

Scientific Report
of
EC RESEARCH PROGRAMME 0890

'The collection of land-races of cruciferous
crops in EC countries'

January 1982 - July 1982

ivt

INSTITUUT VOOR DE VEREDLING VAN TUINBOUWGEWASSEN

WAGENINGEN

Introduction

The contract for EC Research Programme 'The collection of land-races of cruciferous crops in EC countries' was signed on June 12, 1981, by the director of the Institute for Horticultural Plant Breeding IVT, Ir. C.Dorsman. As a main contractor IVT is responsible for the administration and the execution of the Programme and for the financial and scientific reporting to the EC in June and December every year of its duration, that is 1981 - 1983.

The scientific organisation is delegated to a Coordinating Committee of four members (see Annex 1). The financial administration is carried out by Mr.J.Doornbosch (SVP).

The aim of Research Programme 0890 is, to collect seed samples of populations of non-oleiferous cruciferous crops. Although the emphasis is on land-races, other materials such as (obsolete) commercial varieties and mutants or breeding lines do not have to be excluded when met with.

The size of the collected seed samples should at least be a 100 grams, if possible, so that they can be stored in gene banks at once. Rejuvenation and/or multiplication of populations is not foreseen in this programme because of their relatively high costs, but they are neither excluded.

In 1981 five Collecting Programmes were executed in the Netherlands and Great Britain. The sub-contracts were taken out by the institutes constituting the Coordinating Committee. IVT and NVRS and collected horticultural crucifers and SVP and SCRI collected agricultural crucifers. This work is partly being continued. The financial support of the EC only concerns the work undertaken in 1981, however.

The Coordinating Committee had a meeting in Wageningen on March 30 and 31 1982 for the planning of new activities. Scientists from the other EC countries were invited through their country representatives in the Programme Committee on Resistance Breeding and Gene Banks. Except Italy and Greece all EC members are involved now.

The meeting agreed in principal upon the organisation of 8 Collecting Programmes, CP 6-CP 13, in 1982. These programmes deal with different crops in Ireland, Belgium, Denmark, France, Germany and (hopefully) the Mediterranean. Their full names are given on the contents page of this

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report, annex 1 lists the names of the scientists involved and annex 2 gives their geographical distribution. The execution of the different CP's is partly being combined.

A new feature in the work for 1982 is the Foreign Collecting Programme, that is a CP organised and carried out by members of the Coordinating Committee outside their own country. This should be done in cooperation with local experts, if possible.

The participants were asked to make a description of their CP that could be included in the scientific report. This description will generally mention:

- name of the crop(group)(s) concerned in English, Latin, the national language and/or dialect;
- target area;
- history and development of the crop (group)(s) and the agricultural growing practises in the area;
- details on the genetic variation (earliness, quality, usage, productivity, morphology);
- an evaluation of the degree of domestication (land-races, varieties);
- an estimation of the threat of genetic erosion;
- seed growing practises (number of plants, isolation technics);
- target group(s) and collecting methods(s) (seed firms and their organisations, seed catalogues, extension services, crop specialists, publications).

PROPOSAL

E.C. COLLECTION PROGRAMME 0890

CP6 Collection Programme for Ireland.

Title: Collecting land races of all crucifers in the Republic of Ireland

Collector: B. Murphy, An Foras Taluntais, Kinsealy Research Centre, Malahide Road, Dublin 5, Ireland.

Ireland situated on the Atlantic coast with its relatively mild winters and long cool growing season has an excellent climate for growing all brassica crops. Growth continues well into the winter months and in many cases brassicas are put in as a second crop late in the year for additional winter forage/human consumption. Though some breeding has taken place in Ireland most brassica varieties are imported and many growers found it necessary indeed advantageous to select their own land races and have been doing this for some years now. Many wild brassica relatives cross freely and these populations are to be found abundantly in many areas particularly near the coast line.

Though Ireland is small, approximately 600 km long x 300 km wide, it has nevertheless significant climatic variations with the southern part having 3-4 weeks advantage in earliness compared with the midlands. Similarly, large differences in rainfall occur with areas in the west having over three times that of the east (62 cm). Overall, however, the Gulf Stream's influence keeps the island relatively cool in the summer and mild in the winter.

