

## Megatrends

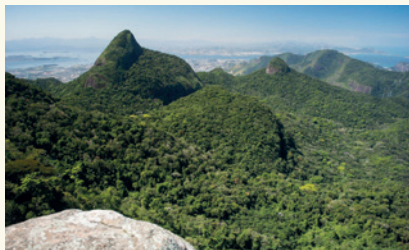
# Meeting global challenges

Of the trends affecting our markets and supply chains, we have identified three key global challenges that our strategy helps to address. Our Commitment to be Climate, Land and People Positive by 2030 is founded on the UN SDGs, ensuring Croda delivers a positive impact.

The following section details the global challenges we face, the technology trends affecting our markets and the opportunities for Croda



# The global challenges:



## Living sustainably within our planetary boundaries

Population growth and increasing consumption, fuelled by the expansion of the middle class with increased disposable income in the developing world, are putting pressure on planetary systems, such as water, climate, biodiversity, and scarce natural resources. Addressing this challenge requires transformational new approaches to consumption and circularity. For example, not only does society need to transition to carbon net zero, it needs to do so by embracing the role nature plays in mitigating and adapting to climate change, and by addressing social inequalities. Consumers in developed markets, and increasingly in China and around the world, are supporting businesses they believe act responsibly. This includes understanding societal challenges, protecting and restoring nature, and providing solutions to mitigate the causes and adapt to the impacts of a changing climate.

**World population of 10bn**

projected by 2050<sup>1</sup> (2022: 8bn)

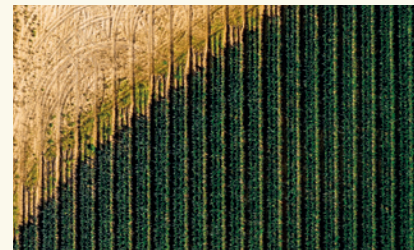


## Global demand for health and wellbeing

The pandemic has laid bare public health challenges around the world and accelerated the demand for health care, already growing due to higher global population, rising malnutrition and an ageing population in developed countries. Following two years of lockdowns, consumers are much more conscious of their own physical and mental wellbeing, and the importance of healthier communities more broadly. This has increased the focus on the efficacy of products, with increased demand for ingredients that are underpinned by science, and that support physical and mental health.

**Increase in food output of 70%**

required by 2050<sup>2</sup>



## Feeding a growing population and restoring nature

The world population passed eight billion in 2022 and is expected to reach nearly ten billion by 2050<sup>1</sup> with the majority of the increase coming in south and east Asia, and Africa. Feeding this growing population will require a 70% increase in agricultural output by 2050<sup>2</sup>, and the challenge is achieving this in a sustainable, regenerative way. Agriculture has undergone yield-enhancing shifts in the past but yields of important crops such as rice and wheat have now stopped rising in some intensively farmed parts of the world. Agricultural soils have been over-used and over-exposed to chemical fertilisers, destroying their vitality and threatening the food security of 3.2 billion people<sup>3</sup>, especially smallholder farmers and poor rural communities. Since most suitable land is already farmed, most of this growth will come from higher yields and more resilient crops in less suitable land, supported by restoring degraded ecosystems.



For more information on the trends in our markets as a result of these challenges

[See page 26](#)

# The enabler:

## Digitalisation facilitating faster, more connected supply chains

Digital is changing expectations about transparency, with consumers demanding businesses take responsibility for their own operations, their supply chains and their products at end of life.

Digital is also increasing the speed at which new trends are adopted, enabling businesses to deliver transformative solutions from wherever they are conceived. Successful products are those which are innovative, highly effective, low impact, sustainably sourced, and clearly labelled.



1. United Nations, World Population Prospects 2022  
 2. Food and Agriculture Organization of the United Nations, Global agriculture towards 2050  
 3. The Global Environment Facility, Land Degradation

# Megatrends continued

## The technology trends affecting our markets

### 1. Move to sustainable ingredients

Consumers want to live more sustainably and this is impacting their decisions when it comes to the products that they buy. Generational shifts are accelerating these trends with an increasing number of consumers willing to pay more for purpose-led brands that meet their specific values. Sustainability will be the biggest single driver of consumer markets over the next decade and beyond.

