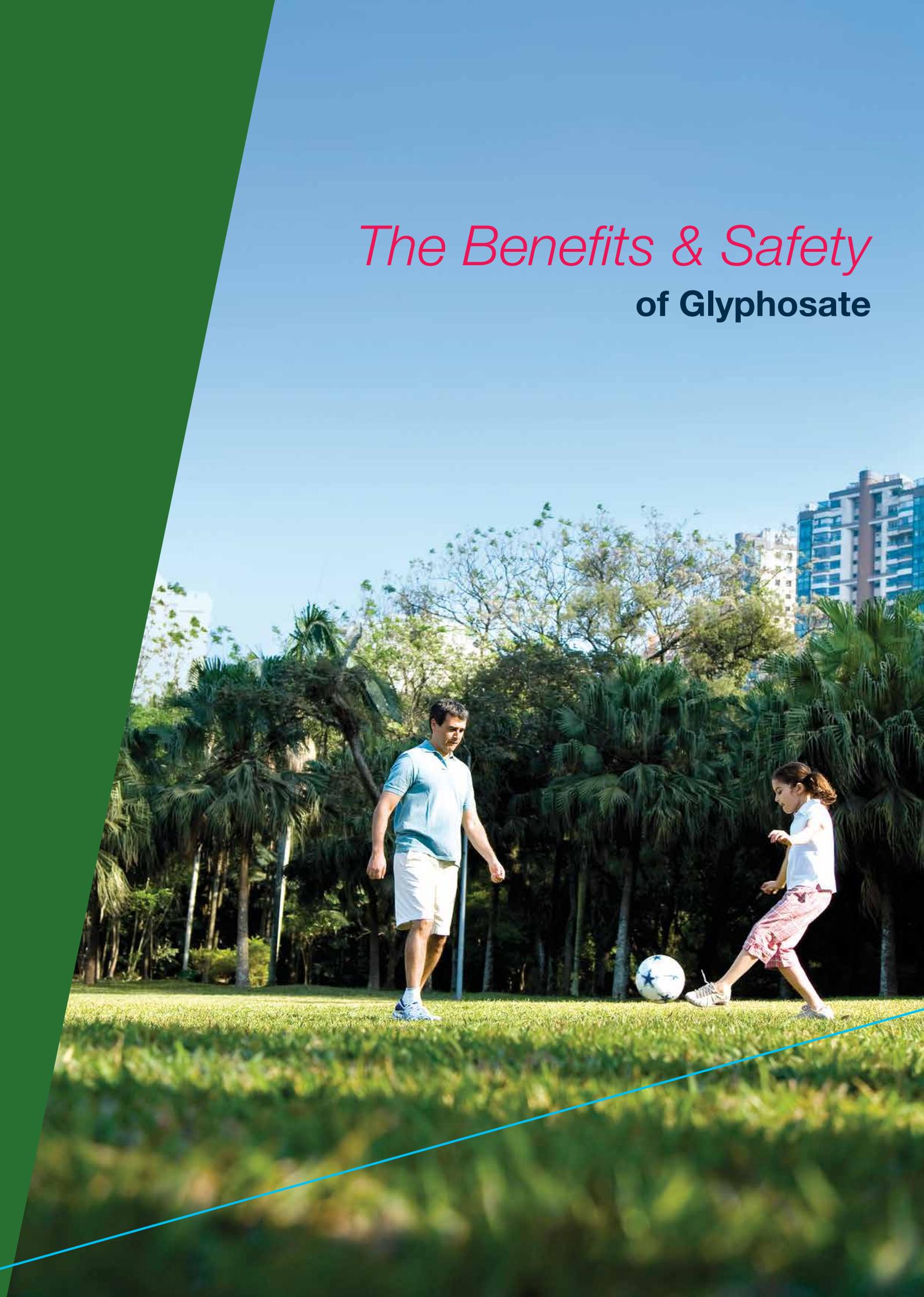


# *The Benefits & Safety* of Glyphosate



*The Benefits & Safety*

*of Glyphosate*



**Tested for 40 years. Approved for 40 years.  
Used safely for 40 years.**



## // Safety

**Glyphosate is one of the most commonly-used herbicides because of its safety profile.**

- // Glyphosate works by targeting an enzyme that is essential to plant growth.
- // When it comes to safety assessments, glyphosate is one of the most extensively evaluated crop protection and weed control tools on the market. The Australian Pesticides and Veterinary Medicines Authority (APVMA) takes a risk-based, scientific approach to regulation which ensures that each agricultural chemical product is thoroughly and independently assessed.
- // As recently as 2018 the APVMA has determined that “glyphosate is safe to use according to label directions.”<sup>1</sup>
- // In 2019, following a scientific review of glyphosate, Health Canada said “No pesticide regulatory authority in the world currently considers glyphosate to be a cancer risk to humans at the levels at which humans are currently exposed.”<sup>2</sup>
- // Glyphosate exhibits low toxicity to humans and non-plant wildlife over both short and long-term exposures.
- // In the environment, glyphosate binds tightly to soil, degrades over time and does not accumulate in the food chain.

