



SUSTAINABLE PESTICIDE MANAGEMENT AT BAYER

How we live the FAO-WHO International Code of Conduct on Pesticide Management



About this report

At Bayer, we are committed to the pesticide industry related principles laid out in the International Code of Conduct on Pesticide Management issued by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO). With this report, we follow the FAO's and WHO's invitation to the industry to report back on product stewardship activities related to observance of the FAO-WHO Code¹.

On the following pages, we provide an overview on our product stewardship activities along the product life cycle including concrete examples of what we do, along the nine key articles of the FAO-WHO Code (articles 3-11)². Please regard this report complementary to other publications like our [Sustainability Report](#) and [Crop Science Sustainability Progress Report](#) and our Group Regulation on [Product Stewardship Commitment, Principles and Key Requirements](#).

With this report, we intend to spark the dialogue about the responsible and sustainable management of crop protection with policy makers, regulators and other stakeholders in these times where we see high scrutiny towards pesticides. However, by no means, this document is supposed to be exhaustive³. Neither does it claim perfection on our end. We keep striving for further advancements within our own operations and systemic changes in line with the FAO-WHO Code together with partners from the industry and beyond.



¹ Article 12.8. of the Code

² In this report, only articles 3-11 are taken into closer consideration. Article 1 describes the objectives of the FAO-WHO Code and article 2 lists relevant terms and definitions. Article 12 on observance of the FAO-WHO Code is covered through the general concept of this report.

³ No claim of completeness:

This report represents an extract of Bayer activities, projects, tools and initiatives. It does not intend to cover all Bayer activities related to the FAO-WHO International Code of Conduct or otherwise. Conversely, topics covered by the FAO-WHO International Code of Conduct may recur in several articles. This report tries to assign the topics to their main article to avoid repetition. Therefore, not every sub-chapter of the FAO-WHO International Code of Conduct is reflected in full.

Farming is one of the most important jobs in the world – though it's not an easy one. On the one hand, technological progress throughout the past decades has been stunning: Today, growers require less than one third of the land they would have needed 70 years ago to produce the same amount of food. On the other hand, growers face high regulatory requirements in many markets, and need to achieve consistent yields and high-quality produce to compete in today's food market. Furthermore, they need to meet the high expectations of food supply chain and consumers.

Crop protection plays an important role in securing global food supply facing the needs of a growing world population, limited – sometimes even diminishing – natural resources and major cropping challenges due to climate change. At the same time, chemicals may negatively impact the environment and human health if they aren't used according to label instructions. Hence, chemical crop protection products and their use face high regulatory and public scrutiny. Diligent product stewardship along the full product life cycle is therefore an imperative, as outlined by the International Code of Conduct on Pesticide Management issued by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) which we at Bayer have committed to.

At Bayer, sustainability is an essential component of our strategy, our business activities, our values and the way in which we conduct our business. We work toward achieving sustainable agriculture that addresses the biggest challenges with innovation: Agriculture that is capable of feeding a growing world population while conserving natural resources; agriculture that emits fewer greenhouse gases and instead contributes to capturing CO₂; and agriculture that protects biodiversity and helps farmers worldwide to deal with the effects of climate change and become more resilient. The focus here is on increasing yields through innovative seeds, products and services, as well as on disseminating agricultural practices and forms of cultivation with ever-reduced environmental impact.



Need more info?

Please visit: [Sustainability Progress Report](#)

Stewardship is a key enabler of sustainable agriculture: Product Stewardship practices help support the availability of high-quality products, services and best practices by promoting compliance with statutory and regulatory requirements as well as good agricultural practices. They can also help maximize product potential and sustainability and minimize risk. As you'll see in this report, we often go beyond national regulatory requirements when assessing product safety and promoting safe and sustainable product use.

As outlined in the FAO-WHO Code, effective stewardship requires a multi-stakeholder approach. The pesticides industry has their role to play, but also other stakeholders including national governments – e.g., in providing effective national legislation, regulatory systems, and training and certification schemes that support the professionalization of agriculture. Likewise, international institutions like the FAO and WHO have their role to play in capacity building. Hence, collaborations and partnerships with the various actors in the agricultural value chain are essential for progress. Together, we can drive sustainable pesticide management at scale.



Jessica Christiansen
Head of Sustainability
at Crop Science, a Division of Bayer AG



Kyra Constanze Pauly
Head of Crop Protection Stewardship
at Crop Science, a Division of Bayer AG



What is the FAO-WHO Code?

The International Code of Conduct on Pesticide Management, the most recent version was issued by the FAO and WHO in 2014, is a voluntary framework that guides the private sector, governments, civil society, and other stakeholders on best practices in managing crop protection products throughout their life cycle, from invention to ultimate use and finally discontinuation. Its main objective is to maximize product potential and sustainability and minimize risks to human and animal health and the environment. The FAO-WHO Code is our overarching guidance for managing pesticides throughout the product life cycle.



Need more info?

Read more on our sustainability targets in our [Sustainability Report](#).

Relevant Articles of the FAO-WHO Code:



03

PESTICIDE
MANAGEMENT

[Page: 6](#)



04

TESTING OF
PESTICIDES

[Page: 11](#)



05

REDUCING HEALTH
AND ENVIRONMENTAL
RISKS

[Page: 17](#)



06

REGULATORY AND
TECHNICAL
REQUIREMENTS

[Page: 33](#)



07

AVAILABILITY AND
USE

[Page: 38](#)



08

DISTRIBUTION
AND TRADE

[Page: 47](#)



09

INFORMATION
EXCHANGE

[Page: 50](#)



10

LABELLING, PACKAGING,
STORAGE AND DISPOSAL

[Page: 53](#)



11

ADVERTISING

[Page: 60](#)

Spotlight projects:



BAYER SAFE USE
AMBASSADOR
PROGRAM

[Page: 27](#)



BAYG.A.P.
SERVICE
PROGRAM

[Page: 30](#)



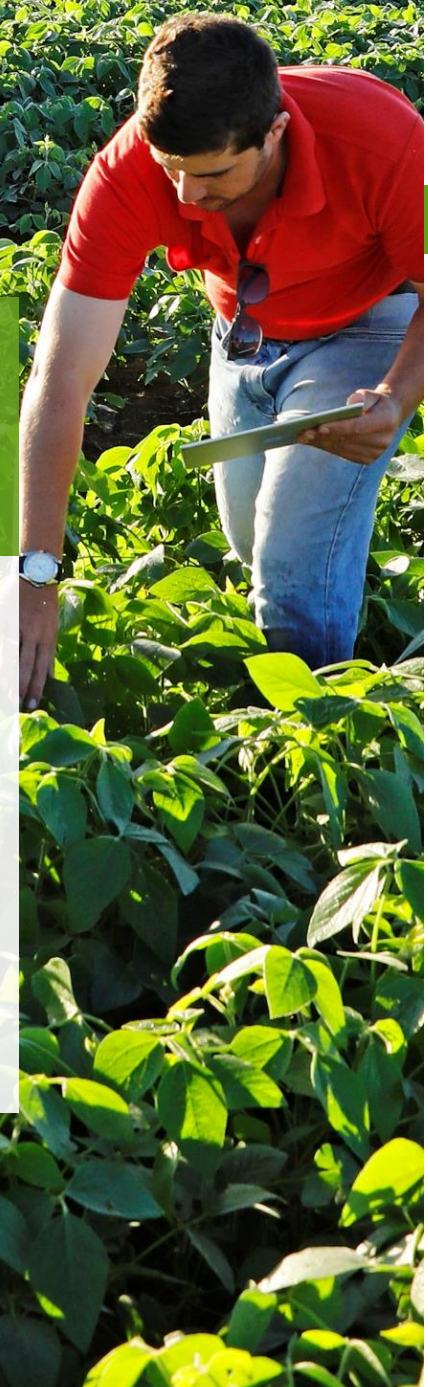
APPLICATION
TECHNOLOGIES
& DIGITALIZATION

[Page: 44](#)



WASTE
MANAGEMENT

[Page: 56](#)



ARTICLE 3: *Pesticide Management*



Key points of the International Code of Conduct on Pesticide Management:

Governments have the overall responsibility for regulating the availability, distribution and use of pesticides in their countries

The pesticide industry should

- // Adhere to the provisions of this Code as a standard for the manufacturing, distribution, sale and advertising of pesticides
- // Derive improvements throughout the product life cycle

Governments, industry and organizations should collaborate in resistance management

Stewardship of our crop protection products focuses on the entire life cycle, from invention to discontinuation.

At Bayer, we commit to the pesticide industry principles laid out in the FAO-WHO Code. We have adopted the FAO-WHO Code's life cycle approach to product stewardship, which addresses all aspects of responsible product management.



Source: Bayer Product Stewardship: Commitment, Principles and Key Requirements

We have specified our principles of responsible product management along the full product life cycle in our Group Regulation on [Product Stewardship Commitment, Principles and Key Requirements](#) which is available on our website. This regulation takes a perspective on both crop protection products and seeds and traits, and is based on the International Code of Conduct on Pesticide Management issued by FAO and the WHO, the voluntary guidelines of the crop protection association CropLife International, and the guidelines of the industry initiative Excellence Through Stewardship (ETS) for seeds and plant traits.

Fulfilling the FAO-WHO Code, we collaborate with many different stakeholders including e.g., governments, regulators, farmers' associations, and industry, to create impact in line with the FAO-WHO Code. Across our [Bayer ForwardFarming](#) network, we partner with independent farmers to show how tailored solutions, modern tools and practices, proactive stewardship measures and partnerships are enabling farmers to run successful businesses, while providing enough food for a growing world, and in a way that preserves the environment.



What is Product Stewardship?

Product Stewardship is the responsible and ethical management of a product, throughout its life cycle, from invention through ultimate use and finally discontinuation. Product Stewardship supports the availability of well-tested, high-quality products and services and best practices to foster compliance with statutory and regulatory requirements, facilitate trade, increase product potential and sustainability, and further minimize potential risks to human and animal health and the environment.

Our Stewardship Commitment

- // Utilizing a life cycle approach to manage products and services.
- // Implementing training activities around the whole life cycle for our staff, customers and other stakeholders.
- // Developing and selling only safe products and services, which used according to the label are safe for users and consumers and poses no unacceptable risk to the environment.
- // Developing quality products and services that deliver solutions to help farmers protect and/or enhance crop sustainability.
- // Evaluating key markets and import activities prior to commercial sale of a product in a country.
- // Manufacturing products using efficient, safe and environmentally sound production processes.
- // Maintaining product quality and genetic integrity.
- // Ensuring products and services are packaged appropriately for the market and with clear guidance on proper use.
- // Making detection methods for our products available to stakeholders when and where appropriate.
- // Complying with all relevant legislation and regulations where a product is developed and commercialized/ marketed by or on behalf of Bayer.
- // Having open dialogue with key stakeholders prior to, during and after sale or use of the product.
- // Using ethical sales and marketing practices.
- // Supporting and promoting the implementation of safe and sustainable practices (e.g., training, educational materials).
- // Requiring the adoption of equivalent product stewardship by those working on behalf of Bayer or distributing or licensing Bayer products and services.
- // Assessing and recording incidents and complaints related to Bayer products and services to limit reoccurrence.
- // Combating the trade and use of counterfeit and illegal crop products and services.
- // Working in partnership with various stakeholders to promote the responsible use of Bayer products and services




Rodrigo Santos

Member of the Board of Bayer AG and President of the Crop Science Division

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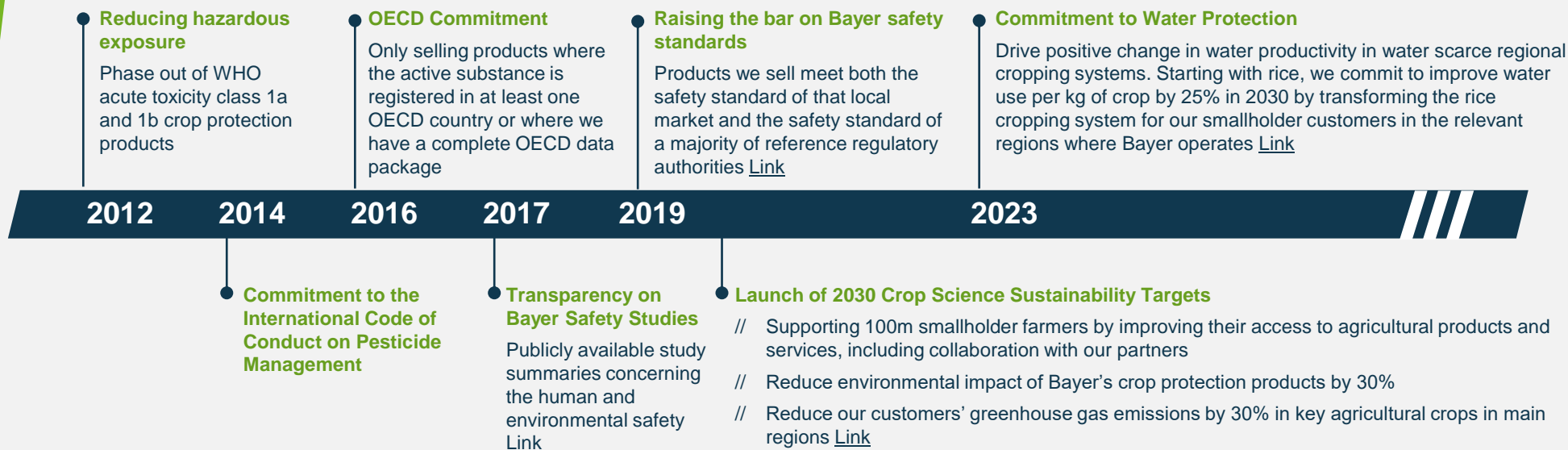
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Timeline of our voluntary commitments and activities



Continued effort: Innovation and portfolio rejuvenation for improved safety and efficacy, incl. targeted phase-outs of active ingredients or entire substance classes. Comprehensive stewardship during the entire commercial phase until discontinuation. For more information: see the Bayer [Sustainability Report](#).