Consumer-facing companies need to enhance consumer trust in their brands, so are looking for ingredients that enable them to deliver products with proven, substantiated claims and transparent, assured information on their social and environmental footprints. Sustainable ingredients must have a low footprint in terms of the carbon, water and resources used in their manufacture, and should also contribute to enabling consumers to live more sustainably.

Growing consumer demand for sustainable ingredients is driving increased regulation by industry and national authorities. For example, there are now very few countries in the world without cosmetic legislation and an increasing number of countries also have chemical regulations in place, with many more set to adopt chemical legislation in the coming years. Increasingly widespread and thorough legislation is providing a higher threshold for approval for new ingredients while increasing consumer confidence about the footprint and sustainability benefits of the products they buy.

The move to sustainable ingredients is not confined to consumer markets. Not only do crop science companies want biodegradable ingredients with a low carbon footprint, they also need innovative ingredients that make a positive contribution to improving yields, soil health and biodiversity.

Alongside more sustainable chemistry, biotechnology can be a highly sustainable route for creating new and existing molecules that have applications in high growth markets of today and the future. Designed correctly, biotechnology will enable ongoing performance innovation, facilitate ingredient footprint reduction, and support the transformation to bio-based ingredients.

### 2. Move to biologics

In Life Sciences, the 20<sup>th</sup> century was the era of the small molecule, relatively simple compounds made by chemical synthesis. The 21<sup>st</sup> century is the era of biologics, much larger molecules manufactured inside animal cells or micro-organisms, that are already transforming medicine and will transform agriculture over the next decade.

Biologic drugs mimic closely our body's biology and are much better at treating disease in a targeted way with fewer side effects. But they are complex molecules that are hard to make, difficult to keep stable, and need sophisticated delivery systems. They are also difficult to administer and are normally injected because otherwise they would be destroyed by stomach acid when swallowed.

The nucleic acid revolution that we are now witnessing, best illustrated by the global roll out of mRNA vaccines for COVID-19, is the next phase in the move to biologics. It is creating an incredible number of opportunities because nucleic acids teach the body to create its own medicine. This is a fundamental shift in the complexity of new drugs and in their value – both in terms of patient outcomes and commercial opportunities for pharmaceutical companies.

Although crop science is some years behind, it is also experiencing a transformation to biologically active ingredients. For example, naturally occurring microbes act as fertilisers for plants but have yet to be exploited systematically to raise crop yields. The nucleic acid revolution is also making new approaches possible in agriculture. For example, RNA interference could be used as a precisely targeted, environmentally friendly pesticide, by preventing the production of a critical molecule in the body of a specific pest.

The ability for these biologics to target specific elements in the host offers a significant opportunity to reduce negative impacts on the planet and society. Increased targeting means reduced overall dosage, fewer unintended side effects and the need for fewer resources to produce the same benefits. Novel performance means new approaches such as improved vaccination to both prevent and cure diseases, and regenerative agriculture that leverages the power of nature.

# Capturing new opportunities

Through the divestment of most of our industrials business, and the acquisitions we have made in recent years, Croda has significantly repositioned to be more closely aligned with the powerful megatrends that are reshaping our markets. We are becoming a pure play company, focused on high value niches in consumer care and life science markets.

We are positively impacting everyday life in Consumer Care, developing ingredients which help promote consumers' wellbeing, confidence and self esteem.

Having refocused our Pharma portfolio, we are pioneering the future of health care by focusing on segments with the highest development needs.

With the crop care market at a pivotal point in its development, we are innovating for sustainable agriculture, helping to address the sustainability challenges of today, and developing new systems for the delivery of the biopesticides of tomorrow.



