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# Contributions to the knowledge of Argentine entomological biodiversity associated with biocontrol research at the FuEDEI

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**ABSTRACT.** The aim of this work is to highlight the contributions of the Fundación para el Estudio de Especies Invasivas (FuEDEI) to the knowledge on insect ecology and biodiversity of Argentina. As a result of 60 pest biocontrol projects conducted since 1962, 22 viruses and one nematode associated with ants, and 63 insect species have been described for Argentina. This work constitutes an example of the interdependence between the disciplines of biocontrol and taxonomy. In 59 % of the descriptions and/or redescriptions presented in this work, at least one Argentine entomologist was involved. This fact is not only a source of pride, but also illustrates the degree of development and excellence achieved by entomology in our country throughout the first 100 years of the SEA.

KEYWORDS. Entomology. Taxonomy. Biological pest control.

# Aportes al conocimiento de la biodiversidad entomológica argentina asociados a las investigaciones en biocontrol en la FuEDEI

**RESUMEN.** El objetivo de este trabajo es destacar el aporte de la Fundación para el Estudio de Especies Invasivas (FuEDEI) al conocimiento sobre la ecología y la biodiversidad de insectos de Argentina. Como resultado de 60 proyectos de biocontrol de plagas realizados desde 1962 a la fecha, se describieron 22 virus y un nematodo asociados a hormigas, y 63 especies de insectos para la Argentina. Este trabajo constituye un ejemplo del refuerzo mutuo que existe entre las disciplinas del biocontrol y la taxonomía. En el 59 % de las descripciones y/o redescripciones presentadas en este trabajo participó al menos un entomólogo argentino. Este hecho no sólo es motivo de orgullo, sino que también ilustra el grado de desarrollo y excelencia alcanzado por la disciplina entomológica en nuestro país a lo largo de los primeros 100 años de la SEA.

PALABRAS CLAVE. Entomología. Taxonomía. Control biológico de plagas.

## INTRODUCTION

The celebration of the 100 years of the Entomological Society of Argentina (SEA) motivated us to produce a review of the biological pest control projects carried out at the FuEDEI (Fundación para el Estudio de Especies Invasivas) to inventory the contributions to the knowledge of biodiversity derived from them. These include the discovery of new species of insects, pathogens and nematodes associated with insects, redescriptions and new species records for the country.

### **Brief historical overview of the FuEDEI**

Although the facility now known as FuEDEI was instituted as a foundation in 2012, its beginnings as a biological

control laboratory in South America date back to 1962. Towards the end of the 1950s, the Agricultural Research Service of the United States Department of Agriculture (ARS-USDA) began conducting research on the biocontrol of the alligator weed, *Alternanthera philoxeroides* (Mart.) Griseb. and the water hyacinth, *Pontederia crassipes* Mart., two of the most important aquatic weeds of South American origin in freshwater courses of the United States (USA) (Coulson et al., 2000). This initiative motivated the installation of the Biological Weed Control Laboratory in 1962 in the facilities of the Plant Pathology Institute of the INTA (National Institute of Agricultural Technology) in Hurlingham, Argentina. This collaboration culminated in the introduction and release in the United States of three

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insects: Agasicles hygrophila Selman and Vogt (Coleoptera: Chrysomelidae), **Amynothrips** andersoni O'Neill (Thysanoptera: Phlaeothripidae), and Macrorrhinia endonephele (Hampson) (Lepidoptera: Pyralidae) for the control of A. philoxeroides (Buckingham, 1996, Hayden & Landry, 2020). The use of A. hygrophila to control alligator weed turned out to be the first successful biocontrol experience of an aquatic weed in the world (Buckingham, 1996). The success of this biocontrol project prompted the establishment of an autonomous laboratory in 1967, in the city of Hurlingham, province of Buenos Aires. Towards the 1990s the laboratory was renamed the South American Biological Control Laboratory, until 2012, when the current foundation was established over an agreement between the USDA and local authorities.

# Biological pest control projects from 1962 to the present

The biocontrol programs developed at FuEDEI involve, for the most part, species of plants or insects native to South America that are pests in other regions of the world. This involves carrying explorations in Argentina and neighboring countries in search for natural enemies (mostly arthropods and pathogens), and evaluating their potential as biocontrol agents. These studies often lead to the discovery of new species, their distribution and trophic associations, as well as uncovering aspects of the workings of the ecosystems that these organisms inhabit.

The main objective of this work is to highlight the contribution to entomology and knowledge of insect biodiversity in Argentina as a result of the development of biological pest control programs carried out at the FuEDEI. To this end, a list of the projects undertaken by FuEDEI since 1962 is provided. In addition, information on the species described and/or re-described in the course of our research is presented.

#### **MATERIAL AND METHODS**

The list of projects carried out by FuEDEI since 1962, their implementation period and whether or not they led to the release of biocontrol agents, was compiled by consulting the FuEDEI annual report archive and the World Catalogue of Agents and their Weeds (Winston et al., 2024). The list of described and/or redescribed species, new records for Argentina, and bibliographic references was compiled by examining FuEDEI's insect collection and publication archives (Supplementary information).

### **RESULTS**

Since 1962 to date, 60 biocontrol projects were undertaken to different degrees of detail: 20 for the control of insect pests and 40 for the control of weeds (Table I). Of the total number of projects, one or more biocontrol agents

(35 to date) were released for 20 targets: one target insect, one cattle dung fouling and 18 weeds (Table I). Seven biocontrol agents were described as new species and use to address problems caused by seven weeds affecting natural, productive and urban areas in eight countries (Table II).

