

Short Communication

Correlation and Path coefficient Analysis of component attributes in Bread Wheat under Late Sown Condition

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Yield of wheat is complex quantitative character that results to the actions and interactions of various component traits (Table 3). Correlation and path coefficient analysis could be used as an important tool to bring information about appropriate cause and effects relationship between yield and some yield components. Selections based on simple correlation coefficients without regarding to interactions among yield and yield components may mislead the breeders to reach their main breeding purposes^[3].

The present study was carried out during *Rabi* 2015 -16 at the Department of Genetics and Plant Breeding, JNKVV, Jabalpur. The experimental material consists of thirty six genotypes including 4 checks (JWJ 536, JWJ 501, JWJ 514, JWJ 529, JWJ 527, JWJ 532, JWJ 535, JWJ 520, JWJ 511, JWJ 506, JWJ 516, JWJ 526, JWJ 505, JWJ 507, JWJ 513, JWJ 524, JWJ 504, JWJ 502, JWJ 533, JWJ 534, JWJ 525, JWJ 509, JWJ 530, JWJ 519, JWJ 518, JWJ 510, JWJ 528, JWJ 521, JWJ 503, JWJ 522, JWJ 512, JWJ 515, JWJ 508, JWJ 517, JWJ 523 and JWJ 531) Observations were recorded on five randomly selected plants for traits Days to 50% heading, Days to maturity, Plant height (cm), Number of effective tillers per

plant, Number of spikelets per spike, Ear length (cm), Ear weight (g), Peduncle length (cm), Number of ears per plant, Number of grains per ear, 1000-grain weight (g), Biological yield per plant (g), Harvest index (%), Grain yield per plant (g), Canopy temperature (°C), Chlorophyll content (SPAD 502) and Relative water content of flag leaf (%). Data were subjected to analysis of variance. Correlation coefficients between each pairs of the traits were computed. In path analysis, grain yield used as dependent variable, and the other studied traits were use a as predictor variables. All statistical analyses were carried out using Indostat software.

The correlation coefficients among the various characters are presented in Table 1(a), Table 1(b) and Table 2. Grain yield per plant revealed significant and Positive relationships with days to 50% heading (0.1135), days to maturity (0.0913), number of effective tillers per plant (0.1501), number of spikelets per spike (0.1800), ear length (cm) (0.1011), ear weight (g) (0.2429), peduncle length (cm) (0.0186), number of ears per plant (0.1253), 1000-grain weight (g) (0.3567), biological yield per plant (g) (0.3352), harvest index (%) (0.6324) and canopy

temperature (⁰c) (0.2623), respectively. Some authors also reported positive and

significant correlations between yield and number of spikelets per spike^[2].

Table 1(a) Analysis of variance for phenological, physiological and yield traits

Source of variation	Df	DFH	DM	PH	NETPP	NSPS	EL	EW	PL
Replication	2	5.898	9.564	4.735	0.696	2.814	1.597	0.070	2.095
Treatment	35	29.355**	23.761**	94.237**	0.737**	6.183**	4.619**	0.800**	7.634**
Error	70	2.450	2.898	0.441	0.156	2.319	0.513	0.016	1.130

Table 1(b) Analysis of variance for phenological, physiological and yield traits

Source of variation	Df	NEPP	NGPE	TGW	BYPP	HI	CT	CC	RWC	GYPP
Replication	2	0.6893	27.027	27.745	6.037	7.618	4.375	0.888	3.478	2.226
Treatment	35	0.7109**	101.302**	40.299**	59.320**	100.300**	11.549**	13.872**	62.094**	9.713**
Error	70	0.145	6.532	4.386	2.448	1.325	0.040	0.053	0.132	0.602

** Significant at 1%

*Significant at 5%

DFH- Days to 50% heading, DM- Days to maturity, PH-Plant height (cm), NETPP-Number of effective tillers per plant, NSPS-Number of spikelets per spike, EL-Ear length (cm), EW-Ear weight (g), PL-Peduncle length (cm), NEPP-Number of ears per plant, NGPE-number of grains per ear, TGW-1000-grain weight (g), BYPP-Biological yield per plant (g), HI-Harvest index (%), CT-Canopy temperature (⁰c), CC-Chlorophyll content (SPAD-502), RWC-Relative water content (%), GYPP-Grain yield per plant (g).

