An assortment of biocontrol agents and other organic plant protection tools for valuable and residue free crop production

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Intrachem Bio Italia

Background

- Pesticides withdrawal (due to EU re-registration process) strongly reduced the number of available active ingredients
- The number of pest populations resistant to chemical a.i.s is increasing
- Concerns about environmental impact of agriculture
- IPM is changing in order to adapt to this new situation

Background

- Consumers are slightly confused about what kind of food they have every day
- The meaning of IPM, organic agriculture, sustainable agriculture, etc. is difficult for them to understand

- However, consumers understand easily the meaning of:
  - WITHOUT CHEMICAL RESIDUES
  - WITH CHEMICAL RESIDUES

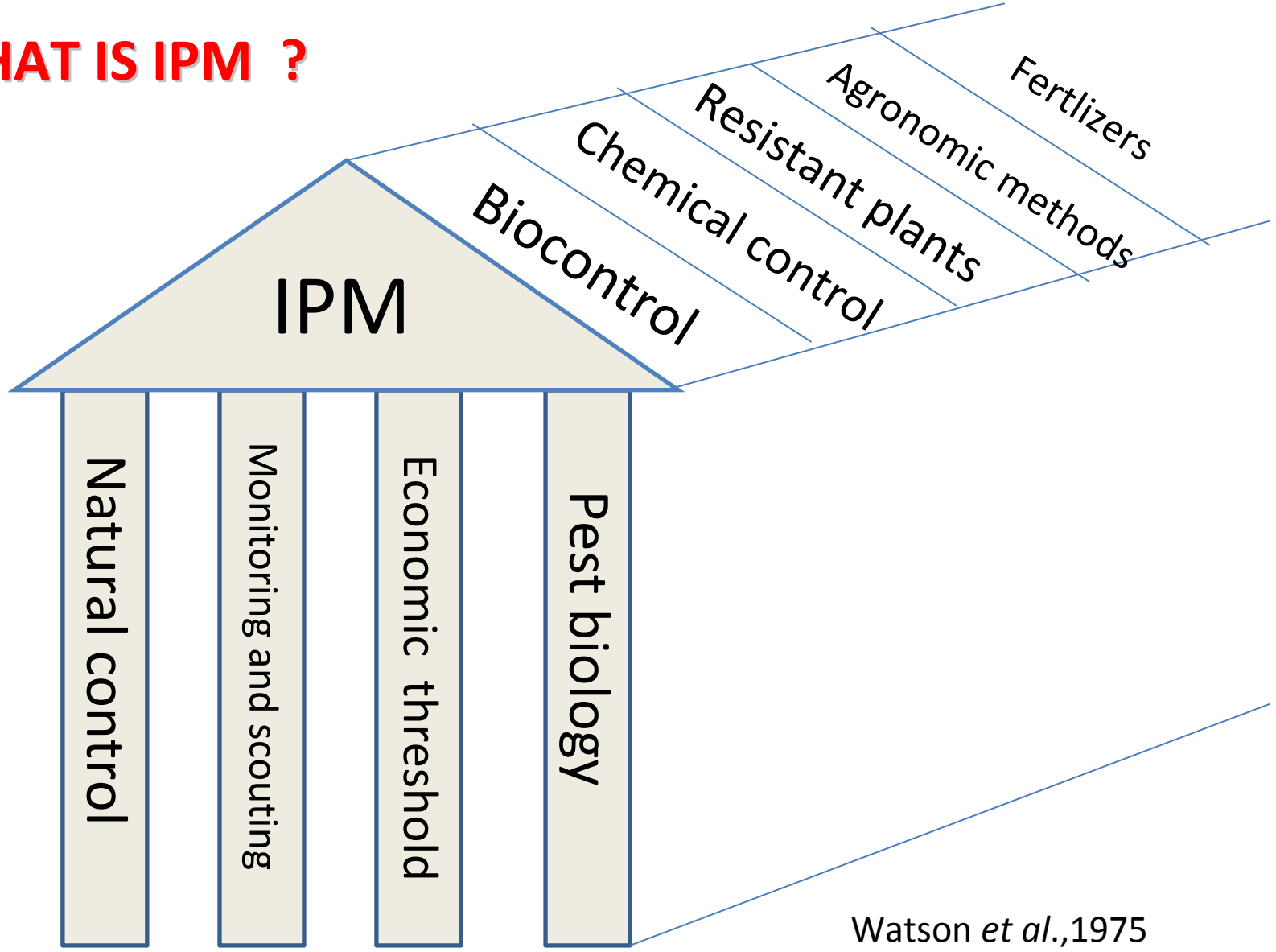
Background

- To fulfill consumers' requests, Supermarket chains are focusing their attention not only on the application of IPM strategies but also on chemical residue levels

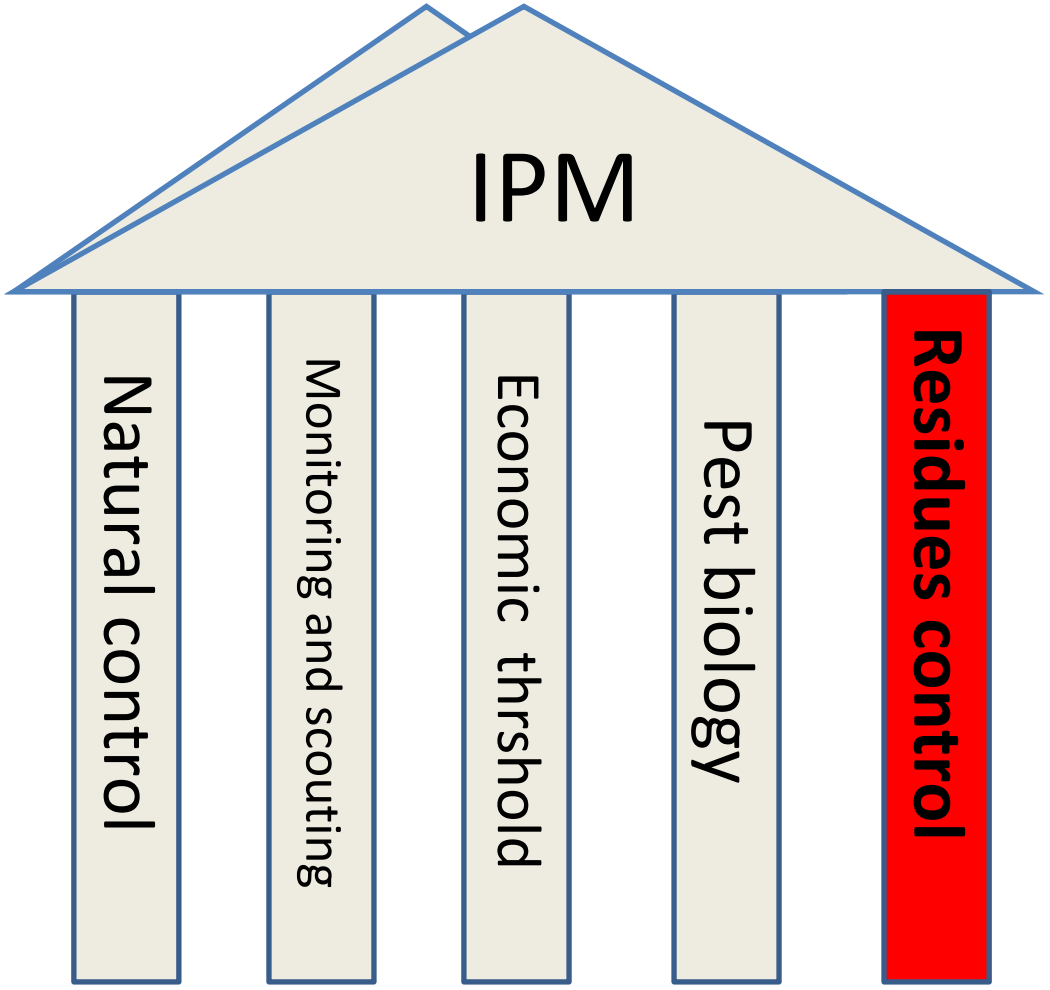
- Therefore, IPM has to change by including new technologies to reduce the levels of undesired residues

- BIOPESTICIDES (especially microbial control agents) can play a key-role in this context

WHAT IS IPM ?