As an extra benefit of these projects, a total of 22 ant viruses, one nematode parasitoid of ants and 63 insects new described as species for Argentina (Supplementary information). Among these, 36 phytophagous insects associated with plant species belonging to 17 genera within 12 families, 26 are insect parasitoids belonging to 16 genera within 10 families, one scavenger ant species (Wasmannia longiseta Cuezzo & Calcaterra), and 22 are pathogens (viruses) of two ant species, Solenopsis invicta Buren and Wasmannia auropunctata (Roger), and one nematode parasitoid of S. invicta (Supplementary information). The 63 insect species belong to the orders Coleoptera in the families Brentidae (one sp.), Buprestidae (one sp.), Chrysomelidae (five sp.) and Curculionidae (two sp.), Diptera in the families Cecidomyiidae (two sp.), Dolichopodidae (nine sp.), Phoridae (three sp.) and Tephritidae (one sp.), Hemiptera in the families Delphacidae (five sp.), Dictyopharidae (one sp.) and Miridae (one sp.), Hymenoptera in the families Braconidae (five sp.), Encyrtidae (four sp.), Eucoilidae (onesp.), Eulophidae (three sp.), Eurytomidae (onesp.), Figitidae (onesp.), Formicidae (onesp.), Mymaridae (five sp.), Pergidae (onesp.), Platygastridae (two sp,) and Trichogramatidae (one sp.) (25 species in 11 families), Lepidoptera in the families Geometridae (one sp.), Gracillariidae (three sp.) and Tortricidae (one sp.) and Thysanoptera in the family Phlaeothripidae (two sp.) (Fig. 1) (Supplementary information).

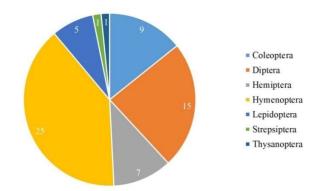


Figure 1. Number of described species of the different insect orders.

Species redescriptions included two mites and 51 insect species. At least one Argentine entomologist was involved in 83 of the 139 taxonomic descriptions and redescriptions compiled in this study (Supplementary information).

Table I. Projects undertaken by FuEDEI since 1962, their implementation period and whether or not they led to the release of biocontrol agents.