Ireland has a very strong agricultural base with over 20% people still involved in agriculture. The main industry revolves around cattle and sheep. Brassicas, particularly swedes, turnip, kales, oil seed rape are grown for forage. It is with these crops that most of the land races exist. However, important acreages of horticultural crops for human use including cabbages, cauliflowers and Brussel sprouts are also grown and some local land races of these are also available. Genetic erosion has happened very recently and is accelerating with many of the local land races. The reasons are mainly due to hybridisation and the fact that

when varieties were withdrawn from commercial practice growers discarded their own selections of these as well. This has happened with swedes, cabbage and Brussel sprouts in particular.

I propose to collect all available cultivars of land races of cultivated crucifers including:-

1. Swede turnip (*Brassica napus* var *napobrassica*)
2. Turnip (*Brassica campestris* var *rapa*)
3. Cabbage (*Brassica oleracea* var *capitata*)
4. Kale (*Brassica oleracea* var *acephala*)
5. Cauliflower (*Brassica oleracea* var *botrytis*)
6. Brussel sprouts (*Brassica oleracea* var *gemmifera*)

I will also endeavour to collect any other species of brassicas which may exist wild in particular species of mustard and radish which are known to occur along many areas of our coastline.

In Ireland most of our brassica seed is imported and as few seed firms are breeding, my task is likely to be time consuming and involve travelling to the areas where the land races are known to exist. Some additional races probably exist with amateur growers also. A more thorough research is needed however to assess the number of brassica species available for collection.

Growing practices vary considerably in Ireland especially in relation to early sowing. Selection criteria for the local land races would involve selecting against bolting and other specific pests and diseases.

I envisage disposal of seed samples to the gene bank at N.V.R.S. in the United Kingdom as quickly as possible.

My main collecting method would be personal collection, visiting and speaking to growers; the use of ACOT advisory personnel, seed firms and publications.

R. F. Murphy,
April 22, 1982.

PROGRESS REPORT

E.E.C. PROJECT CP6

COLLECTION PROGRAMME 0896

Like other EEC countries the experience to date in Ireland shows that much genetic erosion has taken place quite recently in particular Brussels sprouts and to a lesser extent winter cauliflower. Land races of cabbage especially spring cabbage is still being grown and selected but with this crop growers are discontinuing this practice.

Work on the CP6 project to date (June 27th) involved checking out some of the most important growing areas and approximately one fifth of the country has been visited. In addition about 1/3 has been checked out via ACOT and other media.

We have been quite lucky in that we were able to collect to date some very valuable land races which are just about to be discontinued or have been discontinued but we were fortunate enough to procure the seed of these even though some of this seed is 6-7 years old. However, most is fairly new seed, saved during the last 1-2 years.

To date I have collected 16 land races some of which have been selected continuously for as long as 130 years or more.

The breakdown is as follows:

Brussels sprouts	3	land	races
Cabbage	5	"	"
Cauliflower	2	"	"
Swedes	3	"	"
Kale	2	"	"
Rape	1	"	"

The first consignment is about to leave for Wellesbourne Gene Bank.

Other areas will be visited in the coming months where I have located races but seed is not yet available.

R. F. Murphy
25/6/1982

June 21st, 1982

Project CP 7. The collection of seed of Cabbage, Cauliflower,
Kale and Radish cultivars and land races in Denmark (Sub-contract
No. o89o)

By the coordinator Erl. V. Schelbeck

Breeding of horticultural crops are made by 4 Danish firms. I will
collect samples of all Danish strains of Cabbage, Kale, Cauliflower
and Radish. To obtain seed samples all Danish seed firms will be con-
tacted, and I will get 100 g seed of each sample.

The genetic origin of some of these samples may be land-races, but
surely a real land-race does not exist in Denmark. 40-70 years ago
strains were grown and maintained by market growers and farmers. This
has now come to an end, but in the case of particularly good types,
such excellent local strains marketed in Denmark can thus be regarded
as still maintained, but in many cases improved land-races.

