International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(4): 2643-2647

Received: 13-05-2019
Accepted: 15-06-2019

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Per se performance of ridge gourd (*Luffa acutangula* Roxb) hybrids for growth, flowering, yield and quality traits during *kharif* season

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Abstract
An hybridization programme was conducted at Department of Horticulture, Agricultural College and Research Institute, Madurai during *kharifs* 2017 and 2018 to study the *per se* performance of twenty four ridge gourd hybrids evolved through Line X Tester mating design with six inbreed as female parents were lines (L) L_1 (Acc No. 1, PKM-1, High yield), L_2 (Acc No. 2, CO-1, High yield), L_3 (Acc No. 12, Virdhunagar Local, Earliness), L_4 (Acc No. 19, Seranmadevi local, More no. of fruits/plant), L_5 (Acc No. 21, Arka Sujath, High yield), L_6 (Acc No. 22, Arka Sumeet, High yield) and four inbreds as male parents were tester (T), T_1 (Acc No. 7, Periyakottai local, High length of fruits), T_2 (Acc No. 16, Alathur local, Fruit diameter), T_3 (Acc No. 17, Kannapatti Local, Node to first female flower appear), T_4, (Acc No. 20, Srirampuram Local, More Female: Male ratio) used in the crossing programme. The parents were raised in the filed during *Kharif* 2017 for hybridization. The *per se* performance of parents and hybrids showed that the parents L_3 (2.97kg/vine) and L_4 (2.58kg/vine) were high yielding. Among the twenty four crosses, three cross combinations *viz*., L_3 x T_2 (4.75kg/vine), L_3 x T_1 (4.45kg/vine), L_5 x T_2 (4.25kg/vine) recorded higher values for yield per vine. The high fruit weight was recorded in L_3 X T_1 (259g), L_3XT_2 (270g), L_5XT_2 (295g). The number of fruits per vine was high in L_3XT_2 (17.60), L_3XT_1 (17.20) and L_2XT_4 (16.40). The yield per hectare was high in L_3XT_2 (19.01t), L_3XT_1 (17.82t) and L_5XT_2 (16.99t). The high total soluble solids was observed in L_2XT_2 (5.0^0brix) and L_4 XT_4. The highest crude fiber content was estimated in L_3XT_1 (0.58mg/100g), L_4XT_4 (0.50mg/100g) and L_3 XT_2 (0.56mg).

Keywords: *Per se*, ridge gourd, *Luffa acutangula*, hybrids, crude fiber

Introduction
Vegetables are the major constituents of our daily food. India is the largest producer of vegetables next to China. The family Cucurbitaceae consists of the largest number of vegetable crops. India is the centre of origin of many Cucurbitaceous vegetables, where the cucurbits are capable of thriving and performing well. Bitter gourd, bottle gourd, ash gourd, snake gourd, pumpkin, cucumber, water melon, ivy gourd and ridge gourd are the most important among the farmers. Ridge gourd is popularly known as kalitori and also called as angled gourd, angled loofah, Chinese okra, silky gourd and ribbed gourd. Ridge gourd (*Luffa acutangula* (L). Roxb) or Ribbed gourd is an underexploited vegetable crop and it is an important Cucurbitaceous vegetable crop. It is grown as mixed crop in the river bed areas and as monocrop in the garden lands. It is widely grown in tropical and subtropical parts of the world (Narasannavar *et al*. 2014) [24]. The immature fruits are cooked as vegetable and used in preparation of chutney and curries. Fruit is demulcent, diuretic and nutritive. Every 100g of edible portion of ridge gourd contains 0.5 g of fiber, 0.5 per cent of protein, 0.34 per cent of carbohydrate, 37 mg of carotene, 5.0 mg of vitamin C, 18 mg of calcium and 0.5 mg of iron (Hazra and Som, 2005) [25]. Ridge gourd being a monoecious and cross pollinated crop, it exhibits considerable heterozygosity in population and does not suffer much due to inbreeding depression resulting in natural variability in the population. Thus provides ample scope for exploitation of hybrid vigour on commercial scale to increase the production and productivity (Narasannavar *et al*. 2014) [24]. Ridge gourd is a suitable crop for the development of hybrids of commercial importance due to its monoecious sex form and large number of seeds per fruit. The demand of hybrids of ridge gourd is increasing because of earliness, uniformity and high yield. Most of the ridge gourd hybrids released in India, have large sized fruits which breaks during post harvest handling. Hence the objective of crop improvement programme is to develop a hybrid with medium sized fruits easy packaging.

