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CONTENTS

98/179 *Alternaria alternata* pv. *citri* causing brown spot of Minneola tangelos

In Israel in November 1989, an unknown disease was observed in several orchards of Minneola tangelos (*Citrus reticulata* cv. Dancy x *C. paradisi* cv. Duncan), in the region of Kefar Yona (central coastal plain, a long established citrus-growing area). At the beginning of fruit ripening, sunken, dark brown spots (minute to 3-6 mm diameter, 1-3 mm deep) were observed on the rind of fruits. Infected fruits were scattered all over the trees and many dropped to the ground. Leaves presented brown necrotic areas (circular spots to irregular blighted areas) and on some spots the dark discoloration extended into the veins. Apices of some young shoots were completely defoliated. Stems had occasionally circular or elongated brown spots. The causal agent was isolated in culture and identified as a citrus pathotype of *Alternaria alternata* (Solel, 1991). This disease observed in Israel was thought to be similar to 'brown spot of Emperor mandarins' which was first reported in Australia in 1966 (Pegg, 1966) and to '*Alternaria* brown spot' of Dancy tangerines, and of Minneola and Orlando tangelos which was then reported in Florida (US) in 1976 (Whiteside, 1976). It is now considered that *Alternaria* brown spot is caused by *Alternaria alternata* pv. *citri*, although there is discussion on the validity of pathovars for *Alternaria alternata*. In the literature, the disease has sometimes been attributed to *Alternaria citri*, but the latter causes quite other symptoms and has a different host range. Another disease caused 'leaf spot of Rough lemon' has also been reported in South Africa (1929) and Florida (US), the causal agent is an *Alternaria* species but it seems quite distinct from *Alternaria alternata* pv. *citri* (Whiteside, 1988).

- **Host plants**

A recent field survey was carried out in Israel (Solel & Kimchi, 1997) and showed that *Alternaria alternata* pv. *citri* is common on Minneola tangelos, but can also cause typical foliar and fruit lesions on: Dancy and Ellendale mandarins, Murcott tangor (mandarin x sweet orange), Nova and Idith mandarin hybrids, Calamondin (mandarin x kumquat (*Fortunella*)), and Sunrise and Redblush grapefruits. However, it was not found on: Shamouti Washington Navel and Valencia sweet oranges, Marsh seedless grapefruit, Clementine (mandarin), ortanique (mandarin x sweet orange), oroblanco (grapefruit x pummelo) or Eureka lemon, which are common in citrus groves near Minneola tangelos in Israel. In Florida, *Alternaria alternata* pv. *citri* is mainly reported on Minneola tangelos, Dancy tangerines, and less frequently on Orlando tangelos, Murcott tangors and Lee tangerines.

- **Geographical distribution**

In addition to Australia, Israel (where it became widespread on susceptible hosts soon after its first appearance; Solel *et al*., 1997), and Florida (US), *Alternaria alternata* pv. *citri* also occurs in South Africa. It has been present in this country apparently since the early 1980s, and its presence in several major citrus producing areas is considered as a serious threat to the cultivation of susceptible cultivars (Swart *et al*., 1998). In Turkey in 1995, 2000 ha of diseased Minneola tangelo trees were observed in the Cukurova region. 90% of orchards in this region were affected but the disease severity depended upon location and control

strategies applied in each orchard. The symptoms observed were typical of *Alternaria alternata* pv. *citri* described in Israel. *Alternaria* was consistently isolated from disease leaves and fruits. This was considered as the first report of *Alternaria* brown spot of Minneola tangelo in Turkey (Canihos *et al*., 1997). The geographical distribution can be summarized as follows:
Distribution: Australia (first report in 1966), Israel (in 1989), South Africa (at least since the early 1980s) Turkey (in 1995), USA (Florida, in 1976).

- **Biology and control**

The fungus overwinters in lesions on leaves and stems or on any surviving out-of-season fruit. Spores are air-borne and they are produced more abundantly on leaf lesions than on infected fruit. The most important factors influencing brown spot are climatic conditions, host phenology and fruit maturity. Young foliage, twigs and immature fruits are most susceptible to infection. Climatic conditions as extended, interrupted wet periods also enhance infection.
Control of *Alternaria alternata* pv. *citri* is difficult as symptoms develop rapidly and sporulation of the pathogen occurs soon after infection. Fungicides like copper products, mancozeb, procymidone and iprodione can be used, and several studies have been carried out to optimize treatment methods (Solel *et al*, 1997; Swart *et al*; 1998). However, it must be noted that resistance to iprodione has been observed in some orchards in Israel and Florida, where intensive treatments with this compound had been done (Solel *et al*., 1996). Integrated control methods are needed, and should include for example: removal of inoculum sources; avoidance of pruning at wrong time, overhead irrigation, and over fertilization; appropriate timing and dosage of fungicides applications.

Pictures of symptoms can be viewed on INTERNET:
http://gnv.ifas.ufl.edu/~fairsweb/images/ch/ch074p2.gif (on fruit)
http://gnv.ifas.ufl.edu/~fairsweb/images/ch/ch017p2.gif (on leaves)
http://gnv.ifas.ufl.edu/~fairsweb/images/ch/ch017p3.gif (on leaves)

Source:

Canihos, Y.; Erkilic, A.; Timmer, L.W. (1997) First report of *Alternaria* brown spot of Minneola tangelo in Turkey.
Plant Disease, 81(10), p 1214.

Pegg, K.G. (1966) Studies of a strain of *Alternaria citri* Pierce, the causal organism of brown spot of Emperor mandarin.
Queensland Journal of Agriculture and Animal Science, 23(1), 15-28.

Solel, Z. (1991) *Alternaria* brown spot on Minneola tangelos in Israel.
Plant Pathology, 40, 145- 147.

Solel, Z.; Kimchi, M. (1997) Susceptibility and resistance of citrus genotypes to *Alternaria alternata* pv. *citri*.
Journal of Phytopathology, 145(8-9), 389-391.

Solel, Z.; Oren, Y.; Kimchi, M. (1997) Control of *Alternaria* brown spot of Minneola tangelo with fungicides.
Crop Protection, 16(7), 659-664.

