RENOVATE

GLOSSARY

Equipment for crop protection

1. Measures of cultivation, elements and methodologies of determining volumes of application

Canopy:

The upper layer or cover is formed by the collective foliage and branches of crop plants above ground. It is created by the overlapping leaves and stems of individual plants, providing shade and influencing microclimatic conditions within the crop area.

Row Spacing:

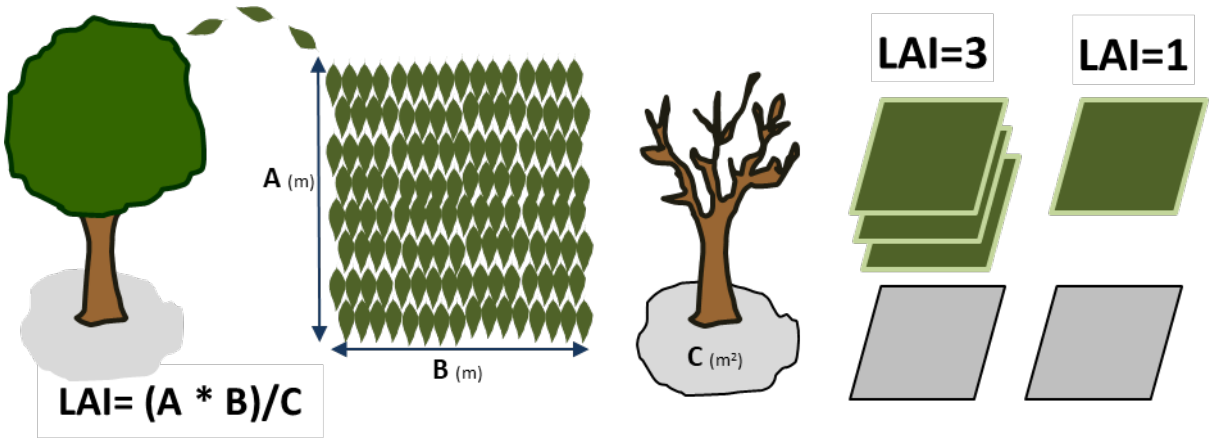
The distance measured between the center of two consecutive crop rows. It is an important parameter in agriculture as it affects the light penetration, air circulation, and ease of access for equipment and workers, influencing overall crop growth and yield. An important crop parameter reflecting the spray swath width to be considered in the procedure of calibration of sprayers for row crops, and to convert the ground dose into the leaf wall area (LWA) and tree row volume (TRV) dose expressions.

Height of the Trees:

The vertical distance from the base of the tree to the top of its canopy or foliage. This measurement is crucial for determining the appropriate application techniques and equipment for treatments such as pruning, fertilization, and pest control.

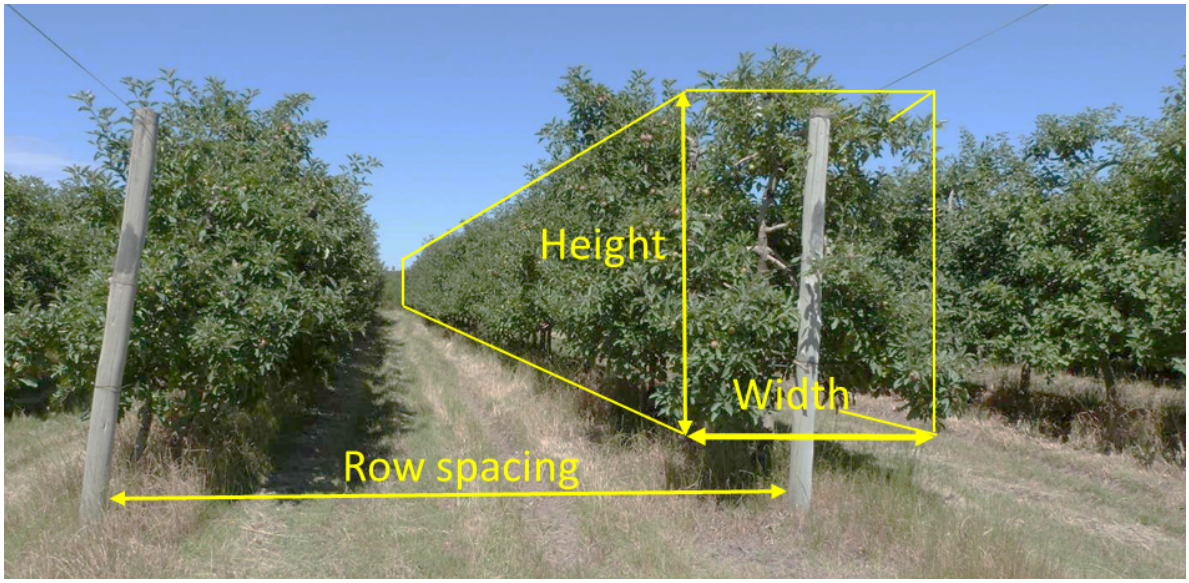
Leaf Area Index (LAI):

The ratio of the total one-sided leaf area to the ground area covered by the crop. LAI is a key indicator of plant canopy density and is used to assess the effectiveness of light interception, photosynthesis, and overall plant health.



Tree Row Volume (TRV):

The estimated total volume of the tree canopy (foliage) per hectare (m^3/ha). This metric helps estimate the spray volume rate required to cover the foliage of tree canopies until runoff occurs (L/ha) and thus obtain satisfactory efficacy of the treatment. It ensures thorough coverage and proper dosage of plant protection products.



$$\text{TRV } (m^3/ha) = \frac{W\ (m) \times H\ (m) \times 10\,000\ (m^2/ha)}{RS\ (m)}$$

Leaf Wall Area (LWA):

A measurement is used for crops with vertical growth to determine the required treatment dose. LWA accounts for factors such as row width, vegetation height, the number of faces of the crop to be protected (typically two faces per row), and an additional factor for vegetative development, providing a comprehensive estimate for accurate application.

$$\text{LWA } (m2/ha) = (2 \times H\ (m) \times 10\,000\ m2/ha)/RS\ (m)$$

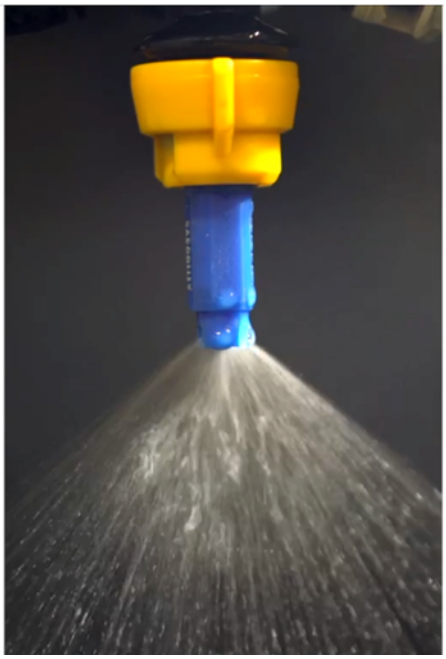
2. Sprayer (sensors-components) and calibration

2.1 General definitions

Application equipment (sprayer):
A device or assembly used to mix and apply plant protection products. It can be manual or automatic, tractor-driven or self-propelled, and typically includes one or more tanks, a pump, nozzles, and may or may not feature a fan to assist in forming and transferring droplets.

Atomize:
When a liquid is broken apart into minute particles or a fine spray, it undergoes a process called atomization. This process involves dispersing the liquid into tiny droplets, which can enhance evaporation, mixing, or distribution. Atomization is commonly used in applications like fuel injection, spray painting, and aerosol sprays.

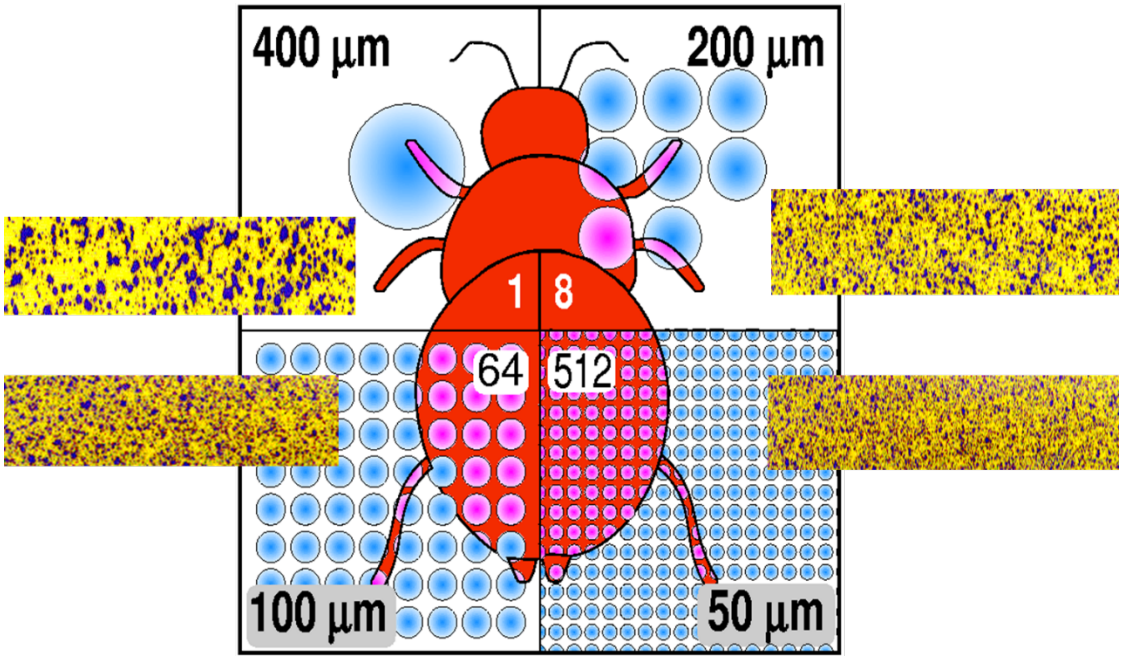
Spraying:
The process of emitting a liquid into the air by atomizing it into droplets for application. This technique is commonly used in agricultural practices to apply pesticides, herbicides, or fertilizers evenly over large areas. The efficiency of spraying depends on factors like droplet size, spray pattern, spraying width and the speed of application, which all contribute to effective coverage and control of pests or diseases.



