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Research Paper

Effect of fertilizer levels on growth parameters of sesamum (*Sesamum indicum* L.) cultivars

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ABSTRACT

The investigation was laid out in Factorial Randomized Block Design with twelve treatment combinations, formed due to four levels of fertilizer (0, 12.5 + 6, 25+12.5 and 37.5 + 18.5 N + p_20_5 kg/ha) , three varieties (Tapi (JLT-7), Phule Til-1and Hawari) and replicated three times. Amongst the three varieties studied, the mean values for height, spread of plant, number of functional leaves were more in the variety Phule Til-1 at 60 days. The total dry matter accumulation per plant, straw yield, straw to grain ratio were also more in Phule Til-1. the number of capsules and branches per plant, number of seeds per capsule, thousand grain weight, grain to empty capsule ratio and harvest index were significantly more in variety Tapi (JLT-7). The variety Tapi (JLT-7) produced significantly more grain yield also. The variety Hawari is early type and required less days for maturity as compared to the rest of the varieties. The growth attributes *viz*., plant height, spread, number of functional leaves and dry matter accumulation per plant were influenced by different fertilizer levels. The values were increased with every successive increased level of fertilizer and was maximum with 37.5 kg N+18.5 kg P_20_5 ha. The grain (9.93q/ha) yield obtained due to the application of 37.5 kg N+18.5kg P_20_5/ha was the highest and significantly more than the rest of the lower levels.

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Key words : Ferlitizer level, Growth parameters, Yield, Sesamum

INTRODUCTION

Sesamum is produced in Southern latitudes in developing countries as a crop of small holders. Sixty five countries in the world grow sesamum out of which 24 are in Asia, 21 in Africa, 15 in Central and South America and 5 in Europe. India is the world's major producer having one-third of the world's average and producer approximately a quarter of total global production. Other sesamum producing countries are China, Burma, Sudan, Mexico, Nigeria, Venezuela, (Ashri, 1981). Cultivation of oilseed crops is gaining momentum to bridge the gap of oilseed production in the country. Sesamum, though cultivated on a small scale, is of immense importance in industry and commerce. Sesamum seed is rich in oil and protein. It is also used as a component for the manufacture of soap and paints. Due to the synergistic effects, it is used in pyrethrun insecticides industry (Kinman and Martin, 1954). In Ayurveda, the seeds of sesamum are medicinally useful in diarrhea. The roots and seeds are used in the preparation of tonic for the hair. They enrich blood and are useful in snake bite, bleeding piles etc.

The production statistics of this crop is most discouraging at both national and state levels. The yield of this crop is low mainly due to its cultivation on marginal and sub-marginal soils with very little or no application of mannure and fertilizers. The other causes of low yield are the use of low yielding varieties and non-adoption of proper and improved agronomic practices. Gaur and Trehan (1974), Deora *et al.*(1975), Maiti *et al.*(1981) and Maiti and Jana (1985) reported that the application of nitrogen and phosphorus increased the yield of sesamum seeds significantly.The research finding emerged out in other regions may not meet the local needs of sesamum cultivation, especially in scarcity area due to its specific agro-climatic conditions. Secondly, the date on specific fertilizer application for sesamum varieties are not available under Rahuri conditions. Therefore, it was considered essential to tackle the problems like fertilizer management and to find out the suitable variety under Rahuri conditions.

MATERIALS AND METHODS

The experiment was laid out during *Kharif* at Instructional farm of Post Graduate Institute Mahatma Phule Agricultrual University, Rahur.The experimental field was fairly uniform and levelled. The sesamum varieties Tapi (JLT-7), Phule Til No.1, and Hawari were selected for the present investigation. Urea (46 % N) was used as a source of nitrogen, while phosphate was applied in the form of single super phosphate containing 16 per cent P_2O_5 .The experiment was laid out in Factorial Randomised Block Design with three replications. There were twelve treatment combinations due to 3 varieties and 4 levels of fertilizer (N+ P_2O_5). The gross plot size was 3.60 x 4.50 m^2 and the net plot size was 2.40 x 3.30 m^2. Various biometrics observations were recorded on the five randomly selected plants of sesamum from each net plot. Pegs were fixed near the selected plants and plants were also labelled for easy demarkation.