Plant breeding programme aims at improving the existing types and creating a new types which will be better than the existing commercial cultivars. Among the variety of biometrical procedures, line x tester analysis proposed by Kempthorne (1957) [26] received considerable attention to assess the genetic differences among the parents for quantitative characters. In ridge gourd, similar attempt has made to create variability for fruit yield and quality. Hence the present study was conducted to develop a hybrids with high yield, medium sized and good quality for commercial cultivation.

Materials and Methods

The field experiment was conducted at Department of Horticulture, Agricultural College and Research Institute, Madurai, during 2017-18. The research area located at 09°58' 30.5" N latitude, 078°12' 27.4 E longitude and at an altitude of 158 m above the mean sea level. The climate at the experimental location is generally warm. The hottest period of the year is between the months of March to August, reaching the maximum temperature recorded up to 41.0°C in April. The temperature drops in December and the low temperature continues up to January, reaching the minimum of 20°C. The location received an average annual rainfall of 1006 mm during 2018.

Parental materials

The experimental material consist of six inbreds as female parent as lines (L) L_1 (Acc No. 1, PKM-1, High yield), L_2 (Acc No. 2, CO-1, High yield), L_3 (Acc No. 12, Virdhunagar Local, Earliness), L_4 (Acc No. 19, Seranmadevi local, More no. of fruits/plant), L_5 (Acc No. 21, Arka Sujath, High yield), L_6 (Acc No. 22, Arka Sumeet, High yield) and four inbreds as male parents tester (T), T_1 (Acc No. 7, Periyakottai local, High length of fruits), T_2 (Acc No. 16, Alathur local, Fruit diameter), T_3 (Acc No. 17, Kannapatti Local, Early Node to first female flower appear), $T_{4,}$ (Acc No. 20, Srirampuram Local, More Female: Male ratio) were used in the crossing programme in Line X Tester design. The parents were raised in the filed during *Kharif* 2017.

Selfing and crossing techniques

The seeds of female and male parents were sown in pits at a spacing of 2.5 x 2m during August 2017. The recommended horticultural practices were adopted uniformly in all the parents under study. The crossing of parents attended in Line X Tester mating design. Ridge gourd is monoecious in nature producing staminate and pistillate flowers separately on the same plant. For hybridization, the staminate and pistillate flowers of all parents were covered separately with butter paper covers on the previous day evening prior to opening. On the next day morning as soon as the flowers opened the pollen from the staminate flowers were collected (6.00 - 7.30 A.M) and the same was dusted on the stigma of the pistillate flower of the bagged female parent. The pistillate flowers were rebagged and tagged for identifying the cross-combination. For selfing, the pollen grains from the bagged male flowers were dusted on the pistillate bagged flowers of the same plant. The pollinated parental lines were rebagged and tagged.

The seeds were extracted from the fully matured dry pods. The seeds were dried at eight percent moisture level. All the 24 F_0 seeds along with their parents and standard check hybrid were raised in Randomized Block Design (RBD) with three replications during August 2018 to evaluate the hybrids. A spacing of 2.5m x 2 m was adopted. Recommended cultural practices and plant protection measures were followed to all the plants. In each replication, five competitive plants were identified randomly for recording data on vine length (m), days to first male and female flower appearance, node to first male and female flower, sex ratio, days to first harvest, average fruit weight (g), fruit length (cm), fruit diameter (cm), flesh thickness (mm), fruit yield per vine (Kg), fruit yield per hectare (tone), total soluble solids (TSS) (^{0}Brix). The crude fiber content estimated in the fruits by following the method suggested by Chopra and Kanwar (1976) [27] and the dry matter content of the fruits measured by following the methods described by AOAC (1975). The data recorded were statistically analysed by using the methodology of Panse and Sukhatme (1967) [13].

