

Appendix 1: Commercially used biological control agents

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Steinernema kraussei

- Insecta, Coleoptera

Adalia bipunctata

Family	Coccinellidae
Main target pests	Aphididae
Original distribution	Palaeartic (?)
Distribution in EPPO	Widespread
Date of first use	?
EPPO countries where used	Belgium, Denmark, Germany, Italy, Netherlands, Portugal, Switzerland
Use	Indoors

Aleochara bilineata

Family	Staphylinidae
Main target pests	<i>Delia antiqua</i> , <i>Delia radicum</i> (= <i>Delia brassicae</i>)
Original distribution	Northern and Middle Europe, Canada and USA
Distribution in EPPO	Widespread
Date of first use	1997 (in Netherlands)
EPPO countries where used	Netherlands, some other European countries
Use	Outdoors

Atheta coriaria

Synonyms	<i>Atheta brachelytra</i> , <i>Dalotia coriaria</i> , <i>Homalota coriaria</i>
Family	Staphylinidae

Original distribution	Europe, Northern Asia, North America, Oceania, widespread in EPPO region
Main target pests	Thripidae (thrips), Sciaridae (fungus gnats), Ephydriidae (shore flies)
Date of first use	2002 (Biobest)
EPPO countries where used	Belgium, France, Germany, Netherlands, Poland, Spain, Switzerland, United Kingdom
Use	Indoors

Chilocorus baileyi

Family	Coccinellidae
Main target pests	Diaspididae
Original distribution	Australia
Distribution in EPPO	Not established
Date of first use	1985
EPPO countries where used	Belgium, France, Netherlands
Use	Indoors

Chilocorus bipustulatus

Family	Coccinellidae
Main target pests	Diaspididae, Coccidae (<i>Saissetia oleae</i>)
Original distribution	South Palaearctic
Distribution in EPPO	Widespread (South and Central)
Date of first use	1959
EPPO countries where used	Belgium, France, Greece, Israel, Italy, Netherlands, Turkey
Use	Outdoors/Indoors

Chilocorus circumdatus

Family	Coccinellidae
Main target pests	Diaspididae
Original distribution	S. E. Asia
Distribution in EPPO	Not established
Date of first use	1985
EPPO countries where used	Belgium, France, Netherlands
Use	Indoors

Chilocorus nigrita

Family	Coccinellidae
Main target pests	Diaspididae, Asterolecaniidae
Original distribution	S. Asia
Distribution in EPPO	Not established
Date of first use	1985
EPPO countries where used	Belgium, Denmark, France, Germany, Netherlands, UK
Use	Indoors

Coccinella septempunctata

Family	Coccinellidae
Main target pests	Aphididae
Original distribution	Palearctic
Distribution in EPPO	Widespread
Date of first use	1980
EPPO countries where used	France, Germany, Portugal
Use	Outdoors

Cryptolaemus montrouzieri

Family	Coccinellidae
Main target pests	<i>Planococcus citri</i>
Original distribution	Australia
Distribution in EPPO	Mediterranean area
Date of first use	1985
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Ireland, Italy, Jersey, Netherlands, Norway, Poland, Portugal, Russia, Slovakia, Spain, Sweden, Switzerland, Tunisia, UK
Use	Indoors/outdoors

Delphastus catalinae

Synonym	<i>Delphastus pusillae</i>
Family	Coccinellidae
Main target pests	Aleyrodidae (<i>Trialeurodes vaporariorum</i> , <i>Bemisia tabaci</i>)
Original distribution	Nearctic/Neotropic
Distribution in EPPO	Not established
Date of first use	1993
EPPO countries where used	Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Jordan, Netherlands, Poland, Russia, Spain, Tunisia, UK (restricted under license)
Use	Indoors

Rhyzobius lophanthae

Synonym	<i>Lindorus lophanthae</i>
Family	Coccinellidae
Main target pests	Diaspididae (<i>Pseudolacaspis pentagona</i>), <i>Quadraspidotus perniciosus</i> , <i>Chrysomphalus dictyospermi</i> , <i>Parlatoria blanchardi</i>
Original distribution	Australia
Distribution in EPPO	Mediterranean, Russia
Date of first use	1980
EPPO countries where used	Belgium, Denmark, Germany, Greece, Israel, Italy, Netherlands, Portugal, Switzerland, Turkey
Use	Indoors

Rodolia cardinalis

Family	Coccinellidae
Main target pests	<i>Icerya purchasi</i>
Original distribution	Australia
Distribution in EPPO	Mediterranean, CIS
Date of first use	?1980s
EPPO countries where used	Belgium, Netherlands
Use	Indoors/outdoors

Scymnus rubromaculatus

Family	Coccinellidae
Main target pests	Aphididae
Original distribution	Central Europe
Distribution in EPPO	Finland, Estonia, Lithuania
Date of first use	1990
EPPO countries where used	Belgium, France, Netherlands, Portugal
Use	Indoors

Stethorus punctillum

Family	Coccinellidae
Main target pests	<i>Panonychus ulmi</i>
Original distribution	Palaeartic
Distribution in EPPO	Widespread
Date of first use	1995
EPPO countries where used	Belgium, France, Germany, Netherlands, Portugal, Spain, Sweden
Use	Indoors

- Insecta, Diptera

Aphidoletes aphidimyza

Family	Cecidomyiidae
Main target pests	Aphididae (<i>Aphis gossypii</i> , <i>Myzus persicae</i> , <i>Macrosiphum</i> sp., <i>Aulacorthum</i> sp.)
Original distribution	Central Europe, Palaeartic
Distribution in EPPO	Widespread
Date of first use	1985
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Hungary, Ireland, Italy, Jersey, Jordan, Lithuania, Malta, Morocco, Netherlands, Norway, Poland, Portugal, Spain, Slovakia, Sweden, Switzerland, Tunisia, UK
Use	Indoors/outdoors

Episyrphus balteatus

Family	Syrphidae
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Main target pests	Aphididae
Original distribution	Europe
Distribution in EPPO	Widespread
Date of first use	1995
EPPO countries where used	Belgium, Denmark, Germany, Italy, Netherlands, Portugal
Use	Indoors/outdoors

Feltiella acarisuga

Synonyms	<i>Feltiella tetranychii</i> , <i>Therodiplosis persicae</i>
Family	Cecidomyiidae
Main target pests	<i>Tetranychus urticae</i> , <i>T. cinnabarinus</i>
Original distribution	W. Europe/Mediterranean
Distribution in EPPO	Widespread
Date of first use	1995
EPPO countries where used	Belgium, Czechia, Denmark, Finland, France, Germany, Guernsey, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, UK
Use	Indoors

Sphaerophoria rueppellii

Synonyms	<i>Sphaerophoria flavicauda</i> , <i>Sphaerophoria nitidicollis</i>
Family	Syrphidae
Main target pests	Mainly Aphididae but also whiteflies, thrips and spider mites
Original distribution	Widely distributed in Palaearctic and Afrotropical regions
Distribution in EPPO	Mediterranean region
Date of first use	2012
EPPO countries where used	Spain
Use	Indoors/outdoors

- Insecta, Hemiptera/Heteroptera

Anthocoris nemoralis

Family	Anthocoridae
Main target pests	Psyllidae (orchards)
Original distribution	Palaearctic
Distribution in EPPO	Widespread
Date of first use	?
EPPO countries where used	Belgium, Denmark, Germany, Netherlands
Use	Outdoors

Anthocoris nemorum

Family	Anthocoridae
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Main target pests	<i>Cacopsylla pyri</i> , thrips
Original distribution	Palaeartic
Distribution in EPPO	Widespread
Date of first use	1992
EPPO countries where used	Belgium, Denmark, France, Italy, Jersey, Netherlands, UK
Use	Outdoors

Macrolophus pygmaeus

Family	Miridae
Main target pests	Aleyrodidae
Original distribution	Palaeartic
Distribution in EPPO	Widespread
Date of first use	1990
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Hungary, Ireland, Italy, Jordan, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Tunisia, Turkey, UK (restricted under license)
Use	Indoors
Additional remark	<p>1) <i>Macrolophus pygmaeus</i> was previously included on the positive list under the name <i>Macrolophus melanotoma</i> (synonym: <i>Macrolophus caliginosus</i>), this error was found and corrected in 2009;</p> <p>2) <i>Macrolophus pygmaeus</i> has been reported as damaging on cherry tomato and on <i>Gerbera</i>. It is therefore not recommended for use on these crops. Caution is advised when using <i>M. pygmaeus</i> on any new crop, particularly ornamentals with a low threshold for cosmetic damage.</p>

