



Food and Agriculture  
Organization of the  
United Nations



# Alternative methods in integrated pest control

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FAO REU

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6<sup>th</sup> International Biocidal Congress 17-20 November 2022, Antalya, Türkiye

# FAO's Vision



**“A world free from hunger and malnutrition, where food and agriculture contribute to improving the living standards of all, especially the poorest, in an economically, socially and environmentally sustainable manner”**



# FAO Strategic Framework/ Regional Perspective



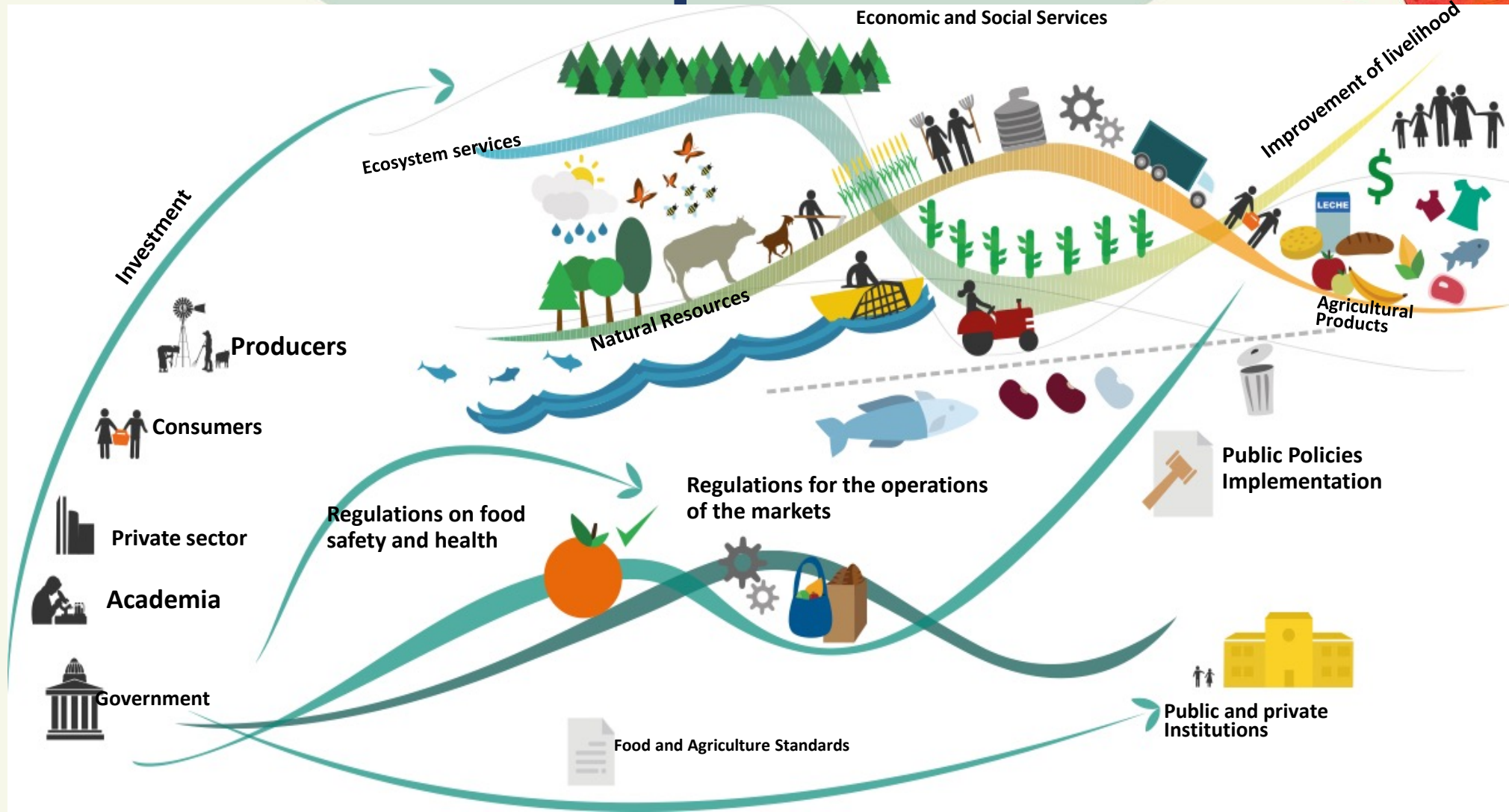
Transformation to **MORE** efficient, inclusive, resilient and sustainable, agri-food systems

