DOBRE RANO

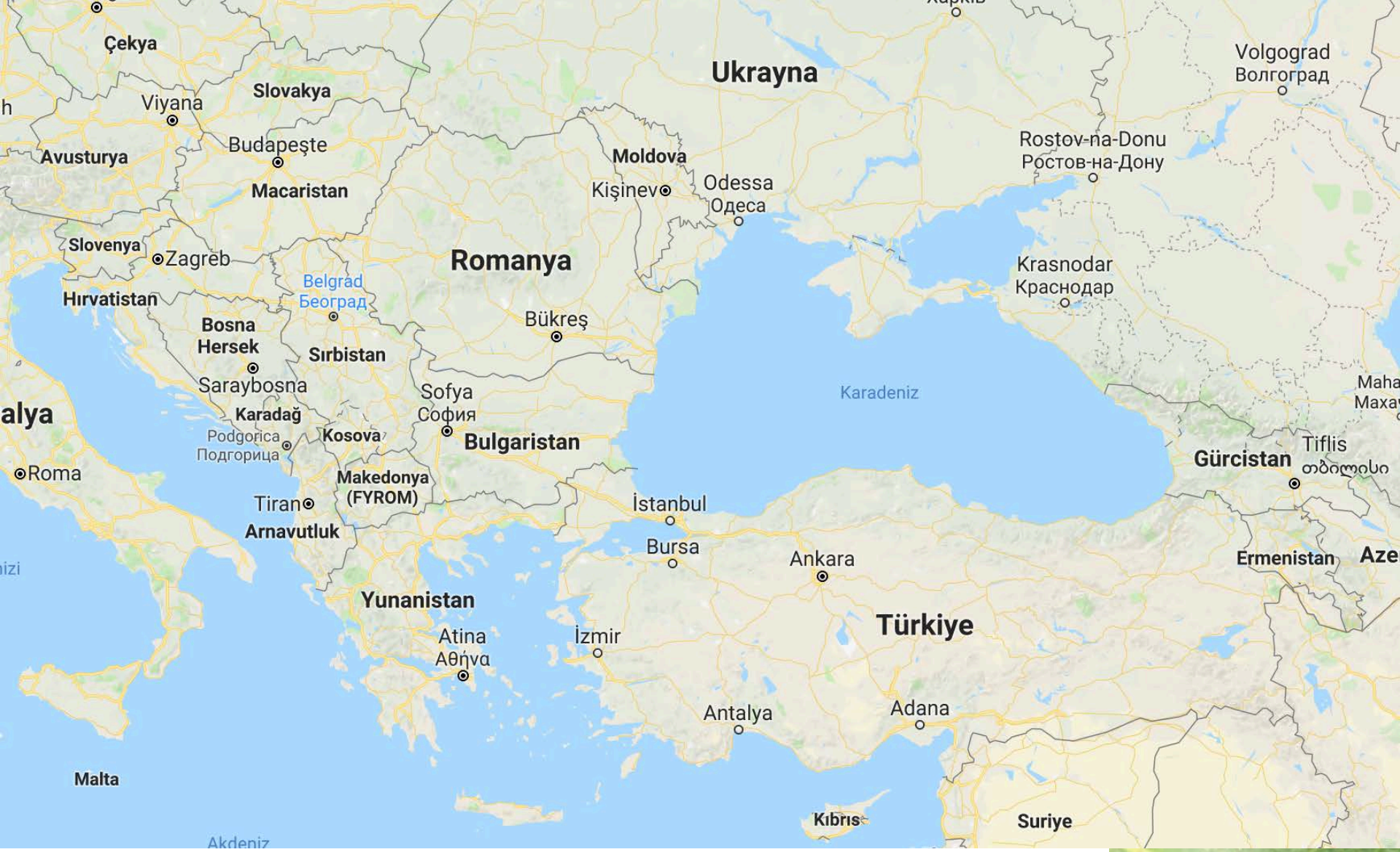
DOBRO JUTRO

KALIMERA

GÜNAYDIN

DZIEN DOBRY

GOOD MORNING


Çekya
Slovakya
Viyana
Budapeşte
Avusturya
Macaristan
Slovenya
Zagreb
Hırvatistan
Belgrad
Београд
Bosna
Hersek
Sırbistan
Saraybosna
Karadağ
Podgorica
Подгорица
Kosova
Roma
Tiran
Makedonya
(FYROM)
Arnavutluk
Yunanistan
Atina
Αθήνα
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Akdeniz
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Bükreş
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Ermenistan