Stronger together: Collaborations help us amplify positive impact for sustainability in line with the FAO-WHO code

Effective stewardship requires a multi-stakeholder approach. Through multi-stakeholder collaborations under the umbrella of CropLife International, for example, we help build capacity, especially in countries that do not yet have efficient local structures in line with the FAO-WHO Code. Capacity building includes effective structures for risk-based regulatory assessments of existing and innovative technologies, incident reporting and management, farmer / operator safe use trainings and certifications, professional applications (e.g., via drones), the availability and use of personal protective equipment (PPE), empty container management, and anti-counterfeit and best practice exchange between authorities – to name only a few.

Another good example are our [Food Chain Partnerships](#): In collaboration with stakeholders along the food value chain, we support farmers in meeting value chain requirements. The concept was launched more than 17 years ago and over 400 initiatives have been implemented worldwide since then. Each initiative is set up according to the varying needs of the collaborating stakeholders.

Example: How it works in practice

A sustainable ecosystem for grape production in India

Our long-term table grape project started in 2011 with three exporters on board. Designed by Greenyard Fresh and the Food Chain Partnership Team at Bayer, the goal was to **make grape production more efficient, increase return on investment for smallholder farmers and develop a sustainable, resilient ecosystem for grape production.**

The program includes grower trainings, the design of new residue-compliant spraying programs, and implementation of digital passports for traceability of products. Other sustainability initiatives, like trainings on the safe handling of crop protection products, and a farm plastic waste management campaign including the establishment of local collection hubs, are also part of the program.

A decade later, the initiative has grown massively, now including 24 partnering exporters. Today, the project supports approximately 1,500 smallholders, accounting for nearly 10 % of India's total grape exports to the EU.

“With a partnership approach, small-plot farmers can play an important role in the international market. They are now on a level playing field with big farmers from South Africa or any other part of the world. That is the biggest success – as Indian farmers, despite our challenges, we can still become professional farmers, enter the global market, and participate in an efficient ecosystem that benefits us and our land.”

Vilas Shinde, MD, Sahyadri Farms
India's largest fruit and vegetable farmer collective



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9

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11

Need more
info?



Learn more about our efforts to adhere to the requirements of Article 3

- // [Group Regulation on Product Stewardship Commitment, Principles and Key Requirements](#)
- // [Crop Science Product Stewardship section of 2022 Annual Bayer AG Sustainability Report](#)
- // [Our position on Product Stewardship in the Agricultural Business](#)
- // [Learn more about our efforts to reduce the areas of concern with regard to our products based on the example of neonicotinoid insecticides](#)

ARTICLE 4:

Testing of Pesticides



Key points of the International Code of Conduct on Pesticide Management:

Pesticide industry should

- // Ensure that each pesticide / product is adequately tested to fully evaluate its properties, efficacy, behaviour, fate, hazard and risk with regard to the various anticipated uses and conditions
- // Make available copies or summaries for assessment by responsible government authorities
- // Ensure that the proposed use, label claims and directions, packages, safety data sheets, technical literature and advertising reflect the outcome of scientific tests and assessments
- // Conduct residue trials in order to provide a basis for establishing appropriate maximum residue limits

Industry and governments should

- // Collaborate in post-registration surveillance and monitoring studies to determine the fate of pesticide and their health and environmental effects under operational conditions

Our active ingredients and products undergo extensive assessment and testing. We apply advanced risk-based approaches to product safety.

On top of the regulatory requirements in countries where we register our products, we apply additional internal safety standards aligned with FAO, WHO, and OECD standards. Our standards continuously evolve based on the latest scientific knowledge and reflect the standards of reference authorities.

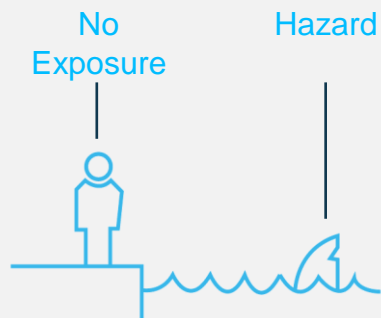
Every year, we invest about 2 billion Euros to drive innovation in agriculture. In doing so, Bayer is combining world-class chemistry, biology, biotechnology & data science platforms into smart, digitally enabled solutions. All our products and solutions undergo extensive testing. As part of the testing process, our chemical and biological crop protection products are examined early in the development phase, to ensure that only those products with state-of-the-art safety profiles are developed. Usually, more than 150 different studies are required to evaluate and demonstrate the safety of a crop protection product. Irrespective of potentially lower local requirements, we ensure a globally consistent risk-based approach to product safety by using complementary aspects from different regulatory systems.

- // We refer to **scientific approaches and risk evaluation models from advanced regulatory systems around the world**, incl. the US, Canada, Brazil, EU, Australia, New Zealand, Japan, and China
- // We will continue to **enhance this approach, while constantly reviewing our current product and service portfolio** and making timely decisions wherever needed
- // In 2019, we announced that the crop protection products we sell meet both **the safety standard of that local market and the safety standard of a majority of reference regulatory authorities** to facilitate raising the bar in crop protection safety also in less regulated markets
- // We share our assessments with authorities, also as part of the (re-)registration data package

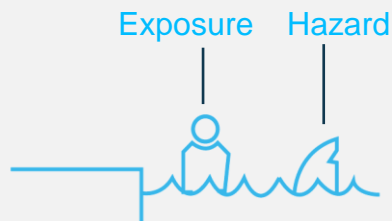
Comprehensive test and assessment journey for crop protection products to minimize negative effects on human and animal health and the environment



What is the difference between risk and hazard?



A shark in the water is a potential hazard. But if you are standing safely ashore, there is no exposure to the hazard – as a result, there is no risk.



If you are in the water, you're directly exposed to the hazard – accordingly, there is a risk.

Raising the bar for operator safety

What does Bayer do to ensure operator safety beyond country regulations?

“We look at specific use and application scenarios that are mostly relevant in low- or middle-income countries or in dense crop scenarios. We found that they may not be adequately addressed by local guidelines and risk assessment approaches. To bridge this gap, new exposure models were developed. Those particularly consider hand-held application or the use of makeshift tools, like the use of a concrete mixer to mix seed treatment.

We share our knowledge with regulators to support the evolution of effective and predictive science- and risk-based regulatory systems. This even has value in advanced regulatory settings. One example is our study to determine exposure of workers who remove bolting sugar beet after field treatment. We published the findings in a peer-reviewed journal (Baumann et al, 2019)⁴ and submitted the raw data to local and regional regulators for evaluation. As a result, the exposure scenario was taken up by binding European regulations (EFSA draft guidance, 2022)⁵ and it will be mandatory to take into consideration for the entire agricultural industry for future evaluations of plant protection products.”

Frank Scherr

Head of Product Safety Commitments at Crop Science,
a Division of Bayer AG

Need more info?



[Find out more about the type of tests and assessments we perform in our Operator Safety Standard.](#)

⁴ Baumann, Anft, Doughty, Kuster (2019), Exposure to pesticide residues during manual removal of bolting sugar beets: determination of transfer coefficients for worker risk assessment, Journal of Consumer Protection and Food Safety (2019) 14:283–286 <https://doi.org/10.1007/s00003-019-01221-9>

⁵ EFSA (European Food Safety Authority), Charistou A, Coja T, Craig P, Hamey P, Martin S, Sanvido O, Chiusolo A, Colas M and Istace F, 2022. Guidance on the assessment of exposure of operators, workers, residents and bystanders in risk assessment of plant protection products. EFSA Journal 2022;20(1):7032, 134 pp, <https://doi.org/10.2903/j.efsa.2022.7032>

- 3
- 4
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- 7
- 8
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- 10
- 11

Bayer pioneered making safety-relevant data on crop protection products and genetically modified crops publicly accessible

Transparency is very important to us, especially with respect to the safety of our products.

- // We adhere to the **Industry Data Transparency Commitment** made by the global crop protection industry to enable more public access to safety data related to pesticides and were the first company and industry forerunner to do so.
- // Our scientific communication, including scientific publications, is in accordance with current internal and relevant external legal and ethical standards. We properly reflect and disclose our participation in scientific work and publications of others.
- // You can request access for non-commercial use to safety-relevant studies of active ingredients that regulatory authorities use to approve crop protection product registrations on our [transparency](#) website.
- // Through our **OpenLabs 360° platform**, viewers have the opportunity to see our team of scientists at work as they carry out a safety study for our crop protection products in Bayer's Monheim laboratories and field-testing facilities. We connect you directly with our scientists and experts in real time through the OpenLabs 360° Webinar and dedicated on-site events.

Need more info?



[Learn more about our transparency initiative on our website](#)



- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11

Example: Taking action

Safe application of neonicotinoid products

In the 1990s, neonicotinoid insecticides were a clear innovation for optimizing operator safety along with certain environmental properties (e.g., a more favorable toxicity profile in wild mammals, fish, birds, etc.). Nonetheless, a few years later, there were some reports about negative effects of certain product uses on bees. After internal review and research into suitable risk mitigation measures, use adaptations or product replacements in the market, we also improved our internal safety targets and profiling of new compounds and products in our R&D pipeline. Bayer now includes various tests in Research and Development to characterize the toxicity of novel development compounds to bees at a much earlier stage of the screening process in order to further optimize the establishment of pollinator-safe use patterns as an integral part of product development. Balancing the need for crop protection with the need to protect pollinators is a key criterion of Bayer's research pipeline and product life cycle development.

Moreover, we actively contribute to the development of new and optimized safety testing methods for honeybees and other pollinator species.



[Learn more about our research and innovation on neonicotinoid insecticides](#)

Tests in R&D



We identify and remove unfavorable chemistry from the development in our tests by characterizing the toxicity of novel development compounds to bees.

Ongoing label revisions and use reductions



The systematic and explicit exclusion of flowering application of imidacloprid products onto bee attractive crops or close to beehives protects beneficial insects.

Innovation in seed coating adhesion



Innovations in film coating allow safe seed treatment application and minimize abrasion. Deflectors when attached to sowing equipment ensure that at least 90% of dust particles are directed onto the soil, not the air.

Need more info?



Learn more about our efforts to adhere to the requirements of Article 4:

- // [Assessment and testing section of 2022 Bayer Sustainability Report](#)
- // [Product Stewardship Principle 1: Research & Development](#)
- // [Ethical requirements for performing animal studies and clinical trials for Bayer suppliers](#)

- // [Our commitment to transparency](#)
- // [Learn more about our efforts to ensure human safety](#)
- // [OpenLabs Platform](#)
- // [CropLife International – how to ensure trust in pesticide safety data](#)

ARTICLE 5: *Reducing Health and Environmental Risks*



Key points of the International Code of Conduct on Pesticide Management:

Governments should

- // Establish national or regional poisoning information and control centres
- // Monitor pesticide residues in food, feed, drinking water, the environment and habitations where pesticides have been applied

Industry should

- // Provide poison control centres and medical practitioners with information about pesticide hazards, toxicity of active ingredients and co-formulants and on suitable treatment of pesticide poisoning
- // Promote responsible information dissemination on pesticides and provide users and environmental authorities with information on appropriate remediation measures in case of spills and accidents
- // Collaborate with government to further reducing risks incl.
 - // Promoting the use of personal protective equipment
 - // Protecting biodiversity and minimize adverse effects of pesticides on the environment
- // Collaborate with manufacturers and governments to establish pesticide production facilities of a suitable standard in developing countries

Our products and solutions help feed a growing world population whilst minimizing risks for people and the planet.

