

GEOGRAPHICAL DISTRIBUTION OF XIPHINEMA COBB
IN SPANISH VINEYARDS

by

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Grapevines are readily cultivated in almost the whole of the Spanish Peninsula; on an acreage basis they are the third most important crop, after wheat and olive, occupying about 7% of the cultivated land.

The world acreage of vineyards is about 10 million hectares, of which 6.9 million hectares, are Mediterranean and of these 5.5 million hectares are grown in the European countries.

According to 1967 statistics, 1.63 million hectares are growing in Spain, compared with 1.64 million in Italy and 0.14 million in France.

Because of the importance of this crop, and as a first step to subsequent and more intensive studies, we have been investigating for some years the occurrence and distribution of nematodes in the main vineyards areas of Spain: La Mancha, Requena, Utiel, Aragón, La Rioja, El Priorato, El Panadés, Alicante, Murcia, Córdoba, Jerez, Huelva, León and Galicia. *Xiphinema* species were found in the 60% of the samples examined. Because of the importance of these nematodes, not only as virus vectors but also because of the direct damage they cause to the plants by their feeding, a survey on their geographical distribution was undertaken and this is reported here.

The first record of *Xiphinema* in Spain is that of Jiménez-Millán (1962), who reported *X. index* Thorne et Allen and *Xiphinema* sp. on grapevines from Abarán (Murcia). Subsequently, Arias et al. (1963) found *X. index* in Madrid and El Arahal (Sevilla) associated with *X. americanum* Cobb and *X. nigeriense* Luc. Jiménez-Millán et al. (1965) reported *X. americanum* from Almachar (Málaga), *X. nigeriense* from Ventas (Toledo) and El Arahal (Sevilla) and *X. index*

