4.4 GENOTYPIC PATH COEFFICIENT ANALYSIS

The genotypic correlation coefficients calculated for different pairs of characters were subjected to genotypic path coefficient analysis for partitioning these values into the direct and indirect effects. The characters which had shown significant genotypic correlation with grain yield per plant were considered for path coefficient analysis. The results obtained for direct and indirect effects of different characters on grain yield per plant are presented in Table 4.4 and depicted diagrammatically in Fig. 4.3.

4.4.1 Days to 50% flowering vs grain yield per plant

Days to 50% flowering had non-significant and negative genotypic correlation with grain yield per plant ($r_g = -0.1618$) but its direct effect was positive and moderate ($0.2682$). This trait exhibited very low and positive indirect effect via number of grains per main spike ($0.0103$). Days to 50% flowering exhibited moderate and negative indirect effect via harvest index ($-0.2403$), while this trait recorded very low and negative indirect effects via days to maturity ($-0.0758$), 100-grain weight ($-0.0657$), number of productive tillers per plant ($-0.0292$), grain filling period ($-0.0161$), ear length ($-0.0044$), grain weight per main spike ($-0.0041$), biological yield per plant ($-0.0029$) and plant height ($-0.0019$).

4.4.2 Days to maturity vs grain yield per plant

Days to maturity had non-significant and negative genotypic correlation with grain yield per plant ($r_g = -0.1400$) and its direct effect was negative and very low in magnitude ($-0.0816$). This trait exhibited moderate and positive indirect effect via days to 50% flowering ($0.2490$), while very low and positive indirect effect of this trait via biological yield per plant ($0.0131$) and number of grains per main spike ($0.0081$) were observed. Days to maturity exhibited moderate and negative indirect effect via harvest index ($-0.2210$), while very low and negative indirect effects of this trait via 100-grain weight ($-0.0600$), number of productive tillers per plant ($-0.0248$), grain filling period ($-0.0134$), grain weight per main spike ($-0.0039$), ear length ($-0.0033$) and plant height ($-0.0022$) were observed.

4.4.3 Grain filling period vs grain yield per plant

Grain filling period had non-significant but positive genotypic correlation with grain yield per plant ($r_g = 0.1893$) and its direct effect was positive but very low ($0.0200$). This trait exhibited positive and low indirect effect via harvest index ($0.1834$), while positive and very low indirect effects of this trait via biological yield
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per plant (0.0793), days to maturity (0.0548), 100-grain weight (0.0525), number of productive tillers per plant (0.0227), ear length (0.0049), grain weight per main spike (0.0037) and plant height (0.0014) were observed. Grain filling period exhibited negative and moderate indirect effect via days to 50% flowering (-0.2164), while this trait recorded very low and negative indirect effect via number of grains per main spike (-0.0171).

4.4.4 Plant height vs grain yield per plant

Plant height had non-significant and negative genotypic correlation with grain yield per plant ($r_g$=-0.1258) and its direct effect was also negative and very low (-0.0081). This trait exhibited very low and positive indirect effects via days to 50% flowering (0.0619), number of productive tillers per plant (0.0336) and number of grains per main spike (0.0080). Plant height exhibited low and negative indirect effect via biological yield per plant (-0.1531), while very low and negative indirect effects of this trait via harvest index (-0.0379), days to maturity (-0.0217), grain filling period (-0.0035), 100-grain weight (-0.0025), ear length (-0.0014) and grain weight per main spike (-0.0010) were reported.

4.4.5 Number of productive tillers per plant vs grain yield per plant

Number of productive tillers per plant had highly significant and positive genotypic correlation with grain yield per plant ($r_g$=0.7261) but its direct effect was negative and low in magnitude (-0.1376). This trait exhibited high and positive indirect effect via biological yield per plant (0.6838). Number of productive tillers per plant exhibited low and positive indirect effect via harvest index (0.1762), while very low and positive indirect effect of this trait via days to 50% flowering (0.0570) and plant height (0.0020) were observed. Likewise, this trait exhibited very low and negative indirect effects via number of grains per main spike (-0.0190), 100-grain weight (-0.0169), days to maturity (-0.0147), grain filling period (-0.0033) and ear length (-0.0014).