At a global scale, our products and solutions help farmers to feed the world with only a limited amount of arable land and provide for their families whilst safeguarding their most precious assets – their health and their land.

Beyond the extensive testing of crop protection products, we pursue various procedures to foster their safe and sustainable use according to the product label (see articles 4 and 6). We have implemented a series of measures to minimize adverse effects of pesticide use, promote safe-use-knowledge and build local capacity in line with the FAO-WHO Code. Our [Bayer ForwardFarming initiative](#) where we show how sustainable agriculture involving end-to-end stewardship solutions including integrated crop management and resistance management can be put into practice. In these representative operations, farmers demonstrate modern cultivation techniques, the sustainable and safe use of seeds and crop protection products, and the action they take to handle resources responsibly. All while accounting for the conditions of the markets in which the products are sold. We extend our activities beyond farm level and have also established a [supplier code of conduct](#) to ensure sustainability and proper management at our production sites.

Partnering to build national capacity for sustainable pesticide management in low- and middle-income countries in line with the FAO-WHO Code

Via our industry association CropLife International, we collaborate with national authorities and other stakeholders to build capacity in line with the FAO-WHO Code and encourage authorities to take on their responsibility to provide effective structures for the management of crop protection products. Effective national structures help drive professionalization in agriculture, which in turn has a positive impact on human, animal, and environmental safety. Further, professionalization is a key driver for on-farm productivity and hence yield and income of farmers increases.

Our collaborations include supporting the set-up of professional spray service providers as well as promoting the availability and use of personal protective equipment (PPE) and training to farmers and other stakeholders like retailers, dealers or government officials. CropLife trains Spray Service Providers (SSPs) in safe product use and prepares them to transfer their knowledge to farmers. Since the program's start in 2011, our SSP network has expanded to, in total, almost 15,000 providers in 14 countries throughout Africa. This has resulted in reaching more than 275,000 farmers, making the program an essential contribution to spreading the safe-use-message while generating job opportunities.

Additionally, we collaborate and continue to expand our network with poison control centres (PCCs) wherever possible. This supports our understanding of the actual number and characteristics of adverse incidents related to our pesticides, so that we can act on it and learn from it. The collaboration also helps to transfer knowledge to poison control centres, ensuring they have the necessary information required to diagnose and treat adverse incidents related to pesticides.

Supporting farmers through knowledge transfer and professionalization

Besides the product label recommendations for correct doses or advice for application, safe use trainings provide educational resources on how to apply crop protection products correctly, to foster product effectiveness and safe use for humans and the environment.

“Farmers are dependent on consistent yields and quality produce to compete in today’s food market. Especially for smallholder farmers, the fear of losing their harvest is also the fear of not being able to feed their families or to pay for their children’s education. Pests, diseases and weeds are part of the challenges, and crop protection products support farmers to enhance their yields. Therefore, it’s important that they know how to use chemicals in a safe and sustainable way.”

Lino Miguel Dias

Vice President Smallholder Farming at Crop Science, a Division of Bayer AG

Working towards a behavioral shift in the use of pesticides

Safe use trainings are an important lever to share knowledge with growers – especially, but not limited to smallholder farmers. Our safe use trainings also include field workers, seed treatment professionals, distributors, retailers, and further stakeholders who are in direct contact with our products. We are fostering best practice exchange and capacity building on the safe use and disposal of crop protection products, with a focus on low- and middle-income countries (LMICs). This includes holistic platforms like Better Life Farming (our flagship program for 360° smallholder support) and the BayGAP training program, as well as stewardship-specific tools like Bayer DressCode (a web-based tool that gives farmers label-conform instructions about the PPE to use in their individual situation).

To maximize impact and reach in LMICs, we collaborate with local universities to train agriculture students, aiming to create a network of Bayer Safe Use Ambassadors who in return transfer their knowledge by training thousands of smallholder farmers in their communities. We are expanding our network to also provide poison control centers and medical practitioners with guidance about hazards, toxicity, treatment of crop protection product poisoning as well as the treatment of snake bites, a common labor safety issue.

Scope and key topic areas of safe use trainings

Face-to-face and digital on operator safety, environmental protection & consumer protection through

- // Demonstration tools
- // In-field demonstrations
- // Ambassador approach
- // Training materials: brochures, videos, posters, manuals, apps

- // Recognizing anti-counterfeit products
- // Safely handling treated seed

// Considering market requirements for food safety

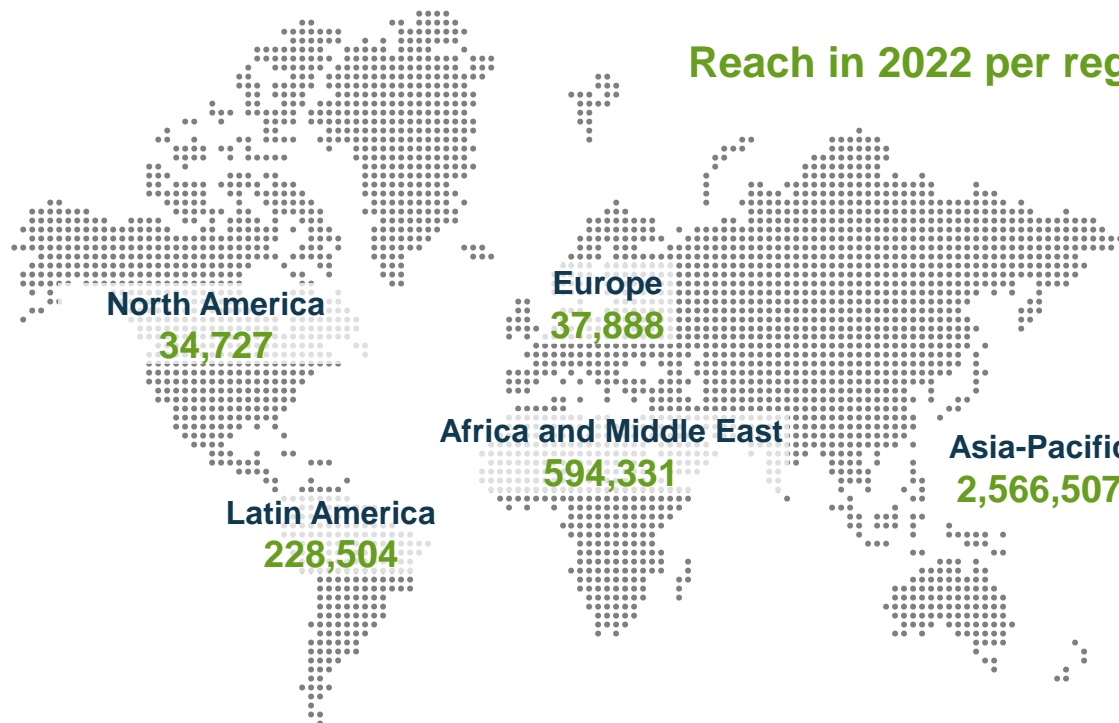


- // Measures to reduce spray drift and dust in order to protect bees and non-target organisms
- // Implementing integrated pest management principles
- // Proper rinsing and disposal of empty pesticide containers
- // Protecting water bodies through buffer zones and mitigating runoff

These large-scale training programs are especially important in countries with no or little regulations on the use and application of crop protection products. Advanced countries, on the other hand, have strong regulations in place that e.g., require farmers to have a certification or permit to purchase crop protection products, and rigid labour laws ensure required personal protective equipment is worn on the farm.

Further, we see the professionalization of agriculture as a major driver in behavioural shifts when using crop protection products and accompanying personal protective equipment. Both, the increased use of technology such as drones or larger tractors as well as a possible certification of trained, professional spray service providers can in future increase the correct and safe use of our products.

Reach in 2022 per region



The flexible approach and use of digital tools enabled us to reach more than **3.4 million external contacts worldwide** (i.e. farmers, field workers, distributors, retailers and other stakeholders in the agriculture industry), including around **2.7 million smallholder farmers**, in 2022.

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- 4
- 5**
- 6
- 7
- 8
- 9
- 10
- 11

Example: How it works in practice

Digitalization as lever for knowledge transfer and reach

As our world gets more digitalized, we are exploring and leveraging new ways of building capacity and raising awareness. We have implemented WhatsApp trainings, messaging campaigns (SMS), and use webinars as critical additions to our face-to-face trainings and outreach activities.

Using only a smartphone or tablet, farmers in Africa, Asia, and South America can record pest and disease data, receive regional agronomic advice, and chat with knowledgeable experts. This has the potential to provide smallholders with a level of data and insights similar to that currently accessible to farmers in developed economies.

Highlights of digitalization for environmental and human safety



Making resources available online

Latin America

Intacta 2Xtend & Xtendicam/Xtendimax (Dicamba) Robust Training Program in Brazil and Paraguay

During the last 6 years, the Intacta 2Xtend launch has been accompanied by many projects, partnerships (e.g., Senar and CCGL – Cooperative) and events reinforcing the safe use of Dicamba, especially to manage drift. Through our robust training program, we share essential knowledge with our customers, internal team, and partners to achieve new levels of productivity combined with safety. This program focuses on sprayer calibration and specific training of the operators for every customer that purchased Xtendicam and is supported by an app and WhatsApp trainings.



Distribution Channels

- + 180 channels trained
- + 2,000 commercial consultants trained
- Covered all the main soybean production zones



Sprayer Checklists in 2022

- + 500 sprayers checked
- +2,200 farmers, sprayer operators and farm personnel trained



Total:

58,993
people trained



United States

Dicamba use training in Xtend System through US partnership

The training course was developed in cooperation with other Dicamba herbicide registrants with products approved for use in the Roundup Ready® Xtend Crop System and governmental certification authorities. Successful completion of the training enables farmers to purchase and apply any Dicamba products registered for use in Dicamba-tolerant soybean and cotton crops.

This includes the responsible use of approved, low-volatility formulations of Dicamba in the Roundup Ready® Xtend Crop System. We established a hotline to answer questions about formulations and to report any misuse of Dicamba products, including the use of non-approved formulations. Additionally, we have developed a free-of-charge service website providing [educational resources](#) such as application requirements, label highlights and comprehensive seasonal training decks. Annually, a survey of product users is conducted by the registrants to better understand the effectiveness of the training and identify opportunities for improvement.



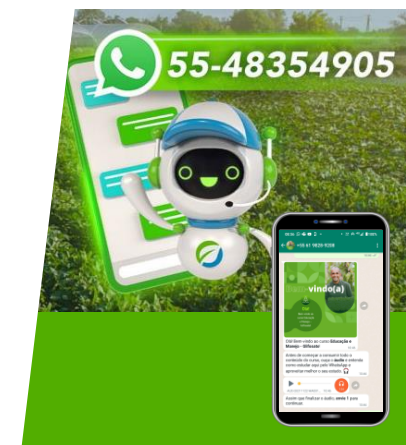
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Mexico & Brazil

Leveraging WhatsApp to deliver effective training in Latin America

Our Mexican team has developed “Cultibot”, a chatbot service using the WhatsApp messenger app, to automatically provide agronomic advice on questions about the application of crop protection products. We are currently developing new functions for Cultibot to add information about the safe use of products.

In Brazil, we use WhatsApp to train farmers in the correct and safe use of pesticides, focusing specifically on the safe use of products containing the active ingredients Glyphosate and Dicamba. Since 2021, we have reached more than 10,700 farmers through our free trainings. In 2022, we expanded the Dicamba training to Paraguay where the digital platform is also already in use.



Asia

Building national training capacity for Good Agricultural Practices

Together with CropLife Asia, we created a nationwide training “institute” for Good Agricultural Practices in Thailand that connects all industry players. The Thai Agriculture Innovation Trade Association (TAITA) and its members play an important role in strategically building the so-called “Kaset5G” platform and in implementing it digitally.