The initial and final plant counts were recorded by counting all plants in each net plot after the final thinning and at the harvest of the crop. The details regarding growth observations recorded as : The plant height was measured (in cm) from the ground level upto the tip of the stem. Observations were started on the 30 days from sowing and subsequently recorded at an interval of 15 days. Number of primary branches were recorded periodically. he green leaves and leaf dried less than half of its area were counted as functional leaves. A leaf which was dried to the extent of more than half of its area was excluded while counting the number of functional leaves. In order to study the dry matter accumulation, two plants other than observational plants were randomly selected at each sampling from each net plot. The plants were cut at the ground level and separated in to stem, leaves and reproductive parts. These plant parts were dried in air and then in oven at 60^0 C temperature till they attained a constant weight. The first sample was collected on 30 day after sowing the subsequent samples were collected at an interval of 15 days.

RESULTS AND DISCUSSION

The experimental results emerged from the trial to assess the response of sesamum varieties to varying levels of fertilizer in respect of growth and yield as affected by different treatments, under rainfed conditions are presented in this paper.

Growth studies:

Height of plant :

The data on periodical mean plant height as influenced by varieties and fertilizer levels are presented in Table 1. Data revealed that there was increase in mean height of plant as the crop age advanced upto the harvest. Mean height of sesamum was 8.68, 33.93, 66.47, 72.78 and 74.67 cm at 30, 45, 60, 75 days crop age and at harvest, respectively. This indicated that the increase in the plant height was comparatively slow during the early period of crop growth (upto 30 days), rapid during 30 to 60 days and thereafter slow towards maturity.

Table 1: Mean height of plant (cm) as affected by varieties and fertilizer levels

Treatments	Days after sowing				
	30	45	60	75	At harvest
Varieties					
Tapi (JLT-7)	7.79	34.32	69.64	77.48	80.07
Phule Til-1	8.97	35.42	75.40	81.41	84.68
Hawari	9.27	32.06	54.37	59.05	59.27
'F' test	Sigt.	Sigt.	Sigt.	Sigt.	Sigt.
S.E. ±	0.17	0.52	0.46	0.43	0.46
C.D. (P=0.05)	0.50	1.53	1.36	1.27	1.34
Fertilizer levels (N+ P_2O_5 kg/ha)					
0 + 0	7.40	27.73	60.68	63.73	65.66
12.5 + 6	8.72	31.49	64.14	69.27	71.43
25.0 + 12.5	9.12	36.29	68.62	75.47	77.42
37.5 + 18.5	9.46	40.21	72.44	82.66	84.20
'F' test	Sigt.	Sigt.	Sigt.	Sigt.	Sigt.
S.E. ±	0.20	0.60	0.54	0.50	0.53
C.D. (P=0.05)	0.58	1.77	1.57	1.46	1.54
Interaction					
'F' test	NS	NS	NS	NS	NS
S.E. +	0.34	1.04	0.93	0.86	0.91
General mean	8.68	33.93	66.47	72.78	74.67

Sigt. = Significant, NS = Non-significant

Effect of varieties :

The mean height of the plant significantly differed due to varieties under study at all the stages of crop growth. At 30 days crop age, the height of variety Hawari was significantly more than the other varieties and it was at par with Phule Til –1. Thereafter, from 45 days crop age till harvest variety Phule Til – 1 produced significantly more mean plant height than other varieties except that it was at par with Tapi at days.

Effect of fertilizer levels :

The mean plant height of sesamum was influenced significantly due to different fertilizer levels at all growth stages. The application of 37.5 kg N + 18.5 kg P_2O_5 /ha was significantly superior over other levels of fertilizer at

all the crop growth stages except that which was at par with application 25 kg N + 12.5 kg P_2O_5 /ha at 30days. The control treatment registered the lowest height at all growth stages.