BIOeconomy

Third Bioeconomy Course, May 21 – 25, 2018

# Use of bio pesticides for integrated pest management and samples from Turkey

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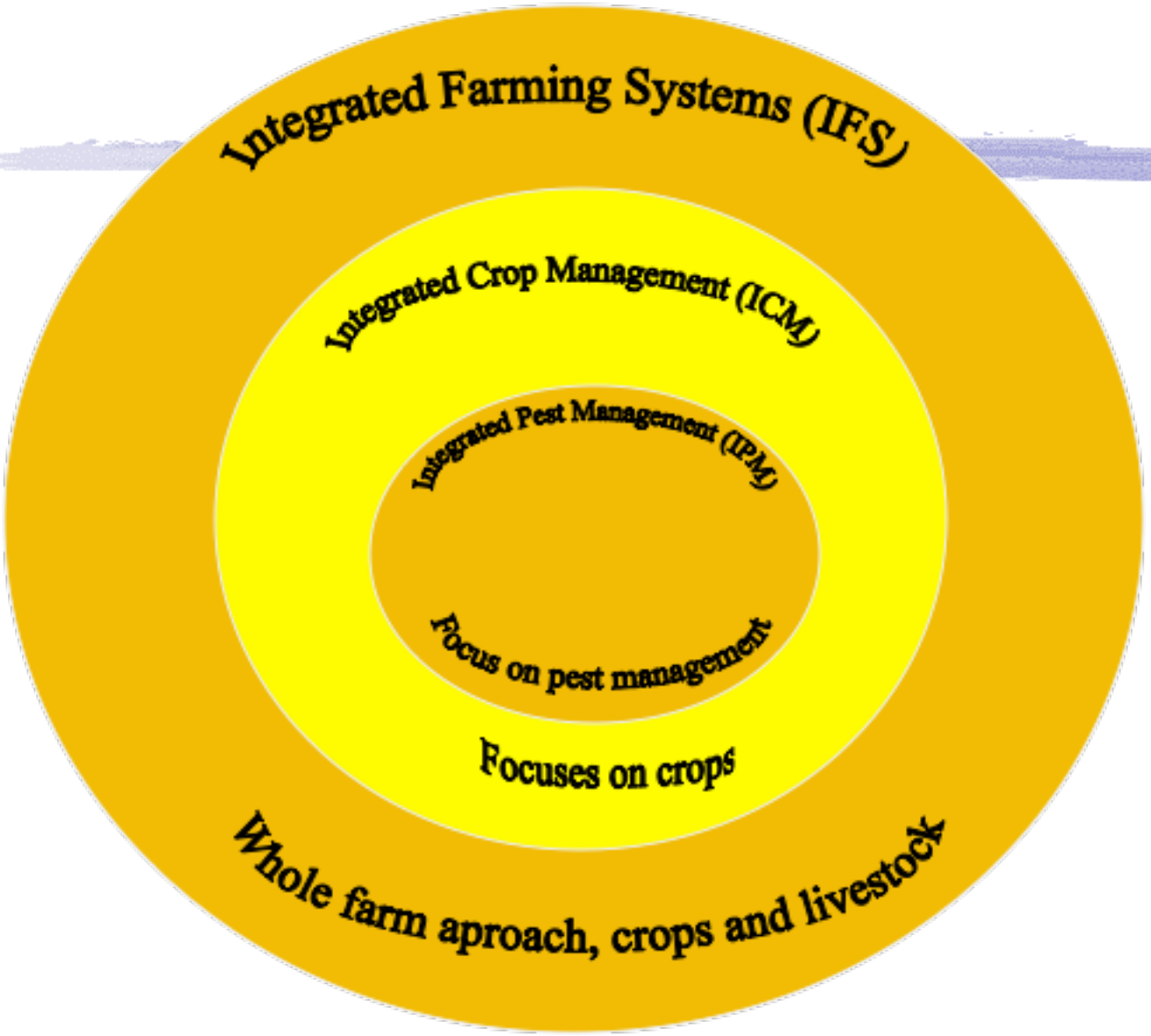
# Itinerary

- What is IFS?
- What is ICM?
- What is IPM?
- What is Biological Control?
- What is Bio-pesticide?

# Sustainable Agriculture




# IFS / Integrated Farming System

**An approach to farming which aims to balance production with economic and environmental considerations by means of a combination of measures including crop rotation, cultivations, appropriate crop varieties and careful use of inputs.**


BIOFARMA SASOV
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SASOV 2
586 01 JIHLAVA
www.biofarma.cz
SBĚR KONOPÍ 2017
NA BIOFARMĚ SASOV
MÁŠ RÁD KONOPÍ A PRÁCI V TEAMU?
SHÁNÍŠ BRIGÁDU?
BAVÍ TĚ PRACOVAT VENKU A RUKAMA?
15.8.-30.9.
HEMPOINT

# ICM / Integrated Crop Management

Integrated Crop Management (ICM) is a common sense approach to farming. It combines the best of traditional methods with appropriate modern technology, balancing the economic production of crops with positive environmental management. It is based on understanding the intricate balance between our environment and agriculture and is a whole-farm approach in achieving a proper balance. Basic components of ICM are crop management, nutrient management, pest management, and financial management. Each of these components of ICM is associated with agricultural Best Management Practices (BMP). Each BMP overlaps between the broader components of ICM. The relationship between farm management and BMP implementation is very dynamic.

