pods contain 11 to 12 seeds with a grain yield of 13 g/plant and 3.4 g from 100 seeds. The harvest index and seed recovery (shelling outturn) are 35.8 and 72.0 per cent respectively. As a whole Co.5 greengram recorded an yield of 903 Kg/ha under rainfed system as against 656 Kg/ha by Co.4 and 673 Kg/ha by Paiyur-1 which accounts to 37.7 and 34.2 per cent respectively as increase. This variety is really a break-through in rainfed green gram cultivation for the following special features.

1. It matures in 70-75 days with an average yield of 903 Kg/ha under rainfed condition.
2. Erect. bushy and medium tall habit with green colour stem.
3. Photo-insenstive
4. Best suited or Adi and Purattasi pattams
5. High DMP and HI
6. Pods mature uniformly and can be completely harvested in two pickings
7. This strain has field tolerance to YMV and pod borers.

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HETEROSIS FOR SEEDLING CHARACTERS IN COTTON (*G. hirsutum* L.)

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ABSTRACT

The present investigation aims to estimate the extent of heterosis through 'Line X Tester' model in 28 cross combinations for seedling characters such as, germination percentage, shoot lenth (cm), root length (cm) and vigour index in cotton *G. hirsutum* L. The study indicated the possibility of attaining heterotic hybrids for seedling characters.

In recent past, plant breeders have extensively explored and utilized heterosis in boosting up yield and fibre quality in cotton. The scope for exploitation of hybrid vigour of seedling characters will depend on the direction and magnitude of heterosis, biological feasibility, and nature of gene action. Study of heterosis will have a direct bearing on the breeding methodology to be employed for the improvement of the trait or the crop as a whole.

MATERIALS AND METHODS

A set of 'Line X Tester' cross was effected with seven lines differing in fuzz grade (Hutchinson and Ramaiah, 1938). Such as, TCH 63/1, TCH 63/4, TCH 104/1, TCH 65/8, TCH 96/6, TCH 70/7 and TCH 89/7 used as males and four testers such as, MCU 5, MCU 7, MCU 9 and LRA 5166 used as females.

Representative seed samples were drawn from five plants each of the parents and the crossed seeds of all the 28, 'Line X Tester' combinations were utilized for the study.

Germination test was conducted as per the procedures outlined in the international rules for seed testing (Anon., 1985) with ten seeds from each samples of the parents and crossed seeds and the germination and other seedling studies repeated three times. For seedling study, five seedlings were taken from the germination test. The length from the collar region to the tip of the seedling in centimetres as shoot length and the length from the collar region to the tip of the root in

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centimetres as shoot length and the length from the collar region to the tip of the root in centimetres as root length were measured. And for the calculation of vigour index, the following formula was used (Abdul Baki and Anderson, 1972).

V.I. = Germination per cent X Total mean length of seedling where,

VI = Vigour index

Magnitude of relative heterosis over mid parental value was calculated, using the formula,

$$\text{Relative heterosis (di)} = \frac{\overline{F_1} - \overline{MP}}{\overline{MP}} \times 100$$

Where,

$\overline{F_1}$ = Mean of the hybrid

$\overline{MP}$ = Mean of the mid parental value of the two corresponding parents.

The significance of (di) was worked out by using the formula suggested by Wynne *et al.*, 1970.

RESULTS AND DISCUSSION

Performence of F_1 hybrids, as compared with midparent mean (relative heterosis) for four characters are presented in Table 1. Heterosis for germination percentage over midparent was in the range of - 16.4% (LRA 5166 X TCH 89/7) to 24.3% (MCU 9 X TCH 63/1). Eighteen crosses recorded significant and positive heterosis and six crosses recorded significant and negative heterosis. For root length eighout of 28 crosses recorded significant and positive heterosis. And the range is - 22.9% (MCU 5 X TCH 63/1) to 11.9% (MCU 7 X TCH 96/6). For shoot length three out of 28 crosses recorded significant and positive heterosis and 14 crosses recorded significant and negative heterosis. The range is - 25.4% (MCU 9 X TCH 65/8) to 12.4% (MCU 9 X TCH 89/7). For vigour index out of 28 crosses six recorded significant and positive heterosis and 16 recorded significant and negative heterosis. The range is - 24.7% (MCU 5 X TCH 63/4) to 20.3% (MCU 9 X TCH 70/7).

