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Effect of dates of sowing on growth and yield of groundnut crop

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ABSTRACT

A field experiment was conducted to study the effect of dates of sowing on growth and yield of groundnut crop during the summer season taking five promising varieties of the region. Results revealed that the number of pods per plant, pod yield, kernel yield and leaf area index had significantly varied due to variation in dates of sowing. The maximum number of pods per plant and pod yield obtained when the crop was sown on 20th January. The kernel yield and leaf area index were maximum when the crop was sown on 5th February ; maximum leaf area index was recorded on 65th DAE which was significantly higher in comparison to 20th January or 20th February sown crop. The study suggests that under sub-tropical humid climate it is better to sow the groundnut crop within the first week of February.

Key words: Date of sowing, growth, groundnut and yield

Growth and yield of a crop depend on a number of factors; however, climate plays the most important role. Among the climatic parameters role of solar radiation, temperature, humidity, rainfall is very crucial. The oilseed crops, particularly groundnut are very sensitive to climatic parameters such as radiation and temperature. Kataria and Pandya (1995) reported that the December and January sown crops showed greater efficiency of partitioning of recent assimilates to the pods. The summer groundnut crop can be sown as early as possible in December/January to get higher yields. Reddy and Reddy (2001) reported that pod yield of groundnut was positively correlated with the total number of flower produced per plant, number of flowers per plant produced during the first four weeks, number of pegs and pods per plant and 100-kernel weight. The late sown crop mature earlier, resulting in a reduced pod number and 100-kernel weight. Reddy and Suresh (2000) reported that plant height and leaf area index (LAI) increased in the late sown crop, while dry matter accumulation at harvest was maximum when the crop was sown in January. The present investigation was taken to study the effect of climatic factors and to identify the suitable sowing date for better growth and yield of groundnut crop.

MATERIALS AND METHODS

The experiment was undertaken during summer season to study the performance of groundnut cultivars under different dates of sowing. The experiment was carried out at Instructional Farm (New Alluvial zone), Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal (situated at 22˚56' N latitude, 88˚32' E longitude and altitude of 9.75 m MSL). The experiment was laid out in a split-plot design, the dates of sowing (20th January, 5th February and 20th February) were allocated to the main plots and varieties (TG-51, ICGS-44, TAG-24, TMV-2, and AK 12-24) to the sub-plots. The number of treatment combinations were 15 and the treatments were replicated thrice the size of the plots was 4x3m. The schedule management practices were followed.

RESULTS AND DISCUSSION

Variation in the date of sowing usher the variation in climatic situation with in the crop canopy. Microclimatic variation thus introduced, has a remarkable effect on growth and yield of the crop. table 1 shows the absorption of PAR by groundnut cultivars. In case of 20th January sowing, the variety TMV-2 recorded maximum absorption on 35th and 50th DAE. On 80th DAE the PAR absorption by the variety TMV-2 was comparable with the other varieties. For the 5th February sowing, the variety TG-51 showed high absorption of PAR on 35th and 65th DAE, second maximum on 50th DAE *i.e.* during 35-65 DAE it showed a very good absorption of PAR. For the 20th February sowing, the variety ICGS-44 recorded a good amount of absorption of PAR on 35th, 50th, 65th and 80th DAE *i.e.* through out the growing period.

Leaf area index (LAI)

Table 2, shows the leaf area index in groundnut crop. During initial growth stage (35 DAE) the late sown crop recorded maximum LAI, when the crop was sown on 20th February, the LAI was 4.73 times higher than the LAI obtained in case of 20th January sown crop. This trend was continued up to 50 DAE although the extent of increase reduced to a great level. On 65th DAE the D_2 sown crop recorded the maximum LAI value which was significantly higher than the 20th January or 20th February sown crop. On 80th DAE the marginal increase in LAI was observed in case of 20th January and 20th February sown crop where as LAI was reduced in 5th February sown crop. Duncan *et. al.* (1978) reported that the LAI value in groundnut crop might reach more than 7.0. However, this was not conducive for a good yield since light interception appeared complete at about LAI value of 3.0.

