



edete

Precision Technologies
for Agriculture

The Case for Artificial Pollination



1. About Edete:

Established in 2016, Edete is an agricultural technology company that developed an artificial pollination system for the purpose of managing pollination deficits and securing and increasing yield. Edete's solution is applicable for both wind and insect pollinated crops and was successfully tested on pistachio and almond. The company is led by a team of industry veterans with decades of collective experience in engineering, agricultural sciences, management and more. During the 2018-2021 growing seasons, Edete had completed several successful trials with key clients in Israel, Australia, and California. Leveraging these successful trials in 2022, the company started commercializing its technology in pistachio in California.

2. Challenge Overview:

Pollination is an essential biological process in our food production systems and contributes substantially to our economy. Over the past few decades, in many crops, evidence of pollination deficits have emerged, resulting in a diminishing yield due to insufficient pollination. Understanding the potential risk to both crop vulnerability and biodiversity, Edete took on a bold mission to address global pollination deficits challenges by designing an end-to-end proprietary artificial pollination solution. The solution manages the entire process of pollination, starting from harvest to storage and through dispersal of pollen, thereby reducing pollination risk within our food systems.



2.1 Pollinating pistachio, a wind pollinated crop:

Winter chill is one of the defining characteristics of a site's suitability for the production of many tree crops. In recent years, due to climate change, a variety of studies have mapped, investigated, and projected future changes in winter chill in California. These models predict a substantial decline for all emission scenarios. The state of California is a home to almost half a million acres of pistachio., pistachio has chilling requirements that need to be fulfilled each winter to ensure homogeneous flowering for adequate pollination and fruit set. In other words, for dioecious trees that rely on overlap between male and female flowering, such as pistachios, with insufficient chilling, male and female trees will not bloom together. This results in deficient pollination and a reduction in crop yields. Collecting pollen at a previous year and preserving it for on-demand application will overcome the desynchronization between male and female flowering.



2.2 Artificial pollination as an insurance policy in an event of blooming desynchronization in dioecious trees:

As climate models predict that winter chill in California will substantially decline over time, tree crop growers will be more vulnerable to the effects of these changes. Consequently, artificial pollination solution is crucial for strategic planning of orchard operations.



3. Solution Overview:

Edete controls the entire process of artificial pollination, recognizing that its success depends on various system inputs, such as the pollen harvesting system, pollen storage method, type of pollination (wet or dry), type of added substance to dilute pollen, and pollination equipment and timing.

Custom designed machinery and proprietary protocols that produce a superior pollen production process.



Pollen
Harvest

Long term storage of pollen bank at a commercial scale. The process ensures that the pollen sustains its viability and germinability.



Pollen
Storage

The application utilizes dry, pure, electrostatically charged pollen (no additives or use of a liquid medium) loaded into Edete's 2B[€]™ autonomous ground system pollinator.



Pollen
dispersal

To enhance the pollen dispersal procedure and increase precision, Edete's has developed the 2B[€]™ ground system autonomous pollinator. The 2B[€]™ has several essential components that present a unique solution in the market. Multiple nozzles generate controlled air vectors with a precise pressure and flow rate, dispersing dry, pure, electrostatically charged pollen, allowing pollination to occur. The system utilizes a fully controllable dozer that enables a precise dispersal of single grams or parts of grams of pollen per tree, while preserving pollen viability and using electrostatic deposition onto the targeted flowers. The 2B[€]™ pollinator is also equipped with a meteorological station that measures the humidity and wind velocity to optimize the time and the amount of pollen being dispersed. Furthermore, 2B[€]™'s modularity, allows the system to cover large acreage and is easy to adjust for a variety of crops, tree sizes and shapes. Ultimately, Edete's artificial pollinator units can operate day and night, under suboptimal weather conditions.



4. Trail Overview

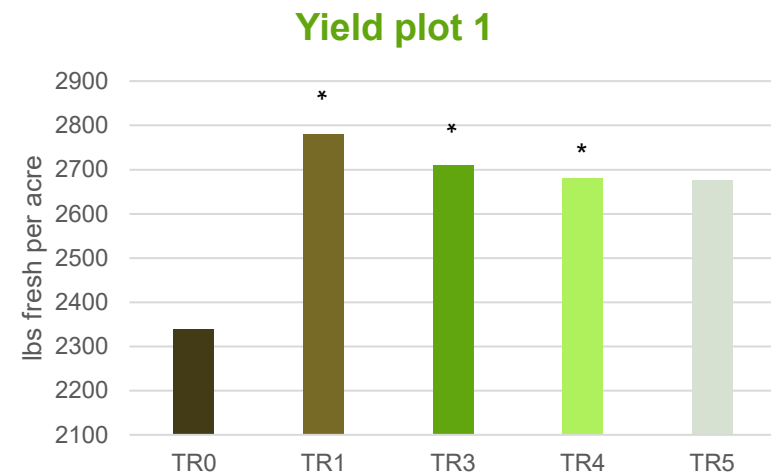
In 2021 Edete conducted its first trial on commercial pistachio orchards in northern California to determine the potential benefit of artificial pollination in different pistachio cultivars.

