

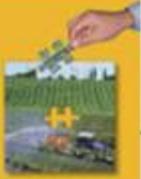
***Btk* strain EG 2348:** **a valuable tool for the control** **of a wide range of Lepidopteran pests**



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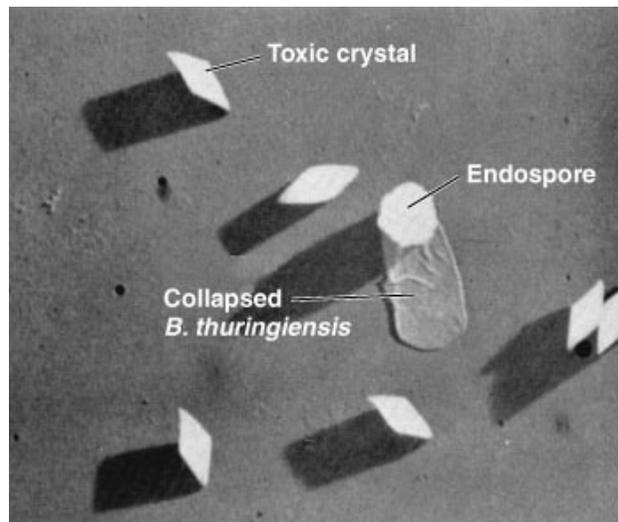
¹Intrachem Production S.r.l., ²Intrachem Bio Italia S.p.A.





Bacillus thuringiensis (Bt)

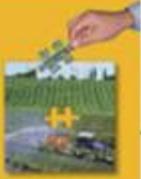
- *Bacillus thuringiensis* is a naturally occurring, soil-dwelling, Gram-positive bacterium.
- During sporulation it produces a translucent crystal protein, the active ingredient of Bt-based formulated products.



Bt forms asexual reproductive **spores**, which enable it to survive under adverse climatic conditions. Under favourable conditions spores can germinate.

At sporulation, *Bt* also forms inclusion bodies (**crystal protein**).



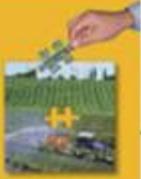


Bt serovar *kurstaki* (*Btk*)

Historical background

- The ability of *Bt* to control pest insect larvae was discovered more than 90 years ago.
- However, it was first commercially used only in the 1940's and for many years its development has been hampered by a general lack of knowledge on *Bt* genetics and mode of action.
- *Bacillus thuringiensis* serovar *kurstaki* was discovered in the late 1960's. This serovar is considerably more effective against caterpillars.

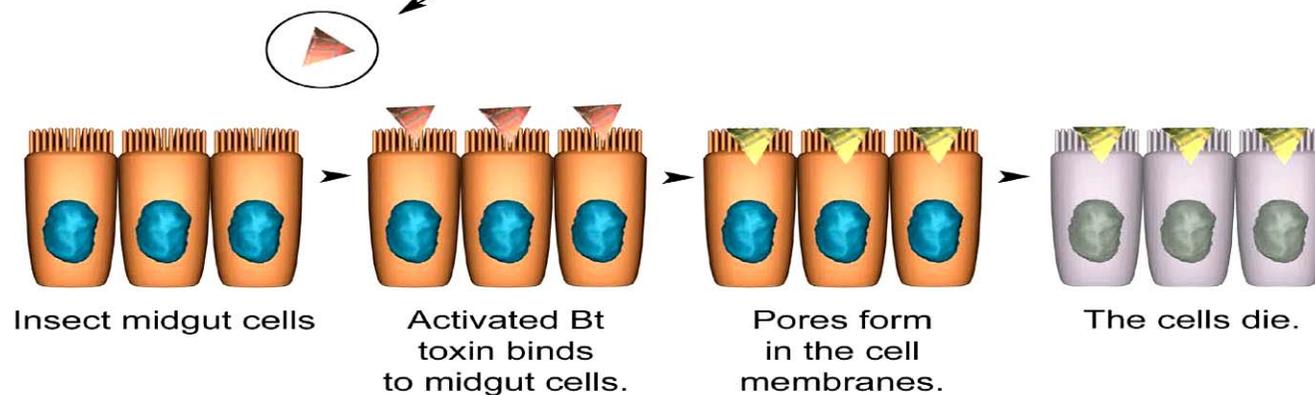
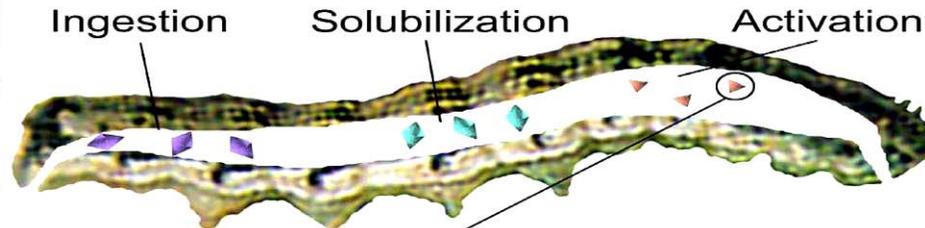