Watson *et al.*,1975


IPM
Natural control
Monitoring and scouting
Economic thrshold
Pest biology
Residues control

- Organic Agriculture is considered to be the main market for Biopesticides
- In reality, in Italy more than 80-90% of Intrachem biopesticides sales go into "conventional agriculture"
- Biopesticides have always been considered "less effective" than standard chemical pesticides

70-80 % vs 99.9 %

The new IPM scenario

- Consumers are very concerned about food quality
- Supermarkets want IPM + controlled levels of residues (no more than 4, each not exceeding 25 % of LMR)
- EU rules = less chemical pesticides
- Chemical control has to face Resistance issues and pests resurgence
- Public opinion worried about agricultural pollution

- Something must change

Intrachem Bio Italia

- The Intrachem Group (and especially Intrachem Bio Italia) has been working on the development of a new IPM approach for more than 10 years
- Intrachem Bio Italia has one of the largest biopesticide portfolios in Europe
- Many of its biopesticides are based on microbial control agents
- Intrachem owns the intellectual property of *Btk* EG2348, *B. bassiana* and *A. quisqualis*

Intrachem's Biopesticides portfolio

- 14 insecticides
- 2 pheromone based control techniques
- 1 nematicide
- 6 fungicides
- Full range of Beneficials and Entomopathogenic Nematodes

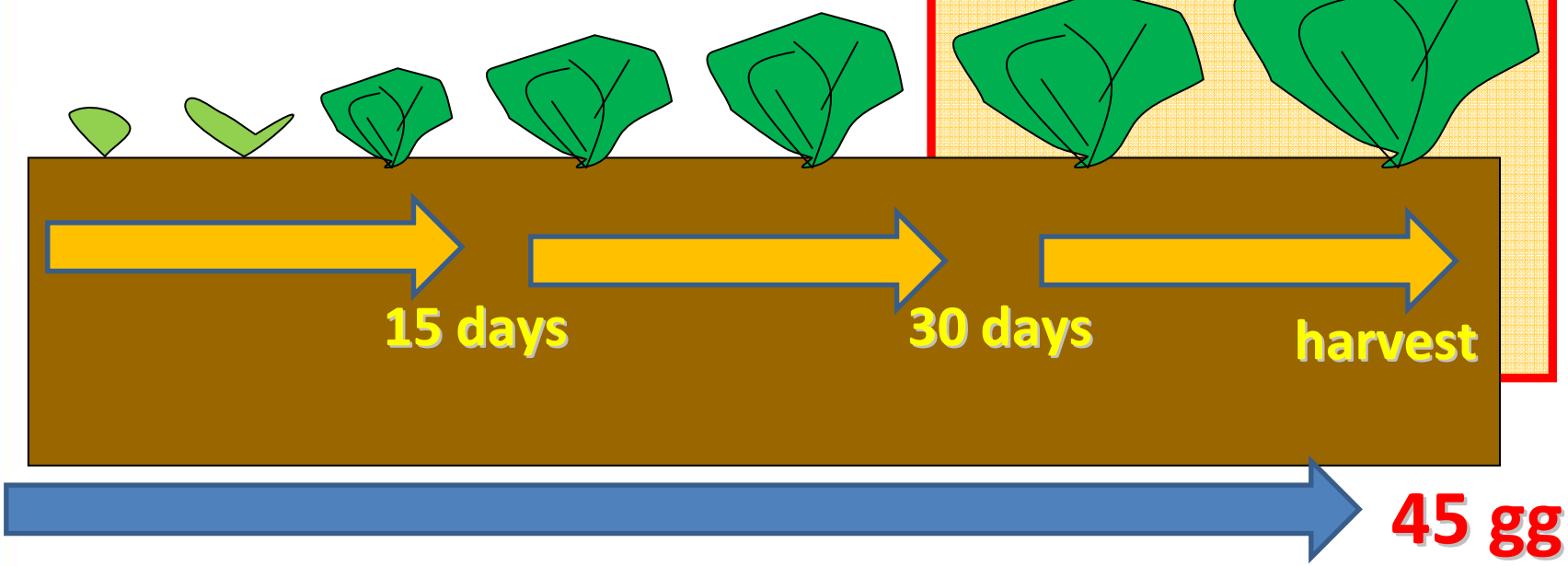
Why

- Intrachem Bio Italia has a unique product portfolio of microbial pesticides (and other products) which do not leave any residue on the crop
- *All "NO residue" biopesticides are authorized by the Italian Ministry of Health*

CONVENTIONAL TREATMENTS + BIOPESTICIDES (with increasing attention to residues)

AREA

NO RESIDUE



45 gg

Example; IPM strategy for whitefly control

Insecticides

Insecticide s

Insecticide s

Effica

95 %

B.bassiana

B.bassiana

Efficacy

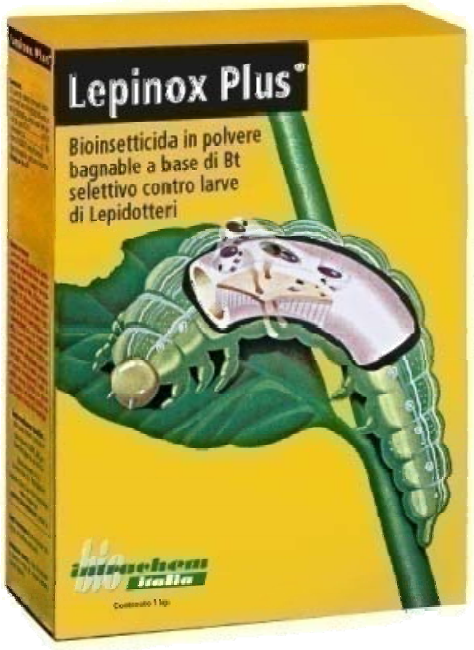
+ 80 %

Insecticides/nematicides

Formulated product	Active ingredient	Target
Lepinox Plus	***Bacillus thuringiensis* EG 2348**	Lepidoptera
Rapax	***Bacillus thuringiensis* EG 2348**	Lepidoptera
Wormox	***Bacillus thuringiensis* EG 2348**	Lepidoptera
Naturalis	***Beauveria bassiana ATCC74040***	Whiteflies, Thrips, Fruit flies, Spidermites, Wireworms
Madex	CpGV	Codling moth
Capex	AoGV	Summer fruit tortrix moth
Exosex CM	Autoconfusion	Codling moth
Ecotrap	Attract & Kill	Olive Fly
Nemasys, Nemaslug	EPNs	Various
Biobest	Beneficials	Various
Bioact WG	*Paecilomyces lilacinus* 251	Root knot nematodes

