, and 41.87. From the correlation and artificial neural network analysis, there were significant relationships between PHS, grain color, alpha-amylase activity as follow: i) the darker the seed, the more dormant it is; ii) the lower the amylase activity, the higher the resistance of wheat to PHS; iii) and the more dormant the seed, the more PHS-resistant it is. The variety between cultivars in terms of pre-harvest sprouting was much less than the native landraces. Genotypes located in the region d outside the circle presented 100% seed dormancy (including landraces 622084, 622099, 622105, 622247, 622264, 622272, 624941, 623953, and 625263, together with CASGOGEN and FRONTANA cultivars). In future, this can be used as a tool to predict the possible PHS tolerance range of a new cultivar.

**Keywords**: α-amylase activity, Colorimetric traits, Pre-harvest sprouting, Wheat