ATYPICAL SYMPTOM OF MUSKMELON WILT INDUCED BY *FUSARIUM OXYSPORUM* SCHLECHT

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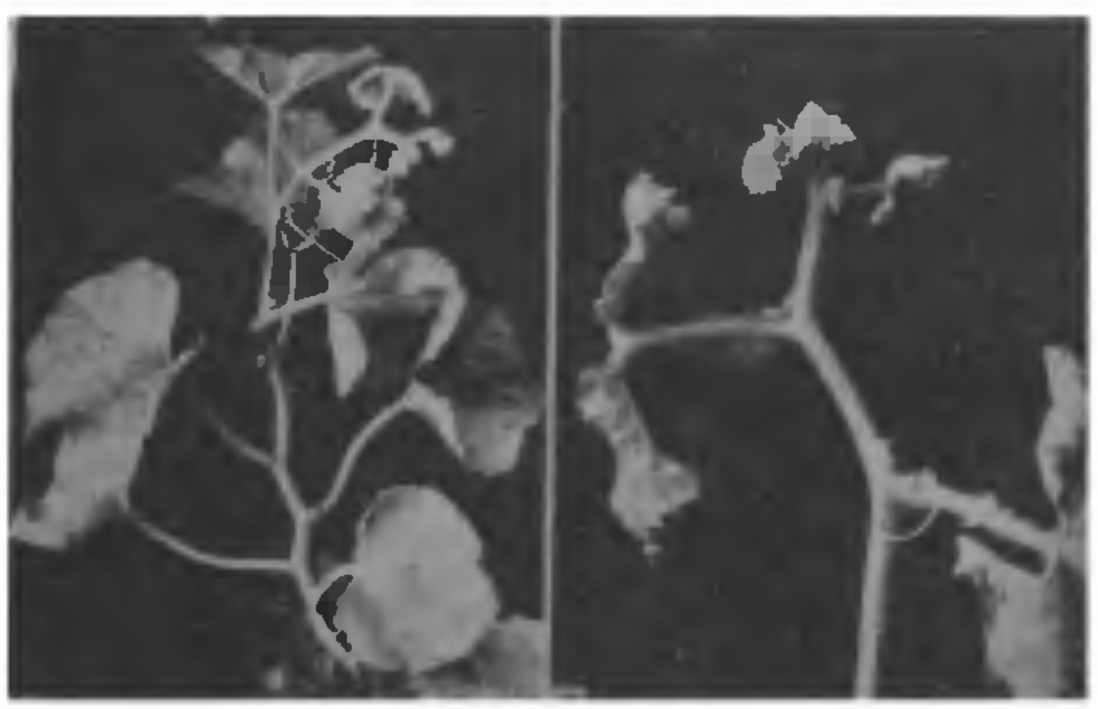
Fusarium wilt of muskmelon has been recorded as a serious disease hampering crop production in this country. Four species of *Fusarium, viz., Fusarium oxysporum* Schlecht., *F. solani* (Mart.) Sacc., *F. moniliforme* Sheld. and *F. moniliforme* var. *subglutinans* Wollenw. Reink. have been found to be responsible for wilt disease in the cultivated cucurbits[1]. Of these *F. oxysporum* is one of the important pathogens causing severe damage to this crop. The types of symptoms induced by different *Fusarium* spp. are many and varied. Moreover expression of symptoms depends upon the virulence of the pathogen and susceptibility of the host with suitable micro- and macro environmental factors. It is known that *F. oxysporum* infection causes hypocotyl rot, pre- and post emergence damping off of seedlings and rotting of root and fruit[2]. On older plants stem streaking[3], stunting and sudden or progressive wilting of plants[4] have also been observed.



Figures 1, 2. 1. *Fusarium oxysporum* infected muskmelon plant showing atypical wilt symptoms starting from tip downwards. **2.** Details showing death of the apical bud.