# ICM / Integrated Crop Management

**ICM is a 'whole farm approach' which is site specific and includes:**

- **the use of crop rotations**
- **appropriate cultivation techniques**
- **careful choice of seed varieties**
- **minimum reliance on artificial inputs such as fertilisers, pesticides and fossil fuels**
- **maintenance of the landscape**
- **the enhancement of wildlife habitats**

# IPM / Integrated Pest Management

**IPM is the sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health and environmental risks.**

# Setting Economic (Action) Thresholds

First step in IPM is to set an **economic threshold (ET)**

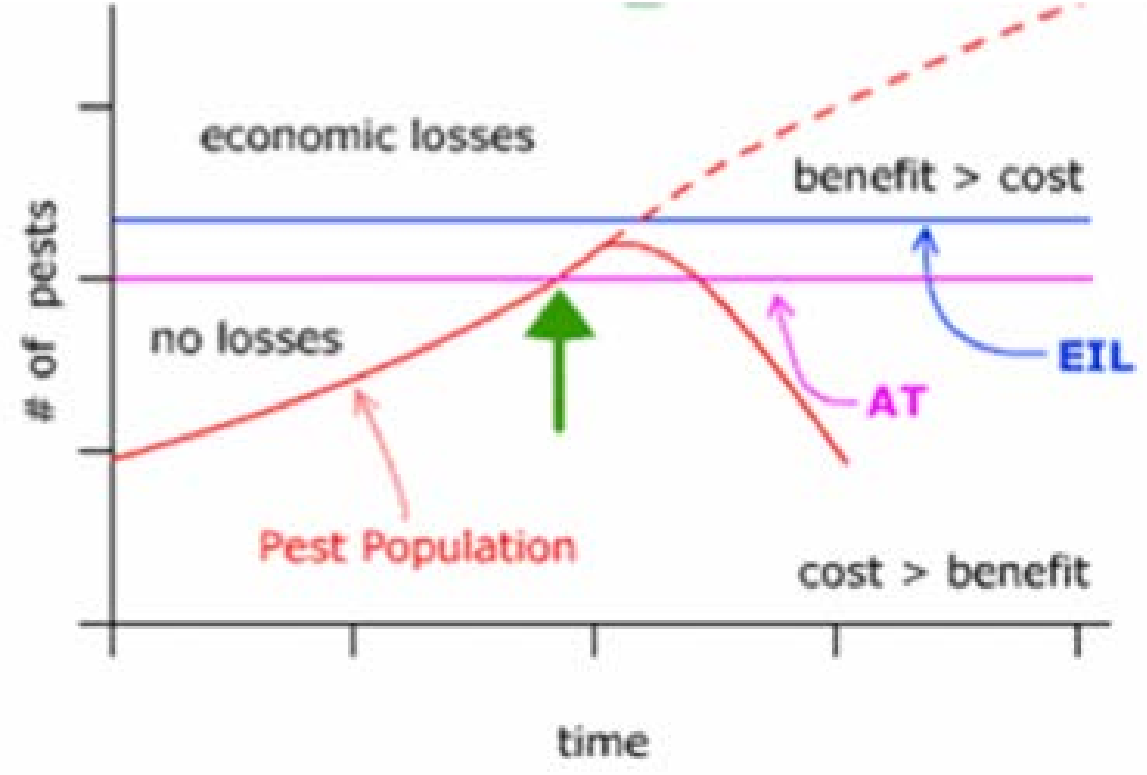
ET also called **action threshold (AT).**

**ET** is the density of a pest at which a control treatment will provide an economic return i.e. point when action needs to be taken.

ET is set at level lower than **Economic injury Level** (EIL).

EIL = lowest number of insects that will cause economic damage.

Allows time to implement control strategy and see its impact.




**ET is not static; it varies with fluctuating market values or control costs.**

**For example:**

- **If crop value increases, ET declines**
- **If cost of control increases, ET increases.**

https://ipmworld.umn.edu/pedigo

**Crop losses < £100 per ha**

**Cost of insecticide + application = £1000 per ha**

**Below Economic Threshold**

**ACTION: Do Not Spray**

**Crop losses > £1000 per ha**

**Cost of insecticide + application = £1000 per ha**

**At or above Economic Threshold**

**ACTION: Control Spray or ...**

# Components of IPM

## Biotechnical Control

Light
Soound
Repellent
Atractant
Pheromone
Hormone
Antifeedant

## Chemical Control

Acaricide
Insecticide
Fungicide
Rhodencide
Herbicide
Nemathicide

## Physical control

Mechanic (Broom)
Heat
Radiation

## Cultural Control

Fertilization
Pruning
Varieties
Rotation

## Biological Control

Augmentation
Natural enemy production
Protection of Natual Enemies
Microbial control

Pesticides are poisons and, unfortunately, they can harm more than just the “pests” at which they are targeted. They are toxic, and exposure to pesticides can not only cause a number of health effects, but is linked to a range of serious illnesses and diseases in humans, from respiratory problems to cancer

# Why do we want to reduce inputs of chemical pesticides?

Harmful to animal health

Drawback of chemical pesticides

Harmful to human health

Kills pollinators

Insecticide resistance

Damages the environment

# Some possible reactions are:

- Fatigue
- Skin Irritations
- Nausea
- Vomiting
- Breathing Problems
- Brain Disorders
- Blood Disorders
- Liver & Kidney Damage
- Reproductive Damage
- Cancer
- Death

# History of IPM

- The Green Revolution
- Pesticide Reduction
- The “IPM Initiative”
- Food Quality Protection Act
- Environmental Stewardship

- Over the last 25 years.....