1972-76, 1997-2015   Water lettuce (*Pista strations*)   Yes     1972-76, 2008-present   Water printroses (*Larbrigit sap.)   No     1973-82	biocontrol agents.						
1962-84, 2003-present   Alligator weed (Alternanthera phitocronics)   Yes	Period	Target	Release of biocontrol agents (Yes/No)				
1967-76, 2004-present							
1972-76, 1997-2015   Water lettuce (*Pista strations*)   Yes     1972-76, 2008-present   Water printroses (*Larbrigit sap.)   No     1973-82	1962-84, 2003-present	Alligator weed (Alternanthera philoxeroides)	Yes				
1972-76, 2008-present   Water primoses (Ladwigta sep.)   No     1974-76, 2019-23   Parrol feather (Myriophythia aquaticum)   Yes     1974-76, 2019-23   Parrol feather (Myriophythia aquaticum)   No     1974-76, 2005-21   Froght (Lambothia lavergation)   No     1974-76, 2005-21   Giant salvimas (Salvinia molecule)   No     1974-76, 2005-21   Giant salvimas (Salvinia molecule)   No     1976-78, 1987-88, 1997-2008   Bitterweed (Hyriophythe ranneculoides)   Yes     1976-78, 1987-88, 1997-2008   Mesquite (Neltama spp.)   Yes     1976-78, 1989-92   Fraktistonia aculetia   Yes     1976-78, 1999-92   Salake weed (Gatierreia spp.)   No     1976-78, 1999-93   Tarbash (Thorreisia spp.)   No     1976-78, 1999-94   Tarbash (Thorreisia spp.)   No     1976-78, 1999-95   Tarbash (Thorreisia spp.)   No     1976-78, 1999-94   Tarbash (Largeat artidentata)   No     1976-78, 1999-95   Tarbash (Cebenia spp.)   Yes     1976-78, 1999-96   Radiophythia (Largeat artidentata)   No     1976-78, 1999-97   Prickly pear (Opuntus spp.)   Yes     1996-79   Prickly pear (Opuntus spp.)   No     1996-2005   Tropical social apple (Solamun varam)   Yes     1998-200, 2017-2019   Elaskeaf flea bane (Conyes spp.)   No     1998-200, 2017-2019   Elaskeaf flea bane (Conyes spp.)   No     2003-12, 2015-200   Barzilian pepter (Solamun varam)   Yes     1998-200, 2017-2019   Elaskeaf flea bane (Conyes spp.)   No     2003-11, 2015-20   Cabomba (Cabomba caroliniana)   Yes     2004-17   Barzilian appeter (Solamun varam)   Yes     1998-200, 2017-2019   Elashage (Solamun varam)   Yes     2004-18   Maleira viae (Arredera cordificial)   Yes     2004-19   Proproportion   Proproportion   No     2005-11   Balloon vine (Cardeare cordificial)   Yes     2005-10   Solamun   Proproportion   No     2005-11   Elapho vine (Cardeare cordificial)   No     2005-12   Bellywale (Ball-Adardia ragiascurio)   No     2018-202   Bellywale (Ball-Adardia ragiascurio)   No     2019-203   Proproportion   Proproportion   No     2019-204   Harrie (Ball-Adardia ragiascurio)   No     2019-2	1967-76, 2004-present	Water hyacinth (Pontederia crassipes)	Yes				
1973-82	1972-76, 1997-2015	Water lettuce (Pistia stratiotes)	Yes				
1973-82			No				
1974-76, 2019-25		1 ( 0 11 /					
1974-76, 2004-present							
1974-76, 2005-21							
1974-76, 2002.4, 2013-present   Giant salvinia (Salvinia molesta)   No     1976-81, 1987-81, 1987-82, 1997-2008   Mesquite (Neluma spp.)   Yes     1989-92   Grounded (Baccharis spp.)   No     1976-95, 2008-1   Parkinsonia catelata   Yes     1989-92   Grounded (Baccharis spp.)   No     1976-87, 1990-92   Tarbash (Flourensia spp.)   No     1976-87, 1990-92   Tarbash (Flourensia spp.)   No     1978-87   Tarbash (Flourensia spp.)   No     1978-88   Thisties   Yes     1988-97   Cocklebut (Canthian struarium)   No     1978-87   Tarbash (Flourensia spp.)   No     1976-78, 1991-94   Whitehould (Aloysia gratissima)   No     1976-78, 1993-2003   Cresosote bush (Latrea iridentata)   No     1976-78, 1993-2003   Cresosote bush (Latrea iridentata)   No     1976-79   Prickly pear (Opinatia spp.)   No     1976-70   Prickly pear (Opinatia spp.)   No     1978-2000   Practled flee home (Convisus spp.)   No     1979-2001   Practled flee home (Convisus spp.)   No     1970-2002   Brazilian waterweed (Egeria dense)   Yes     1970-190   Prickled flee home (Opinatia spp.)   No     1980-81   Prickled flee home (Opinatia spp.)   No     1980-82   Prickled flee home							
1976-86	· ·						
1976-78, 1987-88, 1997-2008   Mesquite (Nethuma spp.)   Yes   1976-95, 2008-19   Parkinsonia oculeuta		,					
1976-95, 2008-19							
1989-92							
1976-79, 1990-92   Tarbush (Flouremia spp.)   No   1976-78, 1991-94   Whitebrush (Aloysia gratissima)   No   1976-78, 1991-94   Whitebrush (Aloysia gratissima)   No   1978-87   Cocklebur (Xamthium strumarium)   No   1978-87   Thistee   Yes   1988-97   Cocklebur (Xamthium strumarium)   No   1994-96   Rattlebox (Seebania spp.)   Yes   1996-77   Prickly pear (Opunia spp.)   No   1996-97   Prickly pear (Opunia spp.)   No   1996-2005   Tropical soda apple (Solamum viarum)   Yes   1998-2000, 2017-2019   Brazilian pepper (Schimus terebinhifolia)   Yes   2003-11, 2015-20   Cabonha (Cabonha caroliniana)   Yes   2004-17   Brazilian waterweed (Egeria densa)   Yes   2004-18   Madeira vine (Amedeac cardiniana)   Yes   2005-11   Balloon vine (Cardiospermum grandiflorum)   Yes   2005-2108   Barbados gooseberry (Perestia aculeuta)   No   2005-209   Pompon weed (Campulaciinium nacrocephalum)   No   2005-19   Pompon weed (Campulaciinium nacrocephalum)   No   2006-11   Carl sclaw (Dolichandra urguis-cart)   No   2007   Carl sclaw (Dolichandra urguis-cart)   No   2011-16   Chromolaean (Chromolaean adorata)   Yes   2018-present   Panagas grass (Corraderia sellonan)   No   2018-present   Panagas grass (Corraderia sellonan)   No   2018-present   Stilking passionflower (Pausiflorus pentida)   No   2018-present   Blar heliotrope (Puliotropium amplesciatu)   No   2019-present   Carl Solamon (Puliotropium amplesciatu)   No   2010-present   Blar amyworm (Spodoptera fragigerada)   No   2010-present   Carl Solamon (Puliotropium applesciatu)   No   2010-present   Harrisia caute mulliona   No							
1976-78, 1990-94   Whitebrush (Alorsia gratissma)   No     1978-87   Thistles   Yes     1978-87   Thistles   Yes     1978-87, 1993-2003   Cressoote bush (Larrea tridentato)   No     1976-78, 1993-2003   Cressoote bush (Larrea tridentato)   No     1976-78, 1993-2003   Cressoote bush (Larrea tridentato)   No     1998-97   Prickly pear (Opunita spp.)   Yes     1996-2005   Tropical soda apple (Solamum viarum)   Yes     1998-2000, 2017-2019   Flaxleaf flee hame (Comyca spn.)   No     1998-2000, 2017-2019   Brazilian pepper (Schium terebrinhifolia)   Yes     1908-2000   Brazilian pepper (Schium terebrinhifolia)   Yes     2003-120   Brazilian waterweed (Egeria densa)   Yes     2004-17   Brazilian waterweed (Egeria densa)   Yes     2004-18   Madeira wice (Interdeur cordificial)   Yes     2005-10   Brazilian waterweed (Egeria densa)   Yes     2005-11   Balloon vine (Lardeur cordificial)   Yes     2005-2008   Barbadian general cordificial   Yes     2005-2008   Barbadian general cordificial   Yes     2005-19   Pompon weed (Campuloclinium macrocephalum)   No     2006-11   Lipia (Piula candeur esti acudeun)   No     2007   Car's claw (Dolichandra unguis-cati)   No     2011-102   Silverleaf inglishade (Solanum elaeaguijolium)   Yes     2011-2022   Silverleaf inglishade (Solanum elaeaguijolium)   Yes     2018-present   Pampas grass (Cortaderia selloura)   Yes     2018-present   Pampas grass (Cortaderia selloura)   No     2018-present   Siluking passyntifolia)   Yes     1917-74   Grasshopper parasitoids and pathogens   No     2019-present   Blue heliotrope (Heliotropium amplecicaule)   No     1917-74   Grasshopper parasitoids and pathogens   No     1917-75   Pall armyworm (Spodoptera friggereda)   No     1918-79   No     1919-2005   Robinversity (Alorsia)   No     1919-2005   Robinversity (Alorsia)	1989-92		No				
1976-78, 1991-94   Whitebrush (Aloysia gratissima)   No     1978-87	1976-97	Snake weed (Gutierrezia spp.)	Yes				
1978-87         Thistes         Yes           1978-87         Cocklebur (Xanthum strumarium)         No           1976-78, 1993-2003         Cresosote bush (Larrea tridentata)         No           1996-97         Prickly pear (Opunita spp.)         Yes           1996-2005         Tropical soda apple (Soltam winarum)         Yes           1998-2004         Prickly pear (Opunita spp.)         No           1998-2005         Brazilian peper (Schium streabint)folia)         Yes           2003-2020         Brazilian peper (Schium streabint)folia)         Yes           2004-17         Brazilian peper (Schium streabint)folia)         Yes           2004-17         Brazilian waterweed (Egeria densa)         Yes           2004-18         Maderia wice (Interdeux cordificitus)         Yes           2004-19         Pompon weed (Cabonbia (Cabonbia cordificitum)         Yes           2005-108         Barbados gooseberry (Pereskia cauleuta)         No           2005-109         Pompon weed (Campulaclinium macrocephalum)         No           2005-11         Lippin (Pysic cantes)         No           2011-16         Lippin (Pysic cantes)         No           2011-16         Lippin (Pysic cantes)         No           20118-2022         Bellyache Bush (Latroph gassp	1976-78, 1990-92	Tarbush (Flourensia spp.)	No				