Through the new **Kaset5G** platform we’ll:

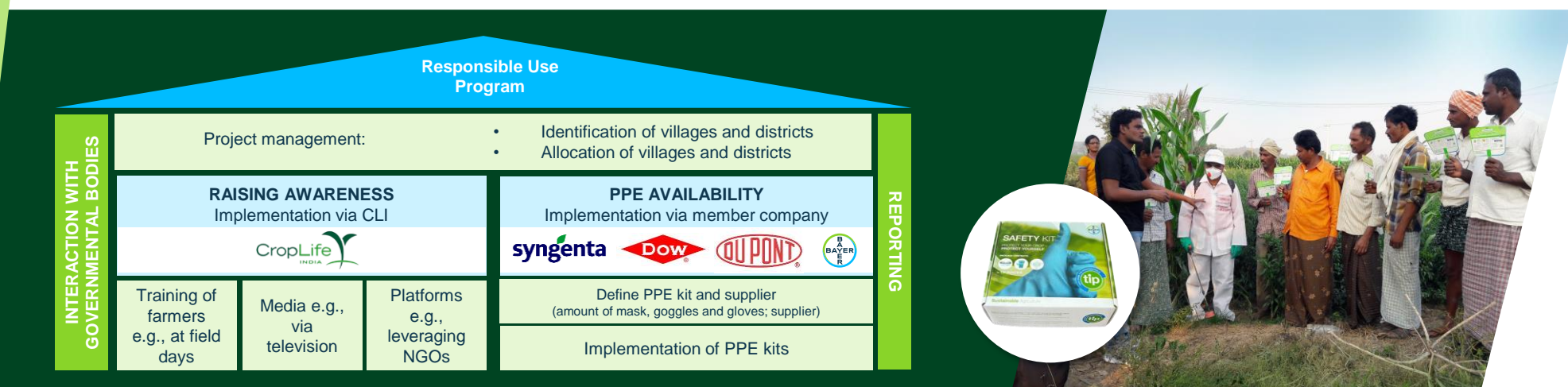
- // Align best practices in agriculture across the country and different trainings, e.g., through the creation of standardized training material
- // Implement trainings and efficiently allocate / manage resources through introducing new digital platforms and joint trainings
- // Build a local network of farmers and organizations to more easily deploy new initiatives that require a nationwide effort e.g., container management
- // Enable continued, regular participation in trainings and ensure long-term results of our efforts through increased community engagement with smart young farmer ambassadors
- // Achieve stronger endorsement from the Department of Agriculture (DOA) by expanding the platform beyond the chemical industry



Example: Taking action

Improving availability and adoption of personal protective equipment in India

In 2019, together with CropLife International and members of CropLife India, we piloted a program to make personal protective equipment (PPE) more accessible for Indian farmers by building an understanding of the importance of PPE and making it available at retailer shops (see figure below). Overall, the program reached approximately 1.5 million farmers.



After our collaboration with CropLife International to increase the availability of PPE, we teamed up again in 2020 to launch a follow-up project on **PPE Behavioral Change** to design and test behavioral interventions that increase the uptake and use of PPE among smallholder farmers when they apply crop protection products. The study aims to further understand the behavioral barriers to adopting this important safety practice and to sensitize farmers to the importance of wearing protective clothing to reduce direct exposure when using chemicals. CropLife International identified the highest priority barrier – among further medium priority barriers – to farmers’ uptake of PPE based on their perception, beliefs, and experience:

“I already do enough to protect myself” – Farmers make false assumptions about the need for PPE and the value of the precautions they already take.

To further understand how to successfully establish behavioral change and how to bridge the identified intention-action gap, a pilot test was conducted with direct outreach communication (weekly messaging in local languages, via WhatsApp or SMS) and distribution of discount coupons for purchased gloves to promote PPE in Jaipur (Rajasthan) and Warangal (Andhra Pradesh). In total, 230 farmers participated, and significant changes have been observed within this group. In the coming years, it is planned to identify scale-up opportunities to further regions and countries.

Example: How it works in practice

Managing and reporting incidents

Any kind of incidents with our products should be avoided. To make this vision a reality, we need reliable data that tells us how, when, where, and how often incidents occur. Solid data is a prerequisite for product monitoring and derivation of effective stewardship measures.

Collaborating with partners outside of Bayer is an important step towards understanding current global events and overcoming the challenges posed by the lack of coordinated worldwide monitoring systems. We already collaborate with various universities as well as environmental and regulatory authorities to gain reliable monitoring data related to residues of our products in water and agricultural produce. We are expanding our database through a network of partnerships with poison control centers and rural doctors, equipping them with tools to facilitate reporting of poisonings related to crop protection products.

We keep track of incidents related to our crop protection and seeds products worldwide through our internal management system and the software solution CAIRnew. Data includes both information from poison control centers (where that information is provided) and any incidents we record through our network of Bayer colleagues and external partners.



CAIRnew improves risk mitigation by optimizing: Response, Product quality, Traceability, Compliance, Collaboration

CAIRnew enables efficient and consistent reporting, managing, documenting, and analyzing of external adverse incidents, complaints and, if necessary, product recalls in line with our Product Stewardship Commitment, Principles and Key Requirements.

To achieve our goal of increasing awareness and strengthening reporting channels, Global Crop Protection Stewardship Managers play an important role in providing CAIRnew training for key users, who then train local users in the respective functions and countries. In 2022, we reached more than 230 colleagues through targeted trainings on External Incident Management and its Incident Reporting Tool.

How can incidents be reported?

At the moment, information on incidents can be reported directly to Bayer through sales staff or hotline numbers provided on product labels. We also use further sources like verified media reports and collaborate with medical professionals (for example those trained via our Safe Use Ambassador Program), and Poison Control Centers for incident reporting. Our incident management system and continuous review of product use in practice form the key reference points for monitoring the safety of our products and identifying any necessary improvements. We analyze the collected data to understand issues associated with the use of our products on the market, identify hotspots and derive learnings on how to optimize and implement targeted stewardship measures. These may be in response not only to human health incidents but also to those involving domestic animals, bees and the environment. In general, steps to mitigate risks can vary from enhanced training efforts, change of a formulation and revised application recommendations, use limitations or even product withdrawal in line with the FAO-WHO Code.

In addition to our own efforts to continuously assess risks associated with the use of our products in the market, Bayer appreciates and supports actions by local authorities to implement official systems for data collection. We believe that through a collective effort at all levels, true positive impact can be achieved in the safe management of pesticides around the world. More comprehensive data will enable us to better identify how we can further improve our portfolio and service management to continue making the use of our products safer.

Example: How it works in practice

A comprehensive approach to integrated weed management

Simply put, weeds are the wrong plants in the wrong place at the wrong time. They pose critical challenges for farmers' yields around the world as they take away nutrients and water from the actual crops. To control weeds, herbicides are an important tool in a farmer's toolbox – but not the only one. **Integrated Weed Management (IWM)** is a strategy for weed control that considers the use of all available weed control techniques.

We offer sustainable IWM programs with less environmental impact to help guide farmers through science-based best practices for crop protection and herbicide stewardship, also to prevent resistances. Our customized agronomic solutions show farmers the benefits of a holistic approach to weed management, including the **use of crop rotation, cover crop planting, utilizing multiple modes of action, and other cultural and mechanical practices such as harvest weed seed control**. We support this by adding the mode of action of the product to the label.

IWM as system approach for sustainable and long-term weed management is particularly useful for managing and minimizing herbicide resistance to maintain productive harvests. The approach also helps to reduce soil erosion and increase soil organic matter levels.

We keep investing into research for resistance-breaking chemistry, as solutions that are discovered and developed today need to meet the future customer priorities and regulatory requirements 10-15 years from now. In the past two years, we have been able to show the proof of concept of a new herbicidal mode of action for use in soybeans that is effective for broad-spectrum weed control. However, there is still a long way to go before approval and production.



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Need more info?



Learn more about our efforts to adhere to the requirements of Article 5

- // [Commitment: Crop Protection Environmental Impact Reduction](#)
- // [Bayer - A new water strategy to take action, value water, and connect for the better](#)
- // [Biodiversity section of 2022 Annual Bayer AG Sustainability Report](#)
- // [Biodiversity website: Generating value for customers by restoring biodiversity and eco-system services](#)
- // [Conservation and restoration of biodiversity in agriculture and forestry](#)
- // [Integrated Weed Management](#) at Bayer
- // [Development of sustainable agricultural practices through innovation](#)
- // [Benefiting biodiversity & soil health – sustainable solutions to nurture nature](#)
- // [Bending the curve of biodiversity loss – How can agriculture become part of the solution?](#)
- // [Pollinator health](#)
- // [Link to WHO directory of existing PCCs](#)
- // [Kaset 5G homepage](#) and [YouTube](#)



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4

5

6

7

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11

SPOTLIGHT PROJECT:

Bayer Safe Use Ambassador Program

Sharing safe-use-knowledge with the next generation in agriculture in LMICs

Safe use practices for the handling of crop protection products are directly connected to the health of growers and farm workers. Appropriate personal protective equipment and proper disposal of pesticide containers limit farmers' exposure to chemicals, therefore reducing the risk of adverse health effects when applying those products.

The Bayer Safe Use Ambassador Program aims at advancing farmer safety by training diverse stakeholders like agriculture and medical students, agronomists and rural medical practitioners as 'Safe Use Ambassadors'. We launched the program in 2017, with the goal of creating a network of ambassadors, who, in return, transfer their knowledge by training thousands of smallholder farmers in their communities.



Train-the-trainer:
Promoting safe use practices at farms



Webinars for academia and officials about the safe use of products and technologies



Training modules for health professionals on prevention and treatment of crop protection product incidents

“Born and raised in a small farmer family in India, I've always wanted to give back to my farming community. During my bachelor program of agricultural science in India, I attended Bayer's Safe Use Ambassador Program, an excellent initiative to make farmers aware of responsible management of agrochemicals throughout their use and beyond. Gaining an understanding of potential hazards due to the irresponsible use of agrochemicals on farmers' health and soil and water ecosystem, I decided to take care of the farming community and the environment by spreading awareness of agrochemicals' safe and responsible use. I started giving lectures and demonstrations in farmers meetings. Until today, I have trained more than 1,200 farmers in western India, I was nominated in the Youth Ag Summit 2022 and I'm an ambassador for NGIN, the Next Generation Agriculture Impact Network.”

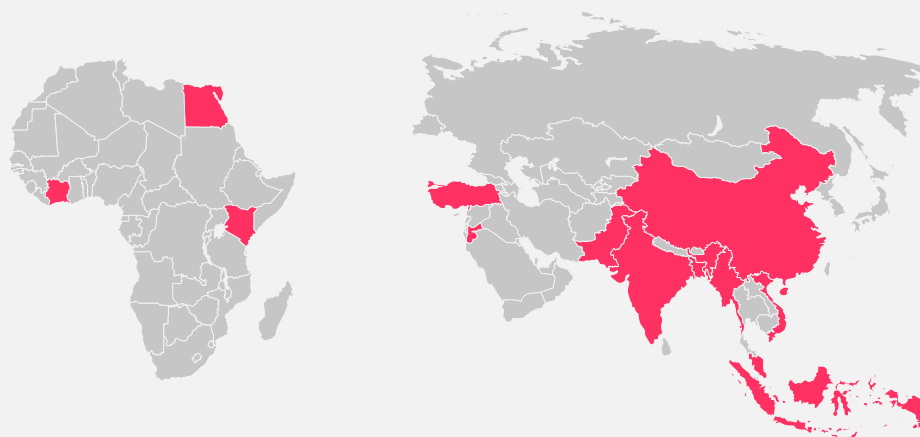
Nimeshkumar Jitendra Gorani
Ambassador for NGIN

Partnering with academia and health professionals

We partner with academics and health professionals to host tailored trainings on safe-use-related topics and regular events and webinars on aspects related to the sustainable use of pesticides for our stakeholders. Since the program's start in Asia, we've initiated collaborations with 53 universities in 13 countries throughout Asia-Pacific, the Middle East, and Africa. **Every year, 3,000-5,000 students and professionals participate in our program and in 2022, over 1,000 people from across the world participated in our webinars (incl. side events).**



Bayer Safe Use Ambassador network as of 2022



For seamless communication across the regions and among all stakeholders involved in the program, we launched a Bayer [Safe Use Ambassador group on Facebook](#). In the group, external stakeholders can share their views and experiences and we as Bayer can share the latest news and relevant topics of interest. This two-way communication platform also offers information on upcoming webinars and events. It further gives student participants the opportunity to connect with fellow ambassadors from other participating countries around the world.

For 2023, we are looking to further expand the program in both the agricultural and the medical sectors, with a focus on African and Latin American countries. We'll work in close collaboration with all stakeholders, from local to regional and global level, to provide a new platform to strengthen the collaboration with our medical Safe Use Ambassadors.



Need more info?

// Get a glimpse of how our student Bayer Safe Use Ambassadors sharing their knowledge by training farmers on safe use topics in this [video](#).

// The topic "Bayer Safe Use Ambassador Program" is related to the following articles of the [FAO-WHO Code: Article 5, Article 7, Article 9](#)

SPOTLIGHT PROJECT:

BayG.A.P. Service Program





Training farmers on good agricultural practices (G.A.P.) to enable their access to local and international markets

Food Chain Partnership at Bayer launched the BayG.A.P. Service Program in 2015 in partnership with GLOBALG.A.P. in order to address the ongoing challenges farmers face when working towards obtaining verified produce for the market. Today, we work with 40 global and local food value chain partners (e.g., Gesellschaft für Internationale Zusammenarbeit (GIZ), Greenyard) and provide trainings to small- and medium-sized farms around the world.

