

Variety registration report:

Registration of variety CIM – Sharda: An early maturing, methyl chavicol rich and high essential oil yielding of basil (*Ocimum basilicum*)

LAL RK* • SHASENY AK • CHANDRAR • SINGH SMITA • SARKAR S • YADAV R • SATTARA • DHAWAN OP • GUPTA AK • CHANOTIYA CS • DHAWAN SS • GUPTA PANKHURI • YADAV ANJU • KUMAR B • ZAIM M • SINGH VR • PANDEY R • DUBEY BK

Article History

Received: 18th December, 2015

Accepted: 28th December, 2015

Key words

Chemotype

CIM-SHARDA

CIM-Sharda

Methyl chavicol

Ocimum basilicum

ABSTRACT

*Basil belongs to the family “Lamiaceae”. The essential oil of basil obtained via hydro- or steam distillation of leaves or whole aerial biomass is used for flavouring foods, preparation of dental and oral hygiene products, fragrances, social/religious rituals and traditional medicines. Methyl chavicol – one of the important constituent of essential oil of *Ocimum basilicum* is widely used by the aroma, pharmaceutical and cosmetic industries after its conversion into trans-anethol. The new variety of *O. basilicum* (CIM - EOH-1, now christened as CIM-Sharada) has been developed by CSIR-CIMAP through intensive breeding efforts for improved herb and essential oil yield coupled with high methyl chavicol content (85-89%). The potential herb yield of this new variety is 280-290 q/ha and oil yield 200 kg/ha. The variety mature in a short duration of 80-90 days and hence, fits very well into crop rotation/intercropping cycle between wheat and paddy along with other vegetables crops for small and holders. It is ideally suited for rain fed cultivation. The unique leaf morphology and high survival in winter season are the two main distinctive features of this variety to satisfy DUS criteria.*

© Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow (India)

INTRODUCTION

Ocimum (Family: Lamiaceae) is a genus of about 35 species of annual and perennial aromatic herbs and shrubs. Most species are native to the tropical and warm regions of the old world, including India. The essential oil of Indian basil obtained via

hydro- or steam distillation of leaves or whole aerial biomass of the plant is used to flavour foods, dental and oral products, fragrances, social/religious rituals and traditional medicines. The essential oil has also been shown to contain biologically active constituents that have insecticidal, nematicidal, fungistatic or antimicrobial properties.

At CSIR-CIMAP, Lucknow U.P. (India) availability of 189 genetic stocks of nine *Ocimum* species namely, *Ocimum sanctum* (Krishna and

*Corresponding author, Email: rk.lal@cimap.res.in
CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR), P.O. CIMAP, Lucknow - 220 015 (India)

Shyam tulsi), *O. longifolia*, *O. kilimandscharicum*, *O. canum*, *O. gratissimum*, *O. Africanum*, *Ocimum viridis*, *O. tenuiflorum* and *O. Basilicum* (Sweet and French basil) offers many possibilities to develop high yielding cultivars/varieties or chemotype with high value chemical constituents.

Keeping this in mind, a need to develop a better plant type of *O. basilicum* having early maturing and high essential oil yielding traits with better methyl chavicol content was felt. Methyl chavicol is widely used by the herbal aroma and pharmaceutical industries after its conversion into trans-anethol, which is used in cosmetics. Hence, a planned breeding and selection process was undertaken at CSIR- CIMAP, Lucknow to develop such a variety of *Ocimum basilicum*.

Statement of distinction/ Breeder's claim:

Variety CIM Sharada is a medium tall (80.56cm) genotype with dark green leaves and purple colour stem. Twelve sections of *O. basilicum* along with check variety CIM-Saumya (also developed by CSIR-CIMAP a few years back) were put to rigours testing under IST, BST & DST. Data is summarised in Tables 1-5.