Result and Discussion

The success of any breeding programme depends upon the choice of elite genotypes based on the mean performance. While evaluating the genotypes, high mean value is considered as the acceptable procedure for a long time among the breeders. Parents with high order of performance would be useful in choosing better genotypes. Parents with good *per se* performance would results in good hybrids. Good hybrids are generally identified based on their high *per se* performance (Gilbert, 1958). Among the six female parents, L_2 (7.83m) and T_1 (8.15m) among the male parents produced longest vine length followed by L_3 (7.57m). The hybrid L_1 x T_2 (10.18m) significantly recorded the highest value for this trait followed by L_1 x T_3 (8.41m). Similar results also reported by Aravindakumar *et al.* (2005) [2] in musk melon and Rakesh and Rajamany (2005) in ash gourd and. The female parent L_3 (33.50), male parent T_2 (33.33) and the hybrids L_1 x T_1 (32.60), L_2 x T_2 (33.20), L_4 x T_1 (33.00) and L_4 x T_2 (33.60) were early with respect to days to first male flower opening. It might be due to the expression of dominance allels present in the female parent. The results are in accordance with the finding of Hossain *et al.* (2010) [14] in pumpkin. The female parent L_6 (41.80), male parent T_3 (44.33) and the hybrids L_6 x T_1 (41.00), L_3XT_3 (41.40) and L_4 x T_1 (41.80) were early with respect to days to first female flower opening. It might be due to the expression of dominance allels present in the female parent. The results are in accordance with the reports of Tamilselvi (2010) [16] in pumpkin. The first male flower in the female parents L_2 (7.75), L_6 (8.40) and in male parents T_4 (5.00), T_3 (7.67) appeared in lower nodes, while in the hybrids L_4 x T_1 (6.60), L_1 x T_1 (6.80), L_1 x T_1 (6.80). It may be due to the non additive gene action of the male parents. This was supported findings of Josephin (2008) [5] in ash gourd and Kumar *et al*. (2005) [7] in pumpkin. The first female flower in the female parents L_4 (19.50), L_5 (21.60) and in male parents T_1 (22.33), T_4 (22.60) appeared in lower nodes, while in the hybrids L_4XT_1 (20.60), L_3 x T_4 (20.80). It may be due to the non additive gene action of the male parents. Similar results were observed by Josephin (2008) [5] in ash gourd and Kumar *et al*. (2005) [7] in pumpkin. The narrow sex ratio is preferable in cucurbits crop improvement programmes, which could be favorable for the production of more number of fruits which results in higher yields. The female parents L_2 (4.31) and male parent T_1 (4.19), T_2 (4.12) recorded lowest values for sex ratio and the hybrids L_2 x T_1 (4.25), L_2 x T_2 (4.15), L_3 x T_1 (3.83), L_3 x T_2 (4.22), L_2 x T_1 (4.22), L_2 x T_1 (4.25) recorded the lowest values. It may be due to the presence of dominant genes expression. Similar observations in ash gourd were made by Manikandan (2012) and Reddy *et al.* (2013) [21] in ridge gourd.

The days to first harvest was less in the female parent L_1 (79.28) and male parent T_4 (69.67) and also in hybrids L_1 x T_1 (64.63) and L_3 x T_3 (61.01). Rana *et al*. (2016) [16] in pumpkin and Kumar *et al*. (2017) [8] in cucumber reported the similar results. The female parents L_2 (13.12), L_3 (14.12) and male parents T_1 (12.81) and T_4 (12.12), hybrids L_3 x T_2 (17.60), L_3 x T_2 (17.20) and L_2 x T_4 (16.40) recorded more number of fruits per vine. The dominant non additive genes might be involved. This is also similar to the results obtained by Bahari *et al*. (2012) [3] in water melon, and Hanchinamani *et al.* (2011) [20] in cucumber. The higher fruit weight was observed in the female parents L_4 (229g) and L_3 (210g) and the male parents T_1 (237g) and T_2 (256g) and in hybrids L_3 x T_1 (259g), L_3 x T_2 (270g), L_5 X T_2 (295g). This is in consonance with the findings of Kothainayagi (2013) in pumpkin. It might be under the control of non additive gene action and partial dominance nature. These results are also in corroboration with the findings of Narasannavar *et al.* (2014) [24] in ridge gourd. The high fruit length among the female parents were recorded in L_1 (36.40cm) and L_2 (32.51cm) and the maximum fruit length in male parent T_4 (35.00). In hybrids the maximum fruit length was recorded by L_5 x T_1 (45.00cm) followed by L_6 x T_4 (43.00cm). This is in consonance with the results of Umamaheshwari and Haribabu (2005) in pumpkin. The female parent L_1 (5.40cm) and the male parents T_2 (5.20cm), T_3 (5.30cm) and hybrids L_5 x T_2 (5.50cm), L_2 x T_4 (4.90cm) recorded higher diameter of the fruit. Nisha (1999) [11] in pumpkin found same results. Fruit flesh thickness is essential to decide the quality of edible portion of ridge gourd. Further, more flesh thickness favours better keeping quality and transportability than the less thick fruits. The highest flesh thickness was observed in the female parent L_1 (4.20 mm), L_6 (4.20mm) and male parents T_2 (10.00mm), T_1 (6.00mm) and in hybrids L_2 x T_4 (4.10mm), L_4 X T_2 (4.10mm). This might be due to the presence of both additive and dominance nature. This result is in corroboration with the finadings of Singh *et al*. (2002) in pumpkin and Muthaiah *et al*. (2017) [10] in ridge gourd. The fruit yield per plant among the parents ranged from 1.75kg to 2.97 kg. The female parent L_3 recorded the highest yield (2.97kg) per vine followed by L_4 (2.58kg). Four parents in the present study recorded significantly higher values than the grand mean (2.49kg). The fruit yield per vine in the twenty four hybrids ranged from 1.58kg to 4.75kg. The hybrid L_3 x T_2 recorded the highest yield (4.75kg) per vine followed by L_3 x T_1 (4.45kg), L_5 X T_2 (4.25kg). Seventeen hybrids in the present study recorded significant higher values than the grand mean (2.98kg/plant). It is similar to the observations reported by Pandey *et al.* (2005) [12] in ash gourd and Podder *et al.* (2010) [23] in snake gourd. The fruit yield per hectare was high in female parent L_3 (11.86 tone /ha), L_4 (10.31 tone /ha), in male parents T_1 (12.41 tone/ha), T_2 (11.41 tone /ha). The hybrid L_3 x T_2 (19.01 tone /ha), L_3 X T_1 (17.82tone/ha) and L_5 X T_2 (16.99tone/ha) recorded the highest yield. This was in accordance with result of Veerendra *et al.* (2010) in ash gourd and Reddy *et al.* (2013) [21] in ridge gourd.