Bt serovar kurstaki (Btk)

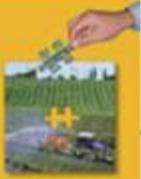
Mode of action

Bacillus thuringiensis (Bt)



Larva stops feeding and dies within 2-3 days.



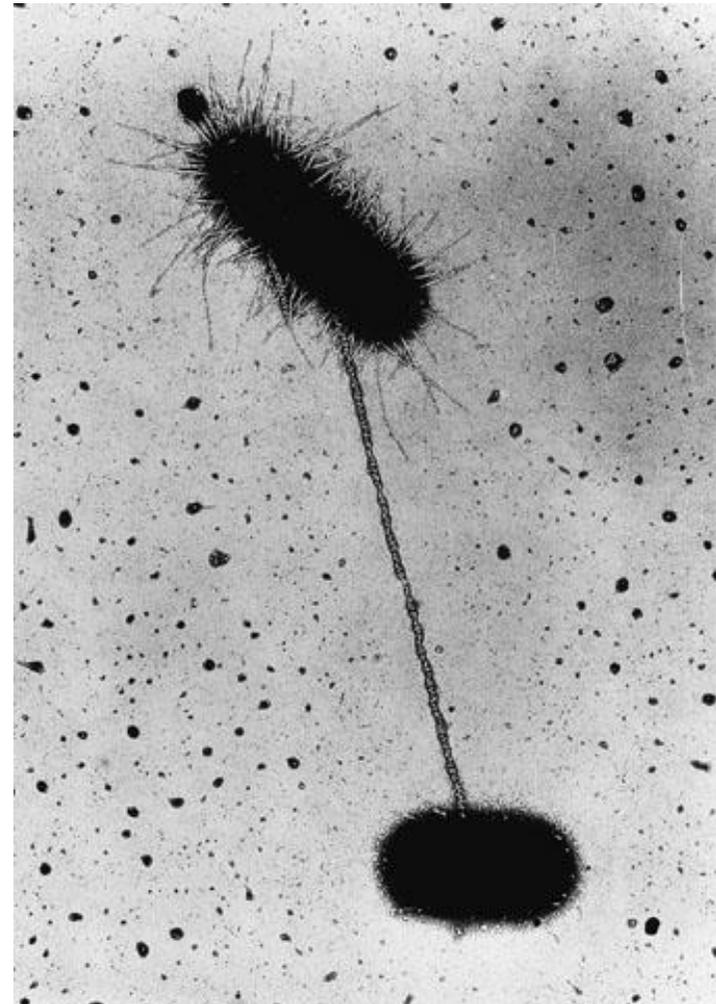


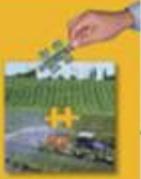
Btk strain EG 2348

- *Bt* strain EG 2348 was created through a process called (trans)conjugation, a phenomenon known to occur in nature and considered analogous to hybridization in higher organisms.

Two or more subspecies of *Bt* are mixed together in a way that facilitates the formation of new strains from which individuals with desirable qualities from both parents may be selected. This method of manufacturing is accepted in organic production systems.

