

SUNFLOWER DISEASE MAPPING IN EUROPE AND ADJACENT MEDITERRANEAN COUNTRIES

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INTRODUCTION

Sunflowers have been an important oilseed crop in eastern Europe, particularly in the U.S.S.R., for many years. They are a new crop in many countries of Europe and adjacent areas of the Mediterranean basin, where large and increasing areas are being devoted to sunflower production.

A great deal of research has been done on sunflowers in some of the older producing areas. Research programs are being established, some of them on an ambitious scale, in various "new" sunflower growing countries. To help coordinate these efforts and to establish closer contacts among the institutions in various countries, F.A.O. sponsored a meeting at Bucharest in October 1975 which organized the European Research Network on Sunflower. One of the subnetworks established was on sunflower disease mapping in Europe, with the National Research Center for Oilseed Crops at Córdoba, Spain, named as the liaison center for the first two-year period.

OBJECTIVES AND JUSTIFICATION OF MAPPING

Sunflower diseases have been studied intensively in only a few countries; relatively little work has been done on them in most of the new sunflower growing areas. Diseases known to be prevalent and destructive in some countries apparently do not occur in others, or have not been recognized or reported there. Diseases considered minor in some older sunflower growing areas, have proved destructive in new areas for the crop.

It is important to know what diseases are present and which are destructive in each country, in order to allocate research resources where they are most needed and to develop programs of the greatest practical value for that country. It is important to know what diseases exist in other countries from which seed is imported, or from which pathogens may spread by natural means or by accidental transport.

It is important to determine relationships between disease occurrence and severity, and such factors as soil and climatic conditions. Some diseases destructive in one area may be of little significance in another because of differences in environment or cultural practices. Disease occurrence, prevalence, and severity may change from year to year. It is important to know if such changes are local or general, and if they are attributable to introduced or changed pathogens, changes in crop cultivars, or in environmental factors.

Knowledge of the distribution, severity, and regularity of occurrence of diseases in various countries may make it possible to share research efforts among cooperating institutions, to mutual advantage.

Much of the necessary information can be presented most effectively and understood most readily in the form of disease maps.

METHODOLOGY

The initial organization of sunflower disease mapping in Europe was done by correspondence. A meeting of pathologists and agrono-

mists interested in the mapping project was held at Krasnodar, U.R.S.S., in July 1976 in connection with the Seventh International Sunflower Conference. Representatives of nine European countries and an observer from U.S.A. reported on the disease situation in their respective countries, and those who made systematic surveys described the methods used.

It was agreed to use a common survey method insofar as possible in each country, as follows :

1. Make two surveys in each country, the first when plants are at about the 10-leaf stage, and the second after full bloom. Where possible make another survey when plants are maturing, to determine head rot.

2. Examine at least 100 plants per field of 10 hectares or less. In small fields walk along the diagonals crossing the field from corner to corner, making two counts of 50 consecutive plants along each diagonal. In fields larger than 10 ha walk along one diagonal, counting 50 consecutive plants at each of six or more locations evenly spaced along the diagonal.

3. Record all the diseases which can be recognized in the field, or diagnosed later in the laboratory.

4. Describe any unidentified symptoms in detail, for future reference.

5. Record the intensity of attack, as well as the number of plants affected by each disease in each sample of 50 plants.

6. For diseases which occur in patches, estimate the area in the patches as a percentage of the total area of the field. Record any other diseases observed in the field, in addition to diseases seen on the plants sampled systematically.

7. For leaf spots and other foliage diseases, indicate if symptoms are present on the lower, middle, or upper part of the plant.

8. Estimate intensity of leaf spots and other diseases as light, moderate, or severe, with reference to area affected as a proportion of total leaf or stem area.

9. Record estimated field size, and inspect a suitable number of fields in each sunflower area of the country, to be able to estimate the significance of each disease in the whole country.

10. The comment was appended : "It has been found useful in some countries to prepare survey sheets, with one sheet to be used for each field examined. Spaces are provided for information on the date ; location of the field ; its estimated size ; plant stage ; soil type ; and any other general information of interest. The diseases which may be expected to occur in surveys made at specific stages of plant development are listed, with space to

record number of plants affected by each disease in each count of 50 plants, and intensity of disease. Space is also provided for miscellaneous diseases not listed. Additional sheets bearing the same field number may be used for detailed descriptions of unfamiliar symptoms observed in the field, or for additional comments".

Not included in the methodology agreed at the time, but desirable, is the preparation of herbarium specimens of each of the diseases seen, and taking general and close photographs of symptoms. These are extremely useful in confirming or correcting diagnoses at some future date.

DISEASE LISTS AND MAPS

LISTS

A meeting to review the results of the first two years of work by the various subnetworks was organized by F.A.O. at Córdoba in September 1977. The response of collaborators in the disease mapping project was most gratifying. Disease lists were prepared and submitted for 14 countries. The information in the lists and the contributors are given in Tables 1 to 14.

Table 1

Sunflower diseases in Bulgaria *

Disease	Pathogen	Comment
Downy mildew	<i>Plasmopara helianthi</i> Novot. (= <i>P. halstedii</i>)	Major disease
Rust	<i>Puccinia helianthi</i> Schw.	" "
White rot	<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary (= <i>S. libertiana</i>)	" "
Leaf spot	<i>Septoria helianthi</i> Ell. and Keller	
Leaf spot	<i>Alternaria</i> sp.	(first report in Bulgaria, 1976)
Broom rape	<i>Orobancha</i> sp.	Severe on Peredovik in one location since 1974

* Submitted by Rossitza Bocharova, Institute for Wheat and Sunflower, General Toshevo, Tolbuhin, Bulgaria.

