THE ROLE OF SOIL-SAMPLING AND REGULATORY MEASURES IN POTATO ROOT EELWORM CONTROL 1)

BY

R. CHAMBERLAIN
Agricultural Entomology Division, Ministry of Agriculture, Belfast, Northern Ireland

In view of the costliness and doubtful efficacy of various chemical means of control and the uncertain future value of eelworm-resistant potato varieties, there is an evident need in many countries for an extension and intensification of systematic soil-sampling surveys supplemented by statutory measures to regulate the frequency of potato cropping and to restrict the movement of infective material in order to stem the increasing spread of potato root eelworm.

The comprehensive scheme in operation for 20 years in Northern Ireland, which embodies a country-wide soil sampling service together with realistic legislative measures, may provide a useful pattern of procedure, especially for those countries where potato root eelworm is a relatively new problem.

In recent years investigational work in Northern Ireland concerned with the control of potato root eelworm, *Heterodera rostochiensis*, has been focussed mainly on developing eelworm-resistant potato varieties. One such variety, "Ulster Glade", raised by a Northern Ireland potato breeder has already been officially registered. It is recognised, however, that significant advances in producing resistant varieties with a wide range of usefulness will depend largely on resolving the complexities of eelworm biotypes which exhibit differences in pathogenicity. In the long-term, therefore, it is of vital importance to persevere with alternative means of curbing the spread of potato root eelworm; in particular, as constantly urged by the European Plant Protection Organisation, earnest attention must be paid to planned surveys of the incidence of the pest, based on soil examination, and supplementing these with suitable regulatory measures restricting potato planting and governing rotational cropping.

The comprehensive soil-sampling scheme in operation in Northern Ireland has two main objectives: the continuance of the existing high yielding capacity of potato ground in Northern Ireland and the maintenance of maximum health standards in seed potatoes and in vegetative planting stock generally both for the home and the export trade. The success which has been achieved is attributable to a number of factors, but undoubtedly the most important have been the very sparse occurrence of potato root eelworm in Northern Ireland and the timely introduction of systematic surveys some 20 years ago. The soil-sampling service alone,

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1) Lecture given at the 7th International Symposium of the Society of European Nematologists at Auchincruive, Scotland, September 1963.
however, would have been unavailing without the stringent regulations which have been administered under the Potato Root Eelworm Order since it was first introduced in 1945; these measures provide for the permanent neutralising of each new focus of infestation as it is detected and impose judicious restrictions aimed at preventing any possible spread of the pest.

SOIL-SAMPLING ORGANISATION IN NORTHERN IRELAND

Field and laboratory staff are engaged full-time throughout the year on duties which are exclusively concerned with potato root eelworm survey work. Each year the operational programme follows a regular pattern in which the sequence of activities and the regional deployment of sampling officers are planned to cope with the following categories of soil-sampling.

(a) all certified seed potato fields

(b) all potato fields, whether for seed or ware crop, in areas scheduled under the Potato Root Eelworm Order

(c) all fields, gardens and plots, irrespective of cropping, on each farm or holding in which an infection has been discovered in the current year

(d) all fields, irrespective of cropping, in certain extension areas forming incremental advances in a progressive survey of the entire country

(e) selected fields, representing the earliest recorded infections, in which the regression of viable infection in the absence of potatoes is assessed

(f) all nurseries, glasshouses and other premises trading in plant propagating material.

In all cases a separate composite soil sample is taken for each area up to 2½ acres (1 hectare) in extent, and larger fields are subdivided into similar units to give proportional numbers of samples. The implement used is an auger which is 2 inches (5 cm) in diameter and capable of taking borings to a depth of 9 inches (23 cm); the spatial distribution of the bore samples is such that at least one is taken for every 100 square yards (84 square metres). Each composite soil sample, comprising a minimum of 120 borings, is thoroughly mixed in the fields and a representative sample of approximately 500 grams is removed for despatch to the laboratory. In the laboratory the soil samples, identified by serial numbers, are put out to dry in shallow metal trays in electric driers and in each case a standard quantity of the air-dried soil (250 grams) is subjected to the cyst extraction process employing Fenwick floatation apparatuses and filtration units.

REGULATORY MEASURES IN NORTHERN IRELAND

In Northern Ireland, legislation relating to potato root eelworm was first introduced in 1945 and the various modifying enactments which followed have