- C1** • Climate change and disaster risk reduction
- C2** • Biodiversity and Nature positive production
- C3** • Environmental sustainability



- **Pesticide and fertilizer management**
- **Agriculture plastic**
- **Soil pollution**
- **Bio economy.**

# Agri food system.... Pest and pesticides





# INTEGRATED PEST MANAGEMENT

IPM is a holistic approach to sustainable agriculture that focuses on managing insects, weeds, and diseases through a combination of cultural, biological, and chemical measures that are cost-effective environmentally sound, and socially acceptable. This includes the responsible use of crop protection and plant biotech products.

**GLOBAL  
POPULATION**  
is on the rise



as well as  
**FOOD  
DEMAND**

**TO REACT TO THE CHANGING  
NEEDS FARMERS MUST**

**INCREASE  
YIELDS**  
on existing  
lands



while  
**PROTECTING  
BIODIVERSITY**  
and looking after  
environment

**IPM PROVIDES TOOLS AND  
STRATEGIES FOR  
PRODUCERS TO**

sustainably  
**MAXIMIZE  
PRODUCTION**



and  
**MINIMIZE LOSSES**  
due to insects, diseases,  
and weeds



## LIFECYCLE MANAGEMENT OF PESTICIDES AND DISPOSAL OF POPS PESTICIDES IN CENTRAL ASIA COUNTRIES AND TURKIYE GCP/SEC/011/GFF

### SAFELY DESTROY POPS AND OBSOLETE PESTICIDES, REMIEDIATE PESTICIDE- CONTAMINATED SITES

- 900 tonnes of POPs and obsolete pesticides are disposed/safeguarded
- Work on contaminated sites
- Container management capacity developed



### STRENGTHEN THE INSTITUTIONAL AND REGULATORY FRAMEWORK FOR MANAGING PESTICIDES THROUGH THEIR LIFE CYCLE

- Regulatory and institutional framework for pesticide management strengthened
- Registration and post registration procedures and capacity strengthened



### PESTICIDE USE AND PESTICIDE RISK REDUCTION THROUGH PEST MONITORING AND PROMOTION OF IPM

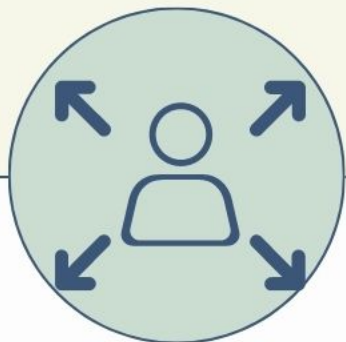
- IPM alternatives to Highly Hazardous Pesticides (HHP) use demonstrated, leading to reduced pesticide application frequencies
- Pest and disease monitoring promoted to guide plant protection decisions in key crop



**PROJECT GOALS**



# FAO'S ROLE IN THE PROMOTION OF IPM IN THE REGION



## Capacity development

Collaboration with  
governments and NGO's  
Farmer Field School (FFS)  
Training  
knowledge materials



## Promotion

ecological approach  
environmental protection,  
health, and safety of farm  
households  
sustainable use of natural  
resources



## Evidence generation

Establish scientific networks  
Develop trials and demo plots  
collect and analyze local  
information on different tools  
and approaches



## Policy support

Review of the legal  
framework  
Development of  
recommendations  
Support of development of  
regulations and policies.