Orius albidipennis

Family	Anthocoridae
Main target pests	Thrips
Original distribution	Mediterranean, palaeartic
Distribution in EPPO	Mediterranean
Date of first use	1991
EPPO countries where used	Belgium, France, Israel, Italy, Netherlands, Spain
Use	Indoors

Orius laevigatus

Family	Anthocoridae
Main target pests	Thripidae (<i>Frankliniella occidentalis</i> , <i>Thrips tabaci</i>)
Original distribution	Palaeartic (except north)

Distribution in EPPO	Widespread (except north)
Date of first use	1991
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Hungary, Ireland, Italy, Jersey, Jordan, Lithuania, Malta, Morocco, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Switzerland, Tunisia, UK
Use	Indoors

Orius majusculus

Family	Anthocoridae
Main target pests	Thripidae (<i>Frankliniella occidentalis</i> , <i>Thrips tabaci</i>)
Original distribution	Palearctic
Distribution in EPPO	Widespread
Date of first use	1991
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Italy, Jersey, Lithuania, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, UK
Use	Indoors

Picromerus bidens

Family	Pentatomidae
Main target pests	Lepidoptera
Original distribution	Palearctic (also established in Nearctic)
Distribution in EPPO	Widespread
Date of first use	1990
EPPO countries where used	CIS countries, Germany, Poland, Russia
Use	Outdoors/indoors

Podisus maculiventris

Family	Pentatomidae
Main target pests	Lepidoptera, <i>Leptinotarsa decemlineata</i>
Original distribution	North and South America
Distribution in EPPO	Not established
Date of first use	1996
EPPO countries where used	Belgium, Bulgaria, Denmark, Finland, France, Greece, Italy, Netherlands, Russia, Spain
Use	Indoors/outdoors

- Insecta, Hymenoptera (part I)

Acerophagus maculipennis

Synonym	<i>Pseudaphycus maculipennis</i> ¹
Family	Encyrtidae
Main target pests	Pseudococcidae
Original distribution	Palaeartic
Distribution in EPPO	Widespread (south)
Date of first use	1980
EPPO countries where used	Belgium, France, Germany, Netherlands, Spain
Use	Indoors
<i>Anagrus atomus</i>	

Family	Mymaridae
Main target pests	Cicadellidae
Original distribution	Palaeartic
Distribution in EPPO	?
Date of first use	1994
EPPO countries where used	Belgium, France, Germany, Guernsey, Jersey, Netherlands, Spain, UK
Use	Indoors

Anagrus fusciventris

Family	Encyrtidae
Main target pests	Pseudococcidae
Original distribution	Australia
Distribution in EPPO	Not present
Date of first use	1990
EPPO countries where used	Belgium, Denmark, France, Germany, Netherlands, Spain
Use	Indoors

Anagrus pseudococci

Family	Encyrtidae
Main target pests	Pseudococcidae
Original distribution	Mediterranean
Distribution in EPPO	Mediterranean
Date of first use	1995
EPPO countries where used	France, Czechia, Greece, Italy, Netherlands, Portugal, Spain
Use	Indoors/outdoors

Aphelinus abdominalis

Family	Aphelinidae
Main target pests	Aphididae (<i>Macrosiphum euphorbiae</i> , <i>Aulacorthum solani</i>)

¹ The genus *Pseudaphycus* was synonymized with the genus *Acerophagus*: Trjapitzin VA (2008) A Review of Encyrtid Wasps (Hymenoptera, Chalcidoidea, Encyrtidae) of Macaronesia. *Entomological Review*, Vol. 88, No. 2, pp. 218–232.

Original distribution	Europe
Distribution in EPPO	Widespread
Date of first use	1992
EPPO countries where used	Austria, Belgium, Bulgaria, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Ireland, Italy, Jersey, Jordan, Netherlands, Poland, Spain, Sweden, Switzerland, Tunisia, UK
Use	Indoors

Aphidius colemani

Family	Braconidae
Main target pests	Aphididae (<i>Aphis gossypii</i> , <i>Myzus persicae</i> , <i>M. nicotianae</i>)
Original distribution	North Africa, Middle East, India
Distribution in EPPO	Mediterranean area
Date of first use	1992
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Hungary, Ireland, Italy, Jersey, Jordan, Lithuania, Malta, Morocco, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Tunisia, Turkey, UK
Use	Indoors

Aphidius ervi

Family	Braconidae
Main target pests	<i>Aulacorthum solani</i> , <i>Macrosiphum euphorbiae</i>
Original distribution	Palearctic
Distribution in EPPO	Widespread
Date of first use	1995
EPPO countries where used	Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Hungary, Ireland, Italy, Jersey, Lithuania, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, UK
Use	Indoors/outdoors

Aphidius matricariae

Family	Braconidae
Main target pests	<i>Myzus persicae</i>
Original distribution	Holarctic
Distribution in EPPO	Widespread in temperate regions
Date of first use	1990
EPPO countries where used	Austria, Belgium, Germany, Guernsey, Jersey, Netherlands, Poland, Portugal, Slovakia, UK
Use	Indoors

Aphytis diaspidis

Family	Aphelinidae
Main target pests	Diaspididae, <i>Quadraspidiotus perniciosus</i> , <i>Pseudaulacaspis pentagona</i>
Original distribution	California
Distribution in EPPO	Mediterranean
Date of first use	?
EPPO countries where used	Netherlands
Use	Indoors

Aphytis holoxanthus

Family	Aphelinidae
Main target pests	Diaspididae
Original distribution	Asia
Distribution in EPPO	Mediterranean
Date of first use	1996
EPPO countries where used	Belgium, Czechia, France, Netherlands, Spain
Use	Indoors

Aphytis lingnanensis

Family	Aphelinidae
Main target pests	<i>Aonidiella aurantii</i> , <i>Chrysomphalus dictyospermi</i>
Original distribution	Probably eastern Asia (widely established elsewhere)
Distribution in EPPO	Mediterranean
Date of first use	?
EPPO countries where used	Greece, Italy, Spain
Use	Indoors/outdoors

Aphytis melinus

Family	Aphelinidae
Main target pests	<i>Aonidiella aurantii</i>
Original distribution	India/Pakistan
Distribution in EPPO	Mediterranean
Date of first use	1985
EPPO countries where used	Belgium, Czechia, Denmark, France, Greece, Italy, Portugal, Spain
Use	Outdoors/indoors

Aprostocetus hagenowii

Synonyms	<i>Tetrastichus hagenowii</i> , <i>Tetrastichodes hagenowii</i>
Family	Eulophidae
Main target pests	Blattidae (<i>Periplaneta</i> spp.)
Original distribution	?
Distribution in EPPO	Romania

Date of first use	1993
EPPO countries where used	Belgium, France, Germany, Netherlands, Spain
Use	Indoors

Bracon hebetor

Synonyms	<i>Habrobracon hebetor</i>
Family	Braconidae
Main target pests	Lepidoptera (on stored products)
Original distribution	India, New England
Distribution in EPPO	Mediterranean area (mostly Eastern)
Date of first use	1980
EPPO countries where used	Many (including Germany, Portugal)
Use	Indoors

Coccophagus lycimnia

Family	Aphelinidae
Main target pests	Coccidae
Original distribution	Cosmopolitan
Distribution in EPPO	Mediterranean
Date of first use	1988
EPPO countries where used	Belgium, Denmark, France, Germany, Netherlands, Portugal, Spain, Sweden
Use	Indoors

Coccophagus rusti

Family	Aphelinidae
Main target pests	Coccidae
Original distribution	Cosmopolitan
Distribution in EPPO	Mediterranean
Date of first use	1988
EPPO countries where used	Belgium, France, Netherlands, Spain
Use	Indoors

Coccophagus scutellaris

Family	Aphelinidae
Main target pests	Coccidae
Original distribution	Cosmopolitan
Distribution in EPPO	Widespread
Date of first use	1986
EPPO countries where used	Belgium, France, Netherlands, Portugal, Spain
Use	Indoors