Path coefficient technique was performed to divide the correlation coefficients between grain yield and yield related traits into direct and indirect effects via alternative characters or pathways. Table 3 exhibited that harvest index, biological yield per plant, number of effective tillers per plant and days to 50% heading exerted positive direct effect on grain yield (1.0958, 0.8709, 0.2009 and 0.02011 respectively), whereas days to maturity, ear weight, number of ears per plant, 1000-grain weight and chlorophyll content had a negative direct effect on grain yield (-0.2136, -0.0167, -0.1420, -0.0281 and -0.0323 respectively). The highest indirect effects on grain yield were observed with harvest index (0.6324), 1000-grain weight (0.3567), biological

yield per plant (0.3352), canopy temperature (0.2623) and ear weight (0.2429). Similar results were reported by It was reported that biological yield per plant and harvest index had positive and high direct effect on grain yield^[1].

High direct effect along positive and high indirect effect through other characters provides a better chance for a character to be selected through breeding program. selection for the characters like high biological yield and harvest index appeared to be the most important sources affecting grain yield variation in central zone regions and consequently may be considered as effective criteria for selecting towards grain yield improvement in bread wheat.

Table 2 Genotypic (G) correlation coefficients

S. No.	Traits	DFH	DM	PH	NETPP	NSPS	EL	EW	PL	NEPP	NGPE	TGW	BYPP	HI	CT	CC	RWC	GYPP	
1	DFH	1.0000	0.9459	0.0295	-0.4819	0.2595	0.2351	0.3644	0.0691	-0.5240	0.2014	-0.3370	0.0854	0.0221	0.1530	-0.1739	0.1782	0.1135	
2	DM		1.0000	0.0365	-0.3572	0.2403	0.2514	0.2549	0.1995	-0.3980	0.1526	-0.3016	0.0557	0.0322	0.0710	-0.2316	0.2212	0.0913	
3	PH			1.0000	-0.0309	0.2618	0.1436	-0.0146	0.0775	-0.0086	0.1217	-0.1729	0.1291	-0.3022	-0.2532	0.2432	0.3061	-0.1884	
4	NETPP				1.0000	0.0706	0.2136	-0.2082	0.0150	1.0050	-0.4199	0.5342	0.2353	-0.0551	-0.0518	0.1012	-0.1785	0.1501	
5	NSPS					1.0000	0.4508	0.0677	0.0516	0.1395	-0.0471	-0.1695	0.2629	-0.0568	-0.1492	0.1924	-0.0561	0.1800	
6	EL						1.0000	0.1293	-0.1743	0.2087	-0.2093	-0.0171	0.1406	-0.0190	-0.1644	0.1383	-0.1235	0.1011	
7	EW							1.0000	0.0573	-0.2243	0.0999	0.1809	0.1707	0.0728	0.4170	-0.0855	0.0096	0.2429	
8	PL								1.0000	0.0551	-0.2379	0.2674	0.1791	-0.1320	-0.1290	0.0539	-0.0391	0.0186	
9	NEPP									1.0000	-0.4217	0.5267	0.2358	-0.0811	-0.1052	0.1698	-0.1268	0.1253	
10	NGPE										1.0000	-0.3464	-0.2254	0.1637	-0.2222	-0.2287	-0.1032	-0.0054	
11	TGW											1.0000	0.2747	0.1213	0.1029	0.2800	-0.2448	0.3567	
12	BYPP												1.0000	-0.5105	0.3661	0.2391	-0.0467	0.3352	
13	HI													1.0000	-0.0670	-0.281	-0.3590	0.6324	
14	CT														1.0000	-0.1491	-0.1479	0.2623	
15	CC															1.0000	0.1824	-0.1242	
16	RWC																1.0000	-0.4469	
17	GYPP																		1.0000

DFH- Days to 50% heading, DM- Days to maturity, PH- Plant height (g), NETPP- Number of effective tillers per plant, NSPS- Number of spikelets per spike, EL- Ear length (cm), EW- Ear weight (g), PL- Peduncle length (cm), NEPP- Number of ears per plant, NGPE- Number of grains per ear, TGW- 1000-grain weight (g), BYPP- Biological yield per plant (g), HI- Harvest index (%), CT- Canopy temperature (°c), CC- Chlorophyll content (SPAD 502), RWC- Relative water content (%), GYPP- Grain yield per plant (g).

