The genus *Nacobbus* Thorne & Allen, 1944 in Argentina. 2. Association between *N. aberrans* (Thorne, 1935) Thorne & Allen, 1944 and the weed *Sisymbrium irio* L.

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SUMMARY

A population of plant-parasitic nematode *Nacobbus aberrans* (Thorne, 1935) Thorne & Allen, 1944 from Rio Cuarto, Province of Cordoba, Argentina, was found parasitizing roots of the weed *Sisymbrium irio L.* The root galls contained mature females with egg masses. The histological changes induced by the nematode — a syncytium formed by a mass of cells with partially dissolved walls — is commonly observed in plants parasitized by *Nacobbus* spp. We suggest that *S. irio* represents an efficient host for *N. aberrans* and describe this association for the first time.

RÉSUMÉ

Le genre Nacobbus *Thorne & Allen, 1944 en Argentine. 2. Association entre* N. aberrans *(Thorne, 1935) Thorne & Allen, 1944 et* Sisymbrium irio *L.*

Une population du nématode *Nacobbus aberrans* (Thorne, 1935) Thorne & Allen, 1944 a été trouvée associée aux racines de la mauvaise herbe *Sisymbrium irio L.* à Rio Cuarto, Province de Córboda, Argentine. Les racines présentaient des galles, renfermant les femelles adultes du nématode. Les altérations histologiques causées par le nématode correspondent à celles observées chez les plantes-hôtes de *Nacobbus,* c'est-à-dire un syncytium formé par des cellules dont les parois sont partiellement dissoutes. Ce phénomène, couplé à la présence de masses d'œufs, prouve que *S. irio* constitue un hôte efficace de *N. aberrans.* C'est la première fois que cette association est signalée.

Nacobbus aberrans (Thorne, 1935) Thorne & Allen, 1944 has a wide host range (Stone & Burrows, 1985) and represents a serious threat to agriculture. It is mainly distributed in the neotropical region associated with weeds or suitable cultivated plants (Lehman, 1980). In Argentina, several weeds are known to be good hosts for this species : *Amaranthus hybridus* var. *quitensis* (Chaves & Sisler, 1980), *Amaranthus* sp., *Brassica campestris, Datura ferox, Portulaca oleracea* (Costilla, 1985) and *Chenopodium album* (Costilla, 1985; Doucet & Ponce de Léon, 1985).

During a survey of *N. aberrans* in the province of Córboda, Argentina, one of the authors (MED) found, in the Rio Cuarto area, a weed belonging to the Cruciferae family, *Sisymbrium irio* L., with galled roots infected by this nematode. *S. irio,* commonly known as " mostacilla ", is adventitious (Romanczuk, 1982) and grows not only in cultivated land but also at the edge of roads and in uncultivated soil. It contains a highly poisonous glucoside, and can be deadly to cattle and sheep, especially during fructification (Ragonesse, 1955). We analysed the histological changes induced by the nematode in the plant to establish the degree of relationship between the host and parasite. This is the first description of this association.

Materials and methods

S. irio plants infested were found on road sides in association with other weeds of various families. The location is across from the Estancia Sol de Mayo, Department of Rio Cuarto, Province of Córdoba.

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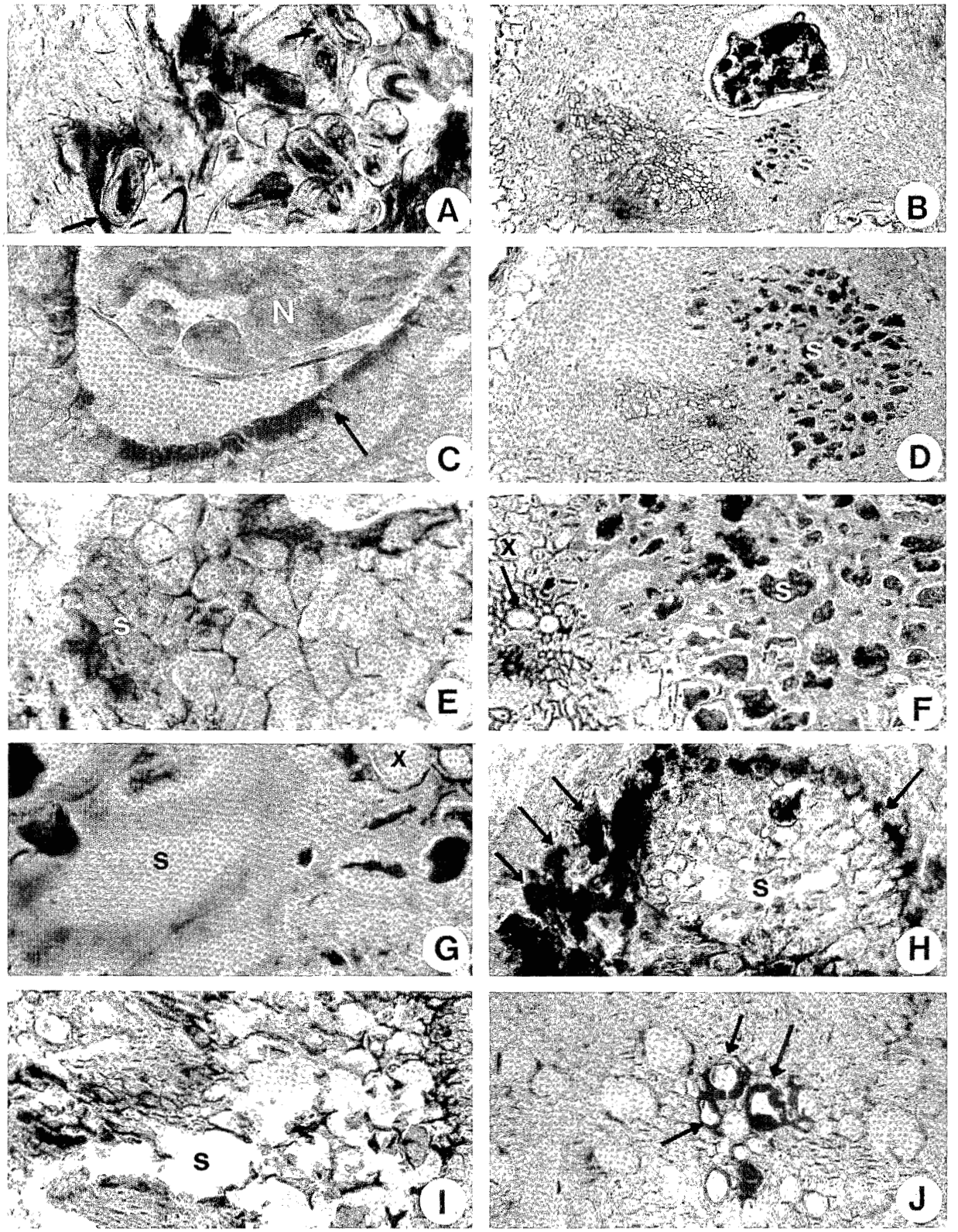

