

Una manera de hacer Europa



BUENAS PRÁCTICAS Actuaciones Cofinanciadas

I+D+i project: Identification and development of management strategies for beneficial insects (natural enemies and pollinators) in horticultural crops in the Region of Murcia
Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario (IMIDA)

**Programa Operativo
de la Región de Murcia**

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Fondo Europeo de Desarrollo Regional

I+D+i project: Identification and development of management strategies for beneficial insects (natural enemies and pollinators) in horticultural crops in the Region of Murcia

The Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario (IMIDA), has carried out this research project in the years 2016 to 2018.

Aphids, whiteflies and certain insects are among the main pests of horticultural crops in Region de Murcia. On the other hand, the transformation of the natural environment, with the intensification of agriculture, has had a negative effect on bee communities, through the destruction of nesting sites and, with the elimination of plant species from which they obtain food, which have been replaced by less attractive ones that do not offer enough pollen and nectar, causing a decrease in the diversity of wild bees whose effects on agriculture and wild plant communities are difficult to quantify.

Biological pest control has been positioned as an economically viable alternative strategy, successfully used in cases where the difficulty of controlling pests with chemical means has compromised the viability of crops. The priority of integrated management and the use of non-chemical methods, such as biological control, are reflected in the European Union guidelines for the sustainable use of insecticides.

With this finality, this research project has been carried out, the objective of which is to identify the main species of natural enemies that contribute to pest control and to develop techniques such as biological control for conservation and modelling of population dynamics, for the optimization of biological control in melon, pepper and tomato crops and the design of multifunctional margins for the conservation of natural enemies and indigenous pollinators.

The total cost of this project has been 258,752 €, with aid from FEDER of 207,002 €.

The impact of this project is manifested in a reduction in economic losses caused by insects such as aphids and whiteflies in horticultural crops (it is estimated that this reduction in losses is around 10-15%), as well as in a reduction of costs derived from the phytosanitary treatments in these crops (around 20% of above mentioned costs), also contributing to the conservation of wild bees.

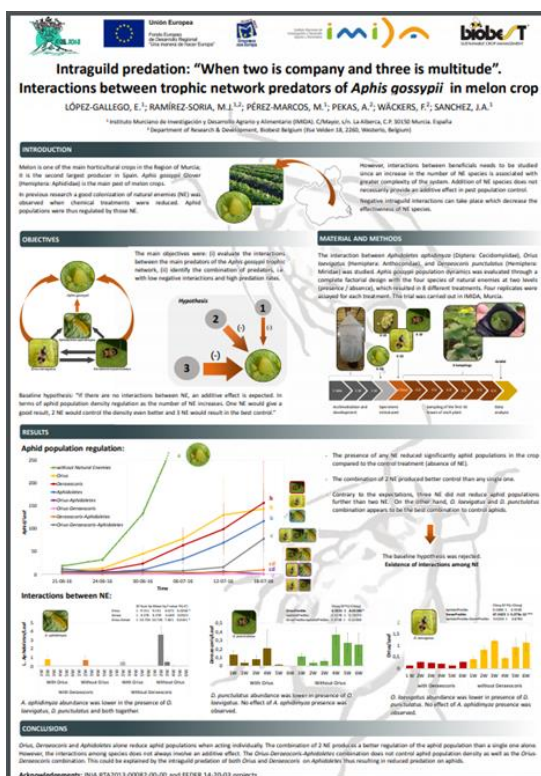
It is considered a Good Practice, since the following criteria have been met:

1. The action has been conveniently spread among beneficiaries, potential beneficiaries and general public

This project has so far been widely spread among beneficiaries and the general public due to the wide dissemination of results through various activities, such as the presentation of posters at international conferences, press releases, web pages and publications in scientific magazines:



Laboratory door sign



Poster presented at the European Entomology Congress, held in Naples (Italy) from July 2 to 6, 2018



INSTITUTO MURCIANO DE INVESTIGACIÓN Y DESARROLLO AGRARIO Y ALIMENTARIO



Región de Murcia

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IMI / Noticias / Empleo de calabaza de peregrino para reducir la inmigración de mosca blanca a cultivos en invernadero.