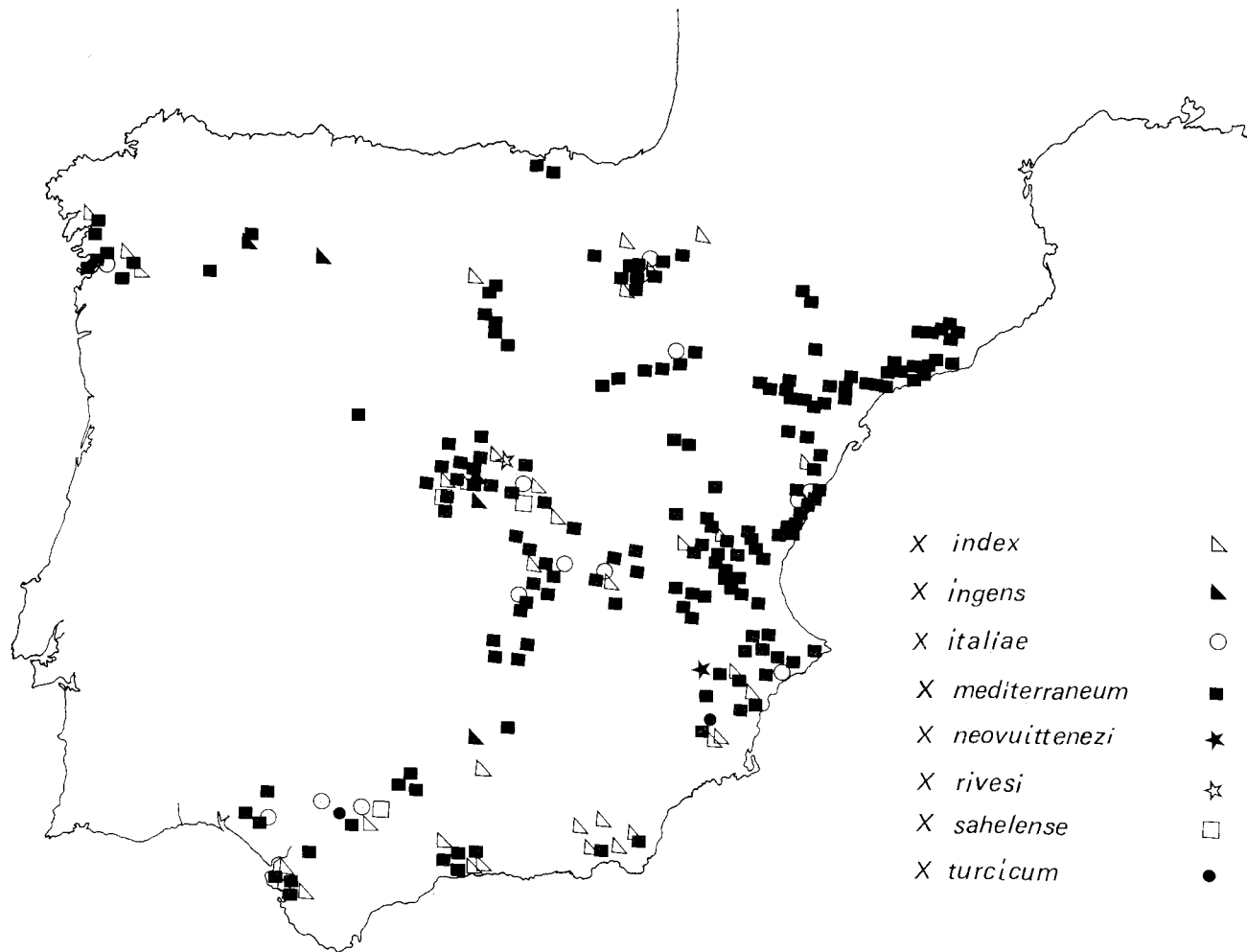


Fig. 1 - Geographical distribution of *Xiphinema* species in Spain.

from 36 localities and *Xiphinema* sp.. Gómez Barcina *et al.* (1965) found *Xiphinema* sp. in Algarrobo, Almachar and Cómputa (Málaga). Tobar Jiménez and Peman Medina (1970) found *X. index* associated with infectious degeneration symptoms in grapevines at Jerez (Cádiz), with *X. mediterraneum* Martelli *et* Lamberti and *Xiphinema* sp. also present.

Material and methods

As a first part of our study, a revision was made of most of the slides that relate to the records of the papers referred to above and which are in the collection of « Sección de Nematología, Instituto Español de Entomología ».

For the main part of the study 400 soil samples were obtained from 225 localities of the main Spanish vineyards; the samples were taken from around the roots of the vines, and nematodes were extracted by means of Seinhorst or Oostenbrink elutriators and mounted in cotton blue lactophenol or in glycerine.

Results

A) In the revision of the slides in our collection the following species of *Xiphinema* were found in the localities as listed alphabetically below:

— *X. mediterraneum*: Minaya, La Roda and Siete Aguas (Albacete); Benisa (Alicante); El Tiemblo (Avila); Ceres de Abrera (Barcelona); Algorta (Bilbao); Aranda de Duero, Fuentespino, Gumiel de Hizán, Lerma, Pardilla and Quintanilla de la Mata (Burgos); Cañete, Montalbo, Pantano de Alarcón and El Provencio (Cuenca); Andujar (Jaén); Alcalá de Henares, Arganda, Brunete, Colmenar Viejo, El Alamo, Fuentidueña de Tajo, Guadarrama, Madrid, Móstoles, Navalcarnero, Pelayos de la Presa and San Juan (Madrid); Algarrobo, Almachar and Cómputa (Málaga); Rio Irati (Navarra); Babilafuente (Salamanca); El Arahál and Paradas (Sevilla); Novés, Ocaña, Quinatanar de la Orden, Valmojado, Ventas de Retamosa (Toledo); Buñol, Requena, Siete Aguas and Villagordo del Cabriel (Valencia).

— *X. index*: Fuentaspina (Burgos); El Provencio (Cuenca); Tor-

redelcampo (Jaén); Arganda, El Alamo, Madrid and Navalcarnero (Madrid); Algarrobo, Almachar and Cómpeeta (Málaga); Abaran (Murcia); and El Arahal (Sevilla).

— *X. ingens* Luc et Dalmasso: Andújar (Jaén) and Valmojado (Toledo).

— *X. italiae* Meyl: El Provencio (Cuenca); Arganda (Madrid); Rio Irati (Navarra); El Arahal (Sevilla) and Quintanar de la Orden (Toledo).

— *X. rivesi* Dalmasso: Madrid (Capital).

— *X. sahelense* Dalmasso: Arganda (Madrid) and El Arahal (Sevilla).

— *X. turcicum* Luc et Dalmasso; Abarán (Murcia) and El Arahal (Sevilla).