Table 1. Mean performance of elite selections in Initial evaluation trial for the three economic traits in *Ocimum*

S. No.	Entries	IET, E=13, RBD, Reps-3, plot size=12.25m ²		
		Fresh herb yield/plot (kg)	Oil Content (%)	Oil yield/plot (g)
1.	EOH-1	53.08	0.88	465.00
2.	EOH-2	38.59	0.63	240.40
3.	EOH-3	33.50	0.39	130.75
4.	EOH-4	36.17	0.30	108.51
5.	EOH-5	40.59	0.31	125.84
6.	EOH-6	28.28	0.35	98.98
7.	EOH-7	32.60	0.43	138.65
8.	EOH-8	37.85	0.43	160.95
9.	EOH-9	31.29	0.50	156.45
10.	EOH-10	35.76	0.65	232.40
11.	EOH-11	31.00	0.68	209.00
12.	EOH-12	32.25	0.63	201.75
13.	CIM Saumya (Check)	35.00	0.67	232.83
CD 5%	-	2.79	0.0696	38.29
CD 1%	-	3.92	0.0975	53.66

Table 2. Mean performance of selected entries with respect to essential oil composition

S. No.	Entries	Methyl chavicol (%)	Linalool content (%)
1.	EOH-1	89.75	1.01
2.	EOH-2	82.88	1.66
3.	EOH-3	85.04	2.13
4.	EOH-4	38.22	27.62
5.	EOH-5	29.08	3.33
6.	EOH-6	61.97	19.63
7.	EOH-7	34.12	35.23
8.	EOH-8	67.89	4.44
9.	EOH-9	60.83	28.54
10.	EOH-10	73.36	19.93
11.	EOH-11	68.30	25.45
12.	EOH-13	17.78	43.50
13.	CIM Saumya (Check)	60.83	28.54

The new variety is morphologically distinct from other *Ocimum basilicum* varieties and clearly identifiable by its curly leaf margin (as shown in Figure 1). and pigmented stem (purple colour) to satisfy DUS cataloging.

The variety has a unique feature and advantage of better survival in winter season in comparison to other *O. basilicum* varieties/varieties. Essential oil extracted from this variety contain



Figure 1. Variety CIM Sharada a high oil and methyl chavicol chemotype of *O. basilicum* showing characteristic distinctive leaf margin morphology

Chromatogram: OC_S_4_RK LAL_050913_6_channelSCHANNEL
NUMBER

CENTRAL LABORATORY, CIMAP

System : CP3800
Method : DB-5 CAP_MANUAL_KI 210813Acquired : 9/5/2013 3:24:04 PM
Processed : 9/20/2013 5:35:42 PM
Printed : 9/20/2013 5:35:49 PM

SEQUENCE: September_2013_

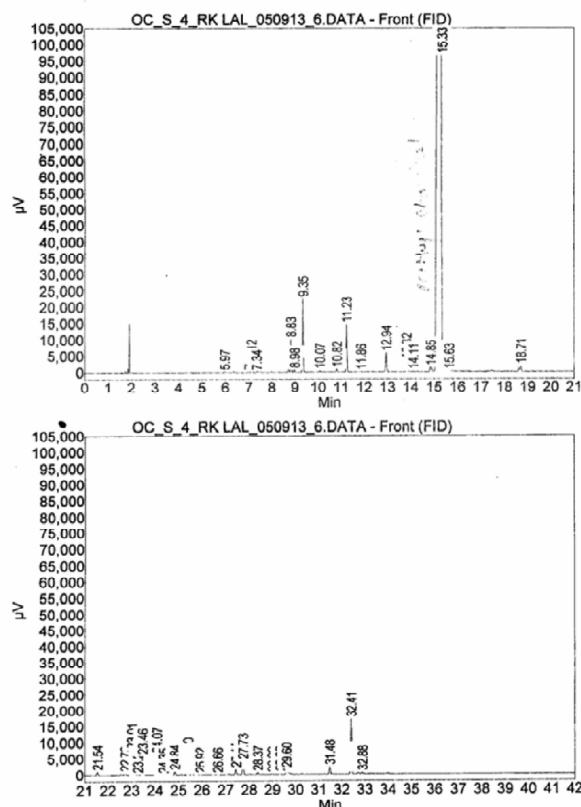


Figure 2. Chromatogram of the essential oil of Variety CIM Sharada

higher amount of methyl chavicol (85-89 %) and very low amount of linalool (<1.0%). The Variety is also suitable for rain-fed cultivation (July-September). The recommended cultivation schedule for the new strain is provided in Table 7.