Fig. 1. Cross sections of a roots of *Sisymbrium irio* infected by *Nacobbus aberrans* — A : Eggs and larvae in cortical zone; B : Nematode in relation to the syncytium and vascular elements; C : Nematode surrounded by a layer of hyperplasic tissue; D : Syncytium in relation with vascular tissue and hyperplasic parenchyma; E : Syncytium in stage II; F : Syncytium in stage III; G : Syncytium cell (stage IV) in relation with xylem; H : Syncytium in stage IV (*in toto* view) surrounded by cells with granular accumulations; I : Inside sector of the syncytium in stage IV; J : Xylem elements with thickened walls close to the syncytium area. (N = nematode; S = syncytium; X = xylem.)

The infested roots were carefully washed free of soil and cut into segments approximately 5 mm long. They were fixed in FAA, dehydrated through an alcohol series and embedded in paraffin. The embedded roots were sectioned at 14 µm, stained with hematoxilin — safranin and fast green and mounted in Canada balsam (Johansen, 1940).

Results

The cross and longitudinal sections showed the presence of eggs and larvae in the cortical zone (Fig. 1 A) as well as a clearly defined syncytium adjacent to the adult female nematode (Fig.1 B). This syncytium, of variable volume, is formed by cells in the central cylinder (Fig. 1 D) that would normally differentiate in vascular elements. Its shape is irregular and it appears immersed in a mass of hyperplasic tissue, which also surrounds the nematode (Fig. 1 C). This tissue is formed by cells of parenchymal nature greatly compressed together but with intercellular spaces. The development of the adult female nematode and of the egg mass induce the formation of a pronounced cortical hyperplasia that originates a gall.

Syncytia corresponding to stages I, II, III and IV were detected (Doucet, Ponce de León & Costilla, in press). In stage I the syncytium cells show thin but rarely destroyed walls. Stage II (Fig. 1 E) is characterized by thickened, slightly fragmented cellulosic walls, and there is little confluence between adjoining cytoplasms. The cytoplasms at both stages show no evidence of alteration. In stage III, there is a significant increase in the thickness of the cell walls, always with cellulosic deposits, and the walls keep their integrity to a great extent (Fig. 1 F, G). Some cells in the syncytium expand until they are in contact with the xylem. The xylem cell walls then become very thick (Fig. 1 J). The cytoplasm at this stage is very dense and contains the remains of nuclei. Stage IV comprises dead cells with disorganized or vacuolated cytoplasm and dissolved walls. The syncitium is delimited by very thick, intensely coloured walls. Granular material of unknown nature is attached to the syncitium walls (Fig. 1 H, I). We found a peculiar anomaly close to the syncitium development area : their walls showed marked ingrowths that reduced the cell lumen; their colour was the same as that of the cell walls that limit the syncytium in stage IV.

Discussion

The presence of the nematode causes formation of a gall as a consequence of an exaggerated cell division in the cortical zone as well as in the central cylinder. At the same time it implies a marked alteration in the disposition of the vessel elements. The reaction of *S. irio* corresponds to what has been observed in other hosts of *N. aberrans*, i.e. a spindle-shaped mass of cells with partially dissolved walls or syncytium (Jones, 1981). The importance of this weed as an alternative host for *N. aberrans* is obvious.

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