INDIVIDUAL COUNTRY MAPS

Maps were submitted from nine countries, as follows :

Bulgaria : 5 maps, one of sunflower regions indicating suitability of climate for sunflowers

Table 2

Sunflower diseases in Egypt *

Disease	Pathogen	Comment
Charcoal rot	<i>Macrophomina phaseolina</i> (Tassi). Goidanich (= <i>M. phaseoli</i> = <i>Sclerotium bataticola</i>)	Major disease
Rust	<i>P. helianthi</i>	" "
Leaf spots (complex)	<i>Alternaria alternata</i> (Fr.) Keissler	" "
	<i>Curvularia lunata</i> Wakker	First record
	<i>Drechslera rostrata</i> (Drech.) Richardson and Fraser	Isolated from leaf spots
	<i>D. Spicifera</i> (Bain) V. Arx	" "
	<i>Ulocladium botrytis</i> Preuss.	" "
	<i>U. septosporum</i> (Preuss) Simons	" "
	<i>Botryodiplodia theobromae</i> Pat.	" "
Wilt	<i>Fusarium oxysporum</i> Schlecht. amend. Snyd. and Hans.	Uncommon
	<i>F. solani</i> App. and Wr.	"
Southern blight	<i>Sclerotium rolfsii</i> Sacc.	Increasing prevalence
Stalk and head rot	<i>Whetzelinia sclerotiorum</i> (Lib.) Korf and Dumont (= <i>S. sclerotiorum</i> = <i>S. libertiana</i>)	Rare
Powdery mildew	<i>Erysiphe cichoracearum</i> D.C. (= <i>Oidium</i> sp.)	Sarce
Head rot	<i>Rhizopus arrhizus</i> Fisher	Heavy damage on short cultivars
	<i>A. alternata</i> <i>Aspergillus</i> sp.	Isolated from heads
Root rot (complex)	<i>Rhizoctonia solani</i> Kühn	Minor disease
	<i>Pythium</i> sp.	" "
	<i>Fusarium</i> sp.	" "
Leaf mottle (Verticillium wilt)	<i>Verticillium dahliae</i> Kleb.	New in 1977 major disease
Root Knot	<i>Meloidogyne</i> sp.	Heavy losses in sandy soils

* Submitted by A. M. El Zarka, Institute of Plant Pathology, Agricultural Research Center, Ministry of Agriculture, Giza, Egypt.

in each zone, and four maps of distribution of *Alternaria* leaf spot, downy mildew, gray rot, and broomrape respectively.

Egypt : 1 map showing sunflower regions.

France : 4 maps, one of sunflower regions showing departaments with less than 1,000 ha, 1,000 to 5,000 and over 5,000 ha of sunflowers, respectively ; one, distribution of downy mildew showing foci of infection, infested zones,

Table 3

Sunflower diseases in France *

Disease	Pathogen	Comment
Downy mildew	<i>P. helianthi</i>	Major disease
White rot (stalk and head rot)	<i>S. sclerotiorum</i>	" "
Gray rot (stalk and head rot)	<i>Botrytis cinerea</i> Fr.	" "
Charcoal rot (premature ripening)	<i>M. phaseolina</i>	" "
Verticillium wilt (leaf mottle)	<i>V. dahliae</i>	Minor disease
Rust	<i>P. helianthi</i>	" "
Powdery mildew	<i>Oidium</i> sp.	" "
Black stem	<i>Phoma oleracea</i> Sacc.	" "
Head rot	<i>Rhizopus</i> sp.	" "
Head rot	<i>Aspergillus</i> sp.	" "

* Submitted by Y. Regnault and collaborators, C.E.T.I.O.M., 174 Av. Victor Hugo, 75116, Paris, France ; and J. J. Guillaumin, INRA, Station de Pathologie Végétale, Domaine Monte Desir, 12 Av. de l'Agriculture, and Felicity Vear, INRA, Station d'Amélioration des Plantes, Domaine de Crouelle, 63110 Clermont-Ferrand, France. Detailed information is provided in Guillaumin et al. (1975, 1976).

Table 4

Sunflower diseases in Hungary *

Disease	Pathogen	Comment
Downy mildew	<i>Plasmopara halstedii</i> (Farl.) Berl. and de Toni	Occurrence and severity vary
White rot	<i>S. sclerotiorum</i>	from year to year with
Gray rot	<i>B. cinerea</i>	climatic conditions and
Charcoal rot	<i>M. phaseolina</i>	with host
Verticillium wilt	<i>V. dahliae</i>	cultivar.
Leaf spot	<i>S. helianthi</i>	
Leaf spot	<i>Alternaria zinniae</i> Pape	
Leaf spot	<i>A. helianthi</i> (Hansf.) Tubaki and Nishihara	
Leaf spot	<i>Alternaria</i> sp.	

* Submitted by J. Vörös, Research Institute for Plant Protection, H-1525 Budapest II, P.F. 102, Herman Otto U. 15, Hungary.

and zones apparently free of the disease ; one, distribution of *Sclerotinia* rot, showing zones of severe infection and widespread occurrence ; and one, distribution of charcoal rot.

Iran : 1 map of sunflower regions, and text giving distribution of diseases listed in Table 5.

Italy : 3 maps, one showing distribution and area of sunflowers as a percentage of total agricultural and forest area, and two showing

Table 5

Sunflower diseases in Iran *

Disease	Pathogen	Comment
Leaf spot	<i>Alternaria</i> sp.	Major
Charcoal	<i>Sclerotinia bataticola</i> Taub.	"
Wilt	<i>Fusarium</i> sp.	Minor
Head rot	<i>Rhizopus</i> sp. <i>Alternaria</i> sp.	Significant in humid regions
Downy mildew	<i>P. halstedii</i>	" "
Rust	<i>P. helianthi</i>	On large-seeded types
White rot	<i>Sclerotinia libertiana</i> Fckl.	Sporadic

* Submitted by M. Aćimović, Institute for Agricultural Research, Maksima Gorkog 30, Novi Sad, Yugoslavia. Detailed information is given by Aćimović (1975 b).

Table 6

Sunflower diseases in Israel *

Disease	Pathogen	Comment
Rust	<i>P. helianthi</i>	Major disease
Head rot	<i>Rhizopus</i> sp.	" "
White rot	<i>S. sclerotiorum</i>	Minor disease
Charcoal rot	<i>M. phaseolina</i>	" "
Powdery mildew	<i>Oidium</i> sp.	" "
Collar rot	<i>Sclerotium rolfsii</i> Sacc.	Rare disease
Downy mildew	<i>P. halstedii</i>	One doubtful record

* Submitted by R. Kenneth, Department of Plant Pathology and Microbiology, Faculty of Agriculture, P. O. Box 12, Rehovot 76-100, Israel.

Table 7

Sunflower diseases in Italy *

Disease	Pathogen	Comment
Downy mildew	<i>P. halstedii</i>	Minor disease
White rot	<i>S. sclerotiorum</i>	Variable
Brown rot	<i>B. cinerea</i>	"

* Submitted by G. Vicentini (deceased) and G. P. Vannozzi, Istituto di Agronomia Generale e Coltivazioni Erbacee, Università di Pisa, Pisa, Italy; and R. Tuberosa, Istituto di Agronomia Generale e Coltivazioni Erbacee, Università di Bologna, Bologna, Italy.

distribution and severity of downy mildew in two main areas in 1977.

