

Performance of cassia [*Cinnamomum cassia* (Blume)] genotypes under high rainfall and high altitude Kodagu region of Karnataka

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Abstract

Fifteen cassia (*Cinnamomum aromaticum*) genotypes were evaluated for their performance for growth and yield characters under high rainfall and high altitude Kodagu region of Karnataka. Analysis of fresh and dry bark yield plant⁻¹ after 7 years of planting showed significant variation among the genotypes. Among the genotypes, IC370405 exhibited superiority in terms of dry weight (1083 g plant⁻¹) and IC370408 was superior in quality.

Keywords: cassia, *Cinnamomum aromaticum*, Chinese cinnamon, yield.

Cassia (Chinese cinnamon) [*Cinnamomum cassia* (Blume)] (Family: Lauraceae) is often used as substitute for cinnamon. Cassia trees growing at 180-300 m above MSL yield better quality bark with higher volatile oil content, whereas, those growing at 90-150 m above MSL yield a relatively thick, coarse bark, somewhat deficient in flavour, containing 1.0% to 1.2% volatile oil (Pruthi 1992). Hence, the present experiment was undertaken to evaluate the performance of cassia genotypes at the high rainfall (2000-3000 mm year⁻¹) and high altitude (1000 m above MSL) Kodagu region of Karnataka.

Fifteen cassia genotypes namely, IC370401, IC370404, IC370405, IC370406, IC370408, IC370410, IC370414, IC370415, IC370418, IC370423, IC370424, IC370425, IC370427,

IC370428, and IC370429 were planted as a monocrop in 2001 at the Cardamom Research Centre, Appangala (Kodagu District, Karnataka) (12°26'N latitude and 75°45'E longitude). The experiment was conducted in a randomized block design with eight replications. The vegetatively propagated genotypes (cuttings) consisted of 15 accessions as treatments (1 plant treatment⁻¹) and planted in a spacing of 2 m × 2 m. The first harvest (one time) was performed after 7 years of planting in November, and observations were recorded on various characters namely, plant height, number of branches, girth, leaf length, leaf breadth, canopy size, fresh bark yield and dry bark yield. The data was statistically analyzed by the method of Panse & Sukhatme (1995).

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Table 1. Morphological, yield and bark oil characters of cassia genotypes

Acc. No.	Plant height (cm)	No. of branches	Girth at 120 cm (cm)	Leaf length* (cm)	Leaf breadth* (cm)	Canopy (sq. m)	Bark yield (g plant ⁻¹)		Oil content (%)	Oleoresin content (%)	Cinnamaldehyde content (%)	
							Fresh	Dry				
IC370401	444.30	22.00	19.25	20.13	5.65	6.26	1268.00	512.50	40.42	3.06	14.02	74.18
IC370404	392.50	16.33	14.50	23.53	6.03	4.73	1216.60	416.67	34.25	3.26	11.37	66.15
IC370405	410.00	16.50	17.58	22.93	5.76	3.84	2380.00	1083.30	45.50	2.37	09.97	84.20
IC370406	411.40	18.42	16.42	20.77	6.26	5.00	1285.00	450.00	35.02	1.23	11.92	67.01
IC370408	465.00	21.00	17.71	20.34	5.95	6.85	2082.50	850.00	40.82	3.71	14.14	81.58
IC370410	407.14	20.85	16.57	20.23	5.74	3.39	1613.80	623.75	38.65	2.63	12.05	69.62
IC370414	387.00	19.80	15.20	19.62	5.68	4.24	1076.30	450.00	41.81	2.65	07.52	65.07
IC370415	416.25	19.36	18.00	20.60	6.08	5.73	2040.00	608.34	29.82	3.12	10.76	78.77
IC370418	407.14	15.86	15.80	19.63	5.73	4.24	1971.60	1000.00	50.72	1.41	10.28	75.60
IC370423	395.00	20.17	19.50	21.77	5.90	4.47	1233.30	450.00	36.49	1.20	08.87	89.63
IC370424	340.71	13.43	14.86	19.63	5.82	4.31	1438.80	583.30	40.54	2.52	08.58	83.71
IC370425	347.14	16.43	14.43	20.40	5.91	3.70	1163.30	400.00	34.38	2.56	11.58	77.93
IC370427	399.30	21.83	18.00	20.47	6.02	3.98	2150.00	716.67	33.33	3.28	09.48	75.45
IC370428	375.70	16.29	17.86	20.23	5.99	5.14	2583.00	960.00	37.16	3.37	09.33	73.39
IC370429	369.38	18.63	16.88	21.27	6.19	3.75	1405.00	750.00	53.38	1.58	09.02	73.40
Mean	398.12	18.46	16.84	20.70	5.89	4.67	1645.10	626.25				
SD	57.23	03.01	02.66	01.85	0.68	1.25	499.51	163.89				
CV	28.75	32.71	31.61	17.88	23.20	53.73	60.73	52.34				
CD (P=0.01)	NS	NS	NS	NS	NS	NS	1312.20	430.53				