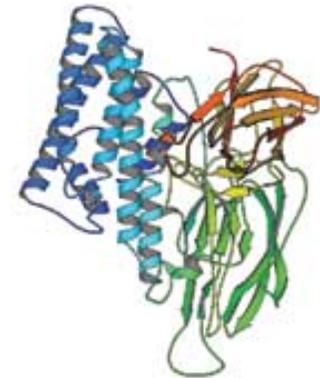
- *Btk* strain EG 2348 is therefore not genetically modified.

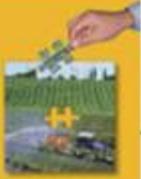




Btk strain EG 2348

- *Btk* strain EG 2348 produces different Cry toxins (Cry 1Aa, 1Ac, and 2A toxins), which are responsible of its insecticidal activity and enhanced efficacy against a wide range of Lepidopteran pests, noctuid moths included.
- In 2002 Intrachem Bio International S.A. (Geneva, CH) and Ecogen Inc. (USA) entered into a License Agreement for the exclusive production and distribution of *Btk* strain EG 2348.
- Annex I inclusion is expected in January 2009 (on 10-11 July 2008, SCoFCAH gave a favourable opinion for the inclusion of *Btk* strain EG 2348 into Annex I of Directive 91/414/EEC).





***Btk* strain EG 2348**

- In order to obtain optimum field performance and highest efficacy of the *Btk* strain EG2348 against different target insects and on different crops, Intrachem developed 3 products,

Lepinox Plus

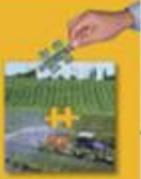
Rapax

Wormox

which differ in formulation type and concentration of active ingredient.

- Manufacturing occurs in outsourcing under the supervision of Intrachem Production S.r.l. (Bergamo, IT).
- *Btk* strain EG 2348-based products are registered in Italy, Spain, Greece, Serbia, Bulgaria, and registration is pending in Turkey and Morocco.





LEPINOX PLUS®

A.i.: *Btk* strain EG 2348; conc. a.i. 15%; WP; 32,000 IU *T. ni*

- **Lepinox Plus is the most recently developed formulation of *Btk strain* EG 2348, which shows improved efficacy against the major Lepidopteran pests.**
- **Both its high concentration of a.i. (15%) and the innovative inert ingredients of Lepinox Plus result in improved field performance of *Btk strain* EG 2348 against the most noxious Lepidopteran pests, such as:**

Oriental Fruit Moth (Cydia molesta)

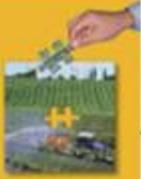
Peach Twig Borer (Anarsia lineatella)

Plum Fruit Moth (Cydia funebrana)

Different species of Noctuid moths

(*Helicoverpa armigera*, *Lacanobia oleracea*, *Chrysodeixis chalcytes*, etc.)





RAPAX®

A.i.: *Btk* strain EG 2348; conc. a.i. 7.5%; SC; 24,000 IU *T. ni*

- **RAPAX is one of the few *Bt*-based products available on the market as a suspension concentrate.**
- **Its oily formulation enables a uniform distribution of the active ingredient on the vegetation. Rapax is indicated for the control of:**

European Grape Berry Moth (Lobesia botrana)

Grape Berry Moth (Eupocilia ambiguella)

Leafrollers

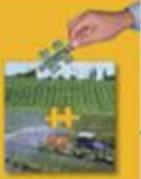
(Argyrotaenia pulchellana, Archips spp., Pandemis spp.)

Olive Moth (Prays oleae)

Citrus Moth (Prays citri)

European Corn Borer (Ostrinia nubilalis)



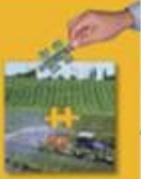


WORMOX®

A.i.: *Btk* strain EG 2348; conc. a.i. 4.5 %; SC; 16,000 IU *T. ni*

- This oily formulation has been especially developed for aerial applications against defoliators of forest trees, such as the Gypsy Moth (*Limantria dispar*) and the Pine Processionary Moth (*Thaumetopoea pityocampa*), and other Lepidopteran pests infesting parks and gardens.



