ORGANISATION EUROPEENNE
ET MEDITERRANEENNE
POUR LA PROTECTION DES PLANTES

EUROPEAN AND MEDITERRANEAN
PLANT PROTECTION
ORGANIZATION

EPPO Reporting Service

NO. 4 PARIS, 2007-04-01

CONTENTS _____ *Pests & Diseases*

1, rue Le Nôtre
75016 Paris

Tel. : 33 1 45 20 77 94
Fax : 33 1 42 24 89 43

E-mail : hq@eppo.fr
Web : www.eppo.org

2007/066 EPPO Plant Protection Thesaurus (EPPT) is available from the EPPO website

The EPPO Plant Protection Thesaurus (EPPT) is a database of plant and pest names. For more than 50,000 organisms important in agriculture and crop protection, it provides preferred scientific names, synonyms, common names in different languages, EPPO codes, and taxonomic relationships. Previously, EPPT had to be purchased on a CD-Rom from the EPPO Secretariat but from June 2007 the whole database can be freely accessed from the EPPO website at the following address: http://eppt.eppo.org
As mentioned above, EPPT contains the EPPO codes (formerly the BAYER codes) which can be used for computing purposes. In this system, a unique letter code is attributed to each biological entity. In the near future, users who wish to include the EPPO codes into their own computer systems will be able to obtain licenses to download codes directly from the online database. In addition, licensed users will also have a privileged access to request new codes. But for the moment these features are still under development.

Source: EPPO Secretariat, 2007-06.

2007/067 First report of *Agrilus planipennis* in the region of Moscow, Russia

In Russia, *Agrilus planipennis* (Coleoptera: Buprestidae - EPPO A1 List) was first reported from the Far East as *Agrilus marcopoli* (Alexeev, 1979) which was later considered a synonym of *A. planipennis*. So far, *A. planipennis* is not a regulated pest for Russia. In 2005, several specimens of an unusual Buprestidae were observed in the city of Moscow (in several instances walking on the pavement!). Similar insects had already been observed in 2003. Specimens were sent to Dr Alexeev who identified the pest as being *A. planipennis*. In 2006, more beetles were found in the city of Moscow as well as in the surroundings (30 km west of the city). It is estimated that in the city of Moscow, around 20% of the planted tree species are *Fraxinus* (mainly *Fraxinus pennsylvanica* and to a lesser extent *F. excelsior*). Many declining or dying *Fraxinus* trees are being observed in city squares or along railway tracks. In some places, 70-80% of the *Fraxinus* trees have lost most of their foliage, usually with a few remaining green branches at the base of the trees. Some *A. planipennis* adults could be observed on the lower branches, both on healthy looking and stressed trees. The source of this introduction remains unknown but different hypotheses are envisaged. In the 1990s, many large trees were imported from Canada (although the pest was not known to occur there at that time) and planted in the city along roads or in private gardens. It is also suggested that *A. planipennis* may have been introduced from Asia with wood packing material. It is stressed that *A. planipennis* represents a high risk for urban plantations and natural forests of *Fraxinus*, and that delimiting surveys are needed. This is the first report of *A. planipennis* in the European part of Russia.
The situation of *A. planipennis* in Russia can be described as follows: **Present, Far East and European Russia (Moscow and its surroundings).**

Source: Alexeev AV (1979) [New species of beetles (Coleoptera, Buprestidae) unknown or hardly known from the territory USSR of eastern Siberia and the Far East] 12-139. In: Krivolutskaya (Ed.): [Beetles of the Far East and eastern Siberia (new data on fauna and systematics)], Vladivostok Akademiya Nauk SSSR, 157 pp (in Russian).
Mozolevskaya EG, Izhevskii SS (2007) [Outbreaks of emerald ash borer in Moscow region.] (in Russian). *Zashchita Rastenii* no. 5, 28-30.

INTERNET (last retrieved in 2007-04)
Zoological Institute, St Petersburg, Russia. Beetles (Coleoptera) and Coleopterists website
Izhevsky SS (2007) [The threatening finding of *Agrilus planipennis* in the region of Moscow.] (in Russian). http://www.zin.ru/Animalia/Coleoptera/rus/agrplaiz.htm
Shankhiza EV (2007) [Invasion of *Agrilus planipennis* in the region of Moscow.] (in Russian). http://www.zin.ru/Animalia/Coleoptera/rus/fraxxx.htm
Volkovich MG (2007) [*Agrilus planipennis*, a new and dangerous pest of *Fraxinus* in the European part of Russia.] (in Russian). http://www.zin.ru/Animalia/Coleoptera/rus/eab_2007.htm

Additional key words: new record **Computer codes:** AGRLPL, RU

2007/068 *Tetrastichus planipennisi* is a parasitoid of *Agrilus planipennis* in China

Research is being carried out in China to identify parasitoids which may be used to control *Agrilus planipennis* (Coleoptera: Buprestidae – EPPO A1 List). During surveys done in different parts of China, several parasitoids were identified. An unknown *Tetrastichus* species (Hymenoptera: Eulophidae) was commonly found parasitizing *A. planipennis* in northeast China. The species was identified as *Tetrastichus planipennisi*. This parasitoid develops from eggs to larvae within the *A. planipennis* larva, which remains alive until its last instar. The wasp larvae then emerge from their dead hosts and chew exit holes through the bark of the tree. In north-eastern China, four generations per year of the parasitoid have been observed. Although further studies are needed, it is felt that *T. planipennisi* has the potential to be an effective biocontrol agent. It can be recalled that during similar surveys another parasitoid, *Spathius agrili* (Hymenoptera: Braconidae), had also been identified in China (see EPPO RS 2006/206).

Source:
NAPPO Phytosanitary Pest Alert System
Alerts. *Tetrastichus planipennisi* Yang. Newly described parasite of Emerald ash borer (EAB) in China. http://www.pestalert.org/viewNewsAlert.cfm?naid=33

Yang ZQ, Strazanac JS, Marsh PM, Yao YX, Wang XY (2006) A new species of emerald ash borer parasitoid from China belonging to the genus *Tetrastichus* Haliday (Hymenoptera: Eulophidae). *Proceedings of the Entomological Society of Washington* **108**(3), 550-558.

Additional key words: biological control **Computer codes:** AGRLPL, CN

2007/069 New arthropods identified in Israel

The NPPO of Israel recently informed the EPPO Secretariat of the presence of three new arthropods in Israel.

