

A Botanical Enigma of India's Hottest Chilli 'Bhoot Jolokia' (*Capsicum Chinense* Jacq.)Praveen Kumar Verma^{1*}, Krishna Kumar Rawat², Niren Das³ and Bijoy Pradhan⁴^{1,3,4}Rain Forest Research Institute, Deovan, Sotai Ali, Post Box # 136, Jorhat – 785 001(Assam), India.²CSIR-National Botanical Research Institute, Rana Pratap Marg, Lucknow – 226 001, Uttar Pradesh, India.E-mail for Correspondence: pkverma_bryo@yahoo.co.in

Abstract: The paper deals with recent botanical enigma of India's hottest chilli 'Bhoot Jolokia', or 'Bih Jolokia' earlier identified as *Capsicum chinense*, now identified as *Capsicum assamicum* Purakyasth *et al.*, as new species from Assam, India. But after the detail investigation as well as literature survey it has been found the new species has no novel characters other than *Capsicum chinense* Jacq. Hence the establishment of the species is in question.

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1. Introduction

Bhoot Jolokia, placed among hottest chillis with 'Trinidad Moruga Scorpion' (Wikipedia, April 2013), is an indigenous cultivar growing in Brahmaputra flood plain of Assam, Nagaland, Manipur and other part of Northeast India. The 'Bhoot Jolokia' came in highlight when Tezpur (Assam) based Defense Research Laboratory declared it is as hottest chilli of the world which replaced the world famous Red Savina Habanera (scientifically *Capsicum chinense*). Guinness Book of World Records, 2006 has recorded it hottest chilli with 1001304 SHU. This extreme character of chilli is due to a volatile phenolic amine 'Capsaicin', a molecule which is responsible for the pungency of chilli peppers and found mainly in the placenta as well as fleshy tissue of the fruit (Heiser, 1969). The capsaicin amount varies from 3-5% in comparison to other chillis of the subcontinent. It has been associated among ethno-agricultural activities of the rural people within region. The people of the north eastern India used the fruits of *Bhoot Jolokia* in different food formulations like flavouring curries due to its high-quality fragrance and pungency and also for various medicinal treatments like headache, night blindness (Deorani and Sharma, 2007), rheumatism, arthritis, gastritis, ankylosing spondylitis, digestive diseases (Sarwa *et al.*, 2012) and to reduce chronic congestion (Bhagowati and Changkija (2009). The peoples inhabiting near forest area use the chilli powder or its smoke to keep elephants away from their agriculture fields. The archaeological data proved that the human civilization has been cultivating *Capsicum* since past 7000 years (Basu and De, 2003) to be used in food recipes for hotness and colouration (Purkayastha *et al.*, 2012). FAO (2000) estimated 1.4 Million Hectares land is currently being under *Capsicum*

cultivation producing about 18 Million metric tons per annum.

According to Chewicz and Thorpe (1996) more than 20 taxa of *Capsicum* are found across the world out of which India hosts five viz. *Capsicum annum* Linn., *Capsicum frutescens* Linn., *Capsicum chinense* Jacq., *Capsicum baccatum* Linn., and *Capsicum pubescens* Linn. (Antonious and Jarret, 2006). Walsh and Hoot (2001) proposed two complexes of *Capsicum* species viz. *C. annum* complex (with *C. annum*, *C. frutescens*, and *C. chinense*) and *C. eximium* complex (with *C. eximium* and *C. cardenasii*). The chilli growing even in same geographical and climatic zone shows significantly difference in pungency. The heat of the chilli may reduce up to 50% in arid environment (Tiwari, 2005). On the other hand, ripe fruits may have a maximum number of 45 seed per fruit against a normal count of 25 to 40. Similarly, the full grown healthy plants may produce more than 70 fruits in a single season against a normal range of 30-45.

The traditional 'Bhoot Jolokia' or 'Naga king' chilli has several vernacular names like 'Naga Jolokia', 'Bih Jolokia', 'Dorset Naga', 'Raja Mirchi', 'Borbih Jolokia', 'Nagahari', 'Ghost chilli', 'Naga Viper chilli', 'Poison chilli' etc. Earlier it was identified as *Capsicum frutescens* Linn., however, a number of workers believed that *C. frutescens* do not produce as much hotness as *Bhoot Jolokia* and Bosland and Baral (2007) ended the dilemma on authenticity of *Bhoot Jolokia* and established through RAPD analysis it as *Capsicum chinense* with inclusion of genes of *Capsicum frutescens* through natural hybridization by cross pollination between species or any other method. Moreover, several taxonomists have suggested that *C. frutescens* and *C. chinense* should be merged as one species (Pickersgill 1971; McLeod *et al.* 1979) as both the

species are interbreeding in nature very smoothly (Smith and Heiser, 1957; Lippert *et al.*, 1966). Recently Purakyasth *et al* (2012) reported *Capsicum assamicum* as a separate new species, which was earlier known as ‘*Bhih Jolokia*’ (synonym vernacular name of *Bhoot Jolokia*), hence creating again the taxonomic enigma as the treatment of new species doesn’t answers many taxonomic questions. The authors used only single accession from only one locality and compared with specimens of *C. chinense* and *C. frutescens* available in KAL (Central Botanical Herbarium, Kolkatta). No Holotype or Isotype was concerned which puts a big question mark on its authenticity, as even molecular characterization failed to support it. It may be a natural cultivar as several ecotype growing in farmers field have been found with a large variation in morphological characters, viz. growth habit (branching pattern, branching), floral features like calyx, corolla, androecia and gynaecium especially in plants from of Jorhat, Sibsagar, Golaghat, Sonitpur, Karbi-Anglong, and Tuli (Nagaland) . The extreme variations among different cultivars of *Bhoot Jolokia* include several colours, sizes and textures of fruits. Particularly the colour ranges from light green, yellowish green to dark green in young fruits and gradually changes into light red, bright red, bright orange and even chocolate while the texture varies from wrinkled to semi smooth as well as gloomy with fleshy tissue. Bhagowati and Changkija (2009) also reported existence of several such genotypic and phenotypic variant landraces of *Bhoot Jolokia* in Nagaland. Due to growing in different climatic conditions the different races become more or less pungent.

On the basis of exhaustive survey of published literatures on different aspect taxonomy, chemotaxonomy and molecular characterization of *C. chinense*, *C. frutescens* and *C. assamicum* (Bosland and Baral, 2007; Sarwa *et al.*, 2012; Mathur *et al.*, 2000; Purkayastha *et al.*, 2012) as well as local survey in Assam valley on different cultivars of the Bhoot – Jolokia. It is seems the *C. assamicum* may be the result of natural hybridization of cultivated/ escaped populations of *C. frutescens* and *C. chinense*. The latter two species are closely related and likely to produce hybrids with some degree of fertility. Similarly, the molecular characterization presented by Purakyasth *et al* (2012) provides no explanation of the source of several samples, particularly those of *C. assamicum*, for which only a single population is indicated but several accessions appear in Fig. 5 of the paper. It is better to reduce *C. assamicum* as a synonym under *Capsicum chinense* as there are several intermediate natural cultivars which shares characters of both.



Figs.: Phenological variation within *Bhoot Jolokia*’ at Jorhat (Assam) **a.** Habit, **b.** Dark green in colour, **c.** Light green in colour surface rough, without spines, **d.** Light green in colour surface rough, with spines, **e.** Fruit red in colour in ovate size, **f.** Fruit yellow in colour, **g.** Fruit red in colour, cylindrical, ovate in size, **h.** Fruit chocolate in colour

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