B) In the 400 soil samples from the main Spanish vineyards *Xiphinema* species were found in the following localities:

— *X. mediterraneum*: Alborea, Alcalá de Jucar, Casas Ibañez, Llombay, Villatoya and Villavaliante (Albacete); Alcoy, Benitoba, Crevillente, Elche, Jumilla, Rebolledo and Villema (Alicante); Alhama de Almeria and Sorbas (Almeria); Masquefa, Monistrol de Noya, San Genís, San Sadurní de Noya, Valbona del Camí and Villafranca del Panadés (Barcelona); Jerez, Puerto de Santa María and Sanlucar de Barrameda (Cádiz); Alcalá de Chivert, Azuebar, Benicasim, Cueva Santa, Cueva de Vinromá, Chovar, Maestrazgo, Morella, Oropesa, Salsadella, San Mateo, Segorbe, Torreblanca and Villatorcas (Castellón de la Plana); Alcazar de San Juan, Bolaños, Campo de Criptana, Daimiel, Herencia, Manzanares, Moral de Calatrava and Villarta de San Juan (Ciudad Real); Aguilar Montilla and La Rambla (Córdoba); Padrón (La Coruña); Almendros, Cervero del Llano, Motilla del Palancar and Villarubio (Cuenca); Almuñecar and Salobrena (Granada); Almonte, Manzanilla and Rociana (Huelva); Barbastro, Las Cellas, Monzón del Cinca and Velilla (Huesca); Bailén (Jaén); Villafranca del Bierzo (León); Cervera, Such y Suquets and Tárrega (Lérida); Logroño (capital); Algarrobo, Arenas, Cómpeeta, Nerja, Sayalonga and Torrox (Málaga); Abarán, Jumilla and Yecla (Murcia); Castejón, Cintruénigo, Corella, Estella, Fitero, Funes, Liédena, Olite, Peralta, Sangüesa and Tudela (Navarra); Puebla de Trives, Quines and Valdepereira (Orense); Cesantes, Puenteacaldelas and Vilanoviña (Pontevedra); Jubera (Soria); Alió, Arbós, Corbera de Ebro, Falset, Gandesa, Garidells, Las Pessas, Las Voltas, Mora de Ebro, Pino de

Bofarull, Reus, Rodoña, Tamarit, Tarragona, Valls, Vallmoll and Vendrell (Tarragona); Alcañiz, Calaceite, La Cerollera, Hajar, Monroyo, Ojos Negros, Valdealgorfa, Villafranca del Campo, Valdetormo and Villaster (Teruel); Puebla de Almoradiel and Villatobas (Toledo); Alcublas, Calles, Casinos, Coto de Noya, Chelva, Jalarca, Los Duques y Casas Eufemia, Los Isidros, Losa del Obispo, Llombay, Ollerá, Onteniente, Pedrones, Santa Cruz de Noya, Titaguas and Utiel (Valencia); Ariza, Ateca, La Almunia de Dona Godina, Calatayud and Mieres (Zaragoza).

— *X. index*: Elche and Villena (Alicante); Alhama de Almería and Sorbas (Almería); Jerez, Puerto de Santa María and Sanlúcar de Barrameda (Cádiz); Salsadella (Castellón de la Plana); Padrón (La Coruña); Abarán (Murcia); Cintruénigo, Liédena and Peralta (Navarra); Valdepereira (Orense) and Coto de Noya and Utiel (Valencia).

— *X. ingens*: Villadongos del Páramo and Villafranca del Bierzo (León).

— *X. italiae*: Rebolledo (Alicante); Oropesa and Torreblanca (Castellón de la Plana); Herencia (Ciudad Real); Almonte (Huelva); Cintruénigo and Funes (Navarra); Alba (Pontevedra); Sevilla (capital); and Calatayud (Zaragoza).

— *X. neovuittenezi* Dalmasso: Yecla (Murcia).

Discussion and conclusions

Results of the soil samples indicated the descending order of frequency for *Xiphinema* species as *X. mediterraneum*, *X. index*, *X. italiae*, *X. ingens*, *X. turcicum* and *X. rivesi*. The previous reports of *X. americanum* (see references to papers) are undoubtedly *X. mediterraneum*. *X. nigeriense* was not found in the samples of the survey.

— *X. mediterraneum* is the most frequent species in Spanish vineyards being widespread in the Eastern half of the Peninsula. It is, generally, found in the Mediterranean area, according to Dalmasso (1970). In our survey isolated populations were found in the Cantabrical coast (Bilbao), Atlantical coast (Galicia) and in El Bierzo (León).

