

Research Notes**Association analysis between oil yield and its component characters in *Jatropha*****D. Umamaheswari, M. Paramathma and N. Manivannan****Abstract**

The present study was undertaken to determine the correlation and path analysis in interspecific hybrids of *Jatropha*. Thirteen families along with one check were taken for study. The present investigation revealed that the characters such as seed yield per plant, weight of the capsules per plant, number of seeds per plant, number of capsules per plant, number of flower clusters per plant and oil content recorded significant and positive correlation with oil yield per plant. The path analysis also showed that the characters *viz.*, weight of the capsules per plant and number of seeds per plant showed high positive and direct effect on oil yield per plant, whereas number of capsules per plant recorded positive and high indirect effect via number of seeds per plant on oil yield per plant.

Key words: *Jatropha curcas*, correlation, path, oil yield.

The genus *Jatropha* L. belongs to the family Euphorbiaceae. It is a native species of Central America and has been spread to other tropical and subtropical countries. It is locally known as Ratanjyot (Hindi), Kattamanakku (Tamil) and Physic nut or Purging nut in English. It is a drought tolerant crop, grows quickly and survives in all kinds of soil. It is a morphologically diverse genus which comprises of 176 species of rhizomatous subshrubs and herbs (Paramathma *et al.*, 2004). The world's energy demand continues to increase as we use more machines in our day - to - day lives. As there was rapid decline in fossil fuel due to increased energy consumption, high prices and associated environmental degradation a considerable interest was focused on the development and expansion of alternate source of energy i.e., biofuels. Since India is not self sufficient in edible oil requirement focus is drawn on the production of biodiesel from non edible oilseeds sources. According to the estimate even 5% replacement of fossil fuel by biodiesel will help saving foreign exchange of over Rs. 4000 crores (Kumar *et al.*, 2008). Though many non edible oil seeds were available, *Jatropha curcas* L. recognized as the most potential species for biodiesel

production, since the seeds contain high oil content of 30 to 38%. The ultimate goal in any breeding programme is to identify and to study the interaction and its various components associated with yield and other traits. Hence the present study has been initiated.

A field study was conducted in BC₄F₁ of *Jatropha* hybrid derivatives which comprises of 13 families and one check variety TNMC7 in Tamil Nadu Agricultural University, Coimbatore. The BC₄F₁ hybrids were developed from interspecific hybridization of *Jatropha curcas* x *Jatropha integerrima* followed by four repeated backcrossing with *Jatropha curcas* L. The families were grown in randomized block design with two replications and each replication with twenty plants. Observations were recorded in all plants for the characters *viz.*, plant height, collar diameter, number of branches per plant, number of flower clusters per plant, female flower percentage, number of capsule per plant, weight of the capsule per plant, number of seeds per plant, seed yield per plant, and oil content. Simple correlation and path analysis (Dewey and Lu, 1959) were carried out to find out the association between oil yield and its component characters.

present study the simple correlation coefficients of the characters were studied for 13 characters and the results were presented in the Table 1. The character oil yield per plant had significant and positive correlation with collar diameter(0.20), number of flower clusters per plant (0.43), female flower percentage (0.16), number of capsules per plant (0.87), number of seeds per plant (0.90), weight of the capsules per plant (0.92), oil content (0.36) and seed yield per plant (0.97). Hence these characters were considered as dependable selection indices for oil yield per plant. Partitioning of phenotypic correlation coefficient of different components with oil yield per plant into direct and indirect effects was done and the results were given in the Table 2. Among the characters studied weight of the capsules per plant (0.591) and number of seeds per plant (0.336) recorded high and positive direct effect on oil yield per plant. The traits such as number of capsule per plant (0.325) and weight of the capsules per plant (0.323) recorded positive and high indirect effect on oil yield per plant via number of seeds per plant. Prasanthi *et al.* (2009) also reported that the weight of capsules per plant and numbers of seeds per plant were important selection indices based on path analysis.

