

Eliminating microplastics from seed treatment



“With our technologies, growers do not have to sacrifice performance for better environmental solutions.”



Marta Dobrowolska-Haywood
Head of Research and Technology, Incotec

An important part of our commitment to Land Positive is that, through our Crop Science Innovation, we will address some of the key challenges in agriculture, helping to mitigate the impacts of climate change and land degradation. A great example of this is the work by Incotec to develop microplastic-free seed coatings.

There is growing global concern about the accumulation of microplastics in the environment, and for good reason: microplastics remain present in the environment for a significant amount of time after their initial release, and, as levels increase, there is potential risk to animal and human health. One of the biggest challenges in reducing microplastic pollution is that they are resistant to normal environmental degradation. This is why new European legislation banning intentionally added microplastics in seed coatings is expected to come into effect in 2027.

Developing microplastic-free seed treatments is complex. For these new, microplastic-free, film coatings to be effective they must glue the plant protection ingredients as effectively as today's polymers, and cannot interfere with seed health, shelf life or germination. This problem is made more complex by the fact that different crops and different plant protection products react differently to different coatings. It's a challenging technical problem to solve.

During 2020, Incotec, our seed enhancement business, succeeded in developing the first microplastic-free products for sunflower, corn and vegetable seeds. These technological breakthroughs solve a real environmental problem without the growers having to sacrifice crop efficiency. Our colleagues at Incotec are continuing to develop more microplastic-free seed coatings and their full portfolio will be microplastic-free well before the new European legislation comes into force, helping customers get ahead of a major regulatory impact, and meet their industry's proactive sustainability targets. Whilst Europe will be the first to have this new legislation, we anticipate similar restrictions will be adopted elsewhere.

The main contributors to microplastics in EU surface water are car tyres, which account for 50% of the pollution, followed by losses of plastic pellets, road markings and washing of clothes. Agricultural activity accounts for around 10% of the total microplastic release, and seed treatment for less than 1%*. Whilst we may not be the largest contributors to microplastics in the environment, we believe that we can, and should, play an active part in reducing this environmental impact.

* ECHA, Annex XV Restriction report of intentionally added microplastics, pages 74-75.



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Land Positive

Our products will enable more land to be saved than is used to grow our bio-based raw materials. Our innovation will help customers to mitigate the impact of climate change and land degradation, increasing the availability of land suitable for growing crops.

Highlights

Net zero

We are already 'land net zero' as our range of biostimulants, adjuvants and seed coatings save more land than is used to grow all of our bio-based raw materials

50%

of our land area saved is in Asia and Latin America, where there is greatest demand for food productivity and the highest threat of deforestation

Veritas™

technology breakthrough launched, a biostimulant that increases nutrient mobility in soybean plants leading to increased crop yields and resilience

Awarded

the Syngenta 2020 Supplier Partnership Award, recognising suppliers making the most significant contributions

Land Positive by 2030

Objectives

Land Use:

We will save more land than we use. We will increase agricultural land use efficiency, protect biodiversity and improve food security by sourcing sustainably and inspiring innovation in our agrochemical businesses.

Crop Science Innovation:

We will invest in innovation projects and partnerships to support crop and seed enhancement in mitigating the impact of a changing climate and land degradation.

Targets

- Throughout this decade, the land saved through the application of our crop protection and seed technologies will exceed any increase in land used to grow our raw materials by at least a factor of two, and by 2030 we will save 200,000 hectares per year more than in 2019

- Through to 2030 we will bring an average of two crop technological breakthroughs to market each year that are in alignment with our SBTs and which help our customers mitigate the impact of climate change and land degradation
- By 2030, we will have established three new partnerships to contribute to the recovery of compromised farmland and protect biodiversity. We will work with customers, universities and business councils to achieve this

Milestones

- By the end of 2024, the land area saved through use of our technologies will be at least 80,000 hectares per year more than in 2019

- By the end of 2024, we will have brought 10 qualifying technological breakthroughs to market

2020 progress

- We have calculated our land use footprint attached to the major crops we source. Working with key suppliers we are continuing to seek details of: yield improvements, protection of biodiversity, soil health, water consumption and GHG data supported by certification standards where possible
- We saved 16,455 hectares per year more than our 2019 baseline year
- We define a technological breakthrough as a new technology with a measurable significant effect and either a more sustainable route to an existing performance effect, or a new performance effect from an existing technology platform that is in line with our SDG goals
- We launched one technology, our microplastic-free seed coating, that was deemed to be a breakthrough innovation in crop science

SDGs



Land Use and Crop Science Innovation



SDG Targets:
2.3, 2.4, 12.2, 13.1, 15.2, 15.3 and 15.5

At Croda, our Commitment to be Land Positive by 2030 means that we will save more land than we use. We will do this by increasing agricultural land use efficiency, protecting biodiversity while ensuring food security through sustainable sourcing, and inspiring innovation through our crop businesses.

Land savings

We, like most businesses in the world, have a land footprint, with land required to grow our crop-based raw materials. As land on earth is a finite resource, we have a duty to use it efficiently and to source our raw materials as sustainably as possible. Accelerating our move away from fossil/ petrochemical feedstocks whilst also maximising the amount of land available for crops, means we must have a detailed understanding of not only our land footprint, but the way in which our activity may impact biodiversity, deforestation, food security, soil health and water consumption. We call this more holistic view of our land usage our 'land budget'.