Spray:
A collection of droplets produced by a nozzle or atomizer for application to a target area. These droplets are dispersed in a fine mist or spray pattern, which can be adjusted based on the type of application required. The spray is used to ensure even distribution of the liquid across the surface, enhancing the effectiveness of treatments such as plant protection products or cleaning solutions.

Spray Mixture:
A liquid containing the formulated product, prepared and ready for application. The spray mixture is created by combining the active ingredient with a carrier liquid, often water, to achieve the desired concentration and ensure proper delivery through the sprayer. Proper mixing is essential to maintain the effectiveness of the treatment and prevent issues such as clogging of nozzles or uneven application.

Droplet:
A spherical liquid particle with a diameter typically less than 1500 µm. Droplets are the fundamental units of spray applications, and their size affects the coverage and efficacy of the treatment. Smaller droplets can provide a finer mist that covers a larger area, while larger droplets may be more suitable for targeting specific areas or achieving deeper penetration.



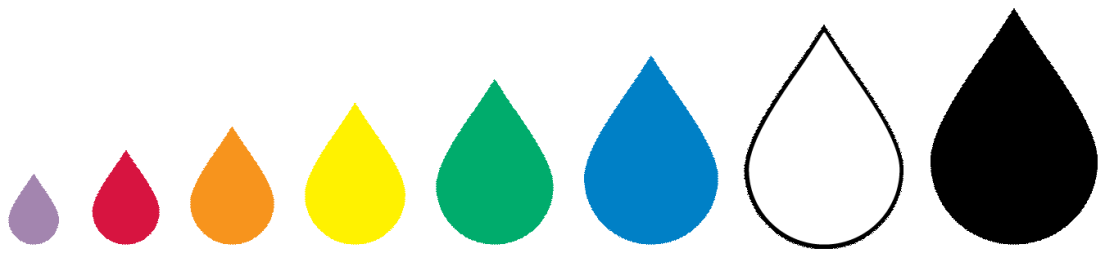
Droplet Size:

The diameter of a droplet, measured in micrometers (µm). Droplet size is a critical parameter in spray applications, influencing factors such as drift potential, coverage, and the uniformity of the application. Proper control of droplet size ensures that the spray is effective and minimizes issues like evaporation, drift, and excessive runoff.

Droplet Category[1]	Symbol	Color Code	Approximate VMD Range[2] (in microns)
Extremely Fine	XF	Purple	<60
Very Fine	VF	Red	60-105
Fine	F	Orange	106-235
Medium	M	Yellow	236-340
Coarse	C	Blue	341-403
Very Coarse	VC	Green	403-502
Extremely Coarse	XC	White	503-665
Ultra Coarse	UC	Black	>665

[1] ASABE (American Society of Agricultural & Biological Engineers) Standard 572.2 July 2018.

[2]

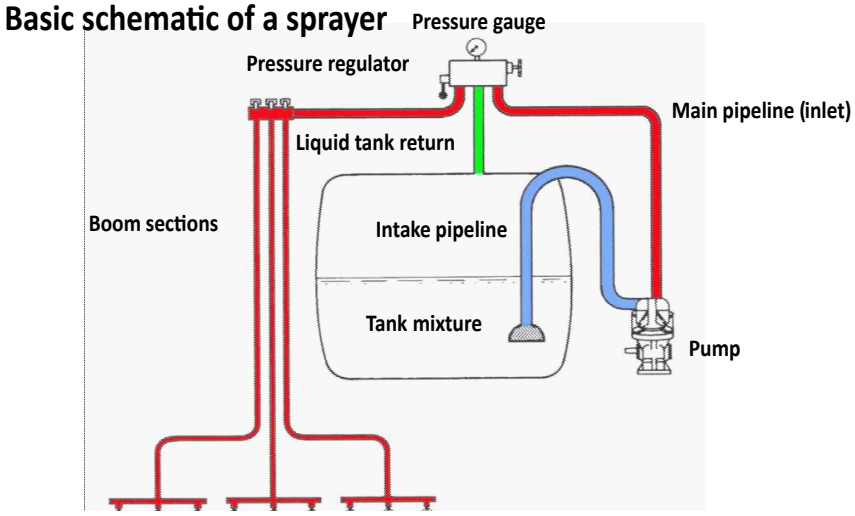


Droplet Size Spectrum:

The range and distribution of droplet sizes, expressed by volume or number. The droplet size spectrum provides insight into the variation in droplet sizes within a spray pattern, which can impact the overall performance and efficiency of the application. A well-balanced spectrum helps achieve optimal coverage and minimizes the risks associated with drift and uneven application.

Sprayer Liquid Circuit:

The system that transports spray liquid from the tank to the nozzle or atomizer. This circuit includes various components such as hoses, pipes, pumps, and valves that ensure the efficient delivery of the spray mixture. Proper maintenance and calibration of the sprayer liquid circuit are crucial for consistent performance and effective application.



Sprayer Setup:

The arrangement of nozzle and boom parameters and adjustments specific to the sprayer model. This setup involves configuring the sprayer to meet the requirements of the specific application, including adjusting nozzle types, spacing, pressure settings, and boom height. A well-calibrated sprayer setup ensures uniform application and optimal performance.

PPP Dose:

The amount of plant protection product to be applied, expressed in kilograms or liters per ground area unit (Ground Dose: kg or L per hectare Ground) or a unit reflecting crop characteristics (CH Dose: kg or L per 1 m of crop height; LWA Dose: kg or L per hectare LWA; TRV Dose: kg or L per 10 000 m^3 TRV). The spray dose is determined based on the target crop, pest or disease severity, and recommended application rates. Accurate dosing is essential for achieving effective treatment while minimizing the risk of over-application or environmental impact.

Spray Volume:

The volume of spray mixture to be applied, expressed in liters per ground area unit (Ground Spray Volume: L per hectare Ground) or a unit reflecting crop characteristics (CH Spray Volume: L per 1 m of crop height; LWA Spray Volume: L per hectare LWA; TRV Spray Volume: L per 10 000 m^3 TRV). Spray volume refers to the total amount of liquid applied to a given area or canopy volume, which affects the coverage and effectiveness of the application. Properly adjusting the spray volume helps ensure that the desired amount of treatment is delivered evenly across the target area.

2.2 Sensors, data processor and storage

Data Processor and Data Storage:

A computer system responsible for storing and processing data using software. It manages data input from operators or sensors, processes these data to control various actuators (such as valves, regulators, and deflectors), and stores information for further use or analysis.

Infrared Sensor:

A sensor that detects infrared radiation emitted or reflected by objects, such as plants. It is used for various applications, including measuring temperature and detecting the presence or condition of objects based on their heat signatures.

LiDAR (Light Detection and Ranging):
A sensor that measures distances to objects by emitting laser beams and analyzing the reflected light. LiDAR is used to create detailed three-dimensional maps of surfaces and objects, providing accurate distance and dimensional information.

Stereo Camera:
A camera system with two or more lenses, each with its own image sensor or film frame. This configuration simulates human vision by capturing images from different perspectives (angles), enabling the system to detect depth, measure distances, and perceive object dimensions.

Ultrasonic Sensor:
A sensor that measures the distance to objects by emitting ultrasonic sound waves and calculating the time it takes for the waves to reflect back to the sensor. It is commonly used for distance measurement and object detection.

2.3 Sprayers and components

Hydraulic Pressure Spraying:
A method where the spray liquid is atomized and dispersed into droplets by the pressure generated through hydraulic means. The hydraulic pressure is used to force the liquid through a nozzle, breaking it into fine droplets for application.

Pneumatic Spraying:
A spraying technique that uses a high-velocity air stream to atomize the liquid after it exits the nozzle at low hydraulic pressure. The air stream helps to break the liquid into droplets and enhances its dispersion, allowing for better coverage of the target area.

Air-Assisted Spraying:
A method where artificial airflow is used to carry and direct the spray droplets. This airflow, created by a fan or other mechanism, helps to improve the coverage and uniformity of the spray by distributing the droplets more effectively across the target area.

Electrostatic Spraying:
A spraying technique that uses electrostatic forces to charge the droplets of the spray liquid. This

charge enhances the attraction of the droplets to surfaces, improving deposition efficiency and ensuring more effective application of the spray material.

Hydraulic Pressure Sprayer:

A sprayer that utilizes hydraulic energy to create pressure for spraying without the aid of air assistance. It relies solely on hydraulic pressure to atomize and project the spray liquid through one or more nozzles.

Air-Assisted Sprayer:

A sprayer equipped with a fan that generates airflow to assist in carrying the droplets to the target area. It typically includes a tank for holding the spray liquid and an axial fan for creating the necessary air stream to enhance coverage and penetration of the spray.

Pneumatic Sprayer:

A sprayer that uses high-speed air streams generated by pneumatic atomizers to form and transport droplets to the target area. The pneumatic force is used to atomize the liquid and deliver it effectively to the intended crop or surface.

Knapsack Sprayer:

A portable, self-contained sprayer worn on the operator's back or shoulder using adjustable straps. It is designed for manual operation and provides mobility for applying pesticides or other liquids in areas that are difficult to access with larger sprayers.

