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Correlation and Path Coefficient Analyses in Rice

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ABSTRACT

Thirty five genotypes of rice, were studied to understand the association among the growth, yield and grain quality characters in rice in pursuit of developing highly potential rice genotypes with good grain quality. The path coefficient analysis was also carried out to understand direct and indirect effects of the rest of the traits on yield to develop efficient selection indices. The results of phenotypic and genotypic correlation analysis revealed that days to 50% flowering, panicle length (cm), number of filled grains panicle^{-1}, test weight (g), harvest index (%) and kernel breadth (mm) were significantly and positively correlated with grain yield (kg plot^{-1}). Path analysis indicated that days to 50% flowering, panicle length (cm), test weight (g) and kernel length (mm) had positive direct effect on yield signifying the importance of these traits in improvement of grain yield (kg plot^{-1}).

Key words : Correlation, Path analysis,Rice.

Rice is the third important staple food crop after maize and wheat of the world in particular. Most of the people in Asia, particularly in developing countries like India, meet their major calorific requirement through rice.

Grain yield is a complex trait and is the result of many variables. While selecting for yield, a knowledge of association between yield and yield component characters and among themselves is helpful in improvement of yield, for which direct selection is not effective. Correlation studies forms an effective basis of phenotypic selection in plant populations. Path coefficient analysis helps in partitioning the correlation coefficient into direct and indirect effects of independent variables on the dependent variable. The path coefficient analysis will help to elucidate the intrinsic nature of the observed associations and imparts a degree of confidence in the selection scheme adopted for a given situation. Thus, correlation in combination with path analysis would give a better insight into cause and effect relationship between the different pairs of characters.

Therefore the present investigation was undertaken to have information on association as well as direct and indirect effects of 18 characters of rice genotypes.

MATERIAL AND METHODS

Thirty five rice genotypes were raised in a randomized complete block design with three replications during *kharif* 2009-10 at Agricultural College Farm, Bapatla. The inter and intra-row spacing adapted was 20cm x 15cm. Each plot consisted of ten rows of 5m length and observations were recorded on ten randomly selected plants from each plot in each replication for characters *viz*., plant height (cm), days to 50% flowering, absolute growth rate (AGR), number of ear bearing tillers m^{-2}, panicle length (cm), number of filled grains panicle^{-1}, test weight (g), grain yield (kg plot^{-1}), harvest index (%), grain length (mm), grain breadth (mm), kernel length (mm), kernel breadth (mm), volume expansion ratio on cooking, head rice recovery, milling per centage (%), hulling per centage (%) and protein content of the grain (%).

The data was statistically analyzed to estimate genotypic and phenotypic correlation coefficients (Falconer, 1964) and path coefficient analysis (Dewey and Lu, 1959).

RESULTS AND DISCUSSION

The analysis of variance revealed significant differences among the genotypes for all the characters studied except grain length (mm), grain breadth (mm), kernel length (mm), kernel breadth (mm) and absolute growth rate (AGR) indicating the presence of considerable amount of genetic variability in the material.Genotypic correlation coefficients in general were higher than phenotypic correlation coefficients (Table 1). Days to 50% flowering, panicle length (cm), number of filled grains panicle^{-1}, test weight (g), harvest index (%) and kernel breadth (mm) showed significant correlation at both genotypic and phenotypic levels with grain yield (kg plot^{-1}). Similar results were also reported by Vinothini and Ananda Kumar et al (2005), Siva Prasad *et al.* (2009), Asif et al. (2008) and Siva Kumar and Kanna Bapu (2005). Days to 50% flowering had significant positive association with number of filled grains panicle^{-1} at both phenotypic

Table 1. Estimates of genotypic (above diagonal) and phenotypic (below diagonal) correlation coefficients among yield and yield components in rice (*Oryza sativa* L.).