We adapt the trainings to suit the needs and challenges of farmer groups according to the local requirements of the country. Female farmers comprise a large part of the agricultural labor force, in some regions up to 80%. Their work on the farms is wide-ranging and essential, but too often undervalued. In many cases, women do not have the same opportunities and resources as men, for example in connectivity, contracting or financial investment. Therefore, women farmers are a particularly important farmer group who benefit from trainings that make an important difference to overall farm operations. In the trainings, they are empowered to gain more knowledge on agricultural practices, sustainability, and decision-making.

“The trainings we conduct go beyond safe use of pesticides – consumers want delicious and healthy fruit and vegetables and cereals, and retailers want sustainable, quality produce to meet that demand. Farmers need a way to improve on-farm practices to meet retail sustainability requirements and get market access.”

Gerhard Adam

Global Food Value Chain Partnership Lead at
Crop Science, a Division of Bayer AG

- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11

Our support with G.A.P. on the farms

BayG.A.P. Service Program supports farmers on their journey to verified produce by offering a range of services from farm assessment to production verification, customized to specific crops and farm size.



Farm Assessment – Assessing individual needs of the farm and measuring on-field impact of G.A.P.



Farmer Training – Development of tailored training modules on how to implement Good Agricultural Practice.



Farm Advice – A dedicated action plan to implement solutions tailored to specific crops and local market requirements.



Verification (new BayG.A.P. Verify App) – Review process to verify that the farmer complies with the criteria needed to achieve G.A.P. standards to become certified to sell produce to more markets.

Our achievements in numbers since 2018

BayG.A.P. is actively collaborating with our more than 40 partners from the public and private sector in 20 countries, and counting.

Outreach:
1,730,000
Farmers reached
through our online trainings, radio, WhatsApp

Deep engagement:
674,882
Farmers trained;
farm assessment based on data sourced

Access to market:
1,749
Farmers certified on G.A.P.
(GLOBALG.A.P., Thai GAP) can now export their produce thanks to BayG.A.P. and improve their livelihoods

Enabling more farmers to enter new markets

Education is the basis for sustainable agriculture. Collaborating with universities worldwide, we reach more than 5,000 participants every year through making our online trainings available on their platforms, on our partners' platforms or via our own BayG.A.P. Training App.

“I would like to tell farmers who have not yet been trained that since coming to the training, we know how to manage our farms correctly and safely. We learn about storage management, and the importance of protection for our (producer) health, and consumers too. I would like everyone to receive good information like this.”

Sermsak Ariyakunti
Durian Farmer, Thailand



Outlook

- // Through our *Tailored Solution* module, we are able to actively collaborate with the [Global Alliance Against TR4](#) on trainings to inhibit the spread of TR4 disease in bananas – we already reached more than 360,000 participants.
- // We will continue to expand the [BayG.A.P. Training App](#) and [BayG.A.P. Verify](#) to reach more producers in need of knowledge. We're launching the new BayG.A.P. module *Regenerating for Life* to educate internal and external users on the importance of regenerative agriculture practices.



Need more info?

Learn more about our BayG.A.P. Project: // [BayGAP Website](#)
// [Multi-stakeholder platform Next Generation Ag Impact Network \(NGIN\) initiated by Bayer](#)

// The topic “BayG.A.P. Service Program” is related to the following articles of the FAO-WHO Code: [Article 5](#), [Article 9](#)



ARTICLE 6: *Regulatory and Technical Requirements*



Key points of the International Code of Conduct on Pesticide Management:

Governments should

- // Introduce the necessary policy and legislation for the regulation of pesticides, their marketing and use [...], and make provisions for its effective coordination and enforcement, including the establishment of appropriate [...] health-care services
- // Detect and control counterfeiting and illegal trade in pesticides

The pesticides industry should

- // Provide national regulatory authorities with up-to-date objective assessments and data for risk evaluation
- // Verify the quality and purity of pesticides offered for sale
- // Take voluntary corrective action when problems occur and collaborate with governments when requested.
- // Provide their national governments with clear and concise data on export, import, manufacture, formulation, sales, quality, and quantity of pesticides



Dedicated teams within our R&D department work on safeguarding compliance with regulatory and technical requirements provided by authorities.

Our Human Safety and Environmental Safety departments work closely with regulators around the world to develop up-to-date dossiers that provide the basis for the registration of our active substances and products. (refer to article 4)

Detailed dossiers deliver scientific information on individual study reports, summaries, and risk assessments, including proposals for risk mitigation. Covering the requirements set by the respective authorities, we conduct and submit numerous studies according to applicable statutory requirements like OECD guidelines. These include for instance residue, toxicological, eco-toxicological, environmental, physical-chemical, and efficacy studies. Beyond that, we carry out further investigations (e.g., formulation studies, advanced safety assessments) and develop application scenarios to thoroughly understand our products in context of relevant agricultural situations. Additional requirements from authorities include record keeping, product integrity, and informing various regulatory agencies should new information become available.

These dossiers, along with up-to-date objective assessments and data, are made available to the respective regulatory authorities for their own risk evaluation as well as to the interested general public through our [transparency initiative](#).

Working towards effective national structures

Together with CropLife International, we support authorities in low- and middle-income countries in implementing frameworks, for example through exchanging on best practice (e.g., with the US FDA) or collaborating with poison control centers. In areas where governments haven't yet established any specific regulatory requirements, we currently make reference to the approaches and risk evaluation models from advanced regulatory systems around the world, including Australia, Canada, China, Brazil, EU, Japan, New Zealand, and the US.

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High product quality throughout the life cycle

Mandatory Quality Management Systems that include “Good Laboratory Practices” and risk assessments help us to ensure the consistently high quality of our products. We also apply specified processes and industry standard analytical methods to test each product batch before release, sale or transport.

Through annual reviews and assessments of potential quality risks, we continuously improve our products as part of our internal Corrective Actions or Preventative Actions (CAPA) and our Plan-Do-Check-Act (PDCA) procedures. Our incident, complaint, and safety performance reporting systems ([refer to article 5](#)), keep us up-to-date on any issues related to the quality of our products. We’re able to act promptly through corrective actions to ensure that we comply with regulatory and customer requirements. Our IT platforms are regularly assessed to secure an integrated, end-to-end approach for tracking, batch quality statistics, key performance indicators, and following up on action items for continuous improvement.

In the rare event that a product is not showing conformity to our quality standards (e.g., packaging issues, impurities, or contaminated product), we follow a product hold, product return or product recall ([refer to article 8](#)) process depending on the specific case that was identified. Bi-annually, overall quality performance risks and improvement needs are reported and reviewed with management and executive leadership as part of a mandatory Quality Management Review that summarizes how our efforts and corrective actions are reducing or mitigating potential quality risks.

Corrective actions are for example:

- // Rework of product where possible
- // Disposal of product
- // Revision of operating processes and training to improve reliability and repeatability of quality
 - // Re-engineering of assets and investment to improve process reliability and quality control
 - // Changing to alternative, registered raw material suppliers where current suppliers are not considered reliable

Beyond the quality aspects, we pursue corrective actions to manage external adverse incidents and mitigate risks ([refer to article 5](#) to learn more).

In addition, we are working with the industry towards eliminating counterfeit products that could compromise the safety of people and the environment.

Example: Taking action

Reducing negative impacts of counterfeits and otherwise illegal crop protection products and seeds

Counterfeit crop protection products pose an increased risk for people and the environment. Their contents do not correspond with the products formulated by Bayer and they are not approved by the regulatory authorities. They may not even contain approved active ingredients. The production, transport, trade, and distribution of counterfeit products and illegal seeds takes place within globally organized criminal networks, and the negative effects are amplified by numerous opaque internet offers.

According to various reports and industry estimations, 12-14% of crop protection products sold worldwide are counterfeit or otherwise illegal. Those cause a value loss of ~8.5 bn US\$ p.a. (status 2021) for the entire crop protection industry. For the seeds business, the industry assumes losses of a global average of at least 10% due to illegal practices, equating to a value loss of ~4.2 bn US\$ p.a.⁵

Furthermore, the use of counterfeit or otherwise illegal crop protection products and seeds compromises sustainable agriculture and puts the achievement of United Nations' Sustainable Development Goals (UN SDGs) at risk.

We believe that the topic of product counterfeiting can only be addressed through cooperation by industry, associations, governments, and non-governmental organizations.

Bayer takes a zero-tolerance position towards illegal activities and has implemented a global strategy to effectively combat the production, transport, trade, and use of counterfeit and otherwise illegal products, covering crop protection products, seeds and traits with the goal to:

- // Mitigate risks for human health and the environment
- // Enable sustainable agriculture and achievement of UN SDGs
- // Protect business and reputation

⁵EUIPO Feb. 2017 Pesticides Infringement Report ,FICCI 2015 Report, IDESF report 2021, National Citizen Observatory Oct 2021, UNEP, 2018, Frezal and Garsous, 2020



Product authentication

Our SafetySeal technology aims to prevent the use of counterfeit products

Bayer SafetySeal technology is an important tool to fight counterfeiting that helps distributors and users to identify original Bayer products. Optical security features and a QR code that can be scanned via an interactive smartphone application show information about the product's authenticity.

The SafetySeal is on all bottled Bayer crop protection products sold in Europe, the Middle East, Africa, and Latin America. The technology has been expanded to selected solid crop protection products, sold in Egypt and Turkey, and to raw crop seeds (corn and oil seed rape) in Europe.



Safety Seal on crop protection products (bottle) and raw crop seed bag

Effective anti-counterfeit management



Need more info?

Learn more about our efforts to adhere to the requirements of Article 6:

- // [Sustainability Report 2022: Protection against product counterfeiting](#)
- // [Bringing crop protection products to the market](#)

- // [Bayer's role in combating counterfeits](#)
- // [CropLife International – Anti-counterfeiting](#)
- // [Counterfeits in agriculture | Bayer Global](#)

ARTICLE 7: *Availability and Use*



Key points of the International Code of Conduct on Pesticide Management:

Authorities should

- // Give special attention to drafting legislation on the availability and use of pesticides. These should be compatible with existing levels of user training and expertise
- // When determining the risk and degree of restriction appropriate for the product, the responsible authority should take into account the type of formulation, method of application, and its uses
- // Prohibition of the importation, distribution, sale [...] of highly hazardous pesticides may be considered if, based on risk assessment, risk mitigation measures [...] are insufficient to ensure that the product can be handled without unacceptable risk to humans and the environment

Improving farmer safety and productivity with access to new technologies

Aside from the diligent safety assessments and risk mitigation already described in this report, we drive technological advances to boost farmer productivity and further reduce the risk for people and the environment.

Application technology

Every crop protection strategy holds one crucial step: execution. That's application technology.

Depending on farm size and the crop being cultivated, various options are available for the specific needs of farmers. Today, ground application is considered the most flexible and efficient application method on large- and medium-sized farms. A variety of equipment and tools can be combined for smart and precise solutions. Good examples include the specific nozzles on sprayers that we recommend and deflectors on sowing equipment. These help significantly in applying pesticides and sowing treated seeds while keeping the product where it is intended. ([Refer to spotlight on application technology to learn more](#))

Further improvement across the various methods will steadily increase the precision and accuracy of application. Some of the most promising technologies are drones i.e., unmanned aircraft systems (UAS). They can significantly improve efficiency and replace handheld application in many regions, especially in low- and middle-income countries. This development goes hand in hand with advances in precision agriculture and automation and is well-suited to smaller fields. We expect that labor shortages and costs will further push these new options.

We partner with major drone-producing companies and local professional drone spray service providers to provide farmers with reliable and high-quality spray applications in countries with regulatory systems that allow such applications. However, drone spray is a technology still under development. We work with regional CropLife organizations, such as CropLife Asia and CropLife America, to establish guidance documents for the safe application of crop protection products via UAS. In various countries, we provide corresponding training courses for our employees and those of our research partners, often virtually. We contribute to further defining operator safety via drone spray by taking into consideration exposure sources such as frequent refills or battery exchanges.



Increasing efficacy, efficiency and environmental safety through automation and innovative application technologies (simplified representation)

	GROUND APPLICATION			AERIAL APPLICATION		
	Backpack	Tractor	Self-propelled	Helicopter	Airplane	Drone
Automation potential until 2050	Low	Medium	High	Low	Medium	High
Operator safety potential	Low	High (w/ cabin)	High	High	High	High
Environmental safety potential	High	Depending on equipment	Depending on equipment	Low	High	High

= Low
 = Medium
 = High



Did you know?

Irrigation systems can also serve as technology for applying crop protection products.

We collaborate with Netafim and BGN Technologies of Israel's Ben-Gurion University to develop new modes of targeted application. As part of DripByDrip, growers use the drip irrigation system, which delivers water and crop protection where it is needed most – directly at the roots. This precise application requires less chemical product and reduces evaporation and runoff, while using 60% less water compared to traditional irrigation. Based on our findings from 2019, precision irrigation contributes to significant water savings as well as optimization of energy, labor, and use of inputs such as pesticides and fertilizers.



