

Commercial biological control: plenty of natural enemies, frustrating lack of uptake

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International Organization for Biological Control
IOBC

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Scope of presentation

- A shot of vitamin biological control
- Overview of developments in use of natural enemies in augmentative biological control
- Frustrations and possibilities for augmentative biological control



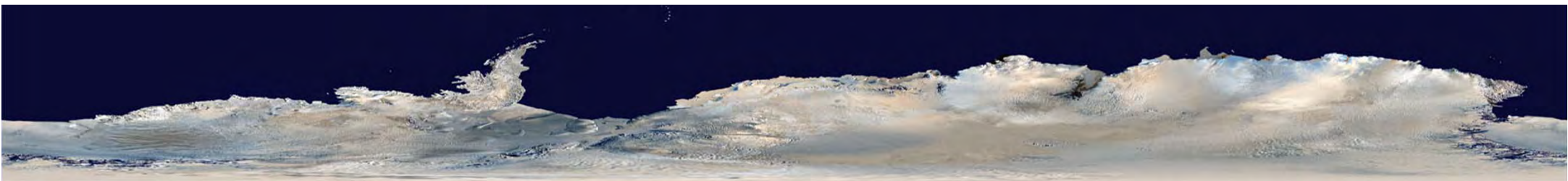
Shot of vitamin biological control: where does it work?



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Natural biological control, also in all agricultural areas, controls majority of potential pests free of costs



Shot of vitamin bico: Classical Biological Control

Classical biological control (CBC): use of exotic natural enemies to control exotic pests

CBC is used on 3.5 million km² (10% of land under culture)

CBC has benefit-cost ratio of 20-500 : 1



Classical Biological Control

Classical biological control (CBC): use of exotic natural enemies to control exotic pests

CBC is used on 3.5 million km² (10% of land under culture)

CBC has benefit-cost ratio of 20-500 : 1

When CBC works, it works forever:

Rodolia controls *Icerya*
worldwide for more
than 100 years in more than
50 countries;

+ 165 spp. in 150 countries



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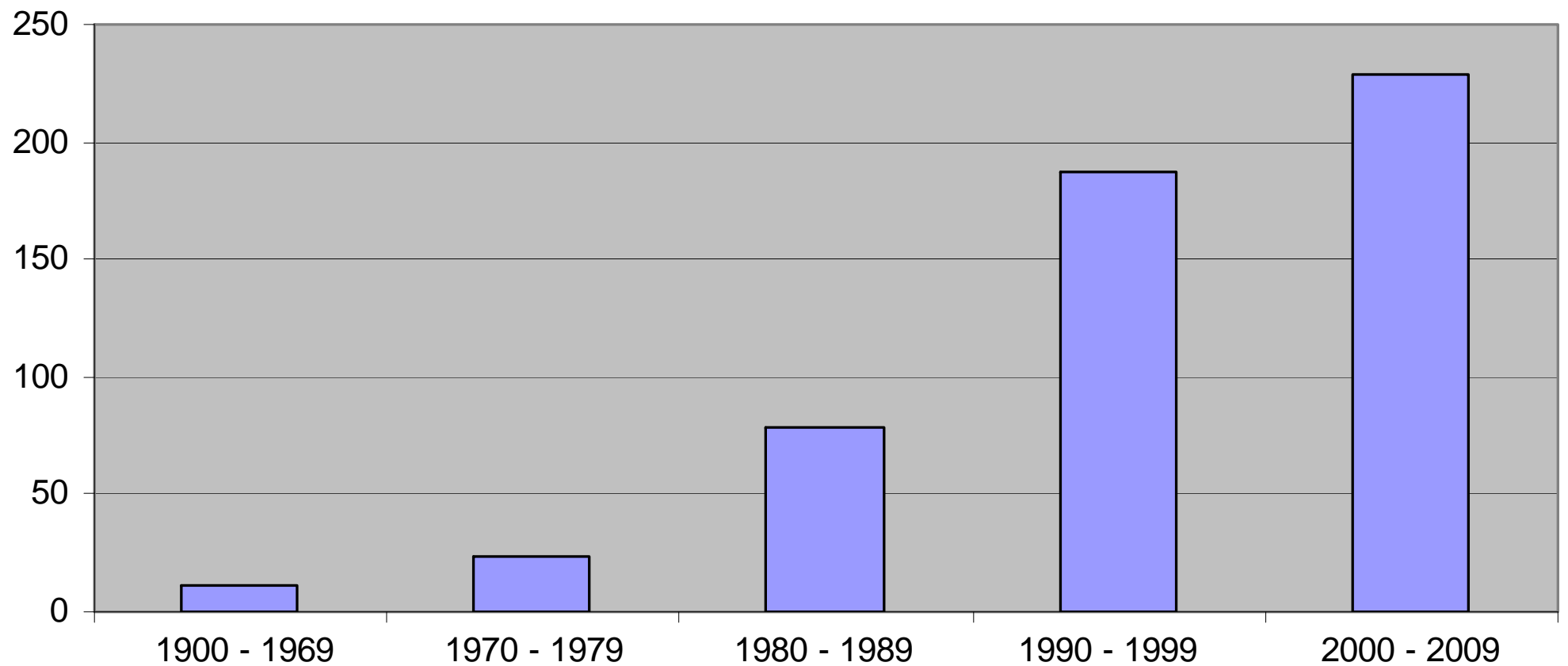
Augmentative Biological Control