Character	Plant height (cm)	Days to 50% flowering	No. of ear bearing tillers m^{-2}	Panicle length (cm)	No. of filled grains $panicle^{-1}$	Test weight (g)	Grain yield (*kg $Plot^{-1}$)	Harvest index (%)	Grain length (mm)
Plant height (cm)	**1.0000**	-0.2611**	0.4012**	0.6504**	0.2115*	0.0464	0.1555	0.3024**	0.1386
Days to 50% flowering	-0.2193*	**1.0000**	-0.2892**	-0.4314**	0.3855**	0.0213	0.2824**	-0.0299	-0.7905**
No. of ear bearing tillers m^{-2}	0.3525**	-0.2571**	**1.0000**	0.3213**	0.1181	-0.1279	0.0831	0.3422**	0.1543
Panicle length (cm)	0.5348**	-0.3504**	0.2638**	**1.0000**	0.1267	0.2112*	0.2978**	0.4745**	0.4089**
No. of filled grains $panicle^{-1}$	0.1848	0.3679**	0.0987	0.0870	**1.0000**	0.1505	0.2958**	0.1519	-0.4811**
Test weight (g)	0.0237	0.0190	-0.1273	0.1438	0.1425	**1.0000**	0.2903**	0.2786**	-0.1555
Grain yeld (*kg $Plot^{-1}$)	0.1309	0.2658**	0.0774	0.2126*	0.2586**	0.2471*	**1.0000**	0.5032**	-0.1356
Harvest index (%)	0.2357*	-0.0178	0.2885**	0.2643**	0.1401	0.2327*	0.4534**	**1.0000**	-0.0831
Grain length (mm)	0.0571	-0.5101**	0.1404	0.3036**	-0.3014**	-0.0689	-0.0707	-0.0479	**1.0000**
Grain breadth (mm)	0.0747	0.0064	-0.0321	0.0076	-0.2362*	0.2517**	0.1706	0.0869	0.0196
Kernel length (mm)	0.2219*	-0.6346**	0.2278*	0.3793**	-0.2469*	-0.0236	0.0122	0.0573	0.6539**
Kernel breadth (mm)	0.2028*	0.0860	-0.1080	0.1193	0.0256	0.4691**	0.1960*	0.1598	-0.1172
Hulling (%)	-0.0038	0.1372	0.1062	0.0101	0.2137*	0.2151*	0.0320	0.1612	-0.1043
Milling (%)	0.1628	0.1916	-0.0580	0.1923*	0.1919*	0.1833	0.0395	-0.0717	-0.0603
Head rice recovery	0.1325	0.1890	0.0816	0.1897	0.1557	0.1419	0.0733	0.2276*	-0.2831**
Volume expansion ratio	-0.2747**	0.1302	-0.1731	-0.2348*	-0.1379	0.2045*	-0.0878	-0.1127	0.0118
Protein content of grain	-0.2935**	-0.1703	-0.0301	-0.2436*	-0.3462**	-0.0072	-0.1275	0.1640	0.1118
Absolute growth rate 50-65 DAT	0.4397**	-0.3301**	0.2287*	0.3736**	0.1004	0.1543	0.0868	0.3128**	0.0678
Absolute growth rate 65-80 DAT	0.5833**	0.1994*	0.1149	0.2086*	0.1629	-0.0248	0.0875	0.1146	-0.1661

