EVALUATING THE AROMA QUALITY OF NUTMEG ACCESSIONS MYRISTICA FRAGRANS L.

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Abstract

Aroma quality of nut and aril of nutmeg accessions maintained at Central Plantation Crops Research Institute, Research Centre is studied. Extractable fat, oleoresin and essential oil of nut and oleoresin and essential oil of aril are the main constituents analysed for evaluating these accessions. Acc. No. 66 and 78 are superior as far as aroma quality is concerned. The quality components are projected to give per plant yields. Acc. No. 66 is found to yield 1.60 kg of extractable fat, 1.15 kg of oleoresin and 133.8 ml of essential oil. Aril of Acc. No. 66 is found to yield 0.28 kg of oleoresin and 36.9 ml of essential oil.

Introduction

Nutmeg *Myristica fragrans* L. is indigenous to eastern islands of the Mouluccas in Indonesia. The tree produces two separate spices nutmeg (the dry shelled seeds) and mace (the dry arillus). The total area under this crop in India is estimated to be 250 ha producing 180 tonnes of nutmeg and 15 tonnes of mace (Nair *et al.*, 1978). The major nutmeg tracts in India are in Kerala and Tamil Nadu. Even though nutmeg oil and oleoresin are widely used in perfumery and confectionary, reports on the aroma quality are scanty (Lewiz *et al.*, 1974; Jauregriberry and Wolff, 1962). Studies on the Lipophilic profile of extractable fat from nutmeg is indicative of its possible use in perfumery (Gopalam and Zachariah, 1986). The results of the study on 20 accessions are reported in this paper.

Materials and Methods

Nut and aril from eighteen year old plants comprising of 20 nutmeg (Myristica fragrans L.) accessions obtained from Agricultural Farm, Mannuthy are maintained at CPCRI Research Centre, Kannara are used in this study. Nutmeg fruits are harvested after 9 months since flowering, when the pericarp splits open exposing scarlet aril. The outer fleshy portion is removed and nut and mace are separated and dried for 9 and 7 days respectively in a partial shade. A uniform sample is selected for analysis when the dark brown nut fades in its colour and scarlet aril turns to yellow brown. The samples are communited just before assessment for aroma quality. Extractable fat is obtained as per the method previously described (Gopalam and Zachariah, 1986) and estimated by gravimetry. Fat depleted nut is used for oleoresin extraction. Oleoresin of fat depleted nut and aril are extracted by acetone percolation and the essential oil by clevengers distillation unit lighter than water type. Aroma quality constituents are expressed both on absolute and per plant basis by extrapolating the results in the former by yield components of the latter. Since these constituents follow a uniform distribution pattern, standard deviation is calculated and they are ranked into high, medium and low on the basis of an evaluation scale.

Results and Discussion

Nut-fat, oleoresin and essential oil determined on moisture free basis are presented in Table I. The variation in nut-fat ranged from 10.52 to 48.65%. Oleoresin varied

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from 2.70% to 14.21% and the essential oil from 1.4 to 3.4%. For demarcating a high quality accession, a single constituent either ext. fat or oleoresin does not appear to be suitable. However, the sum of nut fat and oleoresin when considered together appear to be indicative of the aroma quality of nutmeg. Considering this aspect acc. Nos. 18, 62 and 66 appear to be superior to the other accessions. Incidentally essential oil levels are also moderate in these accessions. It is previously reported (Gopalam and Zachariah, 1986) that oleoresin extraction in nutmeg is unique and extractable fat interference is observed. The designation of high quality lines on the basis of oleoresin and extractable fat further confirm the view expressed by the author (Loc. cit.). Absolute values of the aroma constituents in any spice crop mislead the commercial potential of the latter. To overcome this yields of spice products on a per hectare basis are taken into consideration, while assessing the superiority of either accessions, cultivar or varieties (Kaliannan Raju *et al.*, 1985).

The projected yields of these aroma constituents per plant basis are presented in Table II. The range of variation in extractable fat is observed to be 0.109 kg to 1.856 kg respectively. Oleoresin in nut varied from 0.024 kg to 1.147 kg and in aril ranged from 16 ml to 155 ml. Nut fat, oleoresin and essential oil are ranked high in acc. no. 66 and 78. The sum of oleoresin and extractable fat is also high in these accessions.

The aroma quality of aril which embraces the nut is important to assess the overall performance of an accession. The oleoresin and essential oil as expressed as absolute values and extrapolated per plant basis are presented in Tables 3 and 4 respectively. On the basis of the absolute values oleoresin generally ranged from 10.54 to 38.68% and essential oil from 2.2 to 5.8%. Some of the accessions which contained high oleoresin are 38, 56, 64 and 66 and those which contained high essential oils are 31, 32, 40, 51, and 53. On the basis of per plant yields acc. no. 31, 64, 66 and 78 are higher as far as oleoresin are concerned and acc. no. 51, 78 contained high oils.