- 40% reduction of insecticide applications
- 80% reduction of insecticide use
- 37% reduction of insect control cost

# Traditional Drivers of IPM

- Lower cost - $$
- Less pesticide usage
- Reduce Environmental Risks
- Eliminate pesticide residues in foods

# Biological control

**What Is Biological Pest Control?**

**Biological control is, generally, human's use of a specially chosen living organism to control a particular pest.**

Biological control is the conscious use of living beneficial organisms, called natural enemies, to control pests. Biological control should be an important part of any integrated pest management program, an approach which combines a variety of pest control methods to reduce pest levels below an economic threshold. Virtually all insect and mite pests have some natural enemies. Managing these natural enemies can effectively control many pests. Often the use of insecticides or other practices can injure or kill natural enemies, increasing the survival of the remaining pest insects.

# Biocontrol Categories
# Biopesticides

## Macrobials

Predatory
Insects
mites
Parasitoids

Nematodes

## Microbials

Enthomopathogens

Fungi
Bacteria
Viruses

## Semiochemicals


Pheromones
Plant volatiles

## Natural and Biochemical Products

Plant extracts
Seaweed products
Basic chemical substances

Predation and parasitism are examples of antagonistic ecological interactions in which one species takes advantage of another species. Predators use their prey as a source of food only, whereas parasites use their hosts both as a food and as a habitat.


Coccinellidae (1)

# Samples from Turkey

BİYOLOJİK TARIM DANIŞMANLIK ve MÜHENDİSLİK HİZMETLERİ Ltd. Şti.
Biological Agriculture Consulting and Engineering Co.

IBMA International Biocontrol Manufacturers' Association

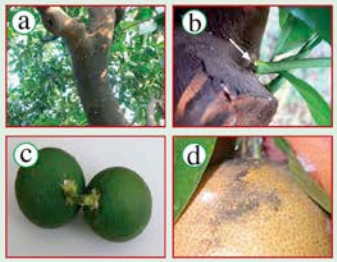
## TURUNÇGİLLERDE UNLUBİT İLE BİYOLOJİK MÜCADELE

Unlubit | BiyoAvcı | Parazitlenmiş unlubit | BiyoArı

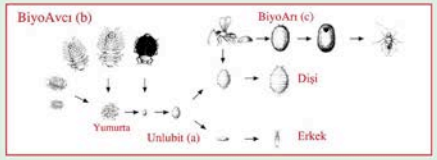

E- 5 Karayolu Üzeri, Kısık Mevki PK 23 Erzin / HATAY
Tel: (0.326) 691 02 17 Faks: (0.326) 691 02 18
Tel/Faks : (0.322) 459 68 21
lerzane@biyotar.com lerzane@superonline.com
www.biyotar.com


## TURUNÇGİL UNLUBİTİ

UNLUBİT (*Planococcus citri* Risso Hom.Pseudococcidae)
Turunçgil çeşitlerinin hepsinde önemli zararlara neden olur
Turunçgillerde unlubit ilkbahardan itibaren sırasıyla
gövdede (a), obur sürgünlerin dibinde (b), meyvede (c) görülmektedir.




Unlubitin turunçgillerdeki en önemli zararı oluşturduğu fumajin (meyve üzerindeki siyah is tabakası) (d) nedeniyle hasatta meyve kalitesinin düşmesidir. Unlubit yumurtadan açıldıktan sonra üç larva dönemi geçirerek ergin olur (a).Larva dönemleri boyunca bitkinin çeşitli bölgelerinde beslenir ve zararlı olur. Unlubitin biyolojik mücadelesinde BiyoAvcı unlubitin yumurta ve küçük dönem larvalarını doğrudan yiyerek tüketir (b). BiyoArı ise unlubitin 3. dönem larvalarına ve erginlerine yumurta bırakır (c). Unlubitin içinde yumurta gelişirken unlubit de ölür. Aşağıdaki şekilde faydalı böceklerin unlubit üzerindeki etki mekanizması görülmektedir.




## UYGULAMA ÖNERİLERİMİZ

Turunçgil bahçelerinde ilk Unlubitin erginleri ve yumurtaları Mayıs ayından itibare görünmeye başlar. Biylolojik mücadele uygulamasına unlubitin ilk görüldüğünde başlanması gerekir. Turunçgillerde salım önerilerimiz aşağıdaki çizelgede verilmiştir.

| Uygulama Zamanı | Zararlı Yoğunluğu | Dozu | Düşünceler |
|---|---|---|---|
| Mayıs-Haziran aylarında ilk unlubit ve yumurta paketi görüldüğünde | Önceki yıllarda unlubit zararı **hafif** olan bahçelerde | 10 BiyoArı/ ağaç<br>10 BiyoAvcı/ ağaç | Salımdan sonra unlubitin bahçedeki gelişmesi takip edilmelidir. Gerektiğinde yeniden salım yapılmalıdır. |
| | Önceki yıllarda unlubit zararı **ağır** olan bahçelerde (iki uygulama gerekebilir) | 20 BiyoArı/ ağaç<br>20 BiyoAvcı / ağaç | |