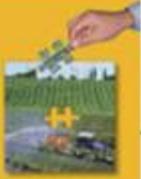


***Btk* strain EG 2348**

Benefits

- **Highly effective against a wide range of Lepidopteran pests**
- **Selection of formulations, especially developed for the control of different target insects**
- **Pre-harvest interval: 3 days**
- **Safe to humans and the environment: no toxic side effects on beneficials, birds, fish, and mammals**
- **No risk of ground water contamination**
- **No risk of undesired residues in crops, food and feeding stuff, helping growers to comply with European/national/specific MRLs**
- **Allowed in organic farming and fits perfectly in any other plant protection strategy**





L'apporto biologico alla Agricoltura Integrata

biochem
ITALIA

Lepinox Plus & Rapax (*Btk* strain EG 2348)



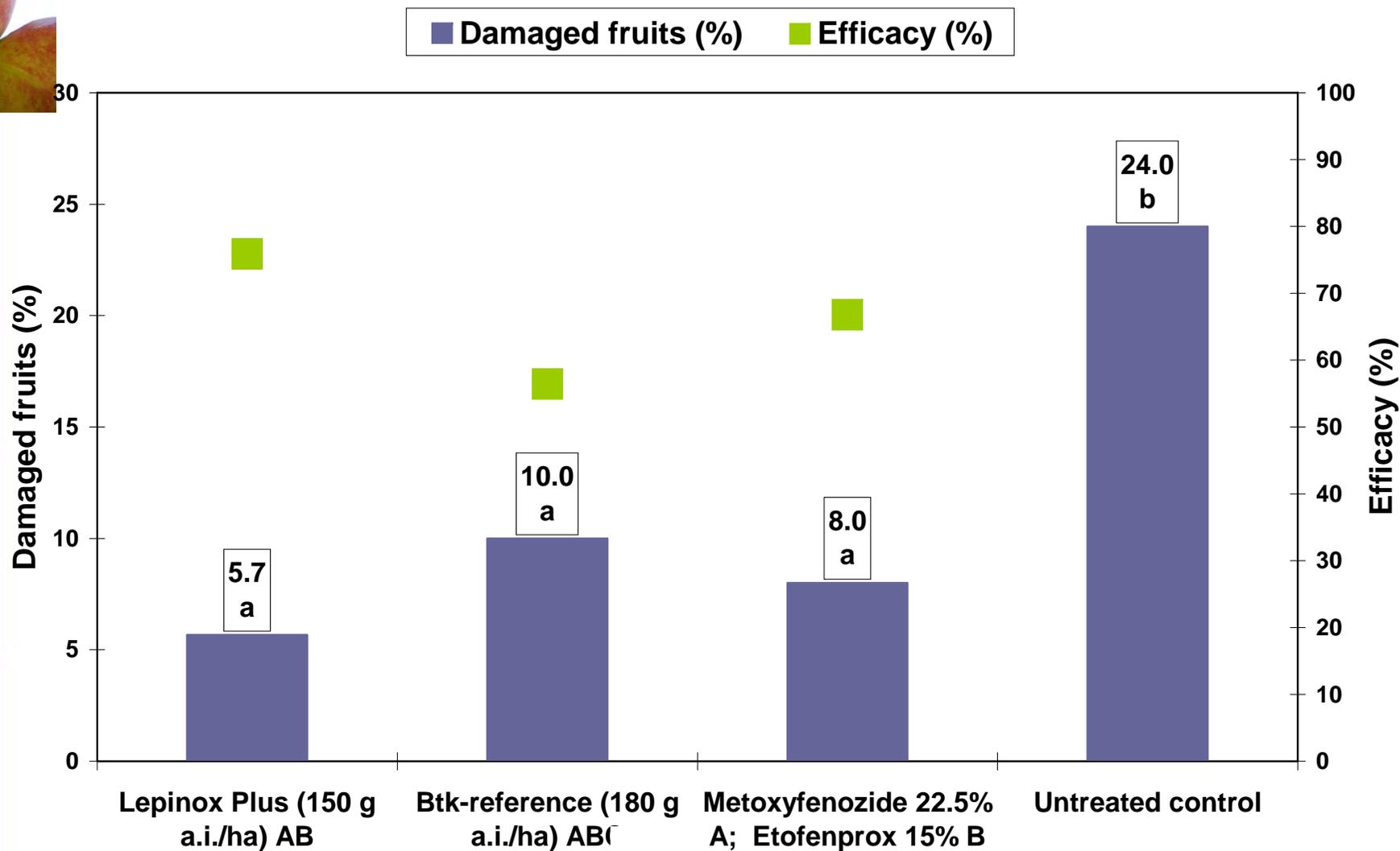
Corroborating efficacy trials





Against Oriental Fruit Moth on nectarine (2008)