Romania : 6 maps of data for 1976 and 1977, one of downy mildew showing zones with 0 to 1, 1 to 10, and over 10% infection; one of *Sclerotinia* rot, showing zones with 0 to 5, 6 to

Table 8

Sunflower diseases in Poland *

Disease	Pathogen	Comment
Gray rot	<i>B. cinerea</i>	Major disease
White rot	<i>S. sclerotiorum</i>	Minor disease
Downy mildew	<i>P. halstedii</i>	First found 1975
Verticillium wilt	<i>V. dahliae</i>	Potentially dangerous

* Submitted by Z. Kloczowski, Instytut Hodowli i Aklimatyzacji Roslin, Oddział Poznański-Gorzowski Zakład Roslin Oleistych Poznań, Sieroca 1a, 61-611, Poznań, Poland.

Table 9

Sunflower diseases in Romania *

Disease	Pathogen	Comment
Downy mildew	<i>P. helianthi</i>	Major disease
White rot (stalk and head rot)	<i>S. sclerotiorum</i>	" "
Gray rot	<i>B. cinerea</i>	Major for first time in 1976
Black stem	<i>P. oleraceae</i> var. <i>helianthi tuberosi</i> Sacc.	Minor disease
Charcoal rot	<i>S. bataticola</i>	" "
Rust	<i>P. helianthi</i>	" "
Verticillium wilt	<i>V. dahliae</i>	First found in 1976
Broomrape	<i>Orobanche</i> sp.	New race

* Submitted by H. Iliescu and A. V. Vrânceanu, Research Institute for Cereals and Industrial Crops, 8264 Fundulea, Jud. Ilfov, Bucharest, Romania.

10, 11 to 20, and over 20% infection; a similar map for gray rot; one showing distribution of broomrape; one of black stem and of charcoal rot; and one of *Verticillium* wilt and of rust; with detailed notes on each disease.

Spain : 7 maps, one showing distribution of sunflowers and provinces in which they occupied under 5, from 5 to 10, and over 10% of total area of annual crops in 1974 to 1976; 5 maps based on surveys in 1976 and 1977, showing distribution of charcoal rot; downy mildew; bract necrosis; head drop; *Rhizopus* head rot; and one indicating scattered occurrences of rust, *Sclerotinia* rot, *Verticillium* leaf mottle, and broomrape.

Tunisia : 1 map showing sunflower regions, and a list indicating occurrence and severity of diseases (Table 11) in each zone.

Yugoslavia : 11 maps, one showing the distribution of sunflower production, and 10 showing distribution of downy mildew; white rot; gray rot; rust; *Septoria* leaf spot; *Alternaria* leaf spot; black stem; charcoal rot; *Verticillium* wilt; and broomrape, respectively. Accompa-

Table 10

Sunflower diseases in Spain *

Disease	Pathogen	Comment
Downy mildew	<i>P. halstedii</i>	Major disease
Charcoal rot	<i>S. bataticola</i>	" "
White rot (stalk rot)	<i>S. sclerotiorum</i>	First found in farm field in 1976
Gray rot (stalk rot)	<i>B. cinerea</i>	Scarce in re-search plots and greenhouse
Rust	<i>P. helianthi</i>	Scarce
Head rot	<i>Rhizopus</i> sp.	Minor
Verticillium wilt	<i>V. dahliae</i>	First found in farm field in 1976
Broomrape	<i>Orobanche</i> sp.	First found on oil-seed sunflowers 1976
Head drop	Cause unknown, possibly physiological or insect attack	Scarce
Bract necrosis	Cause unknown	General, associated with drought

* Submitted by W. E. Sackston, Rafael Jimenez-Diaz, Carlos Garcia-Baudin, and Fernando Romero-Muñoz, Research Center for Oilseed Crops, INIA, Alameda del Obispo, Aptdo. 240, Córdoba, Spain.

Table 11

Sunflower diseases in Tunisia *

Disease	Pathogen	Comment
Charcoal rot (black root rot)	<i>M. phaseoli</i>	Major disease
White rot (stalk rot)	<i>S. sclerotiorum</i>	" "
Head rot	<i>Rhizopus arrhizus</i> Fischer	" "
Fusarium wilt	<i>F. oxysporum</i> f. sp. <i>helianthi</i> Mahjoub	Rare
Gray rot	<i>B. cinerea</i>	Found once on seeds, once on necrotic leaf.

* Submitted by A. Jouhri, Laboratoire des plantes Industrielles, and M. El Mahjoub, Laboratoire de Phytopathologie, INRAT, Ariana, Tunisia. Additional information is given by Mahjoub and Ben Othman (1974a, 1974b, and 1975).

nying text indicates the importance of each disease, when, and by whom it was first reported, and gives details of soil and climatic characteristics of each sunflower region. Overall maps.

Maps of the entire area were prepared showing the occurrence of those diseases considered major in at least four of the reporting coun-

Table 12

Sunflower diseases in Turkey *

Disease	Pathogen	Comment
Downy mildew	<i>P. helianthi</i>	Widespread disease
White rot	<i>S. sclerotiorum</i>	"
Gray rot	<i>B. cinerea</i>	"
Rust	<i>P. helianthi</i>	"
Leaf spot	<i>S. helianthi</i>	"
Leaf spot	<i>Alternaria</i> sp.	"
Leaf spot	<i>Helminthosporium</i> sp.	"
Head rot	<i>Rhizopus</i> sp.	Localized
Charcoal rot	<i>M. phaseoli</i>	"
Broomrape	<i>Orobanche</i> sp.	Widespread

* Submitted by R. Tashan, Agricultural Research Institute, P. O. Box 1, Yesilköy Istanbul, Turkey, and M. M. Yücer, Erenköy Regional Plant Protection Research Institute, Kadiköy, Istanbul, Turkey.