In the present study a new type of hitherto unrecorded atypical symptom has been observed to be caused by *F. oxysporum* infection and designated as sudden death of apical bud. First the apical bud started withering and dying (figures 1 and 2) and the wilt which followed was from tip downwards, gradually killing the whole plant. While scanning the literature it has been found to be a new atypical symptom induced by *F. oxysporum* on muskmelon because the vascular wilt Fusaria usually induce wilt symptoms from base upwards.

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NEUTRAL RED AS A MARKER FOR LYSOSOME—LIKE PARTICLES IN POTATO

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The discovery of lysosome in early fifties by de Duve[1] opened a new area of research on subcellular particles. The lysosomes were later demonstrated to play a definite role in animal as well as plant biology and pathology[1-3]. The lysosome is characterized mainly through electron microscopy, the criteria being the presence of single unit membrane and two or more hydrolases[4]. Acridine orange, a fluorescent dye was reported to accumulate in subcellular particles which were identified as lysosomes[5,6]. Further studies on the accumulation of acridine orange in lysosomes led Canonico and Bird[7] to recommend acridine orange as a non-enzymatic marker for lysosomes.

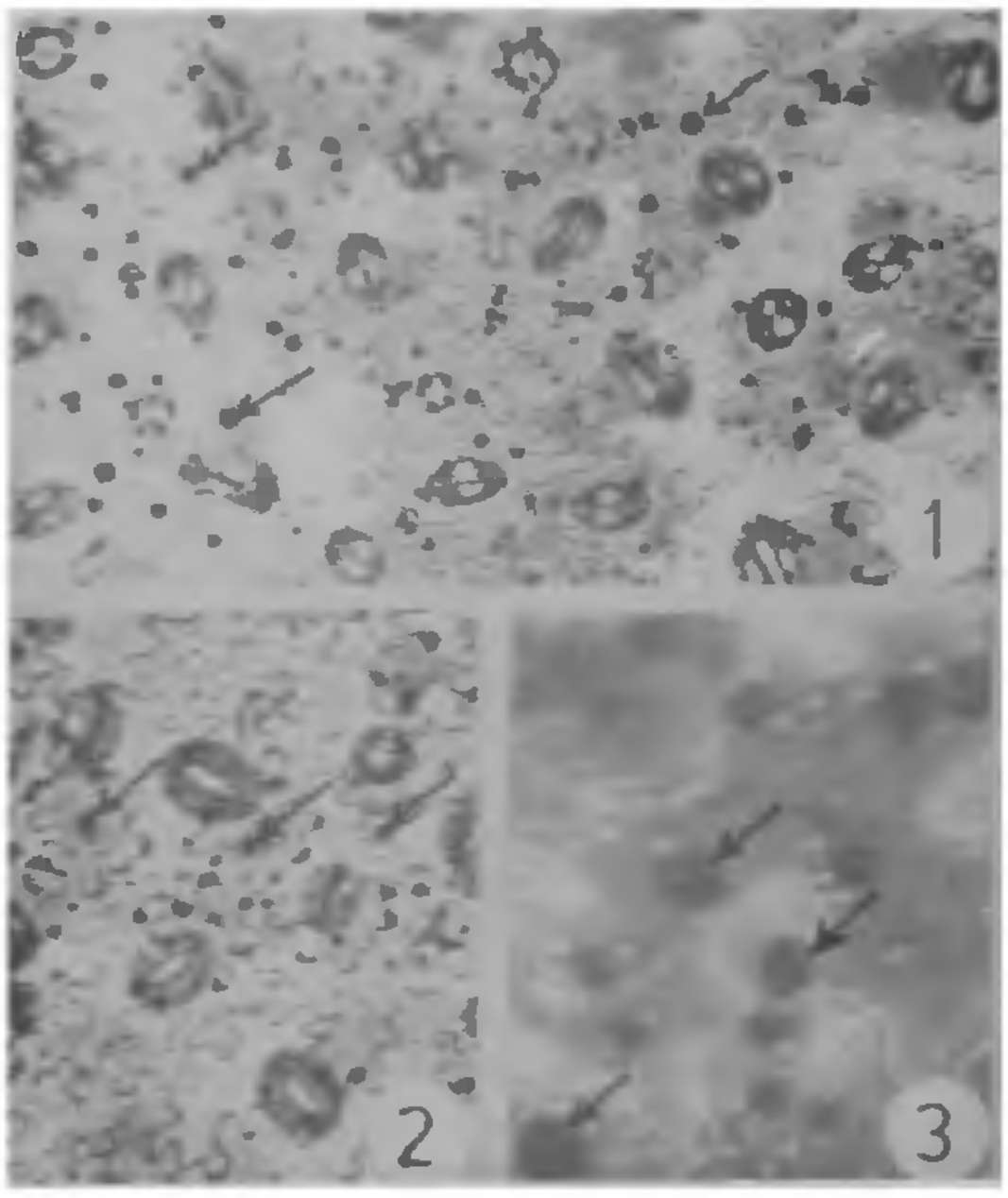
The present investigation was undertaken to examine the lysosome-like particles in potato cultivars through neutral red – non-fluorescent vital dye.

