

# IPM in Southern European Greenhouses: Strengths and Weaknesses

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# Overall Background in 2010

The importance of protected cultivation or **Controlled Environment Agriculture (CEA)** systems have **increased tremendously in the last 25 years** thanks to significant scientific and technical breakthroughs.

These systems are **very attractive to investors** while allowing the **regular supply** of fresh vegetables, fruits and ornamentals to many populations living in all the **different world climates**.

**Production strategies**, driven by both **local opportunities and constraints** (energy availability vs. natural climatic advantages...), have led to **contrasting CEA options** within Europe. Currently, high-tech systems have been mostly developed in Northern Europe. In contrast, Mediterranean regions have favored the low-tech systems.

As the cost of fossil energies is becoming an increasing constraint, the **Mediterranean area becomes attractive** for all CEA systems. A key issue is now to find the type of technology that can best reconcile a **cost-effective investment** with the implementation of **satisfying IPM solutions**.



# Overall Background in 2010

Three types of CEA systems can be distinguished:

- **High-tech systems** based on **closed greenhouses** (without any openings) equipped with sophisticated **active climate control**;
- **Medium-tech systems** with **partially closed greenhouses** (openings with insect-proof screens) providing **semi-active climate control**;
- **Low-tech** and low cost systems using opened plastic-covered greenhouses and providing only **passive climate control**.



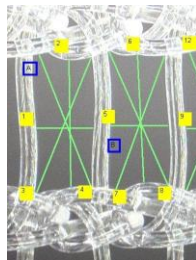
# IPM Background in 2010

Globally, **IPM** is considered a **success story** in the CEA systems.

However, the total area of greenhouses under biological and integrated control in the world is only **5% of the total greenhouse area**.

Furthermore, the situation is **very diversified** and **dependent** on the **type of crop**, the **level of available technology** and the **production areas**. The shift to IPM is highly driven by market requirements and labels.

In contrast, despite some recent advances in the use of biocontrol agents (BCA), the weak point of **low-cost systems** led to **high pesticide use**. This observation supported the hypothesis of **strong interaction** between the **technical characteristics** of the system and the **success of BCA-based IPM tactics**.



*High-tech insect proof nets*



# CEA and climate change issues

Currently, **greenhouse areas** are **still spreading** and the CEA system is one of the **keystones** in **foresight scenarios** on **agricultural development**.

However, **environmental acceptability** of this **very intensive agro-ecosystem** has been **questioned**. Studies on the sustainability of CEA with regard to economic, environmental, social, sanitary performances and on the response to global climate change have given **controversial results**, according to the type of system.

Climate change also has **consequences** on **biotic communities**:

Already, an increasing number of **exotic pests** have repeatedly entered CEA systems over the last ten years, forcing growers to come back to conventional pest control strategies.

Special attention should be given to this process as greenhouses may constitute **favorable entry points for invaders**.





# Approach:

We have focused on IPM solutions for CEA mostly in the **Southern parts of Europe** where the concerns about pesticide use were the most serious, but taking Northern Europe situation into account.

We have addressed **two major bottlenecks**:

- 1/ **Greenhouse engineering and technologies** are improving tremendously in relation to energy and plant physiology issues, but their **impact on crop protection** has **not** been **sufficiently considered**.
- 2/ Much attention has been placed on developing biocontrol methods, but despite considerable experimental efforts, numerous **unexplained failures** have been observed in **real cropping conditions**. Approaches relied too much on trial-and-error experiments and the **ecological knowledge base** underpinning biocontrol in greenhouses was **insufficient**.



# Approach:

- **The tomato** was selected as the **target crop** because of its economic importance and large scale cultivation in Mediterranean areas. It was also a good **case study for pest invasions** with the recent history of virus-transmitting whiteflies and the new threat posed by *Tuta absoluta*.
- However, conclusions drawn from **this case have been enriched by experience gathered from other greenhouse crops** to improve our understanding of CEA systems and **to further extend application** of the results on a **wider range of protected crops**.



# Stakeholders input

## Methodology:

- A **panel of experts** was designated, including researchers from different disciplines, farmers, advisors, greenhouse and BCA industries, cooperatives.
- Experts listed the **properties** and **status** for each innovation, e.g. generic properties and/or specificity to **local economics**, **risk of interference** connected with other methodologies and critical pest problems induced or not resolved by this innovation.
- **Stakeholders** feedback implemented a **multicriteria database** by selecting and using **qualitative indicators**.



# Stakeholders survey synthesis

## Major pests and diseases:

- **Pests** and **airborne diseases** showed **strong similarities** among the countries;
- ***Tuta absoluta*** was a **problem** in the **Southern countries**;
- **Thrips** were also a **problem** in the **Southern regions**;
- The **rust mite** occurred in **all countries**, but was considered a **secondary pest**;
- **Viruses** were a **big problem** in the **South**, especially the TYLCV and the TSWV;
- **Airborne diseases** were **more** of a **problem** in the **South** than in the North and that was due to the **different technological levels** and to the means of **climate control**;
- **Soil pathogens** (nematodes and soil-born diseases) were mainly a problem in **Italy**, because of cultivation in **clay soil**.



# IPM breakthroughs since 2010 and second survey synthesis

Extensive **scientific, experimental** and **training** efforts have been made by the PURE partners to **find solutions** and **transfer knowhow** to the **growers** in the diverse European regions.

**Major evolution** has been observed in **IPM implementation** in real **greenhouse productions**.

In some regions, **IPM** has been **implemented 100% in tomato crops**.

Nevertheless, some **issues** remain **unsolved** in **specific farming situations**.

The **tomato IPM experience** now has to be **extended** to other **greenhouse productions**.



# Thank you for your attention!



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