Table 13

Sunflower diseases in U.S.S.R. *

Disease	Pathogen
Downy mildew	<i>P. helianthi</i>
White rot	<i>S. libertiana</i>
Root rot	<i>Fusarium</i> sp.
Rust	<i>P. helianthi</i>
Verticillium wilt	<i>V. dahliae</i>
Broomrape	<i>Orobache cumana</i> Wallr.
"	<i>O. ramosa</i> L.
"	<i>O. aegyptiaca</i> Pers.
Charcoal rot	<i>S. bataticola</i>
Gray rot	<i>B. cinerea</i>
Head rot	<i>R. nodosus</i>
Powdery mildew	<i>Erysiphe cichoracearum</i> D.C. f. <i>helianthi</i> Jaca.
White rust	<i>Cystopus tragopogonis</i> Schrot. (= <i>Albugo tragopogonis</i>)
Leaf spot	<i>S. helianthi</i>
Black leaf spot	<i>Ascochyta helianthi</i> Abramov.
Angular leaf spot	<i>Pseudomonas solanacearum</i> E. F. Smith

* This list was not submitted, but translated from the Russian book by Khokhryakov et al. (1966).

tries (Tables 1 to 14). They are for downy mildew, white rot, charcoal rot, gray rot, leaf spots, and rust, respectively (Figures 1 to 6) *.

* The maps are intended to show the occurrence and relative severity of individual diseases in each country from which reports were received; they do NOT indicate distribution within the country.

Diseases considered major in the respective countries are indicated by stippling with large dots; diseases considered minor are indicated by stippling with small dots.

Letters used to designate countries are those recognized internationally to identify motor vehicles.

The hollow circles indicate the capital city of each country.

Table 14

Sunflower diseases in Yugoslavia *

Disease	Pathogen	Comment
Downy mildew	<i>H. halstedii</i>	Major disease
White rot	<i>S. sclerotiorum</i>	" "
Gray rot	<i>B. cinerea</i>	" "
Leaf spot	<i>Alternaria</i> sp.	" "
Charcoal rot	<i>M. phaseolina</i>	" "
Black stem	<i>Phoma</i> sp.	Minor disease
Rust	<i>P. helianthi</i>	" "
Leaf spot	<i>S. helianthi</i>	" "
Verticillium wilt	<i>V. dahliae</i>	" "
Fusarium wilt	<i>Fusarium</i> sp.	" "
Bacterial rot	<i>Pectobacterium carotovorum</i> (Jones) Waldee (= <i>Erwinia carotovora</i>)	" "
Head rot	<i>Rhizopus</i> sp.	" "
Broomrape	<i>Orobancha</i> sp.	Major disease

* Submitted by M. Aćimović, Institute for Agricultural Research, Maksima Gorkog 30, Novi Sad, Yugoslavia. Detailed information is provided in Aćimović (1962, 1965, 1969, 1974 a, 1974 b, 1975 a).

DISCUSSION

Considerable information on sunflower disease was available prior to 1975 in a number of the participating countries. Where much effort and enthusiasm have been devoted to studying sunflower diseases for many years, detailed and precise data have been collected on the occurrence, severity, variation with weather conditions, soil types, and host cultivars, for the major diseases. In only a few instances have these data been published in readily available form.

Where sunflowers are a relatively new crop, and where trained staff and facilities to study their diseases are scarce, the information is much more limited. Much work remains to be done everywhere, particularly where least has been done in the past, to determine what diseases occur on sunflowers in each country, whether their prevalence and severity are changing, and what effects they have on the quantity and quality of the crop.

The fact that disease lists of various degrees of completeness, and some maps, could be prepared two years after the project was organized, is highly encouraging.

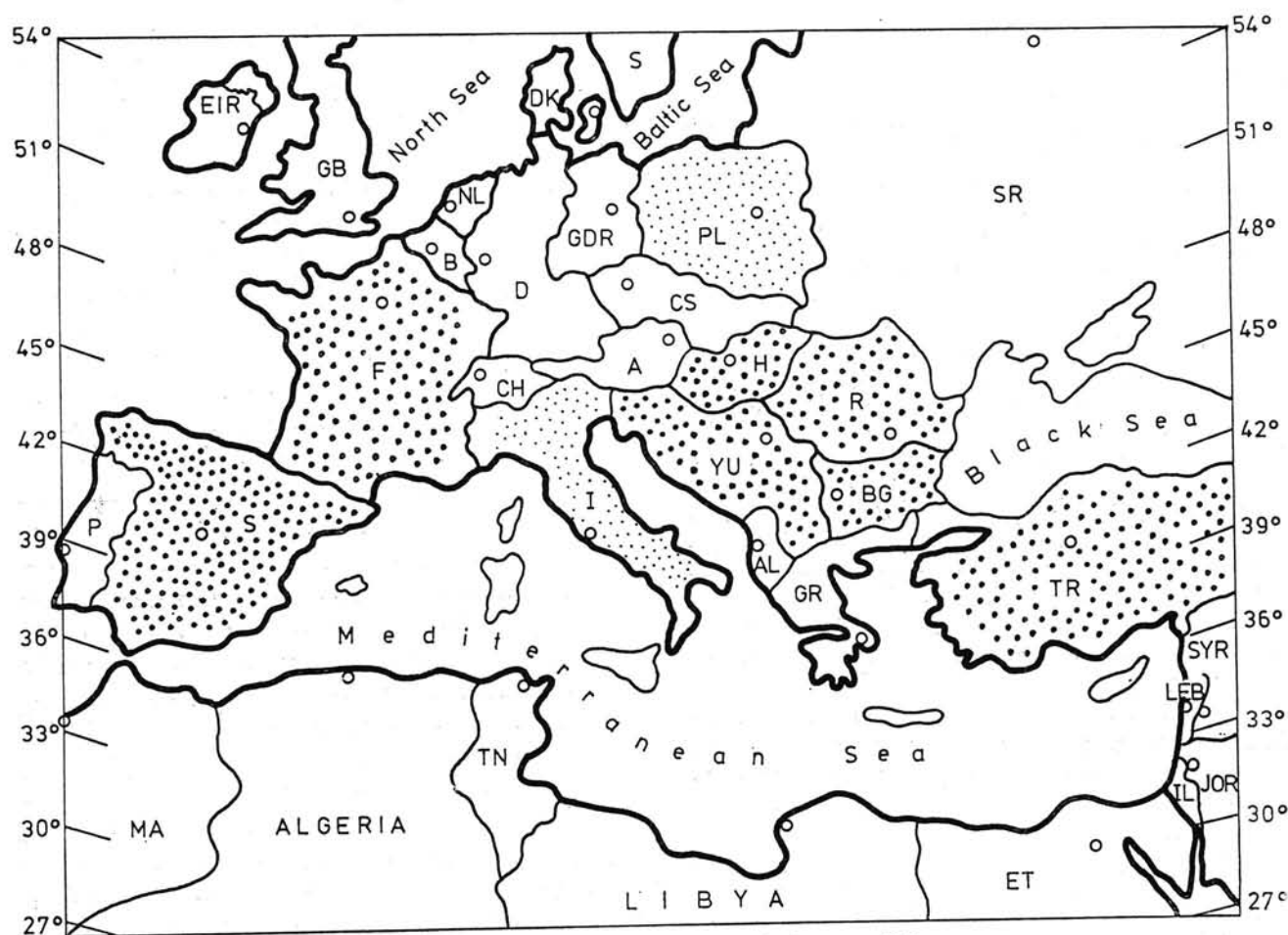


Fig. 1 — Distribution and severity of downy mildew.

