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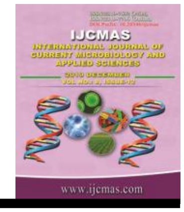

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Correlation Studies and Path Coefficient Analysis in Ridge Gourd [*Luffa acutangula* (L.) Roxb.] Genotypes

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A B S T R A C T

Twenty five genotypes of ridge gourd collected from different places were evaluated to know the character association within the traits and to know the causes and effect of independent variables on yield (dependent variable). Character association and path analysis studies showed that genotypic correlation and path co-efficient is higher than phenotypic correlations path co-efficient for all the characters, indicating little influence of environment on genotypes and the presence of inherent association between various characters. The result revealed that that number of fruits/plant and average fruit weight are the important contributing traits influencing yield through direct effect coupled with high positive correlation and selection based on these characters can be effective for developing high yielding varieties.

Introduction

Ridge gourd [*Luffa acutangula* (L.) Roxb.] is an important cucurbitaceous vegetable crop widely grown in tropical and subtropical parts of the world. Selection based on yield alone is often misleading because it is one of the most complex characters being dependent on its components for its full expression. For rational improvement of yield and its components, association of component characters with yield and among the components themselves should be found out by estimating the correlation co-efficients. Path co-efficient analysis was carried out to know the direct and indirect effect of the traits on plant yield. Hence an investigation was undertaken to study the correlation co-efficient and path analysis in ridge gourd for 12 important yield parameters by considering yield/vine as dependent variable on 12 other independent variable.

Materials and Methods

The present investigation was carried out with 25 genotypes of ridge gourd and were evaluated under RCBD with 2 replication at the College of Horticulture, Mysuru during the kharif season (June 2015). Twenty five diverse genotypes were managed as per recommended package of practices to raise the crop during kharif season. Seedlings were raised in portrays and transplanted at the spacing of 1.2 x 0.9m. Five plants of each genotype were randomly selected from each replication for recording 12 yield contributing horticultural traits.

Results and Discussion

In the present investigation, variance due to treatments (genotypes) was significant for all the characters except for 100 seed weight. In ridge gourd 12 parameters were subjected to genotypic and phenotypic correlation coefficient and are presented in Table 1 and Figure 1.

Correlation co-efficient analysis revealed that fruit yield/plant showed positive and significant correlation with number of primary branches/plant, vine length, number of nodes/vine, number of nodes to first female flower, days to first and last harvest, percent fruit set, number of fruits/plant, fruit weight and fruit length both at genotypic and phenotypic level. Since, these association characters are in the desirable direction, selection for these traits may improve the yield/plant. Negative correlation was observed through sex ratio implies that fruit yield/plant increases with decrease in sex ratio. Similar finding were reported by Choudhary *et al.,* (2014), Dubey *et al.,* (2013), Khatoon *et al.,* (2016), Narasannavar *et al.,* (2014). Number of primary branches, vine length, number of nodes/vine, days to anthesis and number of nodes to first female flower was highly significant and positively associated with each other along with per cent fruit set, number of fruits/plant, averaged fruit weight, fruit yield/plant and negatively correlated with sex ratio suggests that improvement of these traits can be helpful but some compromise has to be made while selecting for this traits (Choudhary *et al.,* 2008).

Days to first and last harvest, average fruit weight and fruit length was positive and significantly correlated within the traits both at genotypic and phenotypic levels, suggesting the possibility of simultaneous improvement of the traits will be effective. However, days to last harvest exhibited highly significant and positive association with per cent fruit set and fruit yield/plant. This suggests that there is a possibility of simultaneous improvement of these traits will be rewarding. Sex ratio had highly significant and negative association with percent fruit set, number of fruits/plant, fruit length and fruit yield/plant, suggesting that simultaneous improvement for these traits is impracticable and some comprise has to be made while selecting for these traits.

Percent fruit set, number of fruits/plant, average fruit weight, fruit length and fruit yield/plant had highly significant and positive association with each other. Hence, selection pressure on this character would bring improvement in yield and had negative correlation with sex ratio. All these results are in conformity with Hanumegowda *et al.,* (2011), Narasannavar *et al.,* (2014), Hanumegowda *et al.,* (2011), Khatoon *et al.,* (2016).