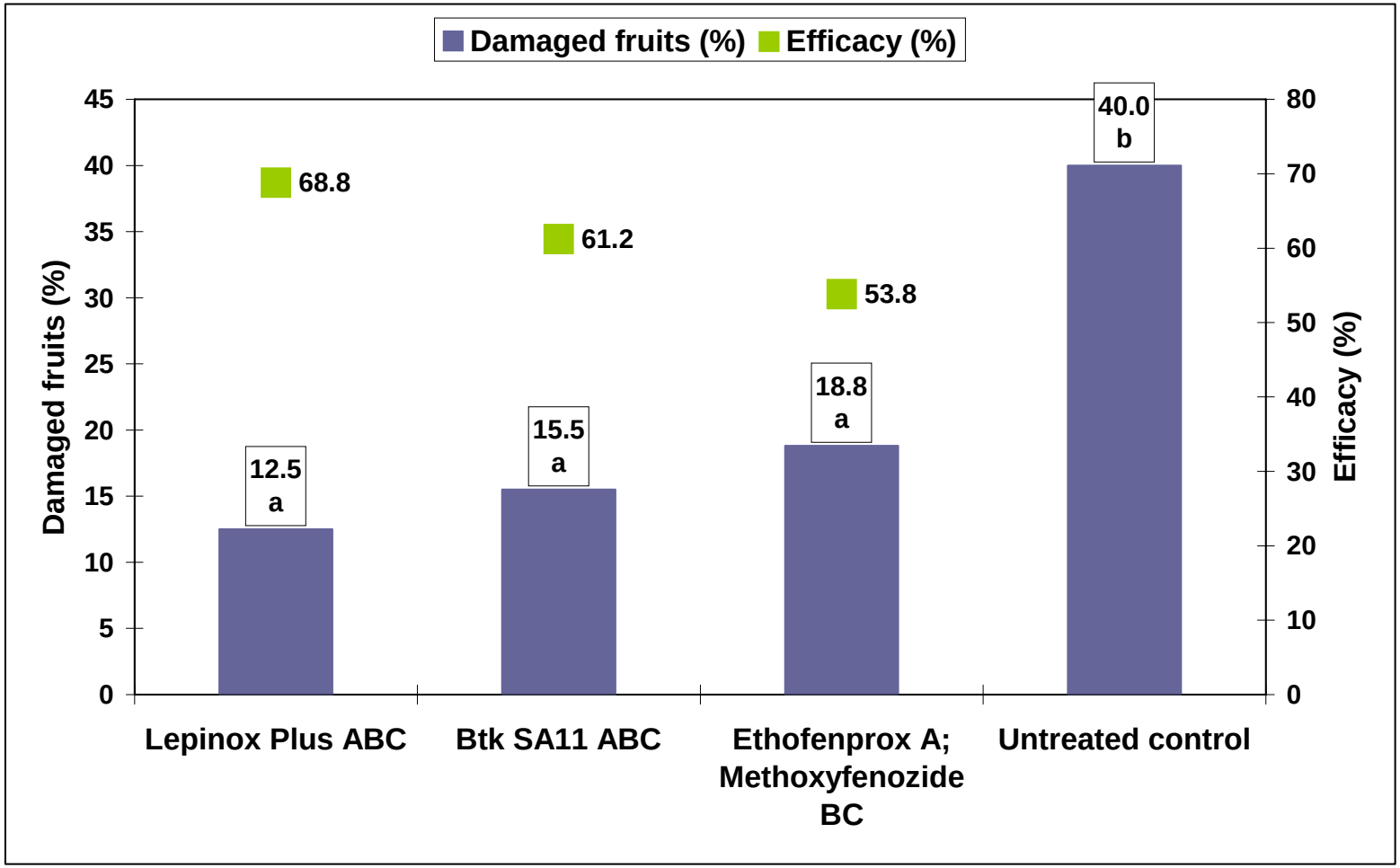
Bacillus thuringiensis EG23 48

LEPINOX PLUS



NO RESIDUE

Efficacy of Lepinox Plus (*Btk* EG2348) against *Grapholita molesta* (OFM) on peach close to harvest (2008)



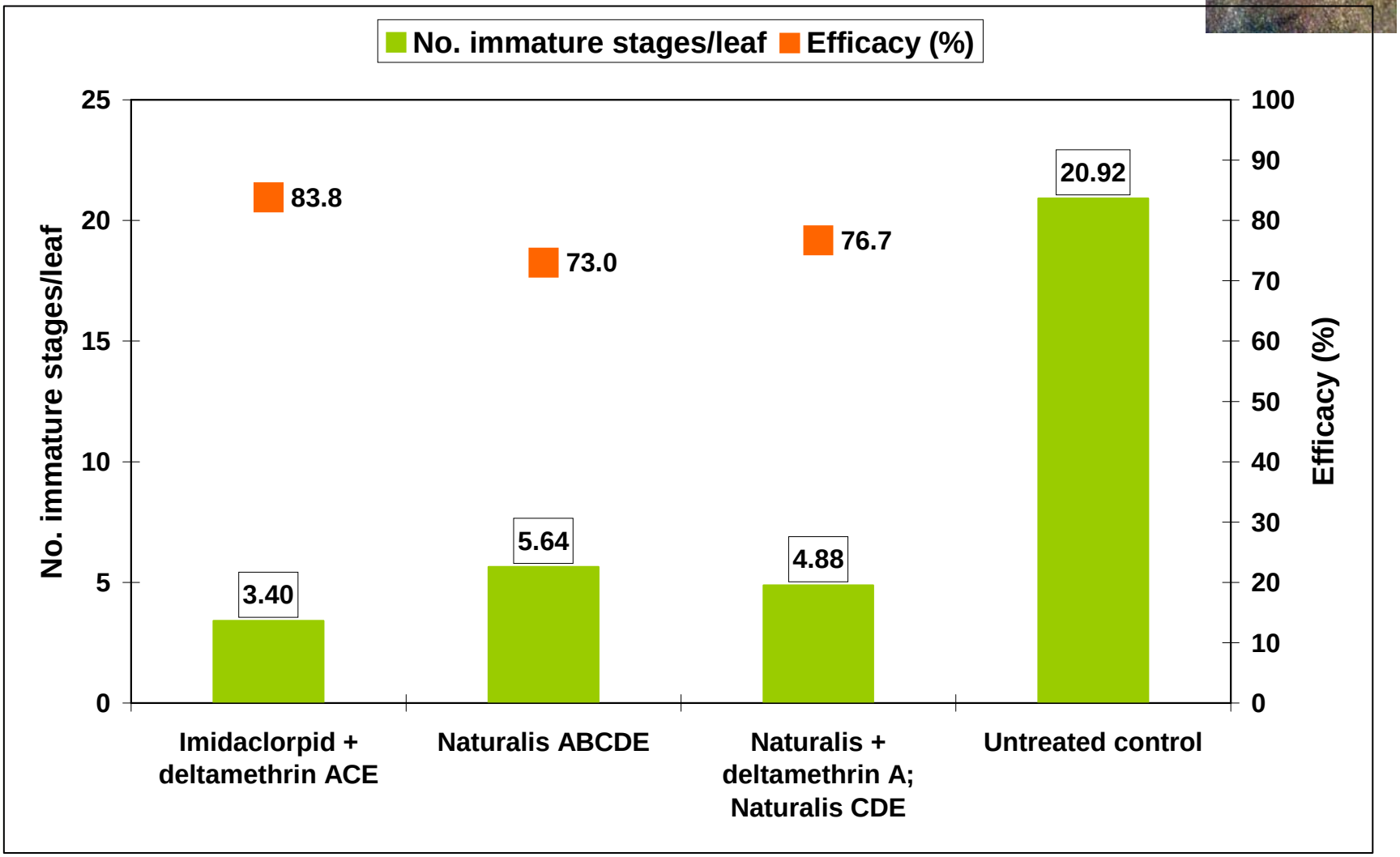
A = 22 dd before harvest; B = 15 dd before harvest C = 8 dd before harvest.

Naturalis

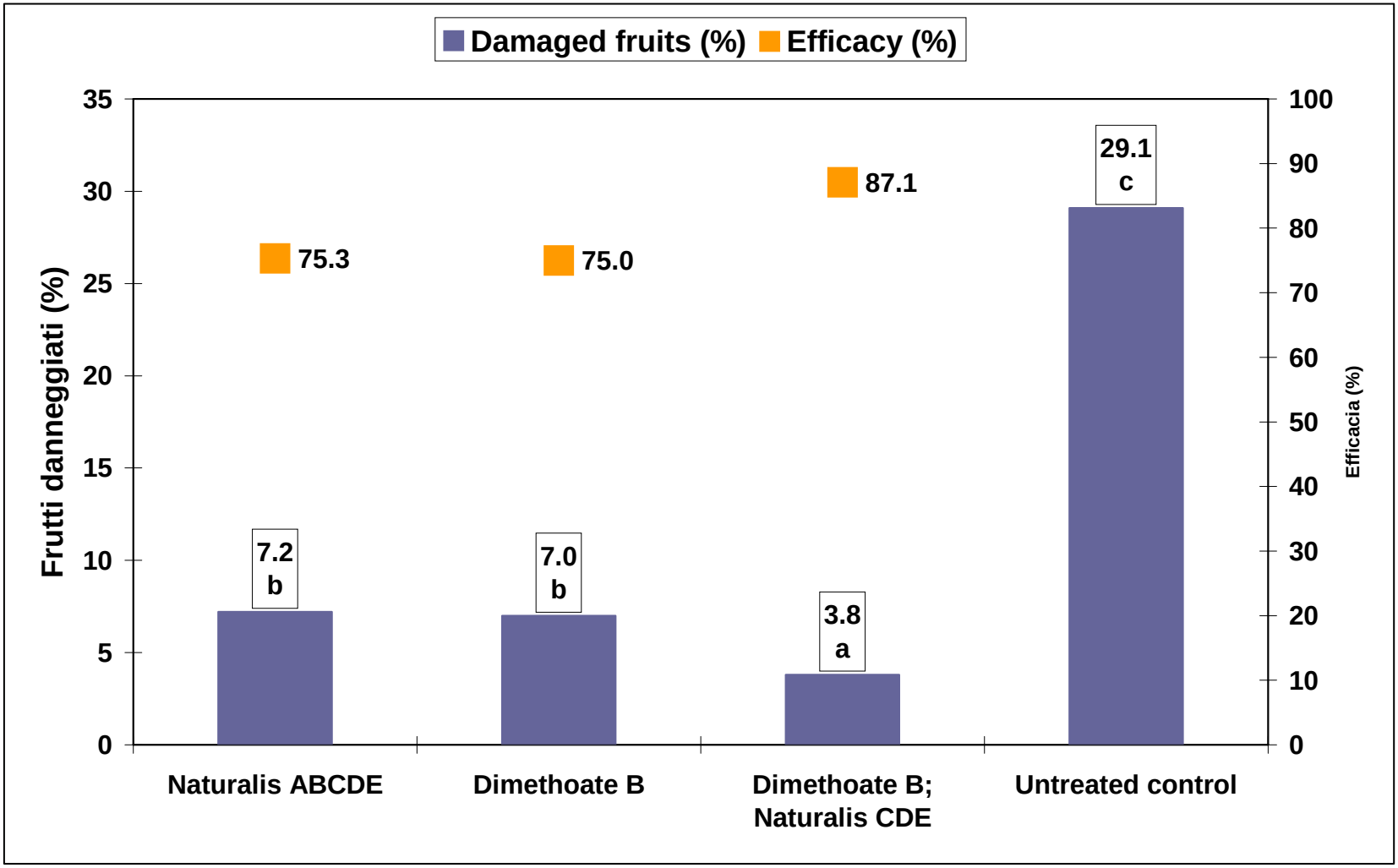
Beauveria bassiana ATCC 74040)