Grain breadth (mm)	Kernel length (mm)	Kernel breadth (mm)	Hulling (%)	Milling (%)	Head rice recovery	Volume expansion ratio	Protein content of grain	Absolute growth rate 50-65 DAT	Absolute growth rate 65-80 DAT
0.1087	0.2817**	0.2588**	0.0370	0.1860	0.2481*	-0.3704**	-0.4287**	0.5173**	0.6715**
0.0310	-0.6662**	0.1396	0.4536**	0.2723**	0.2688**	0.1377	-0.1918	-0.3478**	0.2039**
-0.1165	0.3059**	-0.0327	0.3717**	-0.0673	0.1685	-0.1831	-0.0002	0.2556**	0.1267
0.0312	0.4882**	0.2394*	-0.1935*	0.2748**	0.2343*	-0.3219**	-0.2335*	0.4622**	0.2823**
-0.4311**	-0.2563**	0.0293	0.4279**	0.2334*	0.2899**	-0.1645	-0.4405**	0.1080	0.1654
0.4038**	-0.0292	0.5759**	0.4709**	0.2716**	0.1897	0.2227*	-0.0170	0.1653	-0.0282
0.1509	0.0071	0.3234**	0.1933*	0.0970	0.1903	-0.0689	-0.1510	0.1151	0.0866
0.0331	0.0451	0.2285*	0.2830**	-0.1517	0.4080**	-0.1021	0.2030*	0.3594**	0.1015
-0.2242*	0.9972**	-0.1186	-0.5439**	-0.3331**	-0.4190**	0.1301	0.2265*	0.1095	-0.2439*
1.0000	-0.0680	0.9972**	0.3115**	0.1075	0.2493*	0.2669**	0.0575	0.0707	0.1450
-0.0404	**1.0000**	0.0360	-0.3163**	-0.0932	-0.1698	-0.0269	0.1229	0.1801	0.0014
0.5247*	0.0354	**1.0000**	0.6384**	0.3118**	0.3717**	0.0347	-0.1643	0.0272	0.4028**
0.1604	-0.0754	0.2638**	**1.0000**	0.5231**	1.1719	0.2378**	0.0782	-0.0521	0.1346
0.1043	-0.0630	0.1283	0.2015*	**1.0000**	0.8588**	-0.0624	-0.2055*	-0.0994	0.3824**
-0.0601	-0.1159	0.1573	0.3209**	0.3185**	**1.0000**	-0.3766**	-0.1143	-0.1476	0.5197**
0.1475	-0.0581	0.0542	0.1058	-0.0262	-0.1861	**1.0000**	0.1862	-0.0866	-0.2890**
0.0129	0.1043	-0.0510	-0.0050	-0.1528	-0.0956	0.1438	**1.0000**	-0.0977	-0.3701**
0.0372	0.1544	0.0218	-0.0087	-0.0454	-0.0579	-0.0641	-0.0952	**1.0000**	-0.2429*
0.1142	0.0053	0.3282**	0.0691	0.2784**	0.3304**	-0.2682**	-0.3092**	-0.2381*	**1.0000**

*=significant at 5% level (0.193), **= significant at 1% level (0.252)

Table 2. Direct and indirect effects (phenotypic) of yield components on yield among 35 genotypes of rice (*Oryza sativa* L.).