Hence considering the path analysis weight of capsules per plant, number of seeds per plant, number of flower clusters per plant and number of capsule per plant were considered as the important selection criteria for oil yield per plant. The residual effect was found to be 0.30. It indicates that 70% of variation on oil yield components was determined by the characters taken for the present study. From this investigation it was evident that seed yield per plant, oil content, weight of the capsules per plant, number of seeds per plant and number of capsules per plant were considered as desirable selection indices for oil yield per plant and the path analysis also revealed that weight of capsules per plant, number of seeds per plant as important selection indices for oil yield per plant.

References

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**Table 1. Simple Correlation Coefficients between oil yield and its component characters**

Trait	Plant height	Collar diameter	No. of branches /plant	No. of flower clusters/ plant	Female flower %	No. of Capsules /plant	Wt of the capsule /plant	No. of seeds/ plant	100 – seed weight	Shelling %	Oil content	Seed yield /plant
Collar diameter	0.50**											
No. of branches /plant	0.09	0.26**										
No. of flower clusters/plant	0.26**	0.26**	0.04									
Female flower %	0.06	0.08	0.02	0.01								
No. of Capsules/plant	0.10	0.21**	0.08	0.47**	0.14*							
Wt of the capsule / plant	0.12	0.20**	0.05	0.47**	0.15*	0.95**						
No. of seeds/plant	0.12	0.22**	0.08	0.46**	0.12	0.97**	0.96**					
100 – seed weight	-0.05	-0.09	-0.07	-0.05	0.15**	-0.14*	-0.03	-0.18**				
Shelling %	0.11	0.02	-0.05	-0.09	-0.01	-0.05	-0.04	0.01	0.32**			
Oil content	0.06	0.02	0.01	0.10	0.18**	0.17**	0.26**	0.20**	0.21**	-0.05		
Seed yield /plant	0.12	0.21**	0.07	0.44**	0.13	0.91**	0.95**	0.94**	0.08	0.12	0.26**	
Oil yield /plant	0.11	0.20**	0.09	0.43**	0.16**	0.87**	0.92**	0.90**	0.11	0.12	0.36**	0.97**

*,** Indicates significance at 5 % and 1% level respectively

Table 2. Direct (diagonal, bold) and indirect effects of thirteen characters on oil yield/plant at phenotypic level

Characters	Plant height	Collar diameter	No. of branches /plant	No. of flower clusters/ plant	Female flower %	No. of Capsules /plant	Wt. of the capsule /plant	No. of seeds/plant	100 – seed weight	Shelling percentage	Oil content	Simple correlation with Oil yield / plant
Plant height	-0.031	0.008	0.004	0.005	-0.001	-0.003	0.070	0.041	-0.006	0.013	0.007	0.108
Collar diameter	-0.015	0.016	0.011	0.005	-0.001	-0.005	0.118	0.074	-0.011	0.002	0.003	0.197**
No. of branches / plant	-0.003	0.004	0.042	0.001	0.000	-0.002	0.029	0.027	-0.008	-0.006	0.002	0.086
No. of flower cluster/splant	-0.008	0.004	0.002	0.020	0.000	-0.013	0.275	0.156	-0.006	-0.010	0.013	0.433**
Female flower %	-0.002	0.001	0.001	0.001	-0.008	-0.004	0.090	0.041	0.018	-0.001	0.023	0.160**
No. of Capsules/ plant	-0.003	0.003	0.004	0.010	-0.001	-0.026	0.562	0.325	-0.017	-0.006	0.023	0.873**
Wt. of the capsule /plant	-0.004	0.003	0.002	0.009	-0.001	-0.025	0.591	0.323	-0.004	-0.005	0.033	0.924**
No. of seeds/plant	-0.004	0.003	0.004	0.009	-0.001	-0.025	0.569	0.336	-0.021	0.001	0.026	0.897**
100 – seed weight	0.002	-0.001	-0.003	-0.001	-0.001	0.004	-0.018	-0.059	0.118	0.038	0.027	0.105
Shelling percentage	-0.004	0.000	-0.002	-0.002	0.000	0.001	-0.024	0.003	0.038	0.118	-0.007	0.123
Oil content	-0.002	0.000	0.001	0.002	-0.001	-0.005	0.152	0.067	0.024	-0.006	0.130	0.363**

Residual effect: 0.3018

**... Indicates significance at 1% level