### SALIM ŞEKLİ

## ÖNEMLİ UYARI

### BİYOLOJİK MÜCADELEDE DİKKAT EDİLECEK HUSUSLAR

* Turunçgil unlubiti sorunu olan bahçelerde BiyoArı, *Leptomastix dactylopii* ile BiyoAvcı, *Cryptoleamous montrozieri* birlikte kullanılmalıdır.
* Çünkü her iki faydalının da etki mekanizması diğerinin çalışmasını tamamlayacak şekilde gelişmiştir.
* BiyoArı 3. dönem larva ve yeni ergin olmuş dişi unlubitleri parazitlerken, BiyoAvcı Turunçgil unlubitinin yumurtalarını ve küçük larva dönemlerini doğrudan tüketir.
* Turunçgil bahçelerindeki karınca aktivitesi(a) faydalı böceklerin çalışmasını özellikle BiyoArı faaliyetini olumsuz etkilemektedir.
* Karıncalar unlubitlerin beslenirken çıkardıkları tatlı maddeler ile beslenmeye geldiklerinde hareketleri ve salgıladıkları kokular ile BiyoArı'nın parazitleme davranışına engel olurlar. Bu nedenle karınca faaliyetinin yoğun olduğu bahçelerde ağaçların kök boğazına toz malathion (%25lik) sürülmelidir (b).



* Bu işlem bir sünger yardımıyla ağacın kökboğazının biraz üzerine bilezik şeklinde sürülerek yapılırsa etkisi dahakalıcı olmaktadır.
* Ağaç gövdesine sürülen bu toz ilaç tabakası karıncanın ağaç üzerindeki unlubit kolonisine ulaşmasını engeller.
* Biyolojik mücadele uygulanacak bahçede insektisit (geniş etkili ve/veya böcek büyüme regülatörleri) kullanılmamış olmalıdır.
* Eğer kullanılmış ise bahçede en son kullanılan insektisit ile 30 gün (4 hafta), böcek büyüme regülatörü ile 45 gün (6 hafta) sürenin geçmiş olması gerekir.
* Biyolojik mücadele için salım yapıldıktan sonra da söz konusu ilaçlar kesinlikle kullanılmamalıdır.
* Bu ilaçların kullanılması biyolojik mücadelenin başarısını olumsuz etkiler.
* Uygulama ile ilgili hertürlü sorularınız için, lütfen firmamızı arayınız.

Zararlılar
Hastalılıklar
Zararlı Kontrolü
Polinasyon
Ürünler
Arama

# Faydalı Böcekler

SOLANIPAR

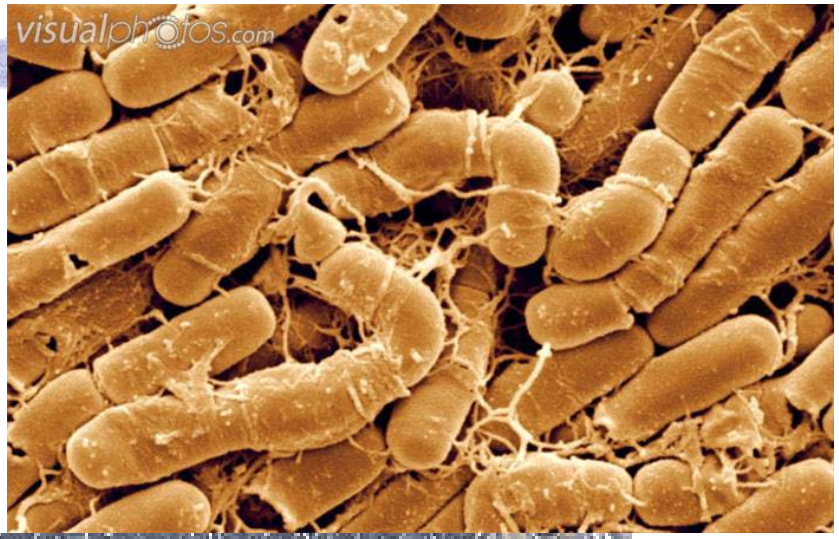
| | | | |
|---|---|---|---|
| APHIDALIA *Adalia Bipunctata* | APHIDEND *Aphidoletes Aphidimyza* | APHILIN *Aphelinus Abdominalis* | APHIPAR *Aphidius Colemani* |
| APHIPAR-M *Aphidius Matricariae* | BIOFLY *Ophyra Aenescens* | BIOPAR *Muscidifurax Raptorellus & Spalangia Cameroni* | CAPSANEM *Steinernema Carpocapsae* |
| CHRYSOPA *Chrysoperla Carnea* | CITRIPAR *Anagyrus Pseudococci* | CRYPTOBUG *Cryptolaemus Montrouzieri* | DELPHIBUG *Delphastus catalinae* |
| EN-STRIP *Encarsia Formosa* | ENERMIX *Encarsia Formosa + Eretmocerus Eremicus* | ENTOMITE-A *Hypoaspis Aculeifer* | ENTOMITE-M *Hypoaspis Miles* |
| ENTONEM *Steinernema Feltiae* | ENZICUR *Potassiumiodide + Potassiumthiocyanate* | ERCAL *Eretmocerus Eremicus* | ERVIBANK *Sitobion Avenae* |
| ERVIPAR *Aphidius Ervi* | LARVANEM *Heterorhabditis Bacteriophora* | LEPTOPAR *Leptomastix Dactylopii* | LIMONICA *Amblydromalus limonicus* |
| MACRO-MITE *Macrocheles robustulus* | MIGLYPHUS *Diglyphus Isaea* | MINUSA *Dacnusa Sibirica* | MIRICAL *Macrolophus Caliginosus* |
| MIRICAL-N *Macrolophus Caliginosus* | MYCOTAL *Verticillium Lecanii-m* | NESIBUG *Nesidiocoris Tenuis* | SAVONA *Potassium Salts of Fatty Acids* |
| SCIA-RID *Steinernema Feltiae* | SOLANIPAR *Leptomastix algirica* | SPICAL *Amblyseius Californicus* | SPICAL-PLUS *Amblyseius Californicus* |
| SPIDEND *Feltiella Acarisuga* | SPIDEX *Phytoseiulus Persimilis* | SPIDEX hot-spot *Phytoseiulus Persimilis* | SWIRSKI-MITE *Amblyseius Swirskii* |
| SWIRSKI-MITE LD *Amblyseius swirskii* | SWIRSKI-MITE PLUS *Amblyseius Swirskii* | SYRPHIDEND *Episyrphus Balteatus* | TERRANEM *Heterorhabditis Bacteriophora* |
| TERRANEM-NAm *Heterorhabditis Bacteriophora* | THRIPEX *Amblyseius Cucumeris* | THRIPEX-PLUS *Amblyseius Cucumeris* | THRIPEX-V *Amblyseius Cucumeris* |
| THRIPOR-I *Orius Insidiosus* | THRIPOR-L *Orius Laevigatus* | THRIPOR-S *Orius Strigicollis* | TRIANUM-G *Trichoderma Harzianum T-22* |
| TRIANUM-P *Trichoderma Harzianum T-22* | | | |

