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VARIABILITY AMONG CINNAMON GENOTYPES FOR GROWTH CHARATERISTICS UNDER HILL ZONE OF KARNATAKA INDIA

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ABSTRACT

Cinnamon (*Cinnamomum verum* J. Presl), a valuable spice crop of the Lauraceae family, is widely recognized for its culinary, medicinal and aromatic applications. Despite increasing interest in its cultivation in India, particularly in Karnataka's hill zone, systematic studies on genetic and phenotypic variability remain limited. This study was conducted at the College of Horticulture, Sirsi, Karnataka, to evaluate morphological variability among fifteen cinnamon genotypes collected from diverse agro-climatic regions of India. The experiment, laid out in a Randomized Complete Block Design with two replications, assessed key growth parameters such as plant height, collar girth, canopy spread in both directions and number of lateral branches recorded 24 months after planting. Significant differences were observed among genotypes with COHS-C-11 exhibiting the highest plant height (177.83 cm) and collar girth (45.45 mm), and COHS-C-5 showing the maximum number of branches (15.5), canopy spread in East-West direction (127.5 cm) and North-South direction (122.0 cm). The results show variability which can be effectively utilized for selecting superior genotypes for cultivation and breeding.

***Keywords*:** *Cinnamomum verum*, variability, cinnamon.

Introduction

Cinnamon (*Cinnamomum verum* J. Presl), a highly valued spice crop belonging to the Lauraceae family, holds significant importance for its culinary, medicinal and aromatic properties. Being earliest known spices used by humankind (Rosengarten, 1969), its versatile flavor profile and distinctive fragrance made it as wider application in seasonings, culinary and beverage industries (Barceloux, 2008; Rao and Gan, 2014; Muhammad and Dewettinck, 2017). The genus *Cinnamomum* Schaeffer comprises approximately 50-55 genera and 2500–3000 species, primarily consisting of evergreen trees adapted to tropical and subtropical climate. *Cinnamomum* is the largest genus within Lauraceae, with around 250 species widely distributed across India, Sri Lanka and Australia (Joy and Maridass, 2008; Mabberly, 2008). In South India, *Cinnamomum* is represented by 12 endemic species, along with the introduced and cultivated species (Kostermans, 1983). India, though not the largest producer globally, has seen a growing

interest in cinnamon cultivation due to its economic potential and increasing domestic demand.

Cinnamon is highly valued for its pharmaceutical and nutraceutical properties due to its rich bioactive compounds like cinnamaldehyde and eugenol. It exhibits antimicrobial, anti-inflammatory, antioxidant and antidiabetic effects, making it useful in managing infections, inflammation, oxidative stress and blood sugar levels. Nutraceutically, it supports heart health, improves digestion, aids in weight management and enhances immunity. Its inclusion in functional foods and supplements highlights its growing role in promoting health and preventing chronic diseases.

Among the diverse agro-climatic zones in the country, the hill zone of Karnataka offers a unique microenvironment that is conducive to the cultivation of cinnamon.Variability in plant charaters plays a crucial role in crop improvement programmes, as it forms the foundation for selection and breeding of superior genotypes. In cinnamon, morphological and biochemical variability can influence not only yield but also essential oil content, bark quality and adaptability to specific environmental conditions. However, systematic studies on the extent and nature of variability in cinnamon under the hill zone of Karnataka remain limited. This study aims to evaluate the growth characters among different cinnamon genotypes cultivated in this region. By assessing key agronomic traits, the research seeks to identify promising genotypes suitable for cultivation and further genetic improvement.

Materials and Methods

The field experiment was conducted at the College Farm, Terakanahalli, situated at College of Horticulture, Sirsi, located in the hill zone (Zone-9) of Karnataka. This region is characterized by a humid tropical climate, with well-distributed rainfall and moderate temperatures, ideal for the growth of cinnamon. The soil at the experimental site was lateritic in nature with good drainage. A total of fifteen cinnamon genotypes, collected from different agro-climatic regions across India, were evaluated for their growth, yield and quality performance. The genotype COHS-C-6 (Konkan Tej) was used as the check variety. The experiment was laid out in a Randomized Complete Block Design (RCBD) with two replications. The genotypes were planted at a spacing of 3×3 meters and standard agronomic and horticultural practices recommended for cinnamon cultivation were followed uniformly across the experimental plots. Regular irrigation, weed management and nutrient application were carried out as per the package of practices recommended by UHS Bagalkot.

Two years after planting, following vegetative growth parameters were recorded. Plant height and the canopy spread in two directions North-South (N–S) and East-West (E–W) was measured by using a measuring scale and expressed in centimeters (cm). Girth of the main stem was measured at 5 cm above the ground level using a vernier caliper and expressed in millimeters. The number of branches emerging from the main stem was manually counted and recorded as the number of lateral branches per plant. The mean data recorded for each parameter across the two replications were subjected to analysis of variance (ANOVA) appropriate for a RCBD to assess the significance of variation among the genotypes.

Results and Discussion

The important vegetative traits in the early stage of cinnamon plant growth which contribute significantly towards yield were subjected to statistical analysis and results obtained are furnished in Table 1. Tree height is a vital agronomic parameter that significantly impacts the yield and overall productivity of plants. The genotypes varied significantly with regard to plant height. At 24 MAP, COHS-C-11 recorded maximum plant height (177.83 cm) and collar girth of 45.45 mm (Fig.1). Plant height was on par with COHS-C-5 (147.17 cm), COHS-C-7 (146.33 cm) and COHS-C-4 (145.67 cm) while, minimum plant height was recorded in COHS-C-10 (52 cm). Joy *et al*. (1998) reported the genetic variation in the cinnamon core collections for plant height and substantial variations have been observed among half-sibling progenies of *C. zeylanicum*. Collar girth was observed in COHS-C-11 (45.45 mm) was statistically comparable to COHS-C-7 (44.21 mm) and COHS-C-5 (38.44 mm) while, lowest collar girth was recorded in COHS-C-16 with closely similar values with COHS-C-10 (10.25 mm). A larger girth often indicates better vascular development, enabling efficient transport location of water, nutrients and photosynthates, which are essential for growth and productivity.

