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The simple correlation coefficient and path analysis of grain yield and its related components for some genotypes of wheat (*Triticum aestivum* L.) for two seasons in Iraqi Kurdistan

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Abstract
This study was aimed to characterize yield components and plant traits to grain yield. Correlation and path analysis were carried out in same wheat (*Triticum aestivum* L.) genotypes under field conditions at two winter successive seasons 2012-2013 and 2013-2014 in the fields of Agriculture Research Station at Qlyasan, Faculty of Agricultural Sciences- University of Sulaimani,. In the path coefficient analysis, grain yield represented the dependent ones average spick weight (g) no. of spikes/m^2, Spike yield (kg/h), 1000- Grain weight (g), straw yield (kg/h), biological yield (ton/ ha), harvest index and grain yield (ton/ha). The results confirm that the grain yield correlated negatively and high significantly with 1000-grain weight, whereas grain weight / spike correlated positively and high significantly with1000-grain. The character No. of grain / spike correlated positively and significantly with spike length, while grain weight / spike showed significant and positive correlation with spike length. The character 1000- grain weight had significant negative correlation with No. of grain / spike.

For the first season, the path analysis showed that, 1000-grain weight gave maximum positive direct effect in Grain yield, while maximum negative direct effect recorded by Grain weight / spike. Highest positive indirect effect exhibited by grain weight / spike and No. of grain / spike both of them *via* 1000-grain weight, whereas highest negative indirect effect showed by 1000- grain weight *via* grain weight / spike.

For the second season maximum positive direct effect recorded by biological yield in Grain yield, whereas maximum negative direct effect noticed by grain weight / spike. Highest positive indirect effect achieved by grain weight / spike *via* 1000-grain weight, while maximum negative in direct effect recorded by 1000-grain weight *via* grain weight / spike.

Keywords: Genotypes, grain yield, Correlation coefficient and path analysis.

1. Introduction

Wheat is a widely adapted crop. It is grown from tem/ate, irrigated to dry and high-rainfall areas and from warm, humid to dry, cold environments. Undoubtedly, this wide adaptation has been possible due to the complex nature of the plant's genome, which provides great plasticity to the crop. Although the crop is most successful between the latitudes of 30° and 60° N and 27° and 40° S [1], wheat can be grown beyond these limits, from within the Arctic Circle to higher elevations near the equator. Today, wheat is grown on more land area than any other commercial crop and continues to be the most important food kernel source for human. It's the first domesticated food crops production before all crops, including rice, maize, and potatoes [2]. Wheat yield is the complex trait, depending on genetic and environmental factors and their interaction. Actually yield is a result of value of yield components as well: height of plant, number of productive tillers, number of spikelet/ spike**,** number of kernel/ spike**,** kernel mass/ spike**,** number of spikes/ m^2**,** thousand kernels mass and others. Environmental factors as well levels of water, fertilizer, pesticide application play important roles in wheat yield increasing [3, 4]. Unlike the correlation coefficient which measures the extent of relationship, path coefficient measures the magnitude of direct and indirect contribution of a component character to a complex character and it has been defined as a standardized regression coefficient which splits the correlation coefficient into direct and indirect effects [5]. Some studies reported that grain yield was determined by three yield components, e.g., spike number / m2, grain number spike-1 and grain weight spike-1 [6]. Some studies concluded that spike number / m2 was the primary determinant of grain yield in barley [7, 8].

Reported that grain number in spike with a direct effect on yield was the most important factor.

Although correlation coefficient is very important to determine traits that directly affect kernel yield, but they were insufficient to determine indirect effects of these traits on kernel yield [9]. Relationships between two metric characteristics can be positive or negative, and the cause of correlation in crop plants can be genetic or environmental [10]. There was positive and significant phenotypic and genetic correlation between kernel yield and each of spike number/ m2, number of kernels/ spike, and negative and non-significant correlations were found between kernel yield and plant height, and kernel weight. While negative and significant correlation between the number of spike/ m2 and kernel weight [11]. Path coefficient analysis is one of the reliable statistical techniques which allow quantifying the interrelationships of different components and their direct and indirect effects on grain yield through correlation estimates.

