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Path coefficient study in grain amaranth (*Amaranthus hypochondriacus* L.)

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Abstract
A study conducted with 18 accessions of grain amaranth indicated that panicle length (0.376) exhibited maximum positive direct effect on grain yield followed by 1000 seed weight (0.125) and number of panicles/ plant (0.119). In general, the indirect effects of yield components were either negligible or intermediate in magnitude. Therefore, improvement in seed yield can be achieved by selecting the genotypes in which panicle length and number of panicles with 1000 seed weight produces more grain yield/ plant.

Keywords: accessions, path, seed yield components

Introduction
Grain amaranth (*Amaranthus hypochondriacus* L.) is a protein rich, monoecious inflorescence crop. Grain amaranth is widely cultivated in different states of India. The exact information on acreage and production in Chhattisgarh state is still not known. The high nutrition value of amaranth seed is the reason for increasing research interest in this alternative pseudocereal. Use of grain amaranth seed provides dietary diversity. Flour helps prevent certain diseases like heart attack, diabetes and brain stroke. Grain amaranth flour are used in making products of biscuits, cakes, laddoo, pasta, chapatti etc. For this highly nutritive underutilized pseudocereal crop to be a matter of choice of farmers and consumers its genetic improvement must be carried out. An attempt was made to study the direct and indirect effects among important traits on grain yield in accessions of grain amaranth by adopting path coefficient analysis.

Materials and Methods
A set of 18 accessions of grain amaranth obtained from co-ordinating centres of potential crops, New Delhi. These accessions were raised in RBD with three replications during rabi 2015-16 at IGKV farm, Raipur (C.G.). Recommended practices were restricted to raise the crop. Observations were recorded on five randomly plants from each plot. Path coefficient analysis was computed by Dewey and Lu (1959) [1].

Results and Discussion
With a view to study the direct (diagonal) and indirect effects of characters of grain yield/plant, the path coefficient analysis was undertaken at genotypic level and is given in the table 1. Panicle length (0.376) exhibited maximum positive direct effect on green yield/plant followed by 1000 seed weight (0.125), number of panicles per plant (0.119) and days to maturity (0.041). Significant direct effect may lead to the development of high yielding genotypes in grain amaranth. These results are in partial agreement for the characters like seed weight and panicle length with those reported by Venkatesh *et al*., (2014) [2]. Some traits like panicle length (-0.376), days to flowering (-0.490) and plant height (-0.247) have shown direct negative effects on grain yield/plant. Days to flowering, days to maturity, panicle length, 1000 seed weight had negligible positive indirect effect while number of panicles/plant had negative indirect effect through grain yield/plant. Days to maturity had negligible positive indirect effects on plant height and number of panicles/plant while negative on days to flowering, panicle length and 1000 seed weight. Plant height showed positive and high indirect effects on days to flowering and number of panicles/plant while negative on days to maturity, panicle length and 1000 seed weight on grain yield/plant. Panicle length had moderate to low positive indirect effects through days to flowering, maturity, 1000 seed weight and number of panicles/

plant while negative on plant height on grain yield/plant. 1000 seed weight had negative indirect effects through days to flowering, maturity, panicle length while positive through plant height and number of panicles/plant on grain yield/plant. Number of panicles/plant showed negligible positive indirect effects on grain yield/plant in components like days to flowering, days to maturity and 1000 seed weight and negative indirect effects through plant height and panicle length on grain yield/plant. In general, the indirect effects of yield components were either negligible or intermediate in magnitude.

Panicle length, 1000 seed weight and number of panicles/plant had strong positive and significant influence on grain yield/plant are main determiners of grain yield. Therefore improvement in seed yield can be achieved by selecting the genotypes in which length and number of panicles with 1000 seed weight producing more grain yield/plant.

Table 1: Direct (diagonal) and indirect (off diagonal) effects of quantitative characters on grain m yield of grain amaranth.

Characters	Days to flowering	Days to maturity	Plant height (cm)	Panicle length (cm)	1000 seed weight (g)	No. of panicles/plant	Correlation for grain yield/plant (g)
Days to flowering	-0.490	0.002	0.118	0.095	0.011	-0.013	-0.401**
Days to maturity	-0.020	0.041	0.059	-0.095	-0.034	0.018	0.213
Plant height (cm)	0.238	-0.009	-0.247	-0.005	-0.024	0.003	0.147
Panicle length (cm)	0.126	0.010	-0.004	0.376	0.061	0.045	0.433**
1000 seed weight (g)	-0.047	-0.012	0.050	-0.192	0.125	0.056	0.292*
No. of panicles/plant	0.055	0.006	-0.007	-0.143	0.056	0.119	0.307*

The figure in bold indicates the direct effect.

*Significant at 5% Prob. Level

**Significant at 1% Prob. Level

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