Vertical Boom Sprayer:

A sprayer that applies plant protection products with spray directed primarily sideways and/or upwards onto or into the target crop. It is commonly used for crops such as vines, top fruit, hops, and citrus. It may include oscillating booms to enhance coverage and reduce gaps

Cannon Sprayer:

A sprayer equipped with a fan that channels air in a concentrated, cannon-like direction for one-sided spraying. It provides targeted application of the spray with the aid of a strong airflow.

Multiple Outlet Sprayer:

A sprayer that employs several outlets to distribute air assistance and direct the spray to the target crop. This configuration improves coverage and ensures more uniform application over a larger area.

Air-Blast Sprayer (Mistblower):
A sprayer that uses either air assistance or pneumatic atomization to create a mist of droplets for applications on bush and tree crops or amenity areas. The air blast helps to distribute the spray evenly and effectively.

Direct Injection Sprayer:
A sprayer that integrates a direct injection system to introduce formulated plant protection products directly into the spray liquid. This system allows for precise mixing and application of chemicals without the need for pre-mixing.

Shielded Sprayer (Shrouded Sprayer, Hooded Sprayer):
A sprayer equipped with a mechanical shield, shroud, or hood that encloses the spray, reducing drift and enhancing application accuracy. It helps to confine the spray to the target area and minimize environmental impact.

Tunnel Sprayer:

A sprayer that uses a tunnel or a series of shrouds to focus the spray on the plants being treated. It is particularly effective for bush and tree crops, providing concentrated application within the tunnel or shrouded area.

Trailed Sprayer:

A sprayer mounted on a trailer and towed behind a multi-functional vehicle such as a tractor. It allows for flexibility in deployment and typically includes a liquid delivery system mounted on the trailer.

Self-Propelled Sprayer:

A sprayer that includes a dedicated vehicle with the liquid delivery system integrated into the vehicle itself. It operates independently and provides mobility and flexibility for large-scale applications.

Sensor Activated Spraying:

A sprayer equipped with sensors that detect various physical characteristics of the crop, such as canopy size and density. These sensors adjust the spraying process in real-time to optimize application rates and coverage based on the detected crop characteristics.

2.3.1 Control valves and sprayer instrumentation

Control System:
A component or set of components that enables the operator to regulate the flow rate, pressure, and spray pattern of the pesticide application. This system can be manual, requiring physical adjustments by the operator, or automated, using electronic controls and sensors to optimize application parameters.

Control Valves:
Components used to adjust the flow rate and spray pattern of the pesticide. They can be manually operated with knobs or levers, or automated with electronic controls, allowing the operator to tailor the spray output to fit the specific shape and size of the target area.

Spray Volume Adjustment System:
A device or system that regulates the spray volume output to ensure a constant spray rate per unit area, regardless of changes in forward speed or other operational factors. This system helps maintain consistent application rates across varying field conditions.

Sprayer Controller:
A device that manages the overall operation of the sprayer, which can include controlling flow rates, pressure, and spray patterns. It can be operated manually with physical controls or automated with electronic systems for precise and efficient management.

Shut-Off Valve:
A valve that allows the operator to stop the supply of spray liquid to the nozzles or application system, enabling immediate interruption of spraying when needed. It is crucial for controlling application and preventing excess chemical use.

Pressure Regulator:
A device that maintains and controls the pressure within the spraying system. It can be manual or automated and ensures that the spray liquid is delivered at a consistent pressure, crucial for achieving the desired droplet size and spray pattern.

Pressure Indicator:
A device that provides a visual display of the pressure of the fluid within the system, measured above atmospheric pressure. It allows the operator to monitor and adjust the pressure as needed for optimal spraying performance.

Flow Meter:
A device that measures the volume of pesticide being sprayed, providing real-time data on the amount used and remaining in the tank. It helps the operator track application rates and manage pesticide usage efficiently.

By-Pass:
A device or mechanism that redirects all or part of the spray liquid delivered by the pump back to the spray tank or another designated location, allowing for pressure relief or flow regulation within the system.

Spray Tank Contents Indicator:
A device that displays the remaining volume of spray liquid in the tank, helping the operator monitor

and manage the amount of pesticide left for the application, ensuring timely refilling or adjustment.

Direct Injection System:
A spraying system that integrates the formulated product into the spray liquid in the spray boom or nozzle bar at a controlled rate. This system can be adjusted based on forward speed or treatment maps, allowing precise application of chemicals.

Anti-Drip Device:
A device typically integrated into the nozzle body that prevents additional spray liquid from dripping after the spray flow has been shut off. It helps reduce waste and ensures a clean application without excess chemical residue.

Valve:
A general term for a device used to regulate the flow of liquids in the system. It controls the direction, flow rate, and pressure of the liquid, playing a crucial role in the operation of the sprayer.

Electronic Valve:
An electrically controlled valve, often powered by direct current (DC), which can function as an on-off valve or a pressure control valve. It provides precise control over liquid flow and pressure using electronic signals.

Non-return valve (check valve):
A valve designed to permit liquid flow in one direction only, commonly used in discharge lines to prevent reverse flow and protect the system from contamination or damage.

2.3.2 Tanks, filling devices and storage facilities

Sprayer Tank:
A reservoir or chamber integrated into the sprayer system designed to hold the spray liquid prior to application. It stores the mixture of pesticides and carrier fluids, providing a consistent supply for efficient spraying.

Filling Hole:
An opening in the spray tank that allows for the pouring or filling of spray liquid. It is typically equipped with a cover or lid to prevent contamination and facilitate the safe addition of chemicals.

Induction Hopper:
A device where formulated products and water are combined to create a mixture before being transferred to the spray tank. It ensures thorough mixing and preparation of the spray solution for effective application.

Induction Probe:
A suction pipe used to transfer formulated products directly from their containers into the spray tank. It facilitates efficient and controlled transfer, minimizing spillage and exposure.

Closed Transfer System:
A system designed to transfer plant protection products from their original containers into application or mixing equipment through enclosed methods. This setup reduces the risk of exposure to the operator and environmental contamination.

Clean Water Tank:
A tank mounted on the sprayer holds clean water for various purposes, including rinsing the sprayer, washing components, and fulfilling the operator's hygiene needs during and after application.

Cleaning Device:
An appliance or tool attached to the sprayer used for cleaning its external surfaces or the interiors of empty plant protection product containers. It ensures proper maintenance and prevents cross-contamination between applications.

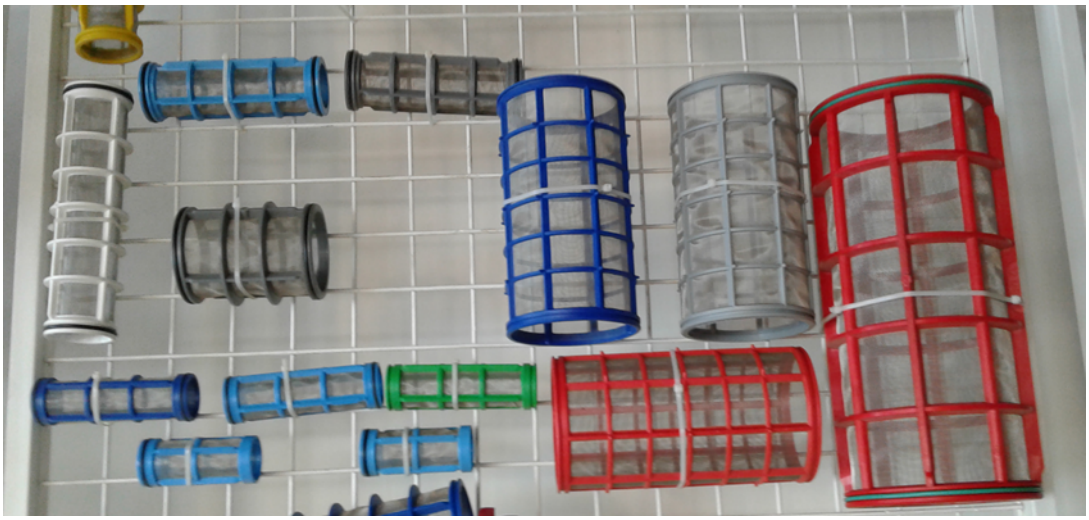
Rinsing Device:
A device attached to the sprayer designed to clean the inside of the spray tank, effectively removing residual chemicals and ensuring the tank is ready for subsequent use.

Rinsing Tank:
A separate tank is dedicated to containing water specifically used for rinsing and cleaning the sprayer. It helps remove any residual chemicals from the spraying equipment, aiding in thorough maintenance.

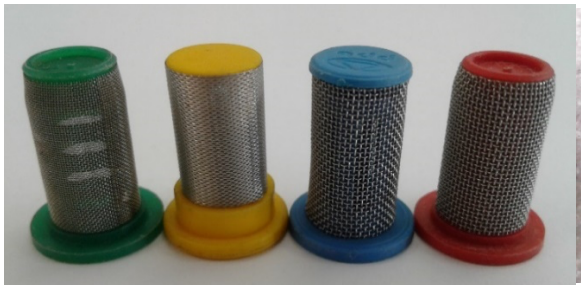
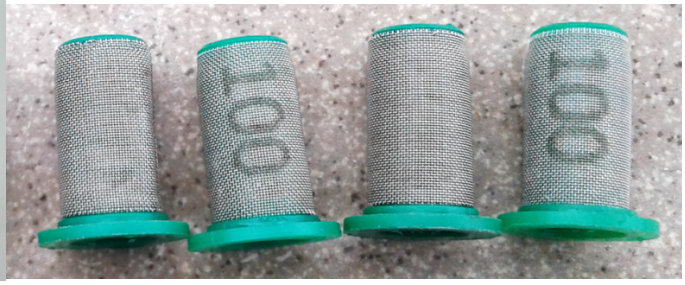
Personal Protective Equipment (PPE) Storage:
An enclosure or compartment on the sprayer designed to securely store personal protective equipment (PPE), such as clothing, gloves, and face shields. This ensures that the operator has access to necessary safety gear to minimize health and safety risks during operation.

