ovarioles in one of the ovaries increased by 1 to that of control (figure 1). Frequently several oocytes were enclosed in a single long tube-like chamber without clear demarkation into individual oocytes (figure 2). Loops developed in some ovarioles (figure 3).

The resultant externally normal male adults were dissected. In a few cases the two developing testes did not fuse into a single sac, they remained wide apart and formed two separate testes each with separate vas deferens and seminal vesicle (figure 4). In other cases the fusion was incomplete and a constriction persisted (figures 5, 6). In controls the two testes were enclosed in a single sac. Such morphological deformities in the testes have been reported earlier with hydroprene[9].

The present finding therefore indicates the importance of solasodine as an anti fertility agent for *C. partellus*.

Two of the authors (SSR and AK) thank UGC, New Delhi for financial assistance.

7 January 1987; Revised 7 March 1987

1. Jacobson, M., Redfern, R. E. and Mills, G. D. Jr., *Lloydia*, 1975, **38**, 455.
2. Prabhu, V. K. K. and John, M., *Experientia*, 1975, **31**, 913.
3. Rajendran, B. and Gopalan, M., *Indian J Agri. Sci.*, 1977, **48**, 306.
4. Suryakala, G., Rao, B. K., Thakur, S. S. and Rao, P. N., *Zool. Jb. Physiol.*, 1984, **88**, 113.
5. Briggs, L. H., Harvey, W. E., Locker, W. A., McGillirry and Steeyle, R. N., *J. Chem. Soc.*, 1950, 3013.
6. Uhle, C. F., *J. Am. Chem. Soc.*, 1953, **75**, 2280.
7. Seshu Reddy, K. V. and Davies, J. C., *Indian J. Plant Protection*, 1979, **6**, 48.
8. Ghosh, M. K., Roychoudhury, N. and Chakravorty, S., *Zool. Anz.*, 1985, **215**, 240.
9. Deb, D. C. and Chakravorty, S., *J. Insect. Physiol.*, 1981, **27**, 397.

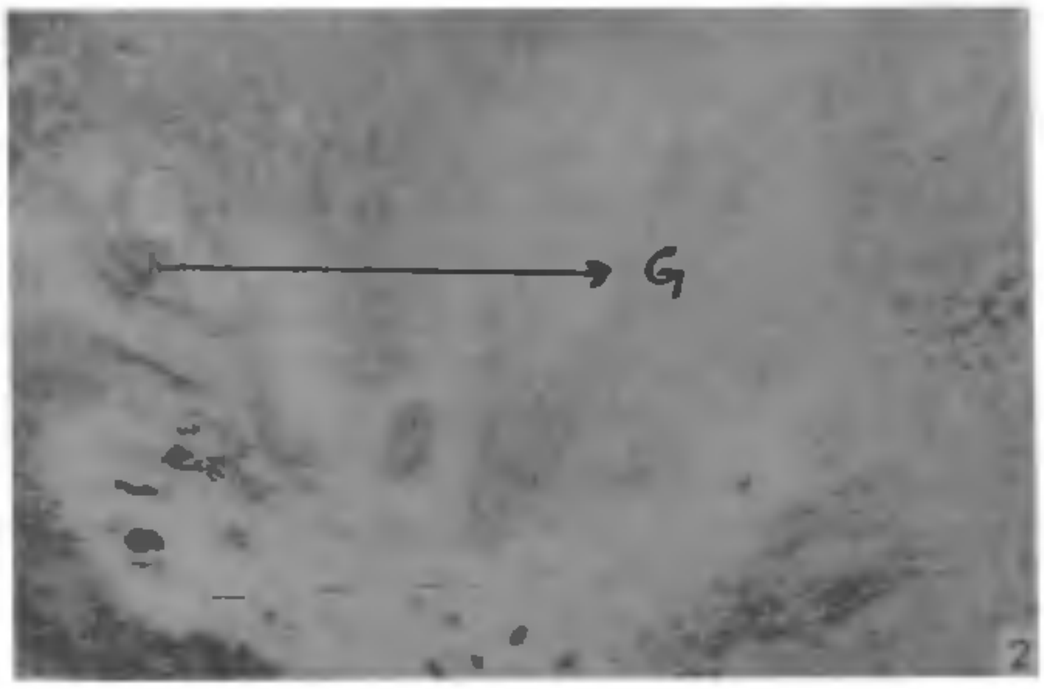
ROOT-KNOT NEMATODE, *MELOIDOGYNE JAVANICA* BREAKS WILT RESISTANCE IN CHICKPEA VARIETY 'AVRODHI'