Comperiella bifasciata

Family	Encyrtidae
Main target pests	Diaspididae (<i>Chrysomphalus aonidum</i> , <i>Aonidiella aurantii</i>)
Original distribution	?California/South China
Distribution in EPPO	Mediterranean
Date of first use	1985
EPPO countries where used	Belgium, Greece, Netherlands
Use	Indoors/outdoors

Cotesia marginiventris

Synonyms	<i>Apanteles marginiventris</i>
Family	Braconidae
Main target pests	Lepidoptera (Noctuidae)
Original distribution	Americas
Distribution in EPPO	?
Date of first use	1993
EPPO countries where used	Belgium, France, Netherlands, Spain
Use	Indoors

Dacnusa sibirica

Family	Braconidae
Main target pests	Agromyzidae (<i>Liriomyza</i> spp.)
Original distribution	Palaearctic, Europe
Distribution in EPPO	Widespread, temperate regions
Date of first use	1981
EPPO countries where used	Austria, Belgium, Bulgaria, Czechia, Denmark, Finland, France, Germany, Guernsey, Italy, Jersey, Jordan, Malta, Morocco, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, UK
Use	Indoors/outdoors (celery, lettuce)

Diglyphus isaea

Family	Eulophidae
Main target pests	Agromyzidae (<i>Liriomyza</i> spp.)
Original distribution	Palaearctic
Distribution in EPPO	Widespread
Date of first use	1984
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Hungary, Italy, Jordan, Malta, Morocco, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Tunisia, Turkey, UK
Use	Indoors/outdoors

- Insecta, Hymenoptera (part II)

Encarsia citrina

Family	Aphelinidae
Main target pests	Diaspididae
Original distribution	Cosmopolitan
Distribution in EPPO	Mediterranean
Date of first use	1984
EPPO countries where used	Belgium, France, Germany, Netherlands, Spain
Use	Indoors

Encarsia formosa

Family	Aphelinidae
Main target pests	Aleyrodidae (<i>Trialeurodes vaporariorum</i> , <i>Bemisia tabaci</i>)
Original distribution	Southern nearctic
Distribution in EPPO	Widespread
Date of first use	1930
EPPO countries where used	Austria, Belgium, Bulgaria, Czechia, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Jordan, Lithuania, Malta, Morocco, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Tunisia, Turkey, UK
Use	Indoors

Encyrtus aurantii

Synonyms	<i>Encyrtus lecaniorum</i>
Family	Encyrtidae
Main target pests	Coccidae
Original distribution	Palaeartic
Distribution in EPPO	Widespread (south)
Date of first use	1980
EPPO countries where used	Belgium, France, Germany, Netherlands, Spain
Use	Indoors

Encyrtus infelix

Synonyms	<i>Eucomys tananarivensis</i>
Family	Encyrtidae
Main target pests	Coccidae
Original distribution	Afrotropical region
Distribution in EPPO	Israel
Date of first use	1992
EPPO countries where used	Belgium, Denmark, France, Netherlands, Spain
Use	Indoors

Ephedrus cerasicola

Family	Braconidae
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Main target pests	<i>Aphis frangulae</i> , <i>A. gossypii</i> , <i>Aulacorthum circumflexum</i> , <i>Aulacorthum solani</i> , <i>Brachycaudus helichrysi</i> , <i>Capitophorus inulae</i> , <i>Cavariella aegopodii</i> , <i>Chaetosiphon fragaefolii</i> , <i>Cryptomyzus galeopsidis</i> , <i>Dysaphis apiifolia</i> , <i>Dysaphis</i> sp., <i>Hyadaphis foeniculi</i> , <i>Hyperomyzus lactucae</i> , <i>Hyperomyzus</i> sp., <i>Myzus ascalonicus</i> , <i>M. cerasi</i> , <i>M. ligustri</i> , <i>M. nicotinae</i> , <i>M. ornatus</i> , <i>M. persicae</i> , <i>Nasonovia ribisnigri</i> , <i>Nasonovia</i> sp., <i>Ovatus crataegarius</i> , <i>Phorodon humili</i> , <i>Rhodobium porosum</i>
Original distribution	Naturally throughout Europe
Distribution in EPPO	Widespread
Date of first use	1999
EPPO countries where used	Belgium, Denmark, Finland, France, Germany, Netherlands, UK
Use	Indoors

Eretmocerus eremicus

Family	Aphelinidae
Main target pests	<i>Bemisia tabaci</i>
Original distribution	Southern nearctic
Distribution in EPPO	Mediterranean
Date of first use	1994
EPPO countries where used	Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Hungary, Italy, Lithuania, Malta, Morocco, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Switzerland, Tunisia, Turkey
Use	Indoors

Eretmocerus mundus

Family	Aphelinidae
Main target pests	<i>Bemisia tabaci</i>
Original distribution	South Europe
Distribution in EPPO	Mediterranean
Date of first use	1996
EPPO countries where used	Denmark, Germany, Italy, Netherlands, Portugal, Spain
Use	Indoors

Gyranusoidea litura

Family	Encyrtidae
Main target pests	<i>Pseudococcus longispinus</i>
Original distribution	Africa
Distribution in EPPO	France, Spain
Date of first use	1990
EPPO countries where used	Belgium, France, Netherlands
Use	Indoors

Leptomastidea abnormis

Synonym	<i>Leptomastix abnormis</i>
Family	Encyrtidae
Main target pests	Pseudococcidae
Original distribution	Palearctic
Distribution in EPPO	Widespread
Date of first use	1984
EPPO countries where used	Austria, Belgium, Denmark, Germany, Guernsey, Israel, Italy, Jersey, Netherlands, Spain, Switzerland, Turkey, UK
Use	Indoors

Leptomastix dactylopii

Family	Encyrtidae
Main target pests	<i>Planococcus citri</i>
Original distribution	Neotropic
Distribution in EPPO	Mediterranean area
Date of first use	1992
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Ireland, Italy, Jersey, Netherlands, Norway, Poland, Portugal, Spain, UK
Use	Indoors/outdoors

Leptomastix epona

Family	Encyrtidae
Main target pests	Pseudococcidae, especially <i>Pseudococcus viburni</i>
Original distribution	Palearctic
Distribution in EPPO	Widespread (south)
Date of first use	1992
EPPO countries where used	Belgium, Denmark, France, Germany, Guernsey, Jersey, Netherlands, Spain, UK
Use	Indoors

Metaphycus flavus

Family	Encyrtidae
Main target pests	Coccidae, <i>Saissetia oleae</i> , <i>Coccus hesperidum</i>
Original distribution	Nearctic
Established in EPPO	Yes
Distribution in EPPO	Mediterranean
Date of first use	1999
EPPO countries where used	Germany, Netherlands, Switzerland
Use	Indoors

Metaphycus helvolus

Family	Encyrtidae
Main target pests	Coccidae (<i>Saissetia oleae Coccus hesperidum</i>)
Original distribution	South Africa (also established in Nearctic)
Distribution in EPPO	Greece, Italy
Date of first use	1992
EPPO countries where used	Austria, Belgium, Denmark, France, Germany, Greece, Israel, Italy, Netherlands, Spain, Sweden, Switzerland
Use	Indoors/outdoors

Metaphycus lounsburyi

Synonyms	<i>M. bartletti</i> , <i>M. anneckei</i> and <i>M. hagenowii</i> , also established in some Mediterranean countries, have been misidentified as <i>M. lounsburyi</i>
Family	Encyrtidae
Main target pests	Coccidae (<i>Saissetia oleae</i>)
Original distribution	California, Australia, Hawaii, South Africa
Distribution in EPPO	Mediterranean
Date of first use	1997
EPPO countries where used	Denmark, France, Italy, Netherlands
Use	Indoors/outdoors

Metaphycus swirskii

Family	Encyrtidae
Main target pests	Coccidae
Original distribution	East Africa?
Distribution in EPPO	France, Greece (Crete), Israel, Italy (probably more widely in Mediterranean region)
Date of first use	1992
EPPO countries where used	Belgium, France, Netherlands, Spain
Use	Indoors

Microterys nietneri

Synonyms	<i>Microterys flavus</i>
Family	Encyrtidae
Main target pests	Coccidae (<i>Saissetia oleae</i>)
Original distribution	California, Pakistan
Distribution in EPPO	Italy
Date of first use	1987
EPPO countries where used	Belgium, Denmark, France, Germany, Greece, Israel, Netherlands, Spain, former-Yugoslavia
Use	Indoors/outdoors