Character	Days to 50% flowering	Plant height (cm)	No .f ear bearing tillers m^{-2}	Panicle length (cm)	No. of filled grains $panicle^{-1}$	Test weight (g)	Harvest Index (%)	Grain length (mm)	Grain breadth (mm)
Plant height (cm)	-0.0411	**0.1874**	0.0661	0.1002	0.0346	0.0044	0.0442	0.0107	0.0140
Days to 50% flowering	**0.5354**	-0.1174	-0.1377	-0.1876	0.1970	0.0102	-0.0095	-0.2731	0.0034
No. of ear bearing tillers m^{-2}	-0.0022	0.0031	**0.0087**	0.0023	0.0009	-0.0011	0.0025	0.0012	-0.0003
Panicle length (cm)	-0.0581	0.0886	0.0437	**0.1657**	0.0144	0.0238	0.0438	0.0503	0.0013
No of filled grains $panicle^{-1}$	0.0341	0.0171	0.0091	0.0081	**0.0927**	0.0132	0.0130	-0.0279	-0.0219
Test weight (g)	0.0027	0.0034	-0.0182	0.0206	0.0204	**0.1429**	0.0333	-0.0098	0.0360
Harvest Index (%)	-0.0077	0.1018	0.1247	0.1142	0.0605	0.1005	**0.4321**	-0.0207	0.0376
Grain length (mm)	0.0451	-0.0050	-0.0124	-0.0268	0.0266	0.0061	0.0042	**-0.0883**	-0.0017
Grain breadth (mm)	0.0013	0.0154	-0.0066	0.0016	-0.0489	0.0521	0.0180	0.0041	**0.2068**
Kernel length (mm)	-0.2119	0.0741	0.0761	0.1267	-0.0825	-0.0079	0.0191	0.2184	-0.0135
Kernel breadth (mm)	-0.0010	-0.0024	0.0013	-0.0014	-0.0003	-0.0056	-0.0019	0.0014	-0.0062
Hulling (%)	-0.0151	0.0004	-0.0117	-0.0011	-0.0235	-0.0237	-0.0177	0.0115	-0.0177
Milling (%)	-0.0060	-0.0051	0.0018	-0.0060	-0.0060	-0.0057	0.0022	0.0019	-0.0032
Head rice recovery	-0.0152	-0.0107	-0.0066	-0.0153	-0.0125	-0.0114	-0.0183	0.0228	0.0048
Volume expansion ratio	-0.0175	0.0370	0.0233	0.0316	0.0186	-0.0275	0.0152	-0.0016	-0.0199
Protein content of grain	0.0216	0.0373	0.0038	0.0309	0.0439	0.0009	-0.0208	-0.0142	-0.0016
Absolute growth rate 50-65 DAT	0.0700	-0.0933	-0.0485	-0.0792	-0.0213	-0.0327	-0.0663	-0.0144	-0.0079
Absolute growth rate 65-80 DAT	-0.0687	-0.2009	-0.0396	-0.0718	-0.0561	0.0085	-0.0395	0.0572	-0.0393
Grain yield (*kg $Plot^{-1}$)	**0.2658****	**0.1309**	**0.0774**	**0.2126***	**0.2586****	**0.2471***	**0.4534****	**-0.0707**	**0.1706**

Kernel length (mm)	Kernel breadth (mm)	Hulling (%)	Milling (%)	Head rice recovery	Volume expansion ratio	Protein content of grain	Absolute growth rate 50-65 DAT	Absolute growth rate 65-80 DAT
0.0416	0.0380	-0.0007	0.0305	0.0248	-0.0515	-0.0550	0.0824	0.1093
-0.3398	0.0461	0.0735	0.1026	0.1012	0.0697	-0.0912	-0.1767	0.1067
0.0020	-0.0009	0.0009	-0.0005	0.0007	-0.0015	-0.0003	0.0020	0.0010
0.0629	0.0198	0.0017	0.0319	0.0314	-0.0389	-0.0404	0.0619	0.0346
-0.0229	0.0024	0.0198	0.0178	0.0144	-0.0128	-0.0321	0.0093	0.0151
-0.0034	0.0671	0.0307	0.0262	0.0203	0.0292	-0.0010	0.0221	-0.0035
0.0247	0.0690	0.0697	-0.0310	0.0984	-0.0487	0.0709	0.1352	0.0495
-0.0578	0.0103	0.0092	0.0053	0.0250	-0.0010	-0.0099	-0.0060	0.0147
-0.0084	0.1085	0.0332	0.0216	-0.0124	0.0305	0.0027	0.0077	0.0236
0.3340	0.0118	-0.0252	-0.0210	-0.0387	-0.0194	0.0348	0.0516	0.0018
-0.0004	**-0.0119**	-0.0031	-0.0015	-0.0019	-0.0006	0.0006	-0.0003	-0.0039
0.0083	-0.0290	**-0.1100**	-0.0222	-0.0353	-0.0116	0.0006	0.0010	-0.0076
0.0020	-0.0040	-0.0063	**-0.0311**	-0.0099	0.0008	0.0048	0.0014	-0.0087
0.0093	-0.0127	-0.0258	-0.0256	**-0.0804**	0.0150	0.0077	0.0047	-0.0266
0.0078	-0.0073	-0.0142	0.0035	0.0251	**-0.1346**	-0.0194	0.0086	0.0361
-0.0132	0.0065	0.0006	0.0194	0.0121	-0.0183	**-0.1270**	0.0121	0.0393
-0.0327	-0.0046	0.0018	0.0096	0.0123	0.0136	0.0202	**-0.2121**	0.0505
-0.0018	-0.1130	-0.0238	-0.0959	-0.1138	0.0924	0.1065	0.0820	**-0.3444**
0.0122	**0.1960****	**0.0320**	**0.0395**	**0.0733**	**-0.0878**	**-0.1275**	**0.0868**	**0.0875**