The highest number of lateral branches was observed in COHS-C-5 (15.5), which was statistically par with COHS-C-11 (15.25), COHS-C-7 (14.33), COHS-C-3 (13.5) and COHS-C-9 (13.17). The lowest number of lateral branches was recorded in COHS-C-16 (1.5). The number of lateral branches increases the surface area for leaf and bark production which directly contributes to higher yields (Kozlowski and Pallardy, 1996). The highest plant spread in East-West direction (127.5 cm) and North- South direction (122.0

cm) was recorded by the genotype COHS-C-5. A wider canopy spread allows for better light capture, enhancing photosynthesis and subsequent biomass production and it is crucial for cinnamon, where leaf and bark are economic products. Various studies have highlighted significant morphological variations in cinnamon species. Paul and Sahoo (1993) noted differences in stem girth in Odisha plantations, while Mozumder*et al*. (2016) reported maximum base girth and tree volume in *Cinnamomum zeylanicum*. Senthil Kumar *et al*. (2009) evaluated 15 cassia genotypes in Kodagu, Karnataka, Krishnamoorthy *et al*. (1999, 2001) assessed 10 *Cinnamomum cassia* accessions, study of Joy *et al*. (1996) on 234 accessions at AMPRS in Kerala showed wide range of morphological variation among studied cinnamon genotypes.

Conclusion

The present study revealed significant variation in growth tarits among fifteen cinnamon genotypes under the hill zone of Karnataka. The observed differences in key growth parameters such as plant height, collar girth, canopy spread, and number of lateral branches highlights the diversity within the species. Notably, genotypes COHS-C-11 and COHS-C-5 demonstrated superior performance across multiple traits, indicating their potential for selection and further utilization in cinnamon improvement programs. Such variability forms a valuable resource for breeding efforts aimed at enhancing productivity and adaptability to local environmental conditions.

Table 1 : Vegetative growth of cinnamon genotypes (2 year after planting)

Genotype	Plant height (cm)	Plant girth (mm)	Plant spread(cm)		Number of lateral branches
			N-S	E-W	
COHS-C-3	133.25	33.31	83.00	85.00	13.50
COHS-C-4	145.67	33.42	104.25	103.25	11.50
COHS-C-5	147.17	38.44	122.00	127.50	15.50
COHS-C-6	93.72	23.46	76.17	79.33	9.50
COHS-C-7	146.33	44.21	106.83	102.67	14.33
COHS-C-8	129.83	27.80	90.50	86.50	10.00
COHS-C-9	138.00	34.70	100.17	98.00	13.17
COHS-C-10	52.00	10.26	20.00	31.75	2.00
COHS-C-11	177.83	45.45	98.67	109.67	15.25
COHS-C-12	92.00	22.73	68.00	59.50	7.50
COHS-C-13	108.75	20.71	70.50	68.50	5.75
COHS-C-14	87.50	18.88	54.75	53.75	3.50
COHS-C-15	91.17	26.47	75.33	70.50	6.83
COHS-C-16	54.75	10.25	18.25	21.25	1.50
COHS-C-17	101.25	26.51	65.25	67.25	8.00
S.Em	**11.20**	**2.34**	**9.90**	**6.92**	**1.26**
CD (0.05)	**33.99**	**7.10**	**30.04**	**21.01**	**3.82**
CV (%)	**13.99**	**11.92**	**18.21**	**12.61**	**19.39**

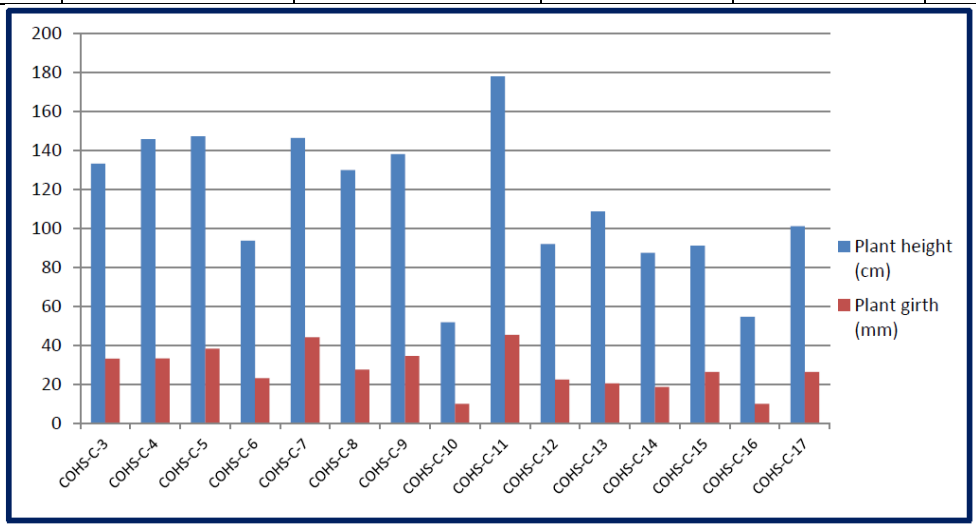

Fig. 1 : Variation in plant height (cm) and plant girth (mm) in cinnamon genotypes

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Abbreviation: MAP- Month after planting

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