Nasonia vitripennis

Synonyms	<i>Pteromalus vitripennis</i> , <i>Pteromalus muscarum</i> , <i>Pteromalus</i>
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	<i>abnormis</i> , <i>Dicyclus pallinervosus</i> , <i>Stictonotus insuetus</i> , <i>Mormoniella brevicornis</i> , <i>Mormoniella vitripennis</i>
Family	Pteromalidae
Original distribution	Cosmopolitan
Main target pests	Stable flies, especially <i>Musca domestica</i>
Date of first use	1997 (Italy)
EPPO countries where used	France, Germany, Hungary, Italy, Norway, Poland
Use	Indoors

Opius pallipes

Family	Braconidae
Main target pests	<i>Liriomyza bryoniae</i>
Original distribution	Palaeartic (?)
Distribution in EPPO	Widespread
Date of first use	1980
EPPO countries where used	Belgium, Czechia, Denmark, France, Germany, Greece, Guernsey, Jersey, Lithuania, Netherlands, Poland, Spain, UK
Use	Indoors

Praon volucre

Synonym	<i>Aphidius volucre</i>
Family	Braconidae
Main target pests	Aphididae
Original distribution	Palaeartic
Distribution in EPPO	Widespread
Date of first use	?
EPPO countries where used	Belgium, Guernsey, Jersey, Netherlands, UK
Use	Indoors

Scutellista caerulea

Synonym	<i>Scutellista cyanea</i>
Family	Pteromalidae
Main target pests	Coccidae (<i>Saissetia oleae</i> , <i>S. coffeae</i> , <i>Ceroplastes rusci</i>)
Original distribution	Africa
Distribution in EPPO	Mediterranean, CIS
Date of first use	1990
EPPO countries where used	Belgium, Denmark, France, Netherlands, Switzerland
Use	Indoors

Tetracnemoidea peregrina

Synonyms	<i>Hungariella peregrina</i>
Family	Encyrtidae
Main target pests	Pseudococcidae
Original distribution	North America

Distribution in EPPO	Israel
Date of first use	1992
EPPO countries where used	Belgium, France, Israel, Netherlands, Spain
Use	Indoors/outdoors

Tetracnemoidea brevicornis

Synonyms	<i>Hungariella pretiosa</i>
Family	Encyrtidae
Main target pests	Pseudococcidae
Original distribution	?
Distribution in EPPO	Italy
Date of first use	1992
EPPO countries where used	Belgium, France, Netherlands, Spain
Use	Indoors

Thripobius javae

Synonyms	<i>Thripobius semiluteus</i>
Family	Eulophidae
Main target pests	Thysanoptera (<i>Heliothrips</i> spp.)
Original distribution	Tropical and subtropical areas of Africa, Asia and Australia
Distribution in EPPO	Israel
Date of first use	1995
EPPO countries where used	Belgium, Denmark, France, Germany, Netherlands
Use	Indoors

Trichogramma brassicae

Synonyms	<i>Trichogramma maidis</i>
Family	Trichogrammatidae
Main target pests	Lepidoptera (<i>Ostrinia nubilalis</i>)
Original distribution	Europe
Distribution in EPPO	Widespread
Date of first use	1980
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Italy, Jersey, Jordan, Netherlands, Slovakia, Spain, Switzerland, UK
Use	Outdoors/Indoors

Trichogramma cacoeciae

Family	Trichogrammatidae
Main target pests	Lepidoptera
Original distribution	Europe
Distribution in EPPO	Widespread
Date of first use	1980
EPPO countries where used	Denmark, France, Germany, Hungary

Use Outdoors

Trichogramma dendrolimi

Family Trichogrammatidae
Main target pests Lepidoptera
Original distribution Europe
Distribution in EPPO Widespread
Date of first use 1985
EPPO countries where used Germany, Slovakia
Use Outdoors

Trichogramma evanescens

Family Trichogrammatidae
Main target pests Lepidoptera (including on stored products)
Original distribution Europe
Distribution in EPPO Widespread
Date of first use 1993
EPPO countries where used Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Italy, Jersey, Jordan, Netherlands, Portugal, Slovakia, Spain, Tunisia, UK
Use Indoors/outdoors

Trichogramma pintoi

Synonyms *Trichogramma euproctidis*
Family Trichogrammatidae
Original distribution Palaearctic, Near East, Nearctic, Neotropical region; Oriental region, widespread in EPPO region
Main target pests Mainly Lepidoptera species: *Ostrinia nubilalis*, *Helicoverpa armigera*, *Cydia nigricana*, *Cydia pomonella*, *Cydia funebrana*, *Plutella xylostella*, *Mamestra brassicae*, *Lacanobia oleracea*
Date of first use 2002 (Hungary)
EPPO countries where used Belarus, Czech Republic, Hungary, Moldova, Poland, Russia, Slovakia, Ukraine, Uzbekistan
Use Outdoors/Indoors

- Insecta, Neuroptera

Chrysoperla carnea

Synonyms *Chrysopa carnea*
Family Chrysopidae
Main target pests Aphididae etc.
Original distribution Cosmopolitan
Distribution in EPPO Widespread

Date of first use	1987
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, Switzerland, UK
Use	Indoors/outdoors

- Insecta, Thysanoptera

Franklinothrips megalops

Synonym	<i>Franklinothrips myrmicaeformis</i>
Family	Aeolothripidae
Main target pests	Thysanoptera
Original distribution	Africa, Israel, India
Distribution in EPPO	Israel, Tunisia
Date of first use	1992
EPPO countries where used	Belgium, France, Netherlands, Spain
Use	Indoors

Franklinothrips vespiformis

Family	Aeolothripidae
Main target pests	Thysanoptera
Original distribution	Asia
Distribution in EPPO	Israel, Portugal
Date of first use	1990
EPPO countries where used	Belgium, Denmark, France, Germany, Israel, Netherlands, Portugal, Sweden, Switzerland
Use	Indoors

Karnyothrips melaleucus

Family	Phlaeothripidae
Main target pests	Coccidae, Diaspididae (<i>Howardia biclavis</i>)
Original distribution	Pantropical
Distribution in EPPO	Portugal (Madeira)
Date of first use	1994
EPPO countries where used	Belgium, Denmark, France, Netherlands, Spain
Use	Indoors

- Arachnida, Acarina

Amblydromalus limonicus

Synonyms	<i>Amblyseius limonicus</i> , <i>Typhlodromus</i> (<i>Amblyseius</i>) <i>limonicus</i> , <i>Amblyseius</i> (<i>Typhlodromalus</i>) <i>limonicus</i> , <i>Typhlodromus</i> <i>limonicus</i> , <i>Amblyseius</i> (<i>Amblyseius</i>)
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	<i>limonicus</i> , <i>Typhlodromalus limonicus</i> , <i>Typhlodromalus lailae</i>
Family	Phytoseiidae
Main target pests	Thrips and whiteflies (mainly <i>Bemisia tabaci</i>)
Original distribution	North, Central and South America, Hawaii, New Zealand and Australia
Distribution in EPPO	Established in north-east Spain
Date of first use	2010
EPPO countries where used	Austria, Belgium, Denmark, England, Finland, France, Germany, Ireland, the Netherlands, Poland, Russia, Sweden and Ukraine
Use	Indoors / Outdoors

Amblyseius andersoni

Synonyms	<i>Typhlodromus andersoni</i>
Family	Phytoseiidae
Main target pests	<i>Tetranychus urticae</i> , <i>T. cinnabarinus</i> , <i>Panonychus ulmi</i> , <i>Aculops lycopersicae</i> , <i>Polyphagotarsonemus latus</i> , <i>Phytonemus pallidus</i>
Original distribution	Palaeartic and Nearctic
Distribution in EPPO	Widespread
Date of first use	2006 (by Syngenta)
EPPO countries where used	France, Guernsey, Italy, Netherlands, Poland, Spain, UK
Use	Indoors / Outdoors