> Get the facts about glyphosate and Roundup® brand herbicides – [bit.ly/2zCM743](https://bit.ly/2zCM743)



## // Land Management

**As part of an integrated weed management strategy, park and land managers use glyphosate-based formulations to keep weeds off roadsides and railways, control invasive weeds, restore habitat for animals, and make recreational areas more functional.**

- // Almost \$5 billion dollars is spent on annual weed control in Australia. In 2018 public expenditure on weeds for land management purposes was \$166 million.<sup>3</sup>
- // Weed management practices help control weeds which steal water, sunlight and nutrients from healthy plants.
- // Glyphosate is one of the most practical methods to control weeds because it is safe, cost-effective and easy to use.

> Superweeds – [bit.ly/2ObRjUz](https://bit.ly/2ObRjUz)

> Farming with and without glyphosate – [bit.ly/2HXHdE2](https://bit.ly/2HXHdE2)



## // Garden/Home Use

**Glyphosate-based formulations control weeds in your garden and around your home.**

- // Homeowners encounter weeds just like farmers, only on a smaller scale. Weeds can take root and grow in gardens, yards and driveway and sidewalk cracks.
- // Just like with the approved uses on a label for glyphosate for farmers and land managers, glyphosate products for use in lawns and gardens also have a recommended use rate to help consumers use the product precisely.
- // Homeowners use weed control methods to:
  - »» Eliminate the need to handle noxious weeds.
  - »» Kill weeds down to the root, ensuring they won't grow back.

> Are Roundup® weed and grass killers safe? – [bit.ly/2ObRjUz](https://bit.ly/2ObRjUz)

>What is glyphosate? – [bit.ly/2XO3cBW](https://bit.ly/2XO3cBW)

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# The Benefits & Safety

## of Glyphosate

### Glyphosate's role in preserving the Environment and Biodiversity

As the population grows, the agricultural industry is continuously working to grow healthy crops with less impact on the environment.

That means using less land and natural resources, preserving biodiversity, reducing greenhouse gas emissions and helping to ensure that soils stay rich with nutrients.

#### Protecting Honey Bees and Preserving Biodiversity

Honey bees and other insects play an essential role in the production of many crops.

This is because many crops are not wind-pollinated but depend heavily on pollinating insects. Almonds are almost entirely dependent upon honey bee pollination, and without honey bees, there would be far fewer blueberries, squash, watermelon and other fruits to harvest. It's why farmers – and the broader agricultural industry – work so hard to protect honey bees through a variety of partnerships and initiatives. It may sound surprising, but global honey bee populations have actually increased by 65 percent since the early 1960s.<sup>1</sup> And their continued growth is really important.

Honey bees face a number of challenges ranging from disease and forage, to the Varroa mite, to poor nutrition and weather. And because they are so critical to the environment, there has been much discussion about whether glyphosate-based herbicides could harm important pollinators and other beneficial arthropods.

*In a study evaluating the potential effects of plant protection products at realistic worst-case exposure rates, "No adverse effects on adult bees or bee brood development were observed in any of the glyphosate-treated colonies."*

– National Institutes of Health.<sup>2</sup>

Glyphosate products have been extensively tested in the laboratory and in the field to evaluate potential toxicity to honey bees. This extensive testing has found that glyphosate products pose no acute or chronic adverse effects to honey bees.<sup>3,4,5</sup> For example, a comprehensive study by Thompson et al (2014) found no adverse effects on adult bee survival or bee brood survival or development in honeybee colonies treated with glyphosate at levels that exceed environmentally realistic exposures.

In addition, regulatory authorities, such as the European Food Safety Authority (EFSA)<sup>6</sup> and the U.S. Environmental Protection Agency (EPA)<sup>7</sup>, conduct comprehensive evaluations to ensure crop protection products, such as glyphosate, can be used safely for the environment. As part of this process, the regulatory authorities specifically evaluate the potential for effects on non-target organisms, including honey bees.<sup>7</sup> Regulatory authorities only approve products that pose no unreasonable risk to the environment.