Solel, Z; Timmer, L.W.; Kimchi, M. (1996) Iprodione resistance of *Alternaria alternata* pv. *citri*

from Minneola Tangelo in Israel and Florida.
Plant Disease, 80(3), 291-293.

Swart, S.H.; Wingfield, M.J.; Swart, W.J.; Schutte, G.C. (1998) Chemical control of *Alternaria* brown spot of Minneola tangelo in South Africa.
Annals of applied Biology, 133(1), 17-30).

Whiteside, J.O. (1976) A newly recorded *Alternaria*-induced brown spot disease on Dancy tangerines in Florida.
Plant Disease Reporter, 60(4), 326-329.

Whiteside, J.O. (1988) *Alternaria* leaf spot of rough lemon.
In: Compendium of citrus diseases (Ed. by Whiteside, J.O.; Garnsey, S.M.; Timmer, L.W.), p 8. APS, St. Paul, USA.

Additional key words: new pest **Computer codes:** ALTEAL

98/180 Insect pests of ornamentals present in southeastern USA of potential quarantine interest

A book published by the North Carolina Cooperative Extension Service (Insect and related pests of flowers and foliage plants. Some important, common and potential pests in the southeastern United States) gives details on the biology, host plants, situation in southeastern US for many insect pests of ornamental plants. The EPPO Secretariat has tried to list below pests which could be of potential quarantine interest. This list (in alphabetical order) is a very preliminary one, whose purpose is mainly to stimulate further discussion.

- *Callopistria floridensis* (Lepidoptera: Noctuidae) - Florida fern caterpillar.

Geographical distribution: Canada, Colombia, Puerto Rico, USA (Florida, New York, New Jersey) and tropical America. One report of a finding (in 1988) in India (Bangalore, Karnataka) on ornamental ferns in a hotel.
Hosts: ornamental ferns and foliage plants (*Adiantum*, *Asparagus sprengeri*, *Blechnum*, *Cyrtomium*, *Nephrolepis*, *Polypodium*, *Pteris*).
Damage: Caterpillars are active feeders which can defoliate severely the plants. Larvae as they mature usually hide on the stems at the base of the plants or in the soil during the day. Pupation takes place in cocoon on the soil surface. Adults are nocturnal.

- *Echinothrips americanus* (Thysanoptera: Thripidae)

Geographical distribution: Bermuda, Canada (south), Mexico, USA (most of the eastern states). This thrips has been introduced into the Netherlands and France recently (see EPPO RS 95/093 and 98/143).
Hosts: many ornamental species. It can attack more than 40 plant genera from 20 families and Araceae and Balsaminaceae are particularly attractive to this insect. Among ornamental species it can be found on: *Anthurium*, *Asparagus*, *Bambusa*, *Cordyline*, *Dendranthema*,

Desmodium, *Dieffenbachia*, *Euphorbia*, *Ficus*, *Hibiscus*, *Impatiens*, *Passiflora*, *Philodendron*, *Spathiphyllum* and *Syngonium*.
Damage: It feeds on leaf tissue and damage is very similar to that caused by mites, with light spots on the leaves. It can also feed on flower parts.

- *Geshna cannalis* (Lepidoptera: Pyralidae) - Lesser Canna leafroller.

Geographical distribution: USA (southeastern states), likely to occur in central America and tropical south America.
Hosts: *Canna* is apparently the only host.
Damage: Caterpillars fasten the edges of leaves before the leaves unroll or they can roll up one side of an open leaf. Within this shelter, the caterpillars feed on the upper surface of the leaves. Heavily infested leaves may never open and die. Infested plants usually do not bloom.

- *Lygus lineolaris* (Hemiptera: Miridae) - Tarnished plant bug.

Geographical distribution: Canada, Mexico, USA (widespread, prefers warm, humid to dry climates in the South, Southeast and Southwest) (see CABI map no. 38, 1954).
Hosts: polyphagous species (fruits, vegetables, ornamentals, field and forage crops, weeds). Glasshouse hosts include *Aster*, chrysanthemums, *Dahlia*, *Impatiens* and *Tagetes*.
Damage: By feeding, adults and nymphs cause yellowing, distortion of terminal growth and reduced plant growth. Flowers from damaged buds sometimes fail to develop on one side or the whole bud aborts.

- *Microcephalothrips abdominalis* (Thysanoptera: Thripidae) - Composite thrips.

Geographical distribution: tropics, and subtropics. Australia, India, Japan, Korea Republic, Peru, Taiwan, Thailand, USA.
Hosts: many ornamental species of family Asteraceae (e.g. *Bidens formosa* (cosmos), chrysanthemum, *Helianthus*, *Pyrethrum*, *Tagetes*, *Zinnia*). In Asia, its presence is reported on Orchidaceae, and also and tea and rice crops.
Damage: Heavy infestations cause damage to the corolla, stamens, and developing seeds of plants in the Asteraceae. Petals lose pigmentation, senesce early and drop prematurely.

- *Phenacoccus gossypii* (Hemiptera: Homoptera: Pseudococcidae) - Mexican mealybug.

Geographical distribution: Bahamas, Cuba, Mexico, Puerto Rico, USA (many southern states, Hawaii).
Hosts: many ornamental plants (e.g. *Althea rosea*, *Aralia*, chrysanthemum, *Euphorbia pulcherrima*, *Gynura*, *Hedera helix*, *Ixia*, *Lantana*). It attacks cotton, and is reported as a minor pest of lima beans (*Phaseolus lunatus*) in the warmer parts of USA.
Damage: Wilting and stunting of attacked plants. Plants are disfigured due to the presence of mealybugs.

- *Platynota* species (Lepidoptera: Tortricidae)

  P. flavedana -variegated leafroller

  Geographical distribution: Jamaica, USA (from Maine to Florida and west to Kansas and Texas).

  Hosts: Polyphagous (e.g: apple, clover, cotton, citrus, *Euphorbia pulcherrima*, *Hypericum*, maple, peach, *Rosa*, sassafras, strawberry).

  P. stultana - omnivorous leafroller

  Geographical distribution: Mexico, USA (California, Maryland, Pennsylvania, Virginia).

  Hosts: Polyphagous (e.g: capsicum, citrus, cotton, celery, grapes, lucerne, *Rosa*, stone fruits, tomatoes)

  P. idaeusalis - tufted apple bud moth

  Geographical distribution: Canada (British Columbia), USA (Michigan, North Carolina, Pennsylvania, Virginia).