Effect of interactions :

The periodical plant height of sesamum remained unaffected due to interaction effects of the factors under study.

Spread of Plant :

The data in Table 2 indicated that there was increased in mean spread per plant upto 60 days growth period reaching its maximum of 40.77 cm/plant, thereafter it declined

Table 2 : Mean spread of plant (cm) as affected by varieties and fertilizer levels

Treatments	Days after sowing			
	30	45	60	75
Varieties				
Tapi (JLT-7)	15.19	30.27	40.91	35.12
Phule Til-1	14.04	30.95	44.86	40.57
Hawari	13.05	27.37	36.53	24.94
'F' test	Sigt	Sigt	Sigt	Sigt
S.E. ±	0.41	0.66	0.52	0.51
C.D. (P=0.05)	1.21	1.95	1.54	1.50
Fertilizer levels(N+ P_2O_5 kg/ha)				
0 + 0	11.77	25.77	35.82	28.29
12.5 + 6	13.48	27.0	37.11	30.90
25.0 + 12.5	14.81	29.94	42.63	35.27
37.5 + 18.5	16.31	35.42	47.50	39.72
'F' test	Sigt	Sigt	Sigt	Sigt
S.E. ±	0.48	0.77	0.61	0.59
C.D. (P=0.05)	1.40	2.25	1.78	1.74
Interaction				
'F' test	N.S.	N.S.	N.S.	N.S.
S.E. ±	0.83	1.33	1.05	1.02
General mean	14.09	29.53	40.77	33.54

Sigt. = Significant, NS = Non-significant

Effect of varieties :

The mean plant spread of the sesamum varieties under study differed significantly at all the stages of crop age. At 30 days crop age, variety Tapi produced significantly more plant spread than varieties Phule Til-1and Hawari. Thereafter, from 45 to 75 days, variety Phule Til –1 produced significantly more spread per plant than other varieties except at 45 days which was at par with Tapi. The variety Hawari produced significantly less mean spread at all the growth stages than varieties Tapi and Phule Til –1.

Effect of fertilizer levels :

The mean plant spread of sesamum differed significantly due to different fertilizer levels throughout growing period. The application of 37.5 kg N + 18.5 kg P_2O_5 /ha was found to be significantly superior over the rest of treatments at all growth stages. The applications of 12.5 kg N+6 kg P_2O_5 /ha was at par with 25 kg N+12.5kg P_2O_5 /ha at 30 day and the same was also at par with control treatment at 45 to 60 days of crop age.

Effect of interactions :

The plant of spread of the sesamum did not differ significantly due to interaction effects of the factors under study at all the stages of crop age.

Number of functional leaves per plant :

The data on periodical mean number of functional leaves per plant as influenced by varieties and fertilizer levels are presented in Table 3.The data in Table3 indicated that there was increase in mean number of leaves per plant upto 60 days of crop age and thereafter decreased towards maturity due to sinescence. The mean leaf number increased from 6.88 at 30 day to 43.92 at 60 days of crop age.

Table 3 : Mean number of functional leaves per plant by varieties and fertilizer levels

Treatments	Days after sowing			
	30	45	60	75
Varieties				
Tapi (JLT-7)	6.85	22.56	43.57	27.30
Phule Til-1	6.72	20.67	46.62	30.78
Hawari	7.09	25.65	41.57	15.43
'F' test	N.S.	Sigt	Sigt	Sigt
S.E. ±	0.16	0.67	0.70	0.41
C.D. (P=0.05)	-	1.95	2.05	1.21
Fertilizer levels (N+ P_2O_5 kg/ha)				
0 + 0	6.31	18.33	37.52	18.27
12.5 + 6	6.79	20.46	40.69	21.20
25.0 + 12.5	7.02	24.32	46.60	26.47
37.5 + 18.5	7.42	28.73	50.87	32.07
'F' test	Sigt	Sigt	Sigt	Sigt
S.E. ±	0.18	0.77	0.81	0.48
C.D. (P=0.05)	0.53	2.26	2.37	1.40
Interaction				
'F' test	NS	NS	NS	NS
S.E. ±	0.31	1.33	1.40	0.83
General mean	6.88	22.96	43.92	24.50

