

Oil and Oil Yield of Initial Varietal Trial (IVT) of Sesame Under Different Agroclimatic Zones of India

Key words : Oil yield, Sesame , Sesame oil

Sesame (*Sesamum indicum* L.) is an important edible oilseed crop of India and is a valuable nourishing food and flavoring agent. The seed is an important source of oil ranging from 44-58 %. Sesame oil has relatively high percentage of unsaponifiable matter. Sesame oil contains two minor constituents sesamin and sesamol together with sesamol which is present in trace amount. Sesamol is formed during hydrolysis of sesamol. These chemical constituents possess antioxidant property. Sesame oil helps to reduce high blood pressure and lower the amount of medication needed to control hypertension (Shultz, 2003).

The composition oil varied with the source and depends on factors such as climatic conditions, soil types maturity of plant and variety (Duhoon *et al.*, 2007). Therefore, present investigation was under taken to evaluate the productivity of oil of sesame genotypes in initial varietal trial under different climatic zones of India.

The Initial Varietal Trial (IVT) of sesame consisted of nineteen new entries from different centers. These were evaluated *vis-a-vis* two national checks (TKG-22, a white seeded variety and RT-54 a brown seeded variety), one zonal check identified separately for each zone and location specific local check (s) during *Kharif*-2007 and 2008.

The oil content (%) in the natural seed samples of twenty two entries tested at 21 locations over three zones was recorded through Oxford NMR system at AICRP (Sesame & Niger) Laboratory, JNKVV, Jabalpur. The oil yield was determined by calculating the formula

Oil yield (Kg/ha)= Oil % X Seed yield (kg/ha) / 100

The entries tested in IVT and their oil contents at 21 locations over three zones are presented in Tables 1, 2 and 3. The analysis of data showed significant differences in the oil contents among the varieties as well as the locations. The mean oil content over the locations ranged from the lowest (42.2%) at Viradhachalam to the highest (52.6%) at Jalgaon. Annual report (2006-07) of AICRP also

reported higher oil content at this location. Among the varieties, the lowest oil content of 31.8 % was recorded in OSC-389-06 and the highest of 57.0 % in RT-352 on different locations. Mohamad *et al.*, (1998) also recorded similar oil range in sesame seed.

The mean data over seven locations in Zone I indicated that LT-5 recorded the highest oil content of 52.3% which was followed by RT-350 (51.8%), RT-351 (51.4%), Mutant-699 (51.4%), DSS-13 (51.1%) and CST-2001-1 (50.6%) as against 49.5% of the best national check, TKG-22. RT-54, the brown seeded national check recorded the lowest oil content of 45.0%.

The highest oil yield of 450.3 kg/ha was recorded by the RT-351 and closely followed by LT-5 (445.1 kg/ha), RT-350 (432.5 kg/ha), RT-352 (428.7 kg/ha) and CST-2001-1 (424.5 kg/ha) against 377.6 kg/ha for the best zonal check Pragati in zone I.

Based on the mean over the nine locations in Zone II (Table 2), LT-5 recorded the highest oil content of 51.4%, which was on par with the best national check TKG-22 (50.9%). RT-350 and JLS-9848-2 also recorded high oil content of 51.0 %.

The highest oil yield of 359.4 kg/ha was recorded by the MT-20-04 against 323.3 kg/ha for the best national check RT-54 in zone II.

The mean over four locations in zone III (Table 3) indicated that out of 19 test entries only 6 entries i.e., LT-5 (52.0%), RT-353 (51.3%), OSC-9-06 (50.7 %), DSS-13 (50.0 %), RT-350 and MT-7-06 (49.8 %) recorded marginally higher oil content over TKG-22, the best national check (49.5%).

The highest oil yield of 297.5 kg/ha was recorded by the DSS-13 and closely followed by OSC-9-06 (290.0 kg/ha), CST-2001-1 (277.6 kg/ha), AT-124 (277.3 kg/ha), RT-351 (257.3 kg/ha) and OSC-389-06 (256.4 kg/ha) against the 224.7 kg/ha of TKG-22, the best national check in zone III.

