



First report of *Groundnut bud necrosis virus* infecting pea (*Pisum sativum*) in India

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Pisum sativum is an important cool season legume crop cultivated under irrigated conditions in many parts of India particularly in the northern plains. It is used as a food grain or as vegetable. In India, there are few reports of viruses infecting pea, one of which includes the tospovirus, tomato spotted wilt virus (TSWV) (Prasada Rao *et al.*, 1985). During the winter season of 2008 and 2009, symptoms of browning of veins, leaves and stem, mostly in growing tips, were observed in pea plants at the research farm of the Indian Institute of Pulses Research (IIPR), Kanpur, and at the farm of G. B. Pant University of Agriculture and Technology (GBPUAT), Pantnagar. Pods showed brown circular spots and later became completely brown. Affected plants finally dried up (Fig. 1 a, b, c). The incidence of the disease was within the range of 1-10% in different fields. Failure to isolate a fungal or bacterial pathogen from leaves and pods showing symptoms, and symptoms resembling those associated with tospoviruses suggested tentatively that a tospovirus was the cause of the disease in pea. Sap inoculation in cowpea cv. Pusa Komal, from leaves and pods showing symptoms resulted in the development of characteristic necrotic local lesions on the inoculated primary leaves (Fig. 2), and subsequent systemic infection developed on newer leaves; these indicated a tospovirus disease aetiology.

Tospovirus was confirmed by reverse transcription-polymerase chain reaction (RT-PCR) and direct sequencing using a specific primer pair for the amplification of the non-structural movement protein (NSm) gene of *Groundnut bud necrosis virus* (GBNV) (Akram *et al.*, 2004). All the pea field samples (ten from IIPR and seven from GBPUAT) and inoculated leaves gave RT-PCR products of expected size (~900 bp). No

amplification was observed from healthy samples of pea or non-inoculated cowpea leaves. The partial NSm gene sequence (GenBank Accession No. GU181408) showed respectively, 97-100% identity at amino acid level, and 99% identity at nucleotide level, with other GBNV isolates (AY221024, AJ537471). This supports results from the biological assay and confirming GBNV as the causal agent of the disease in pea. GBNV has been reported to be associated with a necrotic disease of mungbean (Thien *et al.*, 2003), potato, tomato and cowpea (Akram *et al.*, 2004) in India. To our knowledge, this is the first report of *Groundnut bud necrosis virus* affecting pea in India.

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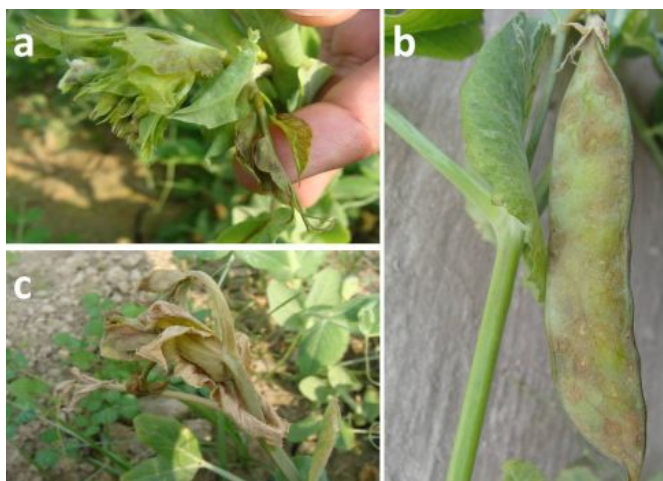


Figure 1



Figure 2

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