1978-87         Thistes         Yes           1978-87         Cocklebur (Xanthum strumarium)         No           1976-78, 1993-2003         Cresosote bush (Larrea tridentata)         No           1996-97         Prickly pear (Opunita spp.)         Yes           1996-2005         Tropical soda apple (Soltam winarum)         Yes           1998-2004         Prickly pear (Opunita spp.)         No           1998-2005         Brazilian peper (Schium streabint)folia)         Yes           2003-2020         Brazilian peper (Schium streabint)folia)         Yes           2004-17         Brazilian peper (Schium streabint)folia)         Yes           2004-17         Brazilian waterweed (Egeria densa)         Yes           2004-18         Maderia wice (Interdeux cordificitus)         Yes           2004-19         Pompon weed (Cabonbia (Cabonbia cordificitum)         Yes           2005-108         Barbados gooseberry (Pereskia cauleuta)         No           2005-109         Pompon weed (Campulaclinium macrocephalum)         No           2005-11         Lippin (Pysic cantes)         No           2011-16         Lippin (Pysic cantes)         No           2011-16         Lippin (Pysic cantes)         No           20118-2022         Bellyache Bush (Latroph gassp	1976-78, 1991-94	Whitebrush (Aloysia gratissima)	No				
1988-97   Cocklebur (Xanthium strumarium)   No     1994-96   Rattlebox (Sechania spp.)   Yes     1994-96   Rattlebox (Sechania spp.)   Yes     1995-2005   Prickly pear (Onjumic spp.)   No     1996-2005   Tropical soda apple (Solamun viarum)   Yes     1998-2000, 2017-2019   Flaskeaf flea bane (Conyza spp.)   No     1998-2000, 2017-2019   Brazilian peper (Schimus terebinthylidia)   Yes     2003-11, 2015-20   Cabomba (Cabomba caroliniana)   Yes     2004-17   Brazilian waterweed (Egeria dense)   Yes     2004-18   Ratilian waterweed (Egeria dense)   Yes     2005-10   Balloon vine (Cardiospermum grandiflorum)   Yes     2005-2008   Barbados gooseberry (Pereskia aculeata)   No     2005-19   Pompon weed (Campuloclinium macrocephalm)   No     2006-11   Balloon vine (Cardiospermum grandiflorum)   No     2006-10   Lippia (Phyla canescens)   No     2011-16   Cardiospermum grandiflorum   Yes     2011-202   Silverleaf nightshade (Solamum elacagnifolum)   No     2011-202   Bellyache Bush (Jatropha gossypifolta)   Yes     2018-present   Pennya grass (Cortaderia selloma)   No     2019-present   Stinking passionflower (Passifora foetida)   No     2019-present   Pennya grass (Cortaderia selloma)   No     2019-present   Pennya grass	1978-87		Yes				
1976-78, 1993-2003   Cresosote bush (Larrea tridentata)   No							
1994-96   Rattlebox (Sechania spp.)   Yes							
1996-97	· ·	,					
1996-2005   Tropical soda apple (Solamun viarum)   Yes		( 11 /					
1998-2000, 2017-2019							
Brazilian pepper (Schimus terebinhifolia)   Yes							
2003-11, 2015-20         Cabomba (Cabomba (Cabomba arabiniana)         Yes           2004-17         Brazilian waterweed (Egeria densa)         Yes           2004-18         Madeira vine (Amedera cordifolia)         Yes           2005-10         Balloon vine (Cardioxpermum grandifforum)         Yes           2005-2008         Barbados gooseberry (Pereskia aculeata)         No           2006-11         Lippia (Phyla canescens)         No           2007         Cat's claw (Dolichandra unguis-cati)         No           2017-2022         Silverleaf nightshade (Solanum elaeagnifolium)         No           2018-2022         Bellyache Bush (Jaropha gossyptifolia)         Yes           2018-present         Panpas grass (Cortaderia selloana)         No           2018-present         Pallow-flag first (Iris pseudacorus)         No           2018-present         Yellow-flag first (Iris pseudacorus)         No           2018-present         Stinking passionflower (Passiffora foettala)         No           2021-present         Blue heliotrope (Heliotropium anplexicaule)							
2004-17         Brazilian waterweed ( <i>Egeria densa</i> )         Yes           2004-08         Madeira vine ( <i>Annedera cordifolia</i> )         Yes           2005-10         Balloon vine ( <i>Cardiospermum grandiforum</i> )         Yes           2005-2008         Barbados gooseberry ( <i>Pereskia aculeata</i> )         No           2005-19         Pompon weed ( <i>Campuloclinium macrocephalum</i> )         No           2007-11         Lippia ( <i>Phyla canescens</i> )         No           2007-12         Car's claw ( <i>Dolichandra unguis-cati</i> )         No           2011-16         Chromolaena ( <i>Chromolaena odorata</i> )         Yes           2018-2022         Bellyache Bush ( <i>Ataropha gossynjifolia</i> )         No           2018-present         Pampas grass ( <i>Cortaderia selloana</i> )         No           2018-present         Pampas grass ( <i>Cortaderia selloana</i> )         No           2018-present         Salticedar ( <i>Tamarix</i> sp.)         No           2018-present         Yellow-flag Iris ( <i>Iris pseudacorus</i> )         No           2012-present         Stinking passionillower ( <i>Peassifora foetida</i> )         No           2012-present         Blue heliotrope ( <i>Heliotropium amplexicaule</i> )         No           1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes     <	2003-2020	1 11 \					
2004-08         Madeira vine (Amedera cordifolia)         Yes           2005-11         Balloon vine (Cardiospermum grandiflorum)         Yes           2005-2008         Barbados gooseberry (Pereskia aculeata)         No           2005-19         Pompon weed (Campuloclinium macrocephalum)         No           2006-11         Lippia (Phyla canescers)         No           2007         Cat's claw (Dolichandra unguis-cati)         No           2011-16         Chromolaena (Chromolaena odorata)         Yes           2011-2022         Silverleaf nightshade (Solanum elaeaganfolium)         No           2018-present         Pampas grass (Cortaderia sellonan)         No           2018-present         Pampas grass (Cortaderia sellonan)         No           2018-present         Saltecdar (Tamarix spp.)         No           2018-present         Stinking passionflower (Passifora foetida)         No           2019-present         Stinking passionflower (Passifora foetida)         No           2011-present         Stinking passionflower (Passifora foetida)         No           1971-74         Grasshopper parasitoids and pathogens         No           1971-74         Grasshopper parasitoids and pathogens         No           1971-74         Grasshoper parasitoids and pathogens         No	2003-11, 2015-20	Cabomba (Cabomba caroliniana)	Yes				
2005-10         Balloon vine (Cardiospermum grandiflorum)         Yes           2005-2008         Barbados gooseberry (Pereskia aculeata)         No           2005-19         Pompon weed (Campuloclinium macrocephalum)         No           2007         Ca's claw (Dolchandra unguis-catt)         No           2011-16         Chromolaena (Chromolaena odorata)         Yes           2011-2022         Silverleaf nightshade (Solanum elaeagnifolium)         No           2018-2022         Bellyache Bush (Jatropha gossypitfolia)         Yes           2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Saltecdar (Tamarix spp.)         No           2018-present         Yellow-flag Iris (Iris pseudacorus)         No           2019-present         Stinking passionlowet (Passiflora foetida)         No           2019-present         Blue heliotrope (Heliotropium amplexicaule)         No           Period         Target         Release of biocontrol agents (Yes/No)           Period         Target         Release of biocontrol agents (Yes/No)           1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda) <t< td=""><td>2004-17</td><td>Brazilian waterweed (Egeria densa)</td><td>Yes</td></t<>	2004-17	Brazilian waterweed (Egeria densa)	Yes				
2005-2008         Barbados gooseberry (Pereskia aculeata)         No           2005-19         Pompon weed (Campuloclinium macrocephalum)         No           2006-11         Lippia (Phyla canaceus)         No           2007         Ca's claw (Dolichandra unguis-cati)         No           2011-16         Chromolaena (Chromolaena odorata)         Yes           2017-2022         Silverleaf nightshade (Solanum elaeagnifolium)         No           2018-2022         Bellyache Bush (Jatropha gossyptifolia)         Yes           2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Salicedar (Tamarix spp.)         No           2018-present         Stinking passionflower (Passiflora foetida)         No           2019-present         Stinking passionflower (Passiflora foetida)         No           2019-present         Blue heliotrope (Heliotropium amplexicaule)         No           1979-resent         Grasshoper parasitoids and pathogens         No           1971-74         Grasshoper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1988-resent         Filth flies         No	2004-08	Madeira vine (Anredera cordifolia)	Yes				
Darbados gooseberry (Pereskia aculeata)   No	2005-11	Balloon vine (Cardiospermum grandiflorum)	Yes				