Sigt. = Significant, NS = Non-significant

Effect of varieties :

The mean number of leaves per plant differed significantly due to varieties under study at all the stages of crop age except of 30 days. At 45 days, variety Hawari recorded significantly more number of leaves than other varieties which were at par with each other. At 60 and 75 days after sowing variety Phule Til-1 produced significantly more number of leaves per plant than those by Tapi and Hawari and the latter two were at par with each other.

Effect of fertilizer levels :

The data presented in Table 3 indicated that the mean number of leaves per plant significantly differed due to fertilizer levels from 30 day to 75 days of crop age. The application of 37.5 kg N +18.5 kg P_2O_5 /ha was significantly superior over rest of fertilizer levels at all growth stages except that it was at par with 25 kg N+12.5 kg P_2O_5 /ha at 30 days.

Effect of interactions :

The interaction effects between varieties and fertilizer levels were not significant at all the growth stages.

Number of branches :

The data on periodical mean number of branches per plant as influenced by varieties and fertilizer levels are presented in Table 4.

The data in Table 4 indicated that the number of branches per plant was increased from 2.59 at 45 days to 3.05 at 75 days. In general the number of branches per plant remained constant after 75 days of crop growth stage.

Effect of varieties :

The mean number of branches per plant of different varieties under study differed significantly. Variety Tapi produced significantly more number of branches than Phule Til-1 and Hawari at all growth stage except that it was at par with Phule Til-1 at 75 days.

Effect of fertilizer levels :

The mean number of branches per plant was influenced significantly due to different fertilizer levels. The mean number of branches increased significantly with successive increased level of fertilizer at all growth stages. The application of 37.5 kg N+18.5 kg P_2O_5 /ha produced significantly more number of branches over rest of fertilizer levels at all growth stages.

Effect of interactions :

Interactions effects on the mean number of branches per plant due to the factors under study were not significant all the stages of crop age.

Table 4 : Mean number of branches per plant as affected by varieties and fertilizer levels

Treatments	Days after sowing		
	45	60	75
Varieties			
Tapi (JLT-7)	2.89	3.25	3.25
PhuleTil-1	2.50	3.13	3.20
Hawari	2 .40	2.70	2.70
F test	Sigt	Sigt	Sigt
S.E.±	0.03	0.03	0.03
C.D. (P=0.05)	0.10	0.10	0.09
Fertilizer levels (N + P_2O_5 kg/ha)			
O + O	2.09	2.44	2.45
12.5 + 6	2.42	2.79	2.80
25.0+12.5	2.77	3.23	3.29
37.5 + 18.5	3.11	3.64	3.66
F test	Sigt	Sigt	Sigt
S.E.±	0.04	0.04	0.04
C.D. (P=0.05)	0.12	0.11	0.11
		Sigt	Sigt
		0.04	0.04
Interaction			
F test	NS	NS	NS
S.E. ±	0.07	0.07	0.06
General mean	2.59	3.02	3.05

Sigt. = Significant, NS = Non-significant

Number of capsules per plant :

The data pertaining the mean number of capsules per plant recorded at 45, 60, 75 days and at harvest as influenced by varieties and fertilizer levels are presented in Table 5. The data indicated that mean number of capsules was increased with the advancement in age of the crop and reached its maximum at harvest.

Effect of varieties :

The mean number of capsules per plant was influenced significantly due to sesamum varieties under study at all stages. Variety Tapi produced significantly more number of capsules per plant than varieties Phule Til-1 and Hawari throughout the growing season except at 45 days variety Hawari produced significantly more number of capsules than varieties Tapi and Phule Til-1. While, at 60 days varieties Phule Til-1 and Hawari were at par with each other.

