

RESEARCH NOTE

STUDIES ON HYBRID VIGOUR IN THE CROSSES OF OKRA (*Abelmoschus esculentus*) (L.) (MOENCH) GENOTYPES OF DIVERSE ORIGIN

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ABSTRACT

The hybrid vigour of first filial generation (F_1) hybrids between three okra (*Abelmoschus esculentus* (L.) Moench) genotypes of diverse origin was studied. F_1 s of these crosses showed a significant increase in yield, number of pods per plant, pod weight and pod length over their parent values only in the crosses in which the better genotypes were used as female parents. The advancement in days to initial flowering was noticed in F_1 s which was considered as a genetic advantage. Yield showed highly significant values for coefficient of correlation ($p=0.01$) with pod length, pod weight and number of pods per plant and significant value for coefficient of correlation ($p=0.05$) with number of leaves at last harvest.

KEY WORDS: First filial generation, Heterotic effect, Hybrid vigour, Okra

INTRODUCTION

Okra (*Abelmoschus esculentus* (L.) Moench) is grown as one of the major vegetable crops in Sri Lanka and is considered highly nutritive among the local vegetables. Owing to its wide adaptability, it is cultivated in various regions of the country as a home garden crop or on a commercial scale and the eastern region is not an exception. A wide range of varieties, mostly local selections, are cultivated by the vegetable growers. In the Batticaloa region, the traditional cultivars such as Batticaloa local (from Batticaloa District) and Palvendi (from Vavuniya District) were popular but the susceptibility of the varieties to yellow vein mosaic virus (YVMV) gradually limits their use in the farming system, despite their superior characters

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such as high yield and higher consumer preference. Consequently, this influenced the introduction of YVMV resistant/tolerant varieties such as VT (Pusasawani) and 'Haritha' on a large scale into the system and the land races had become obsolete.

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Adequate attention has not been paid in the past to exploit hybrid vigour in a self pollinated crop like okra using genotypes of diverse origin, although hybrid vigour in okra has been reported earlier by Joshi *et.al* (1958). Incorporating YVMV resistance in hybrids can be a major break through in crop improvement of okra, in addition to the utilisation of hybrid vigour for other characteristics. Using the concept of hybrid vigour in combining the characters that are important economically and agronomically, an attempt was made to study the manner in which hybrid vigour is expressed by utilising okra genotypes of diverse origin (Palvendi from Vavuniya district, Batticaloa local from Batticaloa district and Haritha, a recommended variety of the Department of Agriculture, Sri Lanka) and also to develop some strategies for selection in the breeding of okra.

MATERIALS AND METHODS

A field experiment to investigate the potential for hybrid vigour in yield and other important characters of okra was carried out during Yala 1996 at the Agronomy Farm of the Eastern University, Sri Lanka situated at Chenkalady. All treatments (parents Haritha, Batticaloa local and Palvendi and the first filial generation (F_1) of their crosses and the reciprocal crosses except that of cross between Batticaloa local x Palvendi) were arranged in a randomised complete block design with each treatment replicated three times, so that there were 24 experimental plots in all and each plot contained 25 plants. Full diallel crosses were performed to generate the F_1 s. The agronomic practices recommended by the Department of Agriculture were followed. (Anonymous, 1990).

'Haritha' is a recommended variety of the Department of Agriculture, Sri Lanka and it has resistance to YVMV. 'Palvendi' is a high yielding local variety and has good pod quality. 'Batticaloa local' is a well known variety grown in the Batticaloa district and it is selected as a parent for its adaptability. However, the latter two are susceptible to YVMV.

Data collection commenced four weeks after planting and measurements were made on yield and yield components such as number of pods per plants, pod weight and pod length. Also number of leaves at last harvest was recorded. The collected data were subjected to the analysis of variance procedure using a general linear model. Significant models were subjected to a mean comparison using the Duncan's Multiple Range Test. The collected data on different characters were correlated with each other using simple correlation model and the level of significance was determined. (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

The results in Table 1 elucidate the fact that okra genotypes of diverse origin, belonging to wider genetic groups, produced hybrids with heterotic effects (hybrid vigour) in many agronomic traits of economic importance and it may be attributed to dominant gene effects. These findings are in concurrence with Joshi *et.al* (1958).