NO RESIDUE

Italy (Salerno) – year 2008
No. immature stages/leaf

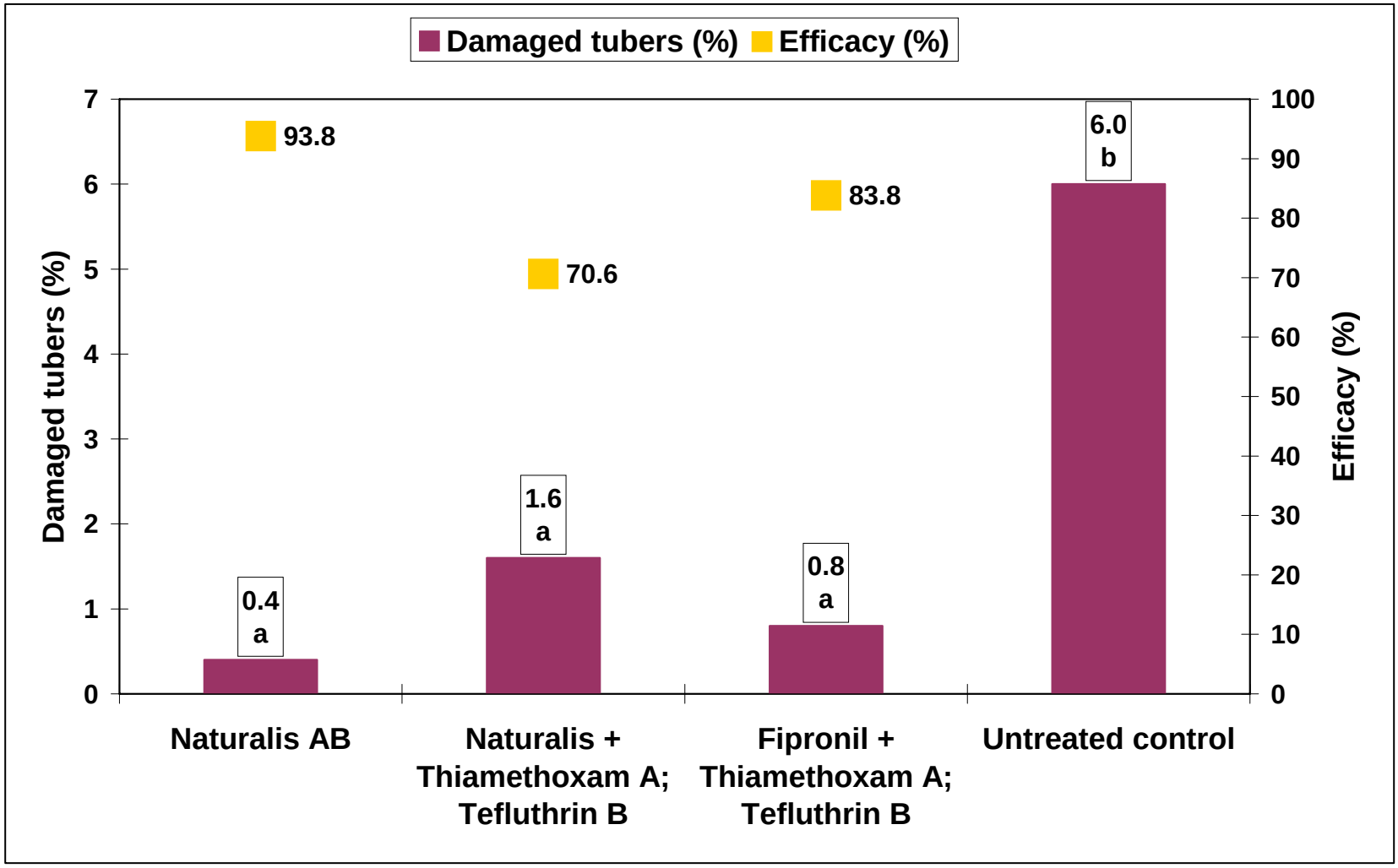


Against Med Fly on peach (Italy 2005)



A = 33 days before harvest; B = 27 days before harvest; C = 19 days before harvest
D = 12 days before harvest; E = 6 days before harvest

Against wireworms on potato (Italy 2008)



A = transplanting; B = earthing up

MADEX

NO RESIDUE

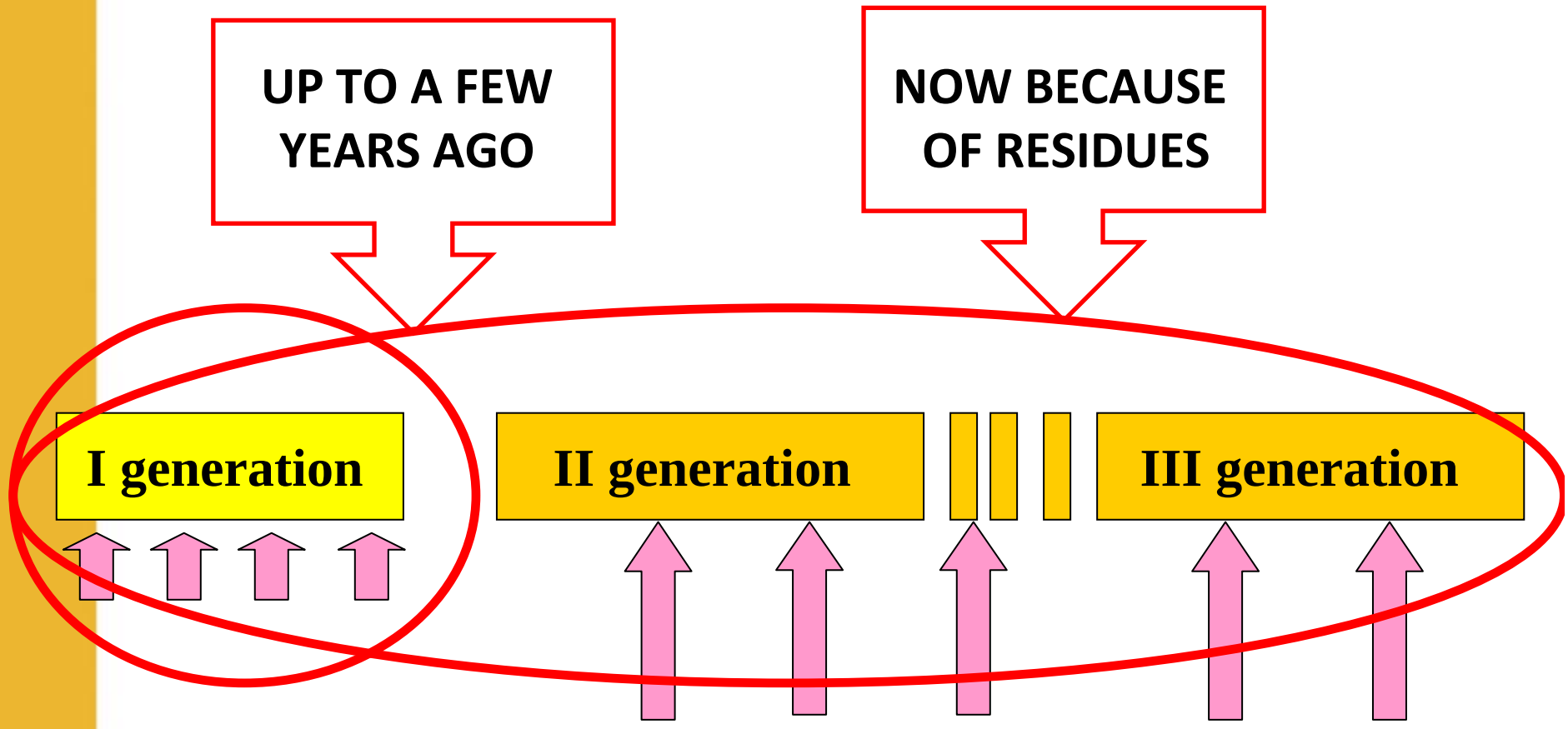
Codling moth control with CpGV

Efficacy of CpGV against II CM generation – Pear, Emilia-Romagna PPS

Products	Damage	Efficacy (% Abbott)
CpGv (4 sprayings)	8,2%	75,8
OP insecticides (3 sprayings)	6%	82,3
Untreated control	34%	---

. Baricella (Bo) 2009 cv Decana

Timing of CpGV applications



Superficial damage ("stings") are tolerated more easily than residues !!!