Table 3 Direct and indirect effects of 17 quantitative traits on grain yield using Genotypic path coefficients

S No	Traits	DFH	DM	PH	NETPP	NSPE	EL	EW	PL	NEPP	NGPE	TGW	BYPP	HI	CT	CC	RWC	GYPP
1	DFH	0.2011	0.1902	0.0059	-0.0969	0.0522	0.0473	0.0733	0.0139	-0.1054	0.0405	-0.0678	0.0172	0.0045	0.0308	-0.0350	0.0358	0.1135
2	DM	-0.2020	-0.2136	-0.0078	0.0763	-0.0513	-0.0537	-0.0544	-0.0426	0.0850	-0.0326	0.0644	-0.0119	-0.0069	-0.0152	0.0495	-0.0472	0.0913
3	PH	0.0008	0.0010	0.0266	-0.0008	0.0070	0.0038	-0.0004	0.0021	-0.0002	0.0032	-0.0046	0.0034	-0.0080	-0.0067	0.0065	0.0081	-0.1884
4	NETPP	-0.0968	-0.0718	-0.0062	0.2009	0.0142	0.0429	-0.0418	0.0030	0.2019	-0.0843	0.1073	0.0473	-0.0111	-0.0104	0.0203	-0.0358	0.1501
5	NSPE	0.0026	0.0024	0.0026	0.0007	0.0101	0.0045	0.0007	0.0005	0.0014	-0.0005	-0.0017	0.0027	-0.0006	-0.0015	0.0019	-0.0006	0.1800
6	EL	0.0043	0.0046	0.0026	0.0039	0.0083	0.0183	0.0024	-0.0032	0.0038	-0.0038	-0.0003	0.0026	-0.0003	-0.0030	0.0025	-0.0023	0.1011
7	EW	-0.0061	-0.0043	0.0002	0.0035	-0.0011	-0.0022	-0.0167	-0.0010	0.0037	-0.0017	-0.0030	-0.0029	-0.0012	-0.0070	0.0014	-0.0002	0.2429
8	PL	0.0046	0.0132	0.0051	0.0010	0.0034	-0.0115	0.0038	0.0662	0.0036	-0.0157	0.0177	0.0119	-0.0087	-0.0085	0.0036	-0.0026	0.0186
9	NEPP	0.0744	0.0565	0.0012	-0.1427	-0.0198	-0.0296	0.0318	-0.0078	-0.1420	0.0599	-0.0748	-0.0335	0.0115	0.0149	-0.0241	0.0180	0.1253
10	NGPE	0.0079	0.0060	0.0048	-0.0164	-0.0018	-0.0082	0.0039	-0.0093	-0.0165	0.0391	-0.0136	-0.0088	0.0064	-0.0087	-0.0089	-0.0040	-0.0054
11	TGW	0.0095	0.0085	0.0049	-0.0150	0.0048	0.0005	-0.0051	-0.0075	-0.0148	0.0097	-0.0281	-0.0077	-0.0034	-0.0029	-0.0079	0.0069	0.3567
12	BYPP	0.0744	0.0485	0.1125	0.2050	0.2289	0.1224	0.1487	0.1560	0.2054	-0.1963	0.2392	0.8709	-0.4446	0.3188	0.2082	-0.0406	0.3352
13	HI	0.0243	0.0352	-0.3312	-0.0604	-0.0622	-0.0208	0.0798	-0.1447	-0.0888	0.1794	0.1330	-0.5594	1.0958	-0.0734	-0.3089	-0.3934	0.6324
14	CT	0.0051	0.0024	-0.0085	-0.0017	-0.0050	-0.0055	0.0140	-0.0043	-0.0035	-0.0074	0.0034	0.0123	-0.0022	0.0335	-0.0050	-0.0050	0.2623
15	CC	0.0056	0.0075	-0.0079	-0.0033	-0.0062	-0.0045	0.0028	-0.0017	-0.0055	0.0074	-0.0091	-0.0077	0.0091	0.0048	-0.0323	-0.0059	-0.1242
16	RWC	0.0039	0.0048	0.0067	-0.0039	-0.0012	-0.0027	0.0002	-0.0009	-0.0028	-0.0023	-0.0053	-0.0010	-0.0078	-0.0032	0.0040	0.0218	-0.4469

R SQUARE = 0.9892 RESIDUAL EFFECT = 0.1039

DFF- Days to 50% heading, DM- Days to maturity, PH- Plant height (cm), NETPP- Number of effective tillers per plant, NSPS- Number of spikelets per spike, EL- Ear length (cm), EW- Ear weight (g), PL- Peduncle length (cm), NEPP- Number of ears per plant, NGPE- Number of grains per ear, TGW- 1000-grain weight (g), BYPP- Biological yield per plant (g), HI- Harvest index (%), CT- Canopy temperature (⁰c), CC- Chlorophyll content (SPAD 502), RWC- Relative water content (%), GYPP- Grain yield per plant (g).

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