2. Material and Methods

The present study was carried out in the fields of Agriculture Research Station at Qlyasan, Faculty of Agricultural sciences-University of Sulaimani, during winter seasons of 2012-2013 and 2013-2014. To study six genotypes of wheat (*Triticum aestivum* L.) were used namely

1- Araz
2- Cham 4
3- D30 BW
4- IBBA
5- HOLANDY 16/119
6- HOLANDY 16/ 120

Grains of cultivars has been obtained from Bakrajo Research Center in Sulaimani, conducted with Randomized Completely Block Design (RCBD), the First factor was genotypes which implemented in the main-plots, and the second factor potassium application (0,100and 200) Kg h^{-1} were implemented in the sub plots.

Studied Characteristics

Grain yield (ton/ ha), grain weight Spike-1, 1000- Grain weight, no of grain Spike-1, spick length cm and Biological yield (ton/ ha).

Correlation Analysis

The correlation coefficient was conducted to determine the degree of association of characters with yield and also among themselves in each environment. Phenotypic correlations were computed between characters in each environment by using the formula given by Singh and Chaudhary (1985) [12].

Path Coefficient Analysis

The path coefficient analysis was carried out as suggested by Dewey and Lu (1959) [13], Soomro (2010) [14], Singh and Chaudhary (1985) [15], Arbuckle (2009) [16], through (Analysis of Moment Structures) AMOS Ver. 18 Software.

3. Result and Discussion

The correlation coefficient among the studded characters for the first season (upper / values) and Second season (lower values) present in table 1 and the appendix 3 explain the significance of these correlations.

Respecting to first season (upper / values) it was highly significant and negative correlation between grain yield/ plant and 1000 grain weight which was -0.658, while it was noticed that grain yield/ plant correlated non significantly with grain weight/ spike, No. of grain/ spike, spike length and biological yield which were -0.309, 0.224, -0.043 and -0.063 consequently. The character grain weight/ spike correlated positively and significantly with spike length which was 0.489, otherwise it correlated non significantly with other characters 1000 grain weight, No. of grain/ spike and biological yield. Maximum positive correlation recorded between the character No. of grain/ spike and spike length which was 0.668.

Regarding to the second season (lower value) highly significant positive correlation represented between grain weight/ spike and 1000 grain weight which was 0.597. Otherwise there were significant and negative correlations between 1000 grain weight and No. of grain/ spike which was -0.474. These results are in accordance with the earlier findings [17].

Table 1: Correlation Coefficient among the studied characters for the first (up/ values) and second (lower values) Seasons.

Characters	Grain Yield	Grain weight spike-1	1000 grain weight	No. of grain spike-1	Spike length	Biological yield
Grain Yield	1.000					
Grain weight spike-1	-0.309ns -0.128ns	1.000				
1000 grain weight	-0.658** 0.060ns	0.222ns 0.597**	1.000			
No. of grain spike-1	0.224ns -0.111ns	0.124ns -0.227ns	-0.122ns -0.474*	1.000		
Spike length	-0.043ns 0.079ns	0.489* -0.009ns	-0.320ns -0.234ns	0.668** 0.372ns	1.000	
Biological yield	-0.063ns 0.342ns	0.403ns -0.013ns	0.263ns -0.143ns	0.442ns -0.191ns	0.464ns 0.314ns	1.000

Regarding to the first season maximum positive direct effect on grain yield recorded by 1000 grain weight 0.489 and followed by spike length 0.403, while maximum negative indirect effect on grain yield was represented by grain weight/ spike -0.227. Maximum positive indirect effect on grain yield recorded by grain weight/ spike and No. of grain/ spikes both of them *via* 1000 grain weight with 0.489, while highest negative indirect effect on grain yield showed by 1000 grain weight *via* grain weight/ spike with -0.227 [18].

Respecting to the second season the character biological yield gave maximum positive direct effect with 0.386 and followed by 1000 grain weight with 0.320, while maximum negative direct effect recorded by grain weight/ spike with -0.305. highest positive indirect effect achieved by grain weight/ spike *via* 1000 grain weight with 0.191, whereas maximum negative indirect effect represented by 1000 grain weight *via* grain weight/ spike with -0.182 [19].

Table 2: Represent direct and indirect Path coefficient analysis on grain yield in first (up/ values) and second (lower values) Seasons.

