REPORTS

Report of the Meeting of the Section Virology at Wageningen (the Netherlands), 7-11 June 1971

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The first 'half-term' Meeting of the Section Virology of the EAPR was held at Wageningen in the Institute of Phytopathological Research. On Tuesday 8 June, 1971, the director of the institute, Dr J. G. ten Houten welcomed the participants. He stressed the importance of more frequent meetings of the Section which should encourage interchange and development of ideas and techniques and would improve personal contact. On the first and second day 20 interesting papers were presented, followed by detailed discussions. The emphasis of the meeting was on soilborne viruses attacking the potato and the elimination of virus from potato by meristem culture. Short summaries of the papers are included in this report.

A business meeting was held at the end of the second day.

The members heard with deep regret of the death of our Section member Dr Maria-Luise Baerecke, at Köln, Germany.

At this meeting it was decided that: sending abstracts of recent literature on potato virology to the Section members should be continued; according to the letter of the President of the EAPR on Section excursions during the 5th Triennial Conference of the EAPR Norwich, England, 4–9 September, 1972, further information should be asked. The suggestion was made to visit the Institutes in Rothamsted and Cambridge;

- a decision on the question whether it was desirable for the Virology Section to join the International Society of Plant Pathology should be postponed until next year;
- it was desirable to publish the papers read during this Meeting in Potato Research as far as the authors wished. 'Paper read at the Virology Section Meeting June 1971' should be added;
- a discussion should be started around the nomenclature of potato viruses. An excursion was organized on 10 June. In the morning a trip was made to Flevoland and North-East Polder, recently reclaimed from the Zuyder Zee and a visit paid to the clonal field trials of the General Netherlands Inspection Service for Field Seeds and Seed Potatoes (NAK) at Emmeloord. After the lunch, which was offered by the North-East Polder & Flevoland Regional Inspection Service, the laboratory of the latter Inspection Service was visited. The finishing touch of our Meeting was the farewell dinner offered by the General Netherlands Inspection Service for Field Seeds and Seed Potatoes (NAK).

Many thanks are due to the NAK, the North-East Polder & Flevoland and North-Holland Regional Inspection Services for their support to organize the meeting.

Summaries of the papers read during the meeting

W. Gabriel (Bonin, Poland): The work at the Institute for Potato Research on the epidemiology of viruses transmitted by aphids

In co-operation with the Institutes for Plant Breeding at Gross-Lüsewitz (East Germany) and Potato Research at Havlickov Brod (Czechoslovakia) two trials of the same scheme were carried out in each of the three countries for 3 years. In these trials the number of infection sources of viruses Y and leafroll were kept constant, the observations of aphids on the leaves and the catches in yellow traps were done and then the infection of seed potatoes was determined.

Potato leafroll virus was spread more intensively at the beginning of the season than potato virus Y. It was found that plants infected with potato virus Y° could be the source of infection only when they were infected soon after emergence. Potato virus Y^{N} could be transmitted from plants infected up to 36 days after emergence.

M. Kus (Kranj, Yugoslavia): Post-control of seed potatoes in Yugoslavia

In the north-western part of the country the post-control of seed potatoes has been carried out on a voluntary basis by seed-potato growers since 1954. Since 1970 the post-control is compulsory for all seed potatoes in the country. According to the certification rules seed potatoes are classified after a post-control test. The maximum permitted infection by viruses is for class E 1%, for class Original 2%, for first reproduction 4% and for second reproduction 5%.

A. Sinnema (Emmeloord, the Netherlands): Laboratory methods for testing of seed potatoes in the Netherlands

Supplementary seed-potato inspection by means of laboratory methods may be significant in relation to three points:

1. *Field inspection.* Virus diseases which are difficult to observe are traced and virus diseases which are not easily distinguished from one another are identified. Serological tests and the 'A6'-test are mainly used as supplementary means of clonal inspection;

2. *Post-control.* The test for potato leafroll virus is carried out by the Igel-Lange test. Mosaic-causing viruses are checked on small plants raised from newly harvested tubers, the dormancy of which has been broken by the gibberellic acid method. These plantlets are grown in greenhouses.