Empleo de calabaza de peregrino para reducir la inmigración de mosca blanca...

13-09-2018 | NOTICIA IMIDA | departamento de protección de cultivos | equipo de control biológico y servicios ecosistémicos

El pasado 3 de septiembre, el equipo de Control Biológico y Servicios Ecosistémicos del IMIDA contó a "Diario del Campo" de TV Región de Murcia, los resultados de las investigaciones para reducir la migración de mosca blanca en invernaderos de tomate empleando la calabaza de peregrino como planta trampa y barrera. Este trabajo ha sido financiado por el INIA y por el Fondo Europeo de Desarrollo Rural. Los resultados han sido presentados recientemente en el XIV congreso internacional "IOBC-WPRS Working Group Integrated Control in Protected Crops, Mediterranean Climate", en Lisboa.

El Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario (IMIDA) ha experimentado con éxito el empleo de la calabaza de peregrino (*Lagenaria siceraria*) en los laterales de los invernaderos como planta trampa para la mosca blanca *Bemisia tabaci* en cultivos de tomate en invernadero.

El tomate es uno de los principales cultivos hortícolas de la Región y la mosca blanca representa un serio problema, debido a los daños directos que provoca al alimentarse, pero sobre todo, a los daños indirectos ya que es transmisora de virus.

El control de esta plaga se realiza en la actualidad mediante métodos de control integrado de plagas en la mayoría de los cultivos de tomate en invernadero de la Región. No obstante, son necesarias técnicas complementarias que reduzcan la inmigración de insectos plaga hacia el cultivo. Por ello, el IMIDA ha realizado ensayos para determinar la funcionalidad de la calabaza de peregrino como planta trampa-barrera para la mosca blanca.

Los trabajos realizados en invernaderos de tomate empleando plantas de calabaza en los laterales a modo de barrera, han derivado en un claro descenso en las poblaciones de mosca blanca. Por ello, puede considerarse un principio eficaz en el diseño de agro-ecosistemas, así como una práctica viable, respetuosa con el medio ambiente y que conduce a una optimización en la regulación biológica de este insecto plaga.

El pasado mes de septiembre, investigadores del Equipo de Control Biológico y Servicios Ecosistémicos del IMIDA asistieron al XIV Congreso Internacional Working Group "Integrated control in protected crops, Mediterranean climate" de la Organización Internacional de Lucha Biológica, celebrado en Portugal, donde se expusieron los resultados de este trabajo, que ha contado con financiación del Instituto Nacional de Innovación Agraria RTA2006-00154-00-00 y el Fondo Europeo de Desarrollo Rural (FEDER).

IMIDA website

<http://www.imida.es/web/imida/-/empleo-de-calabaza-de-peregrino-para-reducir-la-inmigracion-de-mosca-blanca-a-cultivos-en-invernadero>

transferencia tecnológica

| hortícolas |




Figura 6. *Bemisia tabaci* muerta sobre hoja de calabaza.

Figura 7. Detalle de tricoma glandular en una hoja de calabaza de peregrino (*L. siceraria*).

Conclusiones

Los cultivos de tomate con calabaza presentaron un claro descenso en las poblaciones de *B. tabaci* en relación a los cultivos donde no se usó la calabaza. En la zona mediterránea, los invernaderos de tomate se encuentran a menudo rodeados por diversos cultivos y/o vegetación silvestre que sirven de reservorio para moscas blancas, a partir de los cuales se produce la migración hacia los invernaderos. En este sentido, el uso de *L. siceraria* como planta barrera-trampa para este fitófago podría ser una práctica viable, además de respetuosa con el medio ambiente, para reducir la inmigración de mosca blanca a los cultivos de tomate en invernadero.