For more information on our businesses  
**See pages 34-42**

## Our new business structure

### Consumer Care

#### Beauty Actives

- 16,300 combinations<sup>1</sup>
- 100 countries; >40% EM<sup>2</sup>

#### Fragrances and Flavours (F&F)

- 73,000 combinations
- 124 countries; >80% EM

#### Beauty Care

- 23,250 combinations
- 100 countries; >40% EM

#### Home Care

- 2,500 combinations
- >70 countries; >40% EM

### Life Sciences

#### Pharma

- Drug delivery systems
- Empowering biologics delivery
- >5,000 customers across multiple applications

#### Crop Care

##### Crop Protection

- Leader in sustainable delivery

##### Seed Enhancement

- Improving seed germination and growth

#### Supported by

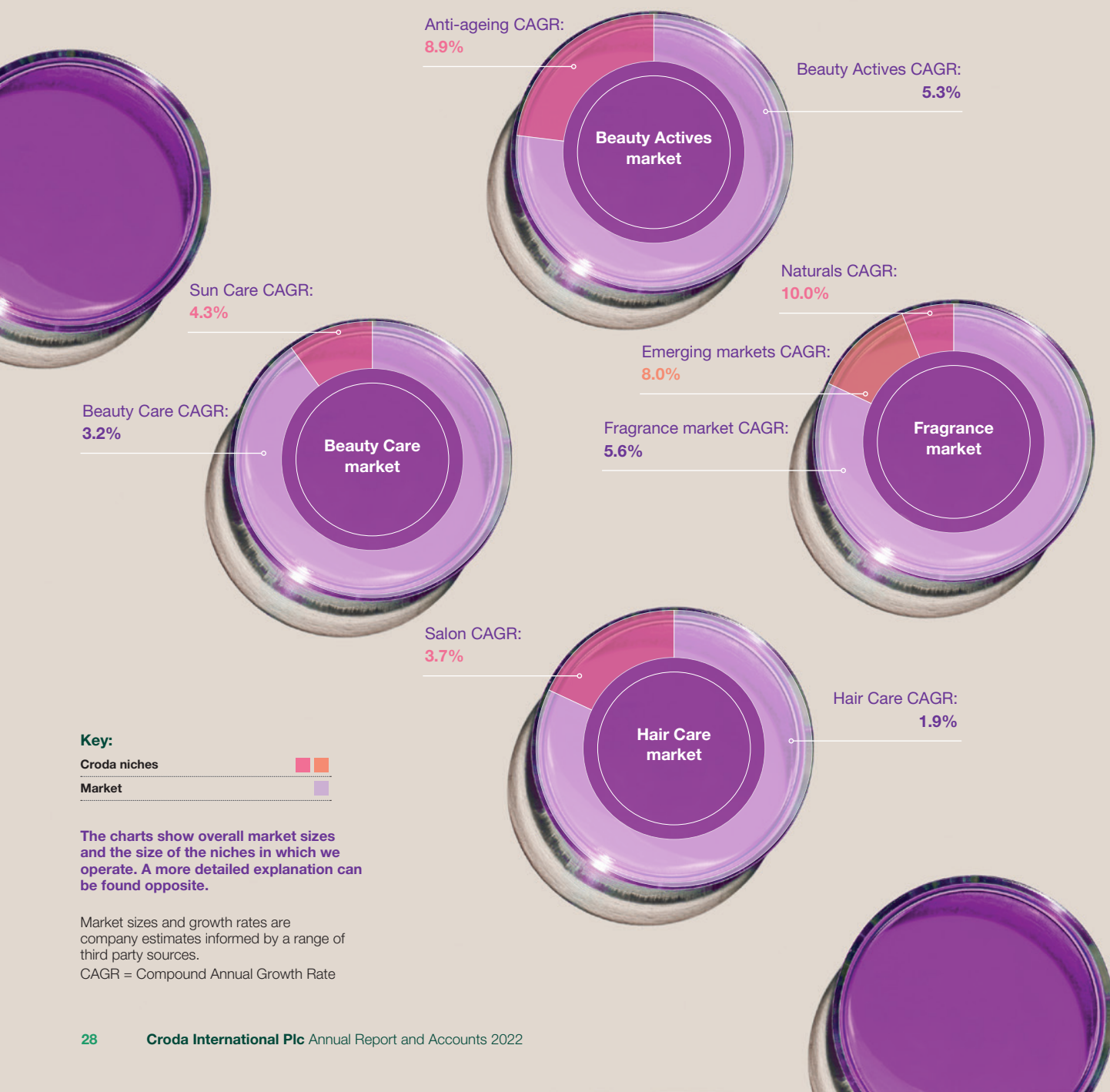
### Industrial Specialties

- Key role in our integrated manufacturing model
- Supports our sectors on shared sites
- Operates supply contract to Cargill

