



Hybrid F3 honeybee pollinating a zucchini flower during field trials. The pollination system and FPI model have been successfully tested on tomatoes, zucchini, peppers, and eggplants.

Region

United Arab Emirates (UAE)

Partners

Al Shamsi Bee & Honey Trading Company, Agricultural Expert Salima Sultan Ali Al Shamsi, and the Research Team consisting of Eng. Faisal Mohamed Tawfik Farid Allam and Dr. Marwa Marie Mahmoud Marie

Project objectives

To develop and deploy a locally adapted hybrid honeybee strain capable of efficient greenhouse pollination under high temperatures, reducing reliance on imported bumblebees, lowering pollination costs, and supporting year-round agricultural production.

Target Group

Tomato, pepper, and eggplant growers operating under protected greenhouse systems in the United Arab Emirates.

Financing Type

Co-financing model: Supported by Al Shamsi Honey Trading Company and Agricultural Expert Salima Sultan Ali Al Shamsi, alongside in-kind contributions from the research team (provision of hives and technical expertise).

Duration

October 2026 to July 2027 (8-10 month growing season)

Contact

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Al Shamsi

An integrated pollination system based on honeybees and directed ventilation to improve tomato pollination efficiency and reduce reliance on imported bumblebees.

Al Shamsi is a UAE-based agricultural research entity focused on developing climate-resilient pollination solutions for protected farming. Its work includes the genetic improvement of honeybee strains and integrated greenhouse management to enhance local food production, reduce import dependency, and promote sustainable land management through more efficient use of natural resources.

About the approach used

Tomato farmers in UAE greenhouses rely heavily on imported bumblebees for pollination, but these pollinators often stop working effectively when temperatures exceed 35°C, leading to reduced fruit set, production losses, and increased dependence on imports. To address this challenge, the project combines a locally developed heat-tolerant **F3 hybrid honeybee strain**, **directed ventilation** to improve pollen distribution and bee activity, and the **Fisal Pollination Index (FPI)**, a digital tool that integrates flower density, bee density, air velocity, temperature, and humidity to optimize pollination management. Together, these three elements provide a more efficient, data-driven, and sustainable pollination system for greenhouse production.

Innovation and impact of the practice

The innovation combines locally adapted pollinators, climate management, and a digital decision-support tool in one integrated system. The hybrid honeybee strain was developed to maintain pollination under high temperatures, while the FPI helps farmers optimize hive density and greenhouse conditions. Preliminary field trials achieved an 88.7% fruit set rate, close to commercial bumblebee efficiency, while reducing pollination costs from approximately AED 1,500 to AED 770 per greenhouse. The solution also lowers the carbon footprint of imported pollinators, reduces the risk of invasive species, and supports environmental, economic, and social sustainability. It can be replicated in greenhouse tomato production and adapted for peppers, zucchini, and

eggplants in hot-climate regions, where it has already been successfully validated under field conditions.

Lessons learned

Key Success Factors

The combination of careful bee breeding, farmer involvement in monitoring, and ongoing technical support was critical to the success of the solution.

Recommendations

- Begin implementing the solution in multiple experimental farms to confirm the results under diverse operating conditions.
- Document and disseminate the results in an accessible manner to farmers to enhance trust and raise awareness.
- Collaborate with relevant authorities to expedite licensing procedures and facilitate access to the strain for the largest possible number of farmers.
- Continue the genetic selection program to improve the strain's traits and increase the fruit set rate to over 90% in the future.

Concluding remarks

The integrated pollination system demonstrates the potential of locally adapted solutions to support more resilient and sustainable greenhouse agriculture in arid environments. The next phase will scale implementation with major Emirati agricultural companies from October 2026 to July 2027.