- *Derelomus piriformis*

The presence of *Derelomus piriformis* (Coleoptera: Curculionidae) was recently confirmed in Israel (Friedman, 2006). *D. piriformis* is a pollinator weevil of *Phoenix canariensis* but is at the same time reported to damage male flowers (and occasionally female flowers). Both larvae and pupae develop inside the closed male flowers which subsequently drop off, and development continues within the fallen flowers. When visiting female inflorescences, the insect may injure some flowers and induce abortion, but it also enhances pollination by

depositing pollen on the receptive stigma of the plant. This species was first described from 1 specimen from Madeira (Funchal, PT) and 2 specimens from Morocco (Rabat). As it develops only on *Phoenix canariensis*, it is assumed that *D. piriformis* originates from the Canary Islands and was later introduced into Europe and North Africa with *P. canariensis* seedlings. Its currently known distribution is the following:
EPPO region: France, Israel, Italy (Liguria, Lazio, Sicilia), Morocco, Spain (mainland and Canary Islands), Portugal (Madeira only).
In Israel, the first specimen of *D. piriformis* was collected at Tel Aviv in 1976 but remained unidentified until the present study. To date, *D. piriformis* has only been found in central and southern parts of the coastal plain. It has not been observed on *P. dactylifera*. As *D. piriformis* is a potential pest of cultivated *P. canariensis* it is suggested that it should be monitored and that possibilities for biological control should be investigated.

- *Frankliniella fusca*

Frankliniella fusca (Thysanoptera: Thripidae) was first reported in Israel in August 2005. A survey conducted in 2005-2006 found the apterous form of this thrips infesting several types of ornamental bulbs around the country. The pest status of *Frankliniella fusca* in Israel is officially declared as: **Present**.

- *Tetranychus ludeni*

Tetranychus ludeni (Acari: Tetranychidae) was discovered on a number of wild plants in Israel. No economic damage is reported. The pest status of *Tetranychus ludeni* in Israel is officially declared as: **Present**.

Source: NPPO of Israel, 2007-05.

Friedman ALL (2006) *Derelomus piriformis* Hoffmann (Curculionoidea: Curculionidae: Curculioninae: Derelomini), a new invasive species in Israel. *Phytoparasitica* **34**(4), 357-359.

Piry S, Gompel N (2002) Présence en France de *Neoderelomus piriformis* (Hoffmann, 1938) sur le palmier *Phoenix canariensis* Hort. (Coleoptera, Curculionidae, Derelomini). *Bulletin de la Société entomologique de France* **107**(5), 529-534.

Additional key words: new records **Computer codes:** FRANFU, TETRLU, IL

2007/070 Oak mortality in Japan is caused by *Raffaelea quercivora* and its insect vector *Platypus quercivorus*

In Japan, wilting and mass mortality of Japanese oak species (*Quercus serrata* and *Q. crispula*) has been observed since the second half of the 1980s. The disease has been observed mainly along the west coast of Honshu (Sea of Japan) but also in the Kii Peninsula (south-east coast of Honshu) and the southern part of Kyushu. Recent studies have shown that the cause of oak tree mortality is the blockage of the ascent of xylem sap induced by a fungus *Raffaelea quercivora* (EPPO Alert List) which is vectored by an ambrosia beetle, *Platypus quercivorus* (Coleoptera: Platypodidae). Images can be viewed on the Internet at:
http://cse.ffpri.affrc.go.jp/keiko/hp/oak.html
http://cse.ffpri.affrc.go.jp/keiko/hp/oakwilting-overview.html

In Japan, massive attacks of oak trees by *P. quercivorus* are characteristic before the appearance of wilting symptoms. Numerous tunnels of *P. quercivorus* were observed in all dead and dying trees and *R. quercivora* was isolated predominantly from discoloured

sapwood, beetle galleries, body surface and mycangia of *P. quercivorus.* On wilting oaks, a dark-colouration of the xylem is observed especially on the lower part of the trunks where beetle galleries are mainly found. A blockage of sap ascent in the trunk has been related to the rapid and significant spread of the fungus within the beetle galleries. Several inoculation studies have demonstrated that *P. quercivorus* is a vector of *R. quercivora*. Investigations in damaged forests indicated that damage occurs just after trees are felled or blown down by the wind, especially in stands with numerous large trees. It is noted that many of these diseased forests had previously been used for charcoal production but were no longer managed appropriately. Host plants of the insect vector are all Fagaceae. Concerning the fungus, several studies have demonstrated the pathogenicity of *R. quercivora* on *Quercus crispula* and *Q. serrata*. Further inoculation studies of the fungus on different oak species also confirmed that sapwood discoloration and non-conduction of water were more important in *Q. crispula* and *Q. serrata* than in other tested species (*Fagus crenata, Quercus glauca, Castanopsis cuspidata* var*. sieboldii, Pasania edulis*). Finally concerning geographical distribution, the insect vector (*P. quercivorus*) occurs in several Asian countries (it is known to occur in Japan, India, Indonesia, Taiwan, and Papua New Guinea), but the pathogen (*R. quercivora*) has only been reported from Japan.

Source: Kinuura H, Kobayashi M (2006) Death of *Quercus crispula* by inoculation with adult *Platypus quercivorus* (Coleoptera: Platypodidae). *Applied Entomology and Zoology* **41**(1), 123-128. http://www.jstage.jst.go.jp/article/aez/41/1/123/_pdf

Kobayashi M, Ueda A (2005) [Wilt disease of Fagaceae trees caused by *Platypus quercivorus* (Murayama) (Coleoptera: Platypodidae) and the associated fungus: aim is to clarify the damage factor.] *Journal of the Japanese Forest Society* **87**(5), 435-450. (abst.)

Kuroda K (2001) Responses of *Quercus* sapwood to infection with the pathogenic fungus of a new wilt disease vectored by the ambrosia beetle *Platypus quercivorus*. *Journal of Wood Science* **47**, 425-429. http://www.2006.botanyconference.org/engine/search/index.php?func=detail&aid=139&GetID=8

Murata M, Yamada T, Matsuda Y, Ito S (2007) Discoloured and non-conductive sapwood among six *Fagaceae* species inoculated with *Raffaelea quercivora*. *Forest Pathology* **37**(2), 73-79.

INTERNET (last retrieved on 2007-04).

