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GEOGRAPHICAL DISTRIBUTION OF *XENOCRICONEMELLA MACRODORA* (NEMATODA: CRICONEMATIDAE)

by
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During a survey of the *Criconematidae* of Spain *Xenocriconemella macrodora* (Taylor) De Grisse *et* Loof was frequently found in association with oak (*Quercus*) and chestnut (*Castanea*) trees. The preliminary results formed the basis for more detailed studies in Spain and Great Britain to investigate the relationship between the nematode and its environment.

Materials and Methods

Preliminary geographical distributions of *X. macrodora* in Spain and Great Britain have been published by Bello (1979) and Boag and Orton Williams (1977). The Spanish samples were extracted using a centrifugation technique (Caveness and Jensen, 1955), while a modification of the sieving and decanting technique was used for most of the British samples (Boag, 1974). The Spanish samples were preserved in T.A.F. and mounted in glycerol before being measured. The relationship between nematode numbers and biotic and abiotic factors was analysed using the Chi-Squared test.

The world distribution compiled from the literature is illustrated in Fig. 1. *X. macrodora* was first recorded from rotting leaves in a forest in Virginia, U.S.A. (Taylor, 1936). Since then it has been found from beech (*Fagus*) and oak (*Quercus*) trees from Sudpfalz, south west Germany, and in a forest in

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Fig. 1 - World distribution of *Xenocriconemella macrodora*.

The Netherlands (Volz, 1951; Thorne, 1961). It has also been reported from Nyasaland (Corbett, 1962), Belgium (De Grisse, 1964) and India (Edward and Misra, 1964). It has been associated with oak in the United States of America, South Africa, Italy, South Korea, the British Isles and Spain (Raski and Golden, 1966; Heyns, 1970; D'Errico, 1970; Scognamiglio *et al.*, 1971; Choi and Geraert, 1975; Boag and Orton Williams, 1977; Calahorra and Bello, 1977). It has also been found in Norway, Czechoslovakia, Mexico and Poland, the first two records of which are reported here for the first time.

A review of the literature indicates that *X. macrodora* occurs in association with forest and woodland soils especially with *Quercus* species, since it was found in these habitats on 21 of the 24 occasions on which it was reported.

In Spain 6,000 soil samples were examined from 913 ten km squares of the U.T.M. grid, and the distribution of these and of *X. macrodora* is shown in Fig. 2. *X. macrodora* was found associated with the following plant species:

> *Quercus pyrenaica* Willd. (63 times); *Q. ilex* L. (<5 times); *Castanea sativa* Miller (3 times); *Q. faginea* Lam. and *Q. petrea* (Mattuachka) Liebl. (2 times); *Cytisus scoparius* (L.) Link; *Erica arborea* L.; *Lavandula stoechas* subsp. *pendunculata* (Miller) Samp.; *Pteridium aquilinum* (L.) Kuhn; *Taxus baccata* L.; and *Malus* sp.; (1).

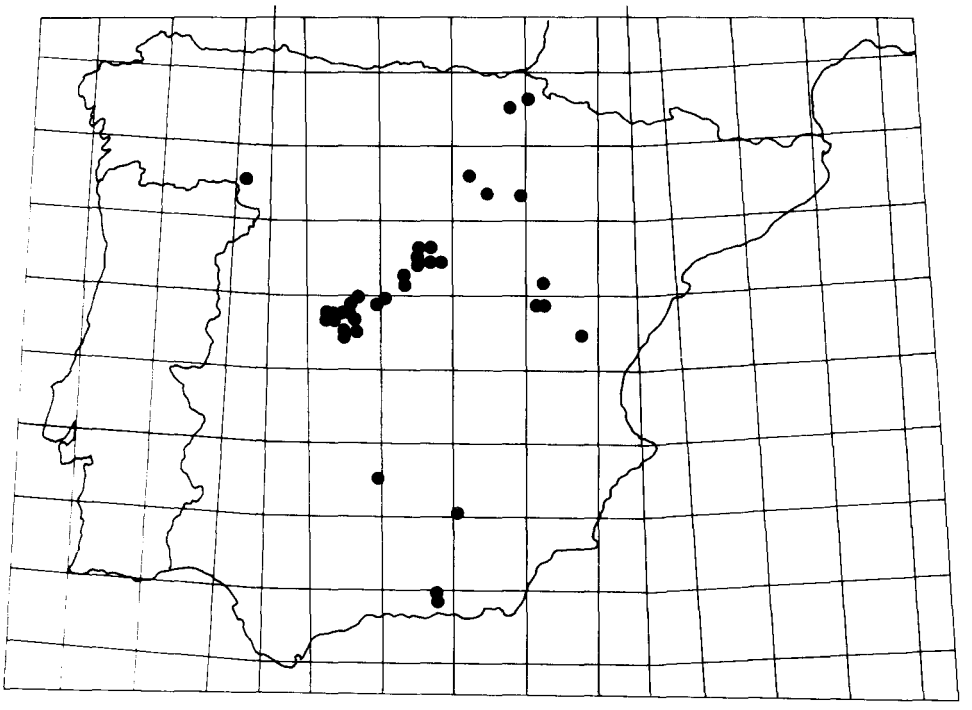

Fig. 2 - Distribution in Spain of *X. macrodora*.

The results of 150 samples taken from many vegetation types from one area, Sierra de Ayllon, are shown in Table I. *X. macrodora* was predominantly associated with oak, 74%; evergreen oak, 46%; and oak-beech forests, 31%.