  Hosts: Polyphagous (e.g: *Acer*, apple, cherries, clover, *Euphorbia pulcherrima*, *Solanum*, *Solidago*, walnut, willow).

  Damage: Feeding on the leaves. Leaves are rolled and tied by silk, as larvae construct their nests.

- *Rhizoecus americanus* (Hemiptera: Homoptera: Pseudococcidae) - Root mealybug.

  Geographical distribution: Colombia, Costa Rica, Cuba, Ecuador, Honduras, Jamaica, Martinique, Mexico, Panama, Puerto Rico, Trinidad, USA (Florida), Virgin Islands (US). Found in Italy for the first time in 1992 on *Saintpaulia* (in glasshouses in Pieve san Paolo) and on *Phoenix roebelenii* (in the field in Catania).

  Hosts: many ornamentals (e.g. *Aralia*, *Asparagus*, chrysanthemum, *Dieffenbachia*, *Ficus*, *Gardenia*, *Hibiscus*, *Kentia*, *Lantana*, *Phoenix*, *Saintpaulia*, *Strelitzia*, etc.) (see Ben-Dov for a more complete list)

  Damage: All stages can be found on the roots of the plants and growing medium. As they attack roots, plant growth is reduced, foliage is deteriorated and plants may finally die. Considered as a serious pest in Florida nurseries (Ben-Dov, 1994)

- *Stenoptilodes antirrhina* (Lepidoptera: Pterophoridae) - Snapdragon plume moth.

  Geographical distribution: USA (California, but they also have been found in glasshouses in southeastern states which have received cuttings from California).

  Hosts: *Antirrhinum* is apparently the only host.

  Damage: Larvae mine the leaves and feed externally on leaves, buds and flower parts.

- *Stephanitis pyrioides* (Hemiptera: Tingidae) - Azalea lace bug.

  Geographical distribution: Japan, USA (from New York to Massachusetts southward to Florida and west to Texas).

  Hosts: azalea (evergreen cultivars are preferred hosts, but also attacks deciduous cultivars), mountain laurel (*Kalmia latifolia*) and rhododendron.

  Damage: caused by adults and nymphs by feeding on leaves. Reported to be the most serious pest of azalea since its introduction from Japan in the 1920s.

Note: Another species, the andromeda lace bug, *Stephanitis takeyai*, also occurs in USA (introduced from Japan). It is a pest of *Pieris japonica* (andromeda) and *Rhododendron*. This species has recently been found outdoors in a very limited outbreak in UK (see EPPO RS 98/061). A third species, *Stephanitis rhododendri* already occurs in Europe but has probably been introduced from North America. It causes damage locally on azalea and rhododendron.

- *Trialeurodes abutilonea* (Hemiptera: Homoptera: Aleyrodidae) - banded-winged whitefly.

Geographical distribution: Cuba, USA (Arizona, California, Colorado, District of Columbia, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Mississippi, Missouri, New Mexico, New York, North Carolina, Pennsylvania, South Carolina, Texas, Utah, Virginia).
Hosts: originally described on *Abutilon theophrasti* but is now considered as a polyphagous species (e.g. *Euphorbia pulcherrima*, *Geranium*, *Hibiscus*, *Petunia*, many weeds). It is reported as an occasional economic pest of ornamentals. It also occurs on cotton and vegetable crops.
Damage: direct feeding damage and presence of honeydew and sooty mould which alter the appearance of the ornamentals. If not controlled, it can be a very damaging pest. It is reported as being able to transmit viruses (e.g. abutilon yellows ?closterovirus, diodia vein chlorosis ?closterovirus), but not as efficiently as *Bemisia tabaci*.

Source:

Insect and related pests of flowers and foliage plants. Some important, common and potential pests in the southeastern United States. edited by Baker, J.R. (1994) North Carolina Cooperative Extension Service, US, 106 pp.
Also available on INTERNET:
http://ipmwww.ncsu.edu/INSECT_ID/AG136/ncstate.html

Ben-Dov, Y. (1994) A systematic catalogue of the mealybugs of the work (Insecta: Homoptera: Coccoidea: Pseudococcidae and Putoidae) with data on geographical distribution, host plants, biology and economic importance. Intercept Limited, Andover, UK, 686 pp.

Bin-Cheng Zhang (1994) Index of economically important Lepidoptera, CABI, Wallingford, UK, 599 pp.

CABPest CD and CABI maps.

Additional key words: potential quarantine pests

98/181 Details on geographical distribution of some quarantine viruses in USA

The USDA-APHIS Web site on INTERNET provides detailed information on the widely prevalent viruses for each state of USA (without indications on their host plants). These lists of viruses have been prepared by the New Virus Working Group of the Plant Virology Committee of APS for USDA-APHIS (1st January 1997). The EPPO Secretariat has extracted the following data which were previously not included in the EPPO database PQR (version 3.7).

Apple mosaic ilarvirus (EPPO A2 quarantine pest on *Rubus*): Connecticut, Idaho, Indiana, Kansas, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, South Carolina, Texas, Utah, Vermont, Wisconsin, Wyoming.

Barley stripe mosaic hordeivirus (EPPO A2 quarantine pest): Florida, Idaho, Michigan, Minnesota, Nebraska, New York, Oregon, Pennsylvania, South Dakota, Texas, Utah, Vermont, Virginia, Wyoming.

Beet curly top hybrigeminivirus (EU Annex II/A1): Arizona, Kansas, Montana, New Mexico, Utah.

Black raspberry latent ilarvirus (EPPO A2 quarantine pest): Michigan, Pennsylvania.

Cherry rasp leaf nepovirus (EPPO A1 quarantine pest): Nebraska, Wisconsin, Wyoming.

Impatiens necrotic spot tospovirus (EPPO A2 quarantine pest): Arkansas, California, Connecticut, Delaware, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Mississippi, Missouri, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Texas, Vermont, Virginia.

Plum American line pattern ilarvirus (EPPO A1 quarantine pest): Oregon, Texas, Wyoming.

Potato spindle tuber viroid (EPPO A2 quarantine pest): Minnesota, Mississippi, Nebraska, New Hampshire, North Dakota, Ohio, Wyoming.