Codling moth bio-control strategy

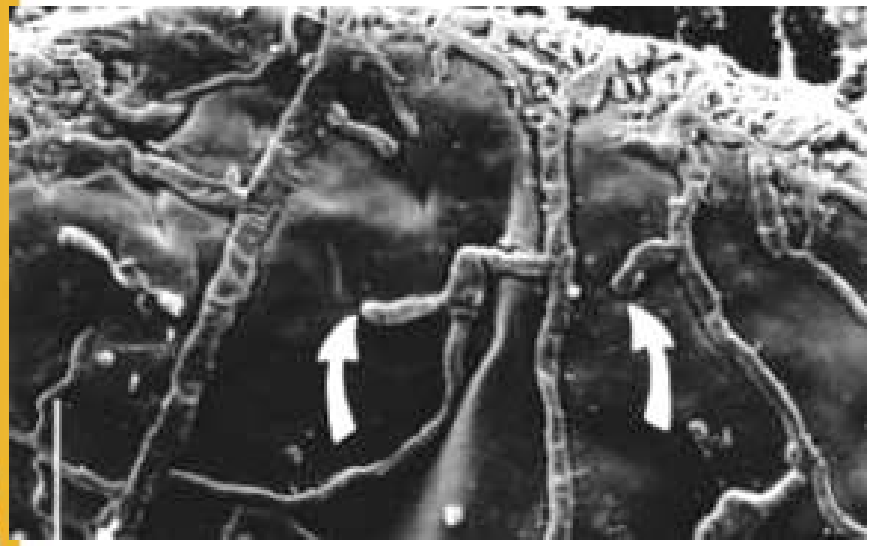
Madex

Exosex CM

Nemasys C

BIOACT

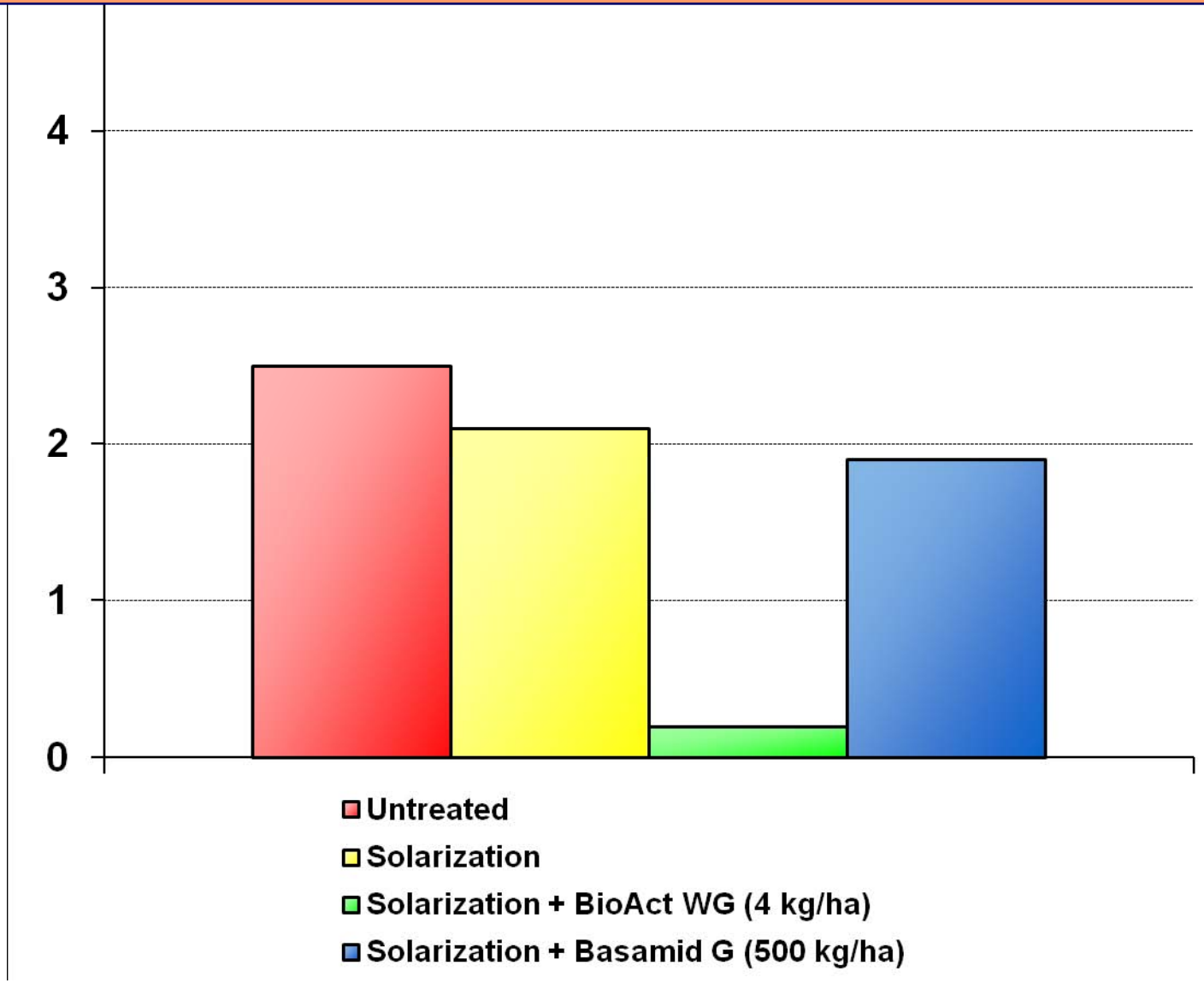
PAECILOMYCES LILACINUS (strain 251)