*=significant at 5% level (0.193), **= significant at 1% level (0.252)

Residual Effect = 0.3280 Diagonal bold values indicate direct effects

Table 3. Direct and indirect effects (genotypic) of yield components on yield among 35 genotypes of rice (*Oryza sativa* L.).

Character	Plant height (cm)	Days to 50% flowering	No. of ear bearing tillersm^{-2}	Panicle length (cm)	No. of filled grains $panicle^{-1}$	Test weight (g)	Harvest index (%)	Grain length (mm)	Grain breadth (mm)
Plant height (cm)	**-1.5226**	0.3976	-0.6109	-0.9904	-0.3221	-0.0706	-0.4605	-0.2110	-0.1655
Days to 50% flowering	-0.1837	**0.7036**	-0.2034	-0.3035	0.2712	0.0150	-0.0210	-0.5562	0.0218
No. of ear bearing tillers m^{-2}	-0.0088	0.0063	**-0.0219**	-0.0070	-0.0026	0.0028	-0.0075	-0.0034	0.0026
Panicle length (cm)	0.7470	-0.4955	0.3690	**1.1484**	0.1456	0.2426	0.5450	0.4696	0.0358
No of filled grains $panicle^{-1}$	-0.0726	-0.1324	-0.0405	-0.0435	**-0.3433**	-0.0517	-0.0521	0.1652	0.1480
Test weight (g)	0.0091	0.0042	-0.0251	0.0414	0.0295	**0.1959**	0.0546	-0.0305	0.0791
Harvest Index (%)	-0.1598	0.0158	-0.1808	-0.2507	-0.0802	-0.1472	**-0.5284**	0.0439	-0.0175
Grain length (mm)	0.0821	-0.4682	0.0914	0.2422	-0.2850	-0.0921	-0.0492	**0.5922**	-0.1328
Grain breadth (mm)	-0.0812	-0.0231	0.0871	-0.0233	0.3221	-0.3017	-0.0247	0.1675	**-0.7472**
Kernel length (mm)	-0.1238	0.2929	-0.1345	-0.2147	0.1127	0.0128	-0.0198	-0.4384	0.0299
Kernel breadth (mm)	0.1369	0.0738	-0.0173	0.1266	0.0155	0.3045	0.1208	-0.0627	0.5273
Hulling (%)	0.0204	0.2499	0.2047	-0.1066	0.2357	0.2594	0.1559	-0.2996	0.1716
Milling (%)	-0.1861	-0.2725	0.0673	-0.2750	-0.2336	-0.2718	0.1518	0.3334	-0.1076
Head rice recovery	0.0699	0.0758	0.0475	0.0661	0.0817	0.0535	0.1150	-0.1181	0.0703
Volume expansion ratio	0.0225	-0.0084	0.0111	0.0195	0.0100	-0.0135	0.0062	-0.0079	-0.0162
Protein content of grain	0.0180	0.0080	0.0000	0.0098	0.0185	0.0007	-0.0085	-0.0095	-0.0024
Absolute growth rate 50-65 DAT	0.5811	-0.3907	0.2871	0.5192	0.1213	0.1857	0.4037	0.1230	0.0794
Absolute growth rate 65-80 DAT	0.8074	0.2452	0.1523	0.3394	0.1989	-0.0339	0.1220	-0.2933	0.1744
Grain yield (*kg $Plot^{-1}$)	**0.1555**	**0.2824****	**0.0831**	**0.2978****	**0.2958****	**0.2903****	**0.5032****	**-0.1356**	**0.1509**