Table.1 Genotypic and phenotypic correlation coefficients among morphological, growth, yield and yield components in ridge gourd [*Luffa acutangula* (L.) Roxb] genotypes

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	G	1. 000	0.475**	0.456**	0.284**	0.341*	0.417**	-0.048^{NS}	-0.385**	0.548**	0.492**	0.276^{NS}	0.518**	0.629**
	P	1.000	0.461**	0.447**	0.220^{NS}	0.307*	0.281*	-0.100^{NS}	-0.227^{NS}	0.500**	0.464**	0.275^{NS}	0.207^{NS}	0.610**
2	G		1. 000	0.931**	0.536**	0.740**	0.295*	0.435**	-0.429**	0.666**	0.576**	0.458**	0.353*	0.641**
	P		1.000	0.916**	0.467**	0.699**	0.218^{NS}	0.372**	-0.302**	0.625**	0.547**	0.449**	0.018^{NS}	0.632**
3	G			1. 000	0.475**	0.643**	0.192^{NS}	0.417**	-0.514**	0.718**	0.567**	0.372**	0.340*	0.591**
	P			1.000	0.378**	0.592**	0.138^{NS}	0.335*	-0.320*	0.660**	0.508**	0.367**	-0.079^{NS}	0.573**
4	G				1. 000	0.793**	0.487**	-0.070^{NS}	-0.075^{NS}	0.334*	0.229^{NS}	0.093^{NS}	-0.093^{NS}	0.219^{NS}
	P				1.000	0.679**	0.437**	0.002^{NS}	-0.019^{NS}	0.239^{NS}	0.179^{NS}	0.057^{NS}	-0.183^{NS}	0.160^{NS}
5	G					1. 000	0.577**	0.198^{NS}	-0.298*	0.582**	0.433**	0.423**	0.218^{NS}	0.505**
	P					1.000	0.447**	0.194^{NS}	-0.249^{NS}	0.515**	0.402**	0.361**	0.026^{NS}	0.463**
6	G						1.000	0.408**	0.155^{NS}	0.131^{NS}	-0.164^{NS}	0.390**	0.318*	0.025 ^{NS}
	P						1.000	-0.174^{NS}	0.177^{NS}	0.102^{NS}	-0.133^{NS}	0.229^{NS}	0.032^{NS}	-0.036^{NS}
7	G							1. 000	-0.187^{NS}	0.538**	0.43*	0.165^{NS}	0.052^{NS}	0.422**
	P							1.000	-0.192^{NS}	0.371**	0.344*	0.115^{NS}	0.286**	0.334*
8	G								1. 000	-0.628**	-0.798**	-0.229^{NS}	-0.445**	-0.796**
	P								1.000	-0.511**	-0.694**	-0.160^{NS}	0.061^{NS}	-0.588**
9	G									1.000	0.825**	0.224^{NS}	0.224^{NS}	0.806**
	P									1.000	0.809**	0.202^{NS}	0.110^{NS}	0.774**
10	G										1.000	0.120^{NS}	0.245^{NS}	0.937**
	P										1.000	0.113^{NS}	0.143^{NS}	0.903**
11	G											1.000	0.691**	0.412**
	P											1.000	-0.005^{NS}	0.406**
12	G												1.000	0.471**
	P												1.000	0.237^{NS}
13	G													1.000
	P													1.000

* and ** Indicate significant at 5 and 1 per cent probability level, respectively NS: Non significant

1. Number of branches/plant 2. Vine length 3. Number of nodes/plant 4. Days to anthesis of first female flower
5. Number of nodes to first 6. Days to first harvest 7. Days to last harvest 8. Sex ratio female flower
9. Per cent fruit set 10. Number of fruits/plant 11. Fruit weight 12. Fruit length
13. Fruit yield/plant

Table.2 Genotypic and phenotypic path coefficient analysis among yield component in ridge gourd [*Luffa acutangula* (L.) Roxb] genotypes