There are no more local-grown races to be found with the growers,
but since many of the strains belonging to the seed companies are
such particularly good races, taken over from capable growers, these
strains represent a continued work on the races in question.

Improvement of land-races and breeding of cultivars was started in
the years before the first World War, and there are now four Danish
seed companies working with their own strain (cultivars). These strains
are based on 40-100 individual plants. The strains (cultivars) have
been the property of the respective companies for many years. In
former years a gradual improvement was done without changing the
name, but after introduction of rules for plant breeders rights, this
is not possible.

Seeds are distributed to commercial horticultural enterprises and to
about 500.000 private gardens. Each of the four firms try to market
their own seed, and in order to satisfy their buyers they breed several
cultivars of each species, e.g. early, medium and late cultivars,
cultivars suited for private consumption, and cultivar suited for
industrial purpose.

Raising of cruciferous crops on a F.1 basis is still very limited
in Denmark, but seed of some F.1 cultivars may be sold on the market.
Seed of the component of F.1 cultivars is not available.

Testing horticultural cultivars was previously carried out by The
State Experiments in Plant Culture in cooperation with the Association
of Commercial Horticulturists and local growers. Reports from this
tests are available, but in Danish.

Cultivars and land-races tested in the years 1947-52 were stored
in sealed glasses after testing and were offered to the Nordic Gene
Bank two years ago. The germination capacity was unsatisfactory for
many samples, but a good deal of the sealed samples germinated very
well and are transferred to the gene bank, in some cases after multi-
plication.

Many Danish cultivars, especially the old ones, were considered to
be very similar, but in a meeting in the Danish board for the Nordic
Gene Bank, it was decided to include the following number of cultivars
(land-races, strains) in the collection:

Cauliflower	29	Cabbage Red	11
Brussels Sprouts	9	Radish	33
Turnip	11	Cabbage White	38
Kale	12	Cabbage Pointed	11

Seeds and information about the entries are available at the files
of the bank. Through professor Sigurd Andersen, Landbrugets Plante-
kultur, an inquiry will be made whether the Nordic Gene Bank will be
in a position to store the seeds collected by me. This will be decided
upon at a meeting which is being hold on July 14th.

EC RESEARCH PROGRAMME

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Collection of Land-Races of Cruciferous Crops in EC-Countries

In Denmark, raising of cruciferous crops on an F₁ basis is still very limited.

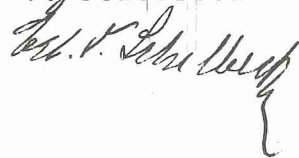
There are four Danish seed companies working with their own strains. These strains are maintained partly through family growing, partly through stock seed growing, and have been the property of the respective companies for many years.

Formerly, strains were grown and maintained by market growers and farmers. This has come to an end, but in the case of particularly good types, such excellent local strains were often bought by the seed companies. Many of the cabbage strains marketed in Denmark can thus be regarded as still maintained, in many cases improved old land-races.

I will therefore try to make a collection of all Danish cabbage varieties.

To obtain samples of cabbage and radish varieties, I am going to consult the Danish companies, asking for their assistance.

Erl. V. Schelbeck



CP 8 : Collecting land races and cultivars of cole crops and radishes in southern Germany.

P. Mattusch, H. Toxopeus

In several areas contacts were made with agricultural specialists having contacts with owners of local varieties. Collecting activities are being carried out in the following areas:

- a. In the area of Stuttgart seed samples are being collected local varieties of the so called 'Fildernkraut'-type.
- b. In the neighbourhood of München local varieties of 'Ismaninger Kraut' are available.
- c. Near Deggendorf near the borders with Austria and Czechoslovakia contacts are being established.