3. *Fixing of the lifting dates.* The swarming of the aphids is precisely registered. The species and numbers of aphids trapped play an important part in determining the dates for lifting.

Miss A. M. Hinostroza Orihuela (Lima, Peru): Experiments with potato virus S

Potato virus S (PVS) was isolated from five varieties of Peruvian potatoes with

systemic symptoms of variable severity, ranging from mild mosaic to yellowing and bronzing of the leaves. Properties of the isolate from *Mantaro* variety in leaf sap were: thermal inactivation point: 55°C; longevity in vitro at room temperature: 6 days; and dilution end point: 10^{-4}. Sedimentation coefficient of the purified virus as determined by analytical centrifugation, was 126 S. The *Mantaro* isolate also produced systemic symptoms on *Chenopodium quinoa*. Nucleic acids were isolated from leaves of *C. quinoa* infected with PVS; a fast-sedimenting nucleic acid fraction was found infectious on *C. quinoa*.

Miss M. de Lourdes V. Borges (Oeiras, Portugal): Mycoplasma and potato diseases

In 1967, in Japan, mycoplasma-like organisms were detected, by electron-microscopy, in the phloem of potatoes with witches' broom symptoms and in other diseased plants. More recently, in USA mycoplasmas have been observed in the phloem cells of purple top-diseased potatoes. The symptoms of mycoplasma diseases, their means of transmission, the localisation of the pathogen and the reaction to the antibiotics were described and discussed from original results, as well as from those obtained in other countries. The present methods of diagnosis were also discussed.

E. L. Calvert (Belfast, Northern Ireland): Effects of potato mop-top virus and prospects for its control

The most characteristic foliage symptoms are dwarfing, aucuba and chlorotic chevrons. Primary tuber symptoms (in tubers infected from the soil) range from spraing to surface rings or blotches without internal necrosis. Tuber cracking is the most common secondary symptom.

Primary tuber infection can be controlled by reducing soil pH to 4.5–5.0 by the application of sulphur to the soil before planting.

Although down-grading or rejection can follow growing crop or tuber inspection, PMTV cannot at present be effectively included in crop inspection schemes.

J. I. Cooper (Dundee, Scotland, UK): Soil treatments for the control of potato mop-top virus and tobacco rattle virus (spraing) in potato

D-D (dichloropropane-dichloropropene) applied at 224 or 448 kg/ha gave the best control of TRV-spraing. D-D (224 kg/ha) almost eliminated the disease in the first year after treatment and greatly decreased it in the second. Application of D-D in the autumn before planting was more effective than in the spring. Aldicarb (45 kg/ha), methomyl (9 kg/ha) and dazomet (168 kg/ha) greatly decreased the spread of TRV in the first year after treatment but not in the second.

By applying sulphur to decrease the soil pH to about 5, the incidence of tuber infection with *Spongospore subterranea* and PMTV was greatly diminished, but the vector was not killed because liming restored the infectivity of soil. Zinc frit (35.5% Zn; 10.5% B) applied at 1880 kg/ha substantially diminished the incidence of PMTV-spraing and tubers accumulated only small amounts of zinc and boron. Preliminary evidence indicates that zinc and not boron is the active ingredient of the frit.

J. Münster (Lausanne, Switzerland): Einige Erfahrungen mit dem Mop-Top Virus der Kartoffel

Im Rahmen der Sortenprüfung wurden in Knollen der ausländischen Herkünfte der Sorten *Ulster Sceptre* und *Arran Pilot* Nekrosen festgestellt deren Symptome ähnlich denen der Pfropfenkrankheit (Rattle-Virus) waren. Im Gegensatz zur Pfropfenkrankheit, wo nur in ganz seltenen Fällen eine Virusübertragung durch Knollen auf den Nachbau nachgewiesen werden konnte, wies die Nachkommenschaft je nach Familie wiederum bis zu 60% der Knollen mit Nekrosen auf.