The mean value for the total soluble solids of six parents ranged from 2.90 to 4.00 ºbrix. The female parent L_5 recorded the highest value (4.00ºbrix), followed by T_2 (4.00ºbrix). The parent L_6 (3.00ºbrix) recorded low total soluble solids. Four parents in the present study recorded significant higher values than the grand mean (3.38ºbrix). The total soluble solid content in the hybrids ranged from 2.10 to 5.00 ºbrix. The hybrid L_2 x T_2 recorded the highest value (5.00ºbrix) followed by L_3 x T_2 (4.20ºbrix). L_4 x T_4 recorded the lowest value (2.10ºbrix). Totally thirteen hybrids in the present study recorded significantly higher values than the grand mean (3.29ºbrix). It is similar to results reported by Ram *et al.* (2004) in bitter gourd and Bahari *et al*. (2012) [3] in water melon. The total crude fiber content among the parents ranged from 0.39 to 0.53mg per 100g. Maximum total crude fiber content was recorded in the parent L_2 (0.53mg/100g) followed by T_3 (0.53mg/100g) and the minimum total crude fiber content was recorded in L_1 (0.39mg/100g). Four parents recorded significantly higher values than the grand mean (0.46mg/100g) for this character. The mean performance of total crude fiber content in hybrids varied from 0.42 to 0.58mg/100g. The hybrid L_3 x T_1 L_4 X T_4 and L_3 x T_2 recorded the highest total crude fiber content of 0.58mg, 0.57 mg and 0.56mg per 100g. The hybrid L_6 x T_1 (0.42mg/100g) recorded the lowest total crude fiber content. The grand mean of 0.49mg/100g was observed for this trait. Eleven hybrids recorded significantly higher values than the grand mean (0.49mg/100g). This was in consonance with result of Tamilselvi (2010) [16] in pumpkin and Narasannaar *et al.* (2014) in ridge gourd**.** The dry matter content among the parents T_2 (20.03%) and L_5 (12.25%) recorded favorable high *per se* values of dry mater content and in hybrids L_6 x T_2 (13.73%), L_5 x T_3 (13.06%), L_4 x T_2 (11.59%) and L_2 x T_1 (10.11%) recorded the higher values. The results are in accordance with the Rana *et al*. (2016) [16] in pumpkin and Kumar *et al*. (2017) [8] in cucumber. The moisture matter content among the female parents L_5 (87.75%) and L_6 (89.62%) recorded low moisture content. The male parent T_2 (79.97%) and T_4 (90.80%) and in hybrids L_5 x T_3 (86.94%), L_6 x T_2 (86.27%) and L_4 x T_2 (88.41) recorded the higher values. The results are in accordance with the Muthaiah *et al*. (2017) [10] in ridge gourd were also recorded similar results.