*3rd leaf

Dried bark of cassia (20 g) was powdered and hydro distilled for 3 h using Cleavenger trap to yield essential oil (AOAC 1975). The separated oil was collected and traces of moisture were removed using anhydrous sodium sulphate and the oil content was calculated. The constituents of the oil were analyzed using gas chromatography-flame ionization detector (GC-FID). GC-FID analysis of the oil was conducted on a Shimadzu gas chromatograph equipped with FID and RTx-5 column. Oven temperature was programmed from 70°C to 210°C at the rate of 5°C min⁻¹. FID temperature and injection port temperature were maintained at 300°C. The chief constituent of the oil was identified by comparing the retention time with that of cinnamaldehyde purchased from Sigma Chemicals. Powdered bark (10 g) was packed in a column, 60 ml acetone (AR grade) was added to it and kept overnight. The extract was drained into a weighed beaker and the column containing the residue was re-extracted twice with acetone (50 ml each) at ambient conditions. The combined extract was evaporated to dryness to constant weight. From the difference in weight, the oleoresin content was calculated and expressed as percentage (AOAC 1975).

There was no significant variation for vegetative characters among the 15 genotypes under study (Table 1). Both fresh and dry bark yield characters showed more than 50% variation among the different genotypes. The highest fresh yield was recorded in IC370428 (2583 g plant⁻¹), which was on par with IC370405 (2380 g plant⁻¹) and IC370427 (2150 g plant⁻¹). The highest dry recovery was recorded in IC370405 (1083 g plant⁻¹) which was on par with IC370418 (1000 g plant⁻¹) and IC370428 (960 g plant⁻¹). Maximum per cent

dry recovery was recorded in IC370418 (50.72%).

The essential oil content varied from 1.20% (IC370423) to 3.71% (IC370408). The oleoresin content varied from 7.52% (IC370414) to 14.14% (IC370408). The highest cinnamal-dehyde content was recorded in IC370423 (89.63%) followed by IC370405 (84.20%). Maximum bark oil content of 4.9% and cinnamaldehyde content of 90.5% were recorded in cassia at Peruvannamuzhi, Kerala (IISR 2007). The superior genotypes for different characters, can be used for developing genotypes for cultivation in high rainfall and high altitude Kodagu region of Karnataka.

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References

- AOAC (Association of Official Analytical Chemists) 1975 Official Methods of Analysis. Association of Official Analytical Chemists, 10th Edn. Washington DC.
- IISR (Indian Institute of Spices Research) 2007 Annual Report 2006-07. Indian Institute of Spices Research, Calicut.
- Panse V G & Sukhatme P V 1995 Statistical Methods for Agricultural Workers. Indian Council of Agricultural Research, New Delhi.
- Pruthi J S 1992 Spices and Condiments, IVth Edn. National Book Trust, New Delhi.