fixing sites created by salt stress, also reduces the ARA and the results were in confirmity with the report of Sprent (1972). Graham and Parker (1964) have shown that concentration of NaCl as high as 2 0 per cent and as low as 0.2 per cent did not favour the growth of the fast and slow growing rhizobia.

The *S. rostrata* were found to record higher number of nodules (30.05 per plant) at 30°C (Table 3). Similar results were also reported by Graham (1979), where the noticed moderate day-night temperature (30-20°C) gives good early nodulation and biological nitrogen fixation. Favourable temperature for multiplication of most species of rhizobium was upto 30°C, above or below which there was sharp decline in growth (Bhriguvanshi and Gangwar, 1984).

In the present study, it was observed that stem nodulation and stem nodule nitrogenase activity was enhanced with the application of NPK upto 75 kg/ha. The increase in levels of NaCl concentration proportionately decreased the stem nodule number and nitrogenase activity of *S. rostrata*. Higher number of nodules and nitrogenase activity was observed in the *S. rostrata* when exposed to 30° C and below or above which, a decline was noticed.

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EFFECTS OF DIFFERENT PLANT DENSITY MODELS ON GROWTH AND FLOWERING OF POINTED GOURD, *Trichosanthes dioica* Roxb.

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ABSTRACT

Field experiment was carried out on the effects of different plant density models on growth and yield of pointed gourd. Three spacings (90cm,120cm,150cm) and 4 densities (5,10,15,20) of female plants from a male plant were tested during the period of study. A local variety of pointed gourd "Bhubaneswar Local" was taken for study. Among different distances tried 150cm was proved to be the most effective than that of 90 cm and 120 cm. As regards to female plant density,15 plants around one male was found to be best. Increasing the female plant population beyond 15 around one male was found to be best Increasing the female plant population beyond 15 around one male resulted in significant reduction in the yield per hectare in this crop.

KEY WORDS: Plant density, Model, Pointed Gourd

Pointed gourd or parwal, *Trichosanthes dioica* Roxb. is an important vegetable grown during summer and rainy season in India. This is one of the most nutritive vegetables of Indian origin and cultivated widely in the states of Orissa, West Bengal, Uttar Pradesh, Bihar and Assam. In Orissa this crop is grown in the regions of Cuttack, Puri, Balasore, Ganjam, Sambalpur and Bolangir. Though this crop is becoming increasingly popular among the farmers the agronomic practices for this is yet to be standardised. One basic factor which is highly responsible for increased yield is the distribution of male and female plants and their optimum density. Therefore in the present investigation, the effects of different plant density models on vegetative growth and flowering of pointed gourd was undertaken.

Table 1. Effect of female plant density and distance from the male plant on vegetative growth of pointed gourd (Parwal)

Female plant density		Distance from the male plant			Mean
		D_1	D_2	D_3	
	Length of vine (mtrs.)	1.59	1.89	1.94	1.68
P_1	No. of branches	5.44	4.88	5.66	5.33
	No. of leaves	245.11	274.33	301.77	273.73
	Length of vines (mtrs.)	1.47	1.87	1.91	1.75
P_2	No. of branches	5.33	4.77	4.89	4.99
	No. of leaves	220.66	255.33	280.88	252.29
	Length of vines (mtrs.)				
P_3	No. of branches	2.66	4.77	4.89	4.10
	No. of leaves	183.33	233.99	244.77	209.46
	Length of vines (mtrs.)	1.28	1.69	1.79	1.59
P_4	No. of branches	1.88	2.99	2.11	2.22
	No. of leaves	112.77	182.99	208.55	168.11
	Mean (Character-1)	1.42	1.82	1.88	
	(Character-2)	3.83	4.27	4.38	
	(Character-3)	182.13	236.66	253.99	
CD (P=0.05)	(Character-1)	D	P	D x P	
		0.06	0.07	NS	
	(Character-2)	0.25	0.36	0.51	
	(Character-3)	4.93	5.69	9.86	

