INFLUENCE OF DIFFERENT SOWING TIMES AND NUTRIENT MANAGEMENT ON GROWTHAND YIELD OF SUMMER SESAME (*Sesamum indicum* L.)

ABSTRACT

A field experiment was conducted during the summer season of 2019 at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari to study the "**INFLUENCE OF DIFFERENT SOWING TIMES AND NUTRIENT MANAGEMENT ON GROWTHAND YIELD OF SUMMER SESAME (*Sesamum indicum* L.).**"The experiment was laid out in split plot designit included three sowing dates *viz*.D_1:2nd week of February, D_2:4th week of February,D_3:2nd week of Marchas main plot as well as five nutrient management practices, including N_1:100% RDN, N_2:100% RDN + Sap (1%), N_3:75% RDN + Sap (1%), N_4:100% RDN + Urea (1%) , N_5:75% RDN + Urea (1%) as sub plot and replicated in four times. The results of this study showed that sesame sown on second week of march recorded higher growth parameters, *viz*, plant height (cm), dry matter accumulation (g/plant) as well as seed yield,stalk yield and harvest index while remaining noticeably on par with 4thweek of February. Among the nutrient management treatments, the significantly improved the growth parameters like plant height (cm), dry accumulation (g/plant)and yield of stalk was observed with crop fertilize 100% RDN along with Urea spray 1% which was statistically at par with 100% RDN and Sap spray 1%. Highest seed yield was recorded when the application of 100% RDN with Urea spray 1%.

Key words:- Sesame, Date of sowing, Nutrient management, Growth, yield

1. Introduction

Sesame is an importatant and ancient oil-yielding crop. It belongs to order Tubiflorae and family pedaliaceae. Sesame oil with 85 percent unsaturated fatty acid is highly stable and has reducing effect on cholesterol and prevents coronary heart disease. Hence, sesame is called as the " The queen of the oil seed crop " by virtue of its excellent quality and utility.It is also used in medicines and pharmaceuticals industries, bio-diesel, pet foods and component of many other products.For synchronizing different stages of plant growth with environmental conditions, the appropriate sowing date is considered one of the most important determining factors for obtaining optimum yield Determining the optimum time of sowing, which in turn improves unit land area utilization and selecting a cultivar with a high average yield is a major factor in ensuring a profitable return of sesame. Sesame can be cultivated in sub-optimal conditions, mainly during February to May in summer. Nitrogen is the most important nutrient for plant growth and is the most limiting nutrients in soil. It is the important constitute of chlorophyll and protein and implies dark green colour to the plants, promotes vegetative growth and rapid early growth. It plays pivotal role in quantitative as well as qualitative important in the productivity of oilseeds. The deficiency of nitrogen leads to synthesis of anthocyanin, which gives different types of colouration and young fruits tend to drop prematurely.The enriched banana pseudostem sap (EBPS) is the value added product prepare from the pseudostem, about 15 to 20 thousand liters of sap can be extracted from one hectare psedostem. The EBPS contains several major and

micro nutrients, plant growth regulators and this mixture is inoculated with different microbes like, *Rhizobium*, *Azatobacter etc*., which play an important role in enhancing the crop yield.

2. Methodology

A field experiment was undertaken at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during summer season of 2019. The soil of experimental site was low in available nitrogen (163.07 kg/ha), medium in available phosphorus (29.94 kg/ha) high in available potassium (435.56 kg/ha) and clayey in texture. The soil was slightly alkaline in reaction with normal electrical conductivity. The experiment was laid in split plot design with four replication where as main plots were assigned to three sowing dates viz., D_1: 2nd week of February, D_2: 4th week of February and D_3: 2nd week of March and sub plots to five nutrient management practices viz., N_1: 100 % RDN, N_2: 100% RDN + Sap (1%), N_3: 75% RDN + Sap (1%), N_4: 100% RDN + Urea (1%) and N_5: 75% RDN + Urea (1%). Sesame variety Guj. Til-5 seeds were sown at 45cm x 15cm spacing. Prior to sowing, the seeds were treated with liquid bio fertilizer *viz*., *Azospirillum*10 ml/kg of seed. Half dose of nitrogen as per treatment, full dose of phosphorus and sulphur were applied as basal just prior to sowing in the form of Urea and SSP. The remaining half dose of nitrogen as per treatment was applied in the form of urea at 30 days after each date of sowing. Two foliar spray of one percent banana pseudostem sap and urea (46 % N) were spraying on crop at branching and flowering stage as per treatments. The weeds were managed by pre-emegence application of pendimethalin 30 EC herbicide applied after sowing on the same day. One hand weeding and interculturing was carried out during the early crop growth stages. The growth parameters were recorded at 30,45, 60 DAS and at harvest whereas the yield attributing and yield parameters were recorded at harvest. Data on different aspects of sesame crop were subjected to statistical analysis as per the procedure of Split Plot Design (Panse and Sukhatme, 1985).