Characters	Grain weight spike-1	1000 grain weight	No. of grain spike-1	Spike length	Biological yield	Grain yield Correlation
Grain weight spike-1	-0.227 -0.305	0.489 0.191	-0.002 -0.009	0.050 0.000	-0.006 -0.005	0.305 -0.128
1000 grain weight	-0.227 -0.182	0.489 0.320	-0.009 -0.018	-0.049 -0.004	0.004 -0.055	0.209 0.060
No. of grain spike-1	-0.050 0.069	0.489 -0.151	-0.009 0.039	0.403 0.006	-0.008 -0.074	0.825 -0.111
Spike length	-0.028 0.003	-0.060 -0.075	-0.009 0.014	0.403 0.016	-0.013 0.121	0.293 0.079
Biological yield	-0.111 0.004	-0.157 -0.046	-0.006 -0.007	0.403 0.005	-0.013 0.386	0.117 0.342

4. Reference

1. Nuttonson MY. Wheat-climatic relationships and the use of phenology in ascertaining the thermal and photothermal requirements of wheat. Washington, DC, American Institute of Crop Ecology, 1955.
2. Curtis BC. Wheat in the world. FAO corporate document repository, agriculture and consumer protection, 2002, 15.
3. Jolánkai M, Szentpétery ZS, Hegedůs Z. Pesticide residue dischange dynamics in wheat grain. Cereal Research Communications. 2006; 34(1):505-509.
4. Falaki AM, Miko S, Mohammed IB, Abubakar IU, Valencia JA. Evaluaton of some improved bread wheat varieties at Chiyako, Jigawa state, Nigeria. ARPN Journal of Agricultural and Biological Science. 2009; 4(4):4.
5. Nadagoud VK. Stability Analysis of Maize (Zea mays L.) Inbred lines / Introduction for Yield Parameters. M.Sc. thesis, University of Agricultural Science, College of Agriculture, Department of Genetics and Plant Breeding, Dharwad, 2008.
6. Grafius JE. A geometry for plant breeding. Crop Sci 1964; 4:241-246.
7. Dofing SM, Knight CW. Yield component compensation in uniculm barley lines. Agron J. 1994; 86:273-276.
8. Ataei M. Path Analysis of Barley (Hordeum vulgar L.) Yield. Tarim Bilimleri Dergisi, 2006; 12:227-232.
9. Bhatt GM. Diallel analysis and cross predication in common wheat. Australian Journal of Agricultural Research. 1973; 24:169-178.
10. Gebre GB. Genetic variability and inheritance of drought and plant density adaptive traits in maize. Ph.D. dissertation submitted to the University of the Free state (Bloemfontein, South Africa), 2005.
11. Al- Assel AM. Genetic and phenotypic correlation and path analysis character in bread wheat. Ph.D. Dissertation submitted to the College of Agriculture University of Baghdad. Iraq, 1998.
12. Griffing B. Concept of general and specific combining ability in relation to, 1956; 9:463-493.
13. Dewey DR, Lu KH. A correlation and path-coefficient analysis of components of crested wheatgrass grain production. Agronomy Journal. 1959; 51:515-518.
14. Soomro ZA. Estimation of gene action and selection parameter in quantitative and qualitative traits of Gossypium hirsutum L., Ph.D. Thesis, Sindh Agri. Unvi. Throught department of plant breeding and genetics, Faculty of crop production, Tandojam, 2010.
15. Sing RK, Chaudhary BD. Biometrical Methods in Quantitve Genetic Analysis. Rev. ed, Kalyani publishers, Ludhiana, New Delhi. India, 1985, 318.
16. Arbukle JL. Amose 18 Users, Guide. Amos Development Corporation. SPSS Inc., USA. ISBN-13: 978-1-56827-404-1, 2009.
17. Akram Z, Ajmal S, Munir M. Estimation of correlation coefficient among some yield parameters of wheat under rainfed conditions Pakistan J Bot. 2008; 40(4):1777-1781.
18. Mondal AB, Sadhu DP, Sarkar KK. Correlation and path analysis in bread wheat. Environ Ecol. 1997; 15(3):537-539.
19. Dokuyucu T, Akaya A. Path coefficient analysis of correlation of grain yield and yield components of wheat (Triticum aestivum L.) genotypes. Rachis Barley Wheat Newslett. 1999; 18(2):17-20.