Potato yellow dwarf nucleorhabdovirus (EPPO A1 quarantine pest): Texas.

Raspberry leaf curl virus (EPPO A1 quarantine pest): Utah.

Strawberry crinkle cytorhabdovirus (EU Annex II/A2): Indiana, Massachusetts, Pennsylvania.

Strawberry vein banding ?caulimovirus (EPPO A2 quarantine pest): Idaho, Louisiana, Oregon.

Tobacco ringspot nepovirus (EPPO A2 quarantine pest): Alabama, Kansas, Missouri, Nebraska, South Dakota, Vermont, Wisconsin, Wyoming.

Tomato ringspot nepovirus (EPPO A2 quarantine pest): Connecticut, Delaware, Indiana, Kansas, Kentucky, Minnesota, Montana, New Hampshire, New Jersey, North Carolina, Ohio, Oklahoma, Tennessee, Texas, Utah, Virginia, Wisconsin, Wyoming.

Tomato spotted wilt tospovirus (EPPO A2 quarantine pest): Connecticut, Delaware, Iowa, Idaho, Indiana, Kansas, Kentucky, Maine, Massachusetts, Michigan, Missouri, Montana, Nebraska, New Hampshire, New Mexico, New York, Nevada, North Dakota, Ohio, South Carolina, South Dakota, Utah, Vermont, Washington, Wisconsin, Wyoming.

Source: USDA-APHIS Web site. Widely prevalent virus list by state. http://www.aphis.usda.gov/ppq/virus/

Additional key words: new detailed records

Computer codes: APMXXX, BTCTXX, BYSMXX, CRRLXX, IMNSXX, PLLPXX, POSTXX, POYDXX, RYBLXX, RYLCXX, SYCXXX, SYVBXX, TMRSXX, TMSWXX, TORSXX

98/182 *Xanthomonas axonopodis* pv. *dieffenbachiae* found again in the Netherlands

Symptoms of *Xanthomonas axonopodis* pv. *dieffenbachiae* (EPPO A1 quarantine pest) were observed in plants of *Anthurium andreanum* in one firm producing cut flowers in Zuid-Holland in June 1998. The presence of the bacterium was then confirmed by laboratory testing. Eradication measures have immediately been applied: destruction of infested *Anthurium* plants and neighbouring plants, disinfection of tools, restricted entrance to the compartment of the glasshouse concerned.
It can be recalled that the disease was detected on *Anthurium andreanum* plants in 1997 (see EPPO RS 97/204) and was subjected to eradication measures.

Source: Plant Protection Service of the Netherlands, 1998-09.

Additional key words: new record

Computer codes: XANTDF, NL

98/183 First report of *Frankliniella occidentalis* in Sri Lanka

In Sri Lanka, thrips were collected in several nurseries (respectively, 6 ornamental plant, 3 orchid and 3 cut-flower nurseries) and 2 botanical gardens, from January to February 1996. Among 23 thrips species observed, *Frankliniella occidentalis* (EPPO A2 quarantine pest) was found on *Alstroemeria* and *Gypsophila*. According to the authors, this is the first report of *F. occidentalis* in Sri Lanka.

Source: Oda, Y.; Kahawatta, U.C.; Rajapaksha, J.P.; Rajapaksha, H. (1997) Thrips collected in Sri Lanka.
Research Bulletin of the Plant Protection Service, Japan, no. 33, 71-73.

Additional key words: new record **Computer codes:** FRANOC, LK

98/184 Survey methods for citrus tristeza closterovirus

In the Central Valley of California (US), an eradication programme for citrus tristeza closterovirus (EPPO A2 quarantine pest) has been implemented for many years. In such a programme, the sampling scheme and the estimation of the incidence of virus infection are key issues. The sampling scheme was established several years ago as follows: every fifth trees in every fifth row is selected and sampled (in blocks of approximately 400 trees). It is estimated that 4 to 6% of trees are sampled and material from each tree is tested separately. An alternative sampling and testing scheme has been studied and compared by using field data and computer simulation to the current scheme. The alternative scheme is defined as follows: approximately 25 % of trees in a block are sampled, and plant material is collected and tested from groups of 4 trees. Results showed that the alternative method resulted in increased accuracy and precision of estimates of citrus tristeza closterovirus incidence without increasing unduly the number of laboratory test to perform.

Source: Hugues, G.; Gottwald, T.R. (1998) Survey methods for assessment of citrus tristeza virus incidence.
Phytopathology, 88(7), 715-723.

Additional key words: sampling **Computer codes:** CTV

98/185 Biological characterization of citrus tristeza closterovirus isolates by *in vitro* cultures

Citrus tristeza closterovirus (CTV - EPPO A2 quarantine pest) has numerous strains differing in biological and serological properties, dsRNA patterns and genome sequences. Despite significant progress made at molecular level, biological characterization of field isolates is still necessary, in particular to control the spread of the most damaging strains. Biological characterization (inoculation to indicators) is expensive and time-consuming. Studies were carried out in Spain to observe *in vitro* the effects of five CTV isolates on the morphogenesis of stem fragments from Mexican lime (*Citrus aurantiifolia*), sweet orange (*C. sinensis*), grapefruit (*C. paradisi*), *Citrus excelsa* and alemow (*C. macrophylla*). Results showed that morphogenesis (regeneration of roots and shoots) of stem fragments is modified as a result of CTV infection. In addition, the CTV isolates caused effects which could be correlated with the *in vivo* effects observed in biological testing. Mexican lime and grapefruit gave the best results, and could be used to discriminate the isolates. The authors felt that the evaluation of morphogenesis response of stem fragments of Mexican lime and grapefruit can be used as an additional tool in the biological characterization of CTV isolates.

Source: Ghorbel, R; Navarro, L.; Duran-Vila, N. (1998) Biological characterization of citrus tristeza virus isolates by *in vitro* cultures.
Plant Pathology, 47(3), 333-340.