		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**rG / rP**
1	**G**	**0.528**	0.194	-0.045	0.071	0.071	-0.025	-0.016	-0.341	-0.558	0.286	0.158	0.195	0.629**
	P	**0.046**	0.031	0.005	0.0103	-0.037	-0.016	-0.001	-0.021	0.044	0.369	0.091	0.022	0.610**
2	**G**	0.251	**0.409**	-0.092	0.134	0.156	-0.018	0.143	-0.379	-0.677	0.335	0.262	0.133	0.641**
	P	0.021	**0.068**	0.009	0.022	-0.083	-0.013	0.004	-0.028	0.055	0.434	0.148	0.016	0.632**
3	**G**	0.241	0.38	**-0.01**	0.117	0.135	-0.012	0.139	-0.455	-0.731	0.33	0.213	0.128	0.591**
	P	0.02	0.062	**0.01**	0.018	-0.07	-0.008	0.003	-0.03	0.058	0.404	0.121	0.015	0.573**
4	**G**	0.15	0.219	-0.047	**0.25**	0.167	-0.03	-0.023	-0.067	-0.34	0.133	0.053	-0.036	0.219 NS
	P	0.01	0.032	0.004	**0.047**	-0.081	-0.026	0.0002	-0.002	0.021	0.142	0.019	-0.002	0.160 NS
5	**G**	0.18	0.302	-0.064	0.198	**0.211**	-0.035	0.065	-0.263	-0.592	0.252	0.242	0.082	0.505**
	P	0.014	0.048	0.006	0.032	**-0.119**	-0.026	0.002	-0.023	0.045	0.319	0.119	0.009	0.463**
6	**G**	0.22	0.121	-0.019	0.122	0.121	**-0.06**	-0.134	0.137	-0.133	-0.095	0.223	0.12	0.025 NS
	P	0.013	0.015	0.001	0.021	-0.053	**-0.058**	-0.002	0.017	0.009	-0.106	0.076	0.01	-0.036 NS
7	**G**	-0.025	0.178	-0.041	-0.018	0.042	0.025	**0.328**	-0.166	-0.547	0.255	0.095	0.019	0.422**
	P	-0.005	0.025	0.003	0.00012	-0.023	0.01	**0.01**	-0.018	0.033	0.273	0.038	0.004	0.334*
8	**G**	-0.203	-0.175	0.051	-0.019	-0.063	-0.009	-0.062	**0.89**	0.639	-0.464	-0.131	-0.167	-0.796**
	P	-0.01	-0.021	-0.003	-0.001	0.03	-0.01	-0.002	**0.094**	-0.045	-0.551	-0.053	-0.01	-0.588**
9	**G**	0.29	0.272	-0.071	0.083	0.123	-0.008	0.177	-0.556	**-1.017**	0.479	0.128	0.084	0.806**
	P	0.023	0.043	0.007	0.011	-0.061	-0.006	0.004	-0.048	**0.087**	0.642	0.066	0.008	0.774**
10	**G**	0.26	0.235	-0.056	0.057	0.091	0.01	0.144	-0.706	-0.84	**0.581**	0.069	0.092	0.937*
	P	0.021	0.037	0.005	0.008	-0.048	0.008	0.003	-0.065	0.071	**0.794**	0.037	0.009	0.903**
11	**G**	0.146	0.187	-0.037	0.023	0.089	-0.024	0.054	-0.201	-0.228	0.07	**0.572**	0.26	0.412**
	P	0.015	0.031	0.004	0.003	-0.043	-0.013	0.001	-0.015	0.018	0.089	**0.33**	0.031	0.406**
12	**G**	0.274	0.144	-0.034	-0.023	0.046	-0.019	0.017	-0.393	-0.228	0.142	0.395	**0.376**	0.471**
	P	0.021	0.023	0.003	-0.002	-0.022	-0.012	0.001	-0.021	0.015	0.148	0.218	**0.047**	0.434**

Diagonal values indicates direct effect

Residual= rG: 0.07748
Residual= rP: 0.01495

rG= Genotypic correlation coefficient of fruit yield per plant
rP= Phenotypic correlation coefficient of fruit yield per plant