2.3.3 Filters

Filter:
A device used to remove particles larger than a specified size from the spray liquid. By ensuring that only clean liquid passes through, filters help maintain the smooth operation of the spraying system and prevent clogging or damage to sensitive components.

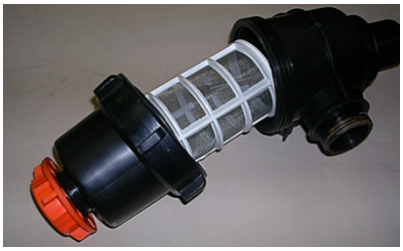


Nozzle Filter:
A component installed between the nozzle holder and the nozzle tip to filter out particles larger than the orifice size from the spray liquid. This helps prevent blockages and ensures a consistent spray pattern by keeping the nozzle clear.

Suction Filter:

A device located on the suction side of the pump to catch debris and foreign materials before they enter the spray system. It protects the pump and other components from damage and ensures smooth operation of the spraying system.



Tank Filling Filter (strainer):

A filter positioned in the filling hole of the spray tank designed to catch debris and foreign materials during the filling process. This helps prevent contamination of the spray liquid and maintains the quality of the mixture.


Flow Meter Filter:

A filter placed between the pump and the flow meter to remove debris and foreign materials from

the spray liquid. It prevents damage to the flow meter and ensures accurate measurement of the liquid flow rate.

2.3.4 Agitation systems.

Agitation System:
A set of components designed to continuously mix the pesticide within the spray tank, ensuring that the active ingredients remain uniformly distributed. This prevents settling at the bottom of the tank and maintains the effectiveness of the pesticide during application.

Agitation:
The process of mixing to maintain a uniform concentration of the active ingredient or formulated product in the spray liquid within the tank. For dusts or granules, agitation ensures their consistent flow from the hopper and prevents clumping or settling.

Hydraulic Agitation:
A method of agitation that uses a pump to recirculate the spray liquid within the tank, promoting even mixing of the pesticide. This technique helps to keep the active ingredients in suspension and ensures consistent application.

Mechanical Agitation:
The process of stirring the spray liquid, dust, or granules inside a spray tank or hopper using mechanically operated agitators. This method maintains a uniform concentration of the active ingredient by physically moving the contents.

Pneumatic Agitation:
A method of agitation that utilizes airflow to mix the spray liquid, dust, or granules inside a spray tank or hopper. Pneumatic agitation ensures consistent distribution of the active ingredients by using air currents to promote mixing.

Mechanical Agitator:
A mechanically operated device designed to mix the spray liquid in the tank or assist in the flow of dust or granules from a hopper. Mechanical agitators help maintain a uniform concentration of the active ingredient or formulated product through physical stirring.

Pneumatic Agitator:
A device that uses airflow to mix the spray liquid in the tank or aid in the flow of dust or granules from a hopper. Pneumatic agitators ensure a consistent concentration of the active ingredient by creating air currents that facilitate mixing.

2.3.5 Fans, compressors

Air Speed and Volume:
The output speed and volume of air produced by the sprayer fan. Air speed refers to how fast the air is moving, while volume indicates the amount of air being moved. Both factors are crucial for effective spray application, affecting the distribution and coverage of the spray.

Air Flow Rate:
The volume of air passing through an appliance or device within a specific period of time, typically measured in cubic meters per minute (m^3/min) or cubic feet per minute (CFM). It determines the efficiency of air movement and impacts the effectiveness of spray dispersal and cooling.

Axial Flow Fan:
A fan that generates airflow parallel to the fan's shaft, creating a straight-line flow of air. Axial flow fans are commonly used in applications requiring high air movement with relatively low pressure, such as in cooling systems and ventilation. It is typically present in air-assisted sprayers.

Centrifugal Fan:

A fan that generates airflow perpendicular to the fan's shaft, using centrifugal force to move air outward. Centrifugal fans are designed for high-pressure applications and are used in systems requiring strong air movement and higher air pressure, such as in industrial ventilation. It is typically present in pneumatic sprayers.

Air Deflector:

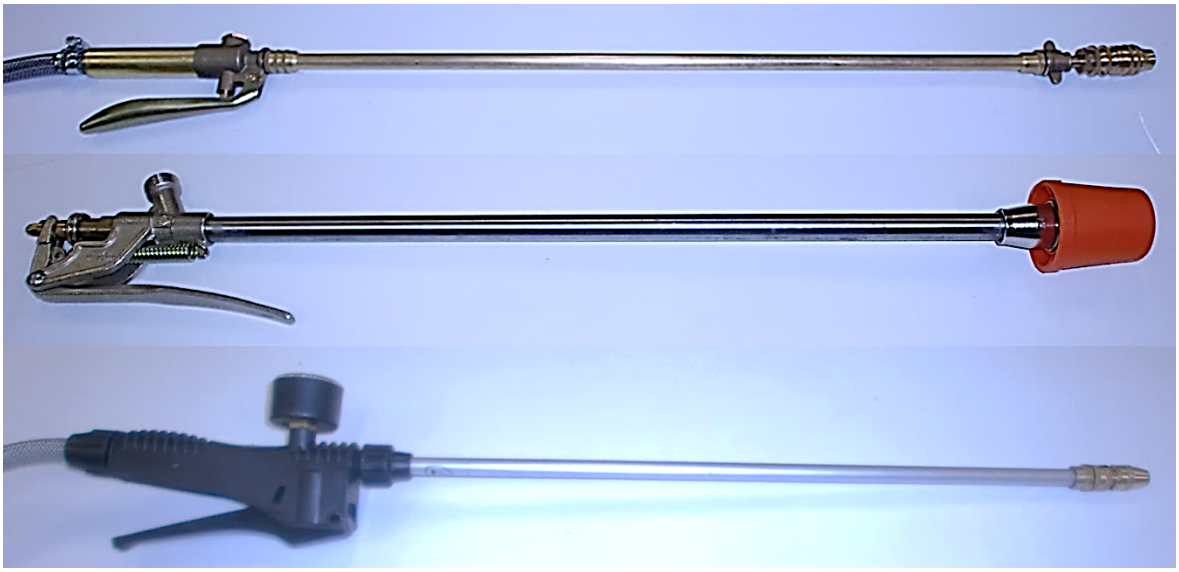
A device designed to change the direction of airflow, directing it to a specific area or modifying its pattern. Air deflectors are used to control and optimize the distribution of air, improving the effectiveness of spraying or cooling systems.

Air Flow Control:

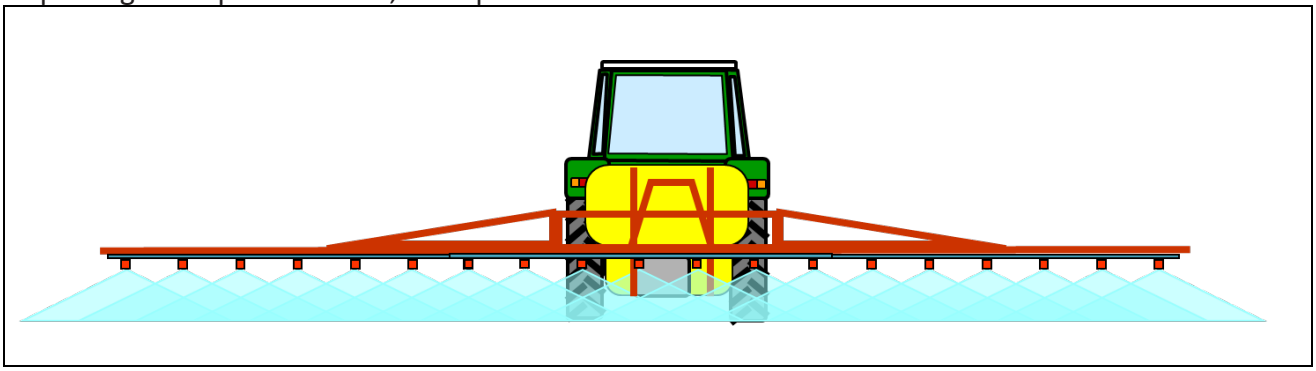
A component of an appliance that regulates the volume, speed, or direction of airflow. Air flow control mechanisms, such as dampers or adjustable vents, allow for precise management of air distribution, ensuring optimal performance in various applications.

2.3.6 Nozzle supports

Spray Lance:
A handheld device equipped with one or more nozzles at one end, allowing the user to manually control and direct the spray. Spray lances are typically used for targeted applications and precision spraying in areas that are difficult to reach with larger equipment.



Spray Boom:
A structure that supports multiple nozzles and often includes pipelines to deliver spray liquid to each nozzle. Spray booms are mounted on sprayers or tractors to cover large areas efficiently by dispersing the liquid in a wide, even pattern.



Spray Boom Section:
A segment of a spray boom or nozzle bar that can independently receive and control spray liquid separately from other sections. This allows for flexible spraying, such as turning off or adjusting specific sections of the boom for more precise application and reduced overlap.

2.3.7 Other components

Pump:
A mechanical device that utilizes suction or pressure to move or elevate liquids, such as water or pesticide solutions, from a tank through a sprayer system. Pumps are essential in agricultural spraying to maintain consistent flow and pressure for effective application.

Diaphragm pump:
A pump design that uses a circular or oblong flexible synthetic membrane, sealed at its outer edges and connected in its middle to a reciprocating rod (or motor rod) or pulsating hydraulic fluid. As the membrane moves in response to the rod or hydraulic fluid, fluid is loaded and dispensed through the check valves.

