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**SHORT COMMUNICATION**

# Preliminary evaluation of cardamom accessions against leaf blight/ Chenthal disease

R. PRAVEENA*, C.N. BIJU, R. SENTHILKUMAR, C.N. DARSHANA and K.C. JASHMI
*Indian Institute of Spices Research, Cardamom Research Centre, Appangala, Heravanadu Post, Madikeri 571 201, Karnataka, India*

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Small cardamom (*Elettaria cardamomum* Maton) popularly known as "Queen of Spices" is a commercially important spice crop belonging to the rhizomatous family, Zingiberaceae. The cardamom of commerce *i.e.*, the dried fruits (capsules) of the cardamom plant is highly valued due to its intrinsic superior qualities like flavour and aroma. Small cardamom which is a perennial herbaceous plant, is indigenous to the moist evergreen rain forests of Western Ghats of South India. It is extensively cultivated in the hilly tracts of South India at elevations of 800 to 1300 MSL either as a monocrop under the shade of forest trees or as an intercrop along with other component crops like arecanut, coffee etc. Globally, India is the leading producer and exporter of cardamom with an area and production of 0. 69 mha and 9470 mt (8). Cardamom industry in India as well in other countries encounters several production constraints, of which diseases incited by various pathogenic fungi, bacteria, viruses and nematodes are considered to be the major problems.

Among the fungal diseases, leaf blight/ Chenthal disease incited by *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc. is the most wide spread, economically important and destructive foliar disease of cardamom. Leaf blight of cardamom popularly known as "Chenthal" was first reported from Idukki district of Kerala state (5). Originally, leaf blight was reported to be caused by the bacterium, *Corynebacterium* spp. (4). However, systematic investigations on the symptomatology, etiology and management aspects revealed that the disease is caused by *C. gloeosporioides* (6). The symptoms induced by the pathogen initially manifests on the foliage as yellowish lesions which later coalesce together to form large blighted areas (Fig.1). The affected area eventually dries up giving a burnt appearance to the plant.

Several fungicides have been recommended to manage this devastating disease before attaining epiphytotic proportions. However, considering persistent nature of the disease in the plantations which attains severity during the post monsoon season, fungicide sprays need to be repeated several times in order to mange the disease effectively which subsequently results in the emergence of fungicide resistant variants of the pathogen, environmental pollution, high labour and chemical inputs and ultimately an escalation in cost of production.

Extensive explorations to discover natural resistance is inevitable for identifying resistant sources which is the most economical, feasible and sustainable strategy to manage diseases. However, information on cardamom lines which are either resistant or tolerant to leaf blight is limited. Hence, the present investigation was undertaken with the objective to identify resistance sources among the cardamom germplasm accessions by screening the lines under natural field conditions.

Fifty cardamom accessions maintained at the experimental farm, Cardamom Research Centre, Indian Institute of Spices Research, Appangala, Kodagu District, Karnataka, India (12°26'N Latitude, 75°45'E Longitude and altitude 920 MSL) were used as experimental materials in the present study. Natural incidence of leaf blight was

**Fig. 1.** Symptoms of leaf blight - yellowish lesions/Chenthal disease caused by *Colletotrichum gloeosporioides*

*Corresponding author: praveena@ spices .res. in

**Table 1.** Reaction of cardamom accessions to Chenthal/leaf blight

| Category | Accession number |
|---|---|
| Highly resistant | IC-349613,IC-349588 |
| Resistant | IC-349368,IC-349402, IC-349411, IC-349484, IC-349646, IC-349410, IC-349440, IC-349453 |
| Moderately resistant | IC-349619, IC-349333, IC-349344, IC-349353, IC-349401, IC-349460, IC-349532, IC-349539, IC-349552, IC-349582, IC-349639, IC-349472, IC-349592, IC-349370,IC-349421, IC-349437, IC-349469, IC-349517, IC-349528, IC-349534, IC-349524 |
| Moderately susceptible | IC-349625, IC-349355, IC-349427, IC-547163, IC-547158, IC-547149, IC-349659, IC-349592, IC-349395, IC-349413, IC-349418, IC-349424, IC-547160 |
| Susceptible | IC-349624, IC-349596, IC-547166, IC-349653 |
| Highly susceptible | IC-547161, IC-547140 |

recorded by employing 1 - 6 disease rating scale (1 – No infection; 2 – Isolated spots; 3 – Sparse elongated spots on younger and matured leaves; 4 – Elongated spots coalesce on young and matured leaves, 25% infection on leaf area; 5 – Extensive elongated spots on all leaf area, 50% of leaf area affected; 6 – Complete infection of all leaves. Blighted appearance of plants) during November 2009 to October, 2010.

Five clumps of each accession were scored for leaf blight incidence and the percentage disease index (PDI) was calculated. The accessions were further classified into highly resistant (< 10%), resistant (11 - 20%), moderately resistant (21 - 30%), moderately susceptible (31 - 40%), susceptible (41 - 50%) and highly susceptible (> 51%) based on percentage disease index.

The accessions exhibited variable reactions towards the leaf blight infection and further the accessions were categorized into different groups based on PDI (Table 1).

Among the accessions screened, two accessions *viz*., IC-349613 and IC-349588 exhibited highly resistant reaction with a disease index of 9.1 and 10.3, respectively. Out of the 50 accessions, 8 were found to be resistant with 11.9 to 20.2 disease index and 21 accessions with 21.0 to 30.2 disease index were grouped under moderately resistant category. The accessions IC-547161, IC-547140 showed highly susceptible reaction with a disease index of 51.9 and 52.4, respectively.

Genetically resistant varieties have been the mainstay for the economic management of plant diseases and considered as the most efficient and feasible among various components in the IDM strategy. Collection, conservation and characterization, the three pillars in the evolution of new varieties have always played vital roles in the development of varieties endowed with several desirable traits. Earlier research in the field of evaluating germplasm for various desirable traits indicated that, owing to cross-pollination, considerable diversity exist in the field populations of cardamom. The studies also revealed that, sources of resistance against leaf blight disease are also existing in the highly heterogeneous population of cardamom (1, 2). Six genotypes viz., IC- 547222, IC-547223, IC-349645,IC - 349649, IC- 547158 and IC-349637 were found to be moderately resistant to leaf blight under field conditions and highly resistant to rhizome rot, another devastating disease of cardamom (3).

Adopting conventional plant breeding approaches supplemented with modern molecular tools would give an impetus to the research aiming at the development of new varieties by harnessing high genetic diversity that exist in the natural population of cardamom. Moreover, periodical monitoring of the pathogen variability by studying relative frequency, distribution and virulence of the pathogen population is also essential since considerable extent of variation is reported in the field populations of the pathogen in other crops (7). Performance of the accessions which exhibited resistant reactions in the present study warrant further screening under natural field conditions in order to establish durable nature of the resistance as the accessions would be exposed to the continuously evolving dynamic populations of the pathogen. Once durability of the resistance is established, the accessions can be incorporated in the resistance breeding programme. Hence, evolving a variety with novel characters like multiple disease resistance, tolerant to pests and other physiological stresses supplemented with good agronomic traits provides a robust system which would be more efficient and sustainable for a commercial crop like cardamom.

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