The heterosis percentage for all the four characters studied was low and distributed on both negative and positive direction. The crossed seeds are the seeds which produce the F_1 plants which usually show vigour and growth. But the genetical expression of heterosis will start only when the cells multiply and heterosis effect expresses in the final product. For germination, the crossed seed appears to be more like maternal parents with seed coats being of maternal origin and the endosperm genetically being 2/3 maternal and 1/3 paternal. The endosperm mainly serves as a stored food for the growth of embryo and apparently do not contribute more to the vigour in germination and very early seedling growth of embryo. But later on after 15 days the seedling vigour appears to gain momentum. However, there are indications of positive heterosis in some of the hybrids and hence the possibility of developing hybrids of heterotic vigour for seedling characters which might boost the growth and final yield also.

The study indicated the possibility of obtaining heterotic hybrids for seedling for seedling characters. Of the four female parents selected for the study, there are marked variations for positive heterosis viz., MCU.7 (16/28), LRA.5166 (6/28), MCU.5 and MCU.9 (10/28). Therefore, it may be highlighted that MCU.7 is the best parent to exploit the positive heterosis in seedling vigour which may ultimately be reflected in yield.

Table 1. Relative heterosis percentage for seedling characters in cotton.

Crosses			Germination %	Root length	Shoot length	Vigour index
MCU 5	x	TCH 63/1	-15.1*	-22.9*	-20.8*	4.4*
MCU 5	x	TCH 63/4	9.4*	-21.1*	-22.4*	-24.7*
MCU 5	x	TCH 104/1	-0.3	-5.5*	-11.9*	-0.9
MCU 5	x	TCH 65/8	2.6*	-12.6*	-1.9	-12.3*
MCU 5	x	TCH 96/6	3.9*	4.8*	-2.3	12.9*
MCU 5	x	TCH 70/7	8.4*	-6.0*	-2.0	-20.7*
MCU 5	x	TCH 89/7	7.8*	6.3*	3.6	-14.2*
MCU 7	x	TCH 63/1	13.4*	-1.2	-14.2*	3.1
MCU 7	x	TCH 63/4	7.6*	-7.3*	-7.3*	-21.1*
MCU 7	x	TCH 104/1	3.0*	8.8*	3.4	7.0*
MCU 7	x	TCH 65/8	14.2*	9.2*	11.0*	8.6*
MCU 7	x	TCH 96/6	6.3*	11.9*	0.01	-6.6
MCU 7	x	TCH 70/7	2.0*	6.5*	-2.3	-10.1*
MCU 7	x	TCH 89/7	-3.6*	-8.8*	-4.1	-13.4*
MCU 9	x	TCH 63/1	24.3*	2.7	-1.7	-8.4*
MCU 9	x	TCH 63/4	-8.0*	-19.4*	-10.1*	-12.2*
MCU 9	x	TCH 104/1	6.1*	-3.6	-6.6*	-11.9*
MCU 9	x	TCH 65/8	3.8*	19.4*	-25.4*	-6.1*
MCU 9	x	TCH 96/6	7.9*	-2.0	-2.2	-14.6*
MCU 9	x	TCH 70/7	-5.5*	1.4	-12.0*	20.3*
MCU 9	x	TCH 89/7	3.8*	-9.2*	12.4*	-2.4
LRA 5166	x	TCH 63/1	-1.2	-8.2*	-3.8*	-3.9
LRA 5166	x	TCH 63/4	-0.3	-0.9	11.5*	5.6*
LRA 5166	x	TCH 104/1	3.5*	-5.6*	-11.2*	-7.9*
LRA 5166	x	TCH 65/8	-7.2*	-4.4*	-14.7*	-5.4*
LRA 5166	x	TCH 96/6	-9.1*	11.7*	-15.5*	1.3
LRA 5166	x	TCH 70/7	-15.9*	8.8*	-0.4	-6.4*
LRA 5166	x	TCH 89/7	-15.4*	-5.7*	-7.0*	-10.7

* Significant at P = 0.05

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