Additional key words: identification method **Computer codes:** CTV

98/186 Insect pests of citrus in Lebanon

In Lebanon, a survey was carried out in 1997 in citrus orchards. Fruit crops are located all along the coast, from north to south. The following pests were found:

- Aphids: *Aphis gossypii*, *Aphis citricola* are present throughout the season with heavy populations on young shoots. *Toxoptera aurantii* is present in low number in August-September.
- Scales: *Aonidiella aurantii* is the most commonly found species. *Saissetia oleae* and *Ceroplastes floridensis* can also be abundant.
- Mediterranean fruit fly: *Ceratitis capitata* (EPPO A2 quarantine pest) was observed, particularly in July and October and is still a serious pest.
- Whiteflies: *Dialeurodes citri* and *Parabemisia myricae* (EPPO A2 quarantine pest) appeared at the end of the 1980s in Lebanon. *Aleurothrixus floccosus* was first found in 1992, and it caused in 1992-1993 extremely serious damage. In 1997, whitefly populations were observed at low levels and did not cause damage. These low levels can probably be explained

by an efficient control of natural enemies (e.g. *Cales noaki* which was introduced in Lebanon in 1993).

- Citrus leafminer: Since 1994, *Phyllocnistis citrella* has been causing heavy damage in orchards and more particularly in nurseries. It still represents a very serious threat to citriculture.

Source: Kfoury, L.; El-Amil, R. (1998) Les insectes ravageurs des agrumes au Liban - La situation en 1997.
Phytoma - La défense des Végétaux, no. 508, 38-39.

Additional key words: detailed record **Computer codes:** CERTCA, PHYNCI, PRABMY, LB

98/187 Persistence of European stone fruit yellows phytoplasma in the aerial parts of *Prunus* in winter

European stone fruit yellows phytoplasma (potential EPPO A2 quarantine pest, including the A2 pest apricot chlorotic leaf roll phytoplasma) affects several *Prunus* species: apricot (*Prunus armeniaca*), peach (*P. persica*), Japanese plum (*P. salicina*), European plum (*P. domestica*), almond (*P. amygdalus*), flowering cherry (*P. serrulata*) and other stone fruit species used as rootstocks. Fluorescence microscopy, PCR, and graft transmission experiments were used to study the persistence of European stone fruit yellows phytoplasma in the stem of various *Prunus* species (artificially inoculated or naturally infected) during the dormant season. Results showed that phytoplasmas are present in the stem during winter and are viable and transmissible.
European stone fruit phytoplasma is closely related to apple proliferation and pear decline phytoplasmas (both EPPO A2 quarantine pests) but these are known to be unable to persist in the aerial parts of the trees during winter (although they can survive in the roots). It is felt that these facts can probably be explained by physiological differences during the dormant season. It has been observed that sieve tubes of the stem phloem (on which phytoplasmas seem to depend) degenerate completely at the end of the growing season in apple and pear, and not in several *Prunus* species. The authors pointed out that the persistence of European stone fruit phytoplasma in aerial parts of *Prunus* in winter has implications for the epidemiology of the disease and also for plant quarantine, as there is a risk of dissemination with exchanges of dormant material.

Source: Seemüller, E.; Stolz, H.; Kison, H. (1998) Persistence of the European stone fruit yellows phytoplasma in aerial parts of *Prunus* taxa during the dormant season.
Journal of Phytopathology, 146(8-9), 407-410.

Additional key words: epidemiology **Computer codes:** ESFY

98/188 Details on *Melampsora medusae* in New Zealand

In a paper describing the *Melampsora* and *Marssonina* pathogens of poplars and willows in New Zealand, it is recalled that in 1973 the poplar rusts *Melampsora larici-populina* and *Melampsora medusae* (EPPO A2 quarantine pest) were introduced into the country. It was felt that they first entered Australia on illegally imported cuttings and were then transported by wind to New Zealand. By 1975, *M. larici-populina* was widespread in New Zealand. In contrast, *M. medusae* had largely disappeared, although it remained in several locations where isolated trees of *Populus deltoides* (cv. Angulata) were grown. In 1984, the disease was no longer seen in these locations. In 1990, *M. medusae* reappeared in Hamilton and has persisted there on several *P. deltoides* x *P. trichocarpa* cultivars. In 1991 in North Island, a severe outbreak of poplar rust was observed on new 'rust resistant' cultivars. Studies showed that the pathogen was an interspecific hybrid of *M. larici-populina* and *M. medusae* named *M. medusae-populina* (see EPPO RS 94/180). It was thought that this hybrid rust first arose in Australia by hyphal fusion or cross-fertilization of pycnia. This hybrid rust failed to overwinter in New Zealand after this first finding, but it reappeared in April 1998 in North Island.

Source: Spiers, A.G. (1998) *Melampsora* and *Marssonina* pathogens of poplars and willows in new Zealand.
European Journal of Forest Pathology, 28(4), 233-240.

Additional key words: detailed record **Computer codes:** MELMME, NZ

98/189 Phylogenetic relationships of phytoplasmas causing palm lethal diseases

Phytoplasmas associated with lethal diseases of coconuts and other palms are found in several regions of the world. Palm lethal yellowing phytoplasma (EPPO A1 quarantine pest) is present in several countries in the Caribbean, in Mexico, Belize, Honduras. Other lethal decline diseases have been reported in West Africa (Cape St Paul wild disease in Ghana, Kribi disease in Cameroon, Kaincopé disease in Togo and Awka disease in Nigeria) and in East Africa (Tanzania, Kenya, Mozambique). Although symptoms are similar, important differences in epidemiology and varietal susceptibility have been observed in each continent and between West and East Africa. In previous molecular studies (using DNA hybridization, RFLP analysis), it was found that pathogens from Florida, East Africa and West Africa, although similar, were distinct (EPPO RS 94/223 and 97/222). PCR was used to amplify the 16S rRNA genes and the 16S-23S spacer regions of phytoplasmas associated with lethal decline diseases of coconuts (*Cocos nucifera*) from Florida and the Yucatan region of Mexico, from East Africa, and from West Africa, and sequences of the amplified products were compared. Results showed that coconut lethal decline phytoplasmas constitute a separate cluster within the phytosplama clade, and that 3 coconut phytoplasma types/strains can be distinguished: the East African, the West African and the Caribbean type. During this study, specific primers have been developed and it is now possible to test plant material and determine which type/strain is present. These tools will be particularly useful for epidemiological studies concerning potential insect vectors of these devastating diseases.