Amblyseius barkeri

Synonyms	<i>Amblyseius mckenziei</i> , <i>Neoseiulus barkeri</i>
Family	Phytoseiidae
Main target pests	Thysanoptera (<i>Thrips tabaci</i> , <i>Frankliniella occidentalis</i>), Tarsonemidae
Original distribution	Europe
Distribution in EPPO	Widespread
Date of first use	1981
EPPO countries where used	Austria, Belgium, Denmark, France, Germany, Italy, Netherlands, Slovakia, Switzerland
Use	Indoors

Amblyseius degenerans

Synonym	<i>Iphiseius degenerans</i>
Family	Phytoseiidae
Main target pests	Thysanoptera
Original distribution	Africa/Mediterranean
Distribution in EPPO	Mediterranean
Date of first use	1993
EPPO countries where used	Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Jersey, Netherlands, Norway, Poland, Spain, Switzerland, Tunisia, Turkey, UK
Use	Indoors

Amblyseius swirskii

Synonym	<i>Typhlodromips swirskii</i>
Family	Phytoseiidae
Original distribution	East of Mediterranean region, naturally occurs in Israel, Italy, Cyprus, Greece and Egypt, found there in various crops like apples, apricot, citrus, vegetables and cotton
Main target pests	<i>Bemisia tabaci</i> , <i>Trialeurodes vaporariorum</i> , <i>Frankliniella occidentalis</i>
Date of first use	2005 (Austria, Belgium, Finland, France, Germany, Greece, Hungary, Italy, Morocco, Netherlands, Poland and Turkey)
EPPO countries where used	Austria, Belarus, Belgium, Denmark, Finland, France, Germany, Greece, Guernsey, Hungary, Italy, Jersey, Morocco, the Netherlands, Norway, Poland, Spain, Turkey, UK
Use	Indoors/outdoors

Cheyletus eruditus

Family	Cheyletidae
Main target pests	Storage mites, spider (foliage) mites
Original distribution	Indigenous
Distribution in EPPO	Belgium, Netherlands
Date of first use	1985
EPPO countries where used	Belgium, Czechia, France, Germany, Netherlands
Use	Indoors
Additional remarks	Cases of allergic reactions to farmers have been reported

Hypoaspis aculeifer

Synonyms	<i>Geolaelaps aculeifer</i>
Family	Laelapidae
Main target pests	Sciaridae, <i>Rhizoglyphus echinopus</i>
Original distribution	Europe
Distribution in EPPO	Widespread
Date of first use	1995
EPPO countries where used	Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Spain, Switzerland, UK
Use	Indoors

Metaseiulus occidentalis

Synonyms	<i>Galendromus occidentalis</i> , <i>Typhlodromus occidentalis</i>
Family	Phytoseiidae
Main target pests	Tetranychidae
Original distribution	Nearctic
Distribution in EPPO	?
Date of first use	1991
EPPO countries where used	Denmark, France, Greece, Guernsey, Jersey, Netherlands, Poland, Spain, UK
Use	Indoors/outdoors

***Neoseiulus californicus* (non-diapausing strain only*)**

Synonyms	<i>Amblyseius californicus</i> , <i>Typhlodromus californicus</i> , <i>Amblyseius mungeri</i> , <i>Typhlodromus mungeri</i> , <i>Amblyseius chilensis</i> , <i>Typhlodromus marinus</i>
Family	Phytoseiidae
Main target pests	Tetranychidae
Original distribution	Southern N. America/California, Mediterranean
Distribution in EPPO	?
Date of first use	1985
EPPO countries where used	Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Ireland, Italy, Jersey, Malta, Netherlands, Poland, Portugal, Spain, Switzerland, Tunisia, UK (restricted under license)
Use	Indoors/outdoors

*** References**

- Gotoh, T., T. Akizawa, M. Watanabe, A. Tsuchiya & S. Shimazaki, 2005. Cold hardiness of *Neoseiulus californicus* and *N. womersleyi*. J. Acarol. Soc. Jpn. 14(2): 93-103.
- Hart, A.J., J.S. Bale, A.G. Tullet, M.R. Worland and K.F.A. Walters, 2002. Effects of temperature on the establishment potential of the predatory mite *Amblyseius californicus* McGregor (Acari: Phytoseiidae) in the UK. J. Insect Physiology 48: 593-599.
- Houten, M. van, P.J.C. van Rijn, L.K. Tanigoshi, P. van Stratum & J. Bruin, 1995. Preselection of predatory mites to improve year-round biological control of western flower thrips in greenhouse crops. Ent. Exp. et Appl. 74: 225-234.
- Morewood, W.D., 1993. Diapause and cold hardiness of phytoseiid mites (Acarina: Phytoseiidae). Eur.J.Entomol.90: 3-10.

Neoseiulus cucumeris

Synonym	<i>Amblyseius cucumeris</i>
Family	Phytoseiidae
Main target pests	Thysanoptera (<i>T. tabaci</i> , <i>F. occidentalis</i>)
Original distribution	Cosmopolitan
Distribution in EPPO	Widespread (not present in Sweden, Finland, Norway)
Date of first use	1985
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Hungary, Ireland, Italy, Jersey, Jordan, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Tunisia, Turkey, UK
Use	Indoors/outdoors

Phytoseiulus persimilis

Synonyms	<i>Phytoseiulus riegeli</i> , <i>Phytoseiulus tardi</i>
Family	Phytoseiidae

Main target pests	Tetranychidae (<i>Tetranychus urticae</i>)
Original distribution	Mediterranean
Distribution in EPPO	Southern Europe
Date of first use	1968
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Hungary, Ireland, Italy, Jersey, Jordan, Lithuania, Malta, Morocco, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Tunisia, Turkey, UK
Use	Indoors/outdoors

Stratiolaelaps scimitus

Synonyms	<i>Hypoaspis scimitus</i>
Taxonomic remark	The species has been previously used under the erroneous name <i>Stratiolaelaps miles</i> (= <i>Hypoaspis miles</i> = <i>Geolaelaps miles</i>)*
Family	Laelapidae
Main target pests	Sciaridae, <i>Rhizoglyphus echinopus</i>
Original distribution	Palearctic
Distribution in EPPO	Widespread
Date of first use	1994
EPPO countries where used	Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Jersey, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, UK
Use	Indoors

* References:

- Cabrera AR, Cloyd RA, Zaborski ER (2005) Development and reproduction of *Stratiolaelaps scimitus* (Acari: Laelapidae) with fungus gnat larvae (Diptera: Sciaridae), potworms (Oligochaeta: Enchytraeidae) or *Sancassania* aff. *sphaerogaster* (Acari: Acaridae) as the sole food source. *Experimental and Applied Acarology* **36**(1/2), 71-81.
- Knapp M, Klapwijk J, October 2012 Information supporting the name change of commercially available *Hypoaspis miles* to *Stratiolaelaps scimitus*. KOPPERT Biological Systems.
- Walter DE, Campbell NJH (2003) Exotic vs endemic biocontrol agents: would the real *Stratiolaelaps miles* (Berlese) (Acari: Mesostigmata: Laelapidae), please stand up? *Biological Control* **26**, 253-269.
- Womersley H (1956) On some new Acarina-Mesostigmata from Australia, New Zealand and New Guinea. *Journal of the Linnean Society (Zoology)* **42**, 505-599.

