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**GB Raut**

Department of Agriculture  
 Meteorology, VNMKV,  
 Parbhani, Maharashtra, India

**PK Waghmare**

Assistant Professor, Department  
 of Agronomy, VNMKV,  
 Parbhani, Maharashtra, India

**SV Shingne**

Department of Agriculture  
 Meteorology, VNMKV,  
 Parbhani, Maharashtra, India

**YE Kadam**

Department of Agriculture  
 Meteorology, VNMKV,  
 Parbhani, Maharashtra, India

**Corresponding Author:****GB Raut**

Department of Agriculture  
 Meteorology, VNMKV,  
 Parbhani, Maharashtra, India

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# Studies on relationship between crop growth and yield of sesame (*Sesamum indicum* L.) under different weather conditions

**GB Raut, PK Waghmare, SV Shingne and YE Kadam**

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**Abstract**

An experiment was conducted on experimental farm Department of Agronomy, College of Agriculture, Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani, during *kharif* season 2017, entitled "Studies on relationship between crop growth, yield and physical environment within the crop canopy of Sesame (*Sesamum indicum* L.) under different weather conditions". An experiment was conducted in randomized block design with six replications. Treatment under study were four sowing dates in *kharif* season i.e. D<sub>1</sub> (23<sup>rd</sup> MW), D<sub>2</sub> (25<sup>th</sup> MW), D<sub>3</sub> (27<sup>th</sup> MW) and D<sub>4</sub> (29<sup>th</sup> MW), and one variety AKT-64. The results found that all the biometric observations (plant height, No. of leaves, No. of branches and dry matter, days to 50% flowering and days to capsule formation, yield contributing characters such as total number of capsules plant<sup>-1</sup>, seed yield (kg/ ha<sup>-1</sup>), straw yield (kg/ ha<sup>-1</sup>) and biological yield (kg/ ha<sup>-1</sup>),) were significantly highest yield in sown in D<sub>2</sub> (25<sup>th</sup> MW) followed by D<sub>1</sub> (23<sup>rd</sup> MW). Sowing at D<sub>2</sub> (25<sup>th</sup> MW) found superior over the rest of treatments with production of highest grain yield (440.8 kg/ha<sup>-1</sup>) followed by sowing in first sowing date D<sub>1</sub> (23<sup>rd</sup> MW) (386.3 kg/ha<sup>-1</sup>), third sowing date D<sub>3</sub> (27<sup>th</sup> MW) (317.8 kg/ha<sup>-1</sup>) and lowest grain yield was observed in fourth sowing D<sub>4</sub> (29<sup>th</sup> MW) (237.2 kg/ha<sup>-1</sup>).

**Keywords:** Sesame, sowing dates, weather parameters and sesame yield

**Introduction**

Sesame (*Sesamum indicum* L.) belongs to the family Pedaliaceae and is one of the most ancient oilseed crop used in cooking. The crop has origins in East Africa and India. It is also known as Benniseed, Ginegelly, Simsim, Ajonjoli, sesame and til. It was major oilseed crop in the ancient world due to its easiness of extraction, great stability and resistance to drought. Sesame crop cultivated throughout the year. Crop also cultivated either as a pure stand or as a mixed crop with aus rice, jute, groundnut, millets and sugarcane (Bedigian *et al*, 2003) [3]. Sesame is basically considered a crop of warm region of tropics and subtropics. It requires fairly hot condition during growth to produce maximum yield. A temperature of 25-27 °C encourage rapid germination, initial growth and flower formation. It can be cultivated in *kharif* and *rabi* season. It is capable of withstanding a higher degree of water stress than many other cultivated plants. Sesame requires the optimum temperature during its life cycle is 25-35 °C. If the temperature is more than 45 °C with hot winds the oil content reduces. If the temperature goes beyond 45 °C or less than 15 °C there is a severe reduction in yield. The seedling stage, however is extremely susceptible to moisture shortage. It will produce an excellent crop with a rainfall of 500-650 mm Ranganatha (2013) [8]. Sesame yield is highly variable depending upon the growing environment, cultural practices and cultivars (Brigham, 1985) [4]. Since the yielding ability of sesame crop is determined by many yield components, all of which are substantially influenced by environmental conditions and agronomic packages.