Augmentative (=inundative) Biological Control (ABC): release of mass produced natural enemies (native or exotic) to control pest; often a commercial activity

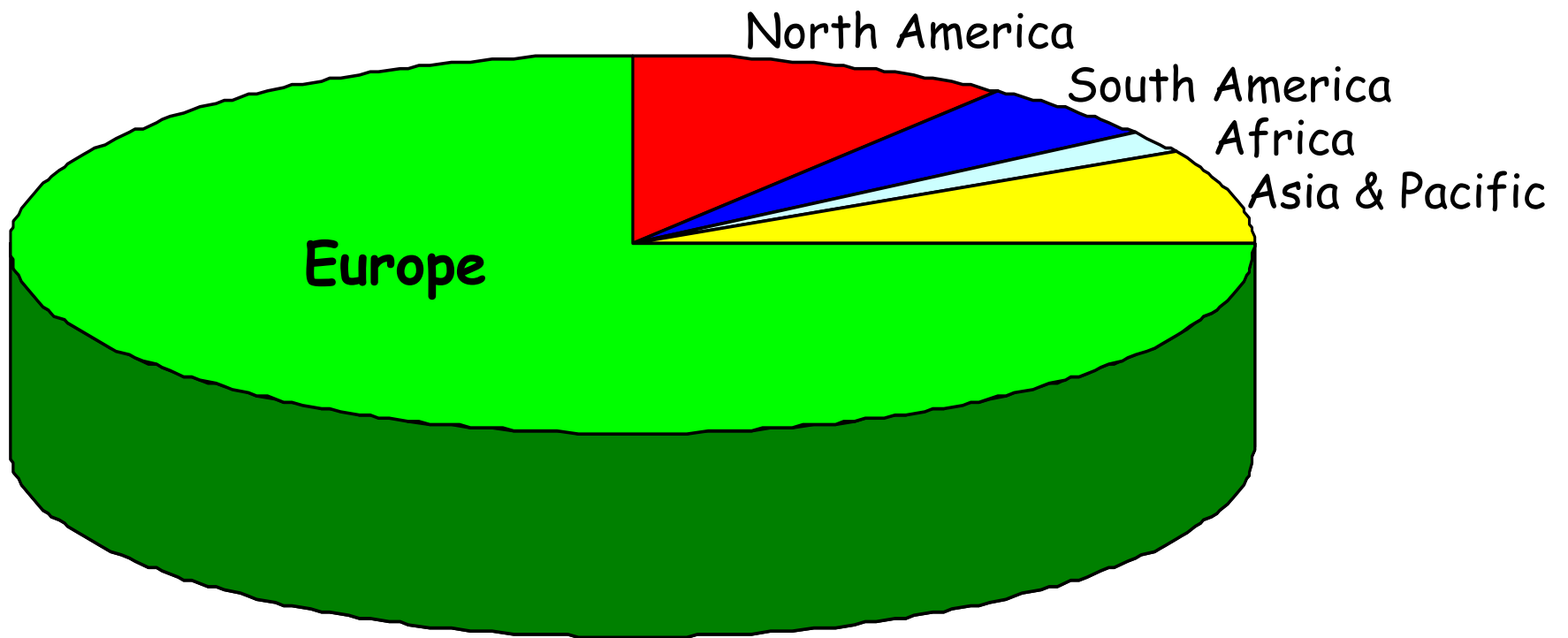
ABC is applied on 0.16 million km² (0.4 % of land under culture)



Enormous increase of commercially available natural enemy species since start of biocontrol