2005-19         Pompon weed (Campulocilnium macrocephalum)         No           2006-11         Lippia (Phyla canescens)         No           2007         Ca's claw (Dolichandra unguis-cati)         No           2011-16         Chromolaena (Chromolaena odorata)         Yes           2018-2022         Sellveleaf nightshade (Solanum elaeagnifolium)         No           2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Saltecdar (Tamarix spp.)         No           2018-present         Y ellow-flag lris (Iris pseudacorus)         No           2018-present         Stinking passionflower (Passiflora foetida)         No           2019-present         Blue heliotrop (Heliotropium amplexicaule)         No           2021-present         Blue heliotrop (Heliotropium amplexicaule)         No           1979-1989         Tasets         Release of biocontrol agents (Ves/No)           1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1987-present         Fire ants (Solenopsis spp.)         Yes <td></td> <td></td> <td>No</td>			No				
2006-11         Lippia (Phyla camescens)         No           2007         Cat's claw (Dolichandra unguis-cati)         No           2011-16         Chromolaena (Chromolaena odorata)         Yes           2017-2022         Silverleaf nightshade (Solanum elaeagnifolium)         No           2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Salteedar (Tamarix spp.)         No           2018-present         Yellow-llag firs (Iris pseudacorus)         No           2019-present         Stinking passionflower (Passiflora foetida)         No           2021-present         Blue heliotrope (Heliotropium amplexicaule)         No           Period         Target         Release of biocontrol agents (Yes/No)           1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1988-1992         Fire ants (Solenopsis spp.)         Yes           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-2005         Roo							
2007         Cat's claw (Dolichandra unguis-cati)         No           2011-16         Chromolaena (Chromolaena odorata)         Yes           2017-2022         Silverleaf nightshade (Solanum elaeagnifolium)         No           2018-present         Bellyache Bush (Jatropha gossypiifolia)         Yes           2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Yellow-flag iris (Iris pseudacorus)         No           2019-present         Stinking passionflower (Passiflora foetida)         No           2021-present         Blue heliotrope (Heliotropium amplexicaule)         No           Period         Target         Release of biocontrol agents (Yes/No)           1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1987-present         Fire ants (Solenopsis spp.)         Yes           1988-1992         Filth flies         No           1988-1992         Filth flies         No           1993-96         Bollworm (Heliothis spp.)         No           1993-96         Melonworm moth (Diaphania spp.)         No           1999-2003         Lygus							
2011-16         Chromolaena (Chromolaena odorata)         Yes           2017-2022         Silverleaf nightshade (Solanum elaeagnifolium)         No           2018-2022         Bellyache Bush (Latropha gossprifolia)         Yes           2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Salteedar (Tamarix spp.)         No           2018-present         Yellow-lag Iris (fire speudacorus)         No           2019-present         Stinking passionflower (Passiflora foetida)         No           2019-present         Blue heliotrop (Heliotropium amplexicaule)         No           Period         Target         Release of biocontrol agents (Yes/No)           Post of Target         Release of biocontrol agents (Yes/No)           Post of Target         Release of biocontrol agents (Yes/No)           Post of Target         Release of biocontrol agents (Yes/No)           Post o							
2017-2022         Silverleaf nightshade (Solanum elaeagnifolium)         No           2018-2022         Bellyache Bush (Jatropha gossypiifolia)         Yes           2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Saltcedar (Tamarix spp.)         No           2018-present         Yellow-flag Iris (Iris pseudacorus)         No           2019-present         Stinking passionflower (Passiflora foetida)         No           2021-present         Blue heliotrope (Heliotropium amplexicaule)         No           Proferior         Target         Release of biocontrol agents (Yes/No)           Proferior         Target         Release of biocontrol agents (Yes/No)           1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Pung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1988-1992         Fire ants (Solenopsis spp.)         Yes           Insects           Insects           Insects           Insects           1983-96         Bollworms (Heliothis spp.)         No           1993-205         Rootworms (Diabrotica spp.)         N		` ,					
2018-2022         Bellyache Bush (Jatropha gossypitfolia)         Yes           2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Saltecdar (Tamarix spp.)         No           2018-present         Yellow-flag Iris (Iris pseudacorus)         No           2019-present         Blue heliotrop (Heliotroptum amplexicaule)         No           Target         Release of biocontrol agents (Yes/No)           Insects           1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1980-81         Velvetbean caterpillar (Anticarsia gemmatalis)         No           1987-present         Fire ants (Solenopsis spp.)         Yes           Insects           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-96         Melonworm moth (Diaphania spp.)         No           1993-205         Rootworms (Diabrotica spp.)         No           1993-206         Rootworms (Diabrotica spp.)         No           1999-2003         Lygus bugs (Lygus spp.)							
2018-present         Pampas grass (Cortaderia selloana)         No           2018-present         Saltecdar (Tamarix spp.)         No           2018-present         Yellow-flag Iris (Iris pseudacorus)         No           2019-present         Stinking passionflower (Passiflora foetida)         No           2021-present         Blue heliotrope (Heliotropium amplexicaule)         No           Period         Target         Release of biocontrol agents (Yes/No)           Insects           1971-74         Grasshopper parasitoids and pathogens         No           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1980-81         Velvetbean caterpillar (Anticarsia gemmatalis)         No           1987-present         Fire ants (Solenopsis spp.)         Yes           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-96         Melonworm moth (Diaphania spp.)         No           1993-2005         Rootworms (Diabrotica spp.)         No           1993-2006         Rootworms (Diabrotica spp.)         No           2001-present         Cactus moth (Cactoblastis cactorum)         No           2001-present         Glassy-winged sharpshooter (Ho							
Salteedar (Tamarix spp.)   No							
2018-present         Yellow-flag Iris (Iris pseudacorus)         No           2019-present         Stinking passionflower (Passiflora foetida)         No           2021-present         Blue heliotrope (Heliotropium amplexicaule)         No           Period         Target         Release of biocontrol agents (Yes/No)           Insects           1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1980-81         Velvetbean caterpillar (Anticarsia gemmatalis)         No           1987-present         Fire ants (Solenopsis spp.)         Yes           Insects           Insects           Insects           Insects           Insects           Insects           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-97         No         No           1993-2005         Rootworms (Diabrotica spp.)         No           1993-2005         Rootworms (Diabrotica spp.)         No <t< td=""><td>•</td><td></td><td></td></t<>	•						
2019-present         Stinking passionflower (Passiflora foetida)         No           2021-present         Blue heliotrope (Heliotropium amplexicaule)         No           Period         Target         Release of biocontrol agents (Yes/No)           Insects           1971-74         Grasshopper parasitoids and pathogens         No           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1980-81         Velvetbean caterpillar (Anticarsia gemmatalis)         No           1987-present         Fire ants (Solenopsis spp.)         Yes           Insects           Insects           Insects           No           1983-96         Bollworms (Heliothis spp.)         No           1993-96         Melonworm moth (Diaphania spp.)         No           1999-2003         Lygus bugs (Lygus spp.)         No           2001-present         Cactus moth (Cactoblastis cactorum)         No           2003-12         Glassy-winged sharpshooter (Homalodisca vitripennis)         No           2003-22         Little fire ant (Wasmannia auropunctata)         No           2010-present	2018-present		No				