Based on the mean of 19 test entries over 21 locations in three zones, only two entries i.e., LT-5 (51.5%) and RT-350 (51.4%) recorded marginally higher oil content as against 50.5 % recorded by TKG-22, the best National Check variety intended

Table 1. Oil content (%) of entries in Initial Varietal Trial (IVT) of sesame at different locations in Zone-I during Kharif-2007

S.No	Locations Entries	Oil Content (%)										Oil yield (kg/ha)
		Amreli	Agra	Bhilwara	Hisar	Jalgaon	Ludhiana	Mandor	Sirmor	Mean		
1	TKG-22 (NC)	54.4	51.3	48.6	44.7	51.3	46.8	47.7	50.8	49.5	327.7	
2	LI-5	53.2	51.8	53.4	51.4	52.8	47.8	53.7	54.1	52.3	445.1	
3	RT-350	54.9	55.6	49.2	-	53.8	45.4	51.6	52.4	51.8	432.5	
4	RT-351	53.6	-	53.8	47.7	53.9	46.0	53.6	51.3	51.4	450.3	
5	Mutant -699	50.3	51.3	51.9	52.6	55.1	-	-	47.3	51.4	217.9	
6	RT-352	50.0	51.6	51.9	46.5	57.0	47.3	47.7	52.2	50.5	428.7	
7	PCUAT-05	45.5	47.8	48.4	-	50.1	47.0	44.2	45.4	46.9	226.1	
8	DSS-13	48.6	49.6	50.5	-	56.3	-	50.2	51.5	51.1	316.8	
9	OSC-366	53.4	48.5	47.4	46.8	49.7	46.0	49.8	48.4	48.8	343.6	
10	OSC-422	51.3	51.7	43.7	43.3	50.5	46.3	54.7	46.9	49.3	269.2	
11	MT-7-06	51.1	52.6	48.7	43.3	54.7	47.2	51.6	50.2	49.9	340.3	
12	OSC-9-06	47.7	47.6	49.6	-	53.9	-	51.0	46.3	49.4	285.0	
13	OSC-389-06	47.2	51.0	49.8	-	51.7	44.8	45.3	48.2	48.3	279.7	
14	AT-124	48.7	45.1	52.7	45.0	51.6	47.0	46.6	54.2	48.9	317.9	
15	MT-20-04	52.7	49.1	55.3	42.2	53.3	48.0	49.5	50.0	50.0	363.5	
16	JLS-9848-2	52.4	50.6	54.3	48.6	53.1	49.7	51.2	50.3	50.5	370.2	
17	RT-54 (NC)	45.0	49.2	41.9	44.1	49.3	41.7	44.0	45.0	45.0	349.7	
18	CST-2001-1	49.4	51.0	54.3	49.6	52.8	48.2	50.8	48.6	50.6	424.5	
19	PKDS-82	50.7	54.0	49.8	-	52.1	45.8	53.5	44.0	50.0	269.5	
20	PKDS-81	50.7	49.4	49.3	-	53.2	-	-	40.5	48.6	179.3	
21	Pragati (ZC)	49.1	54.2	52.3	42.9	50.9	44.8	53.5	45.2	49.1	377.6	
22	RT-353	51.3	42.7	51.7	49.6	49.8	46.1	42.6	53.6	48.4	380.9	
23	LC	51.8	-	-	50.6	49.9	-	50.7	-	-	-	
24	LC	48.9	-	-	48.9	-	-	52.9	-	-	-	
	Mean	50.5	50.3	50.4	46.8	52.6	46.4	49.6	48.9	49.7	344.9	
	Range	45.0-54.9	42.7-55.6	41.9-55.3	42.2-52.6	49.3-57.0	41.7-49.7	42.6-54.7	40.5-54.2	45.0-52.9	179.3-450.3	
	CD (5.0%)	7.81	6.98	5.54	6.01	5.33	-	6.12	6.34	-	-	

NC= National Check; ZC= Zonal Check; LC= Local Check

Table2. Oil content (%) of entries in Initial Varietal Trial (IVT) of sesame at different locations in Zone-II during Kharif-2007

