TOOLS 18	**IPM solutions for protected vegetables**
	Systems

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WHAT IS…	The importance of protected cultivation or **Controlled Environment Agriculture (CEA**) systems have increased tenfold 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. The objectives are to design IPM solutions adapted for different levels of greenhouse technology (based on a combination of strategic options and tactic components) that reduce reliance on pesticides and risks to human health while providing cost-effective investment and ensure that these solutions satisfy the needs of concerned stakeholders.
WHY	In the world of crop protection, the common perception is that greenhouses are farming system types where IPM and biological control in particular have been very successful. Yet, the reality is that the total area under biological and integrated control in greenhouses is still marginal in many areas: in 2007 it was estimated to represent at most 5% of the total greenhouse world area. The vast majority of greenhouses are therefore under conventional chemical pest control which in many greenhouse crops can mean 40 pesticide treatments per year. However, recent evolution in pepper cultivation in Southern Spain under retailer pressure has demonstrated the real potential for increasing BioContol Agents use even in low/medium tech CEA. Based on past experience with IPM in ornamentals, the IPM solutions will provide the basis to generate a 90% reduction in the frequency of chemical applications.

HOW	A major concern in designing IPM solutions for protected crops is to ensure the robustness of the proposed new systems towards current and future major system disturbances: the consequences of cutting back fossil energy input and the risk of exotic pest invasions. Thus, the first step is to select candidate greenhouse designs, i.e. those which include the structure, internal equipment for climate control and subsequent crop conditions, fitting new economic, environmental, social and sanitary requirements. The second step is to select tactical packages, including some emerging technologies, pest control tools and "If Then Else" or "Do that" rules. Examples of candidate emerging technologies are: physical pest control (e.g. insect-proof screens) or nanofiltration systems for disinfestations of recycled water. Examples of pest control tactics are the use of climate precision monitoring, new biopesticides, combinations of natural enemies and plant activators, or push-pull approach exploiting semiochemicals to repel pests from the crop ('push') and to attract them into traps ('pull') (development of biodegradable dispensers of pheromones).
SOURCES	► On the **ENDURE** website: Deliverables: DR 1.10 (Map of EU tomato growing areas), DR 1.11 (Tools for diagnosis) ► On the **ENDURE Information Centre**: Keywords: crop > tomato ► On the **PURE** website: http://www.pure-ipm.eu/taxonomy/term/32