Effect of fertilizer levels :

The mean number of capsules per plant was influenced significantly due to fertilizer levels. The

Table 5 : Mean number of capsules per plant by varieties and fertilizer levels

Treatments	Days after sowing			
	45	60	75	At harvest
Varieties				
Tapi (JLT-7)	2.83	19.78	31.53	33.51
Phule Til-1	1.71	16.39	25.38	31.08
Hawari	3.49	17.63	22.48	22.48
'F' test	Sigt	Sigt	Sigt	Sigt
S.E. ±	0.14	0.44	0.52	0.50
C.D. (P=0.05)	0.41	1.29	1.53	1.46
Fertilizer levels($N+ P_2O_5$ kg/ha)				
0 + 0	1.80	12.81	18.23	20.74
12.5 + 6	2.51	15.64	22.77	26.04
25.0 + 12.5	2.91	19.48	30.86	31.72
37.5 + 18.5	3.49	23.80	33.99	37.58
'F' test	Sigt	Sigt	Sigt	Sigt
S.E. ±	0.16	0.51	0.60	0.57
C.D. (P=0.05)	0.48	1.49	1.76	1.68
Interaction				
'F' test	NS	NS	NS	NS
S.E. ±	0.28	0.88	1.04	0.99
General mean	2.67	17.93	26.46	29.02

Sigt. = Significant, NS = Non-significant

Table 6 : Mean days required for 50 per cent flowering and maturity by varieties and fertilizer levels

Treatments	Days to 50% flowering	Maturity
Varieties		
Tapi (JLT-7)	37.50	90.40
Phule Til-1	40.92	96.58
Hawari	33.82	82.83
'F' test	Sigt	Sigt
S.E. ±	0.24	0.52
C.D. (P=0.05)	0.70	1.54
Fertilizer levels $N+ P_2O_5$ kg/ha)		
0 + 0	37.0	88.44
12.5 + 6	37.44	90.22
25.0 + 12.5	37.67	90.44
37.5 + 18.5	37.68	90.67
'F' test	NS	NS
S.E. ±	0.27	0.61
C.D. (P=0.05)	-	-
Interaction		
'F' test	NS	NS
S.E. ±	0.48	1.05
General mean	37.44	89.94

Sigt. = Significant, NS = Non-significant

differences in mean number of capsules per plant due to different levels of fertilizer tried, were significant at all the stages of crop growth and the same increased significantly with successive increased level of fertilizer. The values registered with application of 37.5 + 18.5 kg N+ P_2O_5/ ha were the highest and were significantly more than those registered in rest of the lower levels. They were 3.49, 23.80, 33.99 and 37.58 at 45, 60 and 75 days after sowing and at harvest, respectively.

Effect of interactions:

The effects of interactions between varieties and fertilizer levels were non-significant at all growth stages

Days required for 50 per cent flowering and maturity:

The data pertaining to the mean days required for 50 per cent flowering and maturity are presented in Table 6. It could be seen that the mean days required for 50 per cent flowering and maturity were 37.44 and 89.94, respectively.

Effect of varieties :

The data in Table 6 indicated that the variety Phule Til-1 required significantly more days for 50 per cent. Flowering and maturity than rest of the varieties. The varieties Hawari and Tapi required significantly less days to 50 per cent flowering and maturity.

Effect of fertilizer levels :

It was observed from the data in Table 6 that the differences in 50 per cent flowering and maturity due to application of fertilizers were not significant.

Effect of interactions :

The interaction effects due to factors under study were not significant on days required for 50 per cent flowering and maturity.

Yield studies :

The data pertaining to grain yield as influenced by varieties and fertilizer levels are presented in Table 7 .The data in Table 7 indicated that mean grain yield and straw yield of sesamum was 7.97 and 15.33 q/ha, respectively.

