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EFFECT OF CRUCIFERS ON THE PENETRATION AND SURVIVAL OF *HETERODERA AVENAE* IN WHEAT

by
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The cereal cyst nematode, *Heterodera avenae* Woll., is present in five states of India viz. Punjab, Haryana, Rajasthan, Jammu and Kashmir and Delhi. It often occurs in high population densities and causes serious damage to wheat (Swarup *et al.*, 1982). Chemical control is well known but is costly and thus an alternative method of control is practiced by intercropping *Brassica* spp. with wheat, although without the exact effect (Singh *et al.*, 1986). This paper provides some information on the effect of three species of crucifers on larval penetration and survival of the cereal cyst nematode on wheat.

Materials and Methods

Cysts of *H. avenae* were extracted from soil samples collected from a field in which wheat had been grown for several years.

Seeds of crucifer plants viz. raya (*Brassica juncea* L. cv. RLM-619), toria (*B. nigra* L. cv. TLC-1) and taramira (*Eruca sativa* L. cv. ITSA) and wheat (*Triticum aestivum* L. cv. WL-711) were surface sterilized by immersion in 0.1% HgCl₂ for 10 min and then germinated between layers of moist Whatman filter paper.

Seven day old seedlings were transferred in the combinations wheat and toria, wheat and raya, wheat and taramira and wheat and wheat to test tubes containing sterile Hoagland nutrient media (20%) with each treatment replicated three times. After 7 days of establishment in the nutrient media, the seedlings were inoculated with one hundred surface sterilized freshly hatched second stage juvenile (J2) of *H. avenae* per tube. The tubes were kept at laboratory temperature in the dark. Three, six and nine days after inoculation roots were stained with lactophenol acid fuchsin and examined for nematode penetration under stereoscopic microscope.

To study the effect of root diffusates on the juveniles, seeds of crucifers and wheat were sown in 7 cm

diameter plastic pots containing 200 g sand. Water was added to the pots, one day before the collection of root diffusates. Root diffusates were collected from the 2-3 week old plants (100 plants) by puncturing the bottom of the pots. These root diffusates were designed as N (Normal) concentration.

Cysts were placed in a facial tissue paper supported on a wire gauze in a Petri dish. The juveniles which hatched, penetrated through the tissue paper, accumulated at bottom of the dish and were collected daily and stored at 4°C prior to use. One hundred J2_s were added to 5 ml N root diffusates of the different crucifers or wheat in rubber corked injection vials. Each set was replicated three times. Observations on the mortality of the nematodes were made at intervals of 1, 2 and 3 wks. Fresh root diffusate was added at 1 wk intervals from the stock solution, and thus the nematodes were exposed to the mechanical stimulation and oxygenation. Dead juveniles in the vials were pipetted out, and counted to determine the percent mortality over the period. This ensured that any differences in kill between treatments were solely due to differences in root diffusates of the various plant materials.

TABLE I - Effect of coculturing crucifers on the root penetration of juveniles of *Heterodera avenae* in wheat roots

Combinations	Number J2 penetrated in root (Days after inoculation)		
	3	6	9
Wheat/Wheat	9	10	11
Wheat/Taramira	2	5	6
Wheat/Raya	2	5	7
Wheat/Toria	3	5	7

C.D. for treatments = 1.84; C.D. for days = 1.55

Results

Coculturing of crucifer seedlings with wheat showed a highly significant reduction in the juvenile penetration of *H. avenae* in wheat roots (Table I). The greatest juvenile penetration was observed in wheat when it was grown alone. The difference was statistically highly significant in treatments in which crucifers were grown with wheat as compared to wheat alone.

Exposure of 3 hrs to the N concentration of tarimira, toria and raya root diffusates gave a 37, 34 and

31% mortality of juveniles respectively. The per cent mortality of juveniles was only 6% in root diffusates of wheat after 3 wks.

Literature cited

- SINGH I., SAKHUJA P.K. and SHARMA S.K., 1986 - Influence of some crucifers on cereal cyst nematode *Heterodera avenae*. Nat. Conf. Plant Parasitic Nematodes of India problems and progress: 39 (Abstr.)
- SWARUP G., SETHI C.L., KAUSHAL K.K. and NAND S., 1982 - Distribution of *Heterodera avenae* the casual organism of molya disease of wheat and barley in India. *Curr. Sci.*, 51: 896-897.