The normal root of *S. surattense* shows tap root system, and in TS they appear tetrach (figure 1). Secondary phloem develops centrifugally while secondary xylem develops centripetally from the vascular cambium.

The infected root in TS, reveals that the nematode penetrates the cuticle and epidermis and ultimately reaches the cortical as well as vascular region. The result of the nematode entry is a massive increase in the number and the size of the host cells. The interesting feature is the presence of a large number of giant cells (figure 2), which are formed due to dissolution of cell walls of adjacent cells and consequently a bigger cell is formed with many nuclei.

With the increase in the intensity of infection, the vascular region is also affected and xylem and phloem are damaged. The severity of nematode infection also leads to a significant change in the thickness of the roots and the heavily infected roots are 10–15 times thicker than those of normal ones. The damage to the vascular tissues may be causing blockage of conduction of food and water. In certain tissues the mature female nematode is seen (figure 3). The nematode also lays eggs in the host plant (figure 4).

The hypertrophy and hyperplaxia of cells of pericycle and vascular elements may cause gall formation[1,4]. Orion and Roberts[6] emphasized that the element of the gall is cortical hypertrophy which occupies most of the *Meloidogyne* sp. gall on tomato and was associated with the process of nematode maturation. In the present study the nematode development initiates growth mechanism resulting in hypertrophy of the cortical parenchyma of the root.

Dropkin and Nelson[2], and Krusburg[7] observed the dissolution of the cell walls of giant cells resulting in larger giant cells by coalescing with the bordering giant cells. Rao and Kumar[4] stressed that they have been observed to form only in the vascular tissues, while the present study reveals that the giant cells extend abnormally towards the vascular tissues resulting in the discontinuity of vascular tissues.

Bird[8] reported that the multinucleate condition in giant cells is due to acquisition of nuclei from the incorporated cells. However, Huarg and Maggenti[9] stated that the giant cells become multinucleate on account of karyokinesis. In addition to the multinucleate giant cells the authors have observed nuclear hypertrophy as reported by Bird[8] and Huarg and Maggenti[9]. They, however, find that cytoplasm also becomes vaculate in the giant cells. Bird[8] has given the reason for its formation mainly due to nuclear enlargement, followed by cell wall breakdown, synchronous mitosis and incorporation of adjacent cells. Similar reports have been confirmed by Maheshwari[3].

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CHANGE IN ASCORBIC ACID CONTENT IN TOMATO FRUIT INOCULATED WITH *ASPERGILLUS NIGER* AND *DROSOPHILA BUSCKII*

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Ascorbic acid is an important component of fruits. Changes in ascorbic acid content in tomato fruit as a result of fungal infection have earlier been reported[1,2]. There is, however, no information on the change in ascorbic acid content when fruits are infected with a fungus in the presence of an insect. In the present note change in the ascorbic acid content of tomato infected with *Aspergillus niger*, a fruit-rot fungus in the presence of an insect, *Drosophila busckii* is reported.

Healthy tomato fruits of the same size and age were surface-sterilized with ethyl alcohol, inoculated with spores of *A. niger* and fed by *D. busckii* for different durations (10–30 min). The ascorbic acid content of the tomato fruit tissue was deter-

mined by the titration method, based on the reduction of 2,6-dichlorophenol indophenol dye[3]. Dried tomato fruit tissues (0.2 g) were thoroughly ground in 0.4% oxalic acid solution and centrifuged at 3000 r.p.m. for 15 min and the supernatant was made up to 20 ml by adding more of oxalic acid solution. Five ml of the tissue extract was titrated against standardized indophenol reagent. A pink colour indicated the end point which, however, persisted only for about 15 sec.

The results indicate a reduction in ascorbic acid content both in healthy and fungus-infected and insect fed fruits. The reduction in ascorbic acid was directly proportional to the increase in the exposure to insect and also to the increase in incubation period after inoculation. Amongst the various treatments the per cent reduction was highest in fruits inoculated with fungus followed by fungus inoculated together with insect fed. With an increase in feeding duration of *D. busckii* the per cent loss of ascorbic acid increased. Various workers[4–7] also observed reduction in ascorbic acid as a result of pathogenesis.

In insect alone the reduction was 69.5% after 30 min duration; and in fungus it was 86.3% while with fungus together with insect the reduction was less than that seen with fungus only but more than that with insect only for 30 min duration.

It appears that the enzyme ascorbic acid oxidase which is known for metabolising ascorbic acid is more active in fruits infected with fungus than in insect but with insect and fungus together the enzymatic activity is slightly reduced.

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ISOLATION OF *CANDIDA TROPICALIS* FROM A CASE OF EMPYEMA

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CANDIDA TROPICALIS, an opportunistic pathogen, was isolated from a case of empyema in an old, debilitated and diabetic patient.

Empyema is an acute or chronic condition characterized by purulent effusion and usually associated with bronchiectasis, lung abscess and pneumonia[1]. Although the role of aerobic and anaerobic bacteria has been investigated in empyema, the occurrence and etiological significance of fungi have not been well studied. The present communication describes the occurrence of *C. tropicalis* in empyema of a 57-year-old male patient.

A 57-year-old male patient who had empyema received extensive doses of antibiotics and other cytotoxic drugs but there was no clinical response. A specimen of purulent exudate was submitted to the laboratory for microbiological examination. A loopful of the material was inoculated on nutrient agar, brain-heart infusion agar, Sabouraud's dextrose agar with chloramphenicol (0.05 mg/ml) and simplified sunflower seed medium[2]. The first three media were incubated at 37°C while the last was kept at 25°C. The isolate was identified according to the procedures recommended by Lodder[3]. Drug sensitivity of the isolate to nystatin (100 μg) was conducted by disk diffusion method.

Bacteria, actinomycetes, dimorphic fungi or *Crypiococcus neoformans* could not be recovered from the empyema fluid of the patient. However, pure and heavy growth of *C. tropicalis* was observed on Sabouraud's dextrose agar with chloramphenicol (figure 1). The isolate produced thin-walled chlamydospores on cornmeal agar at 37°C within 32 h and was found sensitive to nystatin.

In the absence of any other organisms from the exudate, isolation of *C. tropicalis* in pure culture and the clinical history of the patient suggested that the isolate may be associated with empyema in this old, debilitated and diabetic patient.

Though *C. tropicalis* has been found incriminated with many disorders of man and animals[4–7], there appears to be hardly any report on the occurrence of this opportunistic yeast in the empyema of lung. The involvement of *Candida* spp. is most often observed in debilitated, aged and diabetic patients whose