Epidermal peel of potato leaf was treated with 25, 50, 100 ppm of neutral red dissolved in physiological saline (0.9% sodium chloride) for different periods in the dark. After the treatment, the peel was mounted on a microscope slide in a drop of water. The observations were recorded under a microscope and photomicrographs were taken on ORWO NP-22 film.

It was observed that the epidermal peel of the potato cultivars, when treated with various concentrations of neutral red, showed red particles of varying sizes from 0.2 to 7 μm in diameter in a background of light red cell cytoplasm (figures 1, 2). At higher concentration (100 ppm) the staining of the particles was rapid and took only 1 to 2 hr whereas at lower concentrations of 25 and 50 ppm, it required 3 to 4 hr. The number and the size of these particles were found to increase with an increase in the period of treatment at all the concentrations.

Neutral red has been used as a vital dye for a long time[8]. On the basis of the accumulation of vital dye in

animal lysosomes[9] and plant vacuoles[10], it was postulated that plant vacuoles are structurally analogous to animal lysosomes[11, 12]. The accumulation of neutral red[10] and acridine orange[6] in plant vacuoles has established the functional analogy of vacuole with animal lysosome.



Figures 1-3. Red cytoplasmic particles (RCPs) (arrows) in potato (*Solanum tuberosum* L.). **1.** in cv. Kufri Chandramukhi (× 550) **2.** in cv. Kufri Jyoti (× 550) **3.** in cv. Kufri Khasigaro (× 2500)

The red cytoplasmic particles of the present study are similar to lysosome-like particles of Wilson[6] and Pitt[13] and hence these may also be called as lysosome-like particles. The disruption of lysosome-like particles in potato during infection of *Phytophthora erythroseptica* has been reported[14] but their role is not clearly understood. The presence or absence of lysosome, their number, size and rate of appearance in different tissues of potato and their relationship, if any, with susceptibility and resistance to diseases is being investigated.

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THREE NEW RECORDS OF *HELVELLA* FROM INDIA

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Lloyd[1] was the first mycologist to report 2 species of *Helvella* from India *viz.*, *H. crispa* (Scop.) Fr. and *H. fragesii* Pat. In India, many species of *Helvella* were collected[2-6] from hilly areas of Kashmir, Panjab, U. P. and West Bengal, and a total of 18 species have so far been described.

In the present paper 3 more species of *Helvella* viz., *H. costifera* Nannf., *H. lacunosa* Afzel., and *H. macropus* Karst (figure 1) have been described. The materials have been deposited in the herbarium, Botany Department, Kumaun University, Nanital.

1. *Helvella costifera* Nannf.

Pileus globose and cup-shaped at first, becoming almost plane or arched near the margin and the extreme edge; margin free; hymenium greyish brown with a purple tinge, irregularly wrinkled or nodulose with more or less prominant ribs spreading from the base; pileus narrowed below into a stem like base; stipe solid, ribbed, 1.5–3.5 × 0.2–0.8 cm; hypothecium and excipulum formed of stout, interwoven hyphae which become compact to form the cortex; hymenium 250–350 μm broad, asci cylindrical with slightly trun-