APHIS-USDA website

Davis ED, French S, Venette RC (2005) Mini risk assessment. *Platypus quercivorus* Murayama [Coleoptera: Platypodidae]. http://www.aphis.usda.gov/plant_health/plant_pest_info/pest_detection/downloads/pra/pquercivoruspra.pdf

Tokyo University Forests website

Defence responses of oak sapwood in relation to wilt of oak trees in Japan by Yamada T & Ichihara Y. http://www.uf.a.u-tokyo.ac.jp/research/yamada/nz.pdf

Additional key words: detailed record, biology **Computer codes:** RAFFQU, JP

2007/071 *Phytophthora alni* identified in the Czech Republic

A new disease of alder (*Alnus* spp.) causing tree mortality has been reported in Europe since the 1990s. A new species, *Phytophthora alni* (formerly EPPO Alert List), was described and detected in several European countries (see EPPO RS 2005/009) causing bleeding cankers and decline of alder trees. In the Czech Republic, an 'alder *Phytophthora*' was initially isolated from *Alnus glutinosa* in western Bohemia in 2001. A similar *Phytophthora* species was isolated from declining trees of *A. glutinosa* and *A. incana* from about 60 alder stands, mainly from the western part of the country. So far, extensive decline of alder has not been detected in the eastern part of the country (Moravia). Recent studies (morphology, DNA sequencing, pathogenicity tests) confirmed that the pathogen which is causing alder decline in the Czech Republic is *Phytophthora alni*.

Source: New Disease Reports. BSPP website (last retrieved 2007-04).
Cerny K, Gregorova B, Strnadova V, Holub V, Tomsovsky M, Cervenka M (2007) *Phytophthora alni* causing decline of black and gray alders in the Czech Republic.
http://www.bspp.org.uk/ndr/july2007/2007-36.asp

Additional key words: new record **Computer codes:** PHYTAL, CZ

2007/072 First report of *Cryphonectria parasitica* in Azerbaijan

Since 2003, mortality of chestnut trees (*Castanea sativa*) has been observed in the Great Caucasus region of Azerbaijan (north of the country). During field inspections done in 2004, the symptoms observed on dead and dying trees included crown dieback and cankers on the main branches with yellow to orange fungal stromata. Canker tissues were collected from the Gabala district in October 2004, and from the Ismailli, Oghuz and Zagatala districts in 2006. Laboratory analysis (morphology, DNA sequencing, pathogenicity tests) confirmed the presence of *Cryphonectria parasitica* (EPPO A2 List). This is the first report of *C. parasitica* in Azerbaijan.
The situation of *Cryphonectria parasitica* in Azerbaijan can be described as follows: **Present, first observed in 2003/2004 in the north (Gabala, Ismailli, Oghuz and Zagatala districts).**

Source: New Disease Reports. BSPP website (last retrieved 2007-04).
Aghayeva DN, Harrington TC (2007) First report of *Cryphonectria parasitica* on chestnut (*Castanea sativa*) in Azerbaijan.
http://www.bspp.org.uk/ndr/july2007/2007-39.asp

Additional key words: new record **Computer codes:** ENDOPA, AZ

2007/073 First report of *Plasmopara obducens* in Australia

In Australia, impatiens plants (*Impatiens walleriana* cv. 'Fiesta') showing symptoms of downy mildew and growing in a commercial nursery near Melbourne (Victoria) were sent for diagnosis in October 2006. Laboratory analysis (morphology and DNA sequencing) confirmed the presence of *Plasmopara obducens* (EPPO Alert List). Investigations done at the same nursery showed that other cultivars (with single and double flowers) were affected. Most diseased plants were grown from seed, but some from cuttings. The disease was not observed on vegetatively propagated New Guinea hybrids (*Impatiens x hawkeri*). Additional surveys revealed the presence of *P. obducens* in other Australian states: New South Wales, Queensland, and South Australia. This is the first report of *P. obducens* in Australia.

Source: New Disease Reports. BSPP website (last retrieved 2007-04).
Cunnington JH, Aldaoud R, Loh M, Washington WS, Irvine G (2006) First record of *Plasmopara obducens* (downy mildew) on impatiens in Australia.
http://www.bspp.org.uk/ndr/jan2007/2006-96.asp

Additional key words: new record **Computer codes:** PLASOB, AU

2007/074 '*Candidatus* Phytoplasma mali' identified in *Prunus avium, P. armeniaca* and *P. domestica*

Apple proliferation is caused by '*Candidatus* Phytoplasma mali' (EPPO A2 List). In addition to apple (*Malus domestica*) which is the main host, the presence of this phytoplasma has been detected in hazelnut (*Corylus avellana*), pear (*Pyrus communis*) and Japanese plum (*Prunus salicina*). In 2004, in south-western Slovenia, symptoms of wilting, decline, floral and phloem necrosis were observed on cherry trees (*P. avium*). Phytoplasmas could not be found in leaves or phloem from 40 tested trees, but were detected in roots of 3 symptomatic trees and 1 asymptomatic tree (DAPI and electronic microscopy). These phytoplasmas were then identified as '*Ca.* Phytoplasma mali' with molecular techniques (PCR assays, RFLP, sequencing). This phytoplasma was also identified in 2 out of 29 apricot trees showing stem necrosis and leaf wilting, and in 1 out of 34 plum trees showing late flowering. According to the authors, this is the first time that '*Ca.* Phytoplasma mali' has been detected in cherry, apricot or European plum. But it is underlined that although the infected trees tested negative for other pathogenic bacteria, further experiments are needed to verify whether '*Ca.* Phytoplasma mali' caused the observed symptoms.

Source: New Disease Reports. BSPP website (last retrieved 2007-04).
Mehle N, Brzin J, Boben J, Hren M, Frank J, Petrovič N, Gruden K, Dreo T, Žežlina I, Seljak G, Ravnikar M (2007) First report of '*Candidatus* Phytoplasma mali' in *Prunus avium, P. armeniaca* and *P. domestica* http://www.bspp.org.uk/ndr/jan2007/2006-90.asp

Additional key words: new hosts **Computer codes:** PHYTMA, SI

2007/075 '*Candidatus* Phytoplasma palmae' detected in *Cedusa* sp. (Homoptera: Derbidae) in Jamaica

In the Caribbean, lethal yellowing is a severe disease which has killed millions of palms over the last 40 years. In the eastern part of Jamaica, the disease has destroyed all Malayan Dwarf coconut trees. In Florida (US), a planthopper, *Myndus crudus* (Homoptera: Cixiidae – EU Annexes) was shown to be a vector of the disease, but in Jamaica no vector had been be identified. Recent studies carried out in Jamaica showed that the predominant insects found on coconut were planthoppers belonging to the genus *Cedusa* (Homoptera: Derbidae). The species involved remain to be identified. 43 specimens of *Cedusa* sp. were collected from 13 major coconut-growing locations in Jamaica and individually tested for the presence of '*Candidatus* Phytoplasma palmae' (EPPO A1 List), using nested-PCR with specific primers. The phytoplasma could be detected in 13 insect specimens. RFLP studies showed that 6 of them carried a different strain. Although further studies are needed to better understand the possible role of *Cedusa* sp. in transmitting the disease, this is the first time that a potential vector of '*Ca.* Phytoplasma palmae' has been identified in Jamaica.