D_1 - Planting of female plant at 90 cm distance

D_2 - Planting of female plant at 120 cm distance

D_3 - Planting of female plant at 150 cm distance

$P_1P_2P_3P_4$ - Density of female : male 5, 10, 15 and 20

MATERIALS AND METHODS

The experiment was carried out in the (B) Block of Horicultural Research Station of O.U.A.T.located at Bhubaneshwar, from octorber, 1993 till April, 1994. "Bhubaneshwar Local" was taken for experimentation as it is a popular cultivar. All the standard agronomic practices were followed for raising the crop. The experiment was set up with twelve distinct plant density models with female plants of four different densities (5,10,15 and 20), space planted in a circular manner at distance of 90, 120 and 150 cm kipping single male plant at the centre irrespective of the plantings. Different distances and densities were denoted as D_1, D_2, D_3 and P_1, P_2, P_3, P_4 respectively. The total experiment was planned in RBD (factorial) and replicatged thrice. Observation on the vine length (m) from base upto growing point was recorded at about maturity of the plants. The total number of primary branches, number of functional leaves/plant and total number of female flowers per plant was counted from the date of first appearance till maturity on 30.4.1994 and recorded. Weight of furits from each plant during each picking was calculated and was expressed in yield tonnes/ hectare. ANOVA was calculated as per the procedure of Gomez and Gomez (1984).

RESULTS AND DISCUSSION

It is revealed from Table 1 that all the three vegetative growth parameters were significantly influenced by the factors taken into consideration. By increasing the distance of female plants from the male plants (90 to 150), there was significant increase in the vine length and maximum length of 1.88 meter was recorded in D_3. Likewise with increasing the female plant density (5 to 15) there was increase in vine length upto P_3 (1.80) which was at par with P_2 (1.75) m but decreased significantly at a density of 20. Number of branches were also increased up to D_3 with increase in distance, D_3 and D_2 were at par. With increasing the density, branch number was decreased from P_1 (5.33) to P_4 (2.22). Maximum and minimum number of branches were recorded from D_1P_1 (5.44) and D_1P_4 (2.11) treatment combinations respectively. Numbers of leaves were also found to be increased with increasing the distance from 50 to 150 cm and a decreasing trend was recorded for this character with increasing the density of female plants from 5 to 20 around each male plant. Minimum number of leaves (168.11) was observed in P_4. However, D_1 P_4 treatment registered lowest numbre of leaves/

Table 2. Influence of female plant density and distance from male plant on the total number of female flowers per plant in pointed gourd (Parwal)

female plant distance from male	Female plant density				
	P_1	P_2	P_3	P_4	Mean
D_1	91.66	65.54	58.77	41.66	64.41
D_2	117.33	94.11	72.22	40.32	80.99
D_3	152.44	140.55	111.21	49.33	113.38
Mean	120.47	100.07	80.74	43.77	-
C.D. % (P=0.05)	D	P	D x P		
	1.39	1.60	2.78		

Table 3. Influence of female plant density and distance from male plant on per hectare (tonnes) yield of pointed gourd (Parwal)

female plant distance from male	Female plant density				
	P_1	P_2	P_3	P_4	Mean
D_1	2.162	2.338	2.542	2.436	2.369
D_2	1.938	2.448	3.486	2.654	2.623
D_3	1.556	5.223	5.478	3.017	3.818
Mean	1.855	3.225	3.825	2.702	-
C.D. % (P=0.05)	D	P	D x P		
	0.005	0.006	0.011		

plant (112.77) and maximum number was found in D_3P_1 treatment combination.

