

Biological Control of Citrus Plantations in Turkey



Lerzan Bakırciođlu ERKILIÇ
Bülent GÜVEN

Halil DEMİRBAŞ

Biological Agriculture Consulting and
Engineering Co.
Turkey

Citrus growing area in Turkey



Citrus cultivation

Since 1930s citrus have been cultivated in Turkey

Increase in growing area mostly stable up to 1990s

From 1998 to 2002 the citrus planted area was increased 68%

Turkey have 150 000 ha citrus planted area (2005 Statistics)

Biological Control

- ❑ The biological control started almost from the beginning of citrus cultivation;
- ❑ In 1932 *Rodolia cardinalis* (Col., Coccinellidae) imported
- ❑ To control *Icerya purchasi*(Hom., Margarodidae)



Turning Point

- In 1970 *Cryptoleamus montrozieri* (Col., Coccinellidae) and *Leptomastix dactylopii* (Hym., Encyrtidae) were imported for classical biological control of Citrus mealybug, *Planococcus citri* (Hom., Pseudococcidae).



Brife History of Citrus Mealybug Biocontrol in Turkey

- ❑ In 1970 Plant Protection Institutes (Adana and Antalya) belong to Ministry of Agriculture imported the *C. montrozieri* and *L. dactylopii* from USA.
- ❑ The biological control of Citrus mealybug continued with rearing difficulties 1.5 to 2.5 million predators and 3 to 4 million parasitoid per year.
- ❑ Since year 2004 Biological Agriculture Consulting and Engineering Co. (BIYOTAR) started rearing beneficial insects for Citrus mealybug, *Planococcus citri* (Hom., Pseudococcidae).
- ❑ BIYOTAR rearing 5 million predators and 10 million parasitoids with no problem and due to the consumption of beneficials, it is possible to double the production with no additional investment cost.

C. montrozieri and *L. dactylopii* adults



C. montrozieri and *L. dactylopii* in releasing packages



Rearing Facilities



Cryptoleamus and Mealybug rearing rooms, storage, and office

Rearing Facilities



Parasitoid rearing rooms and laboratory

10/22/2008

Luzern 2008

10

Facilities

- 30 climatized rearing rooms
- 2 cold storage
- 1 laboratory
- 1 workshop
- 1 storage
- 2 + 1 office (in Erzin and Adana)
- 1 meeting room

Other Biocontrol agents

- ❑ Citrus Mealybug biological control is the locomotive of other biological activities
- ❑ Growers who used beneficials are try keep away from broad spectrum insecticides
- ❑ We are lucky with natural biocontrol agents in citrus growing area in Turkey

- California Red Scale

- *Chilocorus bipustulatus*, *Ahytis melinus*, *Comperiella bifasciata*





- **Rust Mite; spesific acaricides**

- Aphids; Coccinelids, Chrysopa ssp, Syrphids, parazitoids



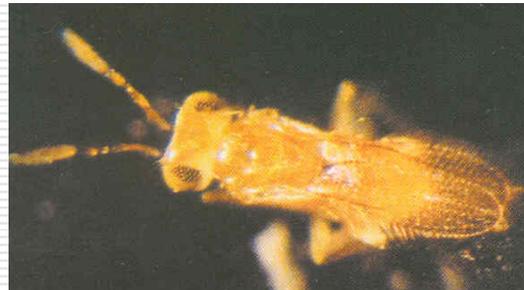
- **Red Spider Mites;** *Scolothrips sexmaculatus*, *Stethorus spp.*, Phytoseiids



- Citrus Whitefly; *Serangium parcesetosum*, *Encarsia* spp



- *Parabemisia myricae*, *Clitostethus arcuatus*, *Eretmocerus debachi*
- *Aleurothrixus floccosus*, *Cales noacki*, *Clitostethus arcuatus*,



- Other Scale insects on citrus



10/22/2008

Luzern 2008

19

- Citrus Leaf Miner; Indigious natural enemies



Pfidanlıkarda



- İlaçlı mücadele

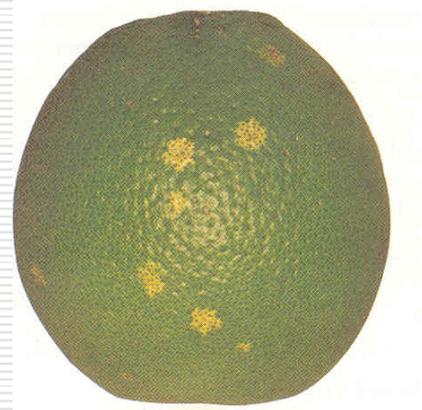
- Lemon Flower Moth
- Carop Moth

- *Bacillus thuringiensis*
- Natural enemies



- Cicadellids

- Lime applications



- Med fly



- Bait sprays

How to Improve Large Scale Biological Control

- To keep diversity of indigenous natural enemies
- New strategies to use these natural enemies
- No use of broad spectrum insecticides
- Commercial and consumer preferences
- More specific pesticides in market
- Subsidize biological control users
- To improve society awareness on biocontrol

Conclusion

- only 4% of citrus growers aware of biological control in Turkey
- We keep our hope to improve the situation
- We are ready to share our experience on citrus mealybug biocontrol with other citrus growing countries in Europe



Thank you