Source: Brown SE, Been BO, McLaughlin WA (2006) Detection and variability of the lethal yellowing group (16Sr IV) phytoplasmas in the *Cedusa* sp. (Hemiptera: Auchenorrhyncha: Derbidae) in Jamaica. *Annals of Applied Biology* **149**(1), 53-62.

Additional key words: epidemiology **Computer codes:** PHYP56, JM

2007/076 Recent studies on the phytoplasmas associated with the Al-Wijam disease of date palm

In Saudi Arabia, a disease of date palm (*Phoenix dactylifera*) of unknown etiology and called 'Al-Wijam' was first observed in the 1950s in the oasis of Al-Hassa in the Eastern Province. The main symptoms are leaf stunting, yellow streaking (faint narrow, yellow longitudinal lines on the midribs) and a marked reduction in fruit and stalk size. In the later stages of the disease, affected date palm trees stop producing fruits and die. Since the 1980s the involvement of phytoplasmas has been suspected. In earlier studies, a putative lethal yellowing-like phytoplasma (belonging to the 16SrIV group) was reported from palm trees affected by Al-Wijam disease at Al-Hassa. Further studies have been performed more recently and a survey was carried out at the Al-Hassa oasis from 2003 to 2005. More than 30 leaf samples were collected from symptomatic and asymptomatic palms, as well as 60 specimens of Cicadellidae. Molecular studies (PCR, RFLP, DNA sequencing) revealed the presence of phytoplasma DNA in 28 symptomatic palms and in 16 batches of insects. No phytoplasma DNA was detected in asymptomatic palms. The 16S rDNA sequences of the phytoplasmas identified in date palms and *Cicadulina bipunctata* (Homoptera: Cicadellidae) were identical and showed 98% homology with the sequence of Aster yellows phytoplasma (belonging to the 16SrI group '*Candidatus* Phytoplasma asteris'). This is the first time that '*Candidatus* Phytoplasma asteris' has been detected in association with the Al-Wijam disease of date palm. This is also the first time that a potential insect vector (*Cicadulina bipunctata*) of the Al-Wijam disease has been identified.

Source: New Disease Reports. BSPP website (last retrieved 2007-04).
Alhudaib K, Arocha Y, Wilson M, Jones P (2007) First report of a 16SrI, *Candidatus*

Phytoplasma asteris group phytoplasma associated with a date palm disease in Saudi Arabia. http://www.bspp.org.uk/ndr/july2007/2007-18.asp

Additional key words: etiology **Computer codes:** PHYPAS, SA

2007/077 First report of *Tomato chlorosis virus* in Mexico

Since 2005, symptoms of leaf yellowing have been observed in tomato (*Lycopersicon esculentum*) fields in the Ahome, Culiacán, and Guasave counties of Sinaloa state, in northern Mexico. The symptoms, the scattered distribution of diseased plants within the fields and the presence of whiteflies suggested the presence of criniviruses. Leaf samples collected from 62 symptomatic tomato plants and from 4 weed species (*Amaranthus retroflexus, Datura stramonium, Parthenium hysterophorus* and *Solanum nigrescens*) were tested for the presence of *Tomato chlorosis virus* (ToCV – EPPO A2 List) and *Tomato infectious chlorosis virus* (TICV - EPPO Alert List). Molecular tests (PCR assays, sequencing) confirmed the presence of ToCV in 60% of the tested tomato samples and in the samples of *Datura stramonium* and *Solanum nigrescens*. TICV was not detected in any sample. This is the first report of ToCV in Mexico.
The situation of *Tomato chlorosis virus* in Mexico can be described as follows: **Present, first observed in 2005 on tomato fields and weeds in Sinaloa state.**

Source: New Disease Reports. BSPP website (last retrieved 2007-04).
Alvarez-Ruiz P, Gámez Jimenez C, Leyva-López NE, Méndez-Lozano J (2007) First report of *Tomato chlorosis virus* infecting tomato crops in Sinaloa, Mexico. http://www.bspp.org.uk/ndr/jan2007/2006-88.asp

Additional key words: new record **Computer codes:** TOCV00, MX

2007/078 First report of *Tomato yellow leaf curl virus* in Tunisia

Several begomoviruses have been reported to cause tomato yellow leaf curl disease. In the Mediterranean Basin, the two species *Tomato yellow leaf curl virus* (TYLCV – EPPO A2 List*) and *Tomato yellow leaf curl Sardinia virus* (TYLCSV) have been found. In Tunisia, until 2004, only TYLCSV had been detected in tomato, pepper and bean crops. In 2004/2005 tomato samples showing severe symptoms of tomato yellow leaf curl disease were collected from glasshouses in the Sahel region of Tunisia. Typing of these isolates (PCR with specific primers, sequencing) revealed the presence of TYLCV. This virus species was also detected on pepper and bean collected from fields in the same region.
The situation of *Tomato yellow leaf curl virus* in Tunisia can be described as follows: **Present, first detected in 2004/2005 in tomato, pepper and bean crops.**

* At present, only Tomato yellow leaf curl virus is listed as such but with the description of several virus species involved in tomato yellow leaf curl disease, this entry may need to be revised.

Source: Gharsallah Chouchane S, Gorsane F, Nakhla MK, Maxwell DP, Marrakchi M, Fakhfakh (2007) First report of Tomato yellow leaf curl virus-Israel species infecting tomato, pepper and bean in Tunisia. *Journal of Phytopathology* **155**, 236-240.

