

Character Association for Seed yield and Yield traits in *Celastrus paniculatus* Willd

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Abstract

This experiment was undertaken to study the correlation and path analysis in six accessions of *Celastrus paniculatus* Willd. Correlation study revealed that the various parameters such as plant height, leaf length, leaf width, petiole length, leaf area, fruit diameter and seed length had high significant positive correlation with seed yield per plant. According to path analysis, leaf length, leaf width, petiole length, fruit diameter and seed length had high positive direct effects on yield per plant. Plant height, leaf area and fruit length had negative direct effects on yield. Thus based on correlation and path analysis, the traits viz., plant height, leaf length, leaf width, petiole length, leaf area, fruit diameter and seed length may be considered as selection indices for high yield.

Key words: *Celastrus paniculatus*, Correlation, Path analysis, Seed yield.

Celastrus paniculatus Willd. is commonly known as *Jyotishmati*, belongs to the family Celastraceae. It is distributed throughout India along sub-Himalayan tracts, up to 2000 m and in South Indian Hills (Singh *et al.*, 2007). In south India, it occurs in forests of Andhra Pradesh, Tamil Nadu and Western Ghats of Karnataka. The seed or seed oil is mostly used for medicinal purpose. The plant exhibits varying degrees of therapeutic value some of which are useful in the treatment of cognitive dysfunction, epilepsy, insomnia, rheumatism, gout and dyspepsia (Sivarajan and Balachandran, 1994).

As this is a threatened plant species globally and comes under IUCN Red list, very less attention has been paid for its improvement. The improvement of this species is through selection which in turn depends on the interrelationship of the number of component characters. In the present study an attempt was made to evaluate the direct and indirect association among the various variables of six *C. paniculatus* Willd. accessions through correlation and path analysis.

This experiment was conducted at the Field Gene Bank of Division of Plant Genetic Resources, Indian Institute of Horticultural Research (IIHR), Bengaluru. The six accessions of *C. paniculatus* Willd. viz., CP 15, KAR RET-169, KAR RET-152, KAR RET-156, KAR RET-68 KAR RET-175 were collected from wild by exploration and maintained here. Recommended cultural practices were adopted for proper growth and stand of the plants.

The observations were recorded for nine traits from all the replications, belonging to the different accessions taken in study. The characters viz., plant height, leaf length, leaf width, petiole length, leaf area, fruit length, fruit diameter, seed length and seed yield were studied. The recorded data were analysed as suggested by Al-jibouri *et al.* (1958) for correlation coefficient analysis and by Deway and Lu (1959) for path coefficient analysis.

RESULTS AND DISCUSSION

The correlation study reveals the degree of interrelationship of plant characters for improvement of yield as well as important quality parameters in any breeding programme (Table 1). Seed yield per plant had high positive correlation with plant height (0.80), leaf length (0.95), leaf width (0.94), petiole length (0.52), leaf area (0.93), fruit diameter (0.99) and seed length (0.80). The results are in agreement with the findings of Kakaraparthi *et al.* (2013), Ahmad and Khaliq, (2002), Rahman *et al.* (2010) who also noticed positive association of plant height, leaf length, leaf width, leaf area, fruit diameter and seed length on seed yield per plant in plants like ashwagandha, *Ocimum* and tea respectively.

Linear relationship between these mentioned characters and seed yield per plant suggest that selection method of crop improvement should mainly be focussed over these characteristics.

The path analysis shows that the association of the independent character with dependent variable is due to their direct effect on it. If the correlation between dependent variable and independent character is due to direct effects of the character, it reflects a true relationship between them and hence selection can be made for such character to improve dependent variable. But, if the association is mainly through indirect effect of the character *i. e.*, through another component character, the breeder has to select for the later through which the direct effect is exerted. In the present experiment, path analysis was done for seed yield per plant (Table 2). Leaf length (2.2867) and leaf width (2.7805) had highest positive effect on seed yield followed by petiole length (0.0897), fruit diameter (0.5010) and seed length (0.0711). The importance of seed length, fruit width, leaf width, leaf length has been highlighted on plants like *Jatropha curcus*, *Piper capense*, Safed musli and *Hypericum perforatum* by

Mohapatra and Panda (2010), Abebe (2014), Yadav *et al.* (2007) and Riazi (2011) respectively. The path analysis confirms the earlier studies that leaf length, leaf width, fruit diameter and seed length are important traits that contribute to fruit yield. Leaf area (-3.3103) had highest direct negative effect on seed yield per plant followed by plant height (-0.3426) and fruit length (-0.0806).

Hence, based on correlation and path analysis, the characters viz., leaf width, fruit length, plant height, leaf area, fruit diameter and seed length may be considered as selection indices for high seed yield.

Table 1: Simple correlation co-efficient among important quantitative character in *C. paniculatus* Willd.

SI. No	1	2	3	4	5	6	7	8	9
1.	1.000	0.9130**	0.9690**	0.9560**	0.9875**	0.5525*	0.9125**	0.7347*	0.8067*
2.		1.000	0.9478**	0.7061*	0.9723**	0.6872**	0.5741*	0.8120*	0.9522**
3.			1.000	0.9159**	0.9936**	0.4697	0.9803**	0.8750*	0.9419**
4.				1.000	0.9298**	0.5219	0.6772*	0.8934*	0.5276
5.					1.000	0.6127**	0.9959**	0.8716*	0.9345**
6.						1.000	0.5150	0.8788**	0.4305
7.							1.000	0.8615*	0.9957**
8.								1.000	0.8011*
9.									1.000

Critical *r* value@ 5%-0.4682 1%-0.5896 1. Plant height 2. Leaf length 3. Leaf width 4. Petiole length 5. Leaf area 6. Fruit length 7. Fruit diameter 8. Seed length 9. Seed yield

Table 2: Path coefficient analysis for growth, yield and its component characters in *Celastrus paniculatus*

Sl. no	1	2	3	4	5	6	7	8
1	-0.3426	-0.3128	-0.3320	-0.3275	-0.3383	0.1893	-0.3127	-0.2517
2	2.0878	2.2867	2.1674	1.6146	2.2234	1.5714	2.2298	1.8567
3	2.6942	2.6354	2.7805	2.5466	2.7627	1.3059	2.7257	2.4328
4	0.0857	0.0633	0.0821	0.0897	0.0834	0.0468	0.0607	0.0801
5	-3.2689	-3.2187	-3.2891	-3.0777	-3.3103	-2.0282	-3.2966	-2.8853
6	-0.0445	-0.0554	-0.0379	-0.0421	-0.0494	-0.0806	-0.0415	-0.0709
7	0.4572	0.5039	0.4912	-0.3393	-0.4990	-0.2580	0.5010	0.4316
8	0.0522	0.0577	0.0622	0.0635	0.0620	0.0625	0.0612	0.0711

RESIDUAL EFFECT = 0.0508 1. Plant height 2. Leaf length 3. Leaf width 4. Petiole length 5. Leaf area 6. Fruit length 7. Fruit diameter 8. Seed length

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