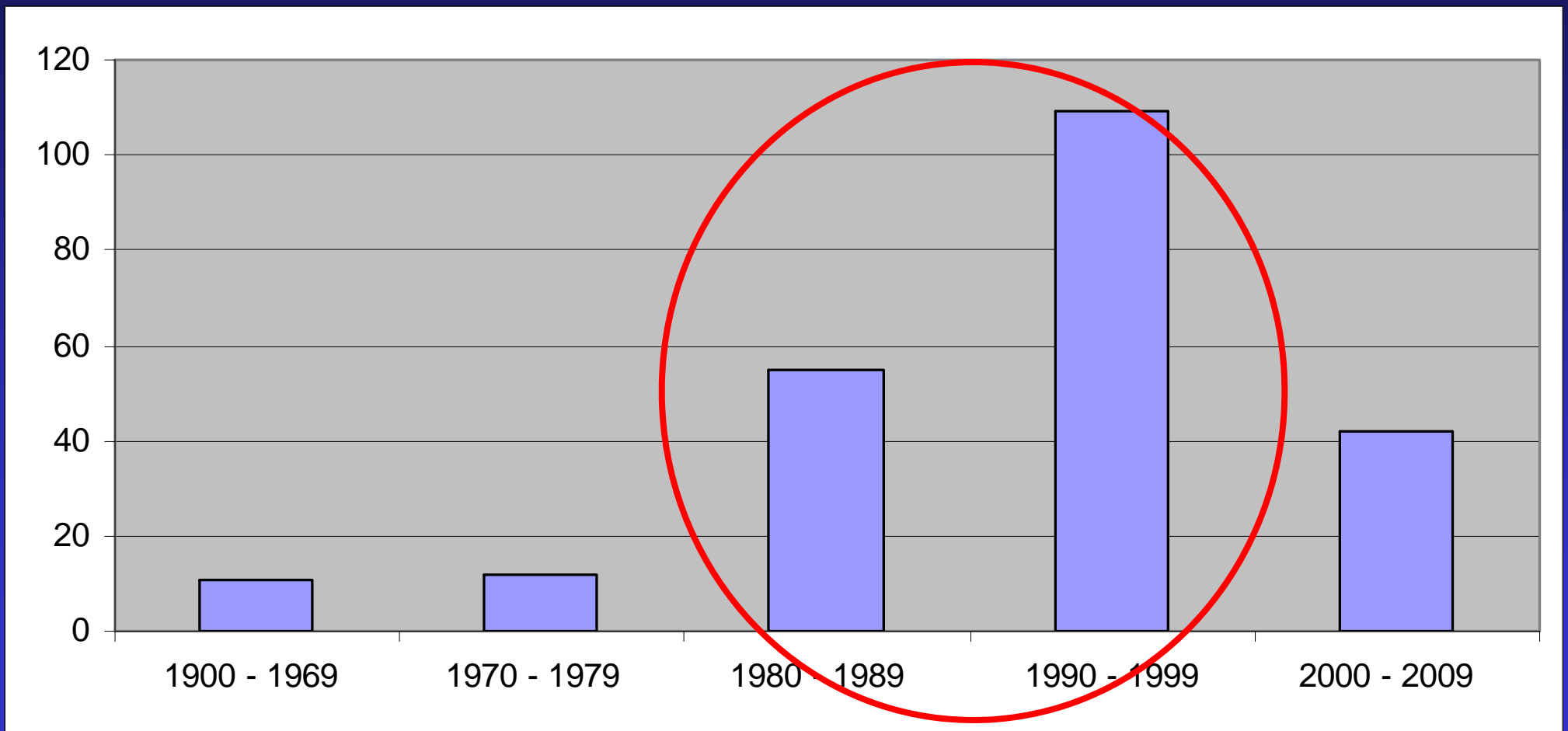


Market value of Augmentative Biological Control in different areas of the world (percentages, 2008)



Main commercial market of augmentative biological control: Europe

Strongest growth in period 1980 - 2000



Why strong increase in ABC agents from 1980 - 2000 ?

- Development of resistance to pesticides, search for natural enemies
- When using one natural enemy, need to use other natural enemies, use of pesticides kills natural enemies, development of IPM
- Health and environmental concerns about pesticides
- Clear benefits of biological control: harvest always possible, higher yields, safer for workers, more pleasant to apply, appreciated by consumers etc.

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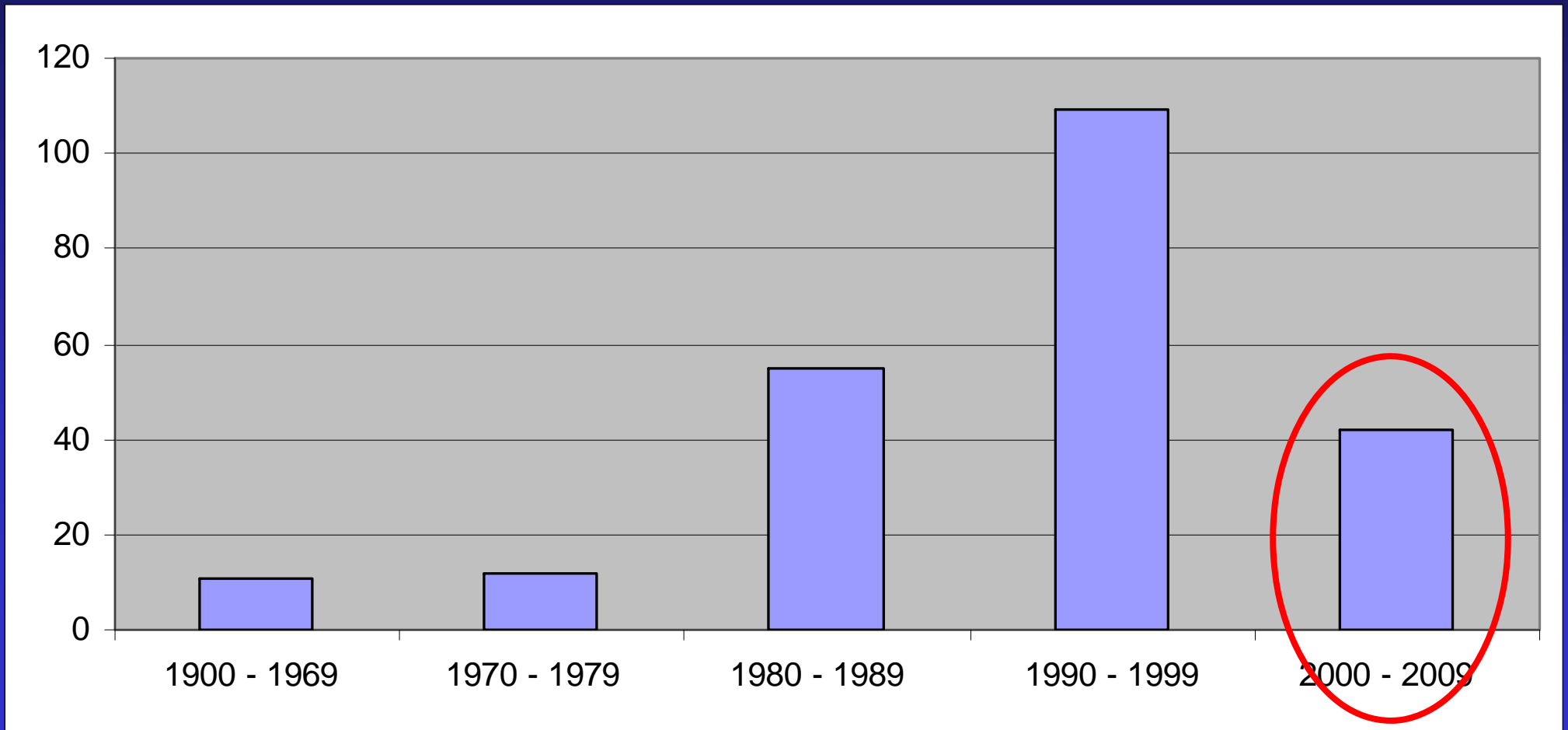
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Slow down of growth after 2000