Hose:
A flexible tube or pipe designed to transport liquids, such as water or chemical solutions, from one point to another in a sprayer system. Hoses are crucial for directing spray liquids from the tank to the nozzles or spray guns.

High-Pressure Hose:
A robust, reinforced hose specifically designed to withstand high-pressure conditions, commonly used with piston pump systems and spray guns. High-pressure hoses ensure safe and efficient delivery of spray liquids, especially in applications requiring strong, consistent pressure.

2.3.8 Droplet generators

Nozzle Flow Rate:
The amount of spray liquid dispensed by a nozzle, measured in liters per minute (L/min). It determines the volume of liquid applied per unit time, affecting the coverage and effectiveness of the pesticide application.

Nozzle:
A device engineered to atomize a spray liquid into droplets, creating a specific spray pattern. Nozzles play a crucial role in determining the droplet size and distribution for effective pest control.

Fan Nozzle:
A hydraulic nozzle featuring a slit or elliptical orifice that produces a flat, sheet-like spray pattern. It

is widely used for uniform coverage in agricultural spraying, especially for herbicides.

Flat Fan Nozzle:
A type of fan nozzle that generates a flat, planar spray pattern, ideal for delivering uniform coverage across a broad area. Commonly used in applications requiring even spray distribution.

Double Flat Fan Nozzle:
A nozzle with two separate orifices that direct sprays both forward and backward relative to the direction of travel. This design enhances coverage and penetration, particularly in dense foliage.

Off-Center Nozzle:
A nozzle designed to produce an asymmetrical fan spray pattern relative to the centerline of travel. It is often utilized at the ends of spray booms to ensure complete field coverage.

Cone Nozzle:
A hydraulic nozzle that creates a conical spray pattern by imparting a swirling or rotational motion to the spray liquid. It is used for targeted applications requiring a broader spray area.

Hollow Cone Nozzle:
A type of cone nozzle where the spray liquid forms a ring-shaped pattern around the periphery of the conical spray. It is effective for delivering fine droplets in precise applications.

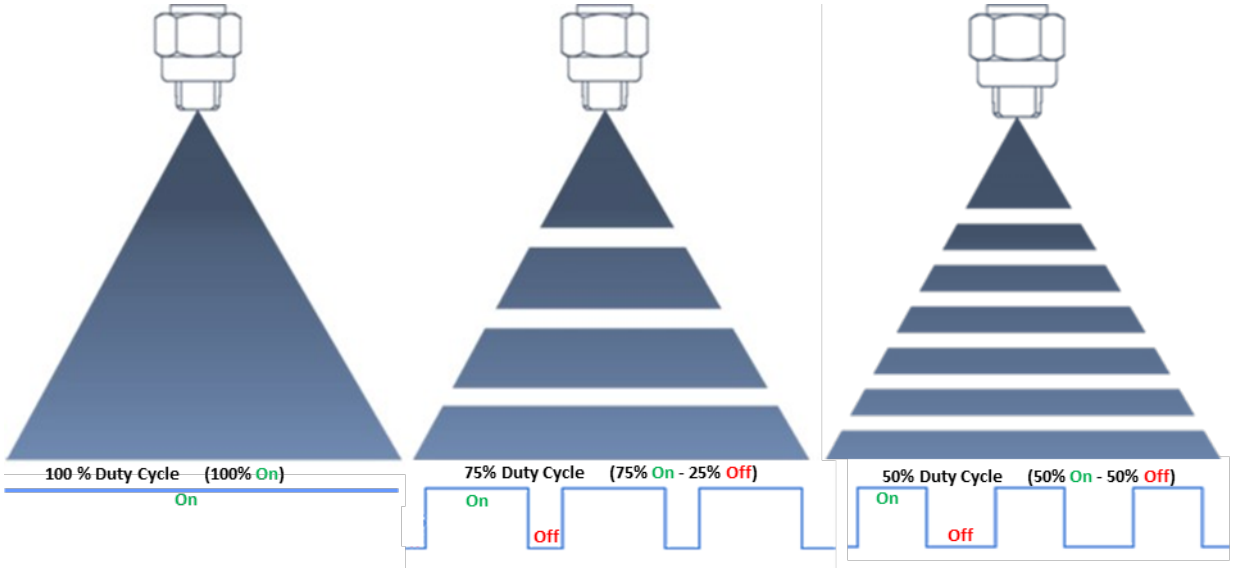
Full Cone Nozzle:
A cone nozzle that distributes the spray liquid evenly throughout the entire conical pattern. It is ideal for applications requiring complete and dense coverage, such as fungicide treatments.

Pneumatic Nozzle:
A nozzle that uses a high-velocity air stream to atomize the spray liquid, creating fine droplets. It is suitable for applications needing superior coverage and penetration.

Pre-Orifice Nozzle:
A nozzle with an internal orifice that meters the spray liquid before it reaches the main nozzle tip, reducing pressure and increasing droplet size. This design minimizes drift and enhances spray uniformity.

Air Induction Nozzle:
A nozzle that uses accelerated liquid flow to create a low-pressure area, drawing in external air and mixing it with the spray liquid. This results in larger, air-filled droplets that reduce drift.

Pulse Width Modulation (PWM) Nozzle:
A nozzle equipped with a solenoid valve that adjusts the spray liquid flow rate by modulating the pulse width, allowing independent control of flow and pressure for precision applications.



Nozzle Body (Nozzle Holder):
The main structural component of a nozzle assembly, typically mounted on a spray boom, nozzle bar, or lance. It secures the nozzle tip and other components, facilitating stable and precise spraying.

Multi-Nozzle Head:
An assembly featuring multiple nozzles, allowing the operator to switch between or use multiple nozzles simultaneously. It provides flexibility in adjusting spray patterns and rates.

Nozzle Turret:
A rotating component that holds multiple nozzles, enabling the selection of different nozzles for varied spraying needs. It allows quick adjustments to spray patterns without changing the nozzle body.

Nozzle Deflector:
A device that changes the direction of the spray liquid after it exits the nozzle orifice. It is used to adjust the spray angle or pattern to suit specific application needs.

Nozzle Spacing:
The distance between adjacent nozzles on a spray boom or lance, measured from tip to tip. Proper spacing ensures uniform coverage and prevents overlapping or gaps in spray patterns.

Nozzle Orientation:
The angle at which nozzle bodies and tips are positioned relative to a reference plane, usually vertical. Proper orientation is essential for achieving the desired spray coverage and minimizing drift.

Spray Angle:
The top angle formed by the edges of the spray pattern as it exits the nozzle tip. The spray angle determines the width of coverage on the target surface.

Nominal Spray Angle:
The spray angle produced by a fan nozzle at a specific reference pressure. It is a standard measure used to classify and compare nozzles based on their spray characteristics.

Nozzle Flow Control Setting:
The pre-determined rate of spray liquid output delivered by a nozzle. This setting is adjusted to match the desired application rate for effective pest control.

Master Flow Control:
A device used to start and stop the flow of spray liquid to the entire spray boom or nozzle bars. It provides a single control point for managing spray operations, ensuring consistency and safety

2.4 Calibration (tools, concepts and units)

Calibration:
The process of adjusting and checking a sprayer to ensure it delivers the correct spray volume and application rate as specified for the target area. Calibration involves setting the nozzle flow rate, pressure, and forward speed of the sprayer to match the desired output. Regular calibration is essential for accurate, uniform applications and to minimize wastage and environmental impact.

Sprayer Calibration:
The process of adjusting and checking sprayer components to ensure that your sprayer delivers the correct/desired volume per area when you apply chemical.

Deviation:
The difference in flow rates between different nozzles on your boom. A deviation of more than 10% between nozzles can cause inaccurate spraying

Calibration tools:
Components that are used to ensure that the sprayer is spraying the correct amount of pesticide solution per unit area. Calibration tools help the operator to adjust the flow rate and spray pattern of the sprayer to match the specific requirements of the target area.

Power Take-Off (PTO):
A mechanical shaft that transfers power from the tractor's engine to various attachments, including sprayers. The PTO enables the use of auxiliary equipment by providing a rotating power source that drives the machinery. It is essential for operating sprayers effectively in agricultural applications.

Pressure Drop
The reduction in pressure due to line losses as spray liquid or air flows through the sprayer's delivery system. Managing pressure drop is essential for maintaining consistent spray patterns and application rates.

Speed of Rotation of the Power Take-Off:
Measured in revolutions per minute (RPM), this determines how quickly the PTO shaft rotates, affecting the power transmitted to the sprayer. The correct speed is crucial to ensure adequate power delivery and efficient operation of the spraying equipment.

RPM (Revolutions Per Minute):
A unit that quantifies the number of complete rotations a shaft or engine makes in one minute. It is used to measure the speed of rotating equipment, such as a PTO or engine, and is vital for maintaining the correct operational speed for various agricultural tools.

Pressure:
The force exerted by a liquid against the walls of its container, such as a sprayer tank or pipe, measured in PSI or bar. Pressure is a key factor in controlling the spray pattern and droplet size, impacting the effectiveness of the pesticide application.

Working Pressure:
The operational pressure within a sprayer that, when released through the nozzles, forms droplets or a specific spray pattern. Proper adjustment of working pressure is essential to achieve the desired coverage and minimize drift or runoff.

PSI (Pounds per Square Inch):
A unit of pressure that measures the force exerted by a liquid or gas per square inch of area. In spraying applications, PSI is used to regulate the pressure within the sprayer tank, ensuring consistent flow rates and effective pesticide application.

Bar:
A unit of pressure measurement commonly used worldwide, equivalent to 100 kilopascals (kPa). In agricultural spraying, the bar is used to specify the working pressure of the sprayer, impacting the droplet size and spray pattern.