Examples of pesticide application using different technologies (left to right: ground application via backpack, farmer in a tractor using digital farming tools, aerial application via airplane)

Drone user demo in India

Need more info?

[// Application technology spotlight](#)
[// Bayer's new water strategy](#)

- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11

Diligent management of highly hazardous pesticides

We follow a clear, globally-applied approach to managing highly hazardous pesticides (HHPs) at Bayer that is grounded in the FAO-WHO 'Guidelines on Highly Hazardous Pesticides' - from the identification of HHPs in our portfolio, a needs and risk assessment for the registered local uses, to subsequent global and local risk mitigation through stewardship.

We consider the FAO's definition of HHPs as international standard. We further believe that the establishment of a global HHP list by FAO and WHO, based on their published criteria and guidelines, could be beneficial in the ongoing public debate on HHPs.

In 2012, we voluntarily phased out of acute toxic agricultural crop protection products as per WHO Class 1a or 1b despite continued formal authorization to do so. We also withdrew registrations for these products. Internal processes ensure that no new product with a WHO class 1a or 1b category can be marketed.

We support a risk-based approach for the assessment of all our products, including HHPs. If any potential risks are identified for our products, steps to mitigate those risks can vary from increased training efforts to change of formulation, revised application recommendations and use limitations, and ultimately product withdrawal (in line with the FAO-WHO Code of Conduct and the FAO guidelines on HHPs). An example of a voluntarily withdrawal are carbendazim-containing products, which Bayer phased out globally from our portfolio in 2021.



Highly Hazardous Pesticides (HHPs) as defined by FAO and WHO:

"Pesticides that are acknowledged to present particularly high levels of acute or chronic hazards to health or environment according to internationally accepted classification systems such as WHO or GHS or their listing in relevant binding international agreements or conventions. In addition, pesticides that appear to cause severe or irreversible harm to health, or the environment under conditions of use in a country, may be considered to be and treated as highly hazardous." (FAO and WHO, Guidelines on Highly Hazardous Pesticides, 2016)

FAO criteria for identifying HHPs

Highly hazardous pesticides (HHPs) have one or more of the following characteristics

- | | |
|-----------------------------|---|
| Acute toxicity | <p>1 Pesticide formulations that meet the criteria of classes 1a or 1b of the WHO Recommended Classification of Pesticides by Hazard</p> |
| | |
| Chronic toxicity | <p>2 Pesticide active ingredients and their formulations that meet the criteria of carcinogenicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS)</p> |
| | <p>3 Pesticide active ingredients and their formulations that meet the criteria of mutagenicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS)</p> |
| | <p>4 Pesticide active ingredients and their formulations that meet the criteria of reproductive toxicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS)</p> |
| | |
| Inter-national Con-ventions | <p>5 Pesticide active ingredients listed by the Stockholm Convention in its Annexes A and B, and those meeting all the criteria in paragraph 1 of annex D of the Convention^a</p> |
| | <p>6 Pesticide active ingredients and formulations listed by the Rotterdam Convention^b in its Annex III</p> |
| | <p>7 Pesticides listed under the Montreal Protocol^c</p> |
| | |
| Incidents | <p>8 Pesticide active ingredients and formulations that have shown a high incidence of severe or irreversible adverse effects on human health or the environment.</p> |

a: Stockholm Convention: persistent organic pollutants; b: Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade; c: Montreal Protocol on Substances that Deplete the Ozone Layer

- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11

Example: How it works in practice

New opportunities for farmers in Asia through drone application

The adoption of drones for spraying and monitoring is growing at a fast pace in many regions of the world, especially Asia. In Vietnam, Thailand, India, and Philippines, showcasing this new technology and engaging with external stakeholders and potential users has been an integral part of our efforts to advocate responsible use. We provide guidance through dedicated roadshows and demonstrations of the practical utility and the risk mitigation requirements for the use of application-drones.

In 2020, the Vietnam Plant Protection Department (PPD) cooperated with organizations to test drone application on main crops, e.g., rice, with eight types of crop protection products. To foster knowledge in the area, the Bayer Vietnam signed a Memorandum of Understanding with the PPD in 2022. Bayer organized workshops about precautions for drone-based pesticide applications with the overall goal of sharing best practices, informing about the regulatory frameworks in Asia Pacific and China, and building an adoption roadmap for Vietnam. More than 200 agricultural extensionists from PPD gave feedback on the draft for the basic standard on testing crop protection products by drones, an important technical guide to deploying the new technology in Vietnam.

In cooperation with the Thai Agricultural Innovation Trade Association (TAITA), we conducted our first workshop on drone regulations and safety awareness in 2021, training 3,000 government extension officers and farmers. Bayer has also been a key driver and prominent voice in fostering the use of drone technology in India. We are in the process of defining guidelines and data requirements for registering and approving crop protection products for drone spraying. We already published a [Standard Operating Procedure](#) for applying pesticides with drones in agricultural, forestry, and non-cropped areas.

In 2022, Bayer led the first commercial drone spraying for rice in Mindanao, Philippines. Rice farmers of Kapalong participated in the activity. The demo spraying was conducted on Dagaang Farm located in Kapalong, Davao Del Norte in collaboration with the drone service provider AgriDOM Solutions Corporation. Rice farmers were invited to the event so they could learn more about the benefits of using drone technology such as the precise and uniform delivery of low-volume spray solutions, minimizing farmer's exposure to agrochemicals.



Need more info?



Learn more about our efforts to adhere to the requirements of Article 7

- // [Raising the bar on crop protection safety standards](#)
- // [Smart solutions for a sustainable future](#)
- // [How biologicals add a new dimension to integrated crop management](#)

SPOTLIGHT PROJECT:

Application technologies and digitalization – optimizing precision and safety of crop protection products



Innovations in crop protection application and digitalization enable farmers to produce more while conserving soil and natural habitats. New application technologies and digital tools optimize the use of crop protection products.

Precision agriculture and digital farming are among the most effective new application technologies: Innovative application techniques are combined with digital solutions to help determine the right application volume of crop protection products at the right spot at the right time. Our advancements in precision application technology have a focus on ground and aerial autonomous machinery, as they minimize direct contact with products and thus reduce the risks connected with pesticide applications.

“Automation and digitalization of farming has unlocked a world of possibilities to build customized solutions farm-by-farm thereby using only the crop protection needed, increasing the potential for higher precision and accuracy of applications, while inserting an engineered human safety barrier for the farmer.**”**

Dan Seyer

Head of Application Technology at Crop Science, a Division of Bayer AG



Optimizing pesticide volumes applied per acre

Our innovative Climate FieldView™ Technology equips farmers with real-time farm data. They can better plan the position, timing, and application of the right amount of crop protection products exactly when and where they are needed.





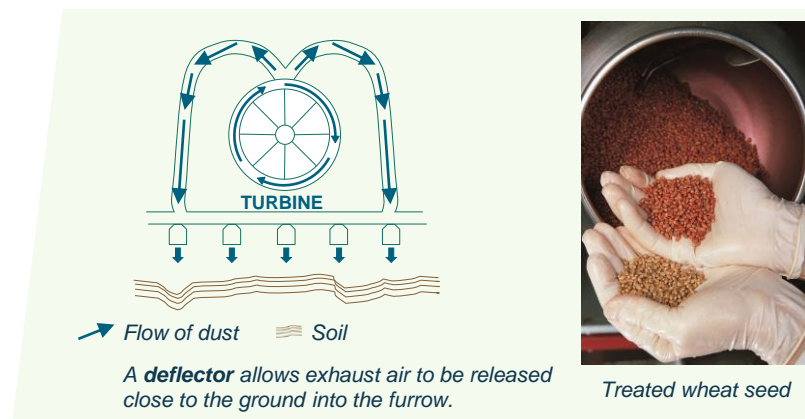
Reducing drift when applying pesticides

We have introduced special drift reduction nozzles together with Agrotop, Lechler and Syngenta. This innovation enables a targeted application, optimizing overall precision when applying product and reducing drift by up to 90%. The so-called DropLeg nozzles aim at applying crop protection products at the bottom side of the crop leaves resulting in increased efficacy depending on crop, product or disease to be treated. Furthermore, we're driving digital solutions connected to machinery to control drift.



Less dust when treating and handling seeds

To reduce dust emissions that may occur during the treatment of seeds or those that can occur during the sowing of seed treated with certain coating techniques, we have certified each of our seed treatment sites according to ESTA (European Seed Treatment Assurance Industry Scheme) by EuroSeeds (European Seed Sector Association). For the sowing of treated seeds, one of our key measures are deflectors that decrease the amount of dust emissions.



Closed transfer systems for more safety while mixing and loading

A 'closed transfer' system enables the transfer of a pesticide directly into the mixing tank. The operator therefore no longer comes into direct contact with the product and there is no product spillage – enabling safe practice for both the operator and the environment.

We support the implementation of closed transfer systems such as the jointly developed "easyFlow" system from Agrotop GmbH. We also have joined the cross-industry group developing the "easyconnect" closed transfer system.



Need more info?



Learn more about our efforts to adhere to the requirements of Article 7

// [Bayer ForwardFarming initiative: Demonstrating sustainable agriculture in practice](#)
// [Better answers for farmers and the environment](#) – tailored solutions

// The Topic "Application Technologies and Digitalization" is related to the following articles of the FAO-WHO Code: [Article 5](#), [Article 7](#), [Article 9](#)

3
4
5
6
7
8
9
10
11

ARTICLE 8: *Distribution and Trade*



Key points of the International Code of Conduct on Pesticide Management:

Governments should

- // Develop legislation and implement licensing procedures relating to the sale of pesticides

Industry should

- // Ensure that pesticides traded internationally conform to relevant international conventions, local regulations, and guidelines on labelling and packaging set out by the FAO, WHO, and UN
- // Recall a product when its use, as recommended, represents an unacceptable risk to human and animal health or the environment
- // Encourage trade partners towards fair trade and marketing practices
- // Ensure persons involved in the sale of pesticides are properly trained and have access to sufficient information

The distribution and trade of our crop protection products is based on diligent adherence to national and international standards

We follow the FAO Guidelines on Good Labelling Practice for Pesticides and the Globally Harmonized System for the classification and labelling of chemicals (GHS) to compile global label references for our products. In emerging markets, our local regulatory colleagues use these references to advocate for the GHS system and improve labels. Moreover, we evaluate local use scenarios to ensure products are only placed on the market when the required personal protective equipment has proven suitable for the country. At the same time, we work with industry, governments, and distributors to make personal protective equipment increasingly available to farmers.

We provide our products in pack sizes that are appropriate to the needs of our customers – which is particularly relevant for smallholders.

As per our [Product Stewardship Commitment, Principles and Key Requirements](#), our business partners who handle our products and services are contractually required to implement Product Stewardship that is equivalent to our internal standards and that meet relevant regulatory requirements and industry standards.

In some countries, we have special dealer trainings (refer to [article 5](#)) available to instruct our partners in the safe storage of our products. Furthermore, they are provided with the relevant Safety Data Sheets.

To further strengthen company-internal awareness of requirements and the impacts of trading crop protection products, we conducted a series of webinars for Bayer employees on the proper processes for importing or exporting pesticides, for example regarding the Rotterdam Convention.



3

4

5

6

7

8

9

10

11

Example: How it works in practice

Clear processes for efficient product recalls

Product recalls can be issued when a product batch needs to be taken from the market due to e.g., contamination or otherwise being out of specification. These can be triggered by an internal finding by Bayer's control systems, an authority request, or due to findings at inspections or monitoring activities, scientific research or regulatory changes. We follow a strict process to analyze and solve the case and related impacts laid out in a comprehensive recall plan. The plan describes which steps need to be taken to ensure the proper handling of any product recall. It includes clear communication of the steps to all involved customers, dealers, retailers and other external stakeholders.

If a product cannot be recalled (e.g., when the product was already applied), we need to take alternative steps, such as

- // Retagging seed products with an updated quality score
- // Monitoring plants during growth after application of a crop protection product
- // Destroying crops treated with the product or sown from treated seed



What is the Rotterdam Convention?

The Rotterdam Convention is a legally-binding, multilateral treaty under the United Nations Environment Program (UNEP) that enables all 162 countries (called parties) that have ratified to the convention to make informed decisions in the international trade of hazardous chemicals. We comply with the Convention and support its main objectives to:

- // Facilitate information exchange about characteristics of hazardous chemicals by providing information for decision-making processes on import and export of these chemicals and disseminating the decisions to the parties.
- // Promote shared responsibility and cooperative efforts among parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm.

To achieve its objectives two key provisions are included:

- // The Prior Informed Consent (PIC) procedure is a mechanism for formally obtaining and disseminating the decisions of importing parties as to whether they wish to receive future shipments of those chemicals listed in Annex III of the Convention and for ensuring compliance with these decisions by exporting Parties.
- // The Convention facilitates information exchange among parties for a very broad range of potentially hazardous chemicals. The Convention requires each party to notify the Secretariat when taking a domestic regulatory action to ban or severely restrict a chemical.