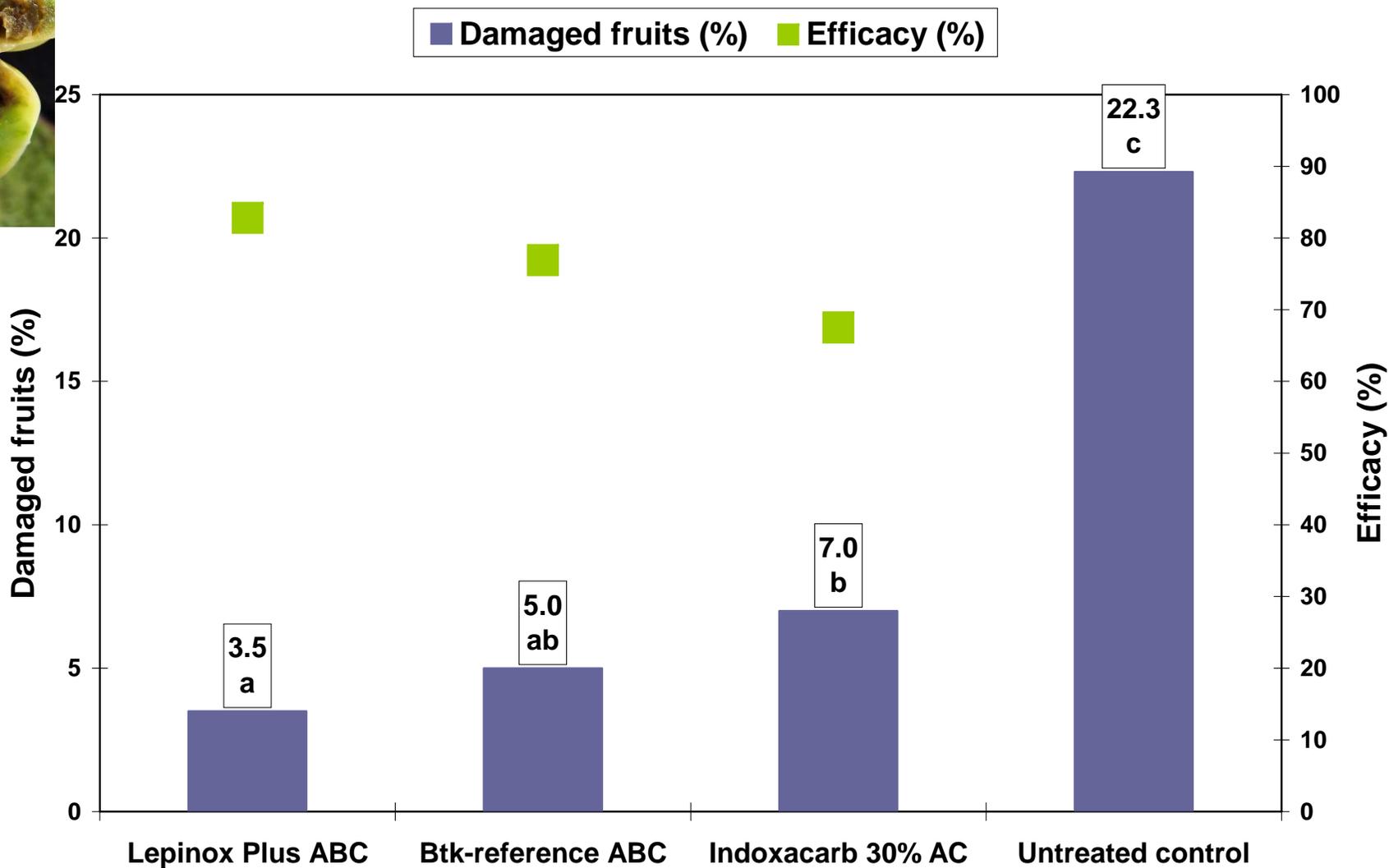
2 applications 14 (A) and 7 days (B) prior to harvest