Application Rate (L/ha):
The volume of liquid pesticide applied per hectare of land, measured in liters. The application rate is critical for ensuring sufficient coverage and pest control while minimizing the risk of over-application and environmental impact.

Forward Speed (Km/h):
The speed at which spraying machinery moves during pesticide application, measured in kilometers per hour. The forward speed affects the uniformity of coverage and the effectiveness of the spray, requiring careful adjustment based on field conditions and target pests.

Number of Nozzles:
The total count of spray nozzles mounted on the spraying equipment. The number of nozzles affects the distribution and coverage of the spray solution, influencing the application rate and pattern.

Nozzle Type:
The specific design or model of nozzles used on spraying equipment, which determines the spray pattern, droplet size, and volume based on the working pressure. Selecting the appropriate nozzle type is crucial for optimizing pesticide application and minimizing drift.

Liquid Flow Rate:
The volume of liquid passing through a device, such as a nozzle or pump, per unit of time. Flow rate is critical for determining the application rate and ensuring uniform coverage of the sprayed area.

Air Output:
The volume of air released by a device, such as a blower or air-assisted sprayer, per unit of time. Air output is important for dispersing spray droplets and enhancing coverage, especially in dense foliage or high-volume applications.

3. Preparation and loading of the product into the sprayer tank

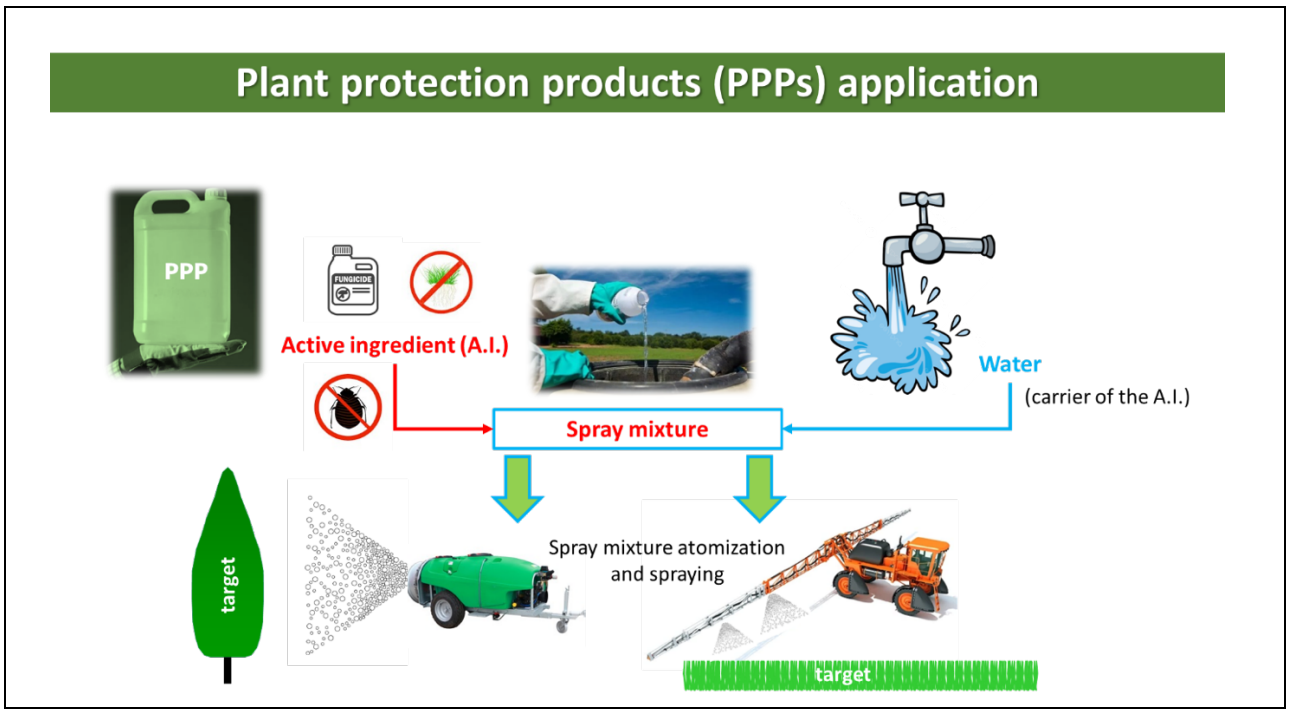
Boom Priming:

Flushing out water or previous spray mix from the boom and filling the lines with the new product. This is important to do before spraying your new product for proper results.

Personal Protective Equipment (PPE):

Devices and clothing designed to protect individuals from exposure to pesticides or pesticide residues. PPE includes items such as gloves, goggles, respirators, and coveralls, which help prevent skin contact, inhalation, or ingestion of harmful chemicals. Proper use of PPE is essential for ensuring safety during pesticide application.

Plant Protection Product (PPP):
A chemical or biological substance used to control, repel, or kill pests. Pesticides include insecticides (for insects), herbicides (for weeds), fungicides (for fungi), rodenticides (for rodents), and other specialized formulations. Pesticides are a common tool in agriculture and public health but must be used carefully to minimize risks to humans, non-target organisms, and the environment.



Product Label:
Tags or labels on a product that provide essential instructions for its safe and effective use. The label includes information about the ingredients, safety warnings, directions for use, and any necessary precautions. Following the product label is crucial for proper application and minimizing risks to users and the environment.

Spray Concentration:
The percentage of chemical in your spray mix. This is closely related to water volume.

Spray Solution:
The mixture of a pesticide formulation and a liquid carrier (such as water, liquid fertilizer, or oil) prepared in the spray tank for application. The spray solution is tailored to achieve the desired concentration of active ingredients for effective pest control. Proper mixing of the solution ensures uniform application and maximizes efficacy.

Solvent:
A liquid, often water, used to dissolve other substances to form a solution. In pesticide applications, solvents are used to dilute the active ingredients, ensuring they are evenly distributed when sprayed. The choice of solvent can affect the stability and effectiveness of the pesticide formulation.

Concentration:
The amount of active ingredient present in a given volume or weight of a formulation. Concentration determines the potency of the pesticide and its effectiveness against the target pest. Accurate measurement of concentration is crucial for ensuring the correct application rate and avoiding damage to crops or the environment.

Adjuvant:
A substance added to a pesticide formulation or spray tank to enhance its performance, safety, or

application characteristics. Adjuvants can improve the spread, adhesion, and penetration of the pesticide on plant surfaces, or reduce drift and evaporation. They are used to optimize the effectiveness of the pesticide under various conditions.

Plant Protection Product Container:
The packaging used for plant protection products, such as cans, bottles, bags, sacks, or boxes. These containers are designed to safely store and transport PPPs, preventing spills and contamination. Proper handling and disposal of containers are important to minimize environmental impact.

Formulated product:
A plant protection product in its final form as purchased by users, containing active ingredients along with other components such as stabilizers, solvents, or surfactants. These formulations are designed to enhance the product's effectiveness, safety, and ease of application in agricultural or horticultural settings.

Active Ingredient:
The chemical component in a pesticide product responsible for controlling the target pest. The active ingredient is the main substance that provides the desired effect, whether it be killing insects, inhibiting weed growth, or preventing fungal infections. The concentration of the active ingredient determines the effectiveness and application rate of the pesticide.

Inert ingredient:
Any substance intentionally included in a pesticide product that does not possess pesticide activity. These ingredients are added to improve the product's formulation, stability, application, or effectiveness without directly affecting pests. Examples include solvents, carriers, preservatives, and emulsifiers.

Diluent:
A liquid, commonly water, used to dilute the active ingredient in a pesticide solution to the desired concentration. Diluents help ensure uniform distribution of the pesticide during application, reducing the risk of over-application and potential crop damage. They play a crucial role in achieving the correct dose and coverage.

Treatment:
The application of plant protection products to achieve a desired biological effect against pests, diseases, or weeds. Treatment can be applied uniformly across a field or targeted to specific areas, depending on the infestation or crop requirements. Effective treatment helps maintain healthy crops and prevent yield loss.

Overall Treatment:
A pesticide application that is uniformly applied over the entire area of a crop or field. This method is used when a widespread pest infestation requires comprehensive control measures. Overall treatment ensures consistent coverage and effectiveness across the entire target area.

Localized Treatment:
The targeted application of a pesticide to specific parts of a crop or field, such as in bands or spots. Localized treatments focus on areas with higher pest concentrations or specific problem zones, minimizing pesticide use and reducing environmental impact. This approach is often used to address localized outbreaks efficiently.

Sprayed Area:
The specific area intended for treatment with a plant protection product. The sprayed area is the portion of the field or crop that receives the pesticide application. Accurate identification of the sprayed area ensures effective coverage and reduces waste.

Spray Target:
The specific pest, plant part, or surface intended to receive the treatment. Identifying the correct spray target is crucial for maximizing the effectiveness of the plant protection product and

minimizing off-target effects. The target can vary depending on the type of pest or disease being controlled.

Target:
The site or pest toward which control measures are directed. The target could be a specific insect, weed, pathogen, or the crop area affected by these pests. Accurate targeting ensures effective pest management and minimizes the impact on non-target organisms and the environment.

Dose:
The amount of active ingredient or formulated product applied per unit area, typically expressed in kilograms or liters per hectare (kg or L/ha). The correct dose is essential for achieving effective pest control while minimizing the risk of phytotoxicity, resistance development, and environmental contamination.

4. Application in the field

4.1 Rates of application and elements to be considered

Band Width:
The width of the spray pattern produced by a single nozzle when it reaches the target surface. This width can be adjusted by changing the height of the nozzle or boom during spraying, which affects the area covered by the spray.

Overlapping:
A situation that occurs when two passes of spraying overlap on the crop surface, leading to certain areas receiving more chemical than others. Overlapping can result in uneven application rates and potential overuse of chemicals.