Agradecimientos

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Bibliografía

Albajes R., Alomar O. 1999. Current and Potential use of Polyphagous Predators. En: Albajes R., Gullino M.L., van Lenteren J.C., Elad Y. (Eds.) Integrated Pest and Disease Management in Greenhouse Crops. Developments in Plant Pathology, vol. 14. Springer, Dordrecht.

Juarez M., Legua P., Mengual C.M., Kassem M.A., Sempere R.N., Gomez P., Truniger V., Aranda M.A. 2013. Relative incidence, spatial distribution and genetic diversity of cucurbit viruses in eastern Spain. *Annals of Applied Biology*, 162: 362-370. <https://doi.org/10.1111/aaab.12029>

Kishaba, A.N., Castle, S., McCreight, J.D., Desjardins, P.R. 1992. Resistance of white-flowered gourd to sweetpotato whitefly. *HortScience*, 27(11): 1217-1221.

Lopes C., Spataro T., Lapchin L., Arditi R. 2009. Optimal release strategies for the biological control of aphids in melon greenhouses. *Biological Control*, 48: 12-21. <https://doi.org/10.1016/j.biocotrol.2008.09.011>

MAPAMA. 2017. <http://www.mapama.gob.es/es/estadistica/temas/estadisticas-agarias/agricultura/superficies-producciones-anuales-cultivos/>

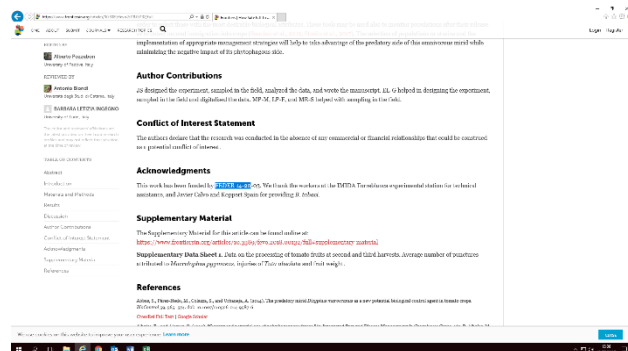
McCreight, J.D., Kishaba, A.N. 1991. Reaction of cucurbit species to squash leaf curl virus and sweet-potato whitefly. *J. Am. Soc. Hortic. Sci.* 116: 137-141.

Schuster, D.J. 2003. Preference of *Bemisia argentifolii* (Homoptera: Aleyrodidae) for Selected Vegetable Hosts. *Journal of Agricultural and Urban Entomology*, 20, 59-67.

Schuster, D.J. 2004. Squash as a trap crop to protect tomato from whitefly-vectored tomato yellow leaf curl. *International Journal of Pest Management*, 50:4, 281-284.

29 | PHYTOMA España / Nº 306 / Febrero 2019

Publication in PHYTOMA-ESPAÑA magazine



Article published in *Frontiers Ecology and Evolution*
<https://www.frontiersin.org/articles/10.3389/fevo.2018.00132/full>

2. The performance incorporates innovative elements

The innovative contributions that this research project brings to Region of Murcia include: improving the management of natural resources by taking advantage of the services provided by natural ecosystems, protecting our agroecological systems and their biodiversity, efficient conservation and sustainable agroecological systems, the improvement and development of new production systems based on sustainable techniques and without negative effects on the environment and, ultimately, increasing the quality and safety of food.

3. Adequacy of the results obtained to the established objectives

The results of the project have allowed selecting species of natural enemies with high effectiveness in pest control, in order to design the best strategies for release or management of vegetation for pest control in horticultural crops.

This project has contributed to improving the control of aphids and whiteflies in horticultural crops, with the consequent reduction of the economic losses caused by these insects and the reduction of costs in phytosanitary treatments.

The modelling works have allowed optimizing the management of pests and natural enemies, and can be used to determine key moments and release rates of natural enemies. Furthermore, the models will allow predicting population dynamics for decision-making and taking measures before damage to crops occurs. Optimizing the management of natural enemies will lead to a reduction in the costs of natural enemies and food for them and, consequently, an increase in profits for producers.

