

“Diversification of open greenhouse tomato through the introduction of flowering plants and spices” – HortEco Project



On 12th June 2019 a workshop in the framework of the HortEco project (NWO-WOTRO -no. W08. 250.304), organized by the Faculty of Agronomy (Universidad de la República del Uruguay) and Red de Agroecología was held.

The objectives were: (1) presenting the project “Diversification of open greenhouse tomato through the introduction of flowering plants and spices”; (2) sharing and discussing the preliminary results of the first growing season; and (3) exchanging about adjustments and improvements for the next season of the experiment.

Around 30 people, among farmers, technicians and researchers, participated.

The project aims to study the effect of the introduction of flowering species on the abundance of natural enemies and pollinators, pest densities, and tomato crop performance in greenhouses. With this technology, we are looking for a complementary way of increasing biological control based on the promotion of the activity of local resources. The idea was born during a workshop with farmers in December 2017, in which opportunities and bottlenecks for agroecological transitions were discussed. The use of flowering plants “islands” inside greenhouses to promote biodiversity and pest regulation was mentioned as promising, but used only by few organic farmers without clear evidence of its performance and impact.

During two growing seasons (2018/2019 and 2019/2020), we are conducting a experiment in 8 commercial farms in Canelones, Uruguay (4 organic and 4 integrated), and a discussion group composed by farmers, technical advisers and scientist is following the experiments providing advice and ideas on how to carry different management activities and discussing results.

At each commercial farm, two similar greenhouses are selected, in one greenhouse flowering plants are included (treatment), while the other greenhouse serve as a control (without flowering plants). The selection of the flowering species, marigold, allysum and basil, was informed by discussions with farmers and review of literature to check their attractiveness to natural enemies and effect on pests.



In the first year, these three flowering plant species were transplanted in flower islands from the start of the tomato cycle. Each flower island (1 m length) containing three plants of each species were located two at each border of the greenhouse and inside the crop, with a maximum distance of 8 m between islands, and a density of 3 islands per 100 m². Pests, natural enemies and pollinator abundance and diversity were assessed using yellow sticky traps. Pest, natural enemy and pollinator visits to the flowering plants were assessed with visual observation and with vacuum sampling. The surrounding vegetation and management practices were characterized. Fruit set and pest and disease incidence were monitored, and tomato yield and quality was assessed at harvest.

As a summary of main results of the first year, we did not find differences in pests, natural enemies, pollinators and crop performance between the greenhouse with treatment and control. However, we found differences between organic and integrated farms. Organic farms had less pests during all the season, more natural enemies in particular at the beginning of the season, and the trend of pests was different: while in conventional farms pests increased exponentially, in organic farms increased at a lower rate, maintain the same level or even decreased.



During the workshop, after a short presentation of the project and preliminary results, we discussed around two questions:

- i. ¿How to improve the design of the experiment to increase the effect of including flowering plants?
- ii. ¿Which new variables and questions would be interesting to include in the research?

The workshop was a very interesting and useful instance. Practical adjustments to increase the effect of flowering plants were suggested, like increasing the amount of flowering plants islands, improving their quality by leaving more space to the islands to reduce competition with tomato. New questions were related to understand the differences observed in pest behaviour between organic and integrated farms. Differences in soil quality, plant nutrition, surrounding vegetation, microclimate inside greenhouses, and agrochemical applications were suggested as possible explanations, some of them will be included as variables in the coming experiment.

All participants were excited with the content of the meeting and the participatory methodology proposed by the research team and are motivated for next group meetings and a future visit to the experiment during November or December 2019.