**Koppert**

Tüm dünyada, profesyonel üreticilere, en gelismis dogal polinasyon ve biyolojik mücadele sistemleri sunmaktadir

# Microbials

## Enthomopathogens
## (fungi, bacteria, viruses and nematodes)




Contain a microorganism (bacterium, fungus, virus, protozoan or alga) as the active ingredient

• Microbial pesticides can control many different kinds of pests, although each separate active ingredient is relatively specific for its target pest[s]

• For example, there are fungi that control certain weeds, and other fungi that kill specific insects

• The most widely known microbial pesticides are varieties of the bacterium *Bacillus thuringiensis*, or Bt, which can control certain insects in cabbage, potatoes, and other crops. Bt produces a protein that is harmful to specific insect pests

• Certain other microbial pesticides act by out-competing pest organisms. Microbial pesticides need to be continuously monitored to ensure they do not become capable of harming non-target organisms, including humans

**Chemical pesticides kills all pests + beneficial arthropods**

**Fungal BCAs kill some but not members of pest complex**

**May require application of 2 or more fungal strains.**

**A costly process because:**

- ***Need to register the different strains***
- ***To avoid blockage of sprayer nozzle – several spray trips needed***

# Samples from Turkey

*Verticillium lecani*

*Paecilomyces lilacinus*
fungi, nematoda



*Beauveria bassiana*


*Paecilomyces fumosoreus*


## Semiochemicals

# Pheromones and other Semiochemicals:

# SEMIOCHEMICALS

**INTERACTION <u>WITHIN</u> SPECIES** **INTERACTION <u>BETWEEN</u> SPECIES**

**Pheromones** **Kairomones** **Allomones**

**Synomone**

**(benefits sender)** **(benefits both)** **(benefits sender & receiver)** **(benefits receiver)**

**Pheromones** are chemicals which act as <u>signals</u> between living organisms (not just insects) <u>of the same species</u>.

**Kairomones** are produced by plants (or animals) in a way which benefits the insect receiving the signal. e.g. chemicals which attract insects to a specific host plant.

**Allomones**, are of benefit to the organism which produces the chemical, e.g. repellent smells emitted by stink bugs to deter predators.

**Synomones,** are of benefit to the organism which produces the chemical, and to the receiver e.g. flower scents and pollinating insects.

# Pheromones and Pest Management

## How are Pheromones Used?

### Monitoring

- measuring populations/activity

### Mass Trapping

- Catching as many individuals
- as possible

### Mating Disruption

- preventing mating

### Attract & Kill

- bringing insect to the insecticide

# Other Control Strategies using Semiochemicals

Mass Trapping

Simple Concept: trap as many insects as you can

Key is to attract and trap females

Kairomones becoming increasingly important

Lure and Kill

Again a simple concept: bring the insects to the insecticide and not the insecticide to the insect