COLLECTING PROGRAMME - BELGIUM (CP9)

"The collection of seed of land-races and cultivars of crucifers in the Belgian provinces East and West-Flanders"

Name of the crops

Fodder rape - Brassica napus oleifera
Stubble turnip - Brassica campestris var. rapa
Fodder kale - Brassica oleracea var. acephala
Marrow stem kale - Brassica oleracea var. acephala

Target area

The Belgian provinces East & West-Flanders

History and development of the crop

Stubble turnip is an ancient crop in Flanders described already by Dodoens. Many farmers grow each year their own seed. In East-Flanders in the subregion Waasland, there is a genetic center of clubroot resistance in stubble turnip.

There are also old landraces of fodder-kale and fodder rape in West-Flanders.

Genetic variation

The available genetic variation became smaller in recent years, the area of stubble turnip diminishing from year to year, mainly due to extension of the area of fodder maize.

Usually stubble turnip is grown as a second crop in the same year after an early maturing crop such as winterbarley. It is sown at the beginning of August or earlier if possible.

In Belgium stubble turnip is considered as the fodder crop with the highest output in comparison with other stubble fodder crops. The root shape of turnips is round or long cylindrical. The leaves are dissected or entire

and mostly pubescent. Besides the landraces, there are cultivars bred in Belgium.

Multiplication or maintenance method

The collected seed will be conserved at -20° C in a refrigerator.

Target groups and collecting methods

The extension services of the Ministry of Agriculture can be of help, having many contacts with farmers.

Frequent personal visits to farmers for collecting the seed will be necessary. Seed-firms will be contacted.

E.C. CONTRACT 0890

THE COLLECTION OF LAND-RACES OF CRUCIFEROUS
CROPS IN E.C. COUNTRIES.

FRANCE SUB-CONTRACT

SCIENTIFIC PROJECT PROPOSAL COLLECTING PROGRAMME FOR 1982

CROPS :

- Kale, Brassica oleracea L. var. acephala D.C. - Chou fourrager ;
- Cauliflower, Brassica oleracea L. var. botrytis D.C. - Chou-fleur ;
- Cabbage, Brassica oleracea L. var. capitata D.C. - Chou pommé ;
- Fodder rape, Brassica napus L. var. oleifera - Colza fourrager.

TARGET AERA :

Western part of France (Brittany - Normandy - Loire country)

HISTORY AND DEVELOPMENT OF THE CROPS - GENETIC STATUS :

Kale :

Kale is an important fodder crop for dairy cattle, mainly in the west of France (about 200.000 hectares).

Farmer varieties has long been used, and still produced, principally in some less-developped agricultural areas of the west. They are of various types : green (perhaps red) marrow stemm kales in southern areas, middle stemmed, leafy of branching types in all areas.

Commercial varieties has been developed by mass and maternal selection. Four types are now used :

- marrow-stem kale (moellier), grown in the western part of France as autumn forage, productive but susceptible to frost and bacterial diseases of the stem.
- middle-stem kale (demi-moellier), now the most popular and productive type.
- thin-stemmed kale (cavalier), some with red foliage, used for late production or in cold areas.
- thoused-head kale (mille-têtes), or branching type (branchu).

Kale is most cultivated for autumn and winter utilization, often still by traditionnal transplanting technics : but drilling, more suitable for grazing or mechanical harvesting, is more and more spreading for the same purposes and also for summer and early-autumn grazing.

Collection methods :

- all varieties present in the official list can be collected from INRA and private breeders.

- a collecting program has to be undestaken to gather a lot of farmers varieties during summer and autumn.

Cauliflower :

Brittany is the most important area for cauliflower growing in France, and probably in Europe.

- Autumn cauliflower (from september to december) is produced on 4.000 hectares in St-Malo area.

- Winter and spring cauliflower (from January to May), commonly called broccoli, is grown on near 30.000 hectares in the north-coastal part of the country.

Cauliflower is becoming more and more important owing to export possibilities during late autumn and winter, acreage has increased from 15.000 hectares in 1965, to near 35.000 hectares.

- Autumn varieties all are commercial cultivars from different origins : France, Netherlands, Australia ; about 30 varieties are now in use and a lot of others, less cultivated, could be found.