Pressure Gauge (Sprayer):
A device used to measure the pressure of the pesticide solution within a sprayer. The gauge helps the operator maintaining consistent pressure throughout the spraying process, ensuring that the application is uniform and the nozzles operate correctly. Proper pressure management is vital for effective spraying and minimizing drift.

Spray volume:
The amount of spray liquid applied by a sprayer over a specific area, typically measured in liters per hectare (l/ha). This volume determines the coverage and effectiveness of the pesticide or fertilizer application.

Spraying (forward) speed:
The speed at which the sprayer or applicator moves while applying chemicals to a crop. The spraying speed influences the distribution and uniformity of the chemical application across the target area.

Spot Application:
The targeted application of a pesticide to a specific area within a field. This method is used to address localized pest infestations, reducing the amount of pesticide applied and minimizing environmental impact. Spot application is an efficient way to manage pests without treating an entire area.

Turbulence:
The chaotic movement of air that occurs when spraying at higher speeds, which can disrupt the spray pattern. Turbulence increases the risk of small droplets being carried away from the target area, leading to spray drift.

Evaporation:
The process by which spray droplets turn into vapor and disperse into the air. Smaller droplets, due to their larger surface area relative to volume, evaporate more quickly, reducing their effectiveness on the target.

Variable Rate Application:
The application of different amounts of a plant protection product to various areas, zones, or spots within a field, tailored to specific needs. This precision agriculture technique optimizes resource use by applying the right amount of product where it is most needed, enhancing efficacy and reducing waste.

High Volume Application (HV):
The application of more than 1,000 liters per hectare (L/ha) for bush and tree crops. High volume applications are typically used for crops with dense canopies to ensure thorough coverage and penetration of the plant protection product.

Medium Volume Application (MV):
The application of 500 to 1,000 liters per hectare (L/ha) for bush and tree crops. Medium volume applications provide a balance between coverage and efficiency, suitable for moderate canopy densities and varying environmental conditions.

Low Volume Application (LV):
The application of up to 500 liters per hectare (L/ha) for bush and tree crops. Low volume applications are often used in situations where less product is needed, reducing costs and potential environmental impact while still achieving effective pest control.

Very Low Volume Application (VLV):
The application of 50 to 200 liters per hectare (L/ha) for bush and tree crops. VLV applications are used for more targeted treatments, often with specialized equipment, to minimize product use and environmental exposure.

Ultra Low Volume Application (ULV):
The application of less than 50 liters per hectare (L/ha) for bush and tree crops. ULV applications are designed for high-efficiency, targeted spraying with minimal water use, often using highly concentrated formulations to maximize effectiveness with minimal environmental footprint.

Swath:
The width of the area covered by a sprayer in a single pass over a field. The swath determines the distance between successive passes needed to ensure complete coverage of the target area. Proper swath management helps to avoid both overlap and gaps, optimizing product use and application efficiency.

4.2 Climatic and field conditions

Spray Buffer Zone:
The distance between the point of direct pesticide application at the downwind end of the swath and the nearest downwind boundary of a sensitive habitat. Spray buffer zones are specified on product labels to mitigate adverse effects from non-target deposition of spray drift.

Relative Humidity:
The ratio of the amount of water vapor in the air at a specific temperature to the maximum amount that the air could hold at that temperature. It's expressed as a percentage. Relative humidity (RH) at the time of application is required for aerial applications, as it affects spray drift potential. Pesticide carrier droplets (water) evaporate faster under low RH, increasing the distance they can travel before falling to the ground.

Temperature (°C):
The air temperature at the site where the plant protection product is applied. Higher temperatures can cause spray droplets to evaporate more quickly, potentially reducing the amount of product that reaches the target and increasing the likelihood of drift. Understanding temperature conditions helps optimize application effectiveness.

Spray Drift:
The unintended movement of spray droplets away from the intended target area due to wind or other environmental factors during application. Spray drift can lead to reduced efficacy on the target pest and unintended exposure to non-target areas, which can pose environmental and safety risks.

Wind Speed:
The speed of the wind at the time of application, which is a critical factor in minimizing spray drift. Higher wind speeds can carry pesticide droplets away from the target area, leading to off-target contamination and reduced treatment effectiveness. Monitoring wind speed helps ensure safe and accurate spraying.

Thermal inversion:
Process that occurs generally in the early morning and at dusk, characterized by the formation of a layer of air of higher temperature over another of lower temperature, very close to the ground. With potential risk of drift high, negatively affect spraying by causing smaller particles to float in the air and drift with the wind.

5. Evaluation of performance

Efficacy:
The effectiveness of pest control achieved through the application of a plant protection product. Efficacy is measured by how well the product controls the target pest or reduces pest damage after treatment. High efficacy indicates a successful application with minimal pest presence or damage.

Distribution:
The uniformity of the volume or mass of spray liquid deposited over the target or treated area. Proper distribution ensures that the plant protection product is applied evenly, maximizing its effectiveness and minimizing waste or over-application.

Vertical Distribution:
The evenness of spray liquid deposition in a vertical plane across the treated area. Consistent vertical distribution is important for ensuring that all parts of a plant, from the top to the bottom, receive adequate coverage of the plant protection product.

Spray Classification:
The categorization of sprays based on the droplet size spectrum produced by different nozzles. This classification helps determining the effectiveness of sprays for various applications, such as targeting specific pests or optimizing coverage.

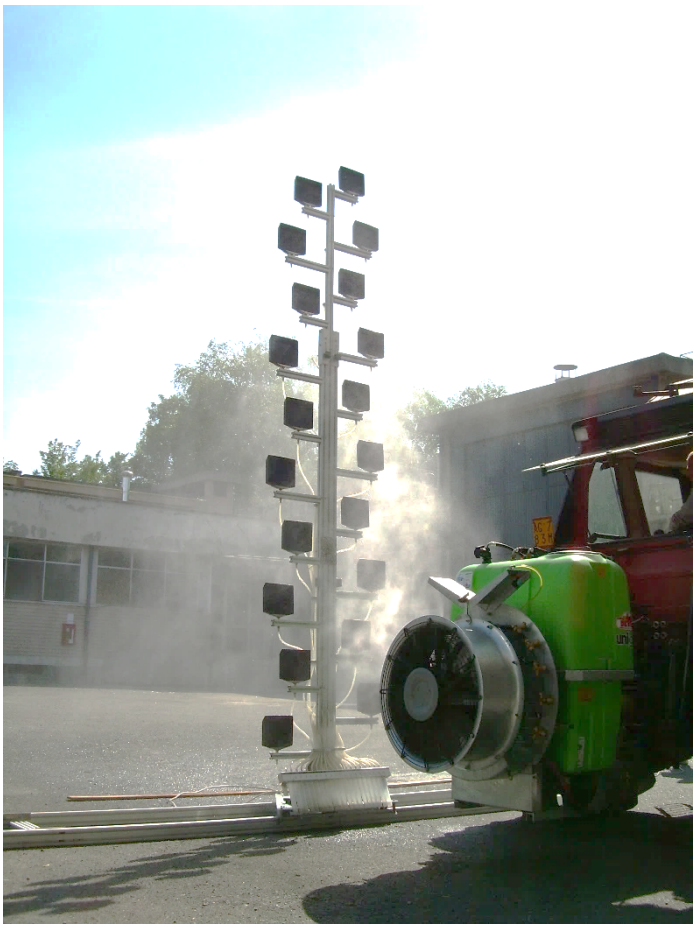
Spray Coverage Percentage:
The proportion of the target area or plant surfaces covered by droplets of a plant protection product, expressed as a percentage. High spray coverage ensures better efficacy of the product by maximizing contact with the target.

Spray Penetration:
The extent to which a spray reaches and deposits within the inner parts of a foliar canopy. Effective spray penetration ensures that the plant protection product reaches pests or diseases located deep within the foliage.

Droplet Density:
The number of droplets deposited per unit surface area, typically measured per square centimeter (1 cm^2). Higher droplet density can improve coverage and effectiveness, especially in areas with dense foliage.

Vertical Patternator:

A laboratory device used to assess the volume distribution from a nozzle or spray boom in a vertical plane, simulating a plant canopy. This tool helps to evaluate the uniformity and effectiveness of spray coverage across different heights of a plant.



Spray Overlap:

The percentage by which the spray from adjacent nozzles overlaps, measured in a horizontal or vertical plane at the target area surface level. Proper spray overlap ensures uniform coverage and reduces the risk of missed areas or over-application.

Spray Deposition:

The quantity, volume, or mass of spray liquid, formulated product, or active ingredient deposited on a surface, usually the spray target. Adequate spray deposition is crucial for the effectiveness of the plant protection product.

Spray Pattern:

The shape of the fluid released from your nozzles or spray gun. This varies with different nozzles. Certain spray patterns are better for certain applications.

Vapour Drift:

The amount of plant protection product that volatilizes and is carried away from the treated area by air currents after application. Vapour drift can affect non-target areas and poses a risk to nearby plants, animals, and water sources.

Spray Drift Potential:
The percentage of the spray volume that could be displaced to a specified distance downwind of the sprayer by air currents during application. This measure helps assess the risk of drift and the need for mitigation strategies.

Spray Drift Reduction:
The difference in spray drift or spray drift potential of a candidate spray system compared to a reference spray system. It evaluates how effectively a system minimizes drift relative to standard practices.

Spray Drift Reduction Technology:
Nozzles, sprayers, or other technologies designed to reduce spray drift or spray drift potential compared to a reference spray system. These technologies help ensure the precise application of plant protection products while minimizing environmental impact.

Spray Drift Deposition:
The proportion of spray drift that deposits at specific distances from the treated area due to gravity and/or air currents. Understanding spray drift deposition patterns helps manage off-target contamination risks.