Against Cotton Bollworm on tomato (2006)

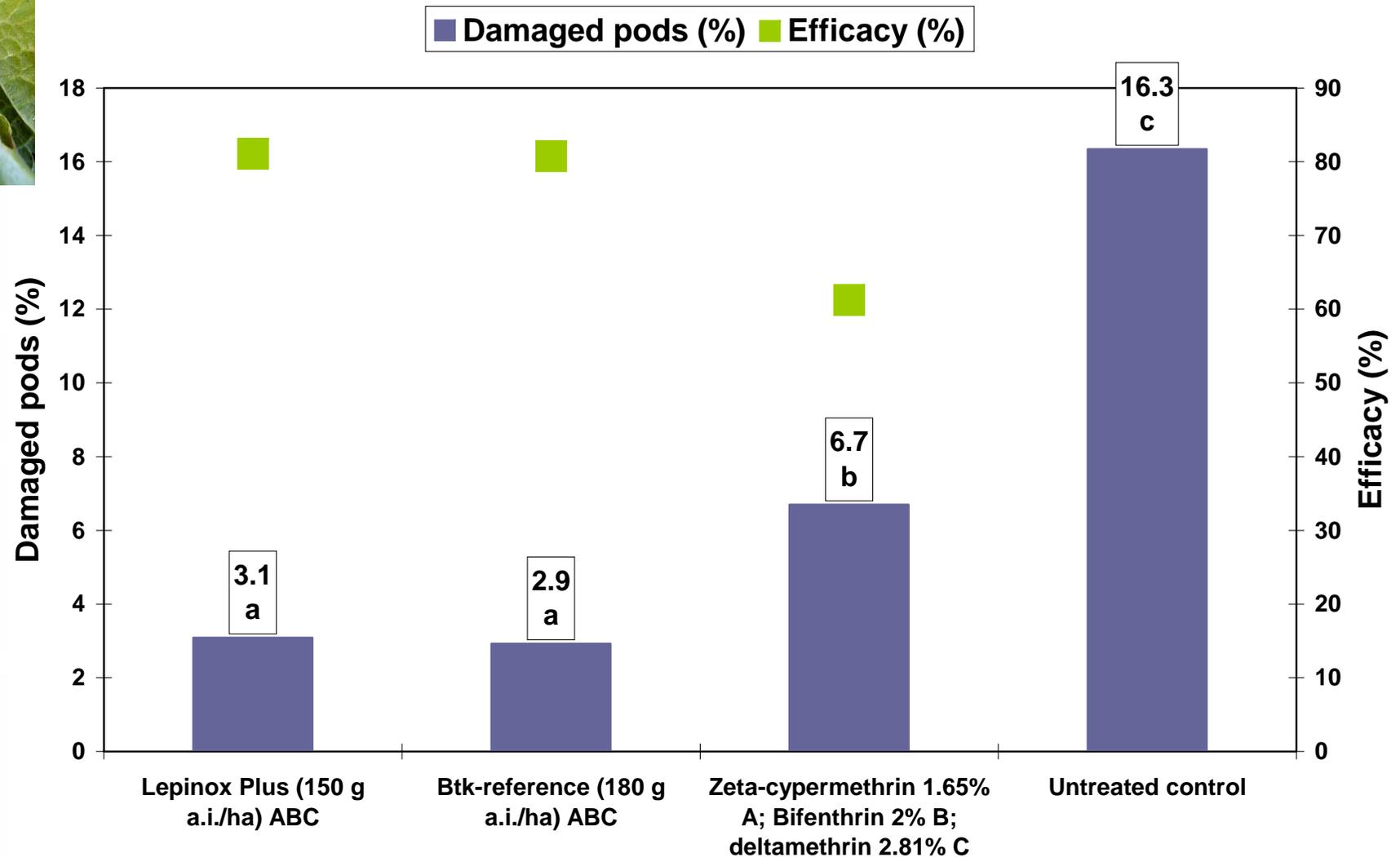
3 applications (A, B, C) at 6-8-day intervals prior to harvest





Against Cotton Bollworm on French bean (2008)