- 10 years ago, all winter varieties were produced by the farmers. Presently 60 % are still growers varieties and the remaining 40 % are produced by a cooperative organisation created by the growers. This organisation offers no more than 2 or 3 varieties by precocity group. Genetic erosion has already begun and will be increasing in the next future, and accelerating with the introduction of F1 hybrids.

Collecting program :

- all breeders and maintainers will be contacted and asked to supply seed from the varieties still in use or maintained.

- a lot of farmers varieties will be collected by personal visits or with assistance of agricultural advisors.

CABBAGE :

Cabbage is grown all over France and in recent past many land races were still in use. More fixed varieties and recently F1 hybrids, often of Dutch origin, are replacing old varieties.

However local varieties, selected by farmers, are appreciated in some specific area or for special purposes.

In western part of France, some open-pollinated varieties can be collected, principally in winter-hardy types heading in March and April.

For all these crops, and some others as fodder rape, turnips..., prospection and collection campaigns would be usefully undertaken in the next future, owing to special risk of increasing genetic erosion in all cruciferous crops.

CP 11 : The collection of seed of land races and cultivars of stubble turnips and other cruciferous fodder crops in the south west Germany.

H. Toxopeus, P. Mattusch

It was decided to collect the true breeding varieties of all but the oleiferous cruciferous crops that are officially registered and that were bred in Germany. The breeders were inventorised and they will be approached by means of a circular letter. They will be requested to send 100 gram seed samples of their varieties to Dr. Mattusch.

The most important seed firms will be visited.

This programme is analogous to CP 2 and CP 3.

CP 12 and/or CP 13 - Preliminary proposal for collecting horticultural crucifers in southern Italy and Sicily by P. Crisp

1. Introduction

- 1.1. Southern Italy (that is, from Tuscany southwards) is the area from which several major brassica crops originated: notably, within the last few centuries, the white curded cauliflower and green sprouting broccoli ('calabrese'). Both of these crops still exist in Italy as a wide range of types.
- 1.2. Other brassicas - cabbage, kale, kohlrabi, radish and turnip - exhibit great diversity in Italy.
- 1.3. Several other distinct forms also exist there, including:
 - 1.3.1. Green curded cauliflowers (eg. the 'Romanesco' type in Tuscany).
 - 1.3.2. Highly branched broccolis (the black broccoli = 'Broccolo neri' near Naples).
 - 1.3.3. Purple heading broccolis in Sicily ('Broccolo violetto di Sicilia').
 - 1.3.4. Shooting forms of turnip ('Broccoletto di rapa').
- 1.4. Wild species, consisting of the B.villosa-incana complex and the rare B.macrocarpa and B.robertiana, all related to B.oleracea, also occur in coastal regions.

2. Existing genetic variation, and threat of erosion

- 2.1. Many of the cultivated forms (1.3 above) are not included in National List regulations, and so the availability of these types is not under any legal threat.
- 2.2. Additionally, it may be that EEC regulations concerning the sale of listed crops are widely unknown or ignored.
- 2.3. However, Italian peasants are, with government help, becoming organised into cooperatives to increase quantities of horticultural crops for export. The Italian output of white cauliflowers, in particular, has increased in recent years and it is a reasonable assumption that this, as an international as well as a national cash crop, is replacing other forms of brassica.
- 2.4. The growth of the Italian white cauliflower and calabrese industries means that, respectively, Australian and French (Roscoff) varieties, and American and Japanese varieties are replacing the traditional, variable forms of these crops.

- 2.5. The wild species are under some threat of erosion due to tourism.
- 2.6. The Italian brassicas are therefore genetically diverse, but are likely to be severely eroded in the near future. These facts are recognised by IBPGR, who gave several Mediterranean B.oleracea crops a first priority rating for collection (AGP:IBPGR/80/100 'Genetic Resources of Cruciferous Crops').