Transeius montdorensis

Synonym	<i>Amblyseius montdorensis</i> , <i>Typhlodromips montdorensis</i>
Family	Phytoseiidae
Original distribution	Pacific Islands and western areas of the Australian mainland
Main target pests	Aleyrodidae (<i>Trialeurodes</i> spp. and <i>Bemisia</i> spp.), thrips (<i>Franklinella occidentalis</i> and <i>Thrips tabaci</i>) and Eriophyidae (<i>Aculops lycopersici</i>), although to be used principally against <i>Frankliniella occidentalis</i>

Date of first use	2004
EPPO countries where used	Belgium, Denmark, Finland, France, Germany, Greece, the Netherlands, Poland, Romania, Spain and UK
Use	Indoors/outdoors

Typhlodromus pyri

Family	Phytoseiidae
Main target pests	<i>Panonychus ulmi</i> , <i>Tetranychus urticae</i> , <i>Eriophyes vitis</i> , <i>Epitrimerus vitis</i>
Original distribution	Europe/Nearctic
Distribution in EPPO	Widespread
Date of first use	1985
EPPO countries where used	Austria, Belgium, Czechia, Denmark, France, Germany, Hungary, Portugal, Slovakia
Use	Outdoors

- Nematoda

Heterorhabditis bacteriophora

Synonyms	<i>Heterorhabditis heliothidis</i>
Family	Heterorhabditidae
Main target pests	Vine weevils (<i>Otiorhynchus</i> spp.)
Original distribution	South and central Europe/N. America
Distribution in EPPO	South and central Europe
Date of first use	1984
EPPO countries where used	Austria, Belgium, France, Germany, Italy, Netherlands, Slovenia, Switzerland
Use	Outdoors/?indoors

Heterorhabditis megidis

Family	Heterorhabditidae
Main target pests	Vine weevils (<i>Otiorhynchus</i> spp.)
Original distribution	Europe
Distribution in EPPO	Widespread
Date of first use	1984
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Ireland, Italy, Jersey, Netherlands, Norway, Poland, Slovakia, Spain, Sweden, Switzerland, Tunisia, UK
Use	Indoors/outdoors

Phasmarhabditis hermaphrodita

Family	Phasmarhabditidae
Main target pests	Slugs

Original distribution	Central Europe
Distribution in EPPO	Widespread (except in Northern countries)
Date of first use	1984
EPPO countries where used	Belgium, Denmark, France, Germany, Guernsey, Italy, Jersey, Netherlands, UK
Use	Indoors/outdoors

Steinernema carpocapsae

Synonyms	<i>Neoaplectana carpocapsae</i> , <i>N. feltiae</i>
Family	Steinernematidae
Main target pests	Vine weevils (<i>Otiorhynchus</i> spp.), Sciaridae, soil-borne insects
Original distribution	Europe (Holarctic)
Distribution in EPPO	Widespread
Date of first use	1984
EPPO countries where used	Belgium, Denmark, France, Germany, Guernsey, Italy, Jersey, Netherlands, Portugal, Slovenia, Sweden, UK
Use	Indoors/outdoors

Steinernema feltiae

Synonyms	<i>Neoaplectana feltiae</i> , <i>N. bibionis</i> , <i>Steinernema bibionis</i> , <i>N. leucaniae</i>
Family	Steinernematidae
Main target pests	Melolonthidae, Sciaridae etc.
Original distribution	Europe (Holarctic)
Distribution in EPPO	Widespread
Date of first use	1984
EPPO countries where used	Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Greece, Guernsey, Ireland, Italy, Jersey, Netherlands, Norway, Poland, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK
Use	Indoors/outdoors

Steinernema glaseri

Synonyms	<i>Neoaplectana glaseri</i>
Family	Steinernematidae
Main target pests	Soil insects, especially Coleoptera including Chrysomelidae, Curculionidae, Elateridae, Scarabaeidae, some Lepidoptera, Orthoptera etc.
Original distribution	Argentina, Brazil, China, Czech Republic, Palestine, Portugal, Republic of Korea, Slovak Republic, Spain, Switzerland, the USA
Distribution in EPPO	Czech Republic, Portugal, Slovak Republic, Spain, Switzerland
Date of first use	2004
EPPO countries where used	Netherlands, Belgium
Use	Indoors/outdoors

Steinernema kraussei

Family	Steinernematidae
Main target pests	<i>Otiorhynchus sulcatus</i>
Original distribution	Throughout Europe and North America
Distribution in EPPO	Widespread
Date of first use	2001 (in Ireland)
EPPO countries where used	Ireland, Norway, most of other European countries
Use	Indoors/outdoors

Appendix II: Successfully introduced classical biological control agents

INSECTA

Coleoptera

Adalia bipunctata

Cryptolaemus montrouzieri

Rhizophagus grandis

Rhyzobius forestieri

Rodolia cardinalis

Scymnus impexus

Scymnus reunioni

Serangium parcesetosum

Diptera

Cryptochetum iceryae

Hymenoptera

Ageniaspis citricola

Allotropa burrelli

Allotropa convexifrons

Amitus spiniferus

Anagyrus agraensis

Anagyrus fusciventris

Anaphes nitens

Aphelinus mali

Aphytis holoxanthus

Aphytis lepidosaphes

Aphytis lingnanensis

Aphytis melinus

Aphytis proclia

Clausenia purpurea

Comperiella bifasciata

Encarsia berlesei

Encarsia herndoni

Encarsia lahorensis

Encarsia perniciosi

Eretmocerus debachi

Metaphycus anneckei

Metaphycus flavus

Metaphycus helvolus

Metaphycus lounsburyi

Metaphycus swirskii

Neodryinus typhlocybae

Neodusmetia sangwani

Ooencyrtus kuvanae

Pseudaphycus malinus

Psyllaephagus pilosus

Psyttalia concolor
Pteroptrix orientalis
Pteroptrix smithi

- Insecta, Coleoptera

Adalia bipunctata

Family	Coccinellidae
Target pest	<i>Toxoptera aurantii</i>
Date of first use	?
EPPO countries where introduced	Portugal (Azores) [S*] (<i>Widespread in the EPPO region</i>)
Multiple/single introductions	Single
Origin of collected material	Portugal

Cryptolaemus montrouzieri

Family	Coccinellidae
Target pest	Pseudococcidae
Date of first use	1929
EPPO countries where introduced	Portugal [S] (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single
Origin of collected material	Australia
Target pest	<i>Planococcus citri</i>
Date of first use	1908-
EPPO countries where introduced	Italy [E; Sardegna P; Sicilia E], Israel [P], Portugal, Greece [F], Cyprus [T], France [P], Spain [P], former USSR (Georgia) [F?] (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single, multiple
Origin of collected material	Australia

Rhizophagus grandis

Family	Rhizophagidae
Target pest	<i>Dendroctonus micans</i>
Date of first use	1963-
EPPO countries where introduced	former USSR (Georgia) [S], UK [E], France [E] (<i>Probably widespread in Central & Eastern Europe</i>)
Multiple/single introductions	Single, multiple
Origin of collected material	Belgium

Rhyzobius forestieri

Family	Coccinellidae
Target pest	<i>Saissetia oleae</i>
Date of first use	1980

EPPO countries where introduced	Italy [S], France [S], Greece [E], Cyprus [N], Israel [E]
Multiple/single introductions	Single
Origin of collected material	Australia

Rodolia cardinalis

Family	Coccinellidae
Target pest	<i>Icerya purchasi</i>
Date of first use	1897-
EPPO countries where introduced	Portugal [C], former USSR (Georgia) [C], Italy [S], former Yugoslavia [N], Israel [C*], France [C], Spain [C], Switzerland [F], Greece [S], Malta [C], Cyprus [S] (<i>Mediterranean distribution, CIS</i>)
Multiple/single introductions	Single, multiple
Origin of collected material	Australia

Scymnus impexus

Family	Coccinellidae
Target pests	<i>Adelges</i> spp.
Date of first use	1968
EPPO countries where introduced	Sweden [S], UK [N] (<i>native in Europe</i>)
Multiple/single introductions	Single
Origin of collected material	Germany

Scymnus reunioni

Synonym	<i>Nephus reunioni</i>
Family	Coccinellidae
Target pest	<i>Planococcus citri</i>
Date of first use	1967
EPPO countries where introduced	Israel [N], Italy (Sardegna) [P], former USSR (Georgia) [F?]
Multiple/single introductions	Single
Origin of collected material	India

Serangium parcesetosum

Family	Coccinellidae
Target pest	<i>Dialeurodes citri</i>
Date of first use	1973
EPPO countries where introduced	former USSR [Georgia, C*; Azerbaijan, C*; Uzbekistan, F], France (Corse) [E], Israel, Turkey [S?]
Multiple/single introductions	Single
Origin of collected material	India, former USSR

Result of introduction when available: [C] complete, [S] substantial, [P] partial, [E]

established but not contributing to control or status unknown, [F] failed to become established; [N] no information on the outcome; [T] established but believed to have died out. Asterisks (*) indicate cases where more than one organism contributed to the result.

- Insecta, Diptera

Cryptochetum iceryae

Family	Cryptochetidae
Target pest	<i>Icerya purchasi</i>
Date of first use	1987
EPPO countries where introduced	Israel [S]
Multiple/single introductions	Single
Origin of collected material	Australia

Result of introduction when available: [C] complete, [S] substantial, [P] partial, [E] established but not contributing to control or status unknown, [F] failed to become established; [N] no information on the outcome; [T] established but believed to have died out. Asterisks (*) indicate cases where more than one organism contributed to the result.