Why fewer new ABC agents since 2000?

- For several crops, a complete set of natural enemies is available
- Stronger regulation of import and release of exotic natural enemies slows down use of exotics
- Most recent development: Access and Benefit Sharing regulations under Convention of Biological Diversity slows down / prevents use of exotics



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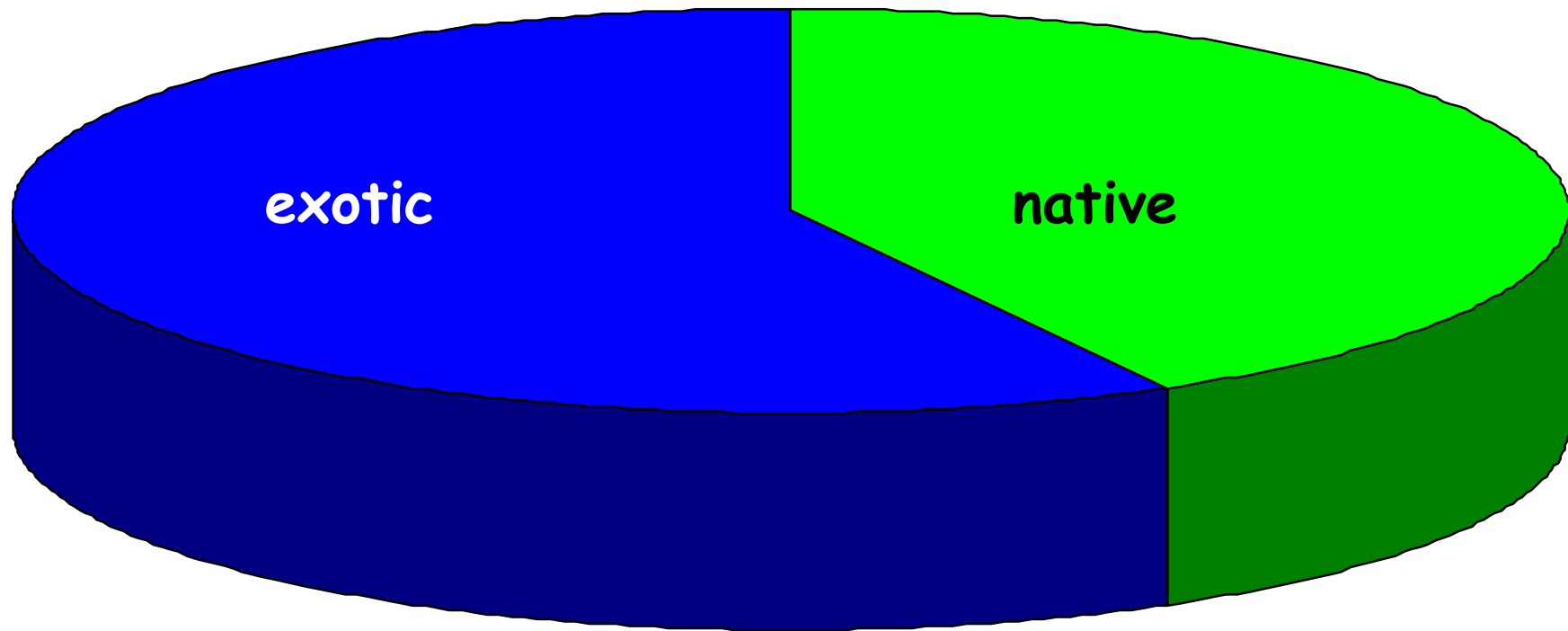
Recent development in search for new ABC agents

- Theory: search biocontrol agents in area of origin of pest
- Experience: natural enemies can also be found in new area where pest occurs (e.g. leafminers, whiteflies)
- New regulations stimulated search for natural enemies in new area of pest
- Shift in use from exotic to native (indigenous) agents