1. Number of branches/plant
2. Vine length
3. Number of nodes/plant
4. Days to anthesis of first female Flower
5. Number of nodes to
6. Days to first harvest
7. Days to last harvest
8. Sex ratio first female flower
9. Per cent fruit set
10. Number of fruits/plant
11. Fruit weight
12. Fruit length

Fig.1 Genotypic and phenotypic correlation coefficient of different characters with yield per vine in ridge gourd

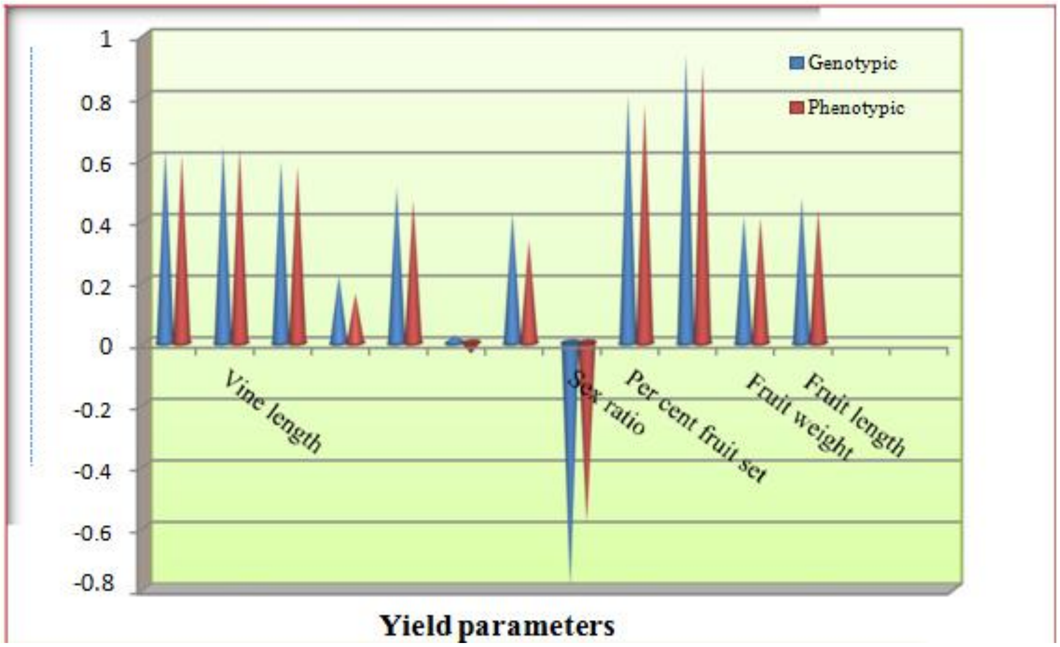
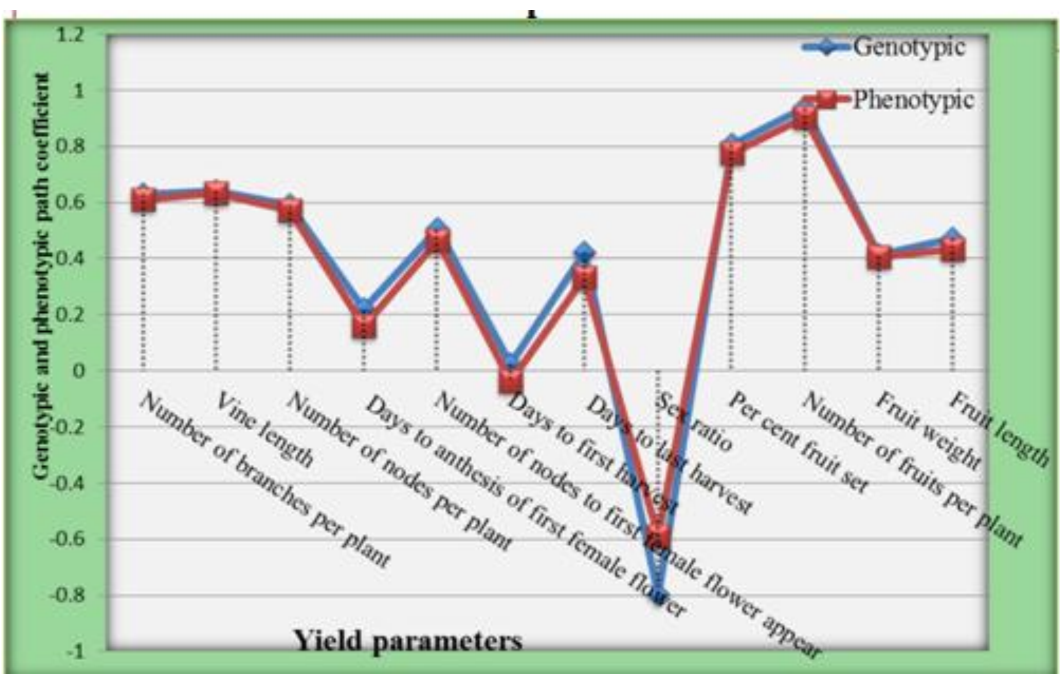


