

Journal of Spices and Aromatic Crops
Vol. 25 (1) : 56-59 (2016)
www.indianspicesociety.in/josac/index.php/josac



Indian Society for Spices



IISR Keralashree - a high yielding and high quality nutmeg (*Myristica fragrans* Houtt.)

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Received 26 November 2014; Revised 21 February 2015; Accepted 19 March 2015

Abstract

An accession of nutmeg IC-537218 derived from an open pollinated seedling progeny of a high yielding tree from Burliar, Nilgiris, Tamil Nadu, was evaluated under a farmer participatory mode at three locations in two states, Kerala and Tamil Nadu, for yield characters, for 13 years and this accession was found superior for mace and nutmeg yield over the existing variety, IISR *Vishwashree*, in all the yield parameters studied. The tree is a pure female which flowers profusely and bears oblong shaped yellow fruits. The aril is thick and covers the entire seed and is dark red in colour. The nut is bold and brownish black in colour. The mace and nut of the new variety is rich in sabinene.

Keywords: *Myristica fragrans*, new variety nutmeg, quality, yield

Introduction

Introduced to India by the colonial rulers during the 18th century, nutmeg (*Myristica fragrans* Houtt.) now occupies 17,490 ha in the country, and mainly grown in the states of Kerala, Tamil Nadu, Karnataka, Maharashtra, Goa, Andamans and Nicobar Islands and to a limited extent in Northeastern states with an annual production of 12,620 tonnes during 2012–13 (Indian Horticulture Database 2013). High yielding varieties not only improve the yield but also ensure varietal diversity. In nutmeg there are not many improved varieties though there is good scope for exploiting the seedling variability for crop improvement of this perennial tree yielding two spices. The objective of this study was to select and develop a high

yielding nutmeg variety through farmer participatory approach.

Materials and methods

Four hundred and forty four nutmeg types maintained at the tree spices germplasm repository were evaluated at ICAR-Indian Institute of Spices Research, Experimental Farm, Peruvannamuzhi for yield and quality attributing parameters during 1990 to 2000. During the evaluation, an accession - IC-537218, a selection from an open pollinated seedling progeny raised from seeds collected from a high yielding tree from Burliar, Nilgiris, Tamil Nadu, with bold sized nutmeg and thick mace covering the entire seed was identified. A clonal progeny evaluation trial with 15 trees was laid out during 2000 in farmer's fields at

Peruvannamuzhi and Karuvarakundu in Kerala and Pollachi in Tamil Nadu during 2001–2013 along with the nutmeg variety *IISR-Viswashree* using plagiotropic grafts. Nutmeg was intercropped with coconut in all the three locations. The trees were grown following all the recommended cultural practices. Fifteen trees were planted in each accession and evaluated for yield and yield attributing characters. The parameters recorded during the study were, number of fruits tree⁻¹, nut weight and mace weight.

Peruvannamuzhi is located at an altitude of 50 m above MSL at 11° 35' 03" N, 75° 49' 03" E. Pollachi is located at 10° 39' 32.43" N, 77° 02' 28.83" E and has an altitude of 293 m above MSL and Karuvarakundu is located at 11° 08' 30.3" N, 76° 02' 30.3" E and has an altitude of 346 feet above MSL. The maximum temperature ranges from 28.9 to 36.2°C and the minimum temperature ranges from 17.0 to 23.4°C at all places and the total average rainfall ranged from 1800-3500 cm at all three places during the period under study. Peruvannamuzhi has laterite soil, Karuvarakundu has forest loamy soil and Pollachi red loamy soil.

Results and discussion

The number of fruits, nut weight and mace weight of accession IC-537218 was significantly more than *IISR-Viswashree* at all three locations (Table 1). Number of fruits, dry nut weight, and mace weight tree⁻¹ of IC-537218 was 2455, 25.757 kg and 5.150 kg, respectively whereas, that for *IISR-Viswashree* was 1444, 13.150 kg and 1.889 kg, respectively. The increase over *IISR-Viswashree* for no. of fruits tree⁻¹, weight of dry nuts tree⁻¹ (g) and weight of mace tree⁻¹ (g) at three locations are given in Table 1 and pooled analysis indicated (Table 2) that there was an increase of 69.5%, 95.8% and 172.6%, respectively over *IISR-Viswashree*.

The morphological features and quality parameters of both varieties are given in Table 4. The tree is a pure female which flowers profusely and bears oblong shaped yellow fruits. The fresh weight of IC-537218 fruits ranged from 75-100 g; seed wt.13.0-16.0 g and mace 4.5-6.0 g in comparison with the released

Table 1. Effect of location on number of fruits tree⁻¹, weight of dry nuts tree⁻¹ and weight of mace tree⁻¹ in nutmeg varieties