Before 1960 in Europe: ABC agents 100% exotic

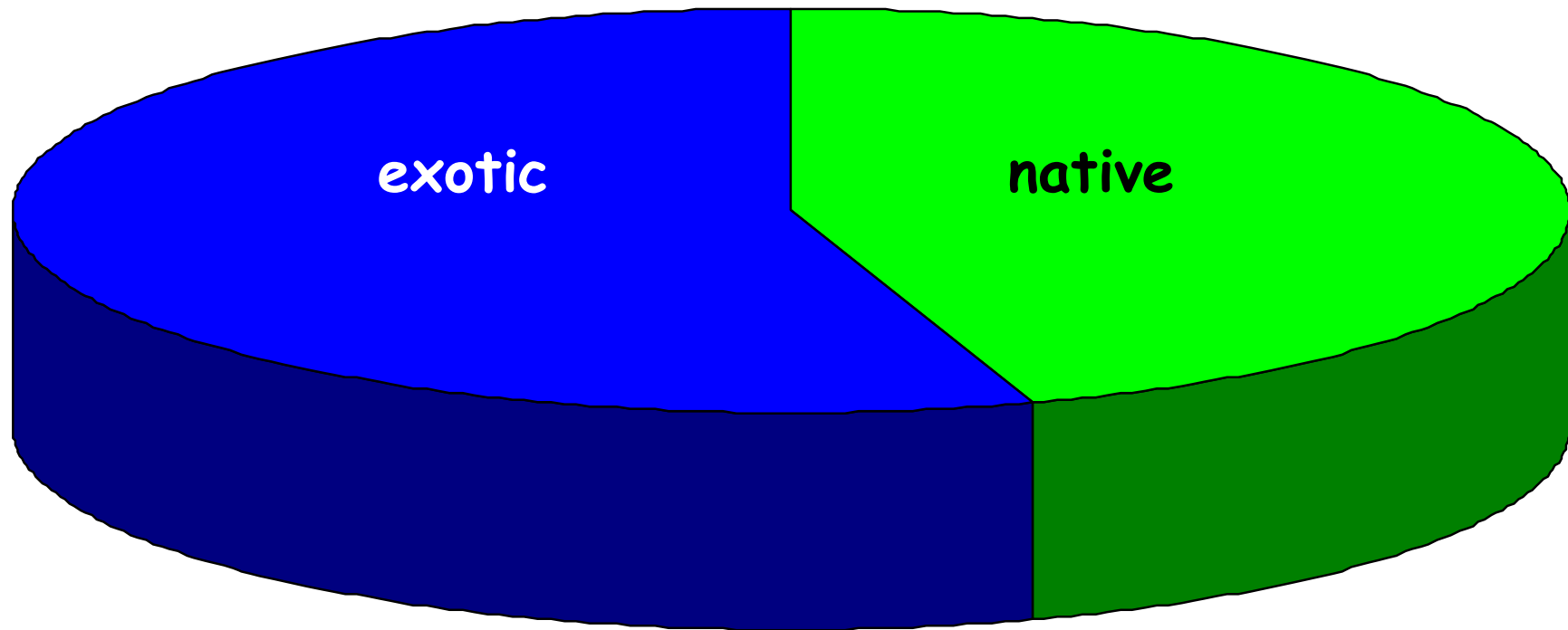
Use of new ABC agents 1960 - 1989

1960-1989: First use of exotic (blue) and indigenous (green) natural enemies in Augmentative Biological Control in Europe (n=55)