2021-present         Blue heliotrope (Heliotropium amplexicaule)         No           Period         Target         Release of biocontrol agents (Yes/No)           1971-74         Grasshopper parasitoids and pathogens         No           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1980-81         Velvetbean caterpillar (Anticarsia gemmatalis)         No           1987-present         Fire ants (Solenopsis spp.)         Yes           Insects           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-96         Melonworm moth (Diaphania spp.)         No           1993-90         Rootworms (Diabrotica spp.)         No           1993-2005         Rootworms (Diabrotica spp.)         No           1999-2003         Lygus bugs (Lygus spp.)         No           2001-present         Cactus moth (Cactoblastis cactorum)         No           2003-12         Glassy-winged sharpshooter (Homalodisca vitripennis)         No           2003-22         Little fire ant (Wasmannia auropunctata)         No           2010-present         Harrisia cactus mealybug (Hypogeococcus spp.)         No           2011-present         Leaf-cutting ants (Atta spp. & Ac	2018-present	Yellow-flag Iris (Iris pseudacorus)	No				
Target         Release of biocontrol agents (Yes/No)           Insects           1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1987-present         Fire ants (Solenopsis spp.)         Yes           Insects           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-905         Rootworm (Diabrania spp.)         No           1999-2003         Lygus bugs (Lygus spp.)         No           2001-present         Cactus moth (Cactoblastis cactorum)         No           2003-12         Glassy-winged sharpshooter (Homalodisca vitripennis)         No           2003-05         Sunflower moth (Homoeosoma electellum)         No           2009-22         Little fire ant (Wasmania auropunctata)         No           2010-present         Harrisia cactus mealybug (Hypogeococcus spp.)         No           2010-present         Sunflower moth (Homoeosoma electellum)         No           2010-19         Leaf-cutting ants (Atta spp. & Acromyrmex spp.)         No           2013-19	2019-present	Stinking passionflower (Passiflora foetida)	No				
Target         Release of biocontrol agents (Yes/No)           Insects           1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1987-present         Fire ants (Solenopsis spp.)         Yes           Insects           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-905         Rootworm (Diabrania spp.)         No           1999-2003         Lygus bugs (Lygus spp.)         No           2001-present         Cactus moth (Cactoblastis cactorum)         No           2003-12         Glassy-winged sharpshooter (Homalodisca vitripennis)         No           2003-05         Sunflower moth (Homoeosoma electellum)         No           2009-22         Little fire ant (Wasmania auropunctata)         No           2010-present         Harrisia cactus mealybug (Hypogeococcus spp.)         No           2010-present         Sunflower moth (Homoeosoma electellum)         No           2010-19         Leaf-cutting ants (Atta spp. & Acromyrmex spp.)         No           2013-19	2021-present	Blue heliotrope ( <i>Heliotropium amplexicaule</i> )	No				
1971-74   Grasshopper parasitoids and pathogens   No   1979-1989   Dung fouling   Yes   1980-81, 2004-07, 2016-17   Fall armyorm (Spodoptera frugiperda)   No   1980-81   Velvetbean caterpillar (Anticarsia gemmatalis)   No   1987-present   Fire ants (Solenopsis spp.)   Yes   Tinsects   Tinsects	•		Release of biocontrol agents (Yes/No)				
1971-74         Grasshopper parasitoids and pathogens         No           1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1980-81         Velvetbean caterpillar (Anticarsia gemmatalis)         No           1987-present         Fire ants (Solenopsis spp.)         Yes           Insects           Insects           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-2005         Rootworms (Diabrotica spp.)         No           1999-2003         Lygus bugs (Lygus spp.)         No           2001-present         Cactus moth (Cactoblastis cactorum)         No           2003-12         Glassy-winged sharpshooter (Homalodisca vitripennis)         No           2003-05         Sunflower moth (Homoeosoma electellum)         No           2009-22         Little fire ant (Wasmannia auropunctata)         No           2010-present         Harrisia cactus mealybug (Hypogeococcus spp.)         No           2010-present         Harrisia cartus mealybug (Hypogeococcus spp.)         No           2011-pesent         Harrisia cartus mealybug (Hypogeococcus spp.)         No							
1979-1989         Dung fouling         Yes           1980-81, 2004-07, 2016-17         Fall armyworm (Spodoptera frugiperda)         No           1980-81         Velvetbean caterpillar (Anticarsia gemmatalis)         No           1987-present         Fire ants (Solenopsis spp.)         Yes           Insects           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-2005         Rootworm (Diabrotica spp.)         No           1999-2003         Lygus bugs (Lygus spp.)         No           2001-present         Cactus moth (Cactoblastis cactorum)         No           2003-12         Glassy-winged sharpshooter (Homalodisca vitripennis)         No           2003-05         Sunflower moth (Homoeosoma electellum)         No           2009-22         Little fire ant (Wasmannia auropunctata)         No           2010-present         Harrisia cactus mealybug (Hypogeococcus spp.)         No           2010-19         Leaf-cutting ants (Atta spp. & Acromyrmex spp.)         No           2013-19         Stink bugs (Pentatomidae)         No           2014-22         Tawny crazy ant (Nylanderia fulva)         No           2016-2018         CBC (Citrus variegated chlorosis) <t< td=""><td>1971-74</td><td></td><td>No</td></t<>	1971-74		No				
1980-81, 2004-07, 2016-17Fall armyworm (Spodoptera frugiperda)No1980-81Velvetbean caterpillar (Anticarsia gemmatalis)No1987-presentFire ants (Solenopsis spp.)YesInsects1988-1992Filth fliesNo1993-96Bollworms (Heliothis spp.)No1993-2005Rootworms (Diabratica spp.)No1999-2003Lygus bugs (Lygus spp.)No2001-presentCactus moth (Cactoblastis cactorum)No2003-12Glassy-winged sharpshooter (Homalodisca vitripennis)No2003-05Sunflower moth (Homoeosoma electellum)No2003-05Little fire ant (Wasmania auropunctata)No2010-presentHarrisia cactus mealybug (Hypogeococcus spp.)No2010-presentHarrisia cactus mealybug (Hypogeococcus spp.)No2010-19Leaf-cutting ants (Atta spp. & Acromyrmex spp.)No2013-19Stink bugs (Pentatomidae)No2014-22Tawny crazy ant (Nylanderia fulva)No2016-2018CBC (Citrus variegated chlorosis)No							
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Fire ants (Solenopsis spp.)         Yes           Insects           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-2005         Rootworms (Diabrotica spp.)         No           1999-2003         Lygus bugs (Lygus spp.)         No           2001-present         Cactus moth (Cactoblastis cactorum)         No           2003-12         Glassy-winged sharpshooter (Homalodisca vitripennis)         No           2003-05         Sunflower moth (Homoeosoma electellum)         No           2009-22         Little fire ant (Wasmannia auropunctata)         No           2010-present         Harrisia cactus mealybug (Hypogeococcus spp.)         No           2010-19         Leaf-cutting ants (Atta spp. & Acromyrmex spp.)         No           2013-19         Stink bugs (Pentatomidae)         No           2014-22         Tawny crazy ant (Nylanderia fiulva)         No           2016-2018         CBC (Citrus variegated chlorosis)         No							
Insects           1988-1992         Filth flies         No           1993-96         Bollworms (Heliothis spp.)         No           1993-96         Melonworm moth (Diaphania spp.)         No           1993-2005         Rootworms (Diabrotica spp.)         No           1999-2003         Lygus bugs (Lygus spp.)         No           2001-present         Cactus moth (Cactoblastis cactorum)         No           2003-12         Glassy-winged sharpshooter (Homalodisca vitripennis)         No           2003-05         Sunflower moth (Homoeosoma electellum)         No           2009-22         Little fire ant (Wasmannia auropunctata)         No           2010-present         Harrisia cactus mealybug (Hypogeococcus spp.)         No           2010-19         Leaf-cutting ants (Atta spp. & Acromyrmex spp.)         No           2013-19         Stink bugs (Pentatomidae)         No           2014-22         Tawny crazy ant (Nylanderia fiulva)         No           2016-2018         CBC (Citrus variegated chlorosis)         No							
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2016-2018 CBC (Citrus variegated chlorosis) No	2013-19		No				
	2014-22	Tawny crazy ant (Nylanderia fulva)	No				
	2016-2018	CBC (Citrus variegated chlorosis)	No				
	2021-present	HLB (Huanglonbing)	No				