Source: Tymon, A.M.; Jones, P.; Harrison, N.A. (1998) Phylogenetic relationships of coconut phytoplasmas and the development of specific oligonucleotide PCR primers.
Annals of applied Biology, 132(3), 437-452.

Additional key words: genetics, taxonomy **Computer codes:** PALYXX

98/190 Monoclonal antibodies against *Xylella fastidiosa* causing pear leaf scorch in Taiwan

Pear leaf scorch disease, caused by a strain of *Xylella fastidiosa* (EPPO A1 quarantine pest), was first reported in Taiwan in 1990. In infected pear trees, such as *Pyrus pyrifolia* cv. Hengshan, leaf scorch symptoms can be observed during summer and autumn, dieback of twigs and branches may also occurs, and if no control measures are taken 10 to 20-year old trees may die. Several monoclonal antibodies have been developed in Taiwan to detect specifically the pear leaf scorch bacterium. The authors felt that these monoclonal antibodies could be very useful to detect *X. fastidiosa* in various parts of infected trees plants using tissue blots (for example for epidemiological purposes), and also for discriminating between strains of *X. fastidiosa*. By using these monoclonal antibodies, serological differences could be observed among strains of *X. fastidiosa* (Pierce's disease, plum, oak strains) and were similar to previous results obtained with RAPD, but it was felt that more efforts are still needed to study the degree of serological relatedness among *X. fastidiosa* strains.

Source: Leu, H.H.; Leu, L.S.; Lin, C.P. (1998) Development and application of monoclonal antibodies against *Xylella fastidiosa*, the causal bacterium of pear leaf scorch.
Journal of Phytopathology, 146(1), 31-37.

Additional key words: detection method **Computer codes:** XYLEFA

98/191 Detection of viable cells of *Ralstonia solanacearum* in soil

A method to detect viable cells of *Ralstonia solanacearum* (EPPO A2 quarantine pest) in soil has been developed in Japan. It combines the use of a semiselective medium (PCCG) and a PCR technique with specific primers. During these studies, 92 strains of soil bacteria were isolated from soil samples of 39 different fields in Honshu (JP). These fields, where tomato or aubergine had been grown, were known to be infected by *R. solanacearum*, and usually biovar 4 had been identified in infected plants. Out of these 92 strains, 12 were confirmed as *R. solanacearum* by biochemical and pathogenicity tests, and were specifically and efficiently (sensitivity threshold 10^2cfu/g soil) detected by this new method (PCCG followed by PCR). The authors noted that this method is rather rapid, as results can be obtained 3 days after soil sampling has been performed. Colonies can be observed on the semiselective medium after 48 h (incubation at 30°C) and readily tested by PCR.

Source: Ito, S.; Ushijima, Y.; Fujii, T.; Tanaka, S.; Kameya-Iwaki, M.; Yoshiwara, S.; Kishi, F. (1998) Detection of viable cells of *Ralstonia solanacearum* in soil using a semiselective medium and a PCR technique.
Journal of Phytopathology, 146(8-9), 379-384.

Additional key words: detection method **Computer codes:** PSDMSO

98/192 PCR detection of an agent associated with yellow vine disease of cucurbits.

As reported in EPPO RS 98/111, a new disease of cucurbits called 'yellow vine' has recently been observed in central Texas and Oklahoma (US). Yellow vine disease of cucurbits is thought to be caused by a phloem-limited bacterium although is has not yet been possible to isolate, culture and transmit the pathogen. From field observations, it is also supposed that insect vectors may transmit the disease, but this could not be verified. However, a PCR method has been developed to detect the yellow vine agent in diseased plants. Results obtained with PCR suggest that the agent which is consistently associated with diseased plants is a prokaryote, and phylogenetic analysis showed that it is a gamma-3 proteobacterium closely related to *Serratia marcescens* (endophytic bacterium occurring in roots and stems of sweet maize and cotton) and is only distantly related to citrus greening bacterium.

Source: Avila, F.J.; Bruton, B.D.; Fletcher, J.; Sherwood, J.L.; Pair, S.D.; Melcher, U. (1998) Polymerase chain reaction detection and phylogenetic characterization of an agent associated with yellow vine disease of cucurbits.
Phytopathology, 88(5), 428-436.

Additional key words: new pest, detection

98/193 Resistance of *Diabrotica virgifera virgifera* to several insecticides

In Nebraska (US), as in many parts of the western Corn Belt, continuous maize is widely grown and subject to serious damage caused by *Diabrotica virgifera virgifera* (EPPO A2 quarantine pest). Insecticides are often applied: soil insecticides at planting or first cultivation against larvae; foliar applications to reduce adult populations and therefore egg-laying. In Nebraska, application of soil insecticides at planting time were initially used in the late 1940s. Organochlorine insecticides (BHC, aldrin, heptachlor) were commonly used by 1954. Ineffective control was first observed in 1959, in south-central Nebraska. By 1963, high levels of resistance to aldrin had been reported. The resistant insects rapidly spread and, by 1980, they were present in most of the Corn Belt. Even today, populations of *D. virgifera virgifera* are still resistant to organochlorine compounds, although these have not been used for many years. From 1970s to early 1990s, carbamates and organophosphorus compounds (e.g. carbaryl, methyl parathion) have been used in Nebraska and provided good larval and adult control. During the last 5 years, reports of insecticide failure have increased in parts of Nebraska where spray programmes have been used for many years. Laboratory studies were done on the susceptibility of adults (collected in selected areas in Nebraska) to 3 insecticides (methyl parathion, carbaryl, bifenthrin). It was found that these field populations showed differences in susceptibility for each insecticide. Relative differences in LD_{50} values between the most tolerant and susceptible populations were 16.4 and 9.4 fold for methyl parathion and carbaryl, respectively. For bifenthrin, there were less differences (up to 4-fold difference in LD_{50} values). Bioassays done on F1 colonies showed that these susceptibility traits are heritable. Populations with the highest LD_{50} values were found in 2 areas where adult management programmes have been extensively applied and treatment failures had commonly been reported. The authors concluded that the current management practices have led to significant levels of resistance to methyl parathion or carbaryl (or both) in certain areas of Nebraska.

Source: Meinke, L.J.; Siegfried, B.D.; Wright, R.J.; Chandler, L.D. (1998) Adult susceptibility of Nebraska Western corn rootworm (Coleoptera: Chrysomelidae) populations to selected insecticides.
Journal of Economic Entomology, 91(3), 594-600.