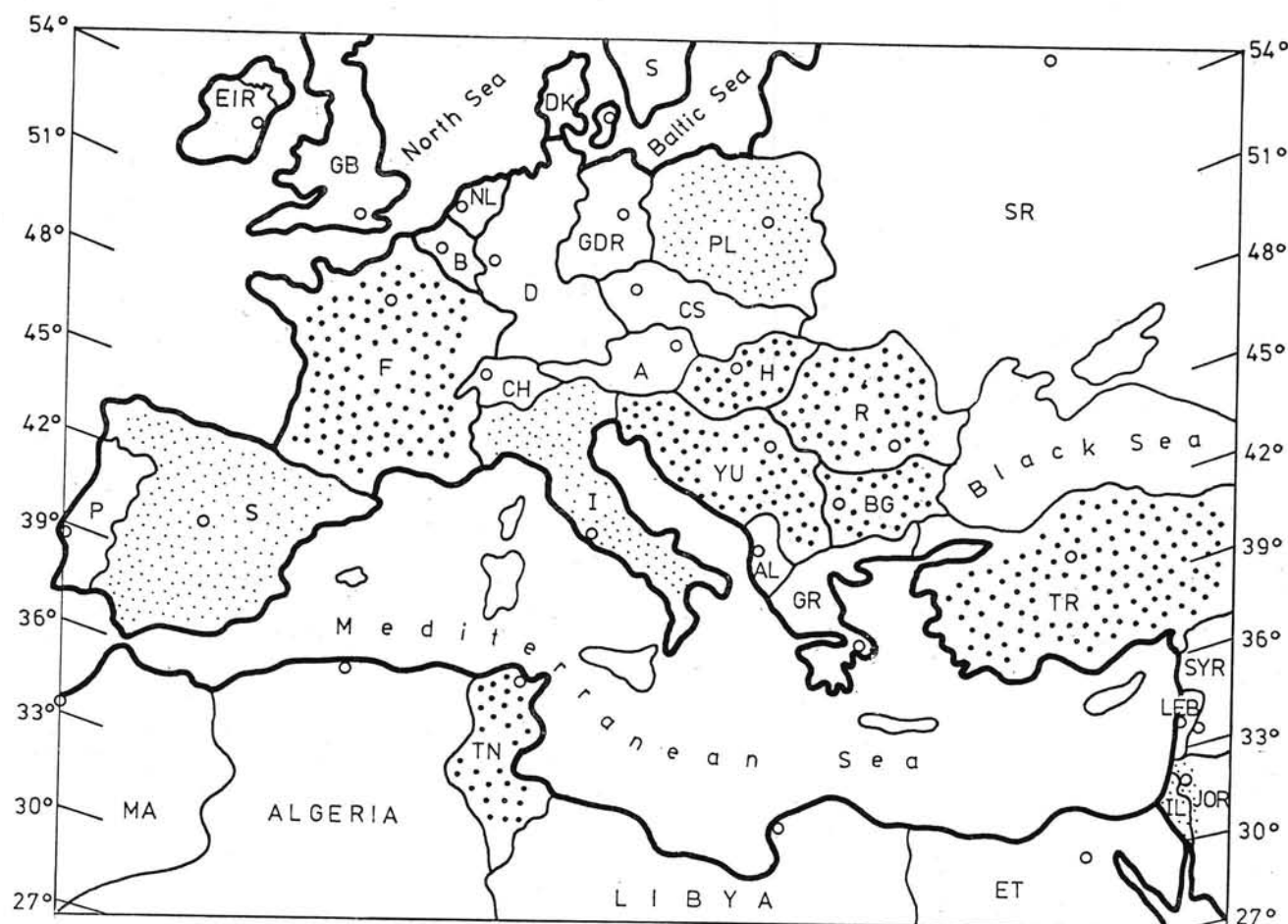


Fig. 2 — Distribution and severity of white rot.

Methods of making disease surveys and estimating disease losses have been studied and reported upon in considerable detail (Chiarappa, 1971). Methods to be used in surveying sunflower diseases for the mapping project were agreed upon at Krasnodar in 1976, but could not be used uniformly in all countries because of shortages of staff and resources in many of them. It is to be hoped that these difficulties can be overcome, and data as complete as necessary can be collected in all participating countries.

Basic principles to be considered in mapping plant diseases were well reviewed by Weltzien (1972). They were kept in mind when formulating a program for mapping sunflower diseases, although in many details fulfilment of the requirements remains an objective rather than a reality.

The objective of this project was to prepare and publish maps showing the distribution and severity in Europe and adjacent areas of each of the common sunflower diseases, in more detail than is possible in Commonwealth Mycological Institute maps such as those for rust and downy mildew (Anon. 1969, 1977). Although not impossible, it would be difficult to prepare usable maps in such detail for an area large

and variable as Europe without using color or else making the maps larger than normal journal pages. Apart from the cartographic difficulties, it would be premature to prepare such maps at present; the information is not sufficiently complete to make them useful. It is however possible to prepare tentative maps showing the countries in which the more important diseases occur, and if they are considered major or minor in each country. A start has been made on this work.

The most pressing need is for each country to accumulate the necessary information and to prepare and publish detailed maps of occurrence and severity of sunflower diseases within its own borders, together with maps showing distribution of sunflower production, and climatic and soil conditions in the various zones. Several countries are already able to publish such maps, and others should be able to do so in the near future. Some skilled cartographer may then be appointed to put the information from each country on overall maps of the whole area.