Tank Residual Volume:
The amount of pesticide residue remaining in the spray tank or that can flow back into the spray tank during normal sprayer operation. This residual volume can affect subsequent applications and requires proper management.

Drainable Volume:
The amount of spray liquid that can be collected from the spray tank outlet(s) and other outlets after internal cleaning of the sprayer. Managing drainable volume helps reduce waste and environmental contamination.

Drainable Rinsing Liquid Concentration:
The concentration of the formulated product or active ingredient present in the drainable volume. This measure is crucial for ensuring that rinse is handled safely and disposed of properly.

Dead Volume:
The volume of spray liquid that cannot flow back to the spray tank during normal operation or after the spraying process has stopped. Dead volume represents residual liquid that may contribute to waste or contamination.

Residue:
The portion of a pesticide or its metabolites that remains in the sprayer or the environment, such as soil, water, or on plants or animals, after application or a spill. Managing residues is important for environmental protection and safety.

Rinse:
Water or another liquid containing pesticides that results from rinsing a pesticide container, equipment, or other materials containing pesticides. Proper rinsing and disposal are essential to minimize contamination and exposure risks.

Total Residual Volume:

The volume of spray liquid remaining in the sprayer that cannot be delivered at the intended application rate or pressure, calculated as the sum of the tank residual volume and the dead volume. It represents the total amount of non-usable product.

Cleaning Device for Plant Protection Product Containers:

A device used for cleaning the interior of emptied plant protection product containers. These devices help ensure that containers are properly cleaned and safe for disposal or recycling.

Uptake:

The absorption of chemicals into the plant after it is applied.

6. Integrated Pest Management (IPM)

Integrated Pest Management (IPM):
A comprehensive approach to pest management that combines multiple strategies to control pest populations in an effective, economical, and environmentally sustainable manner. IPM integrates biological, cultural, mechanical, and chemical methods, focusing on long-term prevention and minimizing risks to humans and the environment. It emphasizes monitoring and identifying pests accurately, using non-chemical methods as the first line of defense, and applying chemical controls only when necessary.

Action Threshold:
The point at which the presence of pests reaches a level that could cause economic damage or pose a significant threat to crop health, triggering the need for intervention. This threshold helps in deciding when to implement pest control measures to prevent yield loss or quality reduction.

Biological Control:
A pest management approach that involves the use of living organisms—such as predators, parasites, nematodes, or pathogens—to control pest populations. This method relies on natural interactions and is considered environmentally friendly, as it reduces the need for chemical pesticides.

Chemical Control:
The practice of applying chemical substances, including synthetic or natural pesticides, to directly kill, repel, or inhibit pests. This method is widely used for quick and effective pest management and includes various types of chemicals, such as insecticides for insects, herbicides for weeds, and fungicides for fungal pathogens.

Cultural Control:
A preventive pest management technique that involves altering farming practices and environmental conditions to reduce pest establishment, reproduction, and survival. Examples include crop rotation to disrupt pest life cycles, proper irrigation management to avoid conditions favorable to pests' outbreak and development, and sanitation practices to remove pest habitats and food sources.

Degradation:
The breakdown of a pesticide into less complex substances through biological processes (such as microbial activity) or abiotic factors (such as sunlight, water, or chemical reactions). Degradation reduces the persistence of pesticides in the environment, minimizing potential negative impacts on non-target organisms and ecosystems.

Economic Threshold:
The point at which the cost of applying pest control measures becomes economically justified based on the expected benefits from reducing pest damage. This threshold is calculated by comparing the potential loss in crop yield or quality with the cost of pest control actions. When pest populations or damage levels reach the economic threshold, it indicates that the cost of further pest damage will exceed the cost of implementing control measures.

Mechanical Control:
A pest management technique that involves the physical removal or exclusion of pests from the crop

or environment. Methods include hand-picking pests, using traps, mowing, tilling, and employing barriers or nets to prevent pest access. Mechanical control is often used in conjunction with other methods to reduce pest populations without relying just on chemical pesticides.

Monitoring:
The systematic process of regularly observing and assessing pest populations, crop health, and environmental conditions to make informed decisions about pest management. Monitoring involves various methods such as visual inspections, trapping, sampling, and remote sensing to detect early signs of pest infestations and determine the effectiveness of control measures. This proactive approach helps in preventing pest outbreaks and optimizing control efforts.

Natural Enemy:
An organism that naturally regulates the population of another organism, particularly pests, through predation, parasitism, or other biological interactions. Natural enemies include predators, parasitoids, and pathogens that help suppress pest populations, reducing the need for chemical control. They are a key component of biological control strategies in integrated pest management.

Non-Selective Pesticide:
A type of pesticide that is not specific to a particular pest species and can affect a wide range of organisms, including beneficial insects, plants, animals, and microorganisms. Non-selective pesticides are often broad-spectrum chemicals that can pose a higher risk to non-target species and the environment compared to selective pesticides that target specific pests.

Pathogen:
A microorganism, such as bacteria, viruses, fungi, or other microbes, that causes disease in plants, animals, or humans. Pathogens can significantly impact agricultural productivity by infecting crops or livestock, leading to yield losses and economic damage. Managing pathogens often requires a combination of preventive measures, cultural practices, resistant varieties, and chemical treatments.

Pest:
Any organism that causes damage, harm, or nuisance to crops, livestock, humans, or structures. Pests can include insects, weeds, rodents, fungi, bacteria, viruses, and other organisms that interfere with agricultural productivity, human health, or quality of life. Effective pest management aims to reduce the negative impact of pests while minimizing harm to the environment and non-target species.

Predatory Insect:
An insect that hunts, captures, and feeds on other insects as its primary food source. Predatory insects, such as ladybugs, lacewings, and predatory beetles, play a crucial role in natural pest control by reducing the populations of harmful pests. They are an important component of biological control strategies in integrated pest management.

Remote Sensing:
A technology used for monitoring and assessing crops and pest populations from a distance, typically through the use of drones, satellites, or aircraft equipped with sensors. Remote sensing allows for the collection of data on crop health, soil conditions, and pest infestations over large areas quickly and efficiently. This technology is valuable for early detection of pest outbreaks and precision agriculture practices.

Resistance:
The ability of a pest population to survive and reproduce despite exposure to a pesticide or other

control measures. Resistance can develop through genetic mutations or behavioral adaptations that reduce the effectiveness of control methods. Managing resistance involves rotating different control strategies, using integrated pest management practices, and avoiding over-reliance on a single type of control.

Resistant Variety:
A plant variety that has been selectively bred or genetically modified to possess natural resistance to specific pests or diseases. Resistant varieties reduce the need for chemical control measures, lowering costs and environmental impact. They are an essential tool in integrated pest management and sustainable agriculture.

Selective PPP:
A pesticide designed to target specific pests while minimizing harm to non-target organisms, such as beneficial insects, plants, or animals. Selective pesticides provide a more environmentally friendly option compared to non-selective pesticides, as they help protect biodiversity and reduce collateral damage in ecosystems.

Threshold:
The specific level of pest population density or extent of crop damage at which pest control actions should be initiated. Thresholds are used in pest management to determine when intervention is necessary to prevent economic damage or unacceptable harm to crops or the environment. They help guide decision-making to optimize pest control efforts and resource use.

Visual Inspection:
A monitoring technique that involves directly examining plants and surrounding areas for signs of pest activity or damage, such as chewed leaves, wilting, or the presence of pests. Visual inspection is a straightforward, low-cost method for assessing pest populations and is often used in conjunction with other monitoring methods.

Water Volume (Application Volume):
The total amount of spray liquid, including pesticides, diluents, adjuvants, carriers, and other components, applied to a specific area, usually measured in liters per hectare (l/ha). Proper water volume is crucial for effective coverage and penetration of the target surface, ensuring optimal pest control.

Yellow Sticky Traps:
A pest monitoring tool consisting of bright yellow sticky surfaces that attract flying insects, such as whiteflies, thrips, and aphids. These traps are used to capture and monitor pest populations, providing an early warning system for infestations and helping guide pest management decisions.

7. Precision spraying and other definitions

Precision Spraying:
A targeted application method that uses advanced technologies, such as sensors and mapping systems, to enhance the accuracy of pesticide application. This approach aims to apply the spray precisely where needed, improving efficiency and reducing the overall amount of pesticide used while minimizing the risk of over-spraying.

Global Positioning System (GPS) and Mapping Systems:
Technologies used to map out target areas and develop a detailed spray plan. These systems assist operators in applying pesticide solutions evenly and efficiently, helping to reduce pesticide usage and minimize the risk of over-spraying.

RTK (Real-Time Kinematics):
A satellite positioning technique providing centimetre-level accuracy. RTK improves upon standard GPS by using a base station and one or more mobile receivers (rovers) to correct positioning errors, offering much greater precision than conventional GPS.

DGPS (Differential GPS):
A system that improves GPS positioning accuracy by using data from multiple GPS receivers. DGPS reduces or eliminates common GPS errors, providing more precise location information.

Crop Type Detection:
Technology used to identify and differentiate various crop types in a field. It helps optimize crop management and improve agricultural practices.

Weed Detection:
Sensors or systems designed to identify and manage weeds in crops. This technology helps reduce herbicide use and improve crop yields.

Disease and Pest Detection:
Methods or sensors for identifying plant diseases and pests, often using image recognition or remote sensing technologies. These systems help manage crop health effectively

Decision Support System (DSS):
Software tool typically based on algorithms enabling the elaboration of multiple factors (e.g. meteorological data, geographical position of the field, pest/disease/weed occurrence, etc.) for determining the optimal time window and method of pesticide application in a selected field, farm area or zone. It can incorporate pest prevision models and be embedded in computer units mounted or remotely connected to the sprayer.

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