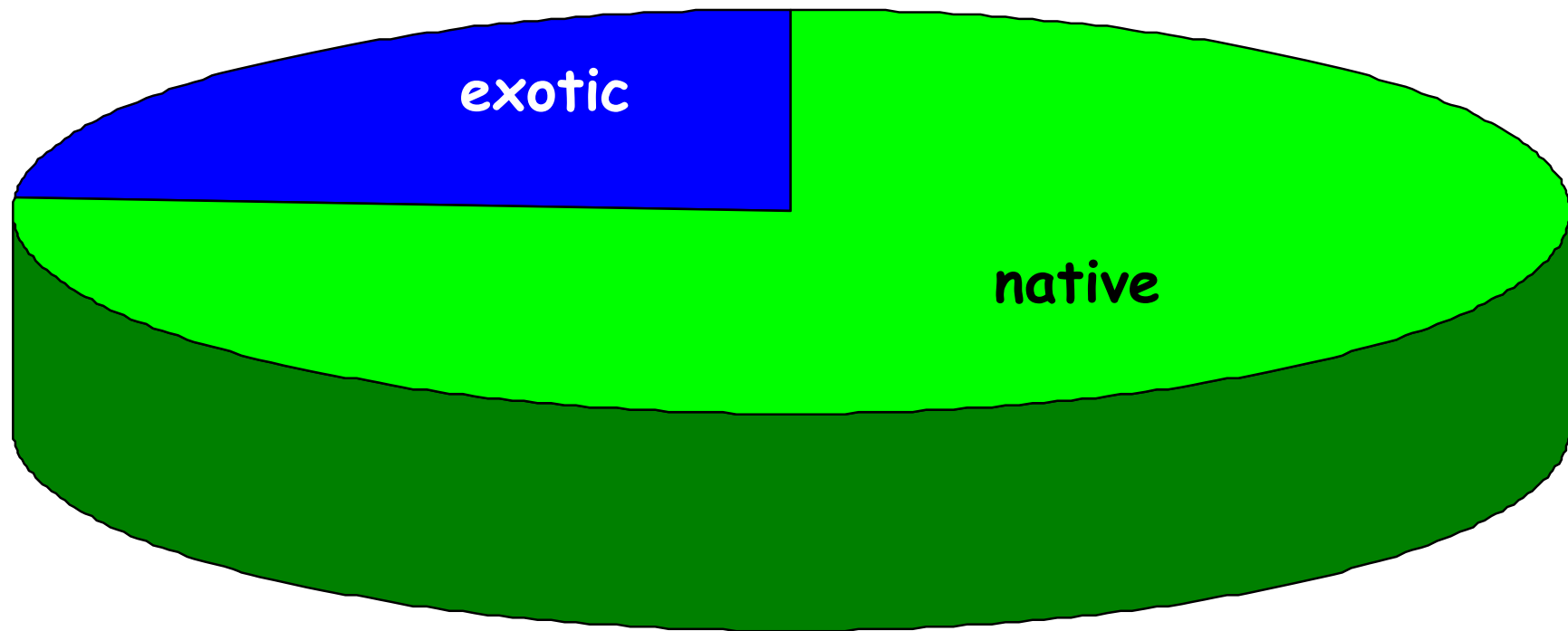
Use of new ABC agents 1990 - 1999

1990-1999: First use of exotic (blue) and indigenous (green) natural enemies in Augmentative Biological Control in Europe (n=72)



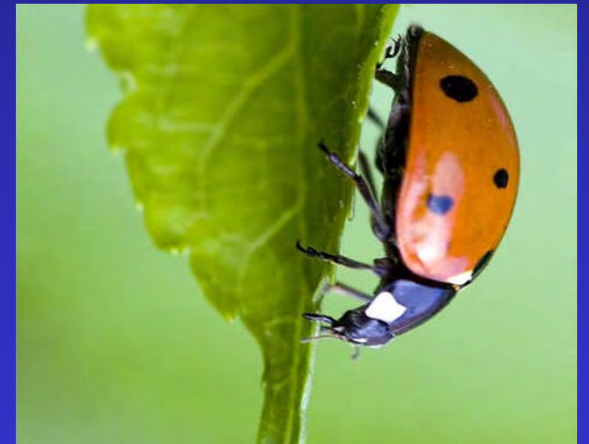
Use of new ABC agents 2000 - 2009

2000-2009: First use of exotic (blue) and indigenous (green) natural enemies in Augmentative Biological Control in Europe (n=25)



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Factors frustrating implementation of Biological Control

- Negative approach chemical industry: tales and lies about biological control; lobbying, advertising
- Pesticide addiction of farmers (is changing)
- Pesticide addiction of many crop cultivars since 1945 (is changing)
- Unnecessary complicated regulations concerning biological control
- Lacking governmentals support for research and application of biological control (is changing!!)
- Chemicals are still the preferred method



Factors frustrating implementation of Biological Control

- Negative approach chemical industry: tales and lies about biological control; lobbying, advertising
- Pesticide addiction of farmers (is changing)
- Pesticide addiction of many crop cultivars since 1945 (is changing)
- Unnecessary complicated regulations concerning biological control
- Lacking governmentals support for research and application of biological control (is changing!!)
- Biocontrol scientists are too kind, we should be more aggressive with lobbying and advertising; IBMA ????



Demand residue free
food, use biological
control
now !!



Factors stimulating implementation of Biological Control

In European Union:

- Decreased dependence on pesticides
- 750 of 1000 pesticides banned
- Application of substitution principle: choice for environmentally best product
- IPM compulsory for all farmers in 2014

Worldwide:

- IPM policies
- Food retailers demand residue free food
- Consumers prefer biological control