In this investigation carried out, the F_1 hybrid of Palvendi X Batticaloa local gave the highest pod yield (46.5 t/ha) and exceeded the yield of the better parent Palvendi by 40%. A similar trend in yield was observed in the hybrid of Haritha X Batticaloa local and the increase over the better parent Haritha was 15%. These hybrids showed the heterotic effect, since they exceeded the yields of better parents at a significant level $p=0.05$ (Table 1). Significant results have been obtained with number of pods per plant, pod weight and pod length at $p=0.05$. Among the hybrids, F_1 of the cross between Palvendi and Batticaloa local produced the highest number of pods per plant (14.9) and they were found to be the largest in size, determined by their mean pod weight (35.2 g) and length (24.5 cm). In fact these values significantly exceeded the better parent Palvendi used in the cross. Another F_1 hybrid obtained from the cross between Haritha and Batticaloa local showed a significantly higher value for the pod weight than the better parent Haritha.

It was observed that when there was a decline in the relative position of yield of hybrids or parents, a similar decline in trend has been noticed in the other agronomic characters (Table 2), which had a significant positive correlation with pod yield (Table 3). Therefore, criteria for selection to increase yield need to include these agronomic characters as far as this crop is concerned.

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The results in Table 2 clearly indicate that the heterotic effect is more effectively utilised if better genotypes are included as female parents in the crosses as in the case of the cross Palvendi X Haritha, in which Palvendi is the better parent and similarly Haritha in the cross of Haritha X Batticaloa local. These crosses showed higher values for yield and in other agronomic traits than their reciprocals.

The results reveal that okra genotypes of diverse origin appear to produce hybrids with appreciable heterotic effects in many agronomic traits of economic importance, including yields. However, selection of female parents appears to be an important factor to be considered for the effective exploitation of hybrid vigour and it seems that the better genotype is to be included as female parent in a cross. Plants with higher values in number of pods per plant, pod weight, pod length and number of leaves at last harvest appear to give higher pod yield. These attributes would be the suitable guidelines to improve yield in okra through selection.

Table 1: Pod yield and other agronomic characters of F_1 hybrids and their parents

Treatment	Pod Yield (t/ha)	Pods Per Plant	Pod Weight (g)	Pod Length (cm)
F_1 (Palvendi x Batticaloa local)	46.5 a	14.9 a	35.2 a	24.5 a
F_1 (Haritha x Batticaloa Local)	28.7 b	12.3 bc	26.9 c	16.8 c
Palvendi	33.2 b	11.9 c	32.1 b	21.7 b
Haritha	25.0 c	13.4 ab	21.7 e	16.8 c
Batticaloa local	15.4 d	7.0 d	25.3 d	16.5 c

Figures followed by the same letter in each column do not differ significantly at $p=0.05$, based on DMRT

Table 2 : The performance of F₁ hybrids of crosses and their reciprocals alongwith their parents

Male	Parents		Yield (t/ha)	Average no. Pods per plant	Pod weight (g)	Pod length (cm)
		Female				
Palvendi		Batticaloa local	46.5	14.9	35.2	24.5 ¹
Palvendi		Haritha	30.4	11.6	29.7	20.3
Haritha		Palvendi	26.9	10.2	29.5	18.3
Haritha		Batticaloa local	28.7	12.3	26.9	16.8
Batticaloa local		Haritha	18.8	9.1	23.4	15.4
	Palvendi		33.2	11.9	32.1	21.7
	Haritha		25.0	13.4	21.7	16.8
	Batticaloa local		15.4	7.0	25.3	16.5

Table 3: Coefficient of correlation between yield and other agronomic characters

Agronomic characters	Coefficient of correlation
Pod length	0.92 * *
Number of pods per plant	0.96 * *
Pod weight	0.84 * *
Number of leaves at last harvest	0.76 *

* ** Significant at $p=0.05$ and $p=0.01$ respectively

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