PTx Trimble Spray Tech Cuts Pesticide Costs and Pollution

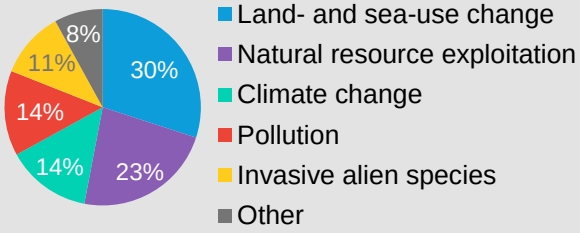
Part of the 'Opportunity Blossoms' series on real economy investments in nature

Broadcast methods used today to spray pesticides are inefficient, ineffective and lead to ecological harm. Although essential to agricultural production, pesticides are markedly overused: as little as 1% of the volumes applied reach the target pest. The remainder enters ecosystems inflicting various harms upon plant and animal life, including reproductive failure, developmental abnormalities and immune system suppression. This threatens the agricultural system itself: More than 40% of insect pollinator species worldwide are threatened with extinction, driven to the edge predominantly by insecticides.

PTx Trimble, a joint venture between American farm machinery and technology giants, produces precision agriculture technology that slashes the amount of pesticide required on crop fields, while retaining efficacy. In doing so, it reduces the level of potential harm to nature and saves both chemical and machinery costs for farmers. Sales of PTx Trimble technology have increased the revenue of its majority owner by an estimated $600 million per year.

Mitigating nature loss

Five drivers account for over 90% of global biodiversity and ecosystem decline. PTx Trimble's technology addresses pollution by reducing the amount of pesticide applied to crop fields.

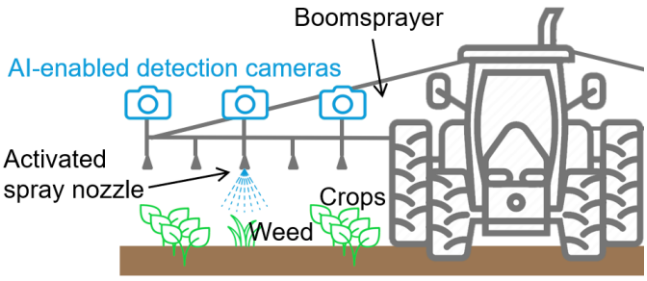


The nature-friendly product

In April 2024, industrial technology giant Trimble carved out its agricultural business, with farm machinery manufacturer AGCO Corp. taking an 85% stake. The $2.35 billion joint venture – the largest ever agtech deal – created PTx Trimble, which provides precision agriculture tools and software to farmers.

One of the key components of PTx Trimble's offering is a precision chemical application technology known as optical spot spraying (OSS). PTx's OSS uses artificial intelligence-enabled cameras to detect weeds in active crop fields and deliver a precise dose of herbicide to the target. The technology, dubbed 'green-on-green OSS', is a major upgrade on its predecessor, which was developed by Trimble but only able to identify weeds in bare fields.

Green-on-green optical spot spraying mechanism

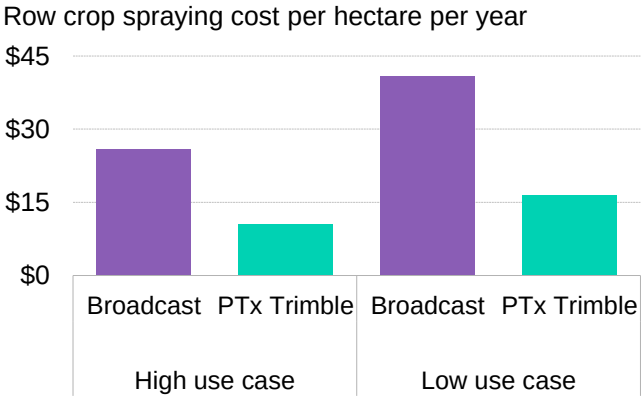


Source: BloombergNEF. Note: AI = artificial intelligence.

The company also produces machinery guidance and connectivity equipment, and plans to launch autonomous vehicle solutions in 2025. This can also result in less over-spraying as autonomous farm vehicles can operate round the clock, without human labor, and switch off when conditions are unsuited to spraying chemicals, such as in high winds or rain.

The joint venture catapulted AGCO into direct competition with Deere & Co., whose 'See and Spray' factory-fit upgrades previously led the market. PTx predominantly targets the retrofit sales channel, increasing sales volumes as farmers with existing sprayers can upgrade without purchasing a new machine. Prior to the joint venture, a similar Trimble retrofit kit retailed for around $100,000, plus a fixed $13,000 annual algorithm fee, well below the near $1 million asking price and $4 per acre licensing fee of the closest Deere equivalent. Taking into account the upfront capex and chemical cost savings, the PTx technology is much cheaper than conventional broadcast spraying, saving farmers up to 60% per hectare over the lifetime of the machine.

Levelized cost of PTx Trimble's technology versus broadcast spraying



Source: BloombergNEF. Note: Costs in real 2023 US dollars. Calculations do not account for tax. High use case represents a spray regimen in a long fallow period, as in Australia, which requires multiple passes of the sprayer to control weeds. The low use case represents a system such as in Europe, which requires fewer passes per hectare.

