



A SMART APPLY CASE STUDY: FIELD EVALUATION BY THE POLYTECHNIC UNIVERSITY OF MADRID

Labor Saving | Chemical Savings | Sustainability

THE OPPORTUNITY

Effective foliar spraying in orchards and vineyards depends on matching spray volume to the amount of leaf surface in the canopy. However, canopy structure naturally varies due to growth stage, pruning, and environmental conditions, creating differences in canopy size and density throughout a field. Conventional air-blast sprayers cannot respond to this variability in real time. Most operate with a single pressure valve controlling the entire hydraulic circuit, meaning all nozzles spray at the same pressure regardless of the actual canopy volume. As a result, areas with little or no vegetation often receive unnecessary spray, leading to wasted inputs and uneven coverage.

To better understand how precision spray technology could address these challenges, the LPF-TAGRALIA research group at the Polytechnic University of Madrid conducted a field evaluation of the Smart Apply Intelligent Spray Control System™ in orange orchards and vineyards. The study examined how Smart Apply could adjust spray volume to real canopy variability while maintaining effective leaf coverage.

THE SOLUTION

The Smart Apply Intelligent Spray Control System™ was mounted on a TEYME EOLO GTE10 hydropneumatic sprayer and evaluated across rows with varying canopy density and structure. Using LiDAR canopy sensing and Pulse Width Modulation (PWM) nozzle control, the system adjusts spray output in real time based on the size and density of vegetation detected. As the sprayer moved through each row, Smart Apply's LiDAR sensor measured canopy height, width, and density to create a three-dimensional profile of the plants. The system translated this canopy data into individual nozzle commands, allowing each nozzle to pulse and deliver spray only where vegetation was present while automatically closing over canopy gaps.

The results demonstrated significant input savings while maintaining effective coverage levels. **Compared to conventional spraying methods, Smart Apply reduced spray volume by approximately 66.6% in orange orchards and 49.3% in vineyards.** The system also showed strong repeatability across multiple passes, confirming its ability to consistently match spray output to canopy structure while reducing unnecessary overspray.

MADRID CASE STUDY AT A GLANCE

Research Group:

LPF-TAGRALIA –Advanced Techniques in Agri-Food

Institution:

Polytechnic University of Madrid (UPM)

Study Locations:

Seville, Spain – IFAPA Las Torres Research Center
Corral de Almaguer, Toledo, Spain –
Commercial Vineyard

Crops Evaluated:

Vineyard Plants and Orange Trees

Plants Analyzed:

102 Orange Trees | 238 Vineyard Plants

Equipment:

TEYME EOLO GTE10 Hydropneumatic Sprayer

Technology:

Smart Apply Intelligent Spray Control System™

Key Results:

66.6% Reduction in Spray Volume – Orange Orchards
49.3% Reduction in Spray Volume – Vineyards

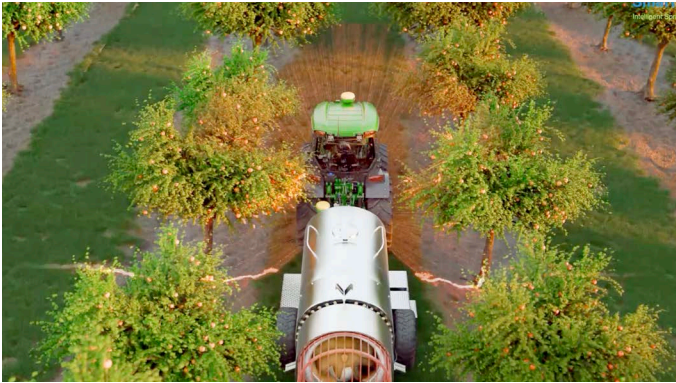
www.upm.es/internacional



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Full Case Study

“The proper application of technical criteria for the optimal selection of operating parameters, along with the verification of the required coverage, positions the SmartApply® system as one of the most efficient in the rational use of inputs and in maximizing the profitability of foliar treatments.”

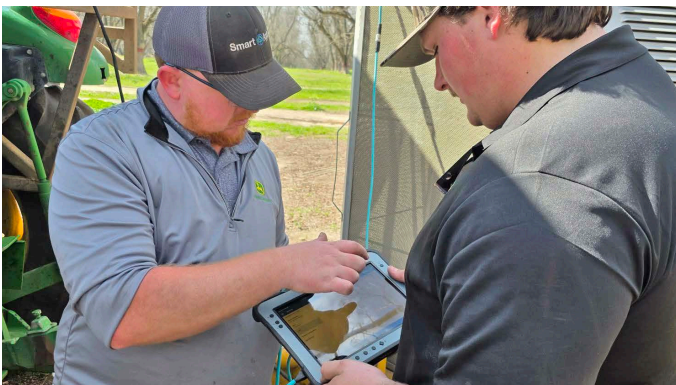
Conclusion of the LPF-Tagralia Research Group: Advanced Techniques in Agri-Food, of the Polytechnic University of Madrid



Smart Apply uses LiDAR to identify individual tree geometry before applying chemicals.



Each tree is sprayed without operator intervention. The system stops when no tree is detected.



Program the entire day of spraying at one time on the Smart Apply tablet. Track job progress in real time.



System creates and archives a digital document on chemical savings, tree counts, rows/tracts sprayed and more.

About the Smart Apply® Intelligent Spray Control System™

Sold as a kit that can be retrofitted onto any new or used air blast, over-the-row or automated sprayer, the Smart Apply System delivers precision spraying and data collection and reporting in one easy-to-use tool. It is designed to help growers of specialty crops and nurseries reduce reliance on chemicals while maintaining yields, lower costs on chemicals and labor, and protect the sustainability of orchards, vineyards and nurseries. The Smart Apply System can be integrated with the Deere Operations Center for more benefits. [Learn more at www.SmartApply.com](http://www.SmartApply.com)



Up to 67% Reduction in Chemical Costs



Up to 93% Less Water & Chemical Run Off



Up to 87% Less Airborne Drift



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