

D 1.6 Plant protection sensors

Plant and plant protection

Plants are often attacked by pests, diseases and weeds during its growth cycle. Furthermore, there are many organisms in the agricultural environment that can cause harm to plants which can result in a decline in its development, reduce their thickness, as well as greatly impair their productivity, and even destroy a crop in some cases.

Protecting the plant through managing pests, diseases and weeds is a key to improve the health of a plant. By minimising the dangers and reducing the devastating effects on farmer livelihoods through conserving biodiversity and nutrients in the earth optimises the resources used and increases our life quality (CABI and ECOS, 2022).

An efficiency of plant protection should combine two directions, reducing risk by applying good agricultural practice (GAP) for healthy plants and controlling pests by Integrated Pest Management (IPM) of which controlling volume of pesticides used in the farms and early stages of detecting plant diseases on fields have very important roles.



Ultrasonic and LIDAR sensors equipped air assistance sprayer. Source: Petrovic et al (2018)

Plant protection sensors and how it searches for data

Plant protection sensors refer to all types of devices that determine whether pesticides have been used, and are also capable of scanning a plant for physiological features, such as moisture, different chemical spraying effects and disease symptoms to detect whether the plant is in a good health or under stress (Petrovic et al., 2018). This means there are two categories of remote sensors for plant protection including pesticide control and plant health management

Petrovic et al. (2018) also indicate that sensors for the application of pesticides (for monitoring dosing spray) operate principally based on the interaction with the surrounding objects, and its reaction is transformed into an output signal and controlled by the technological process. The variable rate technology (VRT) used in field crops which is based on the sensory approach to light reflection measuring from plants and the collected data analysis. By changing the luminous flux which depends on individual plant properties, an electronic signal on the sensor is sent to the regulator which performs the dosing device opening.

For plant disease control, light detection and ranging sensors, also called LIDAR sensors or optical sensors, are often used to determine the trees' geometric structure which give 3D images of the treetop shape and plant structure. These types of sensors help to identify the cause of treetop damage or surface area and leaf mass volume. Beside, ultrasonic sensors, one other type of sensor for plant

disease control, are applied to determine more precise plant physical and chemical characteristics through spectral data at different scales of leaf, canopy and landscape-level of plants.

The importance of applied plant protection sensors in agriculture

An application of modern sensors for plant protection allows precise application of pesticides spraying and detect diseases at early stages which consequently reduce time-consuming compared to manual methods and lower production cost, soil pollution as well as potential exposures of workers to chemicals.

The limitations of plant protection sensors in agriculture

Applying sensors in plant protection gives a great advantage in the sense that it is important to know that each modern/IT sensor has its own limitation due to field conditions. Internet disconnection on the field also interrupted communication between machines and the computer.

The complexity of latest generation sensors requires users' knowledge.

Links to relevant topics

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Key words

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