OBSERVATIONS ON THE DEVELOPMENT OF POTATO ROOT EELWORM, HETERODERA ROSTOCHIENSIS WOLL., ON THE POTATO TUBER AND THE IMPORTANCE OF SUCH DEVELOPMENT IN THE SPREAD OF THIS NEMATODE ON WASHED TUBERS

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INTRODUCTION

For seed production potato crops should be grown on land free from Potato Root Eelworm, but there are some difficulties in the selection of such land. Heavy populations of the pest can be detected without difficulty by means of soil testing, but with light populations, the chances of detection are reduced. Some consignments of seed tubers may, therefore, originate in fields so lightly infested that the infestation is hard to demonstrate. As this pest has been recorded from every seed producing country in western Europe, this problem is common to all. Some degree of confidence in a negative result may be possible where a whole district has been sampled regularly and intensively without ever finding an infestation, but even in these areas low infestations may be building up. Although the danger of spread from lightly infested fields may be slight, the development of a process which would remove all cysts and soil present in a consignment of tubers would be a valuable contribution to the production of clean seed.

HISTORICAL

Until recently, seed-borne spread was generally believed to result only from the cysts carried in the soil adhering to the tubers. Cyst development on tubers had been recorded occasionally but this was regarded as a matter of academic interest rather than one of economic significance. The introduction of processes designed to free potato consignments from soil and, therefore, from cysts present in that soil, renewed interest in the role of the so-called "embedded" cysts. It was suggested that these might be present within washed tubers and so cause eelworm spread.

Apparently the first reference in the literature to the development of cysts on tissues

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other than root tissues is an account by Edwards (1929) who noted that in all the cases of failure he examined in Lincolnshire the "roots and rhizomes" always bore large numbers of cysts. The development of cysts on stolons and tubers has been recorded in Holland (Oostenbrink, 1950) and cysts have been observed attached to tubers of the variety Epicure in Ayrshire (Grainger, 1951). More recently the development of cysts on the tubers of several commercial varieties and also on the tubers of a number of seedlings being bred for resistance to Potato Root Eelworm has again been reported from Scotland (Dunnett, 1957). As, however, few records of the occurrence of cysts on tubers could be found in the literature and as a number of advisory officers in Scotland and England who were consulted stated that they had seen such cysts on a few occasions only, it appeared that such development was infrequent.

A preliminary trial at a commercial washing plant demonstrated that it was possible to remove the adhering soil from potato tubers (Mabbott, 1956). These tubers, which had been grown in infested soil, were free from cysts when examined after washing. Accordingly, with the reservation that in rare cases "embedded" cysts might prove a danger, the principle of washing was accepted provisionally as a means of freeing from infestation tubers from lightly infested land.

An investigation into the biology, frequency and distribution of "embedded" cysts and the possibility of their removal by washing was undertaken and a preliminary report is given below.

INVESTIGATION

1. Frequency and Distribution

In late June and early July 1957 a number of infested potato crops in the Lothians and Ayrshire were examined. In seven crops the eelworm population was sufficiently heavy for cysts to be found without difficulty on the potato roots and in each of these crops white or yellow cysts were observed attached to tubers. In September a further eight infested crops were surveyed in the Lothians and cysts attached to tubers were noted in each case.

In 1958 the survey was continued with the examination during August of ten infested crops in the counties of Angus and Perth: these two counties being the main seed producing areas of Scotland. Cysts attached to tubers were found in each crop.

At East Craigs further observations were made in the course of pot experiments. The cysts used for these experiments had been collected from a number of localities and were bulked together. In all pots examined cysts were present on the tubers.

From these results it was concluded that the development of Potato Root Eelworm in the tubers and stolons is not specific to certain strains of the eelworm and that tuber infestation is co-existent with root infestation.

2. Varieties attacked

During the survey, cysts were found on the tubers of the variety Epicure in the Lothians and Ayrshire, the varieties Craigs Royal, Great Scot, Home Guard, King