As an over view acc. no. 66 followed by 78 are superior accessions where the aroma quality of nutmeg is a criteria of selection. Aroma quality is one of the important criteria when the programme of selection is quality oriented. Along with the constituents which contribute to the quality, the oleoresin, extractable fat and essential oil of nut oleoresin, essential oil and aril are important aroma bearing compounds. It is evident that when the breeding for quality is primary objective not more than two accessions can be shortlisted. Incidently present accession which is qualitatively superior is a potential high yielder also. These materials can be propagated effectively on large scale by epicotyl grafting.

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Table 1. Variation in aroma quality in dried shelled nut of nutmeg accessions.
% Moisture free basis.

Sl. No.	Acc. No.	Nut-fat	Oleoresin	Essential oil
1	18	48.63 H*	2.70	2.4
2	20	17.65	8.65	3.4 H
3	30	11.98	6.81	1.6
4	31	12.92	13.22 H	1.8
5	32	15.72	9.85	3.2 H
6	38	26.20	5.04	1.8
7	40	15.13	10.19	1.8
8	43	16.75	10.61	1.6
9	44	15.98	8.23	1.6
10	48	16.18	6.31	2.6
11	51	17.29	4.68	1.6
12	53	15.23	4.15	1.6
13	54	10.52	9.34	2.8
14	56	21.16	4.23	2.8
15	62	19.17	14.21 H	1.8
16	64	14.91	8.83	1.4
17	66	33.23 H	4.88	2.2
18	71	15.73	6.19	1.4
19	78	16.85	12.05 H	1.4
20	80	14.82	7.95	1.6
H = High =		27.39	11.09	2.64

* Value more than mean + Standard deviations.

Table 2. Variation in aroma quality of dried shelled nuts of nutmeg (per plant basis)

Sl. No.	Acc. No.	Nut fat Kg	Oleoresin Kg	Essential Oil ml
1	18	0.49	0.03	24.2
2	20	0.23	0.11	43.5
3	30	0.18	0.10	24.7
4	31	0.76	0.78	106.1
5	32	0.75	0.48	157.0 H
6	38	0.89	0.17	61.7
7	40	0.47	0.31	43.2
8	43	0.74	0.47	70.8
9	44	0.55	0.28	54.9
10	48	0.28	0.11	5.1
11	51	0.91	0.25	83.9
12	53	0.37	0.10	38.9
13	54	0.11	0.10	29.1
14	56	0.12	0.02	15.9
15	62	1.00	0.76 H	54.6
16	64	0.74	0.44	69.7
17	66	1.86 H*	0.77 H	122.9 H
18	71	0.47	0.19	42.1
19	78	1.60 H	1.15 H	133.8 H
20	80	1.04	0.56	112.4 H
High		1.14	0.67	109.1

* Value more than mean + standard deviation.

Table 3. Variation in aroma quality of dried out nutmeg accessions.

Sl. No.	Acc. No.	Oleoresin g	Eassential oil ml
1	18	38.68	4.8
2	20	8.78	4.2
3	30	35.30	4.2
4	31	32.38	5.3 H
5	32	10.95	4.5
6	38	36.37 H	5.6 H
7	40	12.94	5.6 H
8	43	16.34	3.6
9	44	14.48	3.6
10	48	31.76	3.2
11	51	12.98	5.8 H
12	53	13.21	5.4 H
13	54	12.56	2.8
14	56	34.78 H	3.8
15	62	10.78	4.0
16	64	33.52 H	5.2
17	66	34.40 H	4.6
18	71	12.29	3.2
19	78	14.89	4.3
20	80	10.54	3.4
H = High		32.68	5.26

Value more than mean + standard deviation.

Table 4. Variation in aroma quality in dried aril of nutmeg accessions (per plant basis).

Sl. No.	Acc. No.	Oleoresin	Essential oil
1	18	0.045	5.6
2	20	0.040	19.3
3	30	0.101	12.1
4	31	0.386	65.2
5	32	0.141	57.8
6	38	0.179	27.6
7	40	0.064	28.0
8	43	0.099	21.9
9	44	0.076	19.1
10	48	0.066	6.7
11	51	0.163	72.7 H
12	53	0.062	25.2
13	54	0.044	9.7
14	56	0.066	7.2
15	62	0.127	47.2
16	64	0.256 H	39.8
17	66	0.277 H	36.9
18	71	0.086	22.4
19	78	0.409 H	118.2 H
20	80	0.120	38.8
H = High		250.2	61.5

Value more than mean + standard deviation.