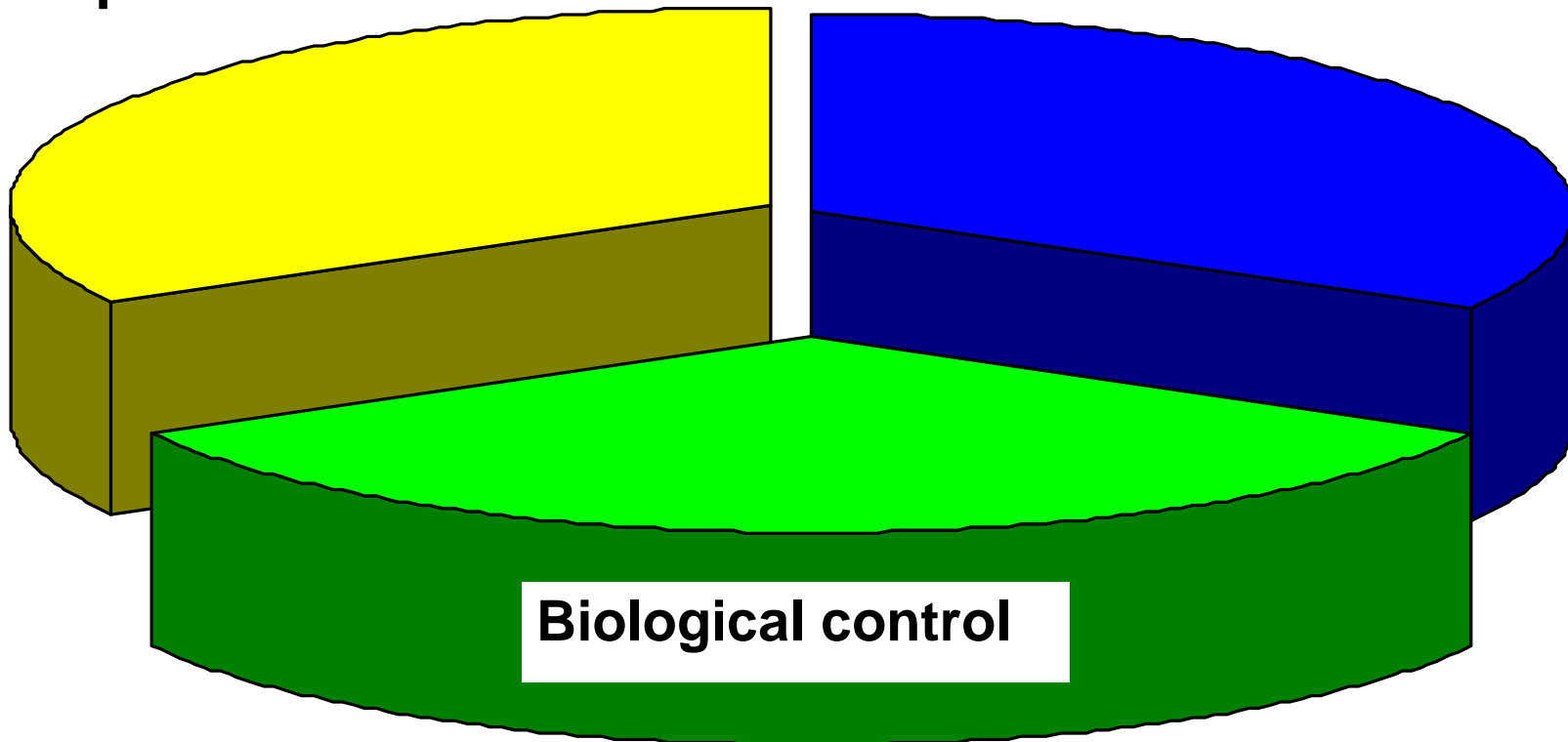


But we cannot solve all pest problems with Biological Control

Pest management in 2030

Host-plant resistance

IPM various methods



The state of commercial augmentative biological control: plenty of natural enemies, but a frustrating lack of uptake

Joop C. van Lenteren

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Abstract Augmentative biological control concerns the periodical release of natural enemies. In commercial augmentative biological control, natural enemies are mass-reared in biofactories for release in large numbers to obtain an immediate control of pests. The history of commercial mass production of natural enemies spans a period of roughly 120 years. It has been a successful, environmentally and economically sound alternative for chemical pest control in crops like fruit orchards, maize, cotton, sugar cane, soybean, vineyards and greenhouses. Currently, augmentative biological control is in a critical phase, even though during the past decades it has moved from a cottage industry to professional production. Many efficient species of natural enemies have been discovered and 230 are commercially available today. The industry developed quality control guidelines, mass production, shipment and release methods as well as adequate guidance for farmers. However, augmentative biological control is applied on a frustratingly small acreage. Trends in research and application are reviewed, causes explaining the limited uptake are discussed and ways to increase

application of augmentative biological control are explored.

Keywords Exotic natural enemies · Indigenous natural enemies · Trends in natural enemy use · Pesticide substitution · Access and benefit sharing in biological control

Introduction

Biological control is the use of an organism to reduce the population density of another organism. Biological control has been in use for about two millennia, and has become widely used in pest management since the end of the nineteenth century (DeBach 1964; van Lenteren and Godfray 2005). The following types of biological control can be distinguished: natural, conservation, inoculative (=classical) and augmentative biological control. Natural biological control is the reduction of pest organisms by their natural enemies and has been occurring since the evolution of the first terrestrial ecosystems some 500 million years ago. It takes place in all of the world's ecosystems without any human intervention, and, in economic terms, is the greatest contribution of biological control to agriculture (Waage and Greathead 1988). Conservation biological control consists of human actions that protect and stimulate the performance of naturally occurring natural enemies (Gurr and Wratten 2000). In inoculative biological control, natural enemies are collected in an

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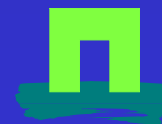
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INTERNATIONAL ORGANIZATION
for **BIOLOGICAL CONTROL**
of Noxious Animals and Plants



History of the first 50 Years (1956-2006)

Ernst F. Boller, Joop C. van Lenteren & Vittorio Delucchi (Editors)