Based on the *per se* performance of 24 hybrids, three cross combinations *viz.*, L_3 x T_2 (Virdhunagar Local X Alathur Local), L_3 x T_1 (Virdhunagar Local X Periyakottai Local and L_5 x T_2 (Arka Sujath X Alathur Local) recorded higher fruit yield per vine 4.75kg, 4.45kg, and 4.25kg and 19.01tone, 17.82 tone, 16.99tone per hectare respectively. These hybrids recorded 27.80, 21.40, 27.20 days to first female flowering respectively. The sex ratio was 3.83, 4.22, 4.92 respectively. These hybrids recorded the fruit length ranged from 29.00cm to 39.00cm. This medium sized fruits will have good marketability as the fruits will be less breakage. These hybrids may used for commercial cultivation.

Table 1: *Per se* performance of parents and F_1 hybrids for growth, flowering, yield and quality traits of ridge gourd

Parents/ hybrids	Vine length (m)	Days to first male flower	Days to first female flower	Node to first male flower	Node to first female flower	Sex ratio	Days to harvest	Fruit weight (g)	No. of fruits/ plant	Fruit length (cm)	Fruit diameter (cm)	Flesh thickness (mm)	Yield (kg/plant)	Yield /ha (tone)	TSS (brix)	Dry matter content (%)	Moisture content (%)	Total crude fiber (mg/100g)
L1	7.22	35.25	43.00	8.75	24.50	5.32	79.28	196	12.04	36.40	5.40	4.20	2.36	9.44	3.10	3.85	96.15	0.39
L2	7.83	38.00	44.25	7.75	24.25	4.31	98.18	185	13.12	32.51	4.90	4.10	2.43	9.71	3.80	9.61	90.39	0.53
L3	7.57	33.50	55.00	9.25	26.00	4.90	87.78	210	14.12	27.00	4.00	3.00	2.97	11.86	3.80	3.15	96.85	0.44
L4	6.95	37.75	44.25	8.50	19.50	5.74	82.53	229	11.25	26.50	3.90	2.90	2.58	10.31	3.20	4.06	95.94	0.49
L5	6.43	35.00	47.00	11.20	21.60	5.06	88.83	203	11.04	22.20	4.60	3.80	2.24	8.96	4.00	12.25	87.75	0.44
L6	6.70	35.20	41.80	8.40	25.80	5.32	91.88	181	11.54	19.70	4.90	4.20	2.09	8.35	3.00	10.38	89.62	0.45
T1	8.15	39.33	47.00	10.33	22.33	4.19	84.70	237	12.81	31.00	4.80	6.00	3.04	12.14	3.00	5.24	94.76	0.47
T2	6.98	33.33	48.00	8.00	25.67	4.12	90.77	256	11.14	28.00	5.20	10.00	2.85	11.41	4.00	20.03	79.97	0.46
T3	6.33	35.33	44.33	7.67	25.67	4.89	74.03	194	9.02	25.40	5.30	4.30	1.75	7.00	2.90	2.99	97.01	0.53
T4	6.53	36.33	46.33	5.00	22.67	4.57	69.67	218	12.12	35.00	4.60	4.20	2.64	10.57	3.00	9.20	90.80	0.44
L1XT1	6.45	33.60	44.60	6.8	24.40	5.10	64.63	210	14.0	30.00	3.80	3.20	2.94	11.76	3.60	9.12	90.88	0.45
L1XT2	10.18	37.20	47.20	12	24.80	5.36	71.66	250	12.6	34.00	3.20	3.70	3.15	12.60	2.70	7.30	92.70	0.47
L1XT3	8.41	36.80	47.00	7.8	26.40	5.20	87.36	245	12.0	34.00	4.50	3.60	2.94	11.76	2.50	4.36	95.64	0.53
L1XT4	7.18	35.60	46.60	10.8	23.40	4.63	86.26	215	12.8	31.00	4.30	3.70	2.75	11.01	3.50	5.26	94.74	0.48