In Great Britain 4,600 soil samples from a range of vegetation types were examined and four were found to contain *X. macrodora* (Boag and Orton Williams, 1977). Further sampling, mainly of oak woodlands, showed that *X. macrodora* has a more widespread distribution, being present in the following 50 km Universal Transverse Mercator grid squares UH 2, 3 and 4; VH 2 and VJ 2 in Scotland and WC2 in England (Fig. 3). Of the 19 samples containing *X. macrodora* from Great Britain, 17 were from oak woods, one from *Picea* sp., and the other from *Alnus* sp. Soil analysis of the samples showed a pH of 3.1-3.9; sand, 70-78%; silt, 20-24%; clay, 2-10%; organic matter, 13-54%.

Table I - *The distribution of* Xenocriconemella macrodora *within different vegetation types, Sierra de Ayllon (Central System, Spain).*

ECOSYSTEMS	SAMPLES		
	positives	negatives	total
1. Oak forest	14 (74%)	5 (26%)	19
2. Oak-beech forest	9 (31%)	20 (69%)	29
3. Beech-oak forest	—	21 (100%)	21
4. Pine forest	—	17 (100%)	17
5. Evergreen oak forest	12 (46%)	14 (54%)	26
6. Clump of juniper	—	11 (100%)	11
7. Brambles (*Rubus* spp.)	—	11 (100%)	11
8. Heaths (*Erica* spp.)	—	10 (100%)	10
9. Pasture ground in oak forest	1 (17%)	5 (83%)	6

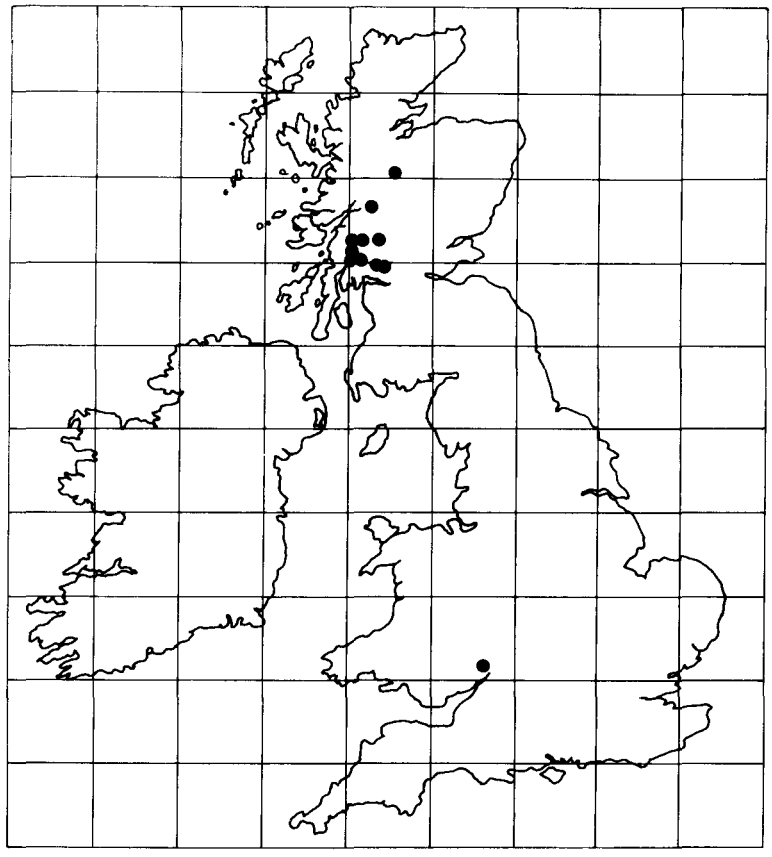

Fig. 3 - Distribution in Great Britain of *X. macrodora*.

Luc and Raski in 1981 transferred *X. macrodora* to the genus *Criconomella* but the present authors consider the species sufficiently distinct to be retained in the genus *Xenocriconemella*.

Discussion

Xenocriconemella macrodora has a cosmopolitan distribution, occurring in North America, Europe, Africa and Asia, associated with woody hosts, especially *Quercus* spp. Its geographical distribution in Great Britain would suggest that it occurs where soils remain moist and where *Quercus* spp. are the predominant vegetation. In Spain it is found mainly associated with *Quercus* species in the north and central region, especially with *Q. pyrenaica* and *Q. ilex* from the subhumid zones, but it is apparently absent from the typically mediterranean regions. Its distribution in Spain coincides with the subhumid brown earth soil types and it is not frequent in the *Q. faginea* woodlands on calcareous soils with high pH.

Further evidence of the relationship between *Quercus* spp. and *X. macrodora* was obtained from a detailed investigation of the Macizo de Ayllon of the Central region of Spain which indicated that the nematode was characteristic of wet *Quercus* forests on acidic sandy loam soils.

The close association between *X. macrodora* and *Quercus* species may provide an insight to the historical ecology of the oak/beech forests in the Ayllon region of Spain; in the Montejo forest, 31% of the samples contained *X. macrodora* but none from the Cantalojas forest. This could indicate that the Cantalojas forest was originally a beech-forest which has become invaded by oak species but that the Montejo forest was possibly an oak forest which has taken on the aspect of a beech forest. If this is so, then *X. macrodora* could be employed as an ecological indicator species. While further studies will be required to confirm this hypothesis, the results reported show a close association between *X. macrodora* and oak trees; such close associations between migratory ecto-parasitic nematode species and host plant taxa are relatively uncommon.

SUMMARY

The geographical distribution of *Xenocriconemella macrodora* (Taylor) De Grisse *et* Loof has been studied and its presence in Norway and Czechoslovakia is reported for the first time. The close relationship between the nematode and *Quercus* has been identified and used

to explain the ecological characteristics of two oak/beech forests found in the Ayllon region of Spain. *X. macrodora* was found in the wettest parts of Spain and Great Britain in close association with *Quercus* species.

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