Need more info?

Learn more about our efforts to adhere to the requirements of Article 8

- // [Rotterdam Convention](#)

ARTICLE 9: *Information Exchange*



Key points of the International Code of Conduct on Pesticide Management:

Governments should

- // Establish and strengthen networks for information exchange on pesticides and Integrated Pest Management/ Integrated Vector Management
- // Facilitate information exchange and public access to information while safeguarding intellectual property

All entities addressed by the FAO-WHO Code should

- // Support information exchange and facilitate access to information
- // Encourage collaboration between all relevant stakeholders to ensure that countries are provided with the available information to meet the FAO-WHO Code's objectives

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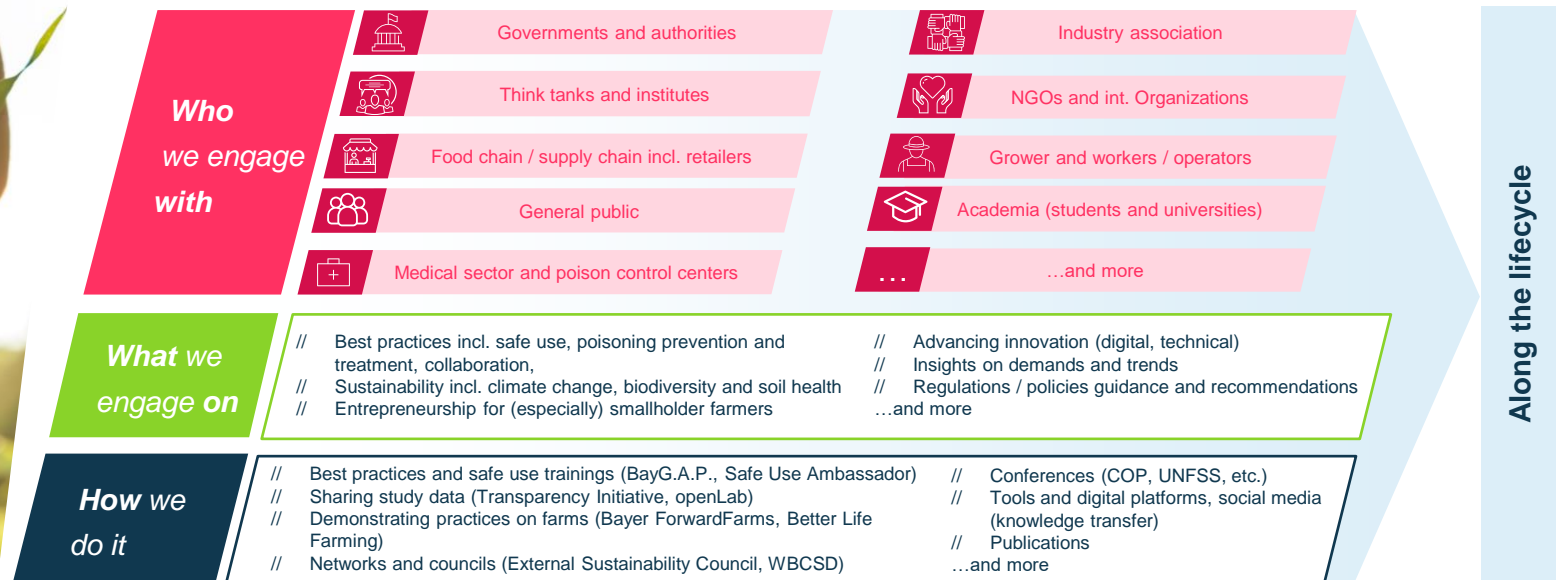
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Transparency, information sharing, and engagement are key imperatives

We engage and share information on the sustainable management of pesticides with all major stakeholder groups, ranging from governments and regulatory authorities to farmers, medics, academia, think tanks and the general public (see chart below). Many examples have been already named in this report – such as transparency on safety information, exchange with regulators, safe use trainings for farmers and applicators, as well as the training and information of medical professionals and poison control centers.



We pursue strategic engagement with a diverse set of stakeholders who are in line with our sustainability and strategic priorities. This engagement informs our business and sustainability strategies and builds powerful relationships that accelerate the transformation of agriculture, for and with our customer, the farmer.

To identify our key stakeholders, we first look at our value chain: growers (customers and non-customers), grower organizations and associations, retail partners, off-takers and traders, food manufacturers and processors, and retailers. Additionally, we identify key stakeholders across international organizations, think tanks, non-governmental organizations, researchers and academia, and multistakeholder platforms such as the World Economic Forum and World Business Council for Sustainable Development. We seek engagement with under-represented groups, in particular youth and women. When identifying stakeholders, we identify organizations and individuals with shared goals and values, as well as those with different points of view.

By sharing our insights, for example by publishing safety-related data on our crop protection products and summaries of scientific studies on biotechnology traits, we want to foster an open conversation about expectations from stakeholders and the public. With projects like the Bayer ForwardFarming Initiative, the Safe Use Ambassador Program and Food Chain Partnership, we want to nurture healthy and open exchange while showcasing how working together can promote positive change.



Food Chain Partnership

The [Food Chain Partnership Initiative](#) addresses challenges throughout our food system. The initiative connects experts like farmers, teams from the processing sector, retailers, traders, and other players along the food value chain, to work together for sustainable agriculture. Bayer has ca. 70 Food Chain Managers working in 44 countries. These experts focus on 76 different crops to broaden our network and bring its benefits to more people, including business opportunities for smallholder farmers. One of their key programs is the [BayG.A.P. Service Program](#).



Bayer ForwardFarming

In collaboration with farmers and other partners from different areas, the [Bayer ForwardFarming initiative](#) enables knowledge-sharing among farmers, value chain partners, academia, scientists, and civil society about modern and sustainable agricultural techniques through first-hand experience on independent farms around the world. ForwardFarmers deploy technologies and best practices that reduce agriculture-related greenhouse gas emissions and environmental impact of crop protection, promote biodiversity and conserve natural resources. Also, best practices in product stewardship including integrated crop management and resistance management are demonstrated here. Currently, the global ForwardFarming network totals to 25 farms in 14 countries, cultivating 28 types of fruits, vegetables, and grains.



Growing Matters and BeSure! Campaign

The [Growing Matters Initiative](#) is committed to open and scientific discourse about the benefits and stewardship of neonicotinoid insecticides in North America as well as their alternatives. Growing Matters launched the [BeSure! campaign](#) with the aim to strengthen awareness and adoption of stewardship practices in order to protect bees and other wildlife during the handling, planting, and disposal of treated seeds and other neonicotinoid applications used throughout the growing season.

In 2022, we have reached audiences in 27 states via owned content, radio sponsorship, media syndications, social content, and targeted trade outreach. This led to 11,700 total campaign engagements.



Need more info?

Learn more about our efforts to adhere to the requirements of Article 9

// [Bayer ForwardFarms website](#)
// [Bayer Biodiversity website](#)

// [Protecting pollinators and other beneficial insects \(Bayer Sustainability Report\)](#)
// [Biodiversity \(Bayer Sustainability Report\)](#)

- 3
- 4
- 5
- 6
- 7
- 8

9

10

11



ARTICLE 10: *Labelling, Packaging, Storage and Disposal*



Key points of the International Code of Conduct on Pesticide Management:

The pesticide industry should:

- // Comply with labelling in line with relevant regulations or GHS and/or FAO/WHO guidelines on good labelling practice for pesticides
- // Ensure that packaging, storage and disposal of pesticides conform in principle to the relevant FAO, UNEP, WHO guidelines or regulations
- // Assist in the disposal of obsolete stocks and used containers in an environmentally sound manner, through collaboration with local governments, international organizations, and the agricultural community



The product label is THE central source of information

We follow the **FAO Guidelines on Good Labelling Practice for Pesticides** and those of the **Globally Harmonized System (GHS)** for the classification and labelling of chemicals, alongside any national regulations. We support resistance management by adding the mode of action of the product to the label.



We ensure that our products are adequately packaged, stored, and transported according to the applicable legal and regulatory requirements. We maintain an SAP product compliance system for production, storage, and transport. All relevant and necessary safety data sheets are prepared and provided to responsible employees and partners across the globe.



To apply a consistent standard on pesticide labels, Bayer launched the **Label4SafeUse** project. By standardizing label elements and use recommendations according to international standards, Bayer ensures consistent and comprehensive hazard communication on our labels worldwide, from appropriate use to disposal instructions. For example, the use of pictograms gives the farmer a quick overview of the personal protective equipment required for different activities. Booklets are attached to the container if more than one language is needed (e.g., in India, we provide 17 different languages).



An important part of our **farmer trainings in safe use** is how to properly read and understand the label, store, and transport the product as well as how to dispose of empty containers and crop protection product leftovers.

Label Pictograms

Following the **FAO-WHO Code**, we use pictograms on our labels. A new label pictogram for pesticides to protect pollinators was designed by **CropLife International** and published by the **FAO**. The new label pictogram serves to optimize global consistency in pollinator safety labelling. It also puts emphasis on the protection of pollinator habitats and wild pollinators beyond honeybees. Bayer contributed to the creation of this label pictogram, and we have started to adopt it for our crop protection products. In countries with no specific requirements for labelling, crop protection products will be labelled in accordance with the **Global Harmonized Systems Codes (GHS)** and the **FAO Guideline on Good Labelling Practice for Pesticides**. Whenever possible, we use this reference to advocate for label improvements when local regulations deviate.



Packaging: reduce, reuse, recycle

Our packaging materials are certified according to International UN Dangerous Goods Transportation Regulations, in reference to the mechanical stability of the packaging and compatibility with the contained chemicals. They are registered in the countries of sale according to the locally required regulations. Regional experts specify compliant packaging materials in master data systems, which then consign this information into the bills of material in the production units. The packaging carries the release date (month and year) of the lot or batch and provides relevant information on appropriate storage conditions for the product in accordance with national labelling rules and requirements.

Additionally, we are looking for opportunities to reduce the amount of packaging used in order to reduce the environmental impact. For example, in North America, we expect to save eight million kilograms of plastics for packaging containers annually by providing over 70 % of our pesticides for broadacre crop and pre-season weed control markets in reusable bulk systems.

Teaming up towards a circular approach

Bayer supports programs worldwide to ensure the safe recycling and disposal of empty packaging and containers. As the disposal of crop protection product containers is handled differently in many countries, the crop protection industry works together with authorities, distributors, and farmers to establish or maintain suitable disposal systems. Users can learn about how to safely dispose of our products through information on the labels.

Particularly successful disposal programs have been established in Brazil, Canada, France, Germany, and Australia (please also refer to our [spotlight on waste management](#)) together with our CropLife International industry association. As a result, more than one million metric tons of plastic have been collected since 2005 globally.

Disposal of leftovers from spraying

Avoiding point-source water pollution through the power of natural soil microbes

Effluent water contaminated with residues of crop protection products is a challenge for sustainable farming worldwide. We look for innovative solutions that secure water quality and protect the environment from any unintentional exposure to crop protection products. Biobeds are one of the key measures we offer e.g., in partnership with Beutech under the brand name Phytobac™. This system is designed to prevent water contamination from residues of crop protection products generated during the filling and cleaning of spraying devices.

The system is already used in many EU countries and is offered commercially by various third-party manufacturers. More than 5,000 Phytobac™ systems are currently in operation in Europe. They can also be found on Bayer ForwardFarms which have been implemented in e.g., Australia, Canada, China, Thailand, Argentina, Brazil, and Colombia.



Virtually visit one of our [ForwardFarms](#) to see what we do to protect water bodies.



Need more info?

Learn more about our efforts to adhere to the requirements of Article 10

// [Protecting pollinators and other beneficial insects \(Bayer Sustainability Report\)](#)

SPOTLIGHT PROJECT: *Waste Management*

3

4

5

6

7

8

9

10

11

Innovative solutions to reduce waste

Crop protection products need to be handled with care. To ensure that products and their packaging are also handled carefully at the end of their life cycle, we engage in various waste management programs. Through dedicated R&D, we strive to find new solutions for more innovative, sustainable packaging. We do this, for example, by identifying new ways to recycle empty plastic packaging or by using new materials that comply with national and international regulations (e.g., REACH Regulation, Extended Producer Responsibility or circular economy laws).

Reducing and recycling of empty containers and packaging

Modern and efficient waste management systems are dependent on various factors, especially nationwide waste management infrastructure and effective legislation.

Container Management is a key area where industry cooperation is particularly important.