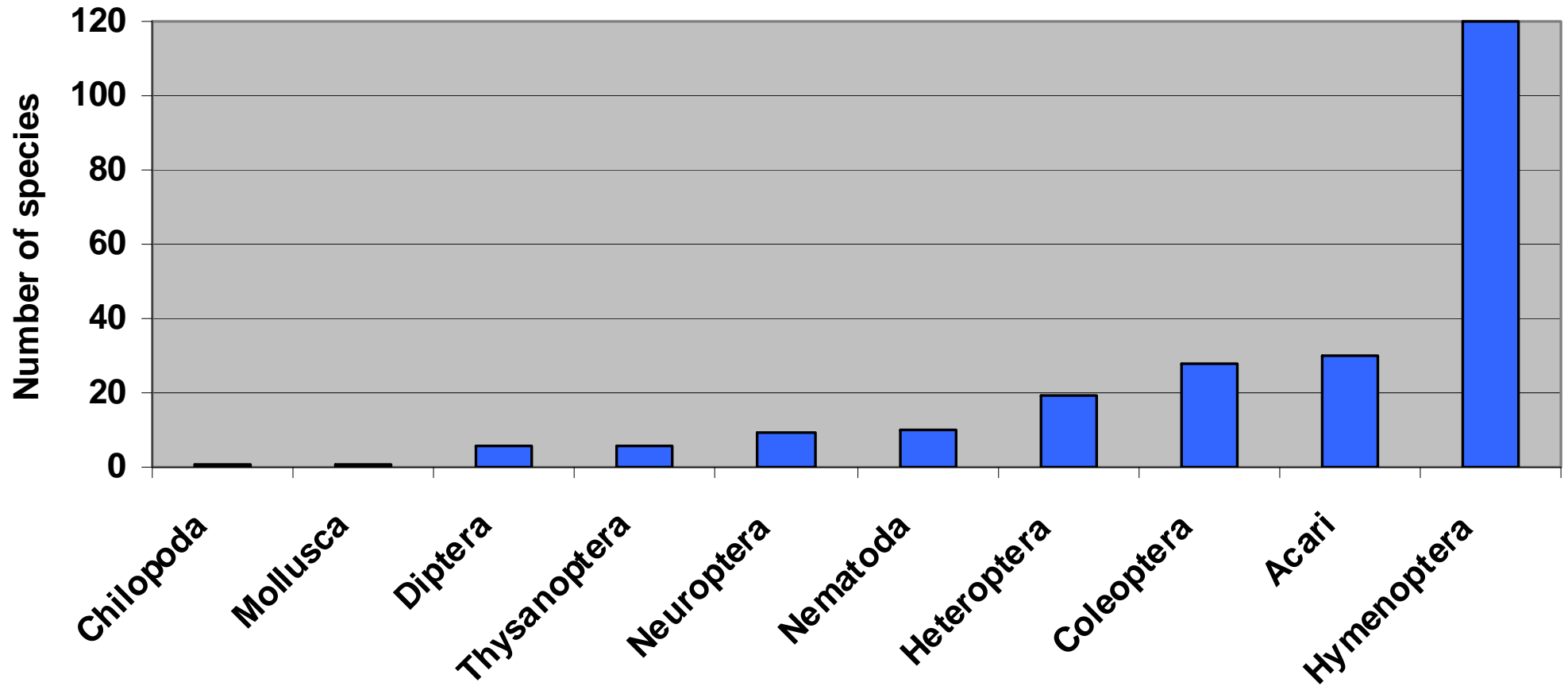
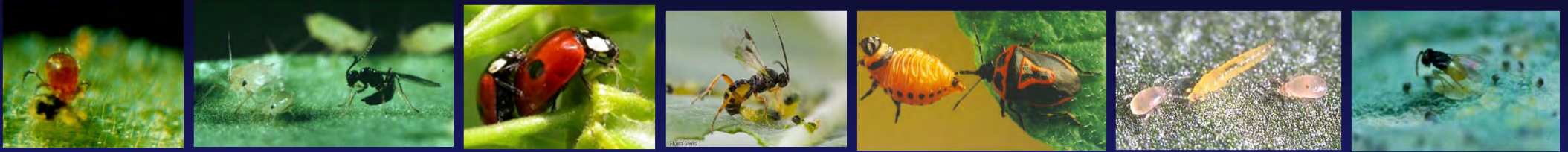
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We offer you our knowledge at www.IOBC-Global.org

We ask you to become member and share your experience with us: we need you !!

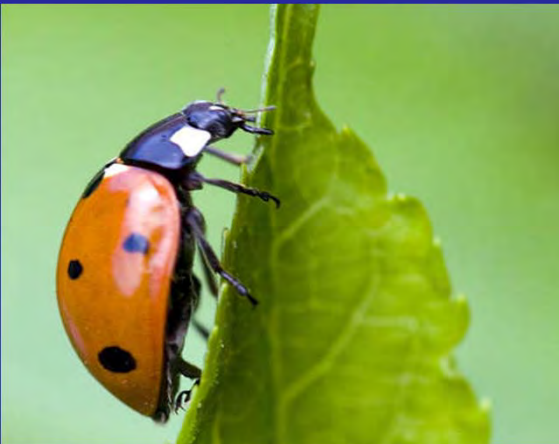


Taxonomic origin of ABC agents



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Overview of developments in augmentative biological control

- Enormous increase of commercially available natural enemy species
- Main commercial market: Europe