Nature impact of pesticide pollution

Pesticides are ubiquitous in crop production – 3.7 million metric tons of active chemical ingredients were applied to crops in 2022 – and have played a critical part in the growth of agricultural yields since the 'green revolution' of the 1960s. Without them, global fruit, vegetable and cereal production would decline by 78%, 54% and 32%, respectively. However, the three major groups of chemical pesticides – herbicides, insecticides and fungicides – are hazardous to wildlife, with the various formulations responsible for diverse ecological impacts particularly in aquatic environments.

The US Environmental Protection Agency found that atrazine and glyphosate, two of the most commonly used herbicides, each cause harm to over 1,000 native species. More than 40% of insect pollinator species worldwide are threatened with extinction, predominantly driven by insecticides, such as the potent neonicotinoid class. Native bees alone provide $3 billion worth of pollination services to US fruit producers, and nearly a quarter of these species are at risk of extinction.

Non-target species are typically affected when the toxic chemicals leave the cropping area, typically through the following processes:

- Spray drift – chemicals are picked up by wind and spread to new locations
- Leaching – displacement by the action of water, often rain or irrigation
- Bioaccumulation – the gradual accumulation of toxic compounds in a non-target organism that consumes contaminated prey. Pesticides bio-accumulate all the way up to humans: a recent study found herbicide residues in 80% of US human urine samples.

The solutions provided by PTx allow farmers to deliver an effective dose of herbicide while minimizing losses to the environment. They can reduce the volume of herbicide applied by up to 97.5% while maintaining crop yields. Empirical studies from competitor products have shown between 44-91% reductions in chemical volumes by deploying OSS.

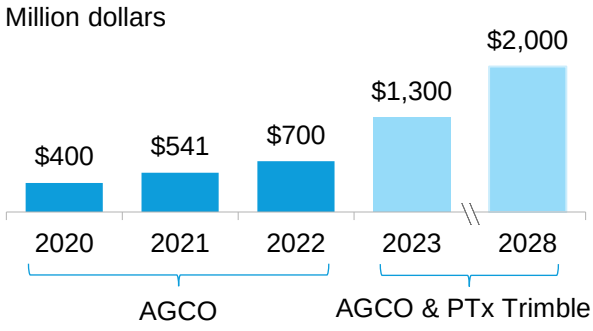
Financial performance

Cost savings have driven rapid uptake of OSS technology. Australia leads adoption, where 70% of farmers in its northern cropping regions deploy some form of the precision sprayers, with PTx Trimble's solution seen as a market leader. In the US, adoption

of precision spraying technology is much lower, between 7-10%. However, advances in AI technology are improving the product and driving global market penetration.

The $2 billion joint venture is already proving fruitful for majority owner AGCO. In a second quarter 2024 earnings announcement, the firm projected an additional $600 million in full-year revenue due to contributions from PTx Trimble. The firm is bullish on the performance of its precision agriculture portfolio, expecting annual revenues to reach $2 billion by 2028.

AGCO revenue with PTx Trimble joint venture revenues



Source: BloombergNEF, AGCO. Note: Light blue represents company estimates.

Broader opportunities within the sector

The precision spraying space is highly competitive, with at least 25 companies and startups working on camera-based solutions. Startups in this cohort have collectively raised almost $470 million, according to CB Insights and BNEF research.

Crop protection companies have recognized the disruption that OSS presents to the $80 billion industry. Both BASF and Bayer are developing solutions – the 'One Smart Spray' and 'MagicSprayer'. Syngenta backed the technology through its corporate venture division, joining a $22 million seed round for startup Greeneye Technology. This Israeli startup is one of the first OSS companies to venture beyond weed control, and plans to launch a fungal pest spot sprayer in late 2024, which it says can reduce fungicide volumes sprayed by up to 40%.

There is also an emerging class of AI-enabled chemical-free weed control technologies. A laser weeder developed by Carbon Robotics had raised $122.8 million by October 2024 and the backing of Nvidia's venture wing NVentures, while FarmWise's AI-enabled mechanical weeder has raised $84 million.

Notable PTx Trimble competitors

Company	Description	Financial gain
John Deere	The US-based farm machinery giant recently launched an upgrade kit version of its AI-enabled sprayer. Costing $25,000 (plus an additional $4 per acre), it competes directly with PTx's offering.	Targeting 10% of total firm revenue from recurring per acre" subscriptions by 2030.
Greeneye Technology	The Israeli green-on-green OSS company says it will soon offer sprayers addressing fungicide use, the first with this capability.	$49.27 million raised to series B.
Carbon Robotics	Developed a weed control unit that uses lasers to eliminate weeds as an alternative to chemicals.	$122.8 million raised to series C-II.

Analyst take

PTx Trimble offers an economically viable way for farmers to reduce the nature loss associated with their operations while also minimizing spend on crop protection. The adoption of precision OSS technology will only grow as more pests, like insects and fungi, are able to be detected and controlled. This presents a notable risk to the business models of crop protection companies, whose revenues are intrinsically linked to the volume of harmful chemicals they sell to farmers.

More from BNEF:

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Precision Pesticide Delivery: Booming, to Spray the Least (web | terminal)

Greener Pastures: Crop Protection with Fewer Chemicals (web | terminal)

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