# Challenges



- **Increasing food demand**
- **Limited land resources**
- **Degradation of natural resources**
- **Climate change**
- **Economic changes**
- **Food supply chain constrains**

## Why practice IPM?

- Biodiversity and ecosystem services
- Decrease environmental and human health risks
- Minimize pesticides resistance
- Effective pest control tactics
- Contribute to soil health



# IPM trials in apple orchards in Türkiye



- **Apple is one of the most important fruits in Türkiye**
- **Conventional practices includes 14-20 chemical applications**
- **Aim to decrease pesticides use**
- **Isparta region approx 20% of national apple production**
- **Evidence generation at national level**
- **Promotion of alternative methods**

## Implementing partners

- Ministry Of Agriculture And Forestry, Fruit Research Institute
- Isparta Youth Businesspeople Association
- Isparta University of Applied Sciences- Plant Protection Department

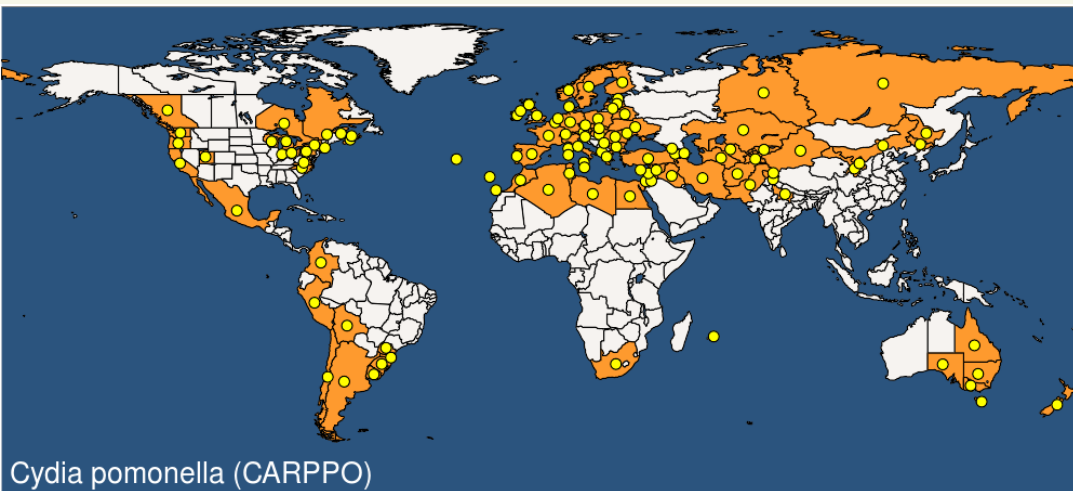


# The PEST

## Codling moth (*Cydia pomonella*)



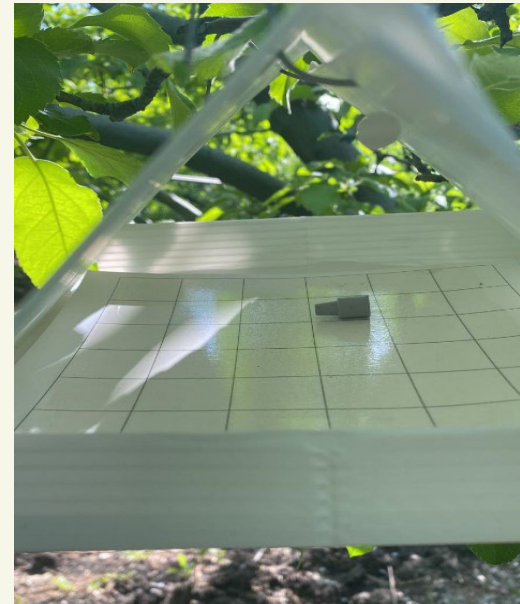
- 2-4 generation
- Imago appearance April- May
- Difficult to separate generations
- First mating in 24 hours
- Appearance after 10-16 days--> 100-150 eggs
- Development period 20-28 days
- One larvae can damage 2-4 fruits



# Forecasting in apple orchards



- Difficult
- Sex pheromone traps 1-5 male moth/week
- Strong weather impact
- Multiple swarming peak
- Difficult to define the proper time for plant protection interventions
- BIOFIX method



## Physical methods

- Tree belts
- Bark cleaning



## Biological methods

- Granulovirus
- Bacillus thuringiensis
- Pheromone-based mating disruption
- Sterile insect technique ?