Up to four different supplemental pollen dosage/applications were tested on equal sized blocks in each plot - TR 0 (control – natural pollination), TR 1, TR 2, TR 3, TR 4.

Plot 1, was planted in 2015 with ‘Golden Hills’ female plant and ‘Randy’ as pollinator. The treatments in this plot were the 0 (control) 1, 2, 3 and 4, conducted on 10 acres per treatment. Plot 2, was planted in 1997 with ‘Kerman’ female plant and ‘Peters’ as pollinator. The treatments in this plot were 0 (control) 1, 2, 3 and 4, conducted on 7 acres per treatment . Plot 3, was planted in 2010 with ‘Kerman’ female plant and ‘Peters’ as pollinator. The treatments in this plot were 0 (control) 3 and 4 conducted on 5 acres per treatment.

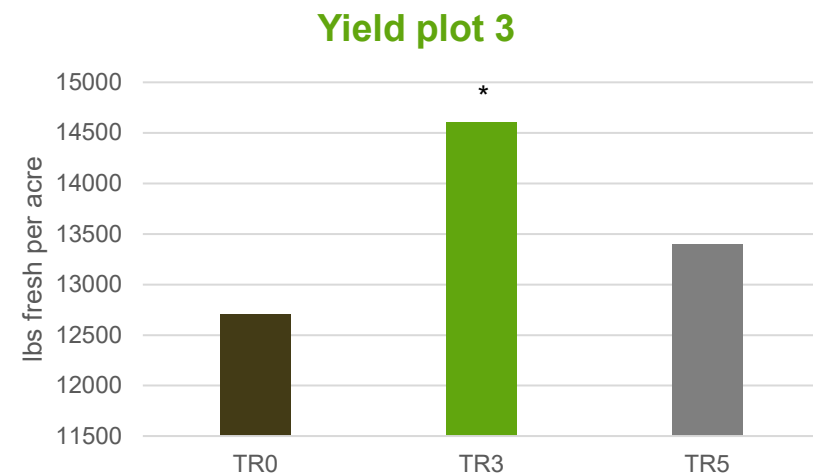
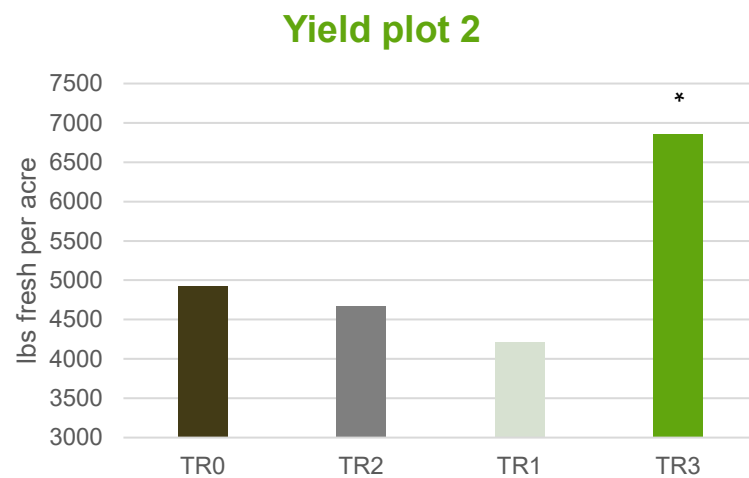
4.1 Results

In plot 1, which is the youngest tested, and with the widest spread between branches, all supplemental pollination treatments (1-4) resulted in a significant improvement in yield relative to the control.





In plots 2 and 3, which were older trees, one treatment dosage regime resulted in a significant improvement of yield (the dosages specifics are Edete's intellectual property). An analysis of the three plots demonstrated that this particular dosage regime (TR3) had statistically significant results with a 24% average increase of fresh nut per acre.



5. Conclusions:

The results validate the ability of artificial pollination to increase pistachio yield in an event of blooming desynchronization. Essentially, Edete's solution acts as an insurance policy as it reduces the reliance on male pollinizers and the risks associated with climate variability. The trial results present an opportunity to improve pollination and fruit set for both young and established orchard, thereby increase bearing potential and income generation. Since pistachio trees constitute a long-term investment with several years needed before an economically significant crop can be harvested, increasing yields in juvenile trees, reduces overall investments and increases equity returns. A cost benefit analysis demonstrates that the yield increase outweighs the cost of artificial pollen application and presents an economically viable solution in different crops under conditions in which natural pollination is limited.