4.4.6 Ear length vs grain yield per plant

Ear length had non-significant but positive genotypic correlation with grain yield per plant ($r_g$=0.0619) but its direct effect was negative and very low in magnitude (-0.0137). This trait exhibited very low and positive indirect effects via days to 50% flowering (0.0868), biological yield per plant (0.0611), harvest index (0.0175) and grain weight per main spike (0.0003). On the other hand, very low and negative indirect effects of this trait via number of grains per main spike (-0.0287),
days to maturity (-0.0196), 100-grain weight (-0.0192), number of productive tillers per plant (-0.0145), grain filling period (-0.0072) and plant height (-0.0008) were noted.

4.4.7 Number of grains per main spike vs grain yield per plant

Number of grains per main spike had highly significant and positive genotypic correlation with grain yield per plant ($r_g=0.6388$) but its direct effect was negative and low in magnitude (-0.1116). Number of grains per main spike exhibited high and positive indirect effect via harvest index (0.4315) and biological yield per plant (0.3435). This trait exhibited very low and positive indirect effects via 100-grain weight (0.0131), days to maturity (0.0059), grain weight per main spike (0.0045), grain filling period (0.0031) and plant height (0.0006), while very low and negative indirect effects of this trait via days to 50% flowering (-0.0248), number of productive tillers per plant (-0.0234) and ear length (-0.0035) were noted.

4.4.8 Grain weight per main spike vs grain yield per plant

Grain weight per main spike had highly significant and positive genotypic correlation with grain yield per plant ($r_g=0.6287$) as well as its direct effect was positive but very low (0.0061). This trait exhibited high and positive indirect effect via harvest index (0.5215), while moderate and positive indirect effect of this trait via biological yield per plant (0.2366) was recorded. Grain weight per main spike exhibited very low and positive indirect effects via 100-grain weight (0.0623), days to maturity (0.0516), grain filling period (0.0122) and plant height (0.0014). On the other hand, this trait exhibited low and negative indirect effect via days to 50% flowering (-0.1798), while very low and negative indirect effects of this trait via number of grains per main spike (-0.0815), number of productive tillers per plant (0.0009) and ear length (-0.0006) were observed.

4.4.9 Biological yield per plant vs grain yield per plant

Biological yield per plant had highly significant and positive genotypic correlation with grain yield per plant ($r_g=0.8750$) and its direct effect was positive and the highest in magnitude (0.8145). This trait exhibited moderate and positive indirect effect via harvest index (0.2211), while this trait exhibited very low and positive indirect effects via grain filling period (0.0019), grain weight per main spike (0.0018), plant height (0.0015) and 100-grain weight (0.0001). On the other hand, this trait exhibited low and negative indirect effect via number of productive tillers per plant (-0.1155), while this trait exhibited very low and negative indirect effects via number
of grains per main spike (-0.0471), days to maturity (-0.0013), ear length (-0.0010) and days to 50% flowering (-0.0009).

4.4.10 Harvest index vs grain yield per plant

Harvest index had highly significant and positive genotypic correlation with grain yield per plant ($r_g=0.7672$) and its direct effect was positive and high in magnitude (0.6125). This trait exhibited moderate and positive indirect effect via biological yield per plant (0.2940), while very low and positive indirect effects of this trait via 100-grain weight (0.0434), days to maturity (0.0295), grain filling period (0.0060), grain weight per main spike (0.0052) and plant height (0.0005) were observed. On the other hand, this trait exhibited low and negative indirect effect via days to 50% flowering (-0.1052), while very low and negative indirect effects of this trait via number of grains per main spike (-0.0786), number of productive tillers per plant (-0.0396) and ear length (-0.0004) were observed.

4.4.11 100-grain weight vs grain yield per plant

100-grain weight had non-significant but positive genotypic correlation with grain yield per plant ($r_g=0.2841$) and its direct effect was positive but very low in magnitude (0.0814). This trait exhibited high and positive indirect effect via harvest index (0.3267), while very low and positive indirect effects of this trait via days to maturity (0.0601), number of productive tillers per plant (0.0285), grain filling period (0.0129), grain weight per main spike (0.0047), ear length (0.0032), biological yield per plant (0.0006) and plant height (0.0002) were observed. On the other hand, this trait exhibited moderate and negative indirect effect via days to 50% flowering (-0.2163), while very low and negative indirect effect of this trait via number of grains per main spike (-0.0180) was observed.