Effect of varieties :

The per hactare grain yield differed significantly due to varieties under study. Variety Tapi (JLT-7) produced significantly more grain yield (9.55q/ha) than Hawari (5.24q/ha) but was at par with Phule Til-1 (9.13 q/ha).

Effect of fertilizer levels :

The grain yield per hectare of sesamum was

Table 7 : Mean grain, straw yield of sesamum (q/ha) by varieties and fertilizer level

Treatments	Grain yield (q/ha)	Straw yield (q/ha)
Varieties		
Tapi (JLT-7)	9.55	16.61
Phule Til-1	9.13	19.32
Hawari	5.24	10.06
'F' test	Sigt	Sigt
S.E. ±	0.24	0.41
C.D. (P=0.05)	0.71	1.20
Fertilier levels (N+ P_2O_5 kg/ha)		
0 + 0	6.03	9.90
12.5 + 6	7.30	13.46
25.0 + 12.5	8.64	16.98
37.5 + 18.5	9.93	20.97
'F' test	Sigt	Sigt
S.E. ±	0.28	0.47
C.D. (P=0.05)	0.82	1.38
Interaction		
'F' test	NS	NS
S.E. ±	0.48	0.82
General mean	7.97	15.33

Sigt. = Significant, NS = Non-significant

significantly affected due to fertilizer levels. The grain yield (q/ha) increased significantly with every successive increased level of fertilizer and was the highest (9.93 q/ha) with 37.5 kg N+18.5 kg P_2O_5/ha.

Effect of interactions :

The grain yield of sesamum remained unaffected due to interaction effects of varieties and fertilizer levels.

The plant height increased from 8.68 cm at 30 days to 74.67 cm at harvest. However,the plant height gradully increased at initial stage upto 30 days and rate of increase was maximum during 30 to 60 days of crop age indicating that the period from 30 to 60 days from sowing was the grand growth period of the crop.

The spread of plant was 14.09 cm at 30 day crop age of reached its maximum of 40.77 cm at 60 days, while the maximum growth rate of functional leaves per plant was noticed during 30 to 60 days of crop age, thereafter, the number of functional leaves and spread reduced due to drying and shedding of leaves. The number of branches per plant increased from 2.59 at 45 days to 3.05at 75 days, thereafter it remained constant.

Effect of varieties:

The performance of the varieties can be judged by different growth attributed *viz*., height, spread, number of leaves, branches, dry matter production etc. The data on the height of plant indicate that variety Phule Til-1 gave maximum height of plant (84.68 cm) throughput the growth period except at 30 day, variety Hawari gave more height than rest of the varieties. The spread of plant was more in variety Tapi (JLT-7) at initial stage (30 day) than rest of varieties, while at advanced stage of crop growth variety Phule Til-1 put at significantly more plant spread than rest of varieties. However, the number of leaves was maximum in variety Hawari upto 45 days while at 60 days crop age variety Phule Til-1 took over and put on significantly more number of leaves than the rest of varieties. After this period, there was decline in leaf number in all the varieties in general, this was mainly due to shedding of leaves after 60 days growth stage. This is in conformity with results reported by Kharde (1981) and Suryavanshi (1988). Similarly, maximum number of branches (3.05) was observed in the variety Tapi and was at par with Phule Til-1 at 75 days. Similar varietal variation which is important yield attributes of sesamum was also reported by Raj and Gupta (1976).

The flowering in plant indicates the physiological shifts to reproduction phase. Variety Phule Til-1 required significantly more days for 50 per cent flowering and maturity followed by Tapi, while the lowest days required by the variety Hawari indicating that the variety Phule Til-1 was late variety, Tapi was an intermediate while Hawari was the early variety. Such differences in maturity amongst the varieties were also reported by Satyanarayana and Reddy (1978), Narayanan and Narayan (1987) .

