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Correlated Response to Selection in Moth Bean (*Vigna aconitifolia* Jacq. Marechal.)

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ABSTRACT

Very high positive coheritability of pods/plant with yield and expected gain in yield while selecting through pods/plant showed that additivity in pods/plant can help in improving mean yield in moth bean. While, there are many characters with higher genetic advance than yield, yet selection benefits can be obtained for want of correlation with later. As for as pods/plant are concerned, genetic advance was highest among characters and was readily transferable in yield. *(Received on Dec. 12, 1976).*

INTRODUCTION

As VIEWED by Searle (1965) attempts at changing the average merit of a trait in a population by means of selection programme are usually made by selecting on the phenotype of the trait concerned. But the possibility might be considered of utilising secondary trait through selection on it rather than on main trait itself. Simultaneous improvement of two or more traits usually involves a selection programme based on phenotypes of traits concerned. This indirect selection is expected to be superior only when the secondary character has a substantially higher heritability than the main trait and the genetic correlation between the two characters is high. Hence, this criterion involves genetic correlation and heritability of two characters. Therefore, study of correlated response is essential for yield improvement programme.

Reports on this aspect are available in soybean (Malhotra *et al.* 1972), Kangni (Gian Singh, 1974), Bengal gram (Asawa and Asawa, 1976) and lentil (Tikka *et al.* 1977). However, such an information is not available in moth bean. Further, as reported by Singh (1975) moth bean has lowest productivity per unit area among pulses, thus to select a breeding programme for yield improvement, information on the interrelationships among different characters is essential. It is with this view, present paper purports to report findings of this nature.

MATERIALS AND METHODS

Material studied by Tikka *et al.* (1973) was further subjected to estimation of coheritability in all possible combinations of two characters as suggested by Nei (1960) and Bedard *et al.* (1972). Estimation of expected change in an unselected character were made

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according to the method described by Al-Jibouri *et al.* (1958).

RESULTS AND DISCUSSION

Estimates of coheritability for all possible combinations are presented in Table 1. Days to flower with days to maturity, primary branches and pods/plant recorded very high coheritability. Similarly, days to maturity and pods/plant; pods/plant and seed yield recorded high coheritability indicating that selection through one character shall be inherent for another character too. However, primary branches and pod length among many other combinations recorded very high negative coheritability. This indicates that inheritance of one character will exclude inheritance of another character. Thus attempts to select plants jointly for profused branching and longer pods should be avoided. It is important to note that pod length in general had negative coheritability with most of the characters except with seeds/pod and seed yield. While increase in pod length is likely to increase seeds/pod and inturn seed yield, selection of such plants will be accompanied with early maturity as well as flowering. Again pod length may increase at the expense of pods/plant and increased pod length may have more number of seeds, reduced in seed weight, since more number of seeds are likely to weigh less for test weight parameter, where a given number of seeds are considered.

While Tikka *et al.* (1976) reported a stronger genotypic correlation in test weight and yield than in seeds/pod and yield, yet comparatively coheritability estimates are in different direction here. It is obviously due to higher genotypic covariance for seeds/pod and yield than for other combinations. Such differential behaviour was clearly observed in expected change in unselected character, given selection through other character. While expected change in character in question is essentially genetic advance, it is worth studying as to how much other characters will change at a given selection intensity. It is clear that change in character was different on account of selection through other character than what is observed, had selection being

TABLE 1

Coheritability (h^2 ij)* estimates in moth bean

Character	*Days to maturity*	*Plant height*	*Primary branches*	*Pods/ plant*	*Pod length*	*Seeds/ pod*	*Test weight*	*Seed yield*
Days to flower	79·346	—48·398	97·853	81·977	—63·111	—4·145	4·010	13·771
Days to maturity		6·103	14·582	97·929	—48·182	33·477	—15·451	35·627
Plant height			29·881	25·203	— 6·279	—1·659	27·808	62·589
Primary branches				7·338	—92·430	—39·323	43·683	20·556
Pods/plant					19·054	—56·196	21·865	93·642
Seeds/pod						—14·244	5·845	13·000
Test weight								0·523

* $h^2ij = h^2ji$

TABLE 2

Expected change ($\Delta Gij \neq \Delta Gji$)* in unselected character in moth bean.

Character	*Character affected*								
	Days to flower	*Days to mature*	*Plant height*	*Primary branches*	*Pods/ plant*	*Pod length*	*Seeds/ pod*	*Test weight*	*Seed yield*
Days to flower	6·85	5·99	— 1·31	1·83	19·34	—0·11	—0·01	0·01	1·45
Days to mature	5·58	7·71	0·16	1·98	21·04	—0·08	0·10	—0·04	1·73
Plant height	—0·97	0·13	8·59	0·28	2·68	—0·01	—0·01	0·07	0·78
Primary branches	3·96	4·60	0·81	3·07	32·66	—0·16	—0·11	0·10	2·81
Pods/plant	3·64	4·25	0·68	2·84	38·44	—0·20	—0·16	0·05	299·97
Pod length	—1·26	—1·03	—0·17	—0·85	—12·65	0·50	0·69	—0·15	0·18
Seeds/pod	—0·08	0·72	—0·05	—0·36	—5·97	0·41	1·00	—0·03	1·35
Test weight	0·08	—0·33	0·76	0·40	2·32	—0·11	—0·04	0·90	1·94
Seed yield	2·27	2·91	1·70	2·04	2504·23	0·03	0·30	0·36	4·58

* Selection intensity = 5%

other way round (Table 2). Selection through pod length changes yield less than if the selection was other way round. A reverse picture emerges for test weight and seed yield. This is on account of differential genetic properties of these characters.

It will be seen that characters representing vegetative phase viz. plant height and pod length affect yield only marginally. It will be further observed that selection through days to flower will result in increase in days to maturity. A similar reciprocal effect was observed, if the selection was other way round. While, besides pods/plant, plant height recorded a large coheritability with yield, it does not stand to same merit for want of selection reflected in seed yield as compared to other characters. Thus high coheritability may not be necessarily associated with corresponding change in other character.

Finally after comparing different characters, pods/plant had better selection prospects than any other character. This finding is in accordance with the earlier report of Asawa and Asawa (1976) in Bengal gram. It is evident that selection for pods/plant bears largest effect on seed yield. Since, natural selection has been on yield, it will be seen that selection through yield results in much less genetic gain for yield than for pods/plant. Yet selection through pods/plant is recommended over selection through yield, since later is breeder's objective and hence, among all characters, pods/plant deserves merit.

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