Additional key words: resistance **Computer codes:** DIABVI

98/194 Combination of insecticides and entomopathogenic nematodes to control *Diabrotica virgifera virgifera*

Chemical treatments are the most widely used methods to control *Diabrotica virgifera virgifera* (EPPO A2 quarantine pest). However, it has been shown that some entomopathogenic nematodes (*Steinernema carpocapsae*, *S. feltiae* and *Heterorhaditis bacteriophora*) can reduce numbers of larvae, adult emergence and damage. Laboratory studies have been carried out in USA to determine whether the combined use of insecticides (terbufos, fonofos, tefluthrin) and entomatopathogenic nematodes (*S. carpocapsae*) could increase insect mortality. Combinations of insecticides and nematodes were tested at several doses and exposure times, and by using different bioassay methods on larvae of *D. virgifera virgifera*. Results showed that larval mortality with combinations of terbufos or fonofos and *S. carpocapsae* was increased (additive effect) in some cases. However, an antagonist effect was obtained in a few cases. Combinations of tefluthrin with *S. carpocapsae* gave in several cases a synergistic response and an average increase of 24 % (lowest increase 12% - highest 44 %) in expected mortality. This synergy was also observed when tefluthrin was used with another nematode species *H. bacteriophora*. These results obtained in laboratory conditions open new possibilities of integrated management, but need to be confirmed in the field.

Source: Nishimatsu, T.; Jackson, J.J. (1998) Interaction of insecticides, entomopathogenic nematodes and larvae of the Western corn rootworm (Coleoptera: Chrysomelidae).
Journal of Economic Entomology, 91(2), 410-418.

Additional key words: control **Computer codes:** DIABVI

98/195 Studies on the maximum pest limit concept: case of *Anastrepha ludens* on fruit imports from Mexico

The probability of introduction into USA of *Anastrepha ludens* (EPPO A1 quarantine pest) on host fruits from Mexico was studied. A maximum pest limit approach was used, i.e. the presence of less than 2 flies per shipment could be tolerated, because establishment will only be possible if a reproductive pair is introduced. The probability of introduction of a single reproductive pair surviving in a shipment of fruits (citrus and mangoes) was studied by using several calculation models developed by New Zealand and American statisticians. Data used for these calculations (e.g. proportions of fruit infested, numbers of larvae per infested fruit), were collected under various pest management scenarios for mangoes and citrus in regions of Mexico where *A. ludens* occurs. Calculations were also made to determine the required quarantine treatments of fruits (methyl bromide fumigation for citrus and hot water dip for mangoes) which would be required to ensure that this reproductive pair did not survive.

Results showed that infestation levels in shipments will exceed this maximum pest limit if no pest management programmes, such as insecticide applications, sterile insect release or selective harvest of fruit, have been used, even if a quarantine treatment ensuring a 99.9968 % (probit 9) efficacy is later applied on the commodity. It shows that, in the case of *A. ludens*, a quarantine treatment will be effective in maintaining the predicted pest survival below the maximum limit (<1 reproductive pair per shipment), only if it is combined with pest management practices in the field.

Source: Mangan, R.L.; Frampton, E.R.; Thomas, D.B.; Moreno, D.S. (1997) Application of the maximum pest limit concept to quarantine security standards for the Mexican fruit fly (Diptera: Tephritidae).
Journal of Economic Entomology, 90(6), 1433-1440.

Additional key words: maximum pest limit, quarantine **Computer codes:** ANSTLU

98/196 EPPO report on selected intercepted consignments

The EPPO Secretariat has gathered the intercepted consignment reports for 1998 received since the previous report (EPPO RS 98/155) from the following countries: Belgium, Czechia, Denmark, Estonia, Finland, Germany, Ireland, Italy, Netherlands, Norway, Switzerland, Romania, Slovenia, Spain, Tunisia, United Kingdom. When a consignment has been re-exported and the country of origin is unknown, the re-exporting country is indicated in brackets. When the occurrence of a pest in a given country is not known to the EPPO Secretariat, this is indicated by an asterisk (*).

The EPPO Secretariat has selected interceptions made because of the presence of pests. Other interceptions due to prohibited commodities, missing or invalid certificates are not indicated. It must be pointed out that the report is only partial, as many EPPO countries have not yet sent their interception reports.

Note. Some remaining interceptions made in 1997 by Tunisia are presented below.

Pest	Consignment	Type of commodity	Country of origin	C. of destination	nb
***Pratylenchus* sp.**	*Lilium*	Bulbs	Netherlands	Tunisia (97)	1
	Rosa	Plants for planting	France	Tunisia (97)	1
***Pratylenchus* sp., *Meloidogyne* sp.**	Ornamentals	Plants for planting	Italy	Tunisia (97)	1
Pseudomonas syringae* pv. *pisi	*Pisium sativum*	Seeds	United Kingdom	Tunisia (97)	1

