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RESPONSE OF CHICKPEA GERMPLASM LINES TO *HETERODERA CICERI* ATTACK

by
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Summary. Two thousand and one lines of *Cicer arietinum* and 20 lines of wild *Cicer* spp. were tested in a plastic-house for their reaction to infestation by *Heterodera ciceri*. Evaluation of root infestation using a 0-5 rating scale based on the number of females and cysts of the nematode occurring on the roots revealed that none of the lines was free of the nematode. However, 20 lines of *C. arietinum* were rated 2; 482 were rated 3 and 1499 4 or 5. Among wild species the lines of *C. bijugum* ILWC 8 and ILWC 34 were rated 2 and ILWC 7 rated 3 while all remaining lines were rated 4 or 5.

The chickpea cyst nematode, *Heterodera ciceri* Vovlas, Greco *et* Di Vito, causes severe damage to chickpea (*Cicer arietinum* L.) in Syria (Greco *et al.*, 1984; Vovlas *et al.*, 1985). Microplot experiments (Greco *et al.*, 1987) demonstrated that at population densities ≥ 64 eggs and juveniles of *H. ciceri*/cm³ soil the yield of chickpea was nil. This nematode can also affect lentil (*Lens culinaris* Medic.), pea (*Pisum sativum* L.), grass pea (*Lathyrus sativus* L.), and reproduces on some other leguminous species (Greco *et al.*, 1986). The best way to control this nematode would be with resistant cultivars. Therefore the response of chickpea germplasm lines to *H. ciceri* was investigated in a plastic house during 1986-87 and the results are reported here.

Materials and methods

Screening was conducted on 2001 chickpea germplasm lines of *C. arietinum* including: ILC 1 to ILC 1297 (except ILC 141, 143, 151, 285, 435, 664, 793, 868, 945, 948, 1192, 1255 and 1271), and FLIP 81-32 to FLIP 81-66, FLIP 82-1 to FLIP 82-261, FLIP 83-1 to FLIP 83-126, FLIP 84-1 to FLIP 84-189, and FLIP 85-1 to FLIP 85-135 (except FLIP 82-86, 82-222, 84-10, and 84-16) and twenty lines of wild *Cicer* spp. (Table I) of the I.C.A.R.D.A. collection. The germplasm lines were divided into three groups and on 24 October 1986, 13 January and 17 March 1987, ten seeds of each line were sown in two 5 litre pots filled with sterilized soil (20.1% sand, 33.2% silt, 46% clay and 0.7% o.m.) artificially infested with cysts of a Syrian population of *H. ciceri*. The cysts were extracted from infested soil using a can similar to, but larger than, that described by Caswell *et al.* (1985) and mixed with sterilized soil and appropriate amounts were added to the sterilized potting mixture to provide an inoculum of 20 eggs and juveniles/cm³ soil. The pots were arranged on benches in a plastic-house maintained at 16-25°C at Tel Hadya (Syria) and in a randomized block design with two replicates of each germplasm line. Twenty pots sown with a local variety (ILC 1929) were used as a control. The pots were irrigated as required. Plants were uprooted fifty days after emergence, the roots were washed gently and examined for the presence of females/cysts. The lines were rated for *H. ciceri* infestation by using a 0-5 rating scale, were 0=no infestation, 1=1-2 females per plant root, 2=3-5 females, 3=6-20 females, 4=21-50 females, and 5 > 50 females.

Results and discussion

The environment of the plastic-house during the experiment was suitable both for chickpea growth and nematode reproduction. Examination of the roots revealed that no chickpea line was found completely free of *H. ciceri* infestation, but twenty of them (1% of the total) were rated 2, 482 (24%) lines of *C. arietinum* were rated 3, and 1499 (75%) were rated 4 or 5. The lines that were rated 2 were ILC 15, 20, 94, 250, 633, 750, 751, 826, 844, 847, 923, 958, 1208, 1259, 1260, 5141, 5180, 5251, 5267 and 5270; resistance was confirmed in ILC 94 but all other lines require confirmation.

TABLE I - *Screening collections of* Cicer *species for resistance to* Heterodera ciceri *at Tel Hadya, Syria, 1986/87.*

Cicer species	Line	Rating
Cicer bijugum K.R. Rech	ILWC 7	3
C. bijugum	ILWC 8	2
C. bijugum	ILWC 34	2
C. chorassanicum (Bge) M. Pop.	ILWC 23	5
C. cuneatum Hochst	ILWC 37	5
C. echinospermum P.H. Davis	ILWC 35	5
C. judaicum Boiss	ILWC 4	5
C. judaicum	ILWC 4-2	5
C. judaicum	ILWC 20	5
C. judaicum	ILWC 30	4
C. judaicum	ILWC 31	5
C. judaicum	ILWC 38	5
C. pinnatifidum Jaub *et* Sp.	ILWC 9	5
C. pinnatifidum	ILWC 29	5
C. pinnatifidum	ILWC 29-1	5
C. pinnatifidum	ILWC 29-2	5
C. pinnatifidum × *C. judaicum*	ILWC 33	5
C. reticulatum Ladiz.	ILWC 21	5
C. reticulatum	ILWC 36	5
C. yamashitae Kitamura	ILWC 3-1	4
C. arietinum L. (control)	ILC 1929	5

The wild lines of *Cicer* spp., which were little infested with *H. ciceri* (Table I) (ILWC 8 and ILWC 34 which were rated 2, and ILWC 7 rated 3), all belong to *C. bijugum*. The remaining wild chickpea lines were severely attacked by the nematode; all were rated 5 except for ILWC 30 and ILWC 3-1 which were rated 4. The control plants had a rating of 5.

The results indicate high levels of resistance to *H. ciceri* among breeding lines of *C. arietinum* and wild *Cicer* species. However, further studies are needed to establish the inheritance of resistance and the behaviour of these promising lines in infested fields under natural conditions.

Literature cited

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