Additional key words: new record **Computer codes:** TYLCV0, TN

2007/079 Genetic studies of *Pepino mosaic virus* in Spain

Pepino mosaic virus (*Potexvirus*, PepMV - EPPO Alert List) was described in 1974 infecting pepino (*Solanum muricatum*) in Peru. During experiments on its host range in Peru, tomato was found to be an asymptomatic host. In the 2000s, tomato infections caused by PepMV were reported in Europe and North America. In Spain, PepMV was first identified in south-east Spain, and its initial location in Murcia suggested a single introduction. Since then, PepMV has caused severe epidemics in tomato crops in south-east Spain and in all tomato-growing areas along the Mediterranean coast. PepMV was also detected in the Canary Islands in 2000, causing similar symptoms. The genetic variability and population structure of PepMV was analyzed in Spain. Results showed that despite a high symptom diversity, the Spanish population was mainly composed of a single genetic type (more than 80% of the population corresponded to the European tomato strain). The Spanish population also contains, at a low frequency, isolates which were similar to those from Peru (Peruvian strain, asymptomatic on tomato) or to an isolate from the USA (US2 strain). The Peruvian and US2 strains were detected in Murcia only in 2004, but the Peruvian strain has been detected in the Canary Islands since 2000. These results suggested that PepMV has been introduced into Spain more than once. It was also observed that isolates belonging to the Peruvian an US2 strains were always found in mixed infections with the European tomato strain, and that recombinants could be identified. The authors concluded that the introduction of new strains and the appearance of new genetic types by recombination between strains represent a potential risk which should be taken into account when designing control strategies.

Source: Pagán I, Córdoba-Sellés MC, Martínez-Priego L, Fraile A, Malpica JM, Jordá C, García-Arenal F (2006) Genetic structure of the population of *Pepino mosaic virus* infecting tomato crops in Spain. *Phytopathology* **96**(3), 274-279.

Additional key words: genetics **Computer codes:** PEPMV0

2007/080 New data on quarantine pests and pests of the EPPO Alert List

By browsing through the literature, the EPPO Secretariat has extracted the following new data concerning quarantine pests and pests included in the EPPO Alert List. The situation of the pest concerned is indicated in bold, using the terms of ISPM no. 8.

New records

Eotetranychus lewisi (EU Annexes) and *Tetranychus evansi* (Acari: Tetranychidae – EPPO Alert List) are both newly recorded in Taiwan. *E. lewisi* was mainly found in mountainous areas with cooler temperatures on *Bauhinia variegata, Pueraria* and *Musa* and at lower elevations on potted seedlings of poinsettias (*Euphorbia pulcherrima). T. evansi* was found in most counties of Taiwan, as well as on the islands of Kinmen and Matsu, on tomato, aubergine and the weed *Solanum nigrum* (Ho *et al*., 2005). **Present, no details.**

Strawberry latent ringspot virus (*Sadwavirus* – EU Annexes) occurs in Himachal Pradesh, India. It was detected in field-grown hybrid lilies (*Lillium* cvs. 'Star Gazer Max', 'Galeili') and in their associated nematode species, *Xiphinema diversicaudatum* (Adekunle *et al.*, 2006). **Present, found in Himachal Pradesh.**

Detailed records

Tetranychus evansi (Acari: Tetranychidae – EPPO Alert List) occurs in coastal areas of Pernambuco state, Brazil (Rosa *et al.*, 2005).

In Turkey, during surveys done in 2002/2003 on tomato viruses, *Tomato spotted wilt virus* (*Tospovirus* – EPPO A2 List) was detected in the province of Samsun, Black Sea region. Other viruses (*Tomato mosaic virus, Potato virus X* and *Cucumber mosaic virus*) were also found (Arli-Sokmen & Sevik, 2006).

In winter 2005, *Pepino mosaic virus* (*Potexvirus* - EPPO Alert List) was detected in the province of Ragusa, Sicilia (IT) on glasshouse tomatoes (Davino *et al.*, 2006).

The recombinant strain of *Plum pox virus* (*Potyvirus* – EPPO A2 List) is reported for the first time from Turkey. So far, this strain had only been reported from central and south-central Europe and it induces only weak symptoms on GF305 seedlings (a widely used indicator plant) which complicates it detection (Candresse *et al.*, 2007).

In Brazil, bacterial spot has become a major problem in processing tomatoes. From 1995 to 2000, 447 strains were collected in commercial fields in the central-west and northeast regions and characterized. The 4 recently described *Xanthomonas* species associated with bacterial spot of tomato were detected: *Xanthomonas gardeneri* (group D/race T2), *X. vesicatoria* (group B/race T2), *X. euvesicatoria* (group A/race T1), *X. perforans* (group C/race T3) (Quezado-Duval *et al.*, 2005).

So far in the USA, *Xylella fastidiosa* (EPPO A1 List) had never been reported from New Mexico, although it occurs in surrounding states (Arizona, California, Texas). But in summer 2006, it was identified in several ornamental trees (*Chitalpa tashkinensis*) showing leaf scorch symptoms and branch dieback in Las Cruces, New Mexico (Randall *et al.*, 2007).

Host plants

Damage caused by *Ditylenchus destructor* (EU Annexes) has been observed on *Panax quinquefolium* (American ginseng) in Hebei Province, China (Zhang & Zhang, 2007).

Natural infection of *Vaccinium membranaceum* (black huckleberry) by *Blueberry scorch virus* (*Carlavirus*, EPPO Alert List) is reported for the first time in British Columbia, Canada. Infected plants were symptomless (Wegener *et al.*, 2007).

Source: Adekunle OK, Saurabh K, Ramdeen P, Vilpin H, Gaurav R, Neeraj V, Raja R, Sanjay K, Zaidi AA (2006) Plant parasitic and vector nematodes associated with Asiatic and Oriental hybrid lilies. *Bioresource Technology* **97**(3), 364-371 (abst.).

Arli-Sokmen M, Sevik MA (2006) Viruses infecting field-grown tomatoes in Samsun province, Turkey. *Archives of Phytopathology and Plant Protection* **39(**4), 283-288 (abst.).

Candresse T, Svanella-Dumas L, Gentit P, Caglayan K, Çevik B (2007) First report of the presence of *Plum pox virus* Rec strain in Turkey. *Plant Disease* **91**(3), p 331.

Davino S, Bellardi MG, Agosteo GE, Iacono G, Davino M (2006) Characterization of a strain of *Pepino mosaic virus* found in Sicily. *Journal of Plant Pathology* **88**(3 supplement), S31-S63.

Ho CC, Wang SC, Chien YL (2005) [Field observation on two newly recorded spider mites in Taiwan.] *Plant Protection Bulletin (Taipei)* **47**(4), 391-402 (abst.).

Quezado-Duval AM, Lopes CA, Leite Jr RP, Lima MF, Camargo LEA (2005) Diversity of

Xanthomonas spp. associated with bacterial spot of processing tomatoes in Brazil. In Proceedings of the 1st International Symposium on Tomato Diseases, Orlando, Florida (US), 2004-06-21/24. *Acta Horticulturae* no. 695, 101-108 (abst.).