Described species used as biocontrol agents	Target	Released country/year	Biocontrol success	Reference
Agasicles hygrophila Selman & Vogt (Coleoptera: Chrysomelidae)	Alternanthera philoxeroides (Mart.) Griseb. (Amaranthaceae)	USA, 1964/1979	Highly successful in Florida and warmer, coastal areas where the insects can overwinter, variable elsewhere. Not effective against plant terrestrial form.	Winston et al. 2024
A. hygrophila	A. philoxeroides	Australia, 1977 (Source: Ex. Argentina via USA)	Successful control of floating mats in New South Wales within two years of release. Provided control in Queensland within 10 months of redistribution. No effect in terrestrial habitat.	Winston et al. 2024
A. hygrophila	A. philoxeroides	Thailand, 1981 (Source: Ex. Argentina via USA (FL) via Australia)	Substantial control seasonally.	Winston et al. 2024
A. hygrophila	A. philoxeroides	China, 1981 (Source: Ex. Argentina via USA)	Impact vary by location. Provides good control of aquatic infestations in many rivers, ponds and lakes; causes heavy damage to terrestrial plants growing nearby but does not provide control.	Winston et al. 2024
A. hygrophila	A. philoxeroides	New Zealand, 1982 (Source: Ex. Argentina via USA (FL) via Australia)	Most effective in static water bodies in warm climates; efficacy restricted by low temperatures and flooding. Not able to attack terrestrial infestations.	Winston et al. 2024
<i>Lysathia cilliersae</i> Cabrera (Coleoptera: Chrysomelidae)	Myriophyllum aquaticum (Vell.) Verdc. (Haloragaceae)	South Africa, 1994 (Source: Ex. Brazil)	By 2014, had eradicated weed from 21% of sites, and is present and abundant at 90% of sites. Weed now considered under complete biological control and no additional agents needed.	Winston et al. 2024; Faltlhauser et al. 2025
A. hygrophila	A. philoxeroides	Puerto Rico, 1997 (Source: Ex. Argentina via USA)	Alligator weed has been successfully controlled by this agent.	Winston et al. 2024
<i>Lepidelphax pistiae</i> Remes Lenicov (Hemiptera: Delphacidae)	Pistia stratiotes L. (Araceae)	Argentina, 2011 (Redistributed in Argentina from Paraná River in Buenos Aires Province to lab culture to a reservoir in Buenos Aires Province).	Pistia stratiotes cover, biomass per square meter, and individual plant size decreased significantly within one year of release of Lepidelphax pistiae and Neohydronomus affinis, and other floating macrophytes later appeared. Within two years of release, P. stratiotes cover reduced to fraction of initial levels, and remained as such in 2017. Control attributed to both species.	Winston et al. 2024; Cabrera Walsh et al. 2017
Liothrips tractabilis Mound & Pereyra (Thysanoptera: Phlaeothripinae)	Campuloclinium macrocephalum (Less.) DC. (Asteraceae)	South Africa, 2013	Infested plants significantly shorter, produce fewer leaves and flowers, have lower above-ground dry mass. Populations continue to increase.	Winston et al. 2024; Mound & Pereyra 2008
Eueupithecia cisplatensis Prout (Lepidoptera: Geometridae)	Parkinsonia aculeata L. (Fabaceae)	Australia, 2013	Permanent populations were established at >60% of the release sites. Evaluation is ongoing and the full impacts may take up to a decade to become apparent.	Raghu et al. 2017
Eueupithecia vollonoides Hausmann (Lepidoptera: Geometridae)	Parkinsonia aculeata L. (Fabaceae)	Australia, 2014	Permanent populations were established at >60% of the release sites. Evaluation is ongoing and the full impacts may take up to a decade to become apparent.	Raghu et al. 2017
Coelocephalapion gandolfoi Kissinger (Coleoptera: Brentidae)	Neltuma (=Prosopis) spp. (Fabaceae)	South Africa, 2021	Too early to assess since agent's release	Winston et al. 2024