3. Results and discussion

3.1Effect of date of sowing and nutrient management on growth parameters of sesame

3.1.1 Plant height

The data revealed (Table 1) that as the significantly greater plant height of pearl millet was recorded in 2nd week of March sown crop at 30,45, 60 DAS and at harvest but found at par with 4th week of February. The increase in the plant height with sowing on second week of March is quite obvious, because crop obtained optimum environment for growth. It may also be attributed to rise in temperature after germination of the crop, which enhanced the rate of growth and development and more growing degree days received during crop growth period. However, cold spell in early sowing of crop affected the plant height adversely. The differences in vegetative growth in terms of plant height due to sowing dates had also been reported by Chongdar*et al*. (2015) and Salem (2016).

With regard to nutrient management practices, application 100% RDN + Urea (1%) recorded higher plant height at 30,45, 60 DAS and at harvest, which was statistically at par with 100% RDN + Sap (1%) (N_2) and 75% RDN + Sap (1%) (N_3). Nitrogen promotes the vegetative growth thus, leading to significant increase in plant height. This might be due to nitrogen application had lead to effective absorption and translocation of nutrients and resulted in production of more number of new nodes. Better translocation of photosynthates from source to

sink due to adequate supply of nutrients to the crop led to improvement of growth characteristics. The findings are in close conformity with the results of Singhal *et al*. (2015), Vani *et al.* (2017) and Gujjar *et al*. (2018).

3.1.2 Dry matter accumulation

Second week of March (D_3) coupled with favorable climate conditions, especially temperature, humidity which produced higher dry matter at 30, 45, 60 DAS and at harvest but, found at par with sowing at fourth week of February (D_2).The results are close conformity with those of Ghosh (2000) and Chongdar*et al*. (2015).

Application of 100% RDN + 1% Urea (N_4) produced significantly higher dry matter accumulation but, it was remained at par with application of 100% RDN + 1% Sap (N_2) at 30, 45, 60 DAS and at harvest, 75% RDN + Urea (1%) (N_5). The foliar application of 1% urea or sap twice at branching and flowering stages along with 75 % RDN produced almost comparable growth attributes to those produced by soil application of 100 % RDN only. Thus, it is evident that, foliar application of urea or sap enhanced growth attributes of crop more efficiently than application of full quantity to the soil. Improvement in growth with better nutrient management that favourably modified the plant architecture and consequently dry matter accumulation showed significant positive correction. The results of present studies corroborate with the findings of Ahirwar*et al*. (2017) and Vani *et al.* (2017).

Table 1: Effect of date of sowing and nutrient management on growth parameter of Sesame

Treatments	Plant height (cm)				Dry matter accumulation (g/plant)			
	30 DAS	45 DAS	60 DAS	At harvest	30 DAS	45 DAS	60 DAS	At harvest
Date of sowing (D)								
D_1: 2nd week of February	27.69	67.39	86.36	94.72	1.69	8.63	13.56	15.16
D_2: 4th week of February	30.09	73.21	94.23	102.86	1.75	10.28	14.94	17.41
D_3: 2nd week of March	31.48	73.95	98.21	107.67	1.81	10.85	15.71	18.36
S.Em.±	0.41	1.11	1.55	1.47	0.20	0.17	0.23	0.40
C.D. at 5 %	1.41	3.83	5.38	5.13	0.07	0.59	0.8	1.38
Nutrient management (N)								
N_1: 100 % RDN	28.73	68.19	87.69	96.22	1.68	8.75	13.53	15.33
N_2: 100% RDN + Sap (1%)	30.34	72.74	94.21	105.13	1.79	10.84	15.63	18.03
N_3: 75% RDN + Sap (1%)	29.44	70.65	91.61	98.84	1.73	9.40	14.22	16.08
N_4: 100% RDN + Urea (1%)	30.64	74.27	98.10	107.60	1.80	10.90	15.73	18.46
N_5: 75% RDN + Urea (1%)	29.61	71.72	93.06	100.99	1.75	9.68	14.57	16.98
S.Em.±	0.45	1.04	1.38	1.53	0.026	0.20	0.27	0.40
C.D. at 5 %	1.30	3.00	3.95	4.39	0.07	0.58	0.77	1.16