Saftübertragungen von kranken Pflanzen (Laub und Lichtkeime) auf *Chenopodium amaranticolor* ergaben die für das Mop-Top Virus spezifischen Lokalläsionen.

G. Borchardt (Hannover, Deutschland): Untersuchungen über die sortenspezifische Reaktion von Kartoffelknollen auf Rattlevirusinfektion

Ein allgemeines Übersicht wurde gegeben.

H. A. van Hoof (Wageningen, the Netherlands): Soilborne viruses of potatoes in the Netherlands

The frequency of the occurrence of nematode-transmitted viruses is closely related to the incidence of their vectors.

The occurrence of tobacco rattle virus (TRV) is not influenced by the proceeding crop nor by winter fallow. Dichloropropane-dichloropropene-treatment reduced TRV and TNV (tobacco necrosis virus) incidence but infection of potato mop-top virus (PMTV) was not changed by this treatment. The last virus occurred predominantly in the north-east part of the country. Tuber symptoms of PMTV however were not observed.

O. Bode (Braunschweig, Deutschland): Erfahrungen mit Meristemkulturen

Ein algemeines Übersicht wurde gegeben.

M. Christensen (Lyngby, Denmark): Eliminating viruses from potatoes

As material for the meristem-tip cultures meristems from the axial buds of both etiolated sprouts and heat-treated plants have been used.

In the case of PVX, meristems from heat-treated plants gave considerably more virus-free plants than did meristems from etiolated sprouts, while in the case of PVS, PVM and PVA only a slight advantage was obtained by use of heat-treated plants.

When the original material was infected both with PVX and PVS it was usually found that when PVX has been eliminated, PVS has also been eliminated. On the other hand it often was found that PVX-infected plants were present among those freed from PVS. Since 1969 one or more viruses have been eliminated from 130 potato varieties of which 15 are grown commercially in Denmark.

A. Garcia Orad and F. Perez de San Roman (Vitoria, Spain): Variation in virus contents and therapy of infected potato plants

Young PVS-infected plants, kept in heating chambers for 3–5 weeks at 30 °C, showed negative serological reactions in apical and also in basal foliage.

A heat treatment, of 12 weeks or more, yielded PVX-free cuttings and even whole PVX-free plants: but no PVS-free cuttings were obtained after a treatment of one year. In order to keep plants alive so long under heat treatment a repeated grafting of the treated plants on tomato was carried out.

Attempts to grow the variety *Saco* on infected plants, in such a way that the subterranean stock was submitted to a heat-treatment and the aerial foliage of the *Saco* scion was at normal temperature, have resulted in some PVX-free but no PVS-free shoots.

Miss F. Quak (Wageningen, the Netherlands): Experiences with meristem tip cultures in the Netherlands

During the last ten years a number of potato varieties were freed from viruses by meristem culture. Based on the results obtained some factors influencing the technique such as composition of the medium, variety and viruses involved, were discussed. It was found that it was easier to free potato plants from potato virus X, than from potato virus S.

D. Spire, C. Ferault and J. Bertrandy (Versailles, France): Immuno-diffusion and immuno electrophoresis of some potato viruses

New methods have been tried to break virus particles. Among these ultrasonic treatment of potato virus X (PVX) was discussed. The way of action of an ultrasonic treatment appeared to be of two types: it may be a direct way, viz breaking the particles or releasing in the agar of particles adsorbed on cell fractions and organelles. PVX has been a good example of that treatment. Using immuno-diffusion and immuno-electrophoresis, it was possible to see a reaction of a sonicated preparation, whereas no serological precipitation was observed in non-sonicated extracts.