We collaborate across the industry towards implementing sustainable waste management systems. With [CropLife International](#), we focus on developing programs that consider legislation and infrastructure and identify ways how the systems can be effectively communicated to and adopted by farmers. CropLife International has outlined key elements in the [roadmap on the establishment of Container Management Systems](#). Part of this program is the development of design programs to ensure environmentally friendly packaging, the implementation of training courses for distributors and farmers in the proper handling of pesticide containers, and the testing of plastic recycling options. In 2021 alone, 124,000 metric tons of packaging materials were recycled into new items, which accounts for around 84% of material collected that year.

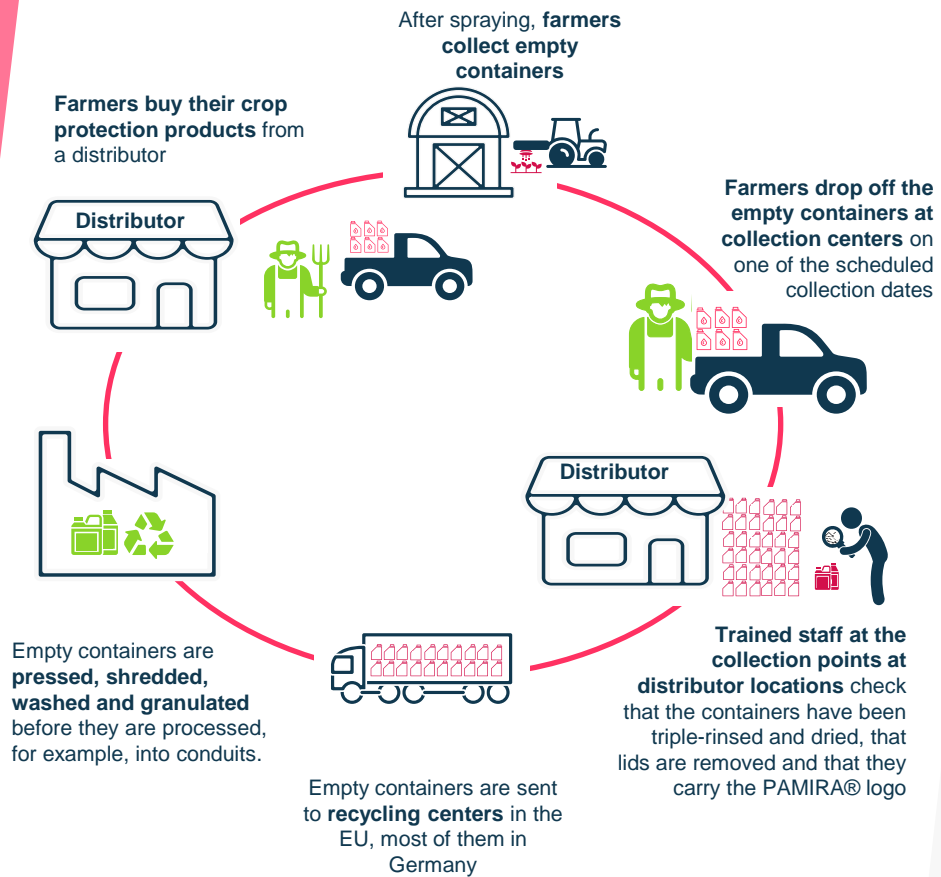
Establishing and activating local waste management systems was particularly successful in Brazil, Canada, China, France, Germany, and Australia. A common success factor among these systems is the presence of national legislation that requires the establishment of nationwide empty pesticide container management systems. The example of China shows how container management systems can achieve remarkable progress within just a few years. Within two years of implementation, the country has already become one of the leading nations globally in terms of collecting packaging waste. In Asia, Bayer is working closely with CropLife Partners to advise governments on the implementation of Extended Producer Responsibility (EPR) initiatives that aim to overcome challenges in the agricultural sector.

In Brazil, the non-profit InpEV (National Institute for Processing Empty Packages) program has reached a recycling rate of 94%, being the most successful container management program worldwide.



In **Germany**, the crop protection industry partnered with agricultural wholesalers to develop the voluntary **PAMIRA** system for disposing of agrochemical packaging materials.

Simplified depiction of key steps of PAMIRA system



Further examples of successful waste management programs around the world

Canada

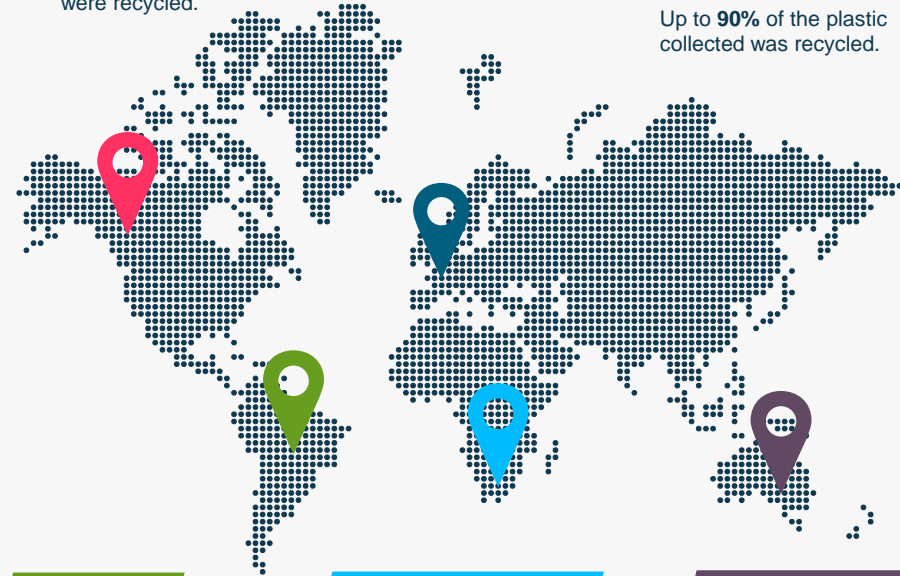
In 2021, the container management program **CLEANFARMS INC.** collected more than **3.3 million kilograms of packaging**

100% of plastic containers collected were recycled.

France

In 2021 the French program **ADIVALOR** recovered **89,000 tons of agriculture plastic**

Up to **90%** of the plastic collected was recycled.



Brazil

600,000 tons of empty containers correctly disposed with **InpEV and Campo Limpo**

400 Collection sites across the country

South Africa

In 2021, the container management program spearheaded by **Croplife South Africa** collected **4,800 tons of plastic containers**

88% of the plastic collected was recycled.

Australia

Since 1999, the **Australian program** has collected and disposed of more than **40.6 million plastic containers**.

Co-funding Zambia's first empty container management program

CropLife Zambia's Empty Container Management Program started in the year 2013 with the objective of tracing empty pesticide containers and collecting them for recycling. In 2021, we reached a major milestone and collected and recycled more than 50% of plastic packaging. Our team at Bayer will continue to support CropLife Zambia to increase the collection rate for all empty container.

“*Together with CropLife, we're establishing four collection sites across the country, each equipped with a wash bay where the products can be gathered, triple rinsed, punctured, and prepared for collection.*”

Geoffrey Matutu

Market Development Manager at Crop Science, a Division of Bayer AG

A key aspect to ensuring the program's success is raising awareness on the importance of product recycling throughout farming communities. For example, we train our customers in safe and responsible use, specifically in how to triple-rinse containers and correctly dispose of the rinsing water in a designated spot. Going full circle, we're also collaborating with NewTech, a profit-making social enterprise creating employment for vulnerable groups, like women and youths, by transforming plastic waste into environmentally friendly products such as furniture, ornaments, and décor.

Outlook

Supporting smallholder farmers' waste and container management

We're working on integrating measures for waste management and implementing solutions for smallholder farmers. In China, we have piloted the "Safe Use Harbor" program, which combines a so-called Biobed (e.g., Phytobac™) with a cleaning and shredding station for empty plastic pesticide packaging. This way, farmers avoid the contamination of water bodies and can more easily transport and recycle shredded plastics.

Did you know?

We work together with suitable incineration plants and partners from CropLife to dispose of obsolete product. Obsolete stocks can pose a risk to the environment and to the health of people if they are not disposed of in an environmentally sound manner. To minimize the risks, identified deteriorating obsolete stocks are incinerated. This is carried out in partnership with suitable incineration plants (e.g., hazardous waste treatment plants) and at high temperatures.

Overall, the prevention of obsolete stocks is the most important step. This requires multi-stakeholder effort to be successful. For example, the setup of large-scale management systems like the Pesticide Stock Management System that includes stakeholders such as the FAO-WHO, donors, industry and national authorities.

It is estimated that there are half a million tons of obsolete stocks globally, especially in developing countries (Source: [FAO](#)). These stocks are caused by:

- // **Unused donations:** Establishment of large on-site stocks due to lack of accurate forecasting models (e.g., for locust invasions)
- // **Deterioration:** Improper, prolonged storage
- // **Withdrawal:** Banning of pesticides or ingredients; expiry or termination of registration

For example, Bayer was involved in the disposal of obsolete stocks from Benin, West Africa, that had expired and were therefore no longer usable. Through collaboration with the former customer of the stock, we were able to transport the unusable product to the Ivory Coast for environmentally sound disposal via incineration. In total, it took us almost 2 years to receive all the required approvals and permits, but we were finally able to incinerate 145,962 tons of obsolete stocks.



Need more info?

- // [CropLife container management](#)
- // [Infographic on container management](#)
- // [CropLife Africa Middle East ramps up its container management program](#)

- // **The topic "Waste Management" is related to the following articles of the FAO-WHO Code:** [Article 5](#), [Article 9](#), [Article 10](#)



3

4

5

6

7

8

9

10

11

ARTICLE 11: *Advertising*



Key points of the International Code of Conduct on Pesticide Management:

Industry should:

- // Ensure that all statements used in advertising are technically justified.
- // Not use misleading statements, visual presentations, or misrepresented claims.
- // Ensure all sales and promotion staff are adequately trained to present complete, accurate, and valid information on the products.
- // Highlight the appropriate warnings and encourage reading the label in promotional materials and advertisements.
- // Ensure that technical literature provides information for correct use in the relevant language



Ethical marketing and sales as a foundation of trust

We couldn't be a globally leading company without our customer's trust. Adhering to ethical sales and marketing practices that meet the standards set by external regulations and codes of practices, in particular the laws and regulations dealing with advertising and marketing practices, the applicable global, regional and local industry codes relevant for our business as well as data protection and privacy of customer or consumer information. With the Bayer corporate compliance policy, Bayer Societal Engagement (BASE) principles, the Group Regulation "Integrity & Responsibility in Communications and Marketing" and our published [Group Regulation on Product Stewardship Commitment, Principles and Key Requirements](#), we apply strict internal guidelines and regulations:



We strive for reviewing all advertising and promotional materials internally for **accuracy, appropriateness and compliance** before being released outside the company.



Technical and commercial Bayer staff is enabled to provide the **appropriate advice, support and training** to their Business Partners, such that they are adequately qualified to present information on Bayer products and services to their customers.



We are aiming at making advertising, promotion and informational materials **understandable, clear and consistent irrespective of form or forum**. They avoid any statement or visual presentation which is likely to mislead or create misunderstandings by buyers/users. (refer to [article 10](#))

Example: How it works in practice

Integrity and responsibility in communications and marketing corporate policy

The overriding objective for all our communications and marketing activities and materials is to communicate in a manner that is honest, fair, and respectful. Unethical, dishonest, or otherwise inappropriate communications or marketing could severely damage public trust in Bayer and our products. The Group Regulation on Integrity & Responsibility in Communications and Marketing holds our employees, contractors and agencies accountable for complying to this.



Need more info?

[Learn more about our efforts to adhere to the requirements of Article 11](#)

[Labeling and packaging / Marketing, sale and distribution as part of our Crop Science chapter of the Sustainability Report](#)

- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

In this report, we have provided an overview on our programs, initiatives, digital tools, and partnerships for the safe and sustainable use of our products - all grounded in the FAO-WHO Code. While we already do much, we are committed to improving even further. We will also continue to encourage and facilitate cross-functional collaboration and raise awareness of the FAO-WHO Code's requirements – guided by our Bayer vision ***“Health for all, Hunger for none”***.

The FAO-WHO Code also outlines that effective stewardship requires a multi-stakeholder effort. National governments have a key role to play in providing effective legislation, regulatory systems, and other structures to enable and drive sustainable pesticide management at scale. While many developed countries have effective structures in place, some LMICs are struggling. At Bayer, and also via CropLife, we will continue to build local capacity where needed – to safeguard safety and improve the professionalization and hence productivity of agriculture.

However, our industry cannot do it alone. We need engaged national authorities and strong local and global partners that build effective structures, legislation and regulation that fosters innovation and professionalization in the agricultural sector, which will, in turn, ensure productivity gains for farmers. In times of a growing world population that is facing food security challenges through climate change and disrupted supply chains, the need has never been higher.



- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11



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