NO RESIDUE

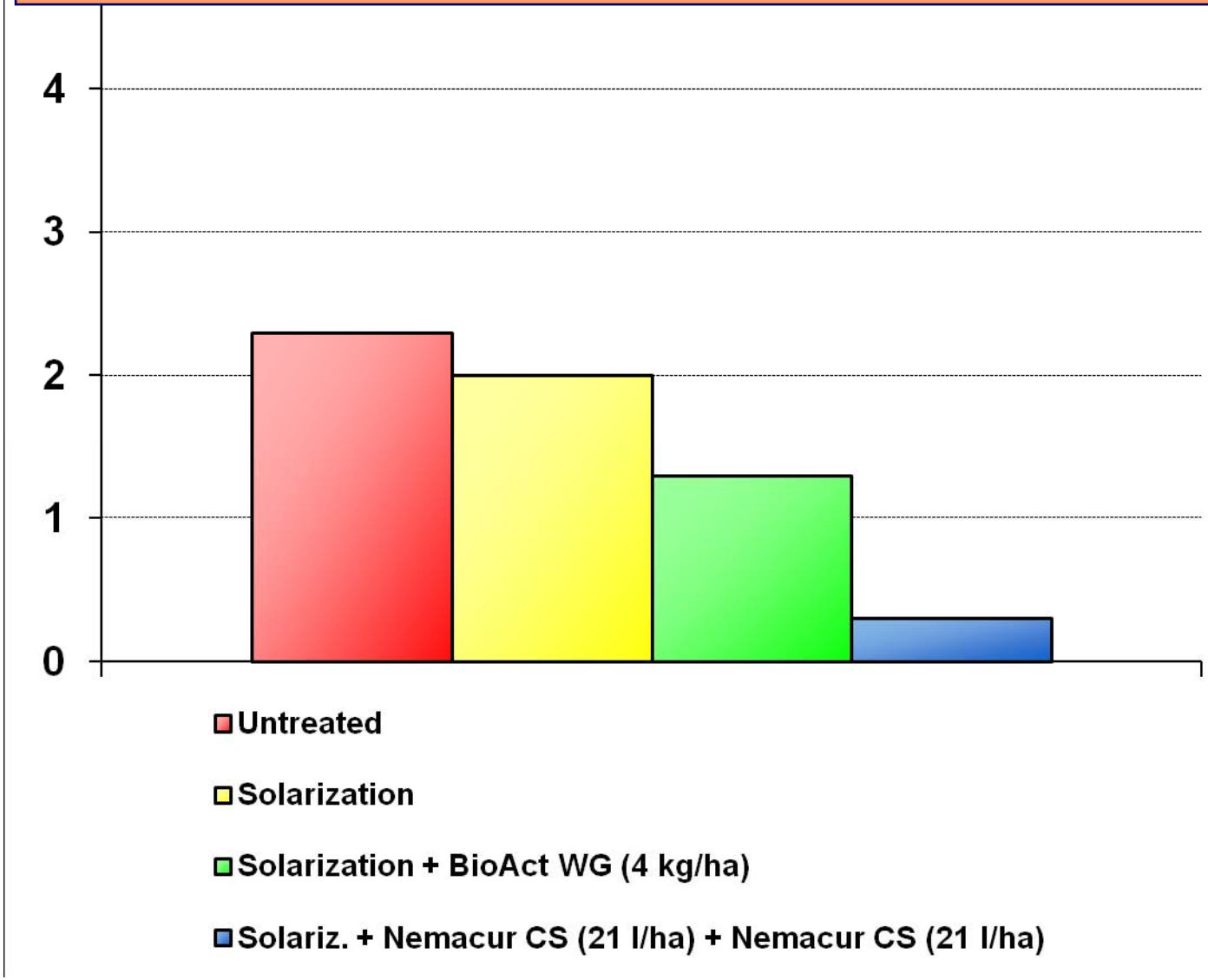
Trial on greenhouse tomato - 2007-08-

Gall Index - Sicily



Trial on greenhouse tomato - 2008-09-

Gall Index - Sicily



Fungicides

Formulated product	Active ingredient	Target
AQ10 WG	***Ampelomyces quisqualis M-10***	Powdery mildew
Serenade Max	*Bacillus subtilis QST 713*	Grey mould, Fire blight, *Sclerotinia* spp., Bacterial diseases
Root Shield Granules	*Trichoderma harzianum* KRL-AG2	Soil Borne pathogens
Contans	*Coniothyrium minitans Con/M/91-08*	*Sclerotinia* spp.

NO RESIDUE

AQ10™ Biofungicide

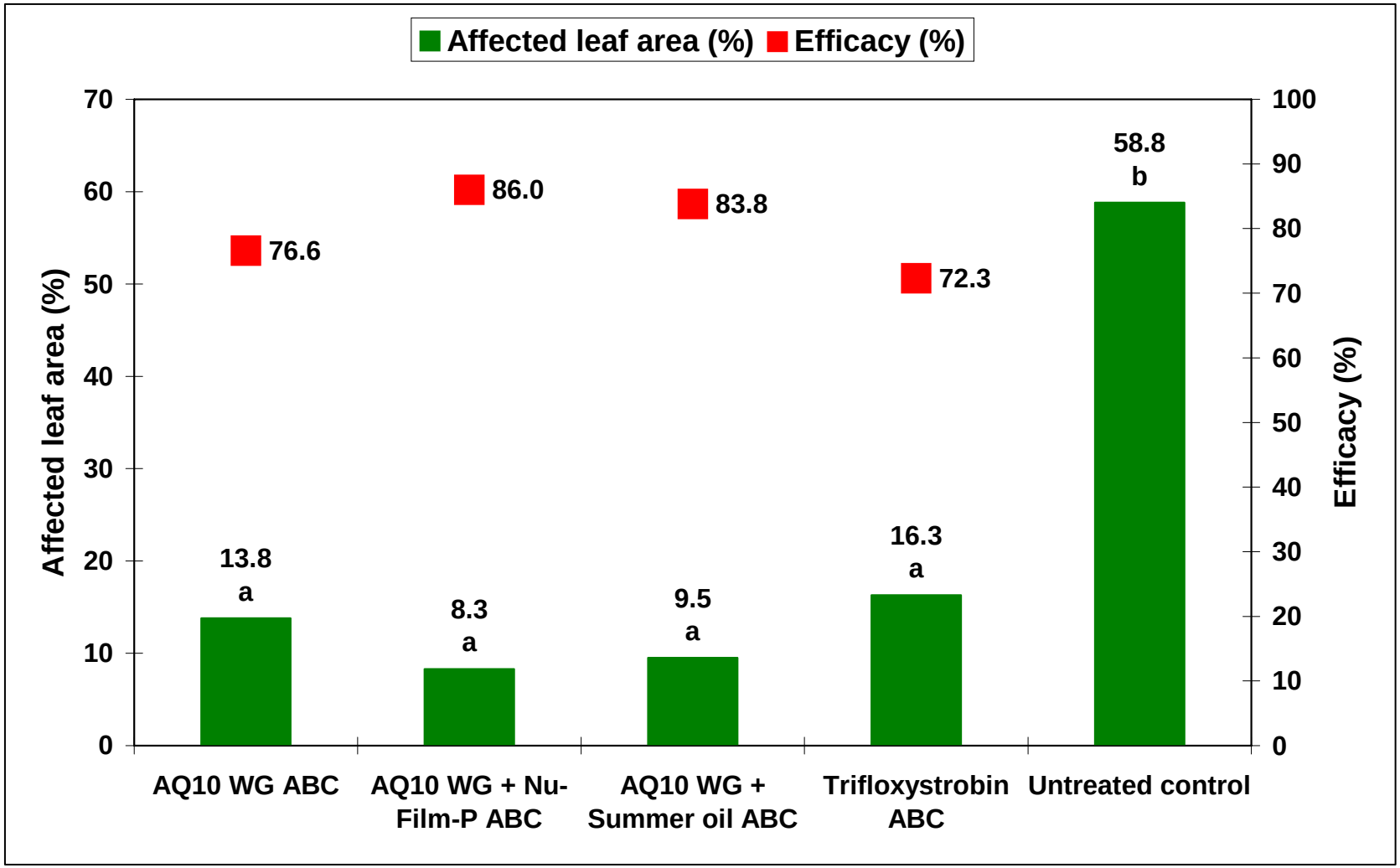
BIOFUNGICIDE FOR POWDERY MILDEW CONTROL

AMPELOMYCES QUISQUALIS

(M10)

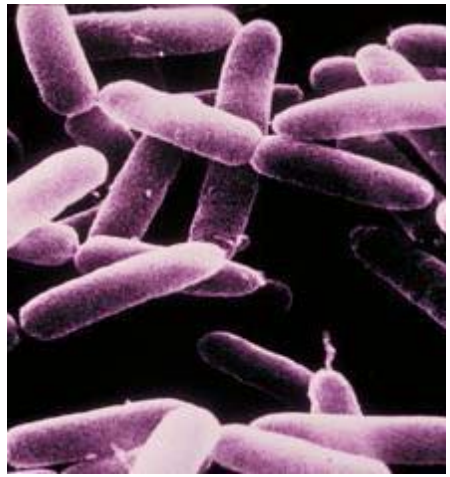
AQ10

TRIAL ON CUCUMBER – Severity (%)



A = 23 days before harvest; B = 16 days before harvest; C = 8 days before harvest