S.No	Locations	Oil content (%)										Mean	Oil yield (kg/ha)
		Jagtial	Maurani	Kanpur	Nagpur	Pantnagar	Pawar	Tikamgath	Sabour	Gossaingaon	kheda		
1	TKG-22 (NC)	51.3	50.4	54.7	53.4	51.4	51.3	54.0	49.9	41.8	50.9	305.4	
2	LT-5	49.4	50.9	52.3	54.2	50.7	50.1	56.0	49.9	48.8	51.4	308.4	
3	RT-350	51.1	50.5	54.6	52.6	51.5	50.3	52.2	47.5	48.6	51.0	249.4	
4	RT-351	50.3	48.8	43.6	53.9	50.0	51.1	52.0	53.2	48.6	50.2	239.5	
5	Mutant-699	51.9	44.4	43.5	-	50.8	48.5	45.2	47.4	47.0	47.3	139.5	
6	RT-352	51.9	52.1	48.6	53.1	50.0	50.7	49.4	51.1	47.8	50.5	273.2	
7	PCUAT-05	48.8	46.4	45.2	50.8	51.1	44.9	48.3	47.0	48.2	47.9	203.6	
8	DSS-13	52.9	48.6	43.9	50.9	50.2	46.3	51.9	48.2	47.6	48.9	221.0	
9	OSC-366	51.9	49.1	51.9	50.9	50.9	48.1	43.8	49.1	45.0	49.0	279.8	
10	OSC-422	55.4	45.5	48.9	48.5	50.1	47.7	45.9	48.2	42.0	48.0	206.4	
11	MT-7-06	51.9	51.4	47.4	50.3	50.6	49.9	52.5	44.6	45.1	49.3	291.4	
12	OSC-9-06	55.3	48.2	52.2	49.6	51.0	47.1	43.9	43.8	45.3	48.5	191.6	
13	OSC-389-06	42.7	46.4	49.2	48.1	46.9	39.3	46.1	41.3	-	45.0	193.5	
14	AT-124	49.5	49.2	52.7	51.9	48.1	48.7	48.0	42.3	48.6	48.8	247.9	
15	MT-20-04	54.0	50.7	54.0	42.6	50.5	49.5	50.9	53.6	48.0	50.4	359.4	
16	JLS-9848-2	54.8	48.8	48.9	52.9	48.9	50.0	53.7	50.5	50.3	51.0	280.5	
17	RT-54(NC)	42.4	41.1	45.9	42.0	45.6	40.6	44.7	48.9	40.5	43.5	323.3	
18	CST-2001-1	52.1	50.1	51.1	47.0	48.9	49.5	51.7	50.1	50.2	50.1	235.8	
19	PKDS-82	49.8	48.4	47.7	49.7	52.0	47.2	50.3	49.1	46.6	49.0	276.9	
20	PKDS-81	50.6	48.2	45.1	50.6	50.1	49.5	52.0	50.2	-	49.5	148.5	
21	JTS-8 (ZC)	52.0	50.8	50.0	48.6	50.5	47.4	-	52.5	45.3	49.6	292.1	
22	RT-353	49.9	49.9	44.5	52.3	51.3	49.2	50.8	49.4	45.9	49.2	215.5	
23	LC	50.7	-	47.3	47.4	-	41.7	53.2	45.3	-	-	-	
24	LC	52.4	-	49.5	48.2	-	49.0	55.1	-	-	-	-	
25	LC	50.9	-	-	-	-	-	-	-	-	-	-	
	Mean	51.0	48.6	48.8	50.4	50.0	47.8	49.6	48.3	46.2	49.1	251.4	
	Range	42.4-	41.1-	43.5-	42.6-	45.6-	39.3-	43.8-	41.3-	40.5-	43.5-	139.5-	
		55.4	52.1	54.7	54.2	52.0	51.3	56.0	53.6	50.3	51.4	359.4	
	CD (5.0%)	5.91	8.12	7.67	6.34	5.89	8.51	7.78	6.54	8.73			

Table 3. Oil content (%) of entries in Initial Varietal Trial (IVT) of sesame at different locations in Zone-III during *Kharif*-2007