Pest	Consignment	Type of commodity	Country of origin	C. of destination	nb
Bemisia tabaci	*Corchorus olitorius*	Vegetables	Cyprus	United Kingdom	2
	Crossandra infundibuliformis	Cuttings	Sri Lanka	Denmark	2
	Dendranthema	Cut flowers	Netherlands	United Kingdom	1
	Diascia	Cuttings	Israel	United Kingdom	2
	Euphorbia pulcherrima	Pot plants	France	United Kingdom	1
	Euphorbia pulcherrima	Cuttings	Germany	United Kingdom	1
	Euphorbia pulcherrima	Cuttings	Netherlands	United Kingdom	2
	Fuchsia	Cuttings	Israel	United Kingdom	2
	Hygrophila polysperma	Aquarium plants	Singapore*	Denmark	1
	Hygrophila salicifolia	Aquarium plants	Singapore*	Denmark	1
	Hygrophila salicifolia, H. difformis	Aquarium plants	Singapore*	Denmark	1
	*Mandevilla (*Dipladenia) hybrids	Cuttings	Israel	Denmark	1
	Melochia	Vegetables	Cyprus	United Kingdom	1
	Ocimum basilicum	Vegetables	Thailand	United Kingdom	1
	Solidago	Cut flowers	Israel	Ireland	5
	Solidago	Cut flowers	Israel	United Kingdom	13
	Solidago	Cut flowers	Netherlands	Ireland	5
	Solidago	Cut flowers	Netherlands	United Kingdom	4
	Thymus	Vegetables	Israel	United Kingdom	1
	Verbena	Cuttings	Israel	United Kingdom	1
Bemisia tabaci (biotype B)	*Arubias barteri?*	Plants for planting	Thailand	Netherlands	1
	Crossandra	Cuttings	Sri Lanka	Netherlands	1
Ditylenchus destructor	*Iris*	Bulbs	France	United Kingdom	1
Frankliniella occidentalis	Ornamentals	Cut flowers	Netherlands	Estonia	1
	Rosa	Cut flowers	Netherlands	Estonia	1
Helicoverpa armigera	*Asparagus officinalis*	Vegetables	Philippines	United Kingdom	1
	Dendranthema	Plants for planting	France	Netherlands	1
	Dianthus	Cut flowers	Israel	Netherlands	2
	Dianthus	Cut flowers	Spain	United Kingdom	1
Hymenoptera	*Musa paradisiaca*	Fruits	Costa Rica	Belgium	1
Leptinotarsa decemlineata	*Solanum tuberosum*	Ware potatoes	Italy	United Kingdom	1
Liriomyza huidobrensis	*Aster*	Cut flowers	Kenya	Ireland	1
	Dendranthema	Cut flowers	Netherlands	United Kingdom	6
	Gypsophila	Cut flowers	Jersey	United Kingdom	1
	Gypsophila	Cut flowers	Netherlands	Ireland	2
	Gypsophila	Cut flowers	Netherlands	United Kingdom	11
	Moluccella laevis	Cut flowers	Netherlands	United Kingdom	1
	Viola	Plants for planting	Netherlands	United Kingdom	2
Liriomyza sativae, Bemisia tabaci	*Ocimum basilicum*	Vegetables	Thailand	United Kingdom	1
***Liriomyza* sp.**	*Dianthus caryophyllus*	Pot plants	Netherlands	United Kingdom	2
	Gypsophila	Cut flowers	Israel	United Kingdom	1
	Gypsophila	Cut flowers	Netherlands	Czech Republic	1
Liriomyza* sp. (probably *L. huidobrensis)	*Gypsophila*	Cut flowers	(Netherlands)	United Kingdom	1
Liriomyza* sp. (probably *L. huidobrensis)	*Gypsophila*	Cut flowers	Netherlands	United Kingdom	1

Pest	Consignment	Type of commodity	Country of origin	C. of destination	nb
***Liriomyza* sp. (probably *L. trifolii*)**	*Gerbera*	Plants for planting	Netherlands	United Kingdom	1
***Meloidogyne* sp.**	*Curcuma domestica*	Plants for planting	Netherlands	Tunisia	1
	Ornamentals	Plants for planting	Italy	Tunisia	1
	Ornamentals	Bulbs	Netherlands	Tunisia	1
Myrothecium roridum	*Clematis*	Cuttings	Israel	United Kingdom	1
Nematodes	*Musa* sp.	Plants for planting	Togo	Germany	1
Pentalonia nigronervosa	*Schismatoglottis*	Plants for planting	USA	United Kingdom	1
***Pratylenchus* sp.**	*Asparagus officinalis*	Plants for planting	France	Tunisia	1
	Castanea sativa	Plants for planting	France	Tunisia	1
	Corylus	Plants for planting	France	Tunisia	1
	Juglans regia	Plants for planting	France	Tunisia	1
	Lilium	Bulbs	Netherlands	Tunisia	1
	Ornamentals	Bulbs	France	Tunisia	1
	Rosa	Plants for planting	France	Tunisia	1
	Vitis vinifera	Plants for planting	Portugal	Tunisia	1
	Vitis vinifera	Plants for planting	Italy	Tunisia	1
Pseudococcidae	*Hedera helix*	Pot plants	Poland	Denmark	1
Puccinia horiana	*Dendranthema*	Cut flowers	Netherlands	Estonia	1
Sitophilus	*Hordeum vulgare*	Stored products	Hungary	Slovenia	2
Spodoptera	*Codiaeum*	Plants for planting	Costa Rica	Netherlands	1
Thrips palmi	*Dendrobium*	Cut flowers	Thailand	Netherlands	1
***Thrips* sp. (probably *T. palmi*)**	*Ocimum basilicum*	Vegetables	Thailand	United Kingdom	1
Tilletia indica	*Triticum durum*	Stored products	Mexico	Italy	1
Tribolium	*Avena sativa*	Stored products	Hungary	Slovenia	2
	Hordeum vulgare	Stored products	Hungary	Slovenia	1
Tribolium, Cryptolestes ferrugineus	*Triticum aestivum*	Stored products	Hungary	Slovenia	2
Tribolium, Sitophilus	*Avena sativa*	Stored products	Hungary	Slovenia	1
	Hordeum vulgare	Stored products	Hungary	Slovenia	3
	Triticale	Stored products	Hungary	Slovenia	2
Xiphinema americanum	*Livistona mota*	Plants for planting	Cuba	United Kingdom	1

- **Fruit flies**

Pest	Consignment	Type of commodity	Country of origin	C. of destination	nb
***Anastrepha* sp.**	*Citrus sinensis*	Fruits	Uruguay	Spain	1
Ceratitis capitata	*Prunus persica*	Fruits	Italy	Estonia	1
	Prunus persica	Fruits	Spain	Slovenia	1

Source: **EPPO Secretariat, 1998-10.**

98/197 Publication on potato cyst nematodes

A new book 'Potato Cyst Nematodes – Biology, Distribution and Control' edited by R.J. Marks and B.B. Brodie has recently been published by CABI. This book is divided into five parts: potato cyst nematodes, detection and identification of potato cyst nematodes, control options for potato cyst nematodes, potato cyst nematode resistance, worldwide status of potato cyst nematodes. This book provides, in particular, detailed information on the origins, the geographical distribution of potato cyst nematodes in different parts of the word, and regulatory control strategies.
It can be obtained from CABI at a price of 65 GBP:

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Source: **EPPO Secretariat, 1998-08.**

Additional key words: publication **Computer codes:** HETDPA, HETDRO