- Insecta, Hymenoptera (part I)

Ageniaspis citricola

Family	Encyrtidae
Target pest	<i>Phyllocnistis citrella</i>
Date of first use	1994-
EPPO countries where introduced	Israel, Morocco, Algeria, Tunisia, France, Greece, Cyprus, Spain [C], Italy (Sicilia); established only on Canary Islands where provides complete control of the target pest
Multiple/single introductions	Single, multiple
Origin of collected material	Thailand, Florida (USA)

Allotropa burrelli

Family	Platygasteridae
Target pest	<i>Pseudococcus comstocki</i>
Date of first use	1945
EPPO countries where introduced	former USSR [P*]
Multiple/single introductions	Single
Origin of collected material	Japan

Allotropa convexifrons

Family	Platygasteridae
Target pest	<i>Pseudococcus comstocki</i>
Date of first use	1945
EPPO countries where introduced	former USSR [P*]
Multiple/single introductions	Single
Origin of collected material	Korea

Amitus spiniferus

Family	Platygasteridae
Target pest	<i>Aleurothrixus floccosus</i>
Date of first use	1971-
EPPO countries where introduced	France [C*], Italy [S*]
Multiple/single introductions	Single
Origin of collected material	Central America

Anagyrus agragensis

Family	Encyrtidae
Target pest	<i>Nipaecoccus viridis</i>
Date of first use	1984-
EPPO countries where introduced	Jordan [S?], Israel [S?]
Multiple/single introductions	Single
Origin of collected material	Guam

Anagyrus fusciventris

Family	Encyrtidae
Target pests	Pseudococcidae (<i>Pseudococcus longispinus</i>)
Date of first use	1972
EPPO countries where introduced	Israel [S]
Multiple/single introductions	Single
Origin of collected material	Australia

Anaphes nitens

Family	Mymaridae
Target pest	<i>Gonipterus scutellatus</i>
Date of first use	1978
EPPO countries where introduced	Italy [C], France [P], Spain [S]
Multiple/single introductions	Single
Origin of collected material	Australia

Aphelinus mali

Family	Aphelinidae
Target pest	<i>Eriosoma lanigerum</i>
Date of first use	1920-

EPPO countries where introduced	France [P], Hungary [S], Israel [P], Italy [S], Switzerland [S], former USSR (Azerbaijan) [C], Portugal [N], Belgium [C], Germany [P], UK [P], Slovenia, Malta, Netherlands [P], Spain [P], Poland [P], Sweden [P], Cyprus [C], Denmark [P] (<i>Widespread in the EPPO region</i>)
Multiple/single introductions	Single
Origin of collected material	USA

Aphytis holoxanthus

Family	Aphelinidae
Target pest	<i>Chrysomphalus aonidum</i>
Date of first use	1956
EPPO countries where introduced	Israel [C*] (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single
Origin of collected material	Hong Kong

Aphytis lepidosaphes

Family	Aphelinidae
Target pest	<i>Cornuaspis beckii</i>
Date of first use	1956-
EPPO countries where introduced	Israel [C], Cyprus [N], France [N], Greece [S], Spain [S], Italy (Sicilia) [P]
Multiple/single introductions	Single
Origin of collected material	China

Aphytis lingnanensis

Family	Aphelinidae
Target pest	<i>Aonidiella aurantii</i>
Date of first use	1960-
EPPO countries where introduced	Cyprus [P], Israel [E], Italy (Sicilia), Morocco [E], Spain [P] (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single
Origin of collected material	China

Aphytis melinus

Family	Aphelinidae
Target pest	<i>Chrysomphalus dictyospermi</i>
Date of first use	1962-
EPPO countries where introduced	Greece [S; Kriti, C], Italy [C], Morocco [C], France (Corse) [P], Spain [P] (<i>commercially available for inondative releases since 2008</i>), former USSR (Georgia) [E?] (<i>Mediterranean distribution</i>)
Multiple/single introductions	?
Origin of collected material	India/Pakistan
Target pest	<i>Aonidiella aurantii</i>

Date of first use	1961-
EPPO countries where introduced	Cyprus [P], Israel [P], Italy (Sicilia) [P], Morocco [E] (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single, multiple
Origin of collected material	India/Pakistan
Target pest	<i>Aspidiotus nerii</i>
Date of first use	?
EPPO countries where introduced	Greece (Kriti) [P] (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single
Origin of collected material	India/Pakistan

Aphytis proclia

Family	Aphelinidae
Target pest	<i>Pseudaulacaspis pentagona</i>
Date of first use	1924
EPPO countries where introduced	Italy [S] (<i>Widespread in the EPPO region</i>)
Multiple/single introductions	Single
Origin of collected material	East Asia

Clausenia purpurea

Family	Encyrtidae
Target pest	<i>Pseudococcus citriculus</i>
Date of first use	1940
EPPO countries where introduced	Israel [C]
Multiple/single introductions	Single
Origin of collected material	Japan

Comperiella bifasciata

Family	Encyrtidae
Target pest	<i>Aonidiella aurantii</i>
Date of first use	1924-
EPPO countries where introduced	Israel [P*], Italy, France [N], Spain [P] (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single
Origin of collected material	South China

Result of introduction when available: [C] complete, [S] substantial, [P] partial, [E] established but not contributing to control or status unknown, [F] failed to become established; [N] no information on the outcome; [T] established but believed to have died out. Asterisks (*) indicate cases where more than one organism contributed to the result.

- Insecta, Hymenoptera (part II)

Encarsia berlesei

Family	Aphelinidae
Target pest	Pseudaulacaspis pentagona
Date of first use	1906-
EPPO countries where introduced	Italy [C], Bulgaria [C], Switzerland [C], Spain [C], Austria [C], former USSR [C], France [P], Hungary, Slovenia
Multiple/single introductions	Single
Origin of collected material	Japan, East Asia

Encarsia herndoni

Synonym	Encarsia elongata
Family	Aphelinidae
Target pest	Lepidosaphes gloverii
Date of first use	1979
EPPO countries where introduced	Spain [S]
Multiple/single introductions	Single
Origin of collected material	East Asia

Encarsia lahorensis

Family	Aphelinidae
Target pest	Dialeurodes citri
Date of first use	1973-
EPPO countries where introduced	Italy [S; Sardegna, P; Sicilia, C], former USSR (Georgia) [C*], France [E], Turkey, Greece [S, E], Israel [C*]
Multiple/single introductions	Single, multiple
Origin of collected material	India, Pakistan

Encarsia perniciosi

Family	Aphelinidae
Target pest	Quadraspidiotus perniciosus
Date of first use	1932-
EPPO countries where introduced	Italy [P], former USSR [E], Germany [P], France [P], Bulgaria [C], former Czechoslovakia [E, N], Switzerland [P], former Yugoslavia [N], Austria [E], Greece [E], Spain [P] (<i>Widespread in the EPPO region</i>)
Multiple/single introductions	Single, multiple
Origin of collected material	China, Korea

Eretmocerus debachi

Family	Aphelinidae
Target pest	Parabemisia myricae
Date of first use	1982-
EPPO countries where introduced	Israel [C], Turkey [C], Italy [S] (<i>Mediterranean distribution?</i>)
Multiple/single introductions	Single
Origin of collected material	Japan, North America

Metaphycus anneckeii

Family	Encyrtidae
Target pest	Saissetia oleae
Date of first use	?
EPPO countries where introduced	Greece [C], Israel [E], France [E], Italy [F]
Multiple/single introductions	Single
Origin of collected material	South Africa

Metaphycus flavus

Family	Encyrtidae
Target pest	Coccus hesperidum
Date of first use	1959
EPPO countries where introduced	Italy [P], former USSR (Ukraine) [C] (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single
Origin of collected material	Morocco

Metaphycus helvolus

Family	Encyrtidae
Target pest	Saissetia oleae
Date of first use	1960-
EPPO countries where introduced	Israel [E], France (Corse) [P*], Greece [C; Kriti, S], Italy [P], Spain [S], Cyprus [E], former USSR [F]
Multiple/single introductions	Single
Origin of collected material	South Africa