L2XT1	6.52	34.60	44.60	8.4	23.80	4.25	91.67	192	15.6	28.10	4.20	3.20	3.00	11.98	4.00	10.11	89.89	0.51
L2XT2	6.81	33.20	45.00	6.8	25.60	4.15	74.03	248	15.2	29.80	4.10	3.50	3.77	15.08	5.00	9.50	90.50	0.53
L2XT3	6.98	35.00	46.40	8.2	22.60	5.39	81.06	210	14.8	21.00	4.50	3.70	3.11	12.43	3.50	6.91	93.09	0.50
L2XT4	6.65	38.40	44.40	14	24.40	4.76	87.68	248	16.4	37.80	4.90	4.10	4.07	16.27	3.20	2.28	97.72	0.49
L3XT1	6.62	38.20	46.00	10.6	27.80	3.83	66.68	259	17.2	29.00	3.90	3.20	4.45	17.82	2.80	3.93	96.07	0.58
L3XT2	6.92	34.40	43.20	8.6	21.40	4.22	65.10	270	17.6	30.60	4.00	3.10	4.75	19.01	4.20	5.92	94.08	0.56
L3XT3	7.17	35.80	41.40	8.6	24.00	5.12	61.01	227	15.1	25.10	3.80	2.30	3.43	13.71	2.90	6.64	93.36	0.51
L3XT4	6.77	35.80	45.40	9.4	20.80	5.40	72.03	225	15.1	29.10	4.40	3.70	3.40	13.61	2.60	3.22	96.78	0.46
L4XT1	6.97	33.00	41.80	6.6	20.60	4.98	92.93	160	15.4	24.20	4.20	3.50	2.46	9.86	3.80	4.10	95.90	0.48
L4XT2	7.17	33.60	50.80	7.4	22.80	5.20	79.38	250	16.0	26.50	4.70	4.10	4.00	16.00	3.20	11.59	88.41	0.53
L4XT3	6.70	34.00	48.60	7.8	22.00	5.98	72.98	239	14.6	25.30	3.90	2.90	3.49	13.96	2.80	6.90	93.10	0.55
L4XT4	7.33	37.20	46.20	10.2	23.40	5.90	73.29	111	14.2	26.00	3.70	3.10	1.58	6.30	2.10	4.90	95.10	0.57
L5XT1	6.57	32.60	48.20	9.6	25.40	4.92	86.63	250	15.8	45.00	4.50	3.60	3.93	15.80	3.30	5.97	94.03	0.44
L5XT2	6.22	37.40	52.40	11	27.20	4.98	92.93	295	14.4	39.00	5.50	3.40	4.25	16.99	3.00	6.70	93.30	0.47
L5XT3	7.17	41.80	50.60	17	27.00	5.00	84.42	245	12.2	24.50	3.90	3.20	2.99	11.96	3.30	13.06	86.94	0.50
L5XT4	6.84	38.60	52.20	13	24.40	5.02	78.75	255	13.4	25.60	3.50	3.80	3.42	13.67	3.50	9.13	90.87	0.49
L6XT1	7.28	32.60	41.00	7	21.60	4.70	91.88	197	14.6	21.60	4.30	3.20	2.88	11.50	2.80	5.88	94.12	0.42
L6XT2	6.92	37.80	43.60	8.6	23.00	5.05	84.53	207	15.6	25.00	4.50	3.70	3.23	12.92	2.20	13.73	86.27	0.45
L6XT3	6.60	37.40	50.20	11.2	22.60	5.12	86.63	185	15.2	21.90	4.10	3.00	2.81	11.25	3.60	7.44	92.56	0.47
L6XT4	6.90	36.00	42.60	9.8	23.40	5.14	84.53	245	16.2	43.00	4.50	3.60	3.97	15.88	3.80	6.38	93.62	0.49
CHECK-1	7.32	32.20	39.40	3.80	15.40	5.74	70.29	291	9.0	28.70	4.70	3.70	2.62	10.48	3.40	5.54	94.46	0.40
Mean of parents	7.07	35.90	46.10	8.49	23.80	4.84	84.76	210.90	11.82	27.91	4.76	4.67	2.49	9.98	3.38	8.08	91.92	0.46
Mean of hybrids	7.06	35.87	46.20	9.30	23.85	4.94	81.34	216.65	13.74	29.04	4.34	3.79	2.98	11.92	3.29	7.39	92.61	0.49
S.Ed.	0,30	0.35	0.7	0.6	1.1	0.6	0.8	10.10	0.3	1.12	0.4	0.2	0.3	0.3	0.4	0.7	1.1	0.11
C.D.(0.05%)	0.6	0.7	1.44	1.2	2.12	1.2	1.64	20.22	0.62	2.24	0.82	0.4	0.62	0.64	0.80	1.4	2.2	0.34

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