3 applications (A, B, C) at 5-7-day intervals prior to harvest

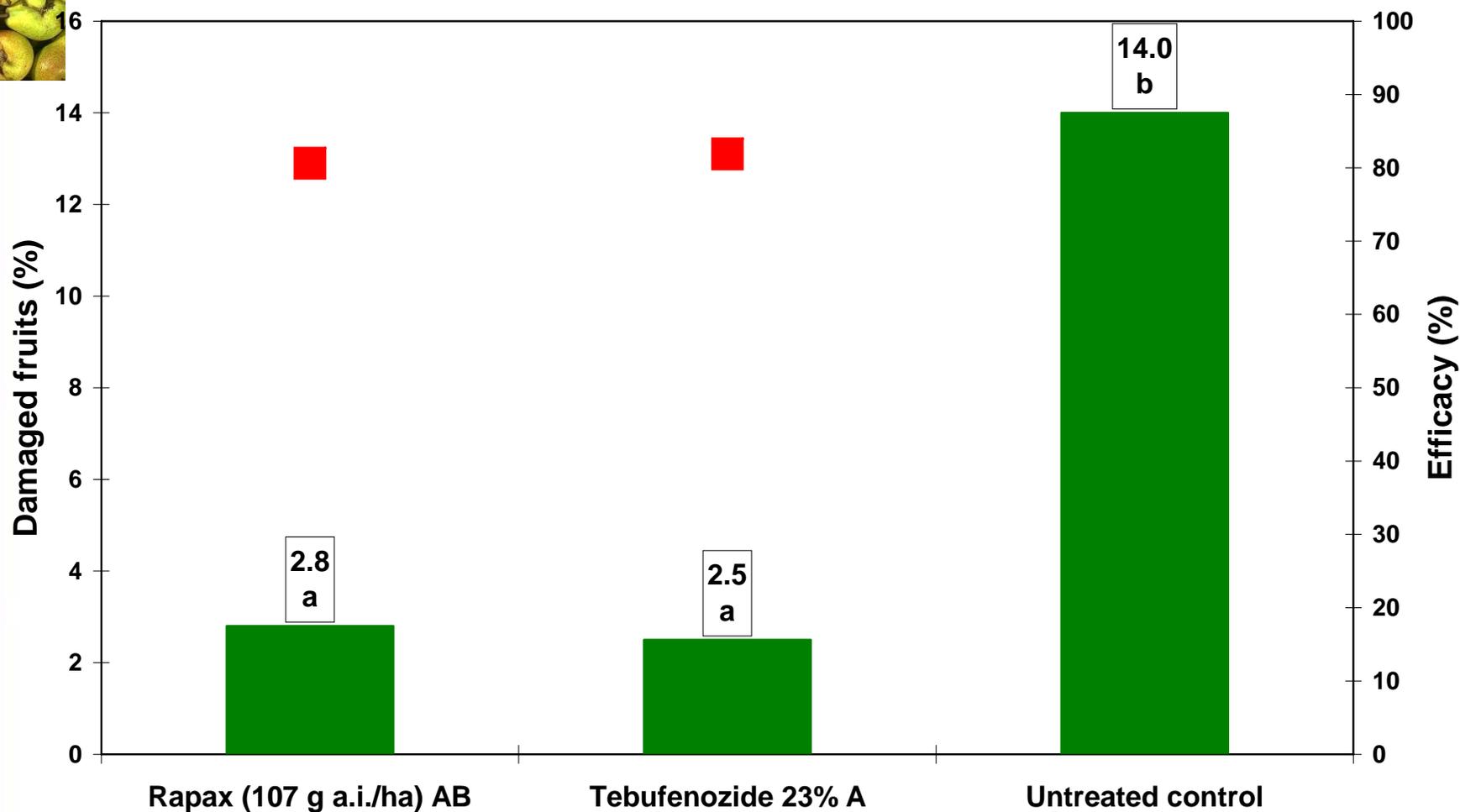




Against leafrollers on pear (2008)