#### **DISCUSSION**

When biocontrol projects target species that are not of major economic or cultural importance in their native area, they often lead to the exploration of unknown trophic webs. Hence, researchers frequently come across organisms hitherto unknown to science, or associations never before observed, constituting novel contributions to the knowledge of biological diversity, species distribution, and trophic associations.

This is the case of many of the biocontrol projects undertaken at FuEDEI, where the targets are native plants and insects from South America that have become invasive elsewhere, or are closely related to South American species (Table I). As a result of the projects developed in FuEDEI, seven new species of insects were described and used as weed biocontrol agents (Table II). The impact of these biocontrol agents on target weed populations has been variable. For example, Agasicles hygrophila and Lysathia cilliersae Cabrera provided successful control of A. philoxeroides in USA, Puerto Rico and Australia, and Myriophyllum aquaticum (VeII.) Verdc. in South Africa respectively (Faltlhauser et al. 2025; Winston et al. 2024).

The impact of *Eueupithecia cisplatensis* Prout and *E. vollonoides* Hausmann spp. on *Parkinsonia aculeata* L. in Australia has not yet been definitively assessed (Raghu et al. 2017). And in the case of *Coelocephalapion gandolfoi* Kissinger, it is too early to make an assessment of the economic and ecological benefits of implementing the biological control program against *Neltuma* (=*Prosopis*) spp. in South Africa (Winston et al. 2024).

Few field and laboratory studies reach the depth of the methodology applied in biocontrol studies, where intensive sampling and rearing protocols, spread through large areas and several ecosystems, tend to provide full checklists of 1<sup>st</sup> to 3<sup>rd</sup>, or further, order in the food chain (Cabrera Walsh et al., 2023). An example of this is the Hymenoptera, which showed a clear predominance in the list of new species, almost all of them being parasitoids (Fig.1). This is not surprising, since these tend to be small, and thus more difficult to collect, and are usually only found when collecting and rearing their hosts in great numbers, an activity typical of biocontrol studies.

In addition, the implementation of biocontrol projects allowed us to study species that, although already described, when studied as potential biological control agents, made possible their redescription (Sosa et al., 2004; Hausmann et al., 2016).

Taxonomy and biocontrol are mutually reinforcing disciplines (Marvaldi, 2024; Shimbori et al., 2023), and this work is an example of that. The descriptions and/or redescriptions reported in this work would not have been possible without the taxonomists. Likewise, the existence of

biocontrol programs developed at FuEDEI promoted the study of these species and allowed the provision of valuable bionomic data, highlighting how the intensive testing and laboratory rearing typical of this discipline redounds in knowledge otherwise difficult to find (Cabrera et al., 2023). The fact that at least one Argentine entomologist was involved in the majority (59 %) of the descriptions and redescriptions compiled in this study is not only a source of pride, it also shows the degree of development and excellence achieved by the entomological discipline in our country throughout the first 100 years of the SEA.

#### **DATA STATEMENT**

The supplementary information that supports the findings of this study is openly available in Figshare at https://doi.org/10.6084/m9.figshare.28632233

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