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Relationships between wheat yield, yield components and physico-chemical properties of soil under rain-fed conditions

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Abstract

This research was conducted to study and classify the physico-chemical properties of soil, yield components of wheat and to determine the significance of these parameters on the grain yield formation. In this research, seven statistical methods consisting of simple correlation analysis (SCA), multiple linear regression (MLR), stepwise regression (SR), factor analysis (FA), principal component analysis (PCA), cluster analysis (CA) and path analysis (PA) have been investigated. The physico-chemical properties of soil, different morphological traits and wheat yield have been obtained from a field with 250×300 meter dimension located in Bajgah (with silty clay loam soil) that consisted of 30 samples. Among statistical analysis performed, MLR has provided more acceptable results. In this method, among the examined characteristics, five traits i.e., the number of stems without spikes per plant, biological yield, harvest index, soil soluble potassium and soil available phosphorus, examined 98.3% of the variations of the yield (P<0.05). Lack of soil nitrogen effect on yield is due to drought stress conditions in which the plant growth is less sensitive to nitrogen. Furthermore, the negative effect of phosphorus on the yield of plant may be due to the inverse relationship between the soil phosphorus and micronutrient elements on the plant growth. Generally, among the yield components, biological yield is the most important and effective trait on grain yield, that has presented a significant contribution in different statistical methods. For some of the used statistical methods, the measured traits, like length of spike, the number of spikes per square meter, the number of grains per spike and harvest index showed positive effects on the grain yield and other traits like