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Table 1: Absorption of photosynthetic active radiation (PAR) within the groundnut canopy as affected by dates of sowing and cultivars

Treatments	Days after emergence							
	35		50		65		80	
	Incident ($w/m^{2)}$	Absorption (%)	Incident ($w/m^{2)}$	Absorption (%)	Incident ($w/m^{2)}$	Absorption (%)	Incident ($w/m^{2)}$	Absorption (%)
D_1V_1	180.0	80.9	140.0	84.0	160.0	82.5	170.0	92.7
D_1V_2	180.0	80.9	140.0	81.0	160.0	89.7	165.0	91.6
D_1V_3	180.0	79.2	140.0	81.2	160.0	86.4	150.0	91.8
D_1V_4	180.0	83.6	140.0	84.6	160.0	84.0	170.0	91.2
D_1V_5	180.0	81.8	146.7	81.7	170.0	88.5	170.0	92.6
D_2V_1	150.0	82.3	160.0	87.3	170.0	93.8	165.0	93.4
D_2V_2	150.0	79.2	160.0	84.4	160.0	93.6	170.0	88.2
D_2V_3	150.0	81.1	160.0	85.4	170.0	93.4	170.0	94.2
D_2V_4	150.0	81.5	160.0	87.7	170.0	92.3	170.0	94.5
D_2V_5	150.0	77.5	160.0	81.3	170.0	90.6	170.0	93.6
D_3V_1	160.0	83.3	80.0	77.3	185.0	93.5	180.0	76.5
D_3V_2	78.0	85.3	110.0	84.1	180.0	94.8	160.0	92.7
D_3V_3	69.0	78.5	170.0	86.5	180.0	93.3	170.0	95.1
D_3V_4	75.0	83.6	53.0	86.9	180.0	93.7	180.0	93.7
D_3V_5	150.0	82.1	52.0	83.1	180.0	93.3	170.0	93.7

D_1=20.01.07, D_2=05.02.07, D_3=20.02.07. V_1=TG 51, V_2=ICGS 44, V_3=TAG 24, V_4=TMV 2, V_5=AK 12-24.

Mc Cloud (1974) observed that on 64th DAE the LAI of groundnut might reach 3.0 and at maturity (137th days) it might reduced to a value of 1.7. Singh (2003) observed that in Sourashtra region of India the LAI of bunch varieties of groundnut might be 1.7 at 60 DAE and might be increased to 4.0 at 90 DAE. In the present study for 5th February sown crop maximum LAI was observed on 65th DAE which was 5.169; for 20th January and 5th February sown crop LAI increase was continued to 80 DAE and a maximum value of 2.86 and 4.67 were observed for 20th January and 20th February sown crop respectively. The reduction of LAI in 5th February sown crop on 80th DAE may be due to loss of leaf by pest attack.

Number of pods per plant

The 20th January sown crop recorded a significantly higher pod number per plant in comparison to 5th February and 20th February. Both the 5th February and 20th February sown crops recorded the similar values in case of number of pods per plant.

Pod yield

Maximum pod yield was recorded when the crop was sown on 20th January. The pod yield significantly varied due to the variation of dates of sowing. As the sowing dates were delayed by 30 days a reduction of 38.5% in pod yield was observed.

Kernel yield

The kernel yield was maximum when the crop was sown on 5th February. The kernel yield was adversely affected when the crop was sown on 20th February.

Test weight

The result shows that the delayed sown crop recorded lower test weight; however, there was no significant difference between 20th January and 5th February sown crop. Reduction in test weight for delayed sowing may be ? attributed to the lower rate of phloem transport for the deposition of photosynthate to the sink portion of the plant as the delayed sowing invites higher temperature, it also invites higher rate of photorespiration as a concomitant effect .

Shelling percentage

Maximum shelling percentage of groundnut was observed when the crop was sown on 5th February; delayed sown crop recorded the lowest shelling percentage indicating the low amount of kernel production in case of third sowing. Difference among the dates of sowing was significant.

Table 2 : Effect of dates of sowing and cultivars on the leaf area index in groundnut crop

Cultivars	35 DAE				50 DAE				65 DAE				80 DAE			
	DOS; (Days of the year)				DOS; (Days of the year)				DOS; (Days of the year)				DOS; (Days of the year)			
	20	36	51	Mean	20	36	51	Mean	20	36	51	Mean	20	36	51	Mean
TG-51	0.333	0.487	1.437	0.752	0.883	2.167	2.050	1.700	1.723	5.397	3.240	3.453	5.587	2.570	3.887	4.014
ICGS-44	0.253	0.597	1.837	0.896	0.777	1.327	1.960	1.354	3.580	4.840	7.473	5.298	2.573	3.520	4.533	3.542
TAG-24	0.313	0.487	0.740	0.513	0.670	1.390	1.037	1.032	1.523	4.390	3.570	3.161	2.343	3.113	1.960	2.472
TMV-2	0.297	0.793	1.540	0.877	0.880	1.523	1.740	1.381	0.490	5.380	5.140	3.670	2.607	3.323	7.210	4.380
AK-12 24	0.270	0.597	1.377	0.748	0.797	1.063	3.403	1.754	3.113	5.840	3.730	4.228	1.177	3.210	5.773	3.387
Mean	0.293	0.592	1.386		0.801	1.494	2.038		2.086	5.169	4.631		2.857	3.147	4.673	