The resultant performance of the variety can only be well judged from the yield obtained. It was observed that Tapi produced significantly more grain yield (9.55 q/ha) than rest of varieties but was at par with Phule Til-1, while straw yield produced by variety Phule Til-1 was the highest and significantly more than Tapi and Hawari. The lowest straw yield was observed in variety Hawari, cause of higher straw yield in Phule Til-1 might be attributed to more plant height and vegetative growth. As regards the straw to grain ratio the variety Phule Til-1 exhibited significantly wider ratio, followed by Hawari (1.87). This indicated that the cultivars Tapi and Hawari were more efficient in converting biological yield into economical yield when compared to Phule Til-1. Such variability in performance of varieties due to the differences in harvest indices amongst them were also reported by Saha and Bhargav (1980), Kharde (1981) and Suryavanshi (1988).

Effect of fertilizer levels:

The effects of combined nitrogen and phosphate

levels on plant growth were assessed by the expression of growth attributes *viz*., plant height, plant spread, number of branches, dry matter accumulation, etc. Amongst different fertilizer levels applied, there was an increase in the plant height with increase in the fertilizer dose throughout the crop growth. The application of 37.5 kg N+18.5 kg P_2O_5//ha increased the mean plant height (84.20 cm) significantly over all other fertilizer levels. The increase in plant height with increase in the levels of nitrogen was also reported by several workers, Raj *et al.* (1971), Kadam (1987), Rao *et al.* (1990) and Sinharoy *et al.* (1990). Similarly, the aplication of 37.5 kg N+18.5 kg P_2O_5/ha produced significantly maximum mean number of functional leaves (50.87) and spread of plant (47.50cm) at 60 days than rest of fertilizer levels, thereafter, number of leaves and spread of plant reduced due to leaf drying and shedding, while studying the effect of fertilizer levels on mean number of branches per plant, it was observed that the application of 37.5 kg N+18.5 kg p20_5/ha produced maximum number of branches (3.66) per plant than rest of levels tried.

The number of days required for 50 per cent flowering and for maturity were not much influenced by the levels of fertilizer, However, in general, the time required for 50 per cent flowering and maturity were increased with increase in fertilizer levels.The number of capsules per plant significantly increased with application of 37.5 kg N+18.5 kg P_2O_5//ha than rest of fertilizers levels at all crop growth stages and it was maximum (37.58) at harvest. Similarly, Rao *et al.* (1990) also observed that the application of nitrogen and phosphorus increased the number of capsules per plant.

The grain yield is considered as the important component to judge the effectiveness of fertilizers. The grain yield increased significantly with each successive increased levels of fertilizer and the application of 37.5 kg N+18.5 kg P_2O_5/ha produced significantly more and the highest grain yield (9.93 q/ha) and straw yield (20.97 q/ha) of sesamum crop. Similar favourable responses of fertilizer application on sesamum yield under rainfed conditions was also reported by Anand Rao and Yaseen (1980). The increase in grain yield of sesamum with fertilizer application was mainly due to increased expression of important yield components *viz*., number of capsules per plant, test weight and weight of grains per plant at higher level of fertilizer dose.

Effect of interactions:

The interaction effects of the factors did not reach the level of significance in respect of growth and yield attributes. This clearly indicated that these factors behaved independently.

Summary and Conclusion:

Some of the important findings emerged from the investigation are summarised below:

Effect of varieties :

The growth of the varieties can be assessed by considering expressions of the parameters like height and spread of plant, etc. The maximum height, spread and number of leaves were recorded in variety Phule Til-1. Similarly, the total dry matter accumulation per plant at harvest was also maximum in Phule Til-1, However, its conversion to produce grain production was comparatively low than the varieties Tapi and Hawari due to more vegetative growth, while the days required for 50 per cent flowering and maturity were also more in Phule Til-1 followed by Tapi and Hawari. Due to expression of these characters this variety produced significantly more grain yield.

Effect of fertilizer levels :

All of the growth contributing characters such as height, spread, number of functional leaves, number of branches, dry matter accumulation per plant and yield contributing characters such as number of capsule per plant and grain yield were significantly influenced by fertilizer levels. Every increased dose of combined nitrogen and phosphate had increased the values of these characters. Grain and straw yields were more with application of 37.5 kg N+ 18.5 kg P_2O_5 ./ha. (the highest level tried).

