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Research Article

Correlation and Path Coefficients Analysis for yield and yield Components in Taramira (*Eruca sativa* Mill.)

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Abstract

80 accessions along with 4 check varieties of taramira (*Eruca sativa* Mill.) evaluated for grain yield during 2015-2016. The association analysis revealed that the seed yield per plant was positively and significantly correlated with number of primary branches per plant, number of secondary branches per plant, siliquae per plant, siliqua length, seeds per siliqua and days to maturity. Whereas, association with plant height and test weight was non-significant, indicating yield to be not improved by these characters.Path coefficient analysis revealed that traits such as number of primary branches per plant, number of secondary branches per plant, siliquae per plant, siliqua length, seeds per siliqua and days to maturityt were effective for the selection of high yielding lines as they exhibited positive direct effect with seed yield. While days to 50 per cent flowering and plant height showed negative and direct effects on seed yield per plant.

Keywords: Taramira, Correlation, Path Analysis and Yield

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Introduction

Taramira (*Eruca sativa* Mill.) is an important winter season oilseed 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 [1]. 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 campestris* and *Brassica juncea* both of which are important crops [2]. Taramira is an 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 coupled with late *Rabi* rains, it is the only alternative available for sowing on soils having limited moisture supply [3]. The oil content in taramira ranges from 31.6 - 41.31% [4] which is affected by manuring, irrigation and disease status.

Taramira oil is mainly used in adulteration of mustard oil to increase pungency. The cake of taramira is used as manure for improving the soil physical condition and soil fertility and it can also be used as nutritional feed for animals. The success in any breeding programme depends on the amount of variability present for different characters in the population and its efficient management and utilization. Selection of yield as such may not be effective as it is a complex character and is a result of interaction among its various components [5]. Knowledge of relationship between yield and its components is essential as this may help in constructing suitable selection criteria for yield. Correlation coefficients, worked out among different characters including seed yield per plant based on adjusted values. Path coefficient analysis helps in separating the direct effect of a component character on yield from indirect effects via other traits.

Table 1 Correlation coefficient based on adjusted values for different characters in taramira

	Days to 50 per cent flowering	Plant height (cm)	No. of pri. Branches/ plant	Number of Sec. Branches /plant	Siliquae per plant	Siliqua length	Seed/ siliqua	1000- seed weight (g)	Oil content (%)	Days to maturity	Seed yield per plant (g)
Days to 50 per cent flowering	1.000	-0.0235	-0.0120	-0.0394	0.0924	0.0158	-0.1684*	0.1744*	-0.0492	0.5182**	-0.0892
Plant height (cm)		1.000	-0.0607	-0.0348	-0.0215	0.3125**	0.0633	0.1449	0.2350**	0.3204**	0.0325
Number of pri. Branches/plant			1.000	0.6454**	0.4013**	-0.0078	-0.0944	0.0051	-0.0413	0.0149	0.4962**
Number of Sec. Branches/plant				1.000	0.5289**	-0.0521	-0.0902	0.1628	-0.1622*	0.0015	0.6419**
Siliquae per plant					1.000	-0.3321**	-0.2803**	0.2789**	-0.0392	-0.0744	0.2958**
Siliqua length						1.000	0.6268**	0.1021	-0.0009	0.3244	0.2681**
Seeds /siliqua							1.000	0.0082	-0.0464	0.0440	0.2057**
1000- seed weight (g)								1.000	-0.1923*	0.0623	0.1381
Oil content (%)									1.000	-0.0153	-0.1139
Days to maturity										1.000	0.1820*
Seed yield per plant (g)											1.000

* Significant at P = 0.05 and ** Significant at P = 0.01

Table 2 Direct (diagonal) and indirect effects (non-diagonal) of different characters on seed yield per plant in taramira based on adjusted values

