Electronic Journal of Plant Breeding, 6(1): 118-124 (Mar 2015)
ISSN 0975-928X

Research Article

JLT-408 A New High Yielding Sesame Variety for Maharashtra State

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(Received: 23 Jun 2014; Accepted:25 Dec 2014)

Abstract
Sesame variety JLT-408 is developed through hybridization followed by advance generation selection from the cross Padma x Yuzhi-8 by pedigree method at Oilseeds Research Station, Jalgaon. This variety gave 29.9 % and 20.8% higher yield than checks JLT-7 and JLT-26, respectively. It has medium maturity period (81-85 days), white bold seed and found superior in quality *viz.* high oil content (53.2%), low in free fatty acid (1.46%) and its Iodine value is 107.0. This new variety is moderately resistant to major diseases like Phyllody, Cercospora leaf spot, Alternaria leaf spot, Powdery mildew and Macrophomina stem/ root rot and it is moderately tolerant to leaf roller /capsule borer and tolerant to gall fly under field conditions. Considering merits in respect of yield, oil content and quality parameters JLT-408 has been released for cultivation in *kharif* season in North Maharashtra and adjoining areas of Vidarbha and Marathwada regions in Maharashtra.

Key words :
Sesame, JLT-408, medium maturity, high oil, low Free Fatty Acids.

Introduction

Sesame (*Sesamum indicum* L) commonly known as 'Til' is oldest indigenous oilseed crop known to man and it dates back to as early as 1600 BC for its high oil quality and medicinal value. It is considered as excellent source of food nutrition, edible oil, health care and biomedicine all in one. The sesame seed is important source of edible oil and is widely used as spice. It contains 50-60% oil which has excellent stability due to presence of natural antioxidants such as sesamolin, sesamin and sesamol (Brar and Ahuja, 1979). The fatty acid composition of sesame oil varies considerably among the different cultivars (Yermanos *et al.* 1972; Brar 1982). Besides oil it also contains approximately 25% proteins and 15% carbohydrates. Oil meal contains 35-50% proteins and rich in tryptophan and methionine. The seed with hulls are rich in calcium (1.3%) and provides valuable source of minerals (Johnson *et al.*, 1979). The addition of high lysine meal of soybean in it produces balanced feed for animals and poultry. Sesamum being early fits well in double and intercropping systems.

In Maharashtra it is mostly cultivated on an area of 40,000 hectares with production of 12000 tones and average productivity of 300 kg/ha during the year 2012-13. In North Maharashtra and adjoining areas of assured rainfall zone early to medium maturing varieties

are generally grown as a sole crop which enables farmers to adopt double cropping system under rainfed condition. The low productivity of this crop in the region can be attributed to the fact that the sesame is grown under rained conditions which is characterized by erratic rainfall, growing of local varieties having low yield potential and susceptibility to major pest and diseases. One of the veritable tools that could be used to boost the production and productivity of sesame is to develop high yielding varieties. Earlier improved varieties Phule Til No.1; Chaudhari *et al.* (1980), JLT-7; Deokar *et al.*(1987) and JLT-26; Anonymous, (1991) were developed and released for general cultivation. However, these varieties did not become popular due to some or other drawbacks like long duration of Phule Til No.1, phyllody susceptibility of JLT-7 and light brown colored seed of JLT-26. Therefore, the efforts were made to develop high yielding, early to medium maturing variety combined with good quality white bold seed and having better tolerance to major pests and diseases.

Material and Methods :

The genotype JLT-408 has been developed from advance generation selection from the cross Padma x Yuzhi-8 by pedigree method at Oilseeds Research Station, Jalgaon. This culture was tested in Station trial (LSYET) along with checks JLT-7 and JLT-26 during 2005. Considering the superior performance, this culture was promoted and tested in State Multilocation Trials conducted at 4 locations over four years during the period from 2006-2009. This new culture was also tested in All India Coordinated Trial (IVT) during 2007 conducted at Oilseeds

Research Station, Jalgaon. It was evaluated on farmer's field at 22 locations in *kharif* 2009 season. The morphological characters were recorded as per "Descriptor for Sesame"; Anonymous (2004). The oil quality parameters were studied for Oil content, Free Fatty Acids (FFA) and Iodine value. The statistical analysis of yield data was done according to Panse and Sukhatme (1967). The culture was screened for its reaction to major pest and diseases under field condition during the year 2007 to 2009.

Results and Discussion :

The distinguishing morphological characters of developed genotype are given in Table 1. The plant is erect with indeterminate growth habit and 84- 127 cm tall. Basal leaves are broad with entire to partly serrated margins and weak to medium lobe incision. While, middle leaves are ovate and top leaves are lanceolate with alternate arrangement. The new genotype had white bold seed and medium maturity period (81-85 days).