**Material and Method**

The field experiment was conducted in an experimental farm Department of Agronomy, College of Agriculture, Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani, during *kharif* season 2017. The topography of experimental site was fairly uniform and leveled. The treatment consisting of four sowing dates, i.e. 23<sup>rd</sup> MW, 25<sup>th</sup> MW, 27<sup>th</sup> MW, 29<sup>th</sup> MW with one sesame variety - AKT-64 and was sown in Randomized Block design and four replication.

After seed bed preparation, sowing was done by drilling. Sesame varieties was sown at 45 cm row to row and 15 cm plant to plant spacing. The seeds was put in soil approximately @ 2-3 cm depth. To maintain optimum plant population thinning and gap filling was carried out 15 and 10 days after sowing by keeping only one healthy seedling hill<sup>-1</sup>. The soil analyzed in experimental field selected for experiment is uniform with typical medium soil having medium fertility and fairly good drainage. fertilizer was applied through nitrogen dose @ 50 kg ha<sup>-1</sup> urea and single super phosphate @ 25 kg ha<sup>-1</sup> was applied through at sowing time. The total rainfall during crop growth period i.e. June 2017 to October, 2017 was 994.1 mm received in 43 rainy days. Observations were recorded on Meteorological parameter, plant height (cm), branches plant, dry matter accumulation plant, number of capsule/ plant, seed yield (kg/ha<sup>-1</sup>), straw yield (kg/ha<sup>-1</sup>) and biological yield (kg/ha<sup>-1</sup>).

## Results and discussion

### Growth studies

The biometric observations of sesame were recorded on various growth characters viz., plant height, number of branches per plant, dry matter accumulation plant, days to 50% flowering, days to capsule formation and days to Maturity.

### Plant height (cm)

Data in Table (1) revealed that the mean plant height was significantly influenced by different sowing dates. The *kharif* sesame sown during (25<sup>th</sup> MW) recorded significantly more plant height at 90 days after sowing (111.10 cm) over the rest of sowing dates and it was at par with (23<sup>rd</sup> MW) sowing date. Lowest plant height was recorded in 29<sup>th</sup> MW (99.03 cm) during all growth stages of crop. Sesame sown at 25<sup>th</sup> MW available more photoperiod as for reproductive stage as a result plant attained maximum plant height and also received good rainfall. During 29<sup>th</sup> MW rainfall at reproductive stage there was stress which limited the plant height. These results are similar by Gade (2013)<sup>[6]</sup>.

### Mean number of branches per plant

The data on mean number of branches per plant as influenced periodically by various treatments are presented in Table 1. It would revealed that the number of branches per plant Sowing of sesame at 25<sup>th</sup> MW produced significantly maximum number of branches (3.87) than other sowing dates at all growth stages while, it was at par with sowing at 23<sup>rd</sup> MW and followed by 27<sup>th</sup> MW and 29<sup>th</sup> MW respectively. Sowing of sesame at 25<sup>th</sup> MW received prolonged photoperiod and good rainfall during vegetative as well as reproductive stage.

As a result of more assimilates was utilized by plant in producing more branches. These results are similar by Ali *et al.* (2005)<sup>[3]</sup> and Abdel Rahman *et al.* (2007)<sup>[11]</sup>.

### Dry matter accumulation plant

The data on mean total dry matter accumulation plant as influenced periodically by various treatments are presented in Table 1. Sowing of sesame at 25<sup>th</sup> MW produced significantly maximum total dry matter accumulation plant<sup>-1</sup> 37.62 (g) than other sowing dates at all growth stages while, it was at par with sowing at 23<sup>rd</sup> MW. However, minimum total dry matter accumulation plant<sup>-1</sup> was recorded in 29<sup>th</sup> MW. Similar results were reported by Gite (2014)<sup>[7]</sup>.