A. Rozendaal, J. van Binsbergen and B. Anema (Wageningen) D. H. M. van Slogteren and Miss M. H. Bunt (Lisse, the Netherlands): Serology of a deviating potato virus Y^C strain in the potato variety *Gladblaadje*

Three main groups of potato virus Y (PVY) can be distinguished, viz PVY^O, PVY^C and PVY^N. Serologically members of all three groups are known to cross react, being detectable with the same PVY^O antiserum. A virus strain found by Rozendaal in the potato variety *Gladblaadje* according to its symptom expression in a range of potato varieties belonged to the PVY^C group. All attempts however to obtain serological reactions with the available PVY antiserum have failed.

An antiserum has been made against the virus from *Gladblaadje* itself with the homologous titre of 1:640. With this antiserum positive reactions were observed with sap from the old varieties *Luiker Tonge* and *Vroege Paarse*. Reactions with other strains of PVY including PCY^C strains from the varieties *Zeeuwse Blauwe* and *Torbecke* were negative. Numerous lesions on leaves of 'A6' suggest a large amount of infective units in sap from *Gladblaadje* used as inoculum.

J. Horvàth (Budapest, Hungary): Experiments with tobacco mosaic virus in potato

Among the *Solanum* species examined only *S. acaule*, *S. cardiophyllum* and *S. vernei* have shown a hypersensitive reaction to tobacco mosaic virus (TMV).

Fifteen potato varieties (*Amsel*, *Aranyalma*, *Auriga*, *Axilia*, *Boldogitó*, *Früka*, *Gülbaba*, *Jávisz*, *Kisvárdai Rózsa*, *Korai Rózsa*, *Opal*, *Osa*, *Somogyi Korai*, *Somogyi Sárga* and *Somogyi Kifli*) were inoculated mechanically with TMV. The inoculated leaves reacted with local lesions and leaf dropping. The newly developed leaves of the inoculated plants were apparently healthy, except those of the varieties *Amsel*, *Auriga* and *Jávisz* which showed mosaic symptoms.

J. B. Novák (Prague, Czechoslovakia): Das Vorkommen eines nekrotischen Stammes des Kartoffel-X-Virus und die Isolierung von Kartoffel-Y-Virus aus *Melilotus albus* in der Tschechoslowakei

Auf Grund unterschiedlicher Reaktion an einigen Testpflanzen und serologisch, war es möglich zu konstatieren, dass ein abweichender Stamm des Kartoffel-X-Virus vorkommt in der Tschechoslowakei.

Bei Isolierung eines Virus von Steinklee-Pflanzen (*Melilotus albus*) mit chlorotischer Scheckung und nekrotischen Flecken an Blattspreiten wurde festgestellt, dass es sich um ein Kartoffel-Y-Virus (KVY) handelt und dass dieses Unkraut als potenzielle Wirtspflanze des KYV in der Tschechoslowakei auftreten kann.

Miss M. de Lourdes V. Borges (Oeiras, Portugal): Cell structure with reference to some potato viruses

Virus-cell relations have been investigated in connection with, Potato virus X, Potato virus Y (PVY), Potato virus M (PVM), also in Potato yellow dwarf virus and Potato leafroll virus.

Localization in the cells, relation with cell structure and alterations of some organelles connected with the presence of those viruses were discussed, according to original observations and to the results obtained by others. During the discussion it was mentioned that Potato virus A (PVA) and Potato virus S (PVS) were studied in potato tissues at the Institute of Phytopathological Research. As in tissues infected with PVY, PVA-infected tissues revealed pinwheel structures. PVS-infected tissues showed bundles of particles.

J. A. de Bokx (Wageningen, the Netherlands): Spread of potato virus S

The spread of six isolates of potato virus (PVS), viz Fort, L, Ind, IJss, Eerst and SR, was investigated in the potato varieties *Alpha* and *Eersteling* (PVS-free). Five PVS-infected tubers were planted at random between 49 healthy tubers. Both varieties, *Alpha* and *Eersteling*, were planted in mid-May and harvested September, 1970. The progeny of all plants was grown in greenhouses and tested serologically for the presence of PVS. The percentage of infected *Eersteling* plants increased from 10 to about 80, whereas in *Alpha* plants it only increased from 10 to about 27.