Kernel length (mm)	Kernel breadth (mm)	Hulling (%)	Milling (%)	Head rice recovery	Volume expansion ratio	Protein content of grain	Absolute growth rate 50-65 DAT	Absolute growth rate 65-80 DAT
-0.4289	-0.3941	-0.0563	-0.2832	-0.3777	0.5640	0.6527	-0.7877	-1.0224
-0.4687	0.0982	0.3192	0.1916	0.1891	0.0969	-0.1350	-0.2447	0.1435
-0.0067	0.0007	-0.0081	0.0015	-0.0037	0.0040	0.0000	-0.0056	-0.0028
0.5607	0.2749	-0.2222	0.3156	0.2691	-0.3696	-0.2681	0.5308	0.3242
0.0880	-0.0101	-0.1469	-0.0801	-0.0995	0.0565	0.1512	-0.0371	-0.0568
-0.0057	0.1128	0.0922	0.0532	0.0372	0.0436	-0.0033	0.0324	-0.0055
-0.0238	-0.1208	-0.1495	0.0802	-0.2156	0.0540	-0.1073	-0.1899	-0.0536
0.5906	-0.0703	-0.3221	-0.1973	-0.2481	0.0771	0.1341	0.0649	-0.1445
0.0508	-0.7451	-0.2328	-0.0803	-0.1863	-0.1995	-0.0430	-0.0528	-0.1084
-0.4397	-0.0158	0.1391	0.0410	0.0747	0.0118	-0.0540	-0.0792	-0.0006
0.0190	**0.5288**	0.3376	0.1649	0.1965	0.0183	-0.0869	0.0144	0.2130
-0.1742	0.3516	**0.5508**	0.2881	0.6455	0.1310	0.0430	-0.0287	0.0741
0.0932	-0.3120	-0.5235	**-1.0008**	-0.8594	0.0624	0.2056	0.0994	-0.3827
-0.0479	0.1048	0.3304	0.2421	**0.2819**	-0.1062	-0.0322	-0.0416	0.1465
0.0016	-0.0021	-0.0144	0.0038	0.0228	**-0.0607**	-0.0113	0.0053	0.0175
-0.0051	0.0069	-0.0033	0.0086	0.0048	-0.0078	**-0.0419**	0.0041	0.0155
0.2023	0.0306	-0.0586	-0.1116	-0.1658	-0.0973	-0.1098	**1.1233**	-0.2728
0.0017	0.4844	0.1618	0.4598	0.6248	-0.3475	-0.4450	-0.2920	**1.2023**
0.0071	**0.3234****	**0.1933***	**0.0970**	**0.1903**	**-0.0689**	**-0.1510**	**0.1151**	**0.0866**

*=significant at 5% level (0.193), **= significant at 1% level (0.252)