Fig.2 Genotypic and phenotypic path coefficient of different characters with yield per vine in ridge gourd



In the present study path analysis was performed for total yield/plant with 12 yield contributing components. Both genotypic and phenotypic path were worked out which are presented in Table 2 and Figure 2, but genotypic path should be considered with more weightage as phenotypic path will have greater influence of environmental factors.

Among the 12 traits chosen for path analysis, number of primary branches/plant (0.629), vine length (0.641), number of nodes/plant (0.591), number nodes to first female flower (0.505), days to last harvest (0.422), per cent fruit set (0.806), number of fruits/plant (0.937), fruit weight (0.412) and fruit length (0.471) had significant correlation with fruit yield at both phenotypic and genotypic level. Among these some *viz.*, number of primary branches/plant, vine length, days to anthesis of first female flower, days to last harvest, sex ratio, number of fruits/plant, fruit weight and fruit length, had positive direct effect indicating their true positive and significant positive association with yield. Therefore, direct selection for these traits would be rewarding for improvement of yield. These results are supported by Choudhary *et al.*, (2014), Dubey *et al.*, (2013), Narasannavar *et al.*, (2014).

Number of primary branches/vine, vine length, days to anthesis and number of nodes to first female flower, days to last harvest and sex ratio had high positive direct effect on yield at both phenotypic and genotypic level and showed positive indirect effect within the parameters along with number of fruits/plant, average fruit weight and fruit length. Negative indirect effect was observed through number of nodes/plant, days to and last harvest, sex ratio and per cent fruit set. Similar findings are reported by Malashetty (2010), Kumar *et al.*, (2007). Number of nodes/vine and days to first harvest had low negative direct effect on yield with positive indirect effect through each other along with number of primary branches/vine, vine length, days to anthesis and number of nodes to first female flower, average fruit weight and fruit length. Negative indirect effect was observed through days to first harvest, sex ratio and per cent fruit set (Rajput *et al.*, 1996).

Percent fruit set had low negative direct effect on yield at both the level. Positive indirect effect was observed in number of primary branches/plant, vine length, days to anthesis of first female flower, number of nodes to first female flower, days to last harvest, average fruit weight, number of fruits/plant and fruit length, while negative indirect effect was seen through number of nodes/vine, days to first harvest and sex ratio resulted in significant positive genotypic and phenotypic correlation with yield.

Number of fruits/plant, average fruit weight and fruit length had high positive direct effect on yield at both the level. Positive indirect effect was observed through number of primary branches/plant, vine length, days to anthesis and number of nodes to first female flower, days to first and last harvest, number of fruits/plant, average fruit weight and fruit length. Similar findings are reported by Dubey *et al.*, (2013), Narasannavar *et al.*, (2014), Islam *et al.*, (2009), Malashetty (2010).

In phenotypic path analysis also similar trends were observed in case of direct and indirect effects as well as correlations with yield for all characters.

From the breeder's point of view, the characters with high positive correlation and high direct effects at genotypic level are useful for selection.

Thus, it can be concluded that number of fruits/plant and average fruit weight are most important traits influencing yield through direct effect coupled with high positive correlation. Therefore, direct selection for these traits would be rewarding for improvement of yield.

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