The performance of new genotypes was studied in station trial (LSYET) conducted at ORS, Jalgaon. The yield differences due to genotypes were found to be significant. The genotype JLT-408 recorded 838 kg/ha seed yield; which was 15.6 % higher than JLT-7 and 30.3% higher than JLT-26. In Initial Varietal Trial conducted at ORS, Jalgaon during the year 2007 the genotype JLT-408 recorded 1115 kg per ha seed yield which was 26% higher than local check JLT-7; it also exhibited 46 % and 14 % increase over national checks TKG-22 and RT-54, respectively. The performance was also evaluated in State multilocation trials conducted at four locations *viz.*, Jalgaon, Dhule, Niphad and Buldhana during 2006-09. The pooled results of multilocation trials indicated 31.8% and 20.0% higher seed yield of this genotype (755 kg/ha) than the checks JLT-7 and JLT-26, respectively.

Average performance of 14 station, multilocation and coordinated trials conducted during the period 2005 to 2009; JLT-408 recorded 787 kg/ha yield as against the check JLT-7 (606 kg/ha) and JLT-26 (630 kg/ha) which was higher by 29.9% and 20.8%, respectively (Table 2). The genotype JLT-408 was also evaluated along with the check variety JLT-7 for yield in 22 adaptive trials conducted on farmer's field during the year 2009. The results revealed JLT-408 (530 kg/ha) having higher yield than JLT-7(424 kg/ha) by 25 per cent.

This new variety is moderately resistant to major diseases *viz.*, Phyllody, Cercospora leaf spot, Alternaria leaf spot, Powdery mildew and Macrophomina stem/ root rot under field conditions (Table 3.1 to 3.3) and it is moderately tolerant to Leaf roller /Capsule borer and tolerant to Gall fly under field conditions (Table 4.1 and 4.2).

In quality studies JLT-408 was found superior in quality; having high oil content (53.2%), low in free fatty acid (1.46%) and its Iodine value was 107.0 as compared to JLT-7 [oil 49.7%, FFA 1.45% and Iodine value 106.2] and JLT-26 [oil 49.2%, FFA 3.67% and Iodine value 104.5] (Table 5).

Considering the merits in respect of seed yield, oil content and quality parameters this variety is identified for release for *kharif* cultivation in assured rainfall zone in North Maharashtra and adjoining areas of Vidarbha and Marathwada region during 2010; and recommended for release by State Seed Sub Committee meeting held at Pune on 9th March, 2012. The variety has been notified under seed Act 1966 as JLT-408 vide S. O. No. 2125(E) dated 10-09-2012 and registered with Protection of Plant Varieties and Farmers Right Authority, Government of India.

Acknowledgement :

Authors are thankful to all the scientists and technical staff who helped in screening and evaluating the new variety in various trials conducted at different locations.

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Table 1. Distinguishing morphological characters of JLT-408.

Sr. No.	Morphological characters	Descriptors
1	**Plant characters**	
	i) Growth type	Indeterminate
	ii) Growth habit	Erect
2	**Stem characters**	
	i)Main stem color	Pale green
	ii)Stem hairiness	Weak
	iii)Stem shape in cross section	Square
	iv) Stem branching	Opposite
	v) Branching pattern	Basal
3	**Leaf characters**	
	i) Leaf colour	Green
	ii) Leaf hairiness	Glabrous
	iii) Leaf arrangement	Alternate
	iv) Middle leaf shape	Ovate
	v) Top leaves	Lanceolate to Linear
	vi) Basal leaf margin	Entire to partly serrated
	vii) Lobe incision of basal leaves	Weak or Medium
	ix) Leaf angle	Acute
4	**Inflorescence characters**	
	i) Days to 50% flowering	38-43
	ii) Extra-floral nectary development	Small
	iii) Extra- floral nectar colour	Light yellow
	iv)Number of flowers per axil	One
	v) Corolla hairiness	Medium
	vi)Exterior corolla colour	White with pink shade
	vii)Interior corolla colour	White
	viii)Corolla interior pigmentation	Absent
	ix) Anther filament colour	White
5	**Capsule characters**	
	i)Numer of locules per capsule	Four
	ii) Numer of carpels per locule	Bicarpellate
	iii) Bicapellate capsule shape	Narrow oblong
	iv) Capsule arrangement	Alternate
	v) Capsule hairines	Sparse
	vi) Type capsule beak	Short
	vii)Capsule length	2.88 cm
	viii) Capsule breadth	0.89 cm
6	**Seed characters**	
	i)Seed coat texture	Smooth,
	ii) Seed coat colour	White.
7	**Maturity**	
	Days to maturity	81 to 85 days
	Maturity group	Medium

Table 2: Summary of yield performance of proposed varietyJLT-408 in Station, Multilocation and Coordinated Trials (*Kharif* 2005 to 2009)