What researchers have also found is that by using glyphosate, farmers can ensure more productive harvests while using less land.

This is a result of decreased competition, because weeds compete with crops for nutrients, water, sunlight and space. By decreasing the amount of land needed to grow crops, farmers can preserve the important habitat and forage area that honey bees and other insects, birds, frogs and beneficial organisms need to thrive.

Extensive tests have been conducted to examine the potential impacts of glyphosate on wildlife. These studies play an essential role in governmental safety reviews of glyphosate and

collectively they demonstrate that glyphosate's approved uses do not pose a threat to the health of animal wildlife.<sup>8,9</sup>

Glyphosate products have been trusted for use in protected habitats such as the Galapagos Islands and the Florida Everglades to protect the native flora from invasive weed species.<sup>10,11</sup>

#### Promoting Environmental Health Through No-Till and Reduced Tillage Practices

We aim to ensure bountiful harvests while preserving the environment.

Through our work developing innovative products and solutions, we promote and are constantly seeking to improve sustainable farming practices.

Tillage, which involves turning over the soil, has been practiced as a form of weed control for generations. While tillage can be effective in controlling weeds, it also releases greenhouse gases stored in the soil and contributes to erosion – which can rob the soil of nutrients, make it difficult for soil to absorb water and cause run-off.

Precise application of glyphosate-based herbicides can allow farmers to leave the soil intact, producing measurable environmental benefits that are contributing to a more sustainable future.

#### Improving Soil Fertility

Glyphosate has become a very useful tool for protecting soil fertility.

One of the greatest benefits of glyphosate is its ability to foster healthier soils by reducing the need for tillage (or ploughing). By using glyphosate-based herbicides, farmers can leave their soil intact while the previous year's crop residue or organic matter remains on top of the soil. This significantly increases the amount of nutrients and microbes – tiny bacteria that assist plants as they grow – in the soil. In addition to creating a thriving environment for plant roots, using no-till and reduced till practices has been shown to reduce soil erosion by as much as 60 to 90 percent.<sup>12,13</sup>

#### Reducing CO<sub>2</sub> Emissions

We all contribute to climate change, which is caused by high levels of greenhouse gases like carbon dioxide that build up in the atmosphere and absorb the sun's heat.

In agriculture, the use of tilling, fertilizers, fuel and other tools naturally emits greenhouse gases. But unlike other industries, agriculture is uniquely capable of removing just as many – or more – greenhouse gases than it emits. All it takes is the right tools and solutions for healthy crops.

Scientists estimate that even if Europe alone used only conventional tillage to control weeds, the carbon dioxide emissions from cultivated soil would double.<sup>14</sup> And that's without taking into account the greenhouse gas emissions released from the fuel and energy consumed by tilling machinery. In 2014 alone, a decrease in tillage led to a reduction in carbon emissions equivalent to removing nearly 2 million cars from the road.<sup>15</sup>

## Preserving Water Sources

No-till and reduced tillage practices are key to keeping water safe and conserving this precious resource.

When farmers don't till, they help the soil retain water and moisture levels. More moisture in the ground means less runoff and more water readily available for crops, which reduces the need for irrigation.

Based on research and monitoring data, glyphosate does not pose a hazard to human health through surface water or drinking water and there is no evidence of any persistent groundwater contamination by glyphosate.<sup>16-31</sup> Glyphosate has a unique combination of qualities that allow it to bind strongly to the soil, making it unlikely to leach into groundwater. And, it degrades into naturally occurring substances like carbon dioxide, nitrogen and phosphate.<sup>32</sup>

## Preserving the Future with Herbicide Stewardship

Like farmers, we think in generations. We aim to ensure bountiful harvests today and leave the planet and our communities in better shape for our children and the generations to come. In addition, we have a robust stewardship program in place to understand and minimize any potential negative impact on human health or the environment.

## Here's how those safety measures are established

When a new herbicide – or any crop protection product – is introduced to the market, regulatory agencies closely scrutinize not only the effects that a product has on its target, but also the peripheral effects it may have on non-target areas, pests, animals, people and more. Only after a thorough assessment of each of these categories can farmers use a new product. And, most importantly, in most countries this scrutiny is recurring, as regulators routinely review such products and the scientific literature supporting their safety profiles.

In the past 40 years, thousands of studies have been conducted on glyphosate and reviewed by the EPA as researchers work to identify potential negative effects on humans or the environment.