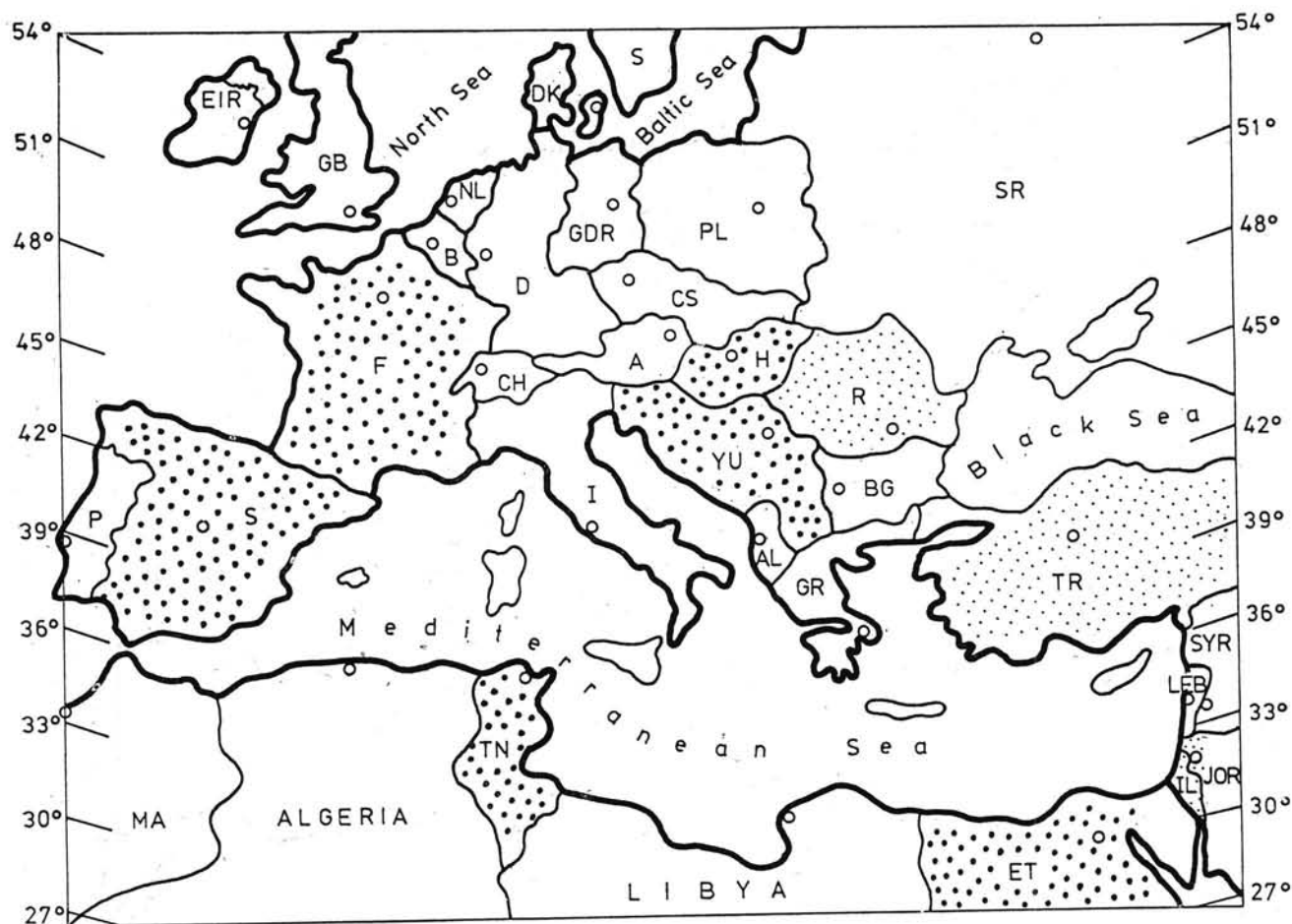


Fig. 3 — Distribution and severity of charcoal rot.

ACKNOWLEDGEMENTS

The author acknowledge with regret his inadequacy as a cartographer, with consequent shortcomings in the work. He acknowledges with pleasure the enthusiasm and cooperation of all the individuals involved in the project and their institutions and governments, those named as contributors to the disease lists and the many others who gave valuable assistance. Particular appreciation must be expressed to Dr. A. V. Vrânceanu of Fundulea, Romania, for stimulating formation of the European Research Network on Sunflower and to F.A.O. for organizing and supporting it. My warmest personal thanks go to Drs. Ing. Agr. Tomás Millán Valderrama and Rafael Gimenez Ortiz, Director and Assistant Director respectively of the Research Center at Córdoba, to Dr. Ing. Agr. Manuel de León López, head of the oilseed crops department and all my colleagues at the Center, and the many agronomists of oilseed companies throughout Spain who gave their encouragement, help, and friendship not only in the disease survey and mapping projects, but throughout my stay as research coordinator at Córdoba.

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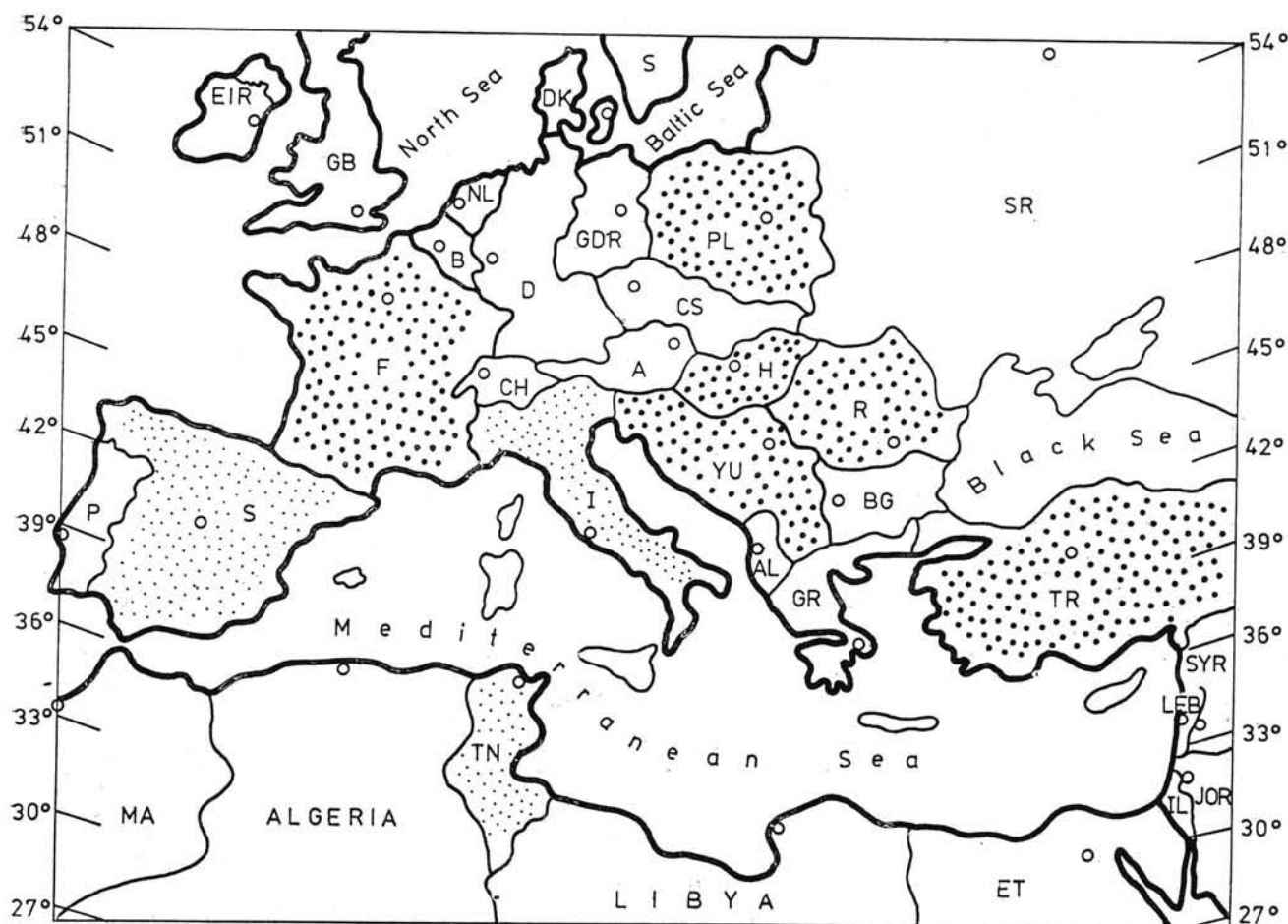