Sr. No.	Trial	Year	No.of Trials	Seed yield (Kg/ha,)			SE ±	CD at 5%
				JLT-408	JLT-7	JLT-26		
1	LSYET (Station)	2005	1	838	725	643	33	93
2	SMVT	2006	2	440	374	321	35	101
		2007	4	912	663	742	69	198
		2008	3	652	470	536	53	150
		2009	3	858	689	777	55	152
3	IVT	2007	1	1115	883	-	58	165
Overall mean			**14**	**787**	**606**	**630**	--	--
% increase over					**29.9**	**20.8**		

Table 3.1: Field reaction of JLT-408 to major diseases recorded at Jalgaon under field conditions (*Kharif* 2007-09)

Sr. No.	Diseases	Years	JLT-408	JLT-7	JLT-26
1	Cercospora leaf spot (0-5 scale)	3	0.87	1.8	1.6
	Reaction		**R**	**MR**	**MR**
2	Alternaria leaf spot (0-5 scale)	3	1.4	1.8	2.0
	Reaction		**MR**	**MR**	**MR**
3	Phyllody (%)	3	8.3	12.8	6.3
	Reaction		**R**	**MR**	**R**
4	Macrophomina stem/root rot (%)	2	9.1	10.1	10.3
	Reaction		**R**	**MR**	**MR**

Table 3.2: Reaction of JLT-408 to major diseases recorded at Niphad (*Kharif* 2009)

Sr. No.	Diseases	Year	JLT-408	JLT-7	JLT-26
1	Cercospora leaf spot (0-5scale)	1	2.0	2.0	3.0
	Reaction		MR	MR	MS
2	Alternaria leaf spot (0-5 scale)	1	1.0	1.0	1.0
	Reaction		R	R	R
3	Macrophomina stem/root rot (%)	1	3.3	1.0	4.7
	Reaction		R	R	R

Table 3.3. Reaction to diseases (UDN *kharif* 2007)

Sr. No.	Diseases	Locations	JLT-408	TKG-22 (NC)	RT-54 (NC)
1	Macrophomina stem/root rot (%)	5	15.5	15.6	5.9
	Reaction		**MR**	**MR**	**R**
2	Phyllody (%)	3	0.8	3.4	3.7
			R	**R**	**R**
3	Powdery mildew (0-5 Score)	3	1.8	3.7	3.0
	Reaction		**MR**	**S**	**MS**
4	Cercospora leaf spot (0-5 Score)	5	2.3	1.8	2.6
	Reaction		**MR**	**MR**	**MS**
5	Alternaria leaf spot (0-5 Score)	5	2.1	2.2	1.8
	Reaction		**MS**	**MS**	**MR**
6	Phytopthora blight	1	2.0	3.0	1.5
	Reaction		**MR**	**MS**	**MR**

Disease Score :-

Score	Infection %	Reaction
0	No infestation	Immune
1	1-10	Resistant
2	11-25	Moderately Rsistant
3	26-50	Moderately Susceptible
4	51-70	Susceptible
5	71-100	Highly Susceptible

Table 4.1 : Field reaction of JLT-408 to major pests recorded at Jalgaon (*Kharif* 2009)

Sr.No.	Pest	Crop Stage	JLT-408	JLT-7	JLT-26
1	Leaf Roller (Capsule borer) %	Plant infestation(30DAS	8.3	14.3	7.6
		Reaction	**T**	**MT**	**T**
2	Gall fly (Bud fly) %	Bud Damage (50 DAS)	4.2	7.1	3.9
		Reaction	**T**	**T**	**T**

Table 4.2: Field reaction of JLT-408 to major pests at AICRP centers (*Kharif* 2007)

Sr. No.	Pest	Crop Stage	Locations	JLT-408	TKG-22 (NC)	RT-54 (NC)
1	Leaf Roller/ Capsule borer (%)	Plant infestation (30 DAS)	2	3.57	9.45	5.68
		Reaction		**T**	**T**	**T**
		Flower Damage (50DAS)	3	15.80	10.45	7.71
		Reaction		**MT**	*MT*	**T**
		Capsule Damage (70DAS)	3	**9.56**	**6.14**	**3.41**
		Reaction		*MT*	**MT**	**T**
2	Gall fly (Bud fly) (%)	Bud Damage (50 DAS)	1	5.40	1.60	8.70
		Reaction		**T**	**T**	**T**

Entries are classified as

A) On the basis of plant and flower infestation

I Infestation below 10 % : Tolerant
II Infestation 10-20%: Moderately Tolerant.
III Infestation 21-30%: Moderately susceptible.
IV Infestation 31-50%: Susceptible.
V Above 50%: Highly susceptible

B) On the basis of Capsule damage

I Infestation below 5 % : Tolerant
II Infestation 6-10%: Moderately Tolerant.
III Infestation 11-15%: Moderately susceptible.
IV Infestation 16-25%: Susceptible.
V Above 25%: Highly susceptible

Table 5 : Quality parameters of JLT-408

Sr. No.	Quality parameters	JLT-408	JLT-7	JLT-26
1	Oil (%)	53.2	49.7	49.2
2	FFA (%)	1.46	1.45	3.67
3	Iodine value	107.0	106.2	104.5