	SEm (±)			LSD (0.05)		
	DOS	Cultivar	Interaction	DOS	Cultivar	Interaction
35 DAE	**0.023**	**0.044**	**0.076**	**0.067**	**0.128**	**0.222**
50 DAE	**0.119**	**0.118**	**0.204**	**0.347**	**0.344**	**0.595**
65 DAE	**0.152**	**0.361**	**0.625**	**0.444**	**1.054**	**1.824**
80 DAE	**0.176**	**0.266**	**0.461**	**0.514**	**0.776**	**1.346**

Table 3 : Effect of dates of sowing and cultivars on yield of groundnut crop

Cultivars	No. of pods per plant				Pod yield (q/ha)				Kernel yield (q/ha)			
	DOS; (Days of the year)				DOS; (Days of the year)				DOS; (Days of the year)			
	20	36	51	Mean	20	36	51	Mean	20	36	51	Mean
TG-51	35.0	25.7	21.7	27.4	52.17	42.92	26.92	40.67	21.67	27.95	14.55	21.39
ICGS-44	28.7	14.0	16.0	19.6	38.87	34.25	33.42	35.51	15.72	17.26	16.52	16.50
TAG-24	37.3	18.3	14.0	23.2	52.20	34.40	26.25	37.62	18.45	19.00	13.50	16.98
TMV-2	28.0	23.0	21.7	24.2	39.83	35.58	22.75	32.72	19.02	20.80	11.33	17.05
AK-12 24	36.7	20.3	24.3	27.1	42.83	31.42	29.58	34.61	17.27	18.67	15.67	17.20
Mean	33.1	20.3	19.5		45.18	35.72	27.78		18.42	20.73	14.32	

	DOS	Cultivar	Interaction	DOS	Cultivar	Interaction	DOS	Cultivar	Interaction
SEm (±)	**1.434**	**2.251**	**3.898**	**0.543**	**1.001**	**1.735**	**0.093**	**0.325**	**0.563**
LSD (0.05)	**4.186**	**6.570**	**11.378**	**1.586**	**2.923**	**5.063**	**0.271**	**0.949**	**1.644**

Table 4: Effect of dates of sowing and cultivars on yield components of groundnut crop

Cultivars	Test weight (g)				Shelling %				Sound mature kernel %			
	DOS; (Days of the year)				DOS; (Days of the year)				DOS; (Days of the year)			
	20	36	51	Mean	20	36	51	Mean	20	36	51	Mean
TG-51	38.13	57.50	54.63	50.09	71.19	79.27	68.80	73.09	93.93	93.27	92.30	93.17
ICGS-44	53.50	51.77	47.33	50.87	69.33	65.45	65.53	66.77	92.43	93.60	92.30	92.78
TAG-24	49.83	54.90	51.13	51.96	68.62	74.35	66.90	69.96	92.70	93.60	92.80	93.03
TMV-2	51.33	39.67	38.17	43.06	73.67	80.27	71.67	75.20	91.47	93.40	94.17	93.01
AK-12 24	57.00	43.40	41.33	47.24	68.33	70.92	66.37	68.54	91.83	93.40	93.40	92.88
Mean	49.46	49.45	46.52		70.23	74.05	67.85		92.47	93.45	92.99	
	DOS	**Culti var**	**Interaction**		**DOS**	**Culti var**	**Interaction**		**DOS**	**Culti var**	**Interaction**	
SEm (±)	**0.437**	**0.499**	**0.864**		**1.344**	**1.034**	**1.791**		**0.515**	**0.438**	**0.759**	
LSD(0.05)	**1.276**	**1.457**	**2.522**		**3.923**	**3.018**	**5.228**		**1.503**	**1.278**	**2.215**	

Sound mature kernel percentage

The sound mature kernel (SMK) percentage did not vary significantly due to the variation in dates of sowing. However, SMK percentage was higher when the crop was sown on 5th February.The experimental result revealed that the number of pods per plant, pod yield and kernel yield of groundnut had significantly varied due to variation in dates of sowing. The maximum number of pods per plant (33) and pod yield (45.18 q/ha) obtained when the crop was sown on 20th January. When the crop was sown on 5th February the pod yield significantly reduced to 35.72 q/ha. Further 15 days delay in sowing drastically reduced the pod yield to 27.78 q/ha. This may be attributed due to higher temperature and higher photorespiration in the delayed sown crop. The kernel yield (20.73 q/ha) was maximum when the crop was sown on 5th February. The leaf area index (LAI) of groundnut varied significantly due to variation in dates of sowing. The 5th February sown crop recorded maximum leaf area index (LAI) on 65th DAE in comparison to 20th January or 20th February sown crop. Therefore, it can be concluded that under tropical sub-humid climate it is better to sow the groundnut crop within the first week of February.

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