Randall JJ, Radionenko M, French JM, Olsen MW, Goldberg NP, Hanson SF (2007) *Xylella fastidiosa* detected in New Mexico in Chitalpa, a common landscape ornamental plant. *Plant Disease* **91**(3), p 329.

Rosa AA, Gondim Jr MGC, Fiaboe KKM, de Moraes GJ, Knapp M (2005) Predatory mites associated with *Tetranychus evansi* Baker & Pritchard (Acari: Tetranychidae) on native solanaceous plants of coastal Pernambuco State, Brazil. *Neotropical Entomology* **34**(4), 689-692.

Wegener LA, Punja ZK, Martin RR (2007) First report of *Blueberry scorch virus* in black huckleberry in British Columbia. *Plant Disease* **91**(3), p 328.

Zhang GZ, Zhang HW (2007) First report of root rot of American ginseng (*Panax quinquefolium*) caused by *Ditylenchus destructor* in China. *Plant Disease* **91**(4), p 459.

Additional key words: new records, detailed records

Computer codes: BLSCV0, DITYDE, EOTELE, PEPMV0, PPV000, SLRSV0, TETREV, TSWV0, XANTVE, XYLEFA, BR, CA, CN, IN, IT, TR, TW, US

2007/081 Voluntary codes of conduct in the USA

In the USA in 2001, the Nature Conservancy and the Missouri Botanical Garden organized a workshop to develop strategies against new introductions of invasive alien species. Participants from various groups, including governmental organizations, garden clubs, the horticulture industry and botanical gardens developed a series of codes of conduct addressed to each of their respective groups. In developing these voluntary codes of conduct, it was recognized that emphasis should be placed on education but that future government regulations might be needed if such educational efforts proved insufficient. These codes are now being considered for endorsement by the major professional societies and organizations representing each of the groups involved. If endorsed, they will be 'tested' and revised if needed for further improvement. In the long term, it is expected that this cooperative working process will lead to a reduction in the number of species escaping from gardens and landscaped areas into the wilderness.

Voluntary codes of conduct for nurserymen were designed as follows:

- Be aware of plants that are invasive in your region and identify alternatives with regional experts.
- Comply with laws on imports and quarantine; assess the potential of invasiveness of a plant before introducing and marketing it (risk assessment, behaviour of the species elsewhere in the world, observations in the nursery).
- Progressively eliminate stocks of plants which are known to be invasive alien plants.
- Develop and promote the use of alternative plant material through plant selection and breeding.
- Encourage customers to use non-invasive plants.

Voluntary codes of conduct for landscape architects include the following:

- Be aware of plants that are invasive in your region and identify suitable alternatives in consultation with other professionals and non-professionals.
- Do not recommend species that are invasive in your region.
- Encourage suppliers to provide landscape contractors and gardeners with non-invasive plants.
- Promote the inclusion of the issue of invasive alien plants in local landscape ordinances.

Voluntary codes of conduct for the gardening public include the following:

- Be aware of plants that are invasive in your region.
- Only ask for and plant environmentally-safe species in your garden. Remove invasive alien plants from your garden and replace them by non-invasive ones.
- Do not exchange or trade plants with invasive characteristics with other gardeners.
- Request that nurseries and botanical gardens do not promote, display and sell invasive alien plants, participate in the education of other gardeners and ask garden writers and media to promote the topic.
- Participate in reporting invasive alien plants observed in your area, and in projects of management of invasive alien plants.

Voluntary codes of conduct for botanical gardens and arboreta and for governments have also been drawn.

The first aim of the project “Preventing Invasion through Horticulture” is to identify a core group of well-known firms to implement and test these codes as part of their standard business practices during the next three years. In a second phase, results will be evaluated and shared in order to encourage a greater number of nurseries and landscape industries to

adopt and implement the codes. The final objective is that, within 10 years, the majority of horticultural firms across the USA will be participating in this programme.

Source: Linking Ecology and Horticulture to Prevent Plant Invasions
http://www.centerforplantconservation.org/invasives/codesN.html

Contact:
Valerie Vartanian, Horticulture and Landscape Professions Liaison, The Nature Conservancy, The Missouri Botanical Garden, valerie.vartanian@mobot.org
http://tncweeds.ucdavis.edu/staff/vvartanian.html

Additional key words: invasive alien plants, nursery industry **Computer codes:** US

2007/082 Horticultural codes of practice in the United Kingdom

In the United Kingdom, horticultural codes of practice have been elaborated by the Scottish Executive, the Department of Food and Rural Affairs (DEFRA), the Welsh Assembly Government, "gardening Which?", the garden centres Association, the Horticultural Trades association, the Royal Horticultural Society, the National Trust, the ornamental and Aquatic Trades Association, Plantlife International and the Royal Botanic gardens (Kew).

These codes are voluntary and give guidance on the safe use, control and disposal of invasive non-native plants. They apply to everyone involved in horticulture or any other activities related to the use of plants in the United Kingdom. The aims of these codes are to promote compliance with legislation and to prevent the spread of invasive non-native species across the countryside. The following advice is addressed to the various plant users:

Know what you are growing: to all users
When in doubt about the invasiveness potential of a non-native plant, it is good practice to take a precautionary approach. It is also worth giving careful consideration to the invasive characteristics of a plant when exchanging it with friends or growing it from imported seeds.

Beware of hitch-hiking pests on plants and in soil: to importers/buyers (nurseries, superstores, garden centres, botanic collections, aquarists)
Plant Health regulations relate to pathogens and pests but not to potentially invasive plants or seeds that are transported unintentionally. It is therefore good practice to keep imported plant material isolated from locally produced plants and from those growing in the wild.
Topsoil should be free of weeds and all viable propagules of invasive non-native species (rhizomes, seeds, corms, etc.).

Know what you are supplying/selling: to suppliers/retailers (nurseries, superstores, aquarists)
Avoid selling non-native plants that are known to be invasive.

Label plants clearly and accurately: to suppliers/retailers (horticulturalists, nurseries, garden centres, aquarists, voluntary organizations)

Know what you are recommending: to landscape architects, garden designers, design engineers, tutors, authors and publishers of gardening books
Be aware of the plants that are considered invasive and do not recommend invasive non-native plants to be planted. Always use the correct Latin name, consider revising or withdrawing old publications encouraging the use of invasive plants.

Dispose of plant wastes responsibly: to all users
Plant material should never be disposed of in the countryside or even over the garden fence; much can be composted or taken to recycling centres. Some weeds should not be composted, as composting will not destroy the plant (ex. *Reynoutria japonica*).