1. Customer and product combinations  
 2. Emerging Markets

# Consumer Care Capturing new opportunities

# Positively impacting everyday life



**Key:**  
Croda niches (Red square)  
Market (Purple square)

The charts show overall market sizes and the size of the niches in which we operate. A more detailed explanation can be found opposite.

Market sizes and growth rates are company estimates informed by a range of third party sources.  
CAGR = Compound Annual Growth Rate

Croda is the name behind the high-performance technologies in some of the world's biggest brands, creating, making and selling speciality ingredients that are relied on by consumers everywhere. Long-term trends such as an ageing population and an expanding middle class are driving consumption, with increased penetration of consumer care products across all cultures of the world. Beauty, in particular, is becoming synonymous with wellbeing, confidence and self-esteem at every stage in life.

Economic growth in the developing world is outstripping established markets with Asia, the Middle East, and Africa representing particularly significant sources of growth over the next decade. With current economic headwinds, consumer demand is likely to vary by region, and Croda's global footprint should help underpin a resilient performance. We are implementing a strategic objective to achieve fast growth in Asia and are already well established there. We are also positioned to serve the growing indie market in Asia by adopting the successful model we have in North America.

Across consumer markets, we are focused on high growth niches which value our innovation through higher margins. Whilst skin care is already a fast-growth segment, the anti-ageing niche that we target is growing faster still. In Beauty Care, we have created new franchises focused on mineral sunscreens and professional hair care which are growing twice as fast as the broader categories. Our Home Care business is focused on two sustainability-driven niches, and our heritage in Fragrances and Flavours is in serving smaller customers in emerging markets, the segment that is widely seen as higher growth.

Consumers are always on the look-out for improved performance and will pay a premium for higher quality products and new trends. We are positioned as the leading innovator in consumer care markets, delivering cutting-edge technology and new ideas with proven substantiated claims. Consumers are also thinking more carefully about the products they buy and prefer those that are good for them and the planet, as well as highly effective. We are complementing our sector-leading range of sustainable ingredients with assured information about their impacts and an R&D programme focused on improving the sustainability of our ingredients and delivering sustainability benefits in use to our customers.

Buying products online has never been simpler and digital is increasing the speed at which new trends are adopted, leading to continued fragmentation of consumer markets. Proximity to our customers is now more important than ever and our ability to facilitate fast innovation and minimise customer time-to-market is creating significant opportunities.

We supply key ingredients, with on trend formulations, as well as broader support in areas like regulatory expertise helping to ensure that all-important element – speed. For our customers speed is the new IP.

Science and sustainability are driving consumers and our customers, with customers also wanting more intimate relationships with key suppliers to reduce time to market. Our portfolio remains the foundation of our success and is constantly evolving. The breadth of our portfolio of speciality and active ingredients is unrivalled in consumer care markets. In all we have more than 40,000 different product/customer combinations across Beauty Actives, Beauty Care and Home Care, augmented by over 70,000 combinations in F&F. In future, our broad portfolio, customer insights, and formulation expertise will enable us to become the complete provider of sustainable solutions to the premium end of consumer care markets.



For more information on our Consumer Care businesses [See pages 34-37](#)



### Sustainability without compromise – ChromaPur

Small, manufactured plastic particles, known as microbeads, are used in a wide range of cosmetic and personal care products, with research suggesting that 87% of products from the ten best-selling cosmetics brands contain these microplastics<sup>1</sup>. Often not visible to the eye, plastic microbeads provide functionality such as exfoliation, sensory enhancement or adding texture to cosmetic formulations. However, they often end up in oceans, with a potentially negative impact on marine life.

