

Effect of row spacing and sowing time on production potential of groundnut (*Arachis hypogaea*)

B. S. SANDHU¹ AND S. S. HUNDAL

Punjab Agricultural University, Ludhiana 141 004

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ABSTRACT

A field study was conducted with groundnut (*Arachis hypogaea* L.) cultivar 'M 13' to ascertain the effect of date of sowing and row spacing on the production potential over 4 consecutive seasons during 1985-1988. The crop was sown on 4 dates (fourth week of May, third week of June, first and third weeks of July) with 3 row spacings (20, 30 and 40 cm) in split-plot design with 4 replications. Sowing in third week of June gave significantly higher pod yield than that in the first week and third weeks of July except in 1985. Mean pod yield of 20.6 q/ha was obtained when the crop was sown in the third week of June which was 14.6, 31.0 and 49.5% higher than that of fourth week of May, first and third weeks of July sowing respectively. No significant differences among 20, 30, and 40 cm-row spacings were observed in pod yield for the 4 crop seasons, however, the closer row spacings tended to produce higher stalk yield. Non-significant interaction effect between dates of sowing and row spacing for pod yield suggested that by sowing the crop in wider rows of 40 cm compared to the currently practised spacing of 30 cm, a saving of about 25% on seed requirement can be achieved without any reduction in pod yield.

Groundnut (*Arachis hypogaea* L.) is a major crop among oilseeds grown during the rainy (*khari*) season in Punjab. Elite germplasm, optimum soil fertility and moisture adequacy are no doubt the prominent factors in increasing the yield, but agronomic management practices best suited to the region play a significant role in realization of potential yields. In groundnut cultivation, the agronomic management practices vary with the genotype. Therefore, the present study was undertaken to evaluate optimum row distance in conjunction with sowing time for 'M 13' groundnut, which is a spreading-type variety and has been recommended at the National level for its

cultivation.

MATERIALS AND METHODS

The field experiment was conducted during the rainy seasons of 1985-1988 at Ludhiana. The experimental soil was loamy sand in texture, low in organic carbon, nitrogen and phosphorus and medium in potassium. The treatments consisted of 3 or 4 dates of sowing (fourth week of May, third week of June, first week of July and third week of July), which were assigned to main plots and 3 row spacings of 20, 30, and 40 cm in subplots in split-plot design with 4 replications. Groundnut 'M 13', a spreading type of 135 days maturity period, was grown

Present address: ¹Regional Research Station, PAU, Bathinda 151 001

Table 1. Effect of sowing dates and row spacings (cm) on pod yield of groundnut during 4 crop seasons

Date of sowing*	Pod yield (q/ha) at row spacing (cm) during															
	1985				1986				1987				1988			
	20	30	40	Mean	20	30	40	Mean	20	30	40	Mean	20	30	40	Mean
IV week May					19.8	19.5	19.9	19.7	15.6	15.3	15.2	15.4				
III week June	20.0	19.5	19.7	19.7	27.2	26.6	26.7	26.8	17.3	17.2	17.5	17.3	18.7	18.5	18.5	18.6
I week July	20.0	23.5	21.9	23.1	10.1	10.3	10.5	10.3	8.7	8.5	8.4	8.5	14.0	13.7	14.3	14.0
III week July	19.1	18.2	18.1	18.5	5.8	6.0	6.0	5.9	8.3	8.3	8.2	8.3	9.2	9.0	8.0	8.7
Mean	21.0	20.4	19.9		15.7	15.6	15.8		12.5	12.3	12.3		14.0	13.7	13.6	
Mean (1985-1988)	15.8	15.6	15.6													
CD (P = 0.05)																
Date		1.8				3.6				2.9				4.2		
Spacing		NS				NS				NS				NS		
Date $\times$ spacing		NS				NS				NS				NS		

*21 June, 6 July, 20 July in 1985; 28 May, 16 June, 1 July, 17 July in 1986; 28 May, 16 June, 7 July, 21 July in 1987; and 16 June, 4 July, 21 July in 1988

Table 2. Effect of sowing dates and row spacings on stalk yield of groundnut during 4 crop seasons