It was found that the total number of female flowers/plant was influenced significnatly by male to female plant distance and female plant density (Table 2). The number of female flowers/plant was increased from 64.41 in 50 cm spacing to 112.38 in 150cm spacing. Likewise with increasing in female plant density from 5 to 20 around each male plant this character was found to be decreased. Highest and lowest number of female flowers/plant was recorded from P_1D_3 and P_4D_2 treatments respectively. Per hectare yield was also follwed the same trend like the vegetative characters (Table 3). The highest (32.868 t/ha) and lowest yields (3.9467 t/ha) were obtained from D_3P_3 and D_1P_4 treatment combinations respectively. It is an established fact that yield of vegetable crops like pointed gourd is mostly influenced by vegetative characters.

In this experiment planting of female plants at a distance of 150cm from male plants gave good result with respect to vegetative characters like production of more number of leaves, branches and lengthier vines which resulted in production of more fruits. When less numbers of female plants were planted around a single male, then there was less competition for light, water as well as nutrients, so it produced quick growth of plants and vines were tended to became lengthier. So for pointed gourd planting of 15 female plants around a single male may be considered optimum. Earlier workers like Yadav *et al.* (1989) reported that increase in yield in this crop while planted in close spacings than other listed wide spacing. In fact, when spacing is wider and less number of female plants were planted aound a male, although it resulted in good vegetative growth. Still the resulted yield was low due to accomodation of less number of plants per unit area. This was the reason for getting lowest yield of 1.556 t/ha from P_1D_3 treatment inspite of all the good characters. On the other hand, although female flower setting/ plant is lowest in dense planted crop and the crop is with poor vigour still than high plant densities are able to overcome these problems due to accomodation of more number of plants per unit area, which gave highest per hectare yield. So it is adivisable to maximise the yield with planting in highest densities of 15 female plants around a male plant but a distance about 150 cm apart. Virtually no information is available regarding the male female plant density in relation to yield in this crop. However clsoe planting was considered to be most vital for maximising yield in other related

vegetables like cucumber (Eindhoven, 1978) and Melon (Nagy, 1978).

In conclusion, with increasing the distance of female plants from the male plant, there is an increase in the vine length, number of branches per plant and leaf number, more number of female flowers and yield. However 15 female plants planted 150 cm away from the male plant placed at the centre is the optimum density for providing sufficient pollen to get maximum yield in a unit area.

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GENETIC ARCHITECTURE OF SEED YIELD AND YIELD COMPONENTS IN LINSEED (*Linum usitatissimum* L.)**

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ABSTRACT

Genetic analysis of seed yield and five yield components as well as oil yield per plant through 10 X 10 diallel excluding reciprocal revealed that all the characters were governed by both additive as well as dominance gene effects, with preponderance of additive gene effect for days to flower; equal importance of both gene effects for days to maturity and with greater magnitude of dominance gene effect for plant height,seeds per capsule, 500 - seeds weight, seed yield per plant and oil yield per plant. Asymetrical distribution of increasing and decreasing alleles was noticed for all the traits except seeds per capsule, seed yield and oil yield. More number of dominant genes were present ($K_D/K_R > 1$) for days to flower, days to maturity and plant height. The population improvement through reciprocal recurrent selection or biparental mating is suggested for increasing seed and oil yield.

KEY WORDS: Genetic architecture, Population improvement, Diallel analysis, Additive, Dominance.

The break-through in boosting yield has not occurred in oilseed crops in general and linseed in particular. The information regarding nature of gene effects and relative magnitude of components of genetic variance is useful in the choice of appropriate and effective breeding methodology for improving seed yield. Though linseed is an important industrial crop, it is neglected by most of the breeders. Hence such information is very meagre for this crop. Therefore, the present investigation was undertaken to study the genetics of some important quantitative characters in linseed.

MATERIALS AND METHODS

Forty five one-way diallel crosses along with their 10 parents *viz.*, LC 1048, LCK 88062, LCK 88511, LW 28-9, LCK 8605, AKL 79, RLC 29, RLC 35, Chambal and Triveni were evaluated in randomized block design with three replications during Rabi 1994-95 at Plant Breeding Farm, Gujarat

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