3. Methods of collecting

- 3.1. Crisp and Ford-Lloyd have already outlined an efficient method of collecting cultivated types in Italy (AGP:PGR/48: Genetic Resources Newsletter 48: 11-12, 1981). Local seeds companies are identified from the telephone 'yellow pages' and samples of their crucifer crops are bought. Postal or telephone contact with these seed companies has usually been of no use; personal contact (with maney in hand) is required.
- 3.2. Undoubtedly, farmers save their own seed of vegetables, but the difficulties of collecting these is probably disproportionately high in comparison with 3.1, above.
- 3.3. Italy does not possess the kind of agricultural advisory network of some N. European countries, and so the assistance from these people (as in projects CP1 and CP5) cannot be sought. Some potentially useful contact has been made with University departments, and, of course, with the Gene Bank at Bari (Appendix 1).
- 3.4. Wild species can be collected from cliff habitats, etc., but a systematic collection would call for time and resources (eg. experienced rock climbers) outside of the scope of the present project.
- 3.5. The best time of the year for collecting is probably September-October.

Appendix 1: Potentially useful contacts in S. Italy/Sicily

Dr. L. Uncini	Instituto Sperimentale per l'Orticultura Via F. Conforti 11 84100 Salerno
Dr. S. Foti	C.S.C.P.O. Sicilia Via Valdisavoia 5 95123 Catania
Prof. E. Porceddu	Laboratoria del Germoplasma Via Amendola 165 a 70125 Bari
Prof. M. Buiatti	Instituto di Biologia Generale e Genetica Via Romana 17 Firenze
Prof. Bianca	University of Bari

Appendix 2: Calculation of number of seed samples to be collected, and their cost.

1. Number of seed companies

There are about 30 in Rome and 6 in Naples, I estimate that another 11 cities may have about 3 companies each, giving a total of 69.

2. Number of samples per company

The number of varieties in the Fratelli Ingegnoli (Milan) catalogue is 48, 20 of these being cauliflowers and broccolis. Seven varieties were foreign. I found that other companies in Rome/Naples had up to 18 cauliflowers and broccolis of Italian origin. It seems reasonable to base calculations on each company selling about 40 varieties of crucifers.

3. Duplication between companies

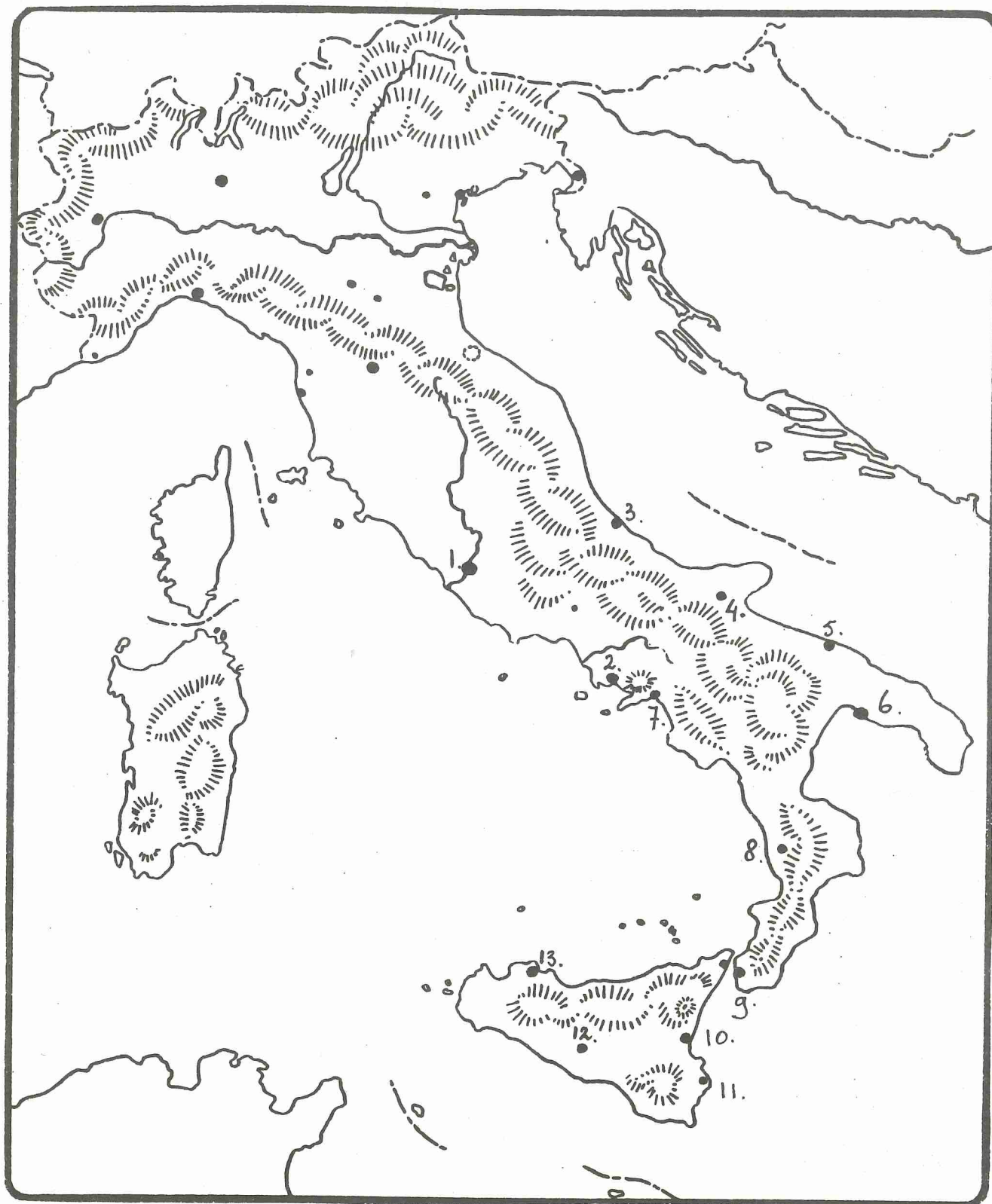
If we assume that the duplication rate is 5% per company, then the total number of varieties would be 767.

