Biological Control of Citrus Plantations in Turkey

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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
Facilities

- 30 climatised 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 trying to 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; specific 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
• Citrus Leaf Miner; Indigious natural enemies

• İlaç mümadele
• 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