Using patented technology Croda has developed ChromaPur as an alternative. These cellulose powders provide exceptional sensory and optical benefits, including optically blurring the skin surface, reducing the appearance of pores and fine lines, and providing enhanced coverage and colour intensity in colour cosmetics. These alternatives to plastic microbeads are 100% natural, fully biodegradable, utilise a sustainable manufacturing process, and deliver equivalent performance to existing solutions.

1. [www.plasticsoupfoundation.com](http://www.plasticsoupfoundation.com)

# Pharma

## Capturing new opportunities

# Pioneering the future of Pharma

Nucleic acids market CAGR:

>20%

Market size: \$30bn

Proteins market CAGR:

10%

Market size: \$300bn

Small molecules market CAGR:

5%

Market size: \$920bn

Increasing development need

This graphic shows the correlation between growth potential and development need of the segmented pharma market. The drug delivery niche where we operate typically represents 1-3% of the total market sizes shown. A more detailed explanation can be found opposite.

Market sizes and growth rates are company estimates informed by a range of third party sources.  
CAGR = Compound Annual Growth Rate

The pharmaceutical market is large, valued at over \$1.2 trillion a year and growing at over 6% CAGR. It is also a resilient market, largely independent of the macro-economic environment.

The chart opposite shows the pharma market segmented by growth potential and development need. At the bottom is the mature small molecules segment, very big and still growing middle single digit, but without the need for significant development. Above it is the protein segment, including monoclonal antibodies. Protein drugs have been developed over the last few decades and represented the first phase of the move to biologics. They account for the majority of the top ten selling drugs today and can cost thousands of dollars per treatment. Although this segment is relatively large already, it is still growing double digit. At the top is the nucleic acid segment which is the next phase of the move to biologics. Whilst it is currently a small segment, it is growing extremely fast and is widely regarded as the next blockbuster drug class. This is because nucleic acids can address the root cause of a disease. They have the potential to change the way that patients with cancer or genetic diseases are treated, and in some cases even provide a cure.

Very few drug formulations comprise the Active Pharmaceutical Ingredient (API) alone. Croda focuses on providing the components and systems for delivering the API. We are empowering biologics delivery by developing systems that deliver the API to the target site in the body, maintain its stability and improve its efficacy. For protein delivery we provide a range of speciality excipients for challenging formulations including injectables. By focusing on high value niches, we are the largest excipient supplier by value. In adjuvant systems, we are the only independent supplier with a full component portfolio and the ability to put those vaccine adjuvants together to power the therapeutic vaccines of the future. We are the leading innovator of components for nucleic acid delivery, capable of both developing new systems and scaling them up to support commercial roll out. We leverage more than 50 years' experience acquired with Avanti and the co-investments we are making with governments in the US and UK.

In total we have over 5,000 customers across the whole lifecycle of a drug, from research to commercial manufacturing. Our approach is to develop delivery systems for candidate drugs in early-stage research, generating revenue during clinical development and then as the principal supplier of the delivery system if the drug is commercialised. Our broad base means that we are not dependent on a single customer, and instead are exposed to a wide range of customers, drugs and applications.

### Supplying delivery systems to help prevent cardiovascular disease

Nucleic acid-based therapies are the next big blockbuster drug class opening up exciting applications such as gene editing, where a patient's genetic material can be modified to correct a disorder. Nucleic acid-based therapeutics require sophisticated technologies to deliver the active and overcome challenges such as instability.

Croda is the leader in non-viral delivery systems for nucleic acid. We are working on many gene therapy applications including a phase III trial with Verve Therapeutics to cure genetically induced high cholesterol, a condition affecting 31 million people worldwide that can lead to accelerated heart disease and early death. Verve Therapeutics recently dosed the world's first patient with a gene editing medicine to correct the disorder, using lipids supplied by Croda as the delivery system. In preclinical studies, a single dose of the drug to silence the problematic gene resulted in a 60% reduction in LDL-cholesterol, persisting for 20 months.