Effect of interaction:

Interaction effects due to different treatment combination on expression of growth, yield contributing characters, grain yield were not significant.

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LITERATURE CITED

Ananda Rao, M. and Yaseen, M. (1980). Effect of different levels of nitrogen, phosphorus and potassium on sesamum (*Sesamum indicum* L.). *Andhra Agric. J.,* **27**.

Ashri, A. (1981). Sesamum status and improvement. Proc.of Expert Consultation, Rome, Italy. 8-12 December, 1980. F.A.O. Plant production and Protection papers. 29: 198. I.S.B.N. 92: 510-1122.

Deora, N.S., Khan,I.A. and Hashmi (1975). A note on response of different levels of nitrogen and phosphorus under different methods of sowing on the seed yield of Til in Western Rajasthan. *Oilseeds J.,* **5**(3):13.

Gaur, B.L. and Trehan, K.B. (1974). Effect of spacing and fertilization on yield if rainfed sesamum. *Indian J. Agron.,* **19** (3) : 217-219.

Kadam,W.G. (1987). Effect of row spacing and nitrogen levels on growth, yield and quality of sesamum varieties. M.Sc. (Ag.) Thesis, Marathwada Agricultura University, Parbhani (M.S.).

Kharde, B.K. (1981). Physiological analysis of growth and differences in yield of sesamum (*Seasmum indicum* L) M.Sc. (Ag.) Thesis, Mahatma Phule Agricultural University, Rahuri (M.S.).

Kinman, M.L. and Martin, J.A. (1954). Present status of sesamum in the United States. *Agron. J.*, **46**:24-27.

Maiti, D and Jana, P.K. (1985). Effect of different levels of nitrogen and phosphorus on yield and yield attributes of sesame. *J. Oil Seeds Res.,* **2**(20) :252-259.

Maiti, S., Majhi, S.K., Roy, A.K.S.and Chrtterjee, B.N. (1981). Effect of nitrogen, phosphorus and potassium on sesamum cultivars under West Bengal conditions. *Food Fmg. & Agril.*, **14**(1&2):6-10.

Narayan, V. and Narayanan, A. (1987). Yield variations caused by cultivar, season and population density of *Sesamum indicum* L. *J. Oil seeds Res.,* **4**:19-27.

Rao, K.L., Raju.,D.V.N. and Rao, C.P. (1990). Response of sesamum (*Sesamum indicum* L.) to nitrogen and phosphrous under rainfed conditions. *J. Oilseeds Res.,* **7** : 117-120.

Saha, S.N. and Bhargava, S.C. (1980). Physiological analysis of the growth, development and yield of oil seed sesame. *J. Agric.Sci.,* **95**(3):733-736.

Satyanarayana, V. and Reddy, Sankara, G.H. (1978). Effect of plant density, nitrogen and potassium on the yield of two gingelly (*Sesamum indicum* L.) varieties. *Andhra Agric. J.*, **25**(3&4): 134-142.

Sinharoy, A., Samui, R.C., Ahasan, A.K. mm and Roy, B. (1990). Effect of different sources and levels on N on yield attributes and yield of sesame varieties. *Environ. & Ecol.,* **B**(1A):221-215.

Suryavanshi, G.B. (1988). Studies on the comparative performance of different Sesamum varieties to dates of sowing in relation to growth and yield. M.Sc.(Ag.) Thesis, Mahatma Phule Agricultural University, Rahuri (M.S.).

Tilak Raj, Sharama, B.M. and Prasad , M. (1971). Effect of sowing dates, nitrogen levels and spacing on the performance of rainfed Sesamum (*Sesamum indicum* L.) *Indian J.Agron.,* **16**(2):252-54.

Tilak Raj and Gupta (1976). Coefficient analysis of seed in Sesamum. *Oilseed J.,* **6**(1): 27-29.

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