# Plant protection interventions



## Chemical methods

- Insecticides (depending on country regulations )
- Examples:
  - Rynaxypyr
  - Piretroids
  - Chlorpyrifos (CPS)
  - Spinosad
  - Etc.

## Decision making process!

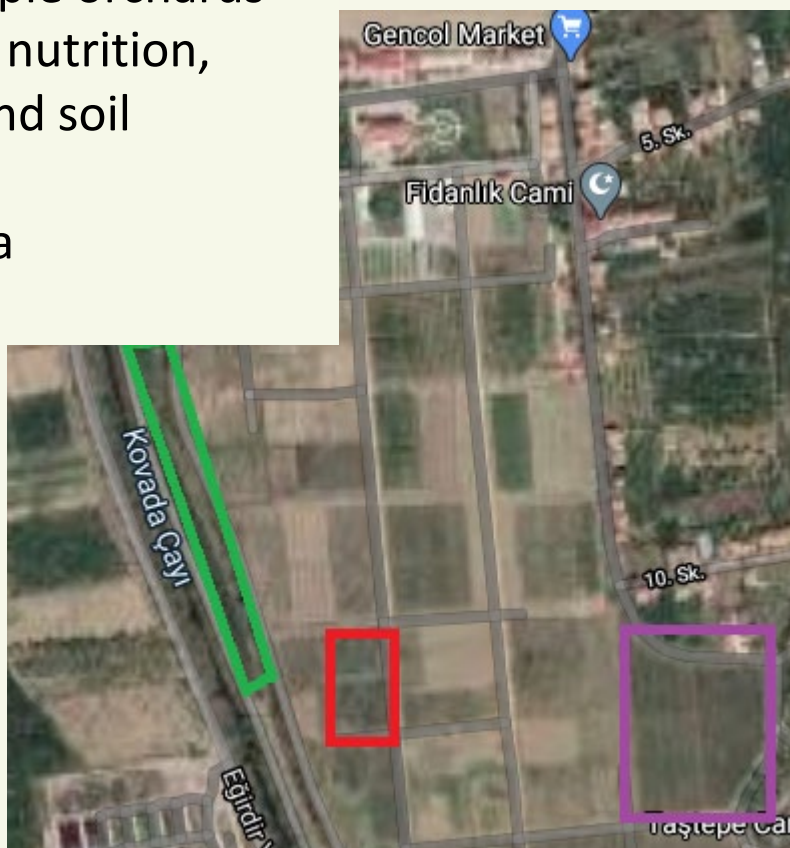
1. Set action thresholds
2. Monitor and identify pests
3. Prevention
4. Control
  - Always combine techniques
  - Avoid repetition
  - Avoid resistance generation
  - Sound management of natural resources
  - Avoid environmental and human health risks

# 2020 comparison trials

conventional, integrated management, organic farming transition

## Eğirdir, Isparta

- Golden Delicious and Starking apple orchards
- same plant nutrition, irrigation and soil conditions,
- Approx 2 ha



	IPM plot (1.3 ha)	Organic Farming transition plot (0.4 ha)	Conventional Farming plot (0.5 ha)
Isomate C-plus	4 400	800	-
Monitoring Traps	2	1	2
Spraying	3 (trichacloprid)	9 (neemazal)	13 (trichacloprid)

Costs	IPM plot (TL/ha)	Organic Farming transition plot (TL/ha)	Conventional Farming plot (TL/ha)
Pesticide cost	3 598	16 625	14 700
Labour cost	1 382	2 925	2 075
Diesel expenses	495	560	1 848
Pheromone dispensers cost	5 846	9 000	-
Fertilizer cost	1 610	1 250	1 610
Total cost per ha	12 931	30 360	20 233