Residual Effect = 0.4524 Diagonal bold values indicate direct effects

and genotypic levels and it had significant positive association with hulling per centage (%) milling percentage (%) head rice recovery and absolute growth rate at 65-80 DAT. Panicle length showed significant positive association with kernel length (mm), milling percentage (%), harvest index (%), absolute growth rate at both stages of 50-65 DAT and 65-80 DAT respectively at both genotypic and phenotypic levels while it had significant positive association with test weight (g), kernel breadth (mm) and head rice recovery at genotypic level. Whereas, number of filled grains panicle^{-1} showed positive significant association with hulling per centage (%), milling per centage (%) at both genotypic and phenotypic levels and it had positive significant association with head rice recovery at genotypic level. Test weight had positive significant association with harvest index (%), grain breadth (mm), kernel breadth (mm), hulling per centage (%), volume expansion ratio on cooking at both genotypic and phenotypic levels and it had positive significant genotypic association with milling per centage (%). Kernel breadth showed positive significant correlation with hulling per centage (%) and absolute growth rate at 65-80 DAT at both genotypic and phenotypic levels and it had positive significant association with milling per centage (%) and head rice recovery at genotypic level. Hulling per centage (%) exhibited positive significant association with milling per centage (%) at both phenotypic and genotypic levels and it had positive significant genotypic association with kernel breadth (mm) and volume expansion ratio on cooking. Harvest index had positive significant association with head rice recovery and absolute growth rate at 50-65 DAT at both genotypic and phenotypic levels and it had positive significant association with kernel breadth (mm), hulling per centage (%) and protein content of grain at genotypic level.

The path analysis indicated high positive direct effect of days to 50% flowering, panicle length (cm), test weight (g) and kernel length (mm) on grain yield (kg plot^{-1}) at both phenotypic and genotypic levels (Table 2 & 3). These results are in accordance with the reports of Siva Prasad *et al.* (2009), Sandhya Kishore *et al*. (2007) and Mohana Krishna *et al.* (2009). Days to 50% had flowering positive significant indirect effects through grain length (mm) and number of filled grains panicle^{-1} on yeild at phenotypic level. Panicle length had indirect effects through kernel length (mm), harvest index (%) and plant height (cm) at phenotypic level. Test weight showed indirect effects through harvest index (%), grain breadth (mm) and days to 50% flowering on grain yield (kg plot^{-1}). And kernel length had indirect effects through plant height (cm), harvest index (%) and panicle length (cm).

The results of correlation and path coefficient analysis indicated that days to 50% flowering, panicle length and harvest index were the major yield contributing characters as these characters are not only showed positive and significant association with grain yield (kg plot^{-1}), but also had high positive direct effects. Thus days to 50% flowering, panicle length (cm) and harvest index (%) could be considered as the most important characters for selection in order to improve the grain yield in rice. Hence, in the improvement programmes due importance may be given for these traits to improve genetic yield potential in rice.

LITERATURE CITED

Asif B. Shikari, Syed Zameer Hussain, Parry G A, Rather A G and Shafiq A. Wani 2008. Physico – chemical and cooking properities of non – basmati temperate rice (*Oryza sativa* L.). Crop Improvement 35(2): 109-114.

Dewey D R and Lu K H 1959. A correlation and path coefficient analysis of components of crested wheat grass seed production. *Agronomy Journal* 51(9): 515-518.

Falconer D S 1964. An Introduction to Quantitative Genetics. Second Edition. Oliver and Boyd, Edinburgh pp. 312-324.

Mohana Krishna D, Reddy D M, Reddy K H P and Sudhakar P 2009. Character association and interrelationship of yield and quality attributes in rice (*Oryza sativa* L.). *The Andhra Agricultural Journal* 56(3): 298-301.

Sandya Kishore N, Ansari N A, Ravindra Babu V, Shobha Rani N, Subba Rao L V and Ravichandran 2007. Correlation and path analysis in aromatic and non – aromatic rice genotypes. *Agricultural Science Digest* 27(2): 122-124.

Siva Kumar P and Kannan Bapu J R 2005. Character association in inter sub- specific rice hybrids involving wide compatible gene. *Crop Research* 30(2): 208-210.

Siva Prasad A, Seetharamaiah K V, Ramana J V, Vijaya Lakshmi and Satyanarayana Rao V 2009. Correlation and path analysis on yield and drought tolerant attributes under drought stress in rice (*Oryza sativa* L.). *The Andhra Agricultural Journal* 56(4): 447-450.

Vinothini S and Ananda Kumar C R 2005. Correlation and path coefficient analyses in drought tolerant rice cultures for yield. *The Andhra Agricultural Journal* 52(3&4): 373-377.

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