Key again is to attract females

Both techniques can be integrated with other techniques for IPM


# Essential oils produced in Isparta, Turkey

# Azadirachtin (Neem)


# Pesticide market on the world 2016 US $

Chemicals

**$ 60 billion**

Biopesticides

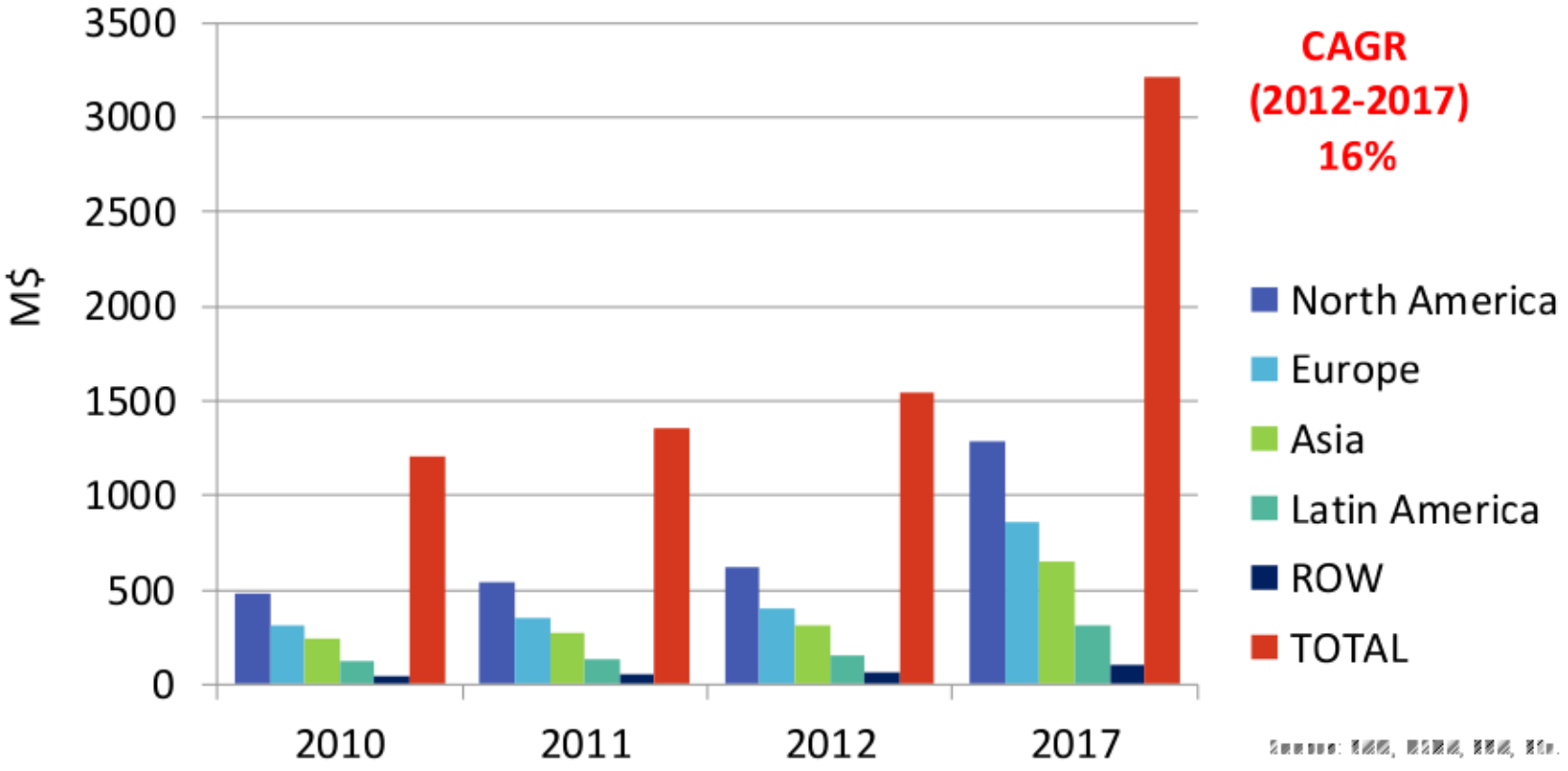
**$ 3 billion**

**Biopesticides rapidly growing sector expected to grow from $1.7 billion in 2013 to $4.4 billion by 2019**

# Another forecasting
# expected to grow $ 11 billion by 2025

it is expected that biopesticides will receive a total 40% share of the pesticide market in the world by 2050

# BIOCONTROL MARKET GROWTH BY WORLD AREA




IBMA
INTERNATIONAL BIOCONTROL MANUFACTURERS ASSOCIATION

# Biological control market in Turkey in 2016

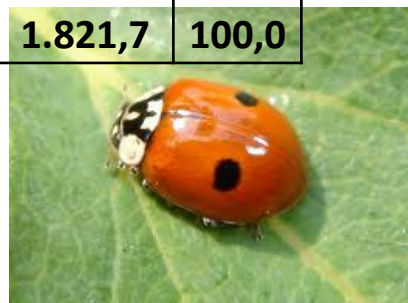
- Registrated product numbers: 80-85
- Biotecnic product numbers : 101
- $600 million pesticide market

% 3-5 Biopesticid rate.