Take advice on best control techniques: to all users
Invasive plants are difficult to control but timely action will reduce the scale of the task. For plants with strong rhizomes, use root barrier fabrics to contain their spread.

Be aware of relevant legislation: all users
Legislation regarding non-native plants and their safe control and disposal should be followed at all times.

Control invasive non-native plants safely: all users (gardeners, landscape architects, garden contractors, local authorities)

Source: DEFRA Website - Helping to prevent the spread of invasive non-native species - Horticultural code of practice
http://www.defra.gov.uk/wildlife-countryside/non-native/non-native_old/pdf/non-nativecop.pdf

Additional key words: invasive alien plants, codes of conduct **Computer codes:** GB

2007/083 Participation of the nursery industry in controlling invasive alien plants: a booklet of substitute plants for southern France

In France, collaboration has been initiated between the 'Conservatoire Botanique National Méditerranéen' of Porquerolles and the nursery industry to prevent the introduction of invasive alien plants, essentially by proposing substitute plants. A Panel of representatives from the nursery and landscaping industries was established and issued in 2003 a booklet presenting the 15 most invasive plants in the Mediterranean area and their corresponding substitute plants. Descriptions of the morphology, biology, habitats, history of introduction, impacts, management and use of the plants are provided for the following invasive plants, and substitute plants are proposed:

Invasive species	Substitute species
Acacia dealbata (Fabaceae) (EPPO List of Invasive Alien Plants)	For dry areas: *Colutea arborescens, Coronilla glauca, Callicotome spinosa*, Fabaceae originating from the Mediterranean Basin. For ornamental purposes: *Sophora microphylla* and *S. tetraptera*, Fabaceae originating from New Zealand.
Ailanthus altissima (Simaroubaceae) (EPPO List of IAP)	For dry areas: *Colutea arborescens, Coronilla glauca, Callicotome spinosa*, Fabaceae originating from the Mediterranean Basin. For ornamental purposes: *Fraxinus angustifolia* (Oleaceae) and *Celtis australis* (Ulmaceae) originating from the Mediterranean area.

Amorpha fruticosa (Fabaceae) (EPPO List of IAP)	In humid environments, indigenous species from the Mediterranean area such as *Populus alba* (Salicaceae), *Fraxinus angustifolia* (Oleaceae), *Salix alba* (Salicaceae), *Alnus glutinosa* (Betulceae) and *Cornus sanguinea* (Cornaceae) can be used. On dry dunes, *Juniperus phoeniceae* (Cupressaceae) is recommended for sand stabilization.
Baccharis halimifolia (Asteraceae) (EPPO List of IAP)	For embankments: the Mediterranean *Atriplex halimus* (Chenopodiaceae). For ornamental purposes: *Leucophyllum frutescens* (Scrophulariaceae), originating from North and Central America and *Xanthoceras sorbifolia* (Sapindaceae) originating from China.
Buddleia davidii (Buddlejaceae) (EPPO List of IAP)	For ornamental purposes: *Syringa persica* (Oleaceae). Note: the hybrid *Buddleja "Lochinch"* (*B. davidii* x *B. fallowiana*) was recommended but has been recorded as escaping (see RSE 2005/131).
Carpobrotus acinaciformis and *C. edulis* (EPPO List of IAP)	For dunes, a mixture of spontaneous species is recommended. For ornamental purposes, *Armeria maritima* (Plumbaginaceae) originating from Southern Europe can be used.
Cortaderia selloana (Poaceae) (EPPO List of IAP)	*Saccharum ravennae* (Poaceae) originating from the Mediterranean Basin can be used for ornamental and re-vegetation purposes.
Lippia canescens (Verbenaceae)	*Frankenia laevis* (Frankeniaceae), *Thymus ciliatus* and *Thymus serpillum* var. *albus* are creeping plants originating from the Mediterranean Basin.
Ludwigia grandiflora and *L. peploides* (Onagraceae) (EPPO List of IAP)	*Ranunculus aquatilis* (Renonculaceae) from Europe and *Hottonia palustris* (Primulaceae) from Eurasia.
Opuntia spp.	To constitute defensive hedges: *Calicotome spinosa* (Fabaceae), originating from the Mediterranean Basin.
Robinia pseudoacacia (Fabaceae)	For dry areas: *Colutea arborescens, Coronilla glauca, Callicotome spinosa*, Fabaceae originating from the Mediterranean Basin. For ornamental purposes: *Sorbus domestica* (Rasaceae) originating from Central and Southern Europe.

Other invasive alien plants which are not commercialized are described: *Ambrosia artemisiifolia* (Asteraceae) (EPPO List of IAP), *Impatiens glandulifera* (Balsaminaceae) (EPPO List of IAP), *Reynoutria japonica* and *R. sachalinensis* (Polygonaceae) (EPPO List of IAP) and *Senecio inaequidens* (Asteraceae) (EPPO List of IAP).
This collaboration has lead to local initiatives, such as in the city of Sète, where Francis Brot, who is in charge of landscaping, has coordinated the eradication of *Carpobrotus acinaciformis, Ailanthus altissima* and *Opuntia* spp. and has drafted a list of invasive alien plants which should not be used in landscaping projects.

Source: Agence Méditerranéenne de l'Environnement, Conservatoire Botanique National Méditerranéen de Porquerolles, 2003 – Plantes envahissantes de la région méditerranéenne. Agence Méditerranéenne de l'Environnement. Agence Régionale Pour l'Environnement Provence-Alpes-Côte d'Azur. 48 pp. http://www.ame-lr.org/plantesenvahissantes/

Contacts:
Isabelle Mandon, Conservatoire Botanique National Méditerranéen de Porquerolles, Montpellier – France. i.mandon@cbnmed.org
Francis Brot, Ville de Sète – France. brot@ville-sete.fr

Additional key words: invasive alien plants, nursery industry

Computer codes: ACADA, AILAL, AMBEL, AMHFR, BACHA, BUDDA, CBSAC, CBSED, CDTSE, IPAGL, LIPCA, LUDUR, LUDPE, 1OPUG, POLCU, REYSA, ROBPS, SENIQ, FR

2007/084 Participation of the nursery industry in controlling invasive alien plants in France: a charter with retailers

In France, the 'Conservatoire Botanique National' of Bailleul has recently established a charter with plant retailers on a voluntary basis. The 'Conservatoire Botanique National' of Bailleul is committing to providing all necessary informative material (booklets, posters, etc.) and advices to retailers.

