

## Variability and association studies in cinnamon (*Cinnamomum verum*)<sup>1</sup>

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### ABSTRACT

Seventy one cinnamon accessions studied for variability and association revealed high coefficient of variation for dry and fresh bark yield, bark oleoresin, leaf oil, bark oil, leaf size index and percentage recovery of bark. Association analysis revealed significant correlation of fresh weight of bark and leaf oil with dry bark yield. Bark oil was negatively associated with leaf oil.

Key words : cinnamon, *Cinnamomum verum*, germplasm, correlation, variability

Cinnamon (*Cinnamomum verum* Bercht & Presl.) is an important tree spice. The dried bark (quill) of the tree is the cinnamon of commerce. Leaf and bark oil are also extracted for commercial use. India imports cinnamon bark for domestic consumption and as such, there is ample scope for genetic improvement for higher yields. Cinnamon is propagated through seeds and the species is reported to be cross pollinated (Josy Joseph 1981). No systematic evaluation of variability in cinnamon germplasm has been done. Ponnuswami *et al.* (1982) reported good variability for five growth characters in a six year old seedling population of cinnamon. Krishnamoorthy, Gopalram & Abraham (1988) observed significant variability

for bark oil content in cinnamon germplasm. Krishnamoorthy, Rema & Sasikumar (1991) also observed significant variation in progeny performance of nine trees for plant height, number of branches per tree, fresh and dry weight of bark and per cent recovery of bark. The present note deals with evaluation of 71 cinnamon germplasm accessions maintained at NRCS Farm, Peruvannamuzhi for yield and quality traits.

Seventy one cinnamon accessions collected from different parts of Kerala and Sri Lanka were maintained at NRCS Farm, Peruvannamuzhi. The trees were 12 years old and of uniform growth. They were planted in a spacing of 13 m x 3 m and received the recommended

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mace. Since flavour and other major components of mace are being synthesised in tissue cultures, this technique could form a base for possible *in vitro* production of myristicin which has anticarcinogenic properties.

### References

- Gopalakrishnan M 1992 Chemical composition of nutmeg and mace. *J. Spices & Aromatic Crops* 1:49-54.
- Himeno H & Sano K 1987 Synthesis of crocin, picrocrocin and safranal by saffron stigma-like structures proliferated *in vitro*. *Agric. Biol. Chem.* 51:2305-2400.
- Hori H, Enomoto K & Nakaya M 1988 Induction of callus from pistils of *Crocus sativus* L. and production of colour components in callus. *Plant Tissue Culture Letters* 5:72-77.
- Mc Cown, Brent H & Amos R 1979 Initial trials of commercial micro-propagation with birch. *Proc. International Plant Prop. Soc.* 29:387-393.
- Mulder-Krieger, Verpoorte R, Baerheim Sevendsen & Scheffer 1988 Production of essential oils and flavours in plant cell and tissue culture - A review. *Plant Cell, Tissue & Organ Culture* 13:85-154.
- Sano K & Himeno H 1987 *In vitro* proliferation of saffron (*Crocus sativus* L.) stigma. *Plant Cell, Tissue & Organ Culture* 11:159-166.
- Sarma K S, Maesato K, Hara T & Sonoda Y 1990 *In vitro* production of stigma like structure from stigma explants of *Crocus sativus* L. *J. Exp. Bot.* 41:745-748.
- Sarma K S, Sharada K, Maesato K & Hara T 1991 Chemical and sensory analysis of saffron produced through tissue cultures of *Crocus sativus*. *Plant Cell, Tissue & Organ Culture* 26:11-16.
- Sujatha Viswanathan, Ravishankar G A & Venkataraman L V 1990 Induction of corcin, crocetin, picrocrocin and safranal synthesis in callus cultures of saffron - *Crocus sativus* L. *Biotechnol. App. Biochem.* 12:336-340.
- Zheng G, Kinney P M & Lam L K T 1992 Myristicin : A potential cancer chemopreventive agent from parsley leaf oil. *J. Agric. Food Chem.* 40:107-110.

**Table 1. Mean, range and coefficient of variation for nine characters in cinnamon**

Character	Mean	Range	C V (%)
Leaf length (cm)	13.08	8.75 - 20.69	17.83
Leaf breadth (cm)	5.06	3.31 - 8.30	18.74
Leaf size index	0.67	0.29 - 1.71	35.13
Fresh weight of bark (g)	207.41	30.00 - 840.00	67.19
Recovery of bark (%)	32.08	10.70 - 80.00	34.00
Bark oleoresin (%)	8.48	1.32 - 20.02	57.08
Bark oil (%)	1.81	0.51 - 3.85	36.28
Leaf oil (%)	1.97	0.72 - 4.80	48.46
Dry weight of bark (g)	64.70	8.00 - 305.00	74.73

Number of accessions : 71

package of practices. The first copicing was done when the trees were four years old. Observations were recorded from a single tree per accession on leaf length, leaf breadth, leaf size index, fresh weight of bark, recovery percentage of bark, bark oleoresin, bark oil and leaf oil contents and dry weight of bark. The data were analysed as per standard procedures.

Among the various characters, maximum variation was observed for dry weight of bark followed by fresh weight of bark, bark oleoresin and leaf oil. Bark oil and leaf size index also had moderate variability (Table 1). Inter character association of the nine characters studied revealed highly significant association of fresh weight of bark and leaf oil with dry weight of bark (Table 2). The association was also observed between leaf length and leaf breadth, leaf length and leaf size index as well as leaf breadth and leaf size index. All other associations were negligible. However, leaf width and bark recovery had moderately good association with dry weight of bark, albeit non significant. A negative trend was observed in the associa-

tion between bark oil and dry weight of bark.

### References

- Josy Joseph 1981 Floral biology and variation in cinnamon. In: Vishveshwara E (Ed.) Proc. PLACROSYM-IV pp.431-434. Indian Society for Plantation Crops, Central Plantation Crops Research Institute, Kasaragod, India.
- Krishnamoorthy B, Gopalam A & Jose Abraham 1988 Quality parameters of cinnamon in relation to flush colour. Indian Cocoa, Arecanut and Spices J. 12 (2) : 38.
- Krishnamoorthy B, Rema J & Sasikumar B 1991 Progeny analysis in cinnamon. Indian Cocoa, Arecanut and Spices J. 14 (3) : 124-125.
- Ponnuswami V, Irulappan I, Annadurai S & Vadivel E 1982 Variability studies in cinnamon (*Cinnamomum zeylanicum* Breyn.). South Indian Hort. 30 (2) : 159-160.

Table 2. Inter-character association in cinnamon

Character	Leaf length	Leaf breadth	Leaf size index	Fresh weight of bark	Recovery of bark	Bark oleoresin	Bark oil	Leaf oil	Dry weight of bark
Leaf length	1.00	0.70**	0.91**	0.067	0.071	-0.00	0.069	-0.034	0.062
Leaf breadth		1.00	0.90**	0.18	0.063	-0.106	-0.048	-0.006	0.21
Leaf size index			1.00	0.13	0.029	-0.053	0.020	-0.021	0.13
Fresh weight of bark				1.00	-0.069	-0.006	-0.165	0.19	0.94**
Recovery of bark					1.00	-0.13	-0.015	0.17	0.21
Bark oleoresin						1.00	0.17	-0.16	-0.046
Bark oil							1.00	-0.37**	-0.20
Leaf oil								1.00	0.29**
Dry weight of bark									1.00

\*\* Significant at 1% level