The information obtained in glyphosate studies and the studies of other crop protection products is then used to establish how, when and where a product can be used safely.

## Here are some of the stewardship measures currently in place

Avoiding pollution of water – A crucial element of product stewardship is the development of clear label instructions, which outline very specific measures to reduce water contamination risks. Regulatory authorities conduct comprehensive evaluations in order to develop these product label instructions. The protection of water on farms and downstream is vitally important. Although glyphosate binds strongly to soil particles and organic matter and is metabolized by microorganisms, farmers go to great lengths to avoid any potential spray drift and run-off.

## Training for responsible use

Many farmers participate in training and certification programs to help ensure they are up-to-date on best practices for using crop protection products effectively and sustainably.

## Adhering to international standards

The FAO International Code of Conduct for the Distribution and Use of Pesticides<sup>33</sup> sets out the principles of product stewardship, which are required to protect human health and the environment, while improving the productivity, sustainability and livelihoods of farmers.

*"We want to explain the benefits that science and innovation can deliver in agriculture while championing what's important to people: safe, healthy and affordable food that is produced in an environmentally sustainable manner. Improving access to the science behind our products is a key part of our Transparency Initiative."*

– Liam Condon,  
President of the Bayer Crop Science Division

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# The Benefits & Safety of Glyphosate



## // Roundup® Product Stewardship

Product stewardship encompasses a range of activities from the responsible development of new formulations right through to supporting their usage, their users, their suppliers and others as may be required. This support doesn't stop after a product is introduced but continues throughout its life cycle. Just a few of the ways we support Roundup are shown here.

## // Best Practice

The increasing pressures on active ingredients mean best practice use is essential for sustainability. Equally, best practice is essential for legislative compliance and to ensure maximum value from the product through correct use. We are committed to providing advice on Roundup best practices e.g.

- // Providing up-to-date, accurate information regarding both glyphosate and Roundup products
- // Providing best practice advice on specific areas of concern, such as:
  - Minimising glyphosate levels in water
  - Minimising risk of glyphosate resistance development via correct dose rates and timing
- // Working with Roundup users, suppliers and others to ensure sharing of knowledge on Roundup and best practice through the whole of the product life cycle
- // Availability of a technical helpline for immediate advice and assistance for both Roundup users (pre and post purchase) and their advisors
- // Online support providing general and seasonal advice, product labels, safety data sheets, and Environmental Impact Assessment forms
- // Prompt communication of any new legislation and how it may relate to Roundup use

## // Roundup Product Development

Over 40 years of investment in Roundup formulation innovation has ensured the delivery of a product that continually responds to the increasing challenges faced by modern amenity professionals. The Roundup Biactive formulation recognises the need for a high level and consistent product performance whilst meeting the increasing demands of environmental stewardship and the practical use of glyphosate in modern amenity situations. The optimised blend of surfactants makes Roundup Biactive our most advanced amenity glyphosate on the market.

## // Safety To The Environment

Safety to the environment is an important consideration when treating weeds in and around water. Roundup Biactive is particularly suitable for these areas. It gives effective weed control, and is quickly broken down in soil or sediment into harmless natural substances. It is non residual, and does not harm animals, birds, fish, insects and other wildlife.

When Roundup Biactive is used correctly, only a small proportion of the spray reaches the water. Any herbicide which enters the water is broken down by microbes.

- // Aquatic approved surfactant
- // Approved for Environmentally Sensitive areas
- // Broad range of annual, perennial and aquatic weeds
- // Highly compatible with many tank mix partners
- // Optimised surfactant package

specifically formulated for use in

*environmentally  
sensitive areas*

**Roundup**  
**BIACTIVE**



Herbicide



# Your Success, Our Science

## // Product Information

RoundUp Biactive Herbicide

Active Constituent: 360 g/L glyphosate  
(present as the isopropylene salt)

Pack Size: 20 L

Group M Herbicide

Formulation type: Soluble concentrate

Roundup Biactive is a water soluble concentrate (SL) for non-selective control of many annual and perennial weeds in certain situations.

