AgroForestry Innovation Lab activities on sprayer performance and certification

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**Abstract.** Plant protection treatments are of paramount importance to the food supply chain, especially with a growing world population. However, they pose serious risks to the health of operators, bystanders and ecosystems, so the products have to be very carefully administered in order to reduce the dispersion to the environment, which also represents a loss of income for the farmer.

The extent of the problem calls for an increased awareness by all stakeholders and new solutions of growing complexity. This, in turn, raises the demand for (i) base research toward new, performance-oriented solutions, (ii) a certification system to guarantee the adoption of good practices to protect functionality and human and environmental health, and (iii) the tailoring of specialized solutions to various operating contexts such as alpine areas.

Within this framework, the AgroForestry Innovation Lab (AFI Lab) is launching a research branch dedicated to sprayer performance and certification in synchrony with local stakeholders, both industrial partners and farmer communities.

Aim of this work is to present the equipment that has been developed in aid of this activity, and some preliminary results obtained, with particular attention to the realization of a wind tunnel for the investigation of atmospheric spray drift, mainly through optical instruments.

The tunnel measures 6x10x30 m (W, H, L) and allows airflows of up to 5 m/s. Within it, vertical and horizontal patternators can be accommodated to characterize the deposition performance of orchard sprayers during simulated treatments with advanced tracing solutions.

A laser Particle/Droplet Image Analysis system is also installed within a dedicated test bench for the characterization of nozzles.

The work is closed with a roadmap of the activities and a panoramic of the potential side-applications of the facility.