3.2Effect of date of sowing and nutrient management on yield of sesame

3.2.1 Seed and stalk yield

On the basis of data presented (Table 2), crop sown on 2nd week of March (D_3) found significantly higher seed yield of sesame (778 kg/ha) and stalk yield (1933 kg/ha). The trends found in order of significance of seed and stalk yield was $D_3 \geq D_2 > D_1$. Favorable climatic conditions, harnessing of more solar radiation as evidenced through higher dry matter production and higher values for all the yield contributing traits which in turn has increased the seed yield. The increased vegetative growth results in higher biomass dry matter production, seed and straw yields as explained above again led to significant increase in biological yield. This result is in line with findings of Chongdar*et al*. (2015), Salem (2016) and Shubha *etal*. (2017).

Among nutrient management practices, significantly the highest seed yield (791 kg/ha) was recorded when crop fertilized with 100% RDN + 1% Urea (N_4) than other treatments. The trends found in order of significance of seed yield was $N_4 > N_2 > N_5 > N_3 > N_1$.Higher availability of nutrients throughout the crop growth, it led to the increased growth and yield attributes resulting in favourable environment for vegetative as well as reproductive crop growth from initial growth stage to harvest, thus enabling the crop for maximum utilization of nutrients, moisture, light and space, which ultimately led to higher seed and stalk yields of sesame. Similar results were obtained by Singhal *et al*. (2015), Mahajan *et al*. (2016), Vani *et al*. (2017) and Gujjar *et al*. (2018)

Time of sowing and nutrient management failed to exert any significant influence on the harvest index. Similar findings were reported by Chongdar, *et al*. (2015) and Lakhran*et al*. (2015).

Table 2: Effect of date of sowing and nutrient management on yield attributes and yield of sesame

Treatments	Seedyield (kg/ha)	Stalk yield (kg/ha)	Harvest index (%)
Date of sowing (D)			
D_1:2nd week of February	638	1766	26.62
D_2:4th week of February	750	1864	28.55
D_3:2nd week of March	778	1933	28.66
S.Em.±	17	35	0.73
C.D. at 5 %	59	120	NS
Nutrient management (N)			
N_1: 100 % RDN	673	1768	27.25
N_2:100% RDN+Sap (1%)	752	1938	27.93
N_3:75% RDN + Sap (1%)	694	1805	27.81

N_4:100% RDN + Urea (1%)	791	1943	28.89
N_5:75% RDN+Urea (1%)	699	1817	27.83
S.Em.±	13	42	0.65
C.D. at 5 %	38	121	NS

3.4Interaction effect of date of sowing and nutrient management on seed yield

Interaction Date of sowing and nutrient management practices showed a Significant variation with respect to seed yield of sesame (Table 3). Significantly higher seed yield (884 kg/ha) was recorded under the treatment combination D_3N_4 (sowing on 2nd week of March + 100% RDN + 1% Urea), but found at par with treatment combination D_3N_2 (858 kg/ha) and D_2N_4 (820 kg/ha). Significantly the lowest seed yield (611 kg/ha) was registered under treatment combination D_1N_1 (sowing on 2nd week of February + 100% RDN). The higher seed yield with respect to these treatments combinations was might be due to variation in temperature and humidity within crop canopy during the crop growth period. Secondly, nutrient management coupled with increased net photosynthesis on the one hand and greater mobilization of photosynthates towards the reproductive organ on the other hand under optimum sowing date. The enhanced seed yield due to optimum environment had also been reported by Lakhran*et al*. (2015), Shubha *et al*. (2017) and Ozturk *et al*. (2017).

Table 3: Seed yield as influenced by interaction of sowing dates and nutrient management

Seed yield (kg/ha)			
Treatments	D_1	D_2	D_3
N_1	611	709	700
N_2	638	761	858
N_3	629	738	716
N_4	670	820	884
N_5	641	723	731
S.Em.±	23		
C.D. at 5 %	66		

4. Conclusion

It was concluded that the sesame crop sown during fourth week of February to second week of March along with 100% RDN +1% spray of either urea or Novel banana pseudo stem sap (at branching and flowering) increased the growth and yield of summer sesame.

5. References

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