Fig. 4 — Distribution and severity of gray rot.

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ETABLISSEMENT DE CARTES DES MALADIES DU TOURNESOL EN EUROPE ET DANS LES RÉGIONS MÉDITERRANÉENNES ADJACENTES

Résumé

Les représentants de huit pays ont organisé en octobre 1975 à Bucarest, dans le cadre d'une réunion patronnée par la F.A.O., un réseau européen de coopération scientifique dans le domaine des recherches sur le tournesol. Le Centre national de recherches pour les plantes oléagineuses de Cordoue, Espagne, a été élu comme Centre de liaison pour organiser l'établissement de la carte des maladies du tournesol. Les détails ont été établis par correspondance aussi bien qu'à l'occasion des réunions de Krasnodar, U.R.S.S., de juillet 1976 et de Cordoue, Espagne, de septembre 1977. Les pays suivants ont fourni les listes de maladies : Bulgarie, Egypte, Espagne, France, Hongrie, Israël, Italie, Pologne, Roumanie, Tunisie, Turquie et Yougoslavie.

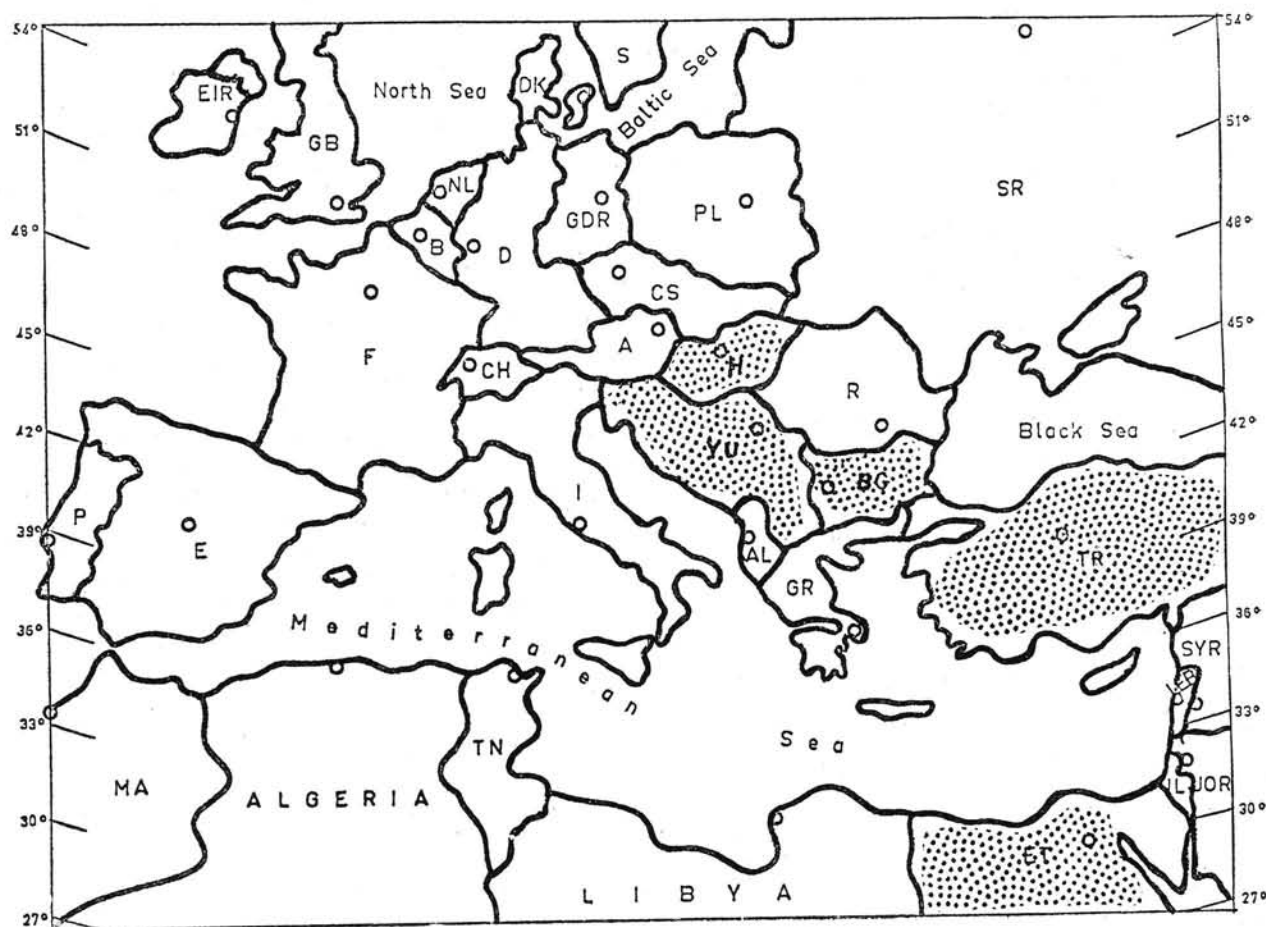


Fig. 5 — Distribution and severity of leaf spots.