Metaphycus lounsburyi

Family	Encyrtidae
Target pest(s)	Saissetia oleae
Date of first use	1973-

EPPO countries where introduced	France [P], Israel [C], Greece (Kriti) [P], Italy [E], Cyprus [S] (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single
Origin of collected material	South Africa

Metaphycus swirskii

Family	Encyrtidae
Target pest	Saissetia oleae
Date of first use	1973
EPPO countries where introduced	Israel [E], France [E], Greece (Kriti) [P], Italy [P]
Multiple/single introductions	Single
Origin of collected material	Kenya

Neodryinus typhlocybae

Family	Dryinidae
Target pest	Metcalfa pruinosa
Date of first use	1989-
EPPO countries where introduced	Italy, France, Slovenia, Switzerland
Multiple/single introductions	Single
Origin of collected material	USA

Neodusmetia sangwani

Family	Encyrtidae
Target pest	Antonina graminis
Date of first use	1971
EPPO countries where introduced	Israel [S]
Multiple/single introductions	Single
Origin of collected material	South India

Ooencyrtus kuvanae

Family	Encyrtidae
Target pest	Lymantria dispar
Date of first use	1922
EPPO countries where introduced	former Czechoslovakia [E], Spain [P], Morocco [E], Algeria [E], Portugal [E], former USSR (Kazakhstan, Moldova, Russia, Ukraine, Uzbekistan) [P]
Multiple/single introductions	Single
Origin of collected material	Japan

Pseudaphycus malinus

Family	Encyrtidae
Target pest	Pseudococcus comstocki
Date of first use	1945
EPPO countries where introduced	former USSR [C]
Multiple/single introductions	Single
Origin of collected material	Korea

Psyllaephagus pilosus

Family	Encyrtidae
Target pest	Ctenarytaina eucalypti
Date of first use	1994
EPPO countries where introduced	Ireland [S], France [S]
Multiple/single introductions	Single
Origin of collected material	Australia

Psytalia concolor

Synonym	Opius concolor
Family	Braconidae
Target pest	Bactrocera oleae
Date of first use	1914-
EPPO countries where introduced	Italy [S], Greece [P], France [P], Spain [P], Portugal, former Yugoslavia [N]
Multiple/single introductions	Single
Origin of collected material	Libya, Tunisia

Pteroptrix orientalis

Synonym	Archenomus orientalis
Family	Aphelinidae
Target pest	Pseudaulacaspis pentagona
Date of first use	1909
EPPO countries where introduced	Italy [S]
Multiple/single introductions	Single
Origin of collected material	Japan

Pteroptrix smithi

Family	Aphelinidae
Target pest	Chrysomphalus aonidum
Date of first use	1956
EPPO countries where introduced	Israel [C*]
Multiple/single introductions	Single
Origin of collected material	Hong Kong

Result of introduction when available: [C] complete, [S] substantial, [P] partial, [E] established but not contributing to control or status unknown, [F] failed to become established; [N] no information on the outcome; [T] established but believed to have died out. Asterisks (*) indicate cases where more than one organism contributed to the result.

Appendix III: List of biological control agents formerly recommended by EPPO

- Insecta: Hymenoptera

Cales noacki

Family	Aphelinidae
Main target pest	<i>Aleurothrixus floccosus</i>
Date of first use	1970
EPPO countries where introduced	Spain [S], France [C], Italy [S], Morocco [C], Portugal [E], Tunisia [C], Malta, Greece (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single, multiple
Origin of collected material	Chile
Date of removal from the list	2009-03-25/26, Joint EPPO/IOBC Meeting on Biological Control Agents, Engelberg (CH)
Summary of reasons	Commercial releases may lead to establishment in non-target habitats in certain areas. Outdoor releases have shown a wide host range that extends beyond the order Hemiptera and in some areas out competes indigenous natural enemies.

Lysiphlebus testaceipes

Family	Braconidae
Main target pest	Aphididae (<i>Aphis gossypii</i>)
Original distribution	Nearctic, USA
Distribution in EPPO	Mediterranean countries (and possibly others)
Date of first use	1990
EPPO countries where used	Denmark, Germany (DE), Italy, Spain
Use	Indoors
Date of removal from the list	2008-03-26/28, Joint EPPO/IOBC Meeting on Biological Control Agents Wageningen (NL)
Summary of reasons	The species has a wide host range and shown non-target effects. In some areas it has spread into non-target habitats, where it has attacked non-target host species and replaced native primary parasitoid species (see

references).

Lumbierres B., Starý P., Pons X., 2007. Seasonal parasitism of cereal aphids in a Mediterranean arable crop system. *Journal of Pest Science*, 80: 125-130.
Pons X., Lumbierres B., Starý P., 2004. Expansión de *Lysiphlebus testaceipes* (Cresson) (Hym., Braconidae, Aphidiinae) en el Noreste de la Península Ibérica. *Boletín de Sanidad Vegetal. Plagas*, 30: 547-552.
Starý P., Lumbierres B., Pons, X., 2004. Opportunistic changes in the host range of *Lysiphlebus testaceipes* (Cr.), an exotic aphid parasitoid expanding in the Iberian Peninsula. *Journal of Pest Science*, 77: 139-144.

- Insecta: Coleoptera

Harmonia axyridis

Family	Coccinellidae
Main target pest	<i>Toxoptera aurantii</i>
Date of first use	1964
EPPO countries where introduced	Portugal (Azores) [S*], Greece, former USSR [N], Ukraine, Tunisia, Italy
Multiple/single introductions	Single
Origin of collected material	East Asia
Date of removal from the list	2009-03-25/26, Joint EPPO/IOBC Meeting on Biological Control Agents, Engelberg (CH)
Summary of reasons	The species has a wide host range across many taxonomic groups with a strong capacity for natural spread. The species has become established in large areas of the EPPO region and is known to attack non-target prey, including some beneficial species. Based on releases elsewhere, replacement of native coccinellid species in the EPPO region could be expected.

- Insecta: Hymenoptera

Cales noacki

Family	Aphelinidae
Main target pest	<i>Aleurothrixus floccosus</i>
Date of first use	1970
EPPO countries where introduced	Spain [S], France [C], Italy [S], Morocco [C], Portugal [E], Tunisia [C], Malta, Greece (<i>Mediterranean distribution</i>)
Multiple/single introductions	Single, multiple
Origin of collected material	Chile
Date of removal from the list	2009-03-25/26, Joint EPPO/IOBC Meeting on Biological Control Agents, Engelberg (CH)
Summary of reasons	Commercial releases may lead to establishment in non-

target habitats in certain areas. Outdoor releases have shown a wide host range that extends beyond the order Hemiptera and in some areas out competes indigenous natural enemies.

Lysiphlebus testaceipes

Family	Braconidae
Target pest	<i>Aphis citricola</i>
Date of first use	1973
EPPO countries where introduced	former Czechoslovakia, France (Corse) [P], Morocco [N] (<i>Mediterranean countries and possibly others</i>)
Multiple/single introductions	Single, multiple
Origin of collected material	USA
Target pest	<i>Toxoptera aurantii</i>
Date of first use	1973
EPPO countries where introduced	France [S, P], Spain [P], Italy [E], Morocco [N] (<i>Mediterranean countries and possibly others</i>)
Multiple/single introductions	Single, multiple
Origin of collected material	USA
Date of removal from the list	2008-03-26/28, Joint EPPO/IOBC Meeting on Biological Control Agents Wageningen (NL)
Summary of reasons	The species has a wide host range and shown non-target effects. In some areas it has spread into non-target habitats, where it has attacked non-target host species and replaced native primary parasitoid species (see references).

Lumbierres B., Starý P., Pons X., 2007. Seasonal parasitism of cereal aphids in a Mediterranean arable crop system. *Journal of Pest Science*, 80: 125-130.
 Pons X., Lumbierres B., Starý P., 2004. Expansión de *Lysiphlebus testaceipes* (Cresson) (Hym., Braconidae, Aphidiinae) en el Noreste de la Península Ibérica. *Boletín de Sanidad Vegetal. Plagas*, 30: 547-552.
 Starý P., Lumbierres B., Pons, X., 2004. Opportunistic changes in the host range of *Lysiphlebus testaceipes* (Cr.), an exotic aphid parasitoid expanding in the Iberian Peninsula. *Journal of Pest Science*, 77: 139-144.

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