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RESEARCH ARTICLE

Phenotypic path co-efficient analysis in taramira (*Eruca sativa* L.) under three environment conditions

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SUMMARY

Forty two genotypes of taramira (*Eruca sativa* mill.) were evaluated for path analysis of seed yield and its related traits over three different environments created by three dates of sowing during *Rabi* 2009-10. In environment first at phenotypic level highest direct positive effect on seed yield was observed for primary branches per plant.In environment second phenotypic level highest direct positive effect on seed yield was observed for days to maturity. In environment third at phenotypic level highest direct positive effect on seed yield was observed for siliquae per plant

Key Words : Path analysis, Penotypic, Path co-efficient, Environment condition

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Taramira (*Eruca sativa* Mill.) is an important winter season oil seed crop of the family Brassicaceae. It is an introduced crop in India. South Europe and North Africa are believed to be the native place of it (Bailey, 1949 and Prakash, 1980). It has diploid number of chromosomes 2n = 22 and the chromosomes are very small. Taramira has desirable traits particularly resistance to powdery mildew that can be transferred to *Brassica compestris* and *Brassica juncea* both of which are important crops (Sastry, 2003). In india, it is known by many names such as tara, schwan, seoha, duan, turra, tirwa, merha, merkai, chara, ushan and sondha (Singh, 1958). In Europe it is known as rocket salad, rocket, roquuette or arrugula, where it is generally grown for young leaves that are eaten as green salad. Taramira is a herbaceous annual, 2 to 4 feet tall and is a common cold weather oilseed crop of the drier areas of north-west India where it is commonly grown mixed with gram and barley. It does not require much preparatory tillage due to efficient and fast penetrating root system permitting extrusion of soil water from deep soil layers. It is a hardy crop that can be successfully grown in dry land areas and poor sandy soils with conserved moisture during the years of severe drought, when no other crop could be successfully grown,taramira is the only alternative (Gupta *et al*., 1998).An improved ideal variety, besides high yield potential must also possess phenotypic path analysis in its performance. However, the degrees of path analysis have been observed to differ among the genotypes, some showing much better direct positive effect correlation than the other. Since yield is a polygenic character and is controlled by a number of components traits, positive phenotypic path analysis of these components characters is essential for increasing the grain yield performance.

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MATERIAL AND METHODS

A set of 40 germplasm lines along with two check varieties namely RTM-314 and RTM-2002 were selected at random from the collection being maintained at the AICRP on oilseeds (Taramira Unit), Department of Plant Breeding and Genetics, S.K.N. College of Agriculture, Jobner. All the 42 entries were sown at three different dates, representing three environments. The sowing dates were 20th October, 5th November and 20th November, 2009. In each environment, all the genotypes were evaluated in Randomized Block Design with three replications. Plot size was 0.6 x 5.0 m^2 accommodating two rows of each entry. The row to row distance was kept at 30 cm and plant to plant distance was maintained 10 cm by thinning at 25 days after sowing. ten competitive plants were randomly selected at the time of maturity (excepting the days to 50% flowering) from each plot to record the following observations: Days to 50 per cent flowering, days to maturity, plant height (cm), primary branches per plant, secondary branches per plant, number of siliquae per plant, number of seeds per siliqua, seed yield per 10 plant (g), test weight (g) and oil content (%).

RESULTS AND DISCUSSION

The direct and indirect effects of various characters along with their phenotypic correlation co-efficients with seed yield per plant are presented in Table 1, 2 and 3 for each of the

Table 1 : Phenotypic path co-efficient analysis in first environment

Characters	Days to 50 % flowering	Days to maturity	Plant height	Primary branches	Secondary branches	Siliquae per plant	Seed per siliqua	Test weight (g)	Oil content (%)	Seed yield (g)
Days to 50 %flowering	0.068	-0.023	0.005	0.037	0.012	0.034	-0.007	-0.031	0.001	0.095
Days to maturity	0.033	-0.046	0.006	0.018	0.009	0.015	-0.005	-0.022	-0.005	0.003
Plant height	0.012	-0.009	0.028	0.013	0.019	0.015	-0.002	-0.014	-0.015	0.048
Primary branches	0.017	-0.006	0.003	0.144	0.055	0.029	-0.001	-0.047	-0.01	0.184
Secondary branches	0.007	-0.004	0.004	0.067	0.119	0.041	0.0	-0.011	-0.019	0.205
Siliquae per plant	0.021	-0.007	0.004	0.039	0.045	0.107	-0.001	0.007	-0.01	0.206
Seed per siliqua	0.016	-0.008	0.002	0.005	0.0	0.005	-0.03	-0.007	-0.01	-0.027
Test weight (g)	0.011	-0.005	0.002	0.035	0.007	-0.004	-0.001	-0.193	0.012	-0.136
Oil content (%)	0.0	0.002	-0.003	-0.012	-0.018	-0.008	0.002	-0.018	0.126	0.071

