In this investigation, four wheat cultivars namely Giza 163, Sakha 94, Giza 168, and Sakha 69 were crossed to each other to obtain three crosses. The obtained crosses were: Cross 1 (Sakha 69 * Giza 163), Cross 2 (Sakha 94 * Giza 168), and Cross 3 (Sakha 69 * Sakha 94). Six populations, P1, P2, F1, F2, BC1, and BC2, were obtained for each cross through the three growing seasons 2004/2005, 2005/2006, and 2006/2007 at Sakha Agricultural Research Station, Agriculture Research Center (ARC.), Egypt.

The results indicate that the two parents of each cross were significantly differed in most cases. The parental cultivar Sakha 94 gave the highest kernels weight (k.w.). In addition, the two crosses 2 and 3 exceeded the better parent (Sakha 94) indicating the presence of over dominance for that trait. Similar results obtained for Grain yield/ plant (G.Y./P). The results also revealed that the additive variance mainly controlled the inheritance of (G.Y./P).

The results also illustrated that resistance of leaf rust and yellow rusts is mainly due to additive variance although dominance variance could not be neglected. The six parameter model was adequacy to explain the type of gene action controlling the studied characters.