S.No.	Locations Entries	Oil Content (%)						Oil Yield (Kg/ha)	National mean oil %	Oil Yield (Kg/ha)
		Bhuba neswar	Dharwad	Pune	Vridha chalam	Mean	Oil Yield (Kg/ha)			
1	TKG-22 (NC)	51.5	51.5	50.2	44.7	49.5	224.7	50.5	338.4	
2	LT-5	49.6	54.5	53.9	49.9	52.0	207.5	51.5	366.7	
3	RT-350	50.7	48.9	50.2	49.5	49.8	208.1	51.4	339.8	
4	RT-351	46.8	47.6	51.3	50.5	49.1	257.3	49.5	344.0	
5	Mutant-699	45.0	42.7	47.0	37.4	43.0	255.4	48.3	195.6	
6	RT-352	45.4	42.1	52.2	49.3	47.3	206.2	49.4	343.8	
7	PCUAT-05	41.5	49.6	50.5	44.4	46.5	185.5	47.5	228.0	
8	DSS-13	52.5	46.1	50.4	50.8	50.0	297.5	49.4	270.2	
9	OSC-366	44.5	54.4	50.7	39.0	47.2	250.2	48.4	320.9	
10	OSC-422	48.7	46.1	50.8	40.0	46.4	229.2	48.6	252.2	
11	MT-7-06	56.0	53.1	49.1	41.0	49.8	217.6	49.1	310.2	
12	OSC-9-06	56.1	55.5	41.2	50.1	50.7	290.0	49.0	261.7	
13	OSC-389-06	54.5	49.4	45.4	31.8	45.3	256.4	47.0	261.8	
14	AT-124	50.6	48.3	54.0	36.7	47.4	277.3	49.2	303.6	
15	MT-20-04	53.1	47.3	49.4	35.1	46.2	214.4	49.6	350.2	
16	JLS-9848-2	52.8	47.2	50.2	47.3	49.4	217.9	49.4	319.1	
17	RT-54 (NC)	48.4	40.0	34.5	48.3	42.8	218.3	45.2	322.7	
18	CST-2001-1	47.4	48.5	47.5	42.5	46.5	277.6	49.2	359.2	
19	PKDS-82	52.1	45.4	54.4	39.5	47.9	181.1	49.5	268.8	
20	PKDS-81	52.0	45.1	50.1	37.4	46.2	191.7	48.1	177.9	
21	Nirmala (ZC)	44.6	41.3	39.0	33.5	39.6	224.1	47.5	-	
22	RT-353	51.6	50.9	51.2	51.4	51.3	263.7	49.0	315.1	
23	LC	48.5	52.3	48.2	-	-	-	-	-	
24	LC	51.6	56.0	-	-	-	-	-	-	
	Mean	50.2	48.4	48.8	42.2	47.7	236.6	48.9	297.3	
	Range	41.5-	40.0-	34.5-	31.8-	39.6-	181.1-	45.2-	177.9-	
		56.1	56.0	54.4	51.4	52.0	297.5	51.5	366.7	
	C D (5.0%)	5.69	6.14	7.48	5.98					

to be replaced. Zone I area recorded best in terms of high oil production from sesame seed because semi hot climatic condition and sandy soil texture as also reported by Rahman *et al.*, (2007).

The mean over the 21 location indicated that the highest oil yield of 366.7 kg/ha was recorded by LT-5 and closely followed by 359.2 kg/ha in CST-2001-1, 350.2 kg/ha in MT-20-04, 344.0 kg/ha in

RT-351, 343.8kg/ha in RT-352 and 339.8 kg/ha in RT-350 against 338.4 kg/ha of TKG-22, the best national check variety.

The climatic condition of western part of India is quite suitable for good productivity of oil and seed yield of sesame. LT-5 and RT-35 produced maximum oil and oil yield in most agro-climatic conditions of India.

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All India Project Coordinated Unit
Sesame and Niger
Jawaharlal Nehru Krishi Vishwa
Vidyalaya (JNKVV), Campus
Jabalpur 482 004
Madhya Pradesh

**Jyoti Nema
Sushama Nema
Seema Paroha**

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