Furthermore, knowledge of the role of native vegetation as a reservoir for natural enemies and as sustenance for pollinator populations has allowed us to design vegetation hedges that maximize ecosystem services. The increase in the populations of natural enemies will translate into a decrease in the incidence of pests globally and a reduction in the use of plant protection products. Many horticultural and fruit crops depend on pollination for fruit set. The increase in pollinator populations, in turn, will translate into improved pollination efficiency and, therefore, crop production. In addition, these works have provided us with information on the role of hedge vegetation as a sink for pest insects. In short, the results have provided us with guidelines for the design of a more sustainable agricultural landscape in the Region of Murcia.

4. Contribution to the resolution of a regional problem or weakness

This project has provided solutions to the agricultural sector in accordance with the new demands of the consumer and the current agri-environmental and agricultural production policies of the European Union, taking into account the generation of basic knowledge.

The biological control programs for pests in peppers, tomatoes and pears developed by the Crop Protection Team at IMIDA have reduced production costs by eliminating a large part of the treatments used for pest control. In turn, the reduction in the number of phytosanitary treatments has improved the quality of life of farmers, reduced the levels of residues at harvest and mitigated the negative effects on the environment. The results of this project will contribute to the improvement of existing biological control programs, or to the development of new biological control programs in crops such as melon. In addition, this project has taken advantage of the services provided by nature through the conservation of populations of natural enemies and pollinators in the environment of crops.

In summary, the development of biological control programs will lead to a reduction in production costs. On the other hand, the adoption of sustainable strategies and the elimination of residues in fruit and vegetables will make Murcia agricultural sector more competitive by having access to more demanding markets. The development of these strategies will have benefits for producers and for society in general, due to the reduction in the use of chemical products that have negative effects on health and on the environment. Pollinator conservation will have an effect on crops that need pollination and on the pollination of wild plant species in natural ecosystems.

5. High degree of coverage of the target population

The results generated have been the subject of publications to disseminate among technicians and farmers for the adoption of optimal control strategies in pest control and the management of natural enemies.

The project is mainly aimed at the horticultural sector in Region of Murcia. Pepper, tomato and melon crops are the main horticultural crops in Region of Murcia. In addition, other sectors such as almond or stone fruit will benefit from strategies to conserve and increase pollinator populations. The beekeeping sector will also benefit from the creation of plant hedges that provide nectar and pollen to bees on crop margins.

The results of the project have been disclosed at scientific and technical meetings of national and international scientific societies and networks of entomology and spread in informative and specialized magazines to reach the citizen and scientific community respectively.

6. Consideration of horizontal criteria of equal opportunities and non-discrimination, as well as social responsibility and environmental sustainability

Compliance with criteria of parity and equal opportunities during the execution of this project has allowed the improvement of the work environment, labour relations and quality and personal skills. These improvements are associated in turn with a higher quality of life for workers, ultimately impacting on the improvement of IMIDA's image, reputation and prestige. In addition, the criterion of equality has been reflected in the use of a neutral, informative and scientific language for the dissemination of the results obtained, with an equal and non-discriminatory treatment in its contents.

Likewise, regarding the criteria of environmental sustainability, the effects of the investigations carried out have contributed to improving and developing new production systems based on sustainable techniques and without negative effects on the environment, minimizing as much as possible the negative impact of natural resources on preserve the existing ecosystems, reduce the use of inputs and promote the Region of Murcia biodiversity.

7. Synergies with other policies or instruments of public intervention

The objectives of the project are not only included in the FEDER and in the Regional Strategy of Intelligent Specialization of Region of Murcia, in relation to “Stimulate the generation of knowledge”, “favour the research career and implement new studies in strategic areas” and “Environmental Impact: Sustainable Agriculture and the Environment”, but they are part of the challenges facing the European population indicated by the European Union's “Horizon 2020” proposal.

One of the most relevant aspects of this project includes collaboration with excellent foreign research centres, which have allowed and will allow our integration into international research consortia. Through these consortia we contribute to the internationalization of research in the Region of Murcia, thus being able to access European calls for future projects.

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