Scan this QR code to read more



We are pioneering the future of health care by focusing on segments with a high development need. Our key differentiator is innovation, creating new ingredients from sustainable sources that have a unique quality. By combining these ingredients into systems tailored for specific applications we can price our products based on the value of the outcome, thereby creating value for shareholders as well as contributing to new treatments for patients.



For more information on our Pharma businesses [See pages 38-41](#)



## Crop Care Capturing new opportunities

# Innovating for sustainable agriculture

Conventional crop care CAGR:

3%

A more detailed explanation  
can be found opposite.

Market sizes and growth rates are  
company estimates informed by a  
range of third party sources.  
CAGR = Compound Annual  
Growth Rate

Biopesticides CAGR:

8%

Biopesticides market size:  
\$5bn

Conventional crop care market size:  
\$60bn

We are at a pivotal moment for the agriculture industry which is facing the dual imperatives of delivering higher yields to feed a growing population and reducing chemical use to support sustainable food production<sup>1</sup>. Through our deep understanding of plant science, we can contribute to increasing food production without the need to use more land, thereby helping to improve global food security. We are also innovating to accelerate sustainable and regenerative agriculture in line with our aspiration to become Net Nature Positive by 2030.

The conventional crop care market is large, valued at \$60bn, and growing at 3% a year. The market for biopesticides is much smaller at \$5bn but is growing at 8% CAGR. While agriculture has traditionally relied on chemical fertilisers and pesticides, the industry is moving to biologics which are more specific and have a lower impact on biodiversity.

Through our expertise in delivery systems, we are enabling our customers to make the move to biologic actives. Today, predators are used to control insects in greenhouses. Next, micro-organisms will be used more widely as pesticides, stimulants or fertilisers, and we are developing next generation delivery systems for these new microbial actives. In the future, nucleic acid will be used to target a specific pest, avoiding unintended impacts on pollinators, or to teach a plant to make its own medicine to inactivate a disease, and we are innovating to enable this approach. The move to biologics is a significant opportunity for Croda as biopesticides, biostimulants and biofertilisers all need new systems to ensure their effective delivery.

Our expertise in seed enhancement supports this move to biologics as microbes can be applied via treated seeds to stimulate growth thereby delivering higher yields and reducing the need for the crop to be sprayed. We are also helping solve the problems the industry is facing, for example being first to market with a microplastic-free seed coating many years before new regulation, and by ensuring seeds germinate in the more challenging conditions created by climate change.

With the agriculture sector a major contributor to global GHG emissions, we recognise we must both create solutions for the future and help address the challenges of today. We create biostimulants to enable farming of less suitable land and mitigations for abiotic stress that promote plant growth in the increasingly harsh weather conditions. We offer drift reduction technologies to target spraying of crops, a key enabler to new farming practices such as drone application, and to reduce pesticide use and run-off. Our low carbon and bio-based delivery systems are enabling the move to sustainable ingredients, and our expertise in biodegradability is promoting soil health.

### Microplastic-free seed coatings

Seed coatings and treatments provide vital protection against pests and diseases, reducing the need to spray chemical plant protection products and fertilisers. Many seed coating products contain polymer-based binders which have poor biodegradability profiles and leave small plastic particles in the soil.

Agricultural activity accounts for about 10% of the total microplastic release and while seed treatment accounts for a small proportion of this, we can still play a critical role in reducing the environmental impact of microplastics. Our range of microplastic-free seed coatings launched in 2021 have been applied to crop and vegetable seeds covering over 100,000 hectares of land. We expect this to grow as European customers adopt our microplastic-free alternatives ahead of legislation banning microplastics in seed coatings from 2028, and other regions also adopt similar legislation.



Scan this QR code to read more



With our focus on delivery systems, Croda is positioned as innovation partner to the major crop science companies. Innovation is becoming more collaborative as delivery systems become more specific to the active. Our relationships with smaller companies are also growing as we expand in Asia and the industry is disrupted by the move to biologics, allowing us to make a bigger contribution to global food security.



For more information on our Crop Care businesses [See pages 38-41](#)

1. The European Union's Farm to Fork strategy, announced in 2020