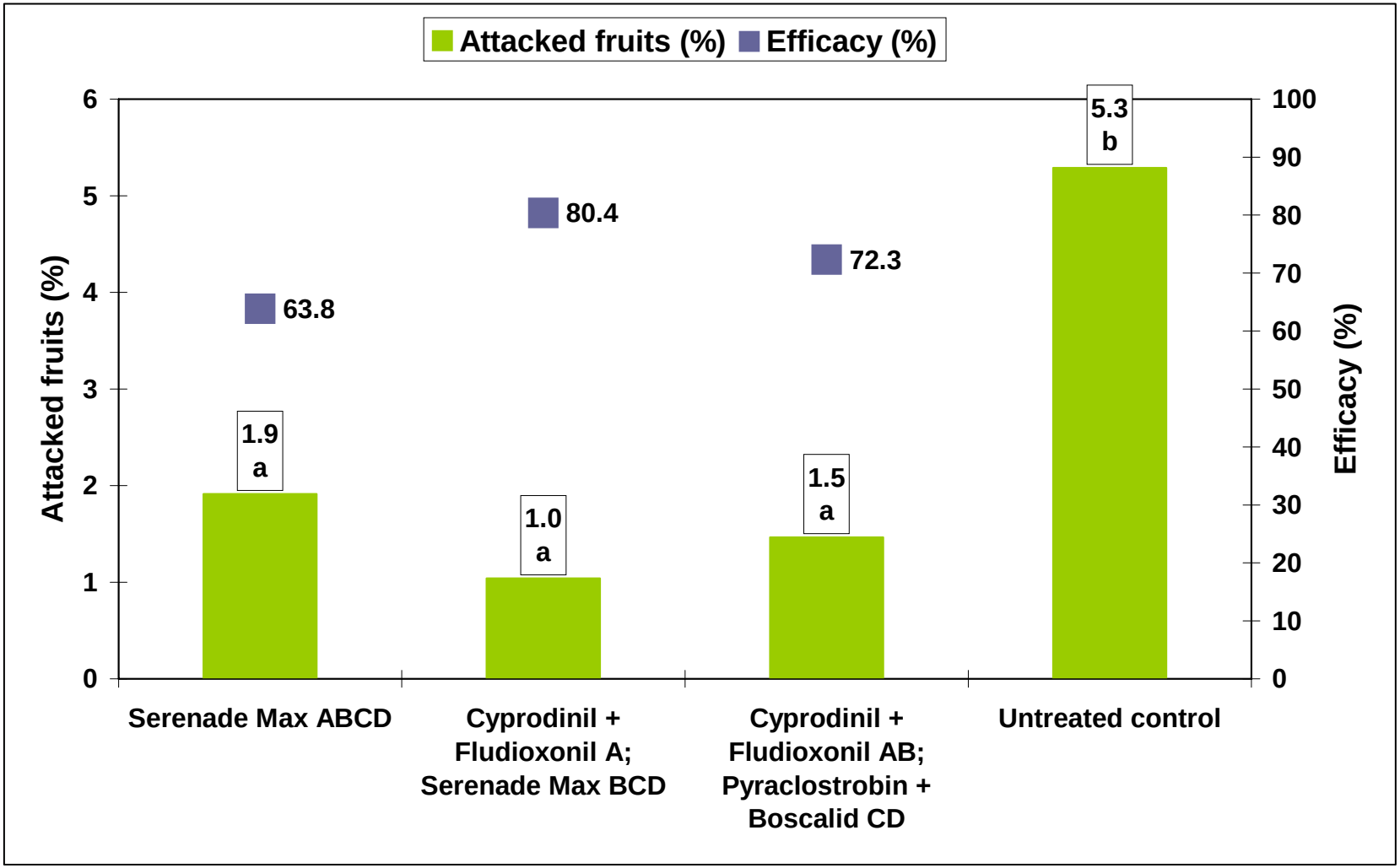
NO RESIDUE



SERENADE MAX

Bacillus subtilis QST 713

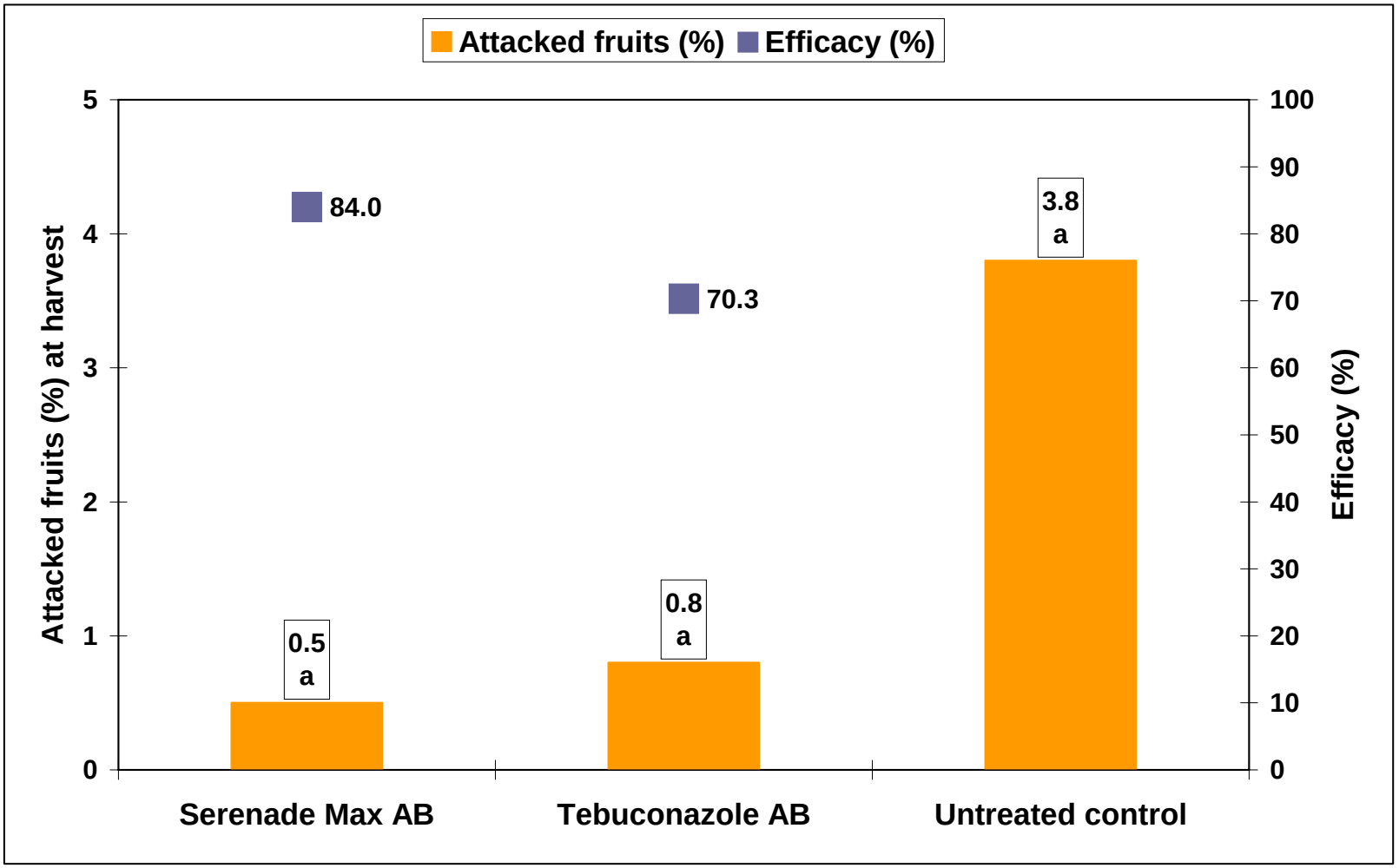
Botrytis control on strawberry (Cesena, FC;2009



A = 10% open flowers, B = full blooming, C = end blooming, D = fruit set

HARVEST

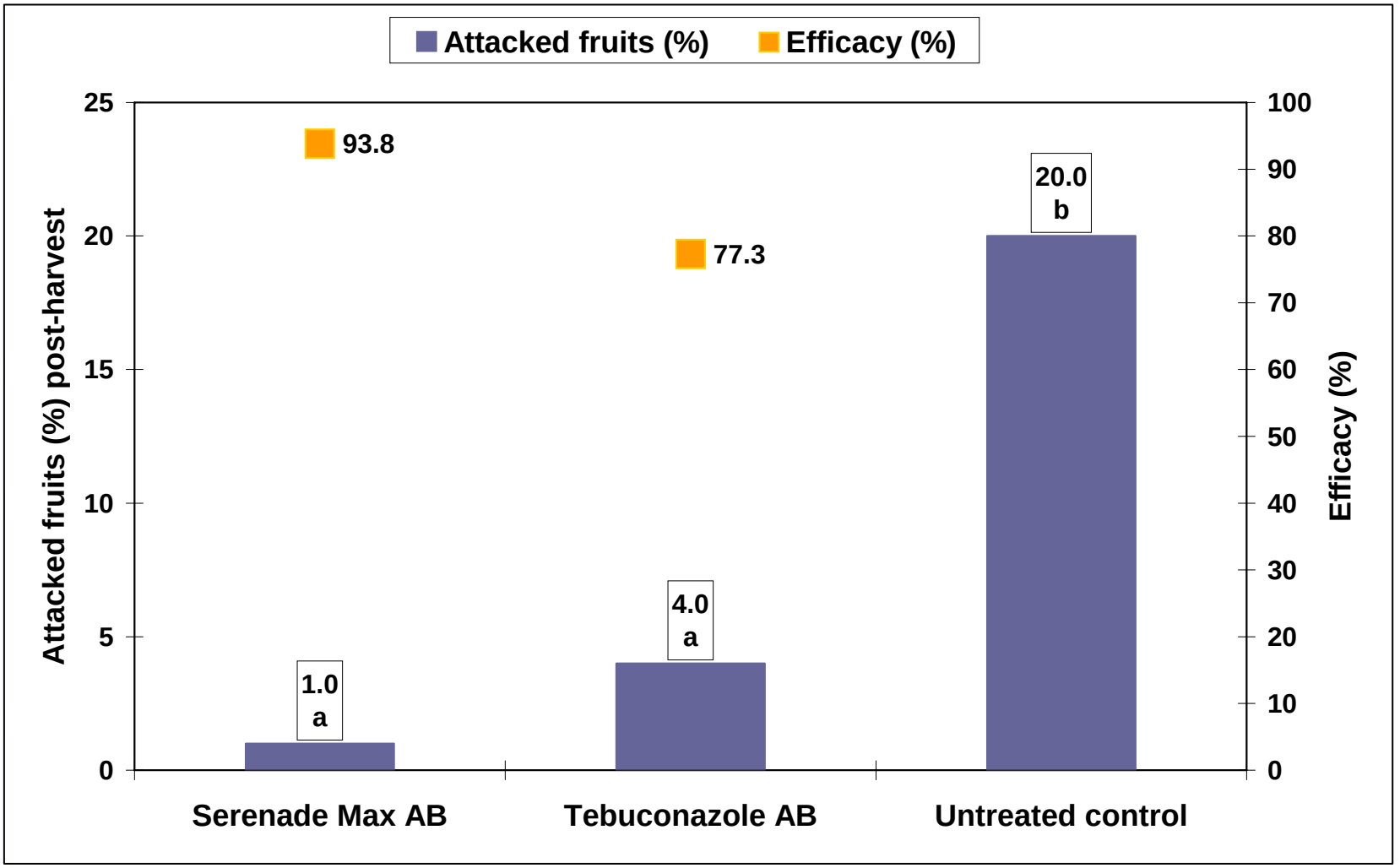
Monilinia spp. control on nectarine (Cesena, FC; 2006)