To help ensure we can meet the challenging commitment we have set, we need to understand the land budget for our entire business, and how each of our major manufacturing sites and individual finished ingredients contribute. We believe this level of

scrutiny for our land use, covering land and biodiversity impact, will help continue to drive positive change in our raw material and supplier selection (p38). Importantly, it will shape our customers' ingredient and supplier selection and proactively contribute to their sustainability goals.

During 2020 we defined our protocol for measuring the land area we save. This calculation looks at the positive yield impact of our products and the use-rate of those products per hectare of land. In 2019, our baseline year, we estimate that our range of biostimulants, adjuvants and seed coatings save around 92,000 hectares of land each year.

As our business grows, and as we move towards more bio-based raw materials, we expect that the amount of land used to grow our raw materials will increase. We have therefore set a roadmap towards an absolute Land Positive target of 300,000 hectares of land saved per year by 2030, more than trebling our current land saved figure.

Higher yields

Around 50% of the world's vegetated land is already used for agriculture. Across the world there is uneven demand for agricultural land use, with developed countries seeing a

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Our crop technologies deliver land area savings equivalent to 110,000 football pitches each year.”

slowing or decrease in demand and developing countries seeing an increase. This demand profile means that growth in crop production needs to come from higher yields and increased cropping intensity, with very little coming from land expansion. Our agrochemical technologies, from biostimulants and adjuvants to seed coatings, designed to increase yields of grain and vegetable crops, are well-placed to support this increasing global demand for crop production. Over 50% of our land area saved is in Asia and Latin America where there is greatest demand for food productivity and the highest threat of deforestation.



Developed by our team at Plant Impact, Veritas improves nutrient mobility in soybean plants.

Improving yield, protecting biodiversity

Our commitment to saving more land than we use is accelerating our development of crop biostimulants. These increase crop yields as well as contributing to a range of other environmental benefits.

One example of these innovative biostimulants is Veritas™. Developed by our team at Plant Impact, Veritas improves nutrient mobility in soybean plants leading to increased crop resilience and more robust plant growth, with a greater number of soybean pods and grains per plant, which increase crop yield.

In Brazil, over 2,000 separate field trials of Veritas were carried out between 2012 and 2017. These showed an average yield increase of 190kg per hectare, representing a yield uplift of 5.2% over untreated controls; similar results were found in field trials in Paraguay and Bolivia. These impressive results represent a significant improvement in yield and land use over conventional techniques.

As a result of this yield improvement, a greater mass of crop can be produced per hectare of land. The land area required to grow one tonne of soybeans is therefore lower, resulting in lower energy and water inputs and lower carbon emissions.

In Brazil, by increasing the amount of crop that can be obtained from existing agricultural land, deforestation can be avoided and the rich biodiversity that exists in Brazil's forests and Cerrado savannah grasslands can be protected. As the global population grows and incomes rise, demand for meat, and the soy-based feed used to raise livestock, will increase. Brazil is one of the world's largest producers of soy, exporting all over the world. Veritas offers a way to increase crop yields, have more efficient land use and help protect our natural world.

The adoption of this technology across a modest 5% of the land used to grow soy in Brazil could avoid the destruction of around 90,000 hectares of this precious biodiversity which is equivalent to the world average agricultural land (crop and grazing land) needed to support 140,000 people. This is a fantastic example of how our smart science can improve lives through the protection of nature and preservation of essential ecosystems.



Targeted delivery, helping protect the environment

To enhance the performance of any spray pesticide formulation, it must be delivered efficiently and effectively to the right part of the crop. Controlling the droplet size of the agricultural spray improves delivery to the target site, reducing both drift and run-off, providing both environmental and economic benefits through less waste and potential impact on biodiversity. We have a range of drift reduction products that help to control the droplet size of agricultural spray, helping ensure that more of the spray is delivered to the intended target crop.

This technology has been developed thanks to the high-speed imaging capabilities in our bespoke wind tunnel. This specialist imaging equipment means we can assess how our products improve spray delivery as well as helping us develop new formulations that meet new customer, market, and environmental needs.



We will play a key role in projects and partnerships to mitigate land degradation, helping prevent deforestation.

“By 2030 our crop technologies will deliver land area savings equivalent to 1,000 football pitches each day.”

Helping to reduce deforestation

We will play a key role in innovation projects and partnerships to mitigate the impact of a changing climate on land degradation; this commitment aligns us further with a number of our major Crop Care customers. Identifying where our technologies and collaborative partnerships can make the most difference, we will continue to focus on crops where increasing demand may be contributing to deforestation, such as soybean. There are over 100 million hectares of soybean plantations in the world*, producing around 50 million tonnes a year*. This is five times greater than the land used for palm plantations, which produce around 80 million tonnes*. Production of soy is far less efficient than palm, requiring greater land use*, making it a significant contributor to deforestation. Delivering yield improvement and increased productivity for crops such as soybean, helps mitigate against potential deforestation, see case study on page 20.

* Estimations using USDA and Oil World data.

Helping seeds to germinate under various climate conditions, improving cultivation efficiency

Most agricultural production starts with seed; these need to germinate well to produce a crop. Germination can be impacted by a number of different conditions, resulting in slow, irregular, or very poor germination. With seed priming, we can speed up the germination process and also allow the seed to germinate at suboptimal conditions, for example, in warm temperatures.

One of the best examples of the benefits of seed priming is lettuce seed. Lettuce seed will hardly germinate at higher temperatures. However, after the seed is primed, the temperature range in which lettuce seeds germinate is increased by up to 10°C. This allows crops to be grown in regions of the world that otherwise would not be suitable, helping agriculture react to a changing climate. It also can increase the yield potential of land by increasing the flexibility and extending the planting season.