Variety	Peruvannamuzhi				Pollachi				Karuvarakundu			
	2010-11	2011-12	2012-13	Mean	2010-11	2011-12	2012-13	Mean	2010-11	2011-12	2012-13	Mean
No. of fruits tree ⁻¹	1914	2479	2878	2424	1943	2502	2911	2452	2000	2501	2973	2491
<i>IISR-Viswashree</i>	1142	1419	1680	1414	1170	1446	1744	1453	1198	1500	1734	1477
% Increase over <i>IISR-Viswashree</i>				71.4				68.5				68.6
Weight of dry nuts tree ⁻¹ (g)	20093	26048	30197	25446	20434	26266	30567	25755	20934	26059	31215	26070
<i>IISR-Viswashree</i>	10275	12770	15081	12708	10539	13016	15699	13084	11258	13501	16209	13656
% Increase over <i>IISR-Viswashree</i>				100.2				96.8				90.96
Weight of mace tree ⁻¹ (g)	4019	5206	6044	5090	4081	5254	6113	5150	4172	5239	6223	5211
<i>IISR-Viswashree</i>	1484	1845	2184	1838	1516	1880	2262	1886	1533	1950	2341	1942
% Increase over <i>IISR-Viswashree</i>				176.9				173.1				168.33

Table 2. Pooled analysis of yield and yield attributes in nutmeg

Variety	No. of fruits	Wt. of dry nuts tree ⁻¹ (g)	Wt. of mace tree ⁻¹ (g)
IC-537218	2455	25757	5150
<i>IISR-Viswashree</i>	1448	13150	1889
% Increase over <i>IISR-Viswashree</i>	69.5	95.8	172.6
CD (P<0.05)	16.98	145.24	12.00
CV (%)	1.57	1.31	0.61

Table 3. ANOVA for pooled analysis

	DF	Fruit Number	Nut weight	Mace weight
Replication	2	722.37	29943.72	154.95
Varieties	1	13705577.01**	2145732823**	143619337.10**
Location	2	19386.41**	2792361.64 **	57299.88**
Year	2	2599921.37**	258384965.56**	8766962.36**
Location × Varieties	2	270.54	131581.22	369.16
Year × Varieties	2	200457.40**	31021271.82**	1877696.55**
Location × year	4	389.24	222919.49**	3976.51**
Location × Year × Varieties	4	1837.86	79730.13	3743.34**
Pooled error	30	932.89	64525.01	466.26
Total	49	365764.8	51578702.54	3114612.0

Table 4. Morphological and quality parameters of IC-537218 and *IISR-Viswashree*

Characters	IC-537218	<i>IISR- Viswashree</i>
<i>a) Morphological characters</i>		
Plant height of graft	4.5 to 5.0 m at 10 years	3.5 to 5.0 m at 10 years
Leaf size	Medium	Medium
Leaf shape	Elliptic	Elliptic
Age at first flowering of graft	4 years after planting	4 years after planting
Flowering	Profuse	Profuse
Per centage of male flowers	0.0	0.0
Per centage of female flowers	100	100
Arrangement of flowers	Single	Single or clusters of 2-3
Colour of ripe fruit	Yellow	Yellow
Colour of aril	Dark red	Dark red
Colour of seed	Brownish black	Shining black
Shape of fruit	Elongate/oblong	Round to oblong
Size of nut	Bold	Medium
Mace	Covers the entire seed, thick and dark red	Do not cover the entire seed, thin

Contd...

Characters	IC-537218	IISR- Viswashree
<i>b) Yield and yield attributes</i>		
Fresh weight of fruit (g)	75-100	80-100
Fresh weight of seed (g)	13-16	10.0-13.5
Dry recovery of nut (%)	70	70
Fresh weight of aril (g)	4.5-6.0	2.8-3.7
Dry recovery of aril (mace) (%)	35	35
Mean fruit yield graft ⁻¹ at 10 th year after planting	2000	1200
Dry nut yield ha ⁻¹ @360 graft (kg)	7560	4050
Mace yield ha ⁻¹ @360 grafts (kg)	1510	550
<i>c) Quality characters</i>		
Nut oil (%)	5.9	7.1
Mace oil (%)	7.5	7.1
Nut recovery (%)	70	70
Mace recovery (%)	35	35
Oleoresin in nut (%)	9.1	9.8
Oleoresin in mace (%)	-	13.8
Myristicin in nut oil (%)	1.6	12.5
Myristicin in mace oil (%)	9.4	22.0
Elemicin in nut oil (%)	1.4	13.6
Elemicin in mace oil (%)	0.07	20.8
Butter in nut (%)	24.9	30.9
α-pinene in mace oil (%)	7.1	7.5
β-pinene in mace oil (%)	4.7	7.7
Sabinene in nut oil (%)	35.4	15.9
Sabinene in mace oil (%)	29.4	19.7
Safrole in nut oil (%)	0.1	0.1

variety *IISR-Viswashree* which has a fresh fruit weight of 80-100 g; seed weight of 10-13.5 g and mace weight of 2.8-3.7 g. This nutmeg variety has bold nuts with thick reddish mace covering the entire seed. The nut is bold and brownish black in colour. The mace and nut oils are rich in sabinene.

The accession was superior over *IISR-Viswashree* at various locations for number of fruits tree⁻¹,

weight of dry nuts tree⁻¹ and weight of mace tree⁻¹ and is suitable for cultivation in Kerala and Tamil Nadu. It is proposed to release as a *IISR Keralashree*.

References

Indian Horticulture Data Base 2013 National Horticulture Board, Ministry of Agriculture, pp.289.