— *X. index* has a world distribution similar to the vine, in two bands along the parallels 40 and 42, existing also in South Africa,

Chile and Argentina. In Spain, *X. index* was found in Jerez (Cadiz) and some localities in Almeria and Murcia associated with virosis symptoms, and in La Mancha, La Rioja and once in the Atlantic coast of Galicia. Attention is drawn to its apparent absence in the Mediterranean coast of Levante and Cataluña, where relatively intense sampling failed to locate it.

— *X. italiae* is regarded as a characteristic species of Mediterranean sandy littoral fauna. In Spain it was found in La Mancha, Coast of Levante, Occidental Andalucia, Aragón, La Rioja, but not in the Cantabrical region. Its absence in the Mediterranean coast of El Panadés is notable and in the Atlantic coast of Galicia it occurred only as an apparently isolated population.

— *X. ingens* was located as two populations in close proximity in the Central Region and in one in the North of Andalucia. Its presence is probably related to the warm and dry climate of these regions since this is the most occidental location for this species. Previous to these records, *X. ingens* has been found only in Israel, Turkey and Italy.

— *X. sahelense* has been found for the first time in Europe in our soils in Occidental Andalucia and in the Central Region with *X. mediterraneum* and *X. italiae*. As with *X. ingens*, the presence of these species may depend on the warm and dry climate in these regions. Previously, *X. sahelense* was known only from Algeria.

— *X. turcicum* is a species from North Africa and Turkey which we found in Andalucia and South of Levante, which are regions with a warm climate.

— *X. rivesi* appears to be very restricted in the Central Region, which is similar to its occurrence in France where Dalmasso (1970) found it only in the Bordelais.

— *X. neovuittenezi* was found in only one sample in Yecla (Murcia) where the climate is very dry, and with less than 400 mm. of annual rainfall, similar to the French locations in the Languedoc and Rousillon, where the species occurs.

All the *Xiphinema* species found in Spain in association with vines are characteristic of the mediterranean region. However, because of the geographical position and different climatic conditions of the Spanish Peninsula, typical species from European countries are found jointly with those from Africa.

SUMMARY

About 400 soil samples were collected from vineyards localities in Spain, where the crop is of importance. *Xiphinema* was found in about 60% of the samples: *X. mediterraneum* Martelli et Lamberti, *X. index* Thorne et Allen, *X. italiae* Meyl, *X. ingens* Luc et Dalmaso, *X. turcicum* Luc et Dalmaso, *X. sahelense* Dalmaso, *X. rivesi* Dalmaso and *X. neovuittenezi* Dalmaso were identified, the first, being the most frequent and widespread and very often associated with *X. index* and *X. italiae*. The other species were found only in a few and isolated localities.

RIASSUNTO

Distribuzione geografica di *Xiphinema* Cobb nei vigneti spagnoli.

Sono stati esaminati oltre 400 campioni di terreno, prelevati in vigneti di località spagnole di importanza viticola. *Xiphinema* Cobb è stato trovato in circa il 60% dei campioni esaminati; sono stati identificati *X. mediterraneum* Martelli et Lamberti, *X. index* Thorne et Allen, *X. italiae* Meyl, *X. ingens* Luc et Dalmaso, *X. turcicum* Luc et Dalmaso, *X. sahelense* Dalmaso, *X. rivesi* Dalmaso e *X. neovuittenezi* Dalmaso. Il primo è risultato essere il più frequente ed il più diffuso, essendo spesso associato a *X. index* e *X. italiae*. Le altre specie sono state rinvenute solo in poche località.

RÉSUMÉ

Distribution géographique de *Xiphinema* Cobb dans les vignobles espagnoles.

Dans l'étude d'environ 400 échantillons du sol de principales régions viticoles espagnoles, les espèces de *Xiphinema* Cobb sont présentes dans le 60% des échantillons. On a identifié *X. mediterraneum* Martelli et Lamberti, *X. index* Thorne et Allen, *X. italiae* Meyl, *X. ingens* Luc et Dalmaso, *X. turcicum* Luc et Dalmaso, *X. sahelense* Dalmaso, *X. rivesi* Dalmaso et *X. neovuittenezi* Dalmaso. La première espèce est la plus largement répandue et elle apparaît fréquemment associée à *X. index* et *X. italiae* tandis que les autres se présentent rarement et isolées.

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