Retailers voluntarily commit themselves to:

- withdrawing from sale within 6 months agreeing to the charter the following very invasive species:
  - *Ailanthus altissima* (Simaroubaceae) (EPPO List of Invasive Alien Plants),
  - *Azolla filiculoides* (Azollaceae) (EPPO List of IAP),
  - *Crassula helmsii* (Crassulaceae) (EPPO A2 List),
  - *Heracleum mantegazzianum* (Apiaceae) (EPPO List of IAP),
  - *Hydrocotyle ranunculoides* (Apiaceae) (EPPO A2 List),
  - *Ludwigia grandiflora* and *L. peploides* (Onagraceae) (EPPO List of IAP),
  - *Myriophyllum aquaticum* (Haloragaceae) (EPPO List of IAP),
  - *Prunus serotina* (Rosaceae) (EPPO List of IAP),
  - *Reynoutria japonica*, *R. sacchalinensis* and *R. x bohemica* (Polygonaceae) (EPPO List of IAP).
- providing information about the invasive behaviour of the following traded species with advice on good practices and substitute plants:
  - *Aster* spp. (Asteraceae),
  - *Bambusa* spp. (Poaceae),
  - *Baccharis halimifolia* (Asteraceae) (EPPO List of IAP),
  - *Buddleja davidii* (Buddlejaceae) (EPPO List of IAP),
  - *Cortaderia selloana* (Poaceae) (EPPO List of IAP),
  - *Egeria densa* (Hydrocharitaceae) (EPPO List of IAP),
  - *Elodea canadensis* (Hydrocharitaceae),
  - *Elodea nuttallii* (Hydrocharitaceae) (EPPO List of IAP),
  - *Impatiens glandulifera* (Balsaminaceae) (EPPO List of IAP),
  - *Lagarosiphon major* (Hydrocharitaceae) (EPPO List of IAP),
  - *Mahonia aquifolium* (Berberidaceae),
  - *Robinia pseudoacacia* (Fabaceae),
  - *Rosa rugosa* (Rosaceae).
- providing customers with informative documents produced by the 'Conservatoire Botanique National' de Bailleul such as good practices for the use of aquatic plants.

Sources: Direction Régionale de l'Environnement Picardie – Les plantes invasives
http://www.picardie.ecologie.gouv.fr/Dossier_Nature/Plantes_Invasives/Plantes_Inv2005.htm (in French)

Contact: Nicolas Borel, Conservatoire Botanique national de Bailleul, Picardie, France. n.borel@cbnbl.org

Additional key words: invasive alien plants, nursery industry

Computer codes: AILAL, 1ASTG, AZOFI, BACHA, 1BAMG, BUDDA, CDTSE, CSBHE, ELDCA, ELDDE, ELDNU, HERMZ, HYDRA, IPAGL, LGAMA, LUDUR, LUDPE, MAHAQ, MYPBR, PRNSO, POLCU, REYBO, REYSA, ROBPS, ROSRG, FR

2007/085 New records of aquatic plants in Germany

The three following plants have been found naturalized in the wild in Germany:

- *Myriophyllum heterophyllum* (Haloragaceae) originates from North America. It is only considered a weed by the Global Compendium of Weeds. It has been known to occur in Eastern Germany since the 1960s but today, several occurrences in the wild have been recorded in Western Germany. Dense stands have been found in shallow lakes in Nordrhein-Westfalen. These populations have been mechanically controlled as they were considered a threat (Hussner *et al*. 2005). This plant is thought to have the potential to become invasive, especially in shallow lakes and channels (A Hussner, pers. comm.).

- *Hygrophila polysperma* (Acanthaceae) originates from Asia and frequently enters the EPPO region for aquarium purposes. According to the Global Compendium of Weeds, this plant has already been recorded elsewhere in the world as a noxious weed, a quarantine weed and an environmental weed. In Germany, the plant has been found naturalized in the Erft river in 2005 and in Lake Fühlingen in 2006. In the Erft river, it forms small and large populations on more than 10 km of the river, and appears to be the most widespread plant there. Moreover, the plant seems to overwinter in gardens and in ponds in Düsseldorf (A Hussner, pers. comm.).

- *Saururus cernuus* (Saururaceae) originates from North America and frequently enters the EPPO region for ornamental purposes. According to the Global Compendium of Weeds, this plant has already been recorded elsewhere in the world as a quarantine weed. The plant was first recorded in Germany in 2004 by Swatek *et al*. (2004) in its emerged growth form at the edge of a pond in a forest in Duisburg-Mülheim (Nordrhein-Westfalen). Swatek *et al*. (2004) described the population as small, circa 20 shoots, but the plants flowered and look vigorous.

These three aquatic plants are imported into the EPPO region (see RS 2007/016) and represent a risk.

Source:

A Global Compendium of Weeds: http://www.hear.org/gcw/alpha_select_gcw.htm
Andreas Hussner, Heinrich-Heine-Universität Düsseldorf, hussnera@uni-duesseldorf.de
Hussner A, Josephs M & Schmitz U (in press) [About *Hygrophila polysperma* (Roxb.) T. Anderson and *Pontederia cordata* L. in North Rhine-Westphalia] (Über *Hygrophila polysperma* (Roxb.) T. Anderson und *Pontederia cordata* L. in Nordrhein-Westfalen). *Floristische Rundbriefe* 40. (in German)
Hussner A (2006) [Alien aquatic plants of North Rhine-Westphalia] (Die aquatischen Neophyten in Nordrhein-Westfalen). *Decheniana* **159**: 39-50. (in German)
Hussner A (2005) [Distribution of alien aquatic plants in the river Erft (North Rhine-Westphalia)] (Zur Verbreitung aquatischer Neophyten in der Erft, Nordrhein-Westfalen). *Frankfurter Geobotanische Kolloquien* **19**: 55-58. (in German)
Hussner A, Nienhaus I & Krause T (2005) [Distribution of *Myriophyllum heterophyllum* Michx. in North Rhine-Westphalia] (Zur Verbreitung von Myriophyllum heterophyllum Michx. in Nordrhein-Westfalen). *Floristische Rundbriefe* **39**: 113-120. (in German)
Swatek JH, Loos GH, Keil P & Haeupler H (2004) [*Saururus cernuus* L. in the forest between Duisburg-Mühlheim (Ruhr area)] (*Saururus cernuus* L., das Eidechsenschwänzchen, im Duisburg-Mülheimer Wald (Westliches Ruhrgebiet, Nordrhein-Westfalen). *Floristische Rundbriefe* **38**: 39-44. (in German)

Additional key words: invasive alien plants, new records **Computer codes:** DE, HYGPO, MYPHE, SUACE