White paper

Effective weed control: a matter of suitable technology ánd the right management

Any crop producer knows that tackling weeds is an end of pipe solution. As a grower you make extra costs, put in extra effort and impair the growth of crops. Preventing weeds from emerging in the first place is a way smarter and often cheaper solution. This can be achieved with the combination of suitable technology and the right weed management.

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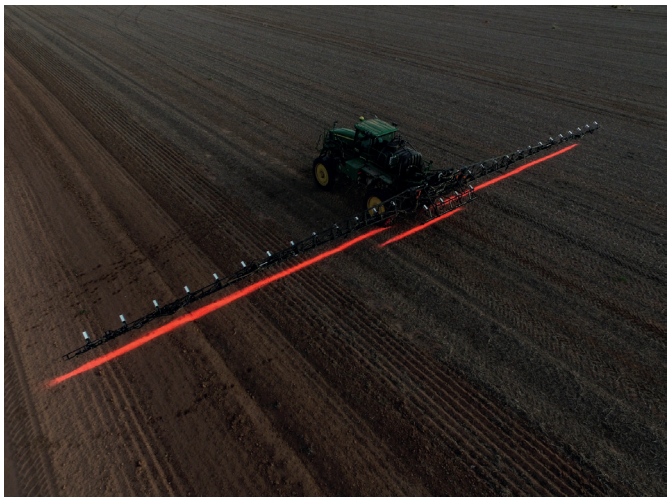
Effective weed control is much like combating viruses like Covid-19: keep the number of infections down and the virus dies out. Similarly, keep the number of weed plants down and the weed population will die out. Here is where WEED-IT comes in. WEED-IT is all about smart detection and targeted eradication of weeds and preventing the development of weeds and weed seed banks. WEED-IT uses fluorescence technology for chlorophyll detection instead of camera technology. 'Keep it simple, reliable and effective', has been the design principle of the technology. It has proven itself on tens of thousands of farms on all continents over nearly 25 years.



WEED-IT in fact originates from the idea of detecting single weeds (or patches of weed) in surroundings where weeds shouldn't be present and where any plant material containing living chlorophyll is to be eliminated. In farming, this is referred to as green (plants) on brown (soil) treatment. There's also green-on-green treatments in situations where there is both a cultivated crop and non-cultivated crops, referred to as weeds. While WEED-IT sensors are also capable of detecting weeds in a cultivated crop based on the differences in greenness, size and volume, its primary use has always been green-on-brown. With the chlorophyll detecting sensors there's no risk of saturation, a known weakness of some sensors measuring vegetation indices. This is because the technology is based on laws of nature: living plant material contains chlorophyll, unlike dead plant material and anything else in the background.

Timing, timing, timing

Every farmer, sprayer operator and agronomist knows that timing is absolutely essential for the effectiveness of spray jobs. Whether you treat your crop for diseases, pests or weeds, it's all about the right timing. Timing also affects the risk of bugs, insects, moulds and weeds building resistance to crop protection agents and the risk of damaging crops. It's a constant effort to keep crops healthy and minimise potential risks and threats. Weed seed banks form such a major threat. These are particular areas in a field where the soil contains a lot of weed seeds. To minimise the effect of seed banks, it is crucial to achieve a very high - preferably over 95% - success rate when spot spraying emerging weeds. The aim is to eliminate every single weed to

prevent it from producing seeds, so the so-called reproduction number (R) is as low as possible. The Covid-19 outbreak learned how important it is to have the R-number - that shows how fast the virus is spreading - below 1 (so 1 infected person infects less than 1 other person). If the R-number is lower than 1 for an extended period, the virus will stop spreading and die out.

Camera systems miss up to 30%

Worldwide experiences show that even the best current day camera detection systems generally achieve success or hit rates between 70 and 95%. A reason for this is that commonly used RGB-camera systems capture everything they see in three different colours (Red, Green and Blue): the soil/background, crops (if present), dead crop residue and weeds. All these data need to be analysed and processed in record time and decisions have to be made on what plants are actually weeds that need to be spot sprayed instantly. This causes the success rates to be further off from the desired 100%. With a 90% hit rate, 10% of the weeds are missed and with an 80% hit rate, even 20% of the weeds are not sprayed! User experiences users across the world have shown that any hit rate below 90 to 95% doesn't stop weed seed banks from developing. WEED-IT on the contrary, relies on fool proof fluorescence technology to detect chlorophyll as the best suitable technology for effective weed management. By using this technology, the amount of data processing is significantly lower, resulting in higher process speeds. The living chlorophyll present in each weed, no matter the size and no matter the type of weed, immediately triggers the sensors at the speed of light. This way, any (type of) weed, no matter how small, is always detected at driving speeds up to 25 km/h (15 mph) resulting in hit rates between 95 and 98%. With spot spraying, it is possible and also economically feasible to use more expensive and also more effective crop protection products or mixtures to prevent weeds from getting resistant because you only spray on the spot instead of doing blanket spraying. As a bonus the amount of water is reduced just as much, which reduces (logistics) costs and adds to the sustainability of farming practices.

Regional differences

Another aspect of timing, or rather weed management as a whole, relates to the short working and spraying windows in certain regions. In Canada for instance, farmers in general and no-till farmers in particular, only have a short spraying window after harvest in autumn before the winter sets in and an equally short spraying window in springtime before planting starts.
In Australia on the other hand, keeping weeds under control between the successive growing seasons is the main target. To prevent them from growing, from reproducing, and from consuming precious water and moisture crops desperately need to grow. Effective weed management therefore is essential to minimise the effects of weeds on crops and on yields. Correct timing to ensure weeds remain under control leads to a decrease in use of crop protection agents and to financial, health and environmental gains. Like diseases and viruses, it's more effective and cheaper to prevent weeds from growing and reproducing, than to 'cure' crops from weeds. Because then you are too late and you will need more time, effort and expensive agents that affect the growth and yields of your crops. Besides, camera-based systems in use for green-on-green applications tend to require a paid subscription per type of weed and per acre/hectare/year. With a WEED-IT, users do not have to pay any periodical subscription fee at all! The ideal strategy - both for herbicide resistance and financial reasons - is to control and time your weed management befóre crops emerge. This will enable you to minimise or even refrain from incrop weed management measurements during the growing season! Or in the words of one of our customers:

"WEED-IT is not the saviour for past poor weed management. It is a way to maintain a proven weed control program by saving input money, fighting resistant weeds, and being able to do things that no one else can do because they can't afford to be out there."

Standard dual mode for volunteer weeds

To support the aforementioned short working window conditions, WEED-IT has a trick up his sleeve. Apart from green-on-brown applications, any WEED-IT Quadro system is also capable of operating in dual or bias mode. In dual spraying mode, the system applies a low application rate (like 30 l/ha) over the full boom width and a higher rate (like 100 l/ha) on every single weed detected. Dual mode is ideal for treating volunteer plants and when your working window is tight. WEED-IT is one of the very few systems capable of dual spray with just one spray line. Research by Wageningen University & Research (WUR) and the Federal University of Santa Maria is Brazil has shown that the WEED-IT system is also capable of measuring the amount of biomass in potatoes and to apply end of season desiccant variable rate accordingly. In 2022, successful tests were done to determine the ability of variable rate desiccation of soybean crops depending on the amount of soybean biomass left. Another trial is focussing on finding the best configurations for green-on-green applications in soybean crops. These tests are all part of the project 'Smart technology for soybean production'.

About this white paper

This white paper is offered by Rometron, the manufacturers of WEED-IT precision spraying technology.

WEED-IT works! For you too!