Table 2 : Phenotypic path co-efficient analysis in second environment

Characters	Days to 50 % flowering	Days to maturity	Plant height	Primary branches	Secondary branches	Siliquae per plant	Seed per siliqua	Test weight (g)	Oil content (%)	Seed yield (g)
Days to 50 %flowering	0.045	0.022	-0.003	-0.004	-0.040	-0.003	0.009	-0.003	-0.005	0.017
Days to maturity	0.008	0.127	-0.010	0.000	-0.012	-0.006	-0.011	-0.011	-0.006	0.080
Plant height	0.004	0.032	-0.039	-0.006	-0.028	-0.017	-0.006	-0.013	0.000	-0.075
Primary branches	-0.003	0.001	0.005	0.055	-0.024	-0.028	-0.004	0.002	-0.005	-0.001
Secondary branches	0.009	0.007	-0.006	0.006	-0.201	-0.012	-0.007	-0.004	0.003	-0.204
Siliquae per plant	0.001	0.006	-0.005	0.012	-0.020	-0.122	-0.007	-0.004	-0.010	-0.148
Seed per siliqua	0.007	-0.026	0.004	-0.004	0.025	0.015	0.054	0.000	0.001	0.078
Test weight (g)	0.001	0.014	-0.005	-0.001	-0.009	-0.005	0.000	-0.095	-0.003	-0.102
Oil content (%)	0.007	0.021	0.000	0.007	0.015	-0.032	-0.002	-0.009	-0.036	-0.029

Table 3 : Phenotypic path co-efficient analysis in third environment

Characters	Days to 50 % flowering	Days to maturity	Plant height	Primary branches	Secondary branches	Siliquae per plant	Seed per siliqua	Test weight (g)	Oil content (%)	Seed yield (g)
Days to 50 %flowering.	0.044	0.000	0.015	0.022	0.016	0.022	0.002	0.001	0.000	0.121
Days to maturity	-0.007	0.002	0.003	-0.030	0.011	-0.007	0.002	0.000	0.002	-0.025
Plant height	-0.008	0.000	-0.080	-0.048	-0.050	0.061	0.005	-0.001	-0.009	-0.129
Primary branches	-0.004	0.000	-0.017	-0.231	-0.019	0.061	0.006	0.000	0.005	-0.198
Secondary branches	-0.005	0.000	-0.025	-0.028	-0.157	0.302	0.005	-0.001	0.002	0.093
Siliquae per plant	0.003	0.000	-0.013	-0.037	-0.122	0.387	0.010	-0.001	0.004	0.231
Seed per siliqua	0.003	0.000	-0.015	-0.053	-0.027	0.138	0.027	0.000	0.006	0.078
Test weight (g)	-0.006	0.000	-0.009	-0.004	-0.024	0.042	0.000	-0.005	0.008	0.002
Oil content (%)	0.000	0.000	0.014	-0.025	-0.005	0.032	0.003	-0.001	0.048	0.068

three environmental conditions. Path co-efficient analysis over three environmental conditions indicated the variable contribution of different characters towards seed yield with change of environmental conditions. Change in the diameter and magnitude of direct and indirect effects were noted between environments.

In environment first at phenotypic level highest direct positive effect on seed yield was observed for primary branches per plant (0.144) followed by oil content (0.126), secondary branches per plant (0.119), siliquae per plant (0.107), days to 50% flowering (0.068),and plant height (0.028), while highest direct effect was observed for test weight (-0.193), days to maturity (-0.046) and seed per siliquae (-0.03).

In environment second at phenotypic level, highest direct positive effect on seed yield was observed for days to maturity (0.127), followed by primary branches per plant (0.055), seed per siliquae (0.055), and days to 50% flowering(0.045).While highest direct negative effect was observed for secondary branches (-0.201), siliquae per plant (-0.122), test weight (-0.095), plant height(-0.039), and oil content (-0.036).

In environment third at phenotypic level, highest direct positive effect on seed yield was observed for siliquae per plant (0.387), followed by oil content(0.048), days to 50% flowering(0.044), seed per siliquae (0.027), and days to maturity (0.002), while negative direct effect primary branches per plant (-0.231), secondary branches (-0.157), plant height (-0.80) and test weight (-0.005).

Conclusion:

The potential productivity of any crop is basically valued in terms of grain yield per unit area. Its improvement by direct selection is generally difficult because yield is complex polygenic characters largely influenced by its various component characters as well as by the environment. Hence, it becomes essential to estimate association of grain yield with component characters and among themselves. The efficiency of selection thus can be increased if it is simultaneously practiced for characters which are correlated with yield. In the quantitative traits, the genotype is influenced by environment.

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