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Study of Virus/es Threatening Large Cardamom Cultivation in Sikkim and Darjeeling Hills of Northeast India

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Abstract : Large Cardamom (Amomum subulatum), family Zingiberaceae is an aromatic spice crop and has rich medicinal value. Large Cardamom is as synonymous to Sikkim as Tea is to Darjeeling. Since Sikkim alone contributes up to 88% of India's large cardamom production which is the world leader by producing over 50% of the global yield. However, the production of large cardamom has declined almost to half since last two decade. The economic losses have been attributed to two viral diseases namely, chirke and Foorkey. Chirke disease is characterized by light and dark green streaks on leaves. The affected leaves exhibit streak mosaic, which gradually coalesce, turn brown and eventually dry up. Excessive sprouting and formation of bushy dwarf clumps at the base of mother plants that gradually die characterize the foorkey disease. In our surveys in Sikkim–Darjeeling hill area during 2012-14, 40-45% of plants were found to be affected with foorkey disease and 10-15% with chirke. Mechanical and aphid transmission study showed banana as an alternate host for both the disease. For molecular identification, total genomic DNA and RNA was isolated from the infected leaf tissues and subjected to Rolling circle amplification (RCA) and RT-PCR respectively. The DNA concatamers produced in the RCA reaction were monomerized by different restriction enzymes and the bands corresponding to ~1 kb genomes were purified and cloned in the respective sites. The nucleotide sequencing results revealed the association of Nanovirus with the foorkey disease of large cardamom. DNA1 showed 74% identity with Replicase gene of FBNYV, DNA2 showed 77% identity with the NSP gene of BBTV and DNA3 showed 74% identity with CP gene of BBTV. The finding suggests the presence of a new species of nanovirus associated with foorkey disease of large cardamom in Sikkim and Darjeeling hills. The details of their epidemiology and other factors would be discussed.

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