A = 14 days before harvest, B = 7 days before harvest.

POSTHARVEST

Monilinia spp. control on nectarine (Cesena, FC;2006)

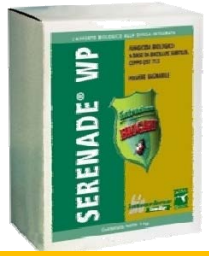


Post harvest: 7 days in refrigerator + 5 days at room T°

Examples of potential applications

- **Against Sclerotinia on lettuce**

Contans before tranplanting or after harvest



Serenade against leaf infections close to harvest

Examples of potential applications

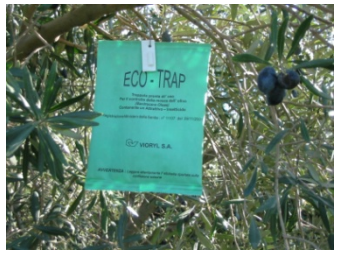
- **Root Knot Nematodes**

Bioact during entire crop cycle

NeemAzal-T/S when soil temperature is low

Examples of potential applications

- **Olive Fly**



Ecotrap at beginning of flight activity

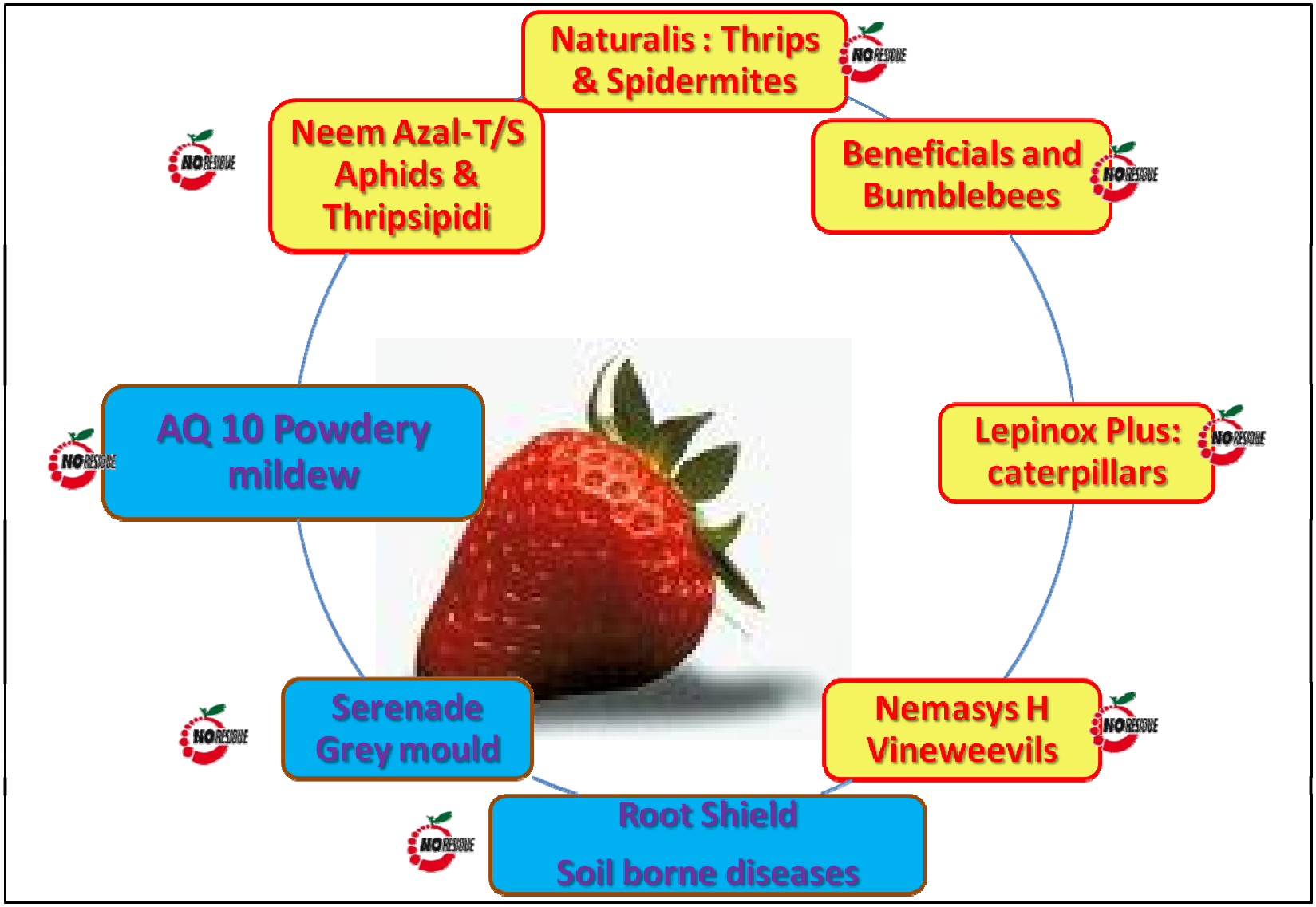
Naturalis close to harvest to avoid egg laying

- **Biopesticides can also be used together in a strategy on the same crop**

- **Biopesticides should not be considered as a mere replacement for chemicals, on the contrary, they can be used in addition to chemicals for more effective pest control**

NO RESIDUE

Intrachem strategy on strawberry



Intrachem Strategy on peach

Lepinox Plus
OFM & PTB

Neem Azal-T/S
Aphids &
Thrips

Naturalis
Thrips & Med Fly

Serenade Max
Monilinia spp.

Intrachem strategy on Pome fruit

Madex, Exosex CM & Nemasys C : Codling Moth

Anthocoris nemoralis pear psilla

Rapax Leafrollers

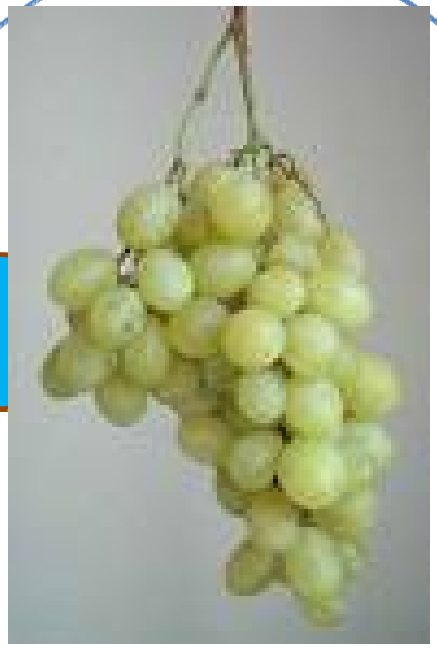
Lepinox Plus OFM

Serenade Max Fireblight

Intrachem Strategy on Table grapes

Naturalis & Neem Azal-T/S
Thrips

AQ 10 WG
Powdery mildew



Rapax
GBmoth

Serenade Max
Grey mould

Intrachem Strategy on Tomato

Naturalis & Beneficials
Whiteflies & Spidermites

AQ 10 WG
Powdery mildew

Bumblebees

Root Shield
Soil borne diseases

Lepinox Plus
Caterpillars

Helicovex
H.armigera

Serenade Max
Grey mould

Bioact + NeemAzal-T/S
RKNematodes

Conclusions

Maybe we will have a bright future !!!