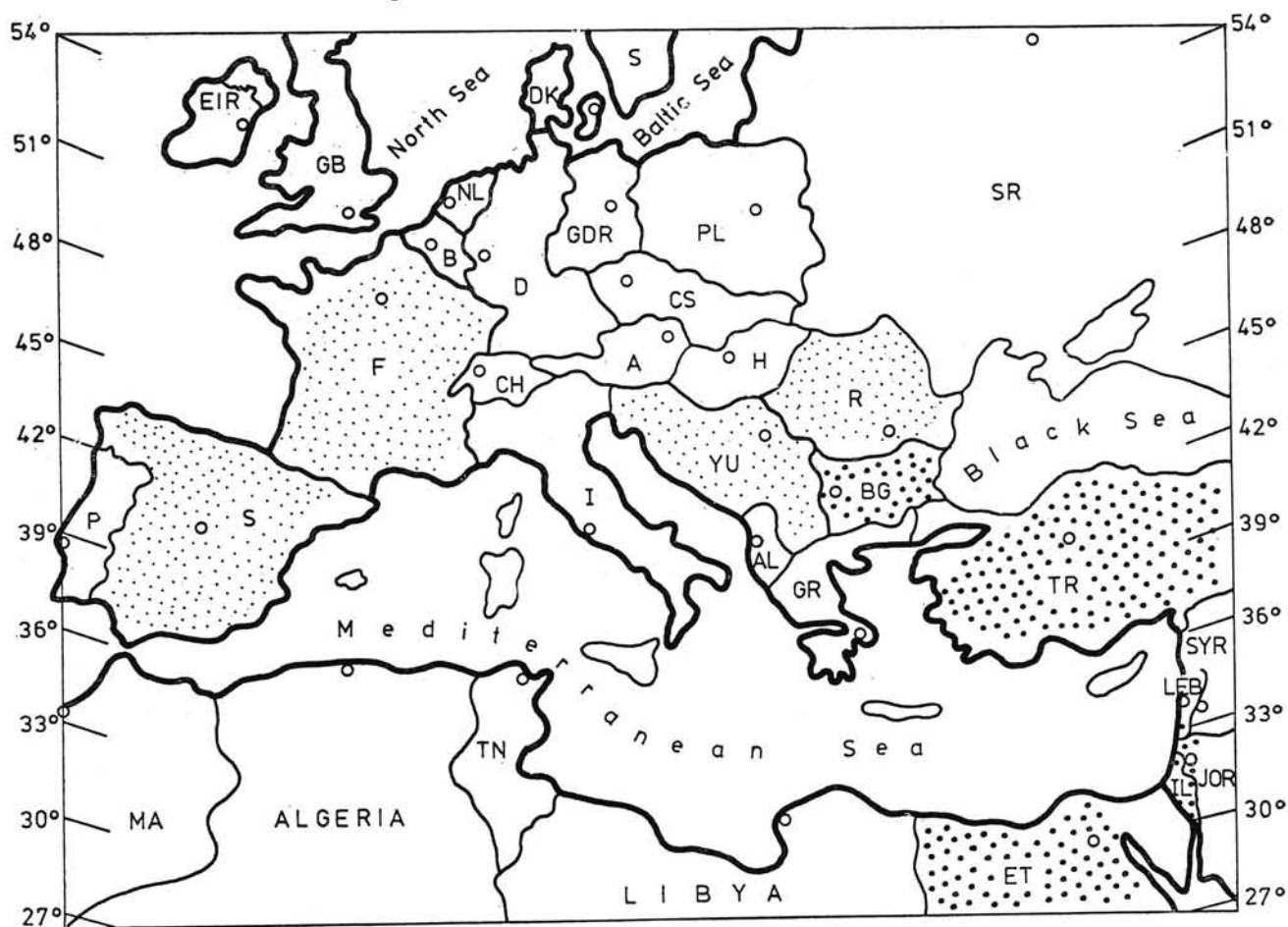


Fig. 6 — Distribution and severity of rust.

On est parvenue à un accord sur les méthodes de surveillance et enregistrement des maladies, mais il n'a pas été possible de les utiliser dans tous les pays. Il reste beaucoup encore à faire dans les pays où la culture du tournesol est relativement nouvelle et où les ressources matérielles et le personnel qualifié sont réduits. Actuellement, il est possible de préparer seulement des cartes générales provisoires, indiquant les pays dans lesquels est apparue une nouvelle maladie et si cette maladie est considérée majeure ou mineure. Il faudrait préparer des cartes détaillées séparément pour chaque pays, indiquant l'emplacement de la culture et la distribution des maladies.

DISTRIBUCIÓN DE LAS ENFERMEDADES DEL GIRASOL POR ZONAS EN EUROPA Y EN LOS PAÍSES MEDITERRÁNEOS ADYACENTES

Resumen

Los representantes de ocho países organizaron en octubre de 1975 en Bucarest, en una reunión patronada por F.A.O., una red europea de cooperación científica en el campo de las investigaciones del girasol. El Cen-

tro nacional de investigaciones para plantas oleaginosas de Córdoba, España, fue elegido como centro de relación para organizar la elaboración del mapa de las enfermedades del girasol. Los detalles fueron establecidos por correspondencia, así como con la ocasión de las reuniones de Krasnodar, U.R.S.S. de julio de 1976 y de Córdoba, España, de septiembre de 1977. Los siguientes países suministraron listas de las enfermedades: Bulgaria, Egipto, España, Francia, Israel, Italia, Polonia, Rumanía, Tunisia, Turquía y Yugoslavia.

Se convino en los métodos de vigilar y de inventariar las enfermedades, pero éstas no se han conseguido en todos los países. Aún queda mucho por hacer en los países donde el cultivo es relativamente nuevo y donde los recursos materiales y los cuadros calificados son reducidos. Actualmente, resulta posible preparar solamente mapas generales provisionarios para cada enfermedad, que indiquen los países en que apareció una enfermedad y si ésta se considera mayor o menor. Mapas detallados, indicando el emplazamiento del cultivo y la distribución de las enfermedades deberán prepararse separadamente para cada país.