2 applications (A, B) at 8-day interval at hatching of larvae

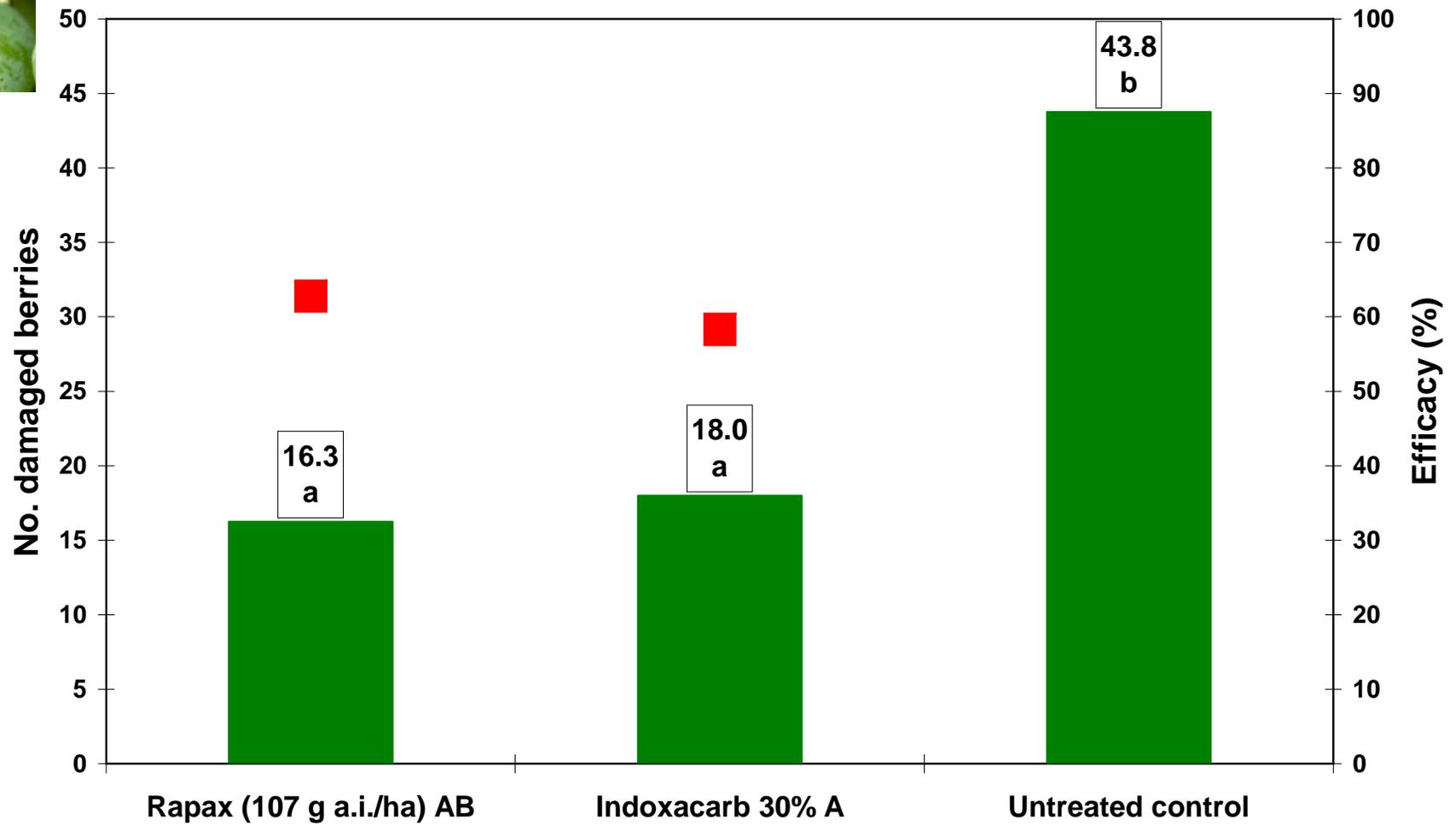
■ Damaged fruits (%) ■ Efficacy (%)

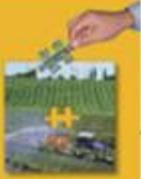




Against III-generation Grape Berry Moth (2008) 2 applications (A, B) at 8-day interval at hatching of larvae

■ No. damaged berries ■ Efficacy (%)





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THANK YOU FOR YOUR ATTENTION