Contact details:

Paul Crack, National Sales Manager (VM)  
M: 0438 991 907

For further information about glyphosate:  
[www.bayer.com/glyphosate](http://www.bayer.com/glyphosate)

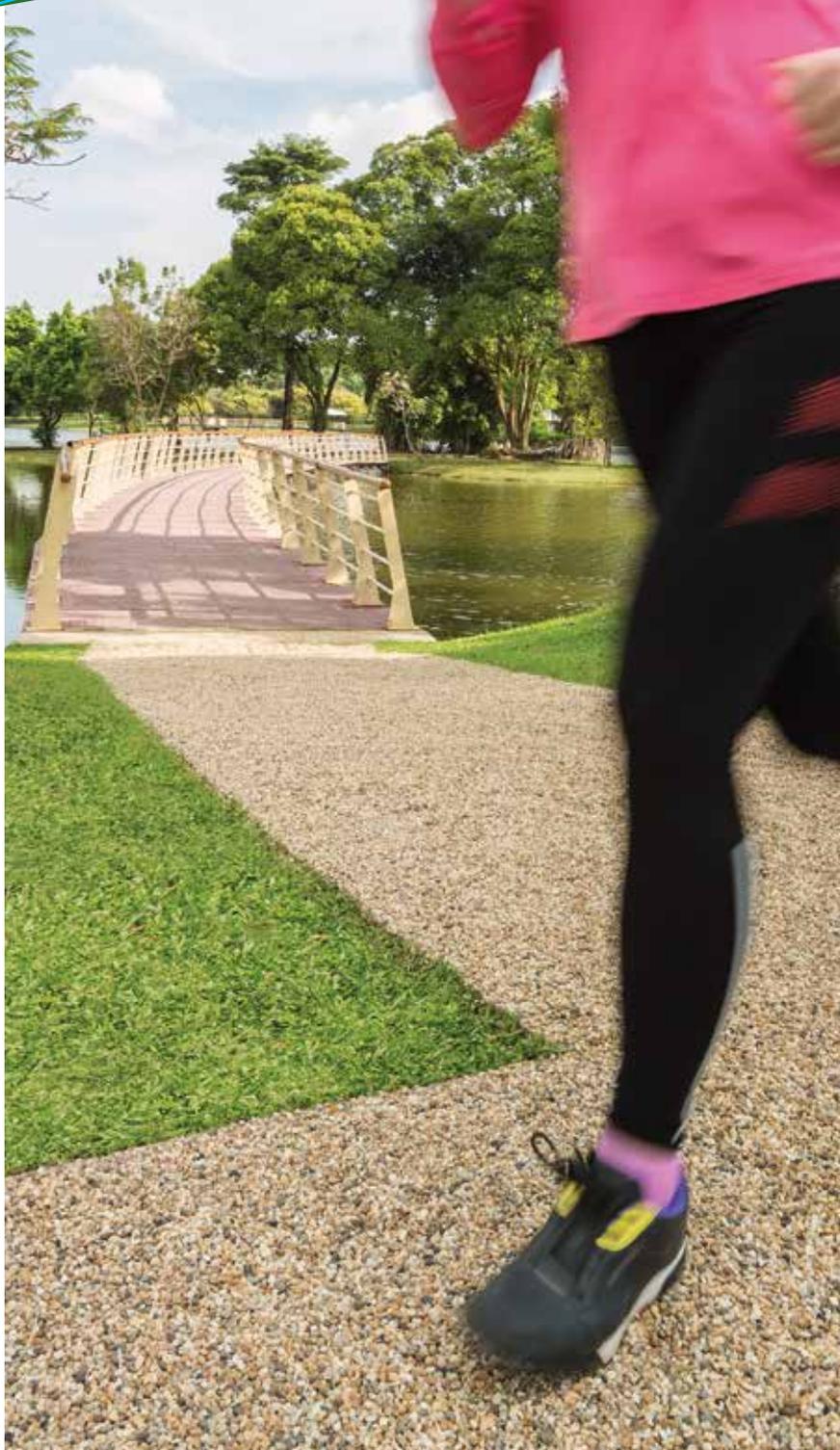
## // Science For A Better Life

Bayer is an international life science company offering innovative products that serve the health of humans, plants and animals.

As an inventor company, Bayer sets trends in these research-intensive areas. Bayer's products and services are developed to improve the quality of life. Bayer is committed to the principles of sustainable development, placing equal value on our economic, environmental and social performance.

Environmental Science, a business unit of the Crop Science Division of Bayer, is a leader in our industry today, and aspires to become a thought leader tomorrow.

Guided by our purpose of "Fostering Healthy Environments where we Live, Work, and Play", we aim to provide to our customers high-quality solutions beyond products, investing in innovation, promoting sustainable development, and strengthening our customer centricity.



ALWAYS READ THE LABEL AND PRODUCT INFORMATION BEFORE USE

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