# Economic Costs of the Application of Pesticides on some crops in Turkey

The share of Pesticide Type and amounts of pesticides used in selected crops

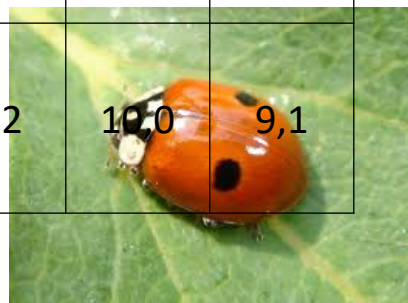
| Type of Pesticide | Apple | | Grape | | Rose oil | | Barley | | Wheat | |
|---|---|---|---|---|---|---|---|---|---|---|
| | gr-cc/ha | % | gr-cc/ha | % | gr-cc/ha | % | gr-cc/ha | % | gr-cc/ha | % |
| Insecticide | 13.701,6 | 50,3 | 490,8 | 33,5 | 2.612,8 | 52,7 | 535,4 | 29,4 | 535,4 | 29,4 |
| Fungicide | 11.394,6 | 41,8 | 975,7 | 66,5 | 2.347,5 | 47,3 | 234,8 | 12,9 | 234,8 | 12,9 |
| Acaricides | 2.152,2 | 7,9 | - | - | - | - | - | - | - | - |
| Herbicide | - | - | - | - | - | - | 1.051,5 | 57,7 | 1.051,5 | 57,7 |
| **Total pesticides** | **27.248,4** | **100,0** | **1.466,5** | **100,0** | **4.960,3** | **100,0** | **1.821,7** | **100,0** | **1.821,7** | **100,0** |



# Economic Costs of the Application of Pesticides on some crops in Turkey

Table The share of plant protection cost in production cost in selected crops

| | Apple | Grape | Rose oil | Barley | Wheat |
|---|---|---|---|---|---|
| Amount of used pesticide gr/cc/ ha) | 27.248,4 | 1.466.5 | 4.960,3 | 1.821,7 | 1.103,5 |
| Average Pesticides+ Pesticide application costs ( € /ha) | 1.574,4 | 404,8 | 593,3 | 44,0 | 50,3 |
| Average production costs ( € /ha) | 3.736,2 | 858,3 | 2.357,5 | 441,5 | 549,9 |
| The proportion of plant protection costs in average production costs (%) | 42,1 | 47,2 | 25,2 | 10,0 | 9,1 |



# The target of Turkey

# IPM is 50% until 2023

- Share of Biological control ajans in pesticides **25%**

- Biological control Company numbers: **100**

# BİYOLOJİK ve BİYOTEKNİK MÜCADELE ÜRÜNLERİ ÜRETİCİLERİ ve TEDARİKÇİLERİ DERNEĞİ

association

- Anasayfa
- Hakkımızda
- Haberler
- Mevzuat
- Üye Listesi
- Biyolojik Mücadele Nedir?
- İletişim

## Haberler

**Böcek İthalatında Gümrük Kontrolleri Hızlandırılıyor**

Biyolojik mücadele ürünlerinin ithalatında işleyişi hızlandırmak amacıyla gümrük kontrol uygulamalarında tam koordinasyon sağlanacak.

Devamını Oku

**Üyeleri Antalya Gıda Tarım Hayvancılık İl Müdürü Ahmet Dallı İle Bir Araya Geldi.**

Antalya İl Gıda Tarım ve Hayvancılık Müdürlüğünün düzenlediği kahvaltılı toplantıda, biyolojik mücadele sektöründe yer alan firmalar bir araya geldi.

Devamını Oku

**Biyolojik Mücadele Danışmanına, Özel Sertifika!**

Biyolojik ve Biyoteknik Mücadele Ürünleri Üreticileri ve Tedarikçileri Derneği BİOTED'in Yönetim Kurulu, İl Müdürü Ahmet Dallı'ya bir nezaket ziyaretinde bulundu. Ziyarete BİOTED Başkanı Ali Eroğlu ile Yönetim Kurulu üyeleri Ahmet Özgür Ateş, Mehmet Oba ve Gökçe Cengiz katıldı.

Devamını Oku

**BİOTED Yönetim Kurulu, 28 Şubat 2014 Cuma Günü Yönetim Kurulu Toplantısını Gerçekleştirdi.**

BİOTED Yönetim Kurulu, 28 Şubat 2014 Cuma günü, dördüncü kez toplanarak derneğin resmi işlerinin yürütülmesi ve gelecek dönem faaliyetleri hakkında görüştü.

Devamını Oku

Design by: Günola Ajans


Biological Control Research and Apply Center

| PESTS | NATURAL ENEMIES |
| --- | --- |
| *Aspidiotus nerii* | *Chilocorus bipustulatus* |
| *Aonidiella aurantii* | *Rhyzobius lophantae* |
| *Chrysomphalus dictiospermi* | |
| *Bemisia tabaci* | *Encarsia inaron* |
| *Trialeurodes vaporariarum* | |
| *Aphis fabae* | |
| *Aphis gossypii* | *Aphidius colemani* |
| *Myzus persicae* | |
| *Acyrthosiphon pisum* | *Hippodamia variegata* |
| *Tetranychus urticae* | *Phytoseiulus persimilis* |
| *Planococcus citri* | *Cryptoleamous montrozieri* |
| | *Leptomastix dactilopii* |
| *Tuta absoluta* | *Beauveria bassiana* |
| | *Macrolophus pygmaeus* |

# DOMATES GÜVESİ

*Tuta absoluta* (Lepidoptera: Gelechiidae)

**"Domates güvesine mikrobiyal enzim etkisi Projesi"**
Batı Akdeniz Kalkınma Ajansı tarafından finanse edilen DFD-38 referans numaralı 2011 Yılı Doğrudan Faaliyet Destek Programı kapsamında yürütülmüştür.

*Beauveria bassiana*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# Thank You

For Your Attention