Appendix 3: Itinerary

Town/City	Days spent in town	Days travel to next town
1. Rome	3	1
2. Naples	1	1
3. Pescara	1	1
4. Foggia	1	1
5. Bari	1	1
6. Taranto	1	1
7. Salerno	1	1
8. Coseya	1	1
9. Reggio	1	1
10. Catania	1	1
11. Syracuse	1	1
12. Agrigento	1	1
13. Palermo	1	1

Total days in Italy/Sicily=27

Appendix 4: Itinerary CP 12 and/or CP 13



Annex 1

Scientists involved in the execution, organisation and coordination of EC Programme 0890.

Ir.H.Roelofsen*

Institute for Horticultural Plant Breeding (IVT), P.O.Box 16
6700 AA Wageningen, The Netherlands.

Ir.H.Toxopeus*

Foundation for Plant Breeding (SVP), P.O.Box 117, 6700 AC Wageningen
The Netherlands.

Dr.P.Crisp* and Dr.D.Astley

National Vegetable Research Station (NVRS), Wellesbourne, Warwick,
CV 3 9 EF, United Kingdom.

Dr.I.H.MacNaughton*

Scottish Crop Research Institute (SCRI) Pentlandsfield, Roslin,
Midlothian, United Kingdom.

R.F.Murphy

An Foras Taluntais, Horticultural Research Centre, Kinsealy
Malahide Co., Dublin, Ireland.

Ir.L.van Hee

Rijksstation voor Plantenveredeling, Burg.v. Gansberghelaan 109,
B. 9220 Merelbeke, Belgium.

Dr.P. Mattusch

Biologische Bundesanstalt, Institut für Pflanzenschutz im
Gemüsebau, Marktweg. 60, 5030 Hürch Fischenich,
Federal Republic of Germany.

Erl.V.Schelbeck

Den Kgl. Veterinaer- & Landbohøjskole, Landbrugets Plantekultur
Thorvaldsenvej 40, Opgang 8, 1871 København V, Denmark.

G. du Créhu

Station d'Amélioration des Plantes (INRA) BS 29, 35650 Le Rheu, France

* members of the Coordinating Committee.

Annex 2

Area covered by Collecting Programmes 1-13 in 1981 and 1982