Date of sowing	Stalk yield (q/ha) at row spacing															
	1985				1986				1987				1988			
	20	30	40	Mean	20	30	40	Mean	20	30	40	Mean	20	30	40	Mean
IV week May					67.1	64.6	37.0	62.9	55.4	49.2	44.6	49.7				
III week June	34.6	28.3	26.9	29.9	46.3	46.1	37.0	43.2	47.1	44.4	39.1	43.5	35.1	33.0	32.1	33.7
I week July	33.5	30.6	27.5	30.6	42.4	38.4	37.0	39.3	29.4	28.0	26.1	29.9	28.3	26.5	26.5	27.1
III week July	30.6	26.9	26.7	28.1	21.8	21.7	16.3		28.4	26.5	23.9	26.2	27.0	25.6	28.2	25.3
Mean	32.9	28.6	27.0		13.8	10.1	9.4		40.1	37.0	33.4		30.5	28.4	27.3	
Mean (1985-1988)	40.6	37.8	34.1													
CD (P = 0.05)																
Date		NS				4.1				7.7				4.5		
Spacing		2.8				4.4				1.7				NS		
Dates $\times$ spacing		NS				NS				3.3				3.2		

Dates of sowing as in Table 1

by the dibbling method each year, keeping a plant-to-plant spacing of 22.5 cm. Seed kernels were treated with fungicide Dithane M-45 @ 3 g/kg seed. The crop received 15 kg N, 20 kg P_2O_5 and 125 kg gypsum/ha at sowing time. One hand-weeding for the control of weeds and supplemental irrigations were given as per the crop requirement. Pod and stalk yields were obtained and compared over a period of 4 years. The final pod and stalk yields of groundnut were recorded after sun-drying for 8–10 days.

RESULTS AND DISCUSSION

Effect of row spacings

The pod yield averaged over dates of sowing did not differ with row spacing during the 4 crop seasons (Table 1). The mean pod yield (1985–88) of 4 years was 15.8, 15.6 and 15.5 q/ha for 20, 30, and 40 cm-row spacings respectively. Donga *et al.* (1990) also reported no differences in pod yield between 45 and 60 cm-row spacings for a spreading variety of groundnut ('GAUG 100') under Gujarat conditions. The average stalk yield for the 4 crop seasons as well as for the individual year (Table 2) was higher in 20 cm-row spacing and showed a progressive reduction with increase in row spacing, which may be due to excessive vegetative growth under closer row spacing.

Effect of sowing time

The crop sown during the third week of June gave significantly higher pod yield over the first and third weeks of July-sown crop, except in 1985 when the sowing during first week of July resulted in higher pod yield. The drastic reduction in pod yield in delayed sowing may be due to fall in temperature

during the pod-filling phase, thereby affecting the translocation of photosynthates from source to sink vis-a-vis the pod development. The early-sown crop in May resulted in excessive vegetative growth but lesser pod yield. The results confirm the finding of Khosa (1971). The mean pod yield (1985–88) of 4 crop seasons for third week of June sowing was 20.6 q/ha (Table 1), which was 14.6, 32.0 and 49.5% higher than the fourth week of May, first and third weeks of July sowings respectively. Garcha (1979) also observed that crop sown on 20 June gave significantly higher pod yield than that sown either on 4 July or 15 July both under irrigated and unirrigated conditions in Punjab.

Time of sowing × row spacing

The interaction effects between date of sowing and row spacing were non-significant for pod yield during the 4 seasons (Table 1). However, the interaction effects for stalk yield were significant in 2 (1987 and 1988) out of the 4 seasons (Table 2). The closer row spacing of 20 cm gave higher stalk yield than that under 30 and 40 cm-row spacings under different dates of sowing. The interaction effects reveal that row spacings tended to affect the vegetative growth without affecting the pod yield in different dates of sowing. In groundnut cultivation the seed is the costliest input which accounts for 35–47% of the total operating cost in crop production (Raoof, 1986). It was concluded that increase in the row spacing to 40 cm in 'M 13' groundnut from currently recommended row spacing of 30 cm, decreases 25% seed requirement without any reduction in pod yield. At prevailing market rate this saving amounts to about Rs 500/ha.

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