Table 3. Mean performance of elite selections in Bench Scale evaluation Trial for the three economic traits in *Ocimum*

Sl. No.	Entries	BST, E=8, RBD, Reps-3, plot size=50.00m ²		
		Fresh herb yield/plot (kg)	Oil Content (%)	Oil yield/plot (g)
1.	EOH-1	122.04	0.84	1022.49
2.	EOH-2	96.19	0.65	638.09
10.	EOH-10	85.95	0.66	631.09
11.	EOH-11	85.75	0.56	492.25
12.	EOH-12	95.75	0.60	574.75
13.	CIM Saumya (Check)	96.98	0.61	586.20
CD 5%	-	6.37	0.071	86.79
CD 1%	-	8.81	0.098	119.97

Table 4. Mean performance of selected entries with respect to essential oil composition

S. No.	Entries	Methyl chavicol (%)	Linalool content (%)
1.	EOH-1	89.23	0.91
2.	EOH-2	80.00	1.00
10.	EOH-10	70.30	18.63
11.	EOH-11	60.10	20.15
12.	EOH-13	15.70	41.50
13.	CIM Saumya (Check)	50.53	29.50

Table 5. Mean performance of elite selections in Pilot scale Trial for the three economic traits in *Ocimum*

S. No.	Entries	PST, E=4, plot size=100.00m ²						
		Fresh herb yield/plot (kg)	Oil Content (%)	Oil yield/plot (g)	Fresh herb yield (q/ha)	Oil yield (kg/ha)	Methyl chavicol (%)	Linalool content (%)
1.	EOH-1	295.50	0.70	206.85	295.50	206.85	89.75	0.067
2.	EOH-2	250.50	0.65	162.83	250.50	162.83	78.50	1.86
10.	EOH-10	210.00	0.60	126.00	210.00	126.00	68.70	17.65
13.	CIM Saumya (Check)	200.52	0.61	122.32	200.52	122.32	60.83	28.54

Table 6. Description of the variety.

Attributes	CIM-Sharada	Check (CIM Saumya)
Growth habit	Eerect	Semi spreading
Days to harvest after transplanting	80-90	90-100
Days to flower (50 %)	70-80	90-95
Plant height (cm)	80-85	90-95
Colour of leaf (U/L) Green group N 137 FAN 3 (Upper side)	137 b Green group	141 a Green group
Colour of leaf Green group N 137 FAN 3 (lower side) RHS	137 c Green group	141 b Green group
Length of leaf (cm)	6.25-6.30	3.50-3.60
Width of leaf (cm)	3.00-3.50	1.5-1.60
Fresh herb yield (ql/ha)	295.50	200.52
Oil content in fresh herb (%)*	0.70	0.61
Potential oil yield (kg/ha)**	206.85	122.32
Methyl chavicol content (%)	85.50-89.75	55.0-60.83
Linalool content (%)	0.067-0.850	28.54-30.00

*- Based on oil content data obtained through from Clevenger apparatus; **- Estimate based on 100 m² plot size.

Table 7: Recommended cultivation schedules for the variety CIM Sharada

S.No.	Practices/	Suitable time
1.	Nursery sowing	Last week of June
2.	Transplanting in field	Last week of July (30 days after sowing)
3.	Harvesting for oil	2 nd fortnight of October (80-90 days after transplanting)
4.	Harvesting for seed	Last week of November to first week of December (120 days after transplanting)

Year of development : 2008-2014

Proposed year of release : 2015

Amount of nucleus seed available : 250 gm