	Days to 50 per cent flowering	Plant height (cm)	No. of pri. Branches/ plant	Number of Sec. Branches/ plant	Siliquae per plant	Siliqua length	Seeds / siliqua	1000- seed weight (g)	Oil content (%)	Days to maturity	Seed yield per plant (g)
Days to 50 per cent flowering	-0.1955	0.0024	-0.0015	-0.0202	0.0092	0.0031	-0.0221	0.0071	-0.0005	0.1290	-0.0892
Plant height (cm)	0.0046	-0.1024	-0.0077	-0.0179	-0.0021	0.0615	0.0083	0.0059	0.0025	0.0797	0.0325
Number of pri. Branches/plant	0.0023	0.0062	0.1272	0.3311	0.0397	-0.0015	-0.0124	0.0002	-0.0004	0.0037	0.4962**
Number of Sec. Branches/plant	0.0077	0.0036	0.0821	0.513	0.0524	-0.0103	-0.0118	0.0066	-0.0017	0.0004	0.6419**
Siliquae per plant	-0.0181	0.0022	0.0511	0.2713	0.099	-0.0653	-0.0368	0.0113	-0.0004	-0.0186	0.2958**
Siliqua length	-0.0031	-0.032	-0.001	-0.0268	-0.0329	0.1967	0.0822	0.0041	0.0001	0.0807	0.2681**
Seeds /siliqua	0.0329	-0.0065	-0.012	-0.0463	-0.0278	0.1233	0.1312	0.0003	-0.0005	0.0109	0.2057**
1000- seed weight (g)	-0.0341	-0.0148	0.0006	0.0835	0.0276	0.0201	0.0011	0.0406	-0.0021	0.0155	0.1381
Oil content (%)	0.0096	-0.0241	-0.0053	-0.0832	-0.0039	-0.0002	-0.0061	-0.0078	0.0108	-0.0038	-0.1139
Days to maturity	-0.1013	-0.0328	0.0019	0.0008	-0.0074	0.0638	0.0058	0.0025	-0.0002	0.2489	0.1820*

Residual Effect=0.0593, * Significant at P = 0.05, ** Significant at P = 0.01

Materials and Methods

The study was conducted using 80 accessions of taramira for seed yield and its related traits in Augmented Randomized Block Design [6] during rabi of 2015-16 at the Research farm of SKN College of Agriculture, Jobner. The experiment material was divided into 5 groups each of 20 accessions. Each group of accession was assigned to a separate block. Four check varieties i.e. RTM-1351, RTM-1355, RTM-314 and RTM-2002 were also assigned to each block. In each block, accessions and check varieties were sown in a plot size of 5 x 0.90m^2 accommodating 3 rows spaced 30 cm apart, after randomization the plant to plant distance was maintained at 10 cm by thinning. Recommended cultivation practices were followed to raise a good crop. Ten plants randomly selected and tagged

before flowering from each plot to record the data on Days to 50 per cent flowering, Days to maturity, Plant height (cm), Number of primary branches per plant, Number of secondary branches per plant, Siliquae per plant, Seeds per siliqua, Siliqua length (cm), Test weight (g), Seed yield per plant (g) and Oil content (%) was recorded on whole plot basis. Statistical analyses were done according to the standard statistical procedures [6].

Result and Discussion

Evaluation of 80 accessions along with 4 check varieties for assessing genetic variability present in the germplasm as well as to estimate the associations of seed yield with other morphological yield traits and to identify superior accessions. Correlation coefficients, worked out among different characters including seed yield per plant based on adjusted values **(Table 1)**. The association analysis revealed that the seed yield per plant was positive and significant correlated with number of primary branches per plant, number of secondary branches per plant, siliquae per plant, seeds per siliqua, siliqua length and days to maturity while non-significant association with plant height and test weight and negative non-significant association with days to 50 percent flowering and oil content. Similar results was founded by [7-11], with number of primary branches per plant plant by [12-15]. It is interesting to note that the characters which exhibited positive association with seed yield per plant have also exhibited positive association among themselves. Thus these characters may be simultaneously improved to increase the seed yield. path coefficient analysis is a powerful tool for studying characters association. In other words the path coefficient analysis measures the direct and indirect contribution of various independent characters towards a dependent character such as seed yield per plant **(Table 2)**. There is good agreement between the values of direct and indirect effects obtained at genotypic level. Path coefficient analysis revealed that traits such is number of primary branches per plant, number of secondary branches per plant, siliquae per plant , siliqua length, seeds per siliqua and days to maturity for the selection of high yielding lines as they exhibited positive direct effect as well as showed positive correlation with seed yield. While days to 50 per cent flowering and plant height showed negative and direct effects on seed yield per plant. Similar finding was by [12, 16, 17]; for secondary branches per plant, while for siliquae per plant reported by [12, 13, 15, 17- 20] for seeds per siliqua by [21].

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