Current Sales Prices by Apple Classification	IPM plot	Organic Farming transition plot	Conventional Farming plot
Table quality sale (2 TL/kg)	36 890 TL (= 18 490 kg X 2 TL)	2 900 TL (= 1 450 kg X 2 TL)	26 600 TL (= 13 300 kg X 2 TL)
Fruit juice quality sale (0.6 TL/kg)	12 252 TL (= 20 420 kg X 0.6 TL)	10 530 TL (= 17 550 kg X 0.6 TL)	23 580 TL (= 39 300 kg x 0.6 TL)
Total income	49 142 TL/ha	13 430 TL/ha	50 180 TL/ha
- Total cost (Table 6a)	- 12 931.6 TL/ha	- 30 360 TL/ha	- 20 233 TL/ha
Net income	36 210.4 TL/ha	-16 930 TL/ha	29 947 TL/ha

# On-farm trials 2021



- 30 producers involved for IPM trial
- Approx 70 ha
- 2 delta trap/ produce
- 100 pheromone dispensers/ha
- Weekly monitoring and advisory service
- Delta trap and weather forecasting
- Suggestion: no pesticide application needed
- Still the habits difficult to change: based on forecast average 5 application was done in trial orchards
- Control orchards: 13 pesticides application

Dates of Monitoring traps counting	Cumulative number of pests observed in project orchards where no pesticides were applied	Average cumulative number of pests observed in project orchards where pesticides were applied 3 times.	Average cumulative number of pests observed in project orchards where pesticides were applied 4 times.	Average cumulative number of pests observed in project orchards where pesticides were applied 5 times.	Average cumulative number of pests observed in project orchards where pesticides were applied 13 times.
21.04.2021				1	5
26.04.2021				2	10
09.05.2021	1		1	2	18
13.05.2021	1	1	1	2	20
16.05.2021	8	1	1	2	22
18.05.2021	8	2	2	2	25
24.05.2021	8	2	2	2	29
31.05.2021	8	2	2	2	29
07.06.2021	8	3	2	2	29
18.06.2021	8	3	2	2	54
31.07.2021	8	3	2	2	87

# Results



Fruit Quality Classification	The field where no was pesticide used X da Total of 4 decares/0,4 ha	The field where pesticides were applied 3 times (kg) X da Total of 9 decares/0,9 ha	The field where pesticides were applied 4 times (kg) X da Total of 40 decares/ 4 ha	The field where pesticides were applied 5 times (kg) X da Total of 688 decares /68,8 ha	The field where pesticides were applied 13 times (kg) X da Total of 20 decares / 2 ha
Table fruits total	22 000 kg	54 000 kg	280 000 kg	4 816 000 kg	136 000 kg
Suitable for fruit juice total	2000 kg	3 744 kg	20 000 kg	688 000 kg	14 000 kg
Total harvest amount	24 000 kg	57 744 kg	300 000 kg	5 504 000 kg	150 000 kg
When averaged to decare:					
Table fruits total	5500 kg/da	6000 kg/da	7000 kg/da	7000 kg/da	6800 kg/da
Juice fruits total	500 kg/da	416 kg/da	500 kg/da	1000 kg/da	700 kg/da
Yield per decare	6000 kg/da	6416 kg/da	7000 kg/da	7000 kg/da	7500 kg/da

Expenses	Orchard without pesticide application	3 times pesticide applied orchard	4 times pesticide applied orchard	5 times pesticide applied orchard	13 times pesticides applied orchard
Pesticide cost	0 TL/ha	180 TL/ha	2400 TL/ha	3000 TL/ha	7800TL/ha
Labour Cost-(For application of pheromone dispensers and pesticide application)	900 TL/da	900+120 TL/Ha	900+160 TL/ha	900+200 TL/ha	520 TL/ha
Fuel cost	0 TL/da	450 TL/ha	600 TL/ha	750 TL/ha	1950 TL/ha
Pheromone dispenser cost	2750 TL/da	2750 TL/ha	2750 TL/ha	2750 TL/ha	-
Total expenses per decare	3650 TL/da	6020 TL/ha	6810 TL/ha	7600 TL/ha	10270 TL/ha



# On-farm trials 2022



- 46 producers involved for IPM trial
- 900 hectares
- Weekly monitoring and advisory service
- Delta trap and weather forecasting
- **Apple scab traps**
- NO final result yet from 2022









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# Thank you for your attention!

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Integrated pest management  
of major pests and diseases  
in eastern Europe and the Caucasus

