THE INCIDENCE AND CONTROL OF APHID-BORNE
POTATO VIRUS DISEASES IN SCOTLAND

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Summary, Zusammenfassung, Résumé, p. 327

The most important requirement for any seed potato industry is a low rate of
spread of the aphid-borne virus diseases. This condition can be met without difficulty
over almost the whole of Scotland where, except for some very small districts, virus
disease has never emerged as a limiting factor in seed potato production. No doubt
mainly for this reason potato virus epidemiology has attracted little academic atten-
tion in Scotland. In the practical realm of seed certification, however, the virus disease
situation has remained under continual observation and review. An attempt is
made in this article to consider, together with the research evidence, some of the in-
formation that the Scottish certification scheme has provided on the incidence and
control of the main aphid-borne virus diseases.

HISTORY OF POTATO VIRUS DISEASE CONTROL

The history of virus disease control in Scotland follows rather a devious and incidental
pathway. It was not until the middle of the 18th century that potatoes began to be
grown as a field crop but thereafter they quickly became established in the economy
of farming. By the end of the 18th century severe virus diseases, then designated
"curl", were widely recognised as is shown by the fact that some agricultural cor-
respondents of the day considered it significant to record the absence of curl from
their counties. That Midlothian, situated in the south of Scotland, did not come into
this category is clear from the comments of ROBERTSON (1795) on the cause and cure
of curl. "The disease of curling has been remarked here for several years: but there is no
other preventative known but that of chaxaging the seed, by getting it from the neigh-
bouring counties where the distemper has not yet made its appearance and which is
accordingly done almost every year... It having been suggested that potatoes taken up
before they arrive at maturity were not liable to produce the curl next season, experi-
ments have been made to ascertain whether it is so or not and the results have been in
favour of that idea. This may, perhaps, be the reason why potatoes from the moor-
lands are less apt than others to produce the curl, for there they seldom come to matu-
rity, the frost affecting the leaf too early in the season to admit of a natural fall. Re-
peated experiments will still be necessary to decide this question."

By the later years of the 18th century, Scottish-grown potatoes had already begun
to acquire a reputation for enhanced productivity. It was not until about 1860, however,
that seed potatoes began to be moved in any quantity from Scotland to England. According to CAMPBELL (1928) the appearance of the choice variety Up-to-Date, introduced in 1893 by the Fifeshire potato breeder A. FINDLAY, further increased the demand for Scotch seed and ushered in the era of the specialist seed potato merchant.

The next step unconsciously towards virus disease control was forced on the industry by the confirmation in 1906 of the presence of wart disease in Scotland and the rapid spread of this disease during the 1914–18 war. An early writer on virus disease (ANON. 1925) states that “its significance would have been little recognised in Scotland but for the attention devoted to the potato in connection with efforts to control wart disease”. GOUGH’s discovery in 1908 of varietal immunity from wart disease (GOUGH, 1920) created a demand for immune varieties but this could hardly be met until the tangle of synonymity was unravelled by the work, started in the period 1915–20, of what became the Potato Synonym Committee of the National Institute of Agricultural Botany.

In 1918, the Board of Agriculture for Scotland started a crop certification scheme for pure stocks of wart-immune varieties. Non-immune varieties were accommodated in 1922 when two grades of certificate became available the lower of which was required only to meet the minimum purity level of 97 per cent demanded by the Seeds Act (1920) for named varieties.

From 1918 to 1931 virus diseases were not counted for purposes of certification except that, according to CAMPBELL (1928), “having secured a very high standard of purity in Scottish potato crops, the Board of Agriculture is now encouraging the production of healthy stock and issue a “Stock Seed Report” to growers of crops of exceptional purity and freedom from disease”. Health grading for commercial grades was introduced in 1932. The higher grade (H) was permitted an aggregate tolerance of 5 per cent for leaf roll, severe mosaic and the non-transmissible variant condition known as wilding. The lower grade (T.S., i.e. “True Stock”) was given a tolerance of 10 per cent for the same diseases. The severe disease tolerance for grade H was reduced in 1933 to 3 per cent. This tolerance has since been reduced to 2% but grade H is now the lowest of five grades and may be planted in Great Britain only to produce ware (consumption) crops. The T.S. grade was dropped in 1936 when grade H was superseded by a new grade A, the maximum tolerance for which was 1 per cent (increased in 1949 to 2.5 per cent), for all discernible virus diseases but not more than 0.5 per cent to consist of leaf roll, severe mosaic and wildings. The earlier “Stock Seed Report” became a third grade which until 1950 was the highest available in Scotland: the main tolerance figures were, and still are, 0.25 per cent of discernible mild mosaic and 4 plants per acre of severe virus disease.

Until the late 1940s, latent and very mild symptom-bearing infections caused by potato virus X were completely disregarded; indeed for grade H no restriction of the amount of visible mild mosaic caused by virus X has ever been required. Since 1950, however, the general health status of Scottish stocks has been greatly improved by the introduction of two new grades known respectively as Virus-tested Seed (in which stocks are multiplied virus-free from single plant parents) and Foundation Seed (the Eu. Potato J., Vol. 4 (1961) No. 4 (December) 317