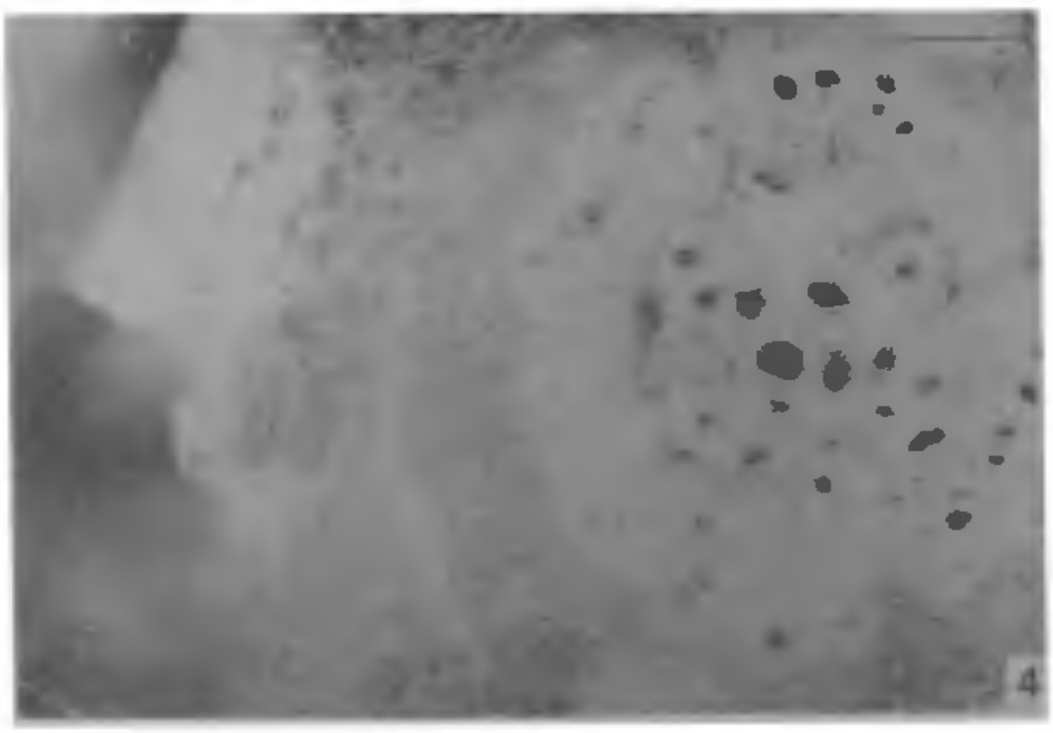
K. D. UPADHYAY and KUSUM DWIVEDI
Department of Entomology, C. S. Azad University of Agriculture and Technology, Kanpur 208 002, India.

A WILT resistant chickpea variety 'Avrodhi' was found infected with root-knot nematode, *Meloidogyne javanica* and *Fusarium oxysporum* f. sp. *Ciceri* at the university research farm. Root-knot nematodes are known for their ability to incite marked anatomical changes in their hosts. There are reports that infestation by root-knot nematodes increases susceptibility for pathogenic fungi and bacteria[1]. A histopathological observation was, therefore, undertaken to determine this aspect. Five surface-sterilized seeds of chickpea variety 'Avrodhi' were sown in pots containing autoclaved sand and soil (1:1) mixture. The fungus was cultured on potato dextrose broth (50 ml contained in 250 ml conical flasks) and the fungal mat was blended before inoculation. Fungal suspension (50 ml) and 500 larvae of *M. javanica* were used as inoculum. The treatments were: (i) fungus alone, (ii) nematode alone, (iii) fungus + nematode simultaneously, (iv) fungus 10 days prior to nematode, (v) nematode 10 days prior to fungus, and (vi) check (uninoculated).

One-week-old seedlings of chickpea were thus inoculated and after appearance of wilt symptoms, inoculated and uninoculated roots were collected, washed and fixed in F.A.A. for histopathological studies[2].

The plants, inoculated with fungus alone exhibited slight wilt but wilting was maximum and rapid in the plants where nematode preceded the fungus. Histologically roots, inoculated with nematode alone or in combination with the fungus, showed typical giant cell formation, development of egg masses, larvae and female nematode inside the roots (figures 1 and 2). This provided the fungus an easier access for entrance and rapid development of the disease (figure 3), with the nematode as a primary pathogen and the fungus as a secondary pathogen. Apparently, nematode infestation predisposed the host by changing its physiology and rendering it more susceptible to fusarium wilt damage. The results add to the understanding that due to change in physiology of the host, wilt fungus was able to break the host resistance.





Figures 1–4. T. S. of chickpea root. **1.** Eggs of *M. javanica*, **2.** Giant cell formation in the vascular region, **3.** Presence of nematode egg and fungus mycelium in the same section, **4.** Control (uninoculated). E = egg; G = giant cell; F = fungus mycelium.

The results emphasize the need for developing combined resistance against the two pathogen for effective control.

2 February 1987

1. Powell, N. T., In: *Plant parasitic nematodes*, Vol II, (eds) Juckerman, B.N.W.F. Mai and R. A. Rohde, Academic Press, New York, 1971.
2. Johansen, D. A., *Plant microtechnique*, Mc-Graw Hill, New York, 1940, p. 523.