### Days to 50% flowering, days to capsule formation & days to Maturity

Data in Table (1) revealed that the sesame crop sown during 29<sup>th</sup> MW recorded significantly minimum days to 50% flowering (43 days), Days to capsule formation (48 days) & days to maturity (85 days) and maximum for 25<sup>th</sup> MW (46 days), Days to capsule formation (51.7 days) and days to maturity (90 days) respectively. The more BSS (hrs) was recorded in 29<sup>th</sup> MW than other sowing dates, because this meteorological parameter is very important to sesame crop for early flowering and maturity.

### Post-harvest studies

#### Mean Number of capsules per plant

The data pertaining to mean number of capsules plant<sup>-1</sup> as influenced by different treatments is show in Table (2). sesame crop sown in 25<sup>th</sup> MW recorded significantly higher mean number of capsules plant<sup>-1</sup> (22.60) and followed by 23<sup>rd</sup> MW (20.9), 27<sup>th</sup> MW (19.2) and 29<sup>th</sup> MW (17.8) respectively. Due to favorable atmospheric conditions at former treatment, the number of capsules was higher as compared to other treatment. Similar result was found Tripathy *et al* (2016)<sup>[10]</sup>.

#### Yield (kg/ha<sup>-1</sup>)

The data pertaining to seed yield and straw yield of sesame at harvest as influenced by sowing dates are presented in Table (2). It was significantly influenced by different sowing dates. Sesame sown 25<sup>th</sup> MW recorded maximum seed and straw yield (440.8 kg ha<sup>-1</sup>) and (1268.6 kg ha<sup>-1</sup>) respectively followed sowing dates in order of sequence were 23<sup>rd</sup>, 27<sup>th</sup> and 29<sup>th</sup> MW respectively. This might be the effect of optimum temperature, good rainfall and BSS (hrs) during crop growth period under former sowing date. The lowest seed yield was observed at 29<sup>th</sup> MW because attack of phyllody disease. Similar results were reported by Choudhary *et al* (2015)<sup>[4]</sup>.

**Table 1:** Periodical mean growth and yield attributing characters of sesame crop as influenced by different treatments

Treatments	Growth and yield characters					
	Plant height (cm)	No. of Branches/Plants	Dry matter accumulation plant <sup>-1</sup>	Days to 50% flowering	Days to capsule formation	Days to maturity
D <sub>1</sub> : 23 <sup>rd</sup> MW	104.5	3.6	35.83	44.3	50.0	90.0
D <sub>2</sub> : 25 <sup>th</sup> MW	111.1	3.9	37.62	46.0	51.7	89.0
D <sub>3</sub> : 27 <sup>th</sup> MW	101.4	3.3	33.18	44.0	49.2	87.0
D <sub>4</sub> : 29 <sup>th</sup> MW	99.0	3.2	32.67	43.0	48.0	85.0
SE ±	2.86	0.13	1.17	0.51	0.44	1.2
CD at 5%	8.61	0.40	3.54	1.55	1.34	3.65

**Table 2:** Yield attributes of sesame crop as influenced by different treatments

Treatments	Post-harvest Observation			
	No of capsule/plants	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)
D <sub>1</sub> : 23 <sup>rd</sup> MW	20.9	386.3	1182.6	1567.4
D <sub>2</sub> : 25 <sup>th</sup> MW	22.6	440.8	1268.6	1709.5
D <sub>3</sub> : 27 <sup>th</sup> MW	19.2	317.8	1042.9	1360.3
D <sub>4</sub> : 29 <sup>th</sup> MW	17.8	237.2	815.2	1052.6
SE ±	0.74	11.7	36.4	57.6
CD at 5%	2.24	35.4	109.8	173.6

### Conclusion

Based on the above findings, it may be concluded that the highest yield was recorded for end june sowing by sesame D<sub>2</sub> (25<sup>th</sup> MW) produced significantly highest all growth characters and grain yield (440.8 kg/ha) as compare to rest of sowing dates.

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