

THE RELATIONSHIPS BETWEEN SEED AND SEEDLING CHARACTERS
IN COCOA (*THEOBROMA CACAO* L.)

Vigorous and healthy seedlings lead to better growth and development of plants and ensure high yield subsequently. Seedling vigour is known to be a function of seed quality {Sonwalker, 1951}. Production of seedlings that can ensure a high productivity assumes added importance in the case of perennial crops as they are characterized by vegetative and productive phases extending to several years. In such cases nonjudicious selection of planting materials is likely to lead irreparable harm to production. Cocoa is no exception to this. Shepherd (1937) attributed extreme variability in yield of cocoa to poor selection. Preliminary observations have shown that weight of cocoa seeds selected for planting is a potential index of early vigour of seedlings (Keshavachandran, 1980). The present paper reveals the results of an investigation carried out to study the bearing of seed and seedling biometrics in cocoa.

The experiment was conducted at the Regional Research Station, Pilicode/Nileshwar during the year 1980-'81. The experimental pods were collected from the Criollo-Forastero natural hybrid population of cocoa, planted as an intercrop in adult coconut plantation. The 10 year old rainfed cocoa plants utilized for this study were maintained as per the Package of Practices Recommendation of the Kerala Agricultural University (Anon., 1978).

Thirty steady yielding trees were marked for collecting fully ripe pods and from each pod, 10 seeds were extracted randomly and their pulp was removed with sand. The weight, length, width and thickness of individual seeds were recorded. The seeds were sown at a depth of 3 cm in polythene bags (20x15 cm) filled with potting mixture of 1:1:1 ratio of sand, soil and compost as per the recommendation (Anon., 1978) and irrigated once in two days. Date of emergence was recorded for each seed and after 45 days of sowing, height of the seedlings and number of leaves per seedling were noted. After a period of four months of sowing, length and width of leaf, length of petiole (of fully developed apex leaf), internodal length, stem thickness, wet and dry weight of plant and length of the tap root were recorded. The inter-relationships between seed as well as early seedling attributes with plant characteristics at four month stage were found out by working out the correlation coefficients.

Coefficients of correlation between seed characters and seedling characters at four month stage are presented in Table 1.

The results showed that weight of seed had significant correlation with plant height, number of leaves produced, stem thickness and wet and dry weight of seedlings. The results also showed a positive though not significant relation of weight of seed to root length with a correlation coefficient of 0.1927. The results would indicate that the early vigour bestowed by a higher seed weight had helped the plant to

absorb nutrients more effectively and utilize the same for tissue build up. Higher photosynthetic efficiency of seedlings is also possible as indicated by the relationship between seed weight and dry weight of seedlings at four months stage.

Observations on the seed length and seedling biometrics showed that leaf width and stem thickness of the seedling significantly increased with increasing length of the seed. Leaf length also was found to increase with increasing seed length. Increase in length and width of the leaf increased the photosynthetic area and consequently production of photosynthates which might have been utilized for increasing girth of seedlings.

Observations on length and width of leaf further showed that both length of seed and number of days taken for germination had significantly influenced the leaf width alone, which suggested that leaf width was more susceptible to the environmental influence.

Results also showed that early emergence of seedlings had significant positive influence on stem thickness as well as wet and dry weight of seedlings. Evidently early emergence facilitated earlier commencement of photosynthetic assimilation leading to higher stem thickness as well as dry and wet weight of seedlings.

Observations on the inter-relationship of the initial seedling characters with those at four month stage showed that expression of seedling vigour and plant development at this stage was largely a reflection of the initial growth habits themselves. Plant height and number of leaves at 45 day stage showed significant relationship with all the seedling attributes studied at four month stage except internodal length. It appeared that internodal length was purely an independent character of the biotype, and seed or other seedling characters had no bearing on it. The data also showed that between plant height and number of leaves produced, the former appeared to express the potential plant growth habits more precisely as the higher correlation coefficient would show. It is possible that leaf production of an emerging plant is governed by other factors as well, such as genetic stimulation whereas initial expression of height appears dominantly a function of food stored in the leaves. Any way, it appears that between these two, height is a more precise and powerful index of seedling vigour.

The very strong inter-relation of these two initial seedling biometrics with plant characters at four months suggests that seedling selection can be done at 45 days stage itself without waiting any further,

An overall perusal of the data could show that vigour of seedlings ultimately works out to be the function of seed weight. Strong inter-relations of early seedling characters with subsequent growth appears to be the magnified expressions of the relation, the weight of seed had earlier indicated and this emphasises the importance of seeds election in progeny production of cocoa.

Table 1
Coefficients of correlation between seed and seedling characters in cotton

	After four months of sowing									
	Plant height	Number of leaves	Leaf length	Leaf width	Petiole length	Inter-nodal length	Stem thickness	Wet weight of seedling	Dry weight of seedling	Root length
Weight of seed	0.2181*	0.2609*	-0.0822	-0.1055	0.1920	0.1682	0.8018**	0.2415	0.2788*	0.1927
Length of seed	0.1588	-0.0355	0.2089	0.2421*	0.1907	0.1864	0.2417*	0.1228	0.1789	-0.118
Width of seed	0.0258	0.1085	-0.1517	0.0504	0.0900	0.0384	0.1458	0.0582	0.0481	0.2058
Thickness of seed	0.0599	0.1428	-0.1181	-0.2802*	-0.0558	0.1098	0.0790	0.1488	0.0884	0.0148
Number of days taken for emergence	0.8743**	-0.1181	-0.2071	-0.2887*	0.0492	-0.1288	-0.2520*	-0.2905*	-0.2866**	-0.0291
Plant height (after 45 days)	0.8450***	0.8592***	0.2963**	0.8580*	0.2417*	0.1718	0.8172**	0.5657**	0.8207	0.8027*
Number of leaves after 45 days	0.5475**	0.4848*	0.2480	0.2421*	0.2447*	0.0097	0.4052**	0.4882	0.4792**	0.3000

* Significant at 5% level
 ** Significant at 1% level
 *** Significant at 0.1% level

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സംഗ്രഹം

കൊക്കോ ചെടിയിലെ വളർച്ചയുടെ ഘടകസ്വഭാവങ്ങളിൽ വിത്തിനും തൈകളുടെ ആദ്യകാല വളർച്ചയ്ക്കുമുള്ള സ്വാധീനത്തെപ്പറ്റി പഠിക്കാനായി പിലിക്കോട് പ്രാദേശിക കൃഷി ഗവേഷണ കേന്ദ്രത്തിൽ ഒരു പഠനം നടത്തുകയുണ്ടായി. വിത്തിന്റെയും 45 ദിവസം മൃപ്പെത്തിയ തൈകളുടെയും വളർച്ചാഘടകങ്ങളെ 125 ദിവസം മൃപ്പെത്തിയ തൈകളുടേതുമായി തുലനം ചെയ്തതിൽനിന്നും തൈകളുടെ പിൽക്കാലവളർച്ച മൗലികമായും വിത്തിന്റെ തൂക്കത്തെ ആശ്രയിച്ചിരിക്കുന്നു എന്നും 45 ദിവസത്തെ വളർച്ചയുടെ അടിസ്ഥാനത്തിൽ തന്നെ നടുന്നതിനനുയോജ്യമായ തൈകൾ തിരഞ്ഞെടുക്കാമെന്നും കാണുകയുണ്ടായി.

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