

Producing More, Using Less



Efficient Crop
Protection
is Climate
Protection



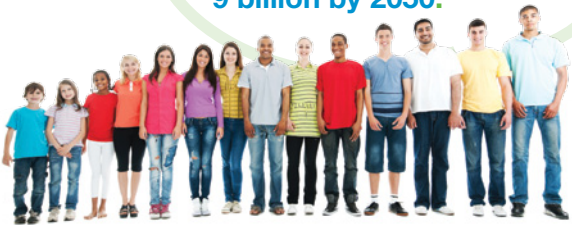
Bayer CropScience

The Issues

Population Increases

With the global population reaching 7 billion during 2011 and projected by the United Nations to exceed 9 billion by 2050, agriculture has never faced a more compelling challenge or exciting time. The demand for food, animal feed, fibres and biofuels will continue to grow yet the amount of land available to meet these needs will continue to fall. In short, we need to get more food out of less land while ensuring that production is sustainable, something that the Royal Society, and the Government's Foresight report, have termed 'Sustainable Intensification'.

The United Nations projects that the global population will exceed 9 billion by 2050.



Climate Change

- Changes to the world's climate offer a further challenge to agricultural systems. Recent reports from the Climatic Research Unit at the University of East Anglia suggest that increases in global temperatures since 1995 are statistically significant.
- The Stern Review (in 2006) reported that even modest increases in global temperatures would increase the frequency of extreme weather events such as droughts, flooding and heat waves. All of these have the potential to adversely impact on agriculture and food production.

Water in Agriculture

Both the rising global population and the effects of climate change will impact on the availability of drinking water. **The OECD estimates that globally, 70% of the freshwater withdrawn from natural resources is used in agriculture for food and fibre production.** So at a time when we need to intensify agricultural production we need to do this with less water. We therefore need to harvest more food per drop of water.

Water protection and water use efficiency must be an integral part of sustainable intensification. Our activities in this area include:

- Developing stress and drought tolerant crops
- Developing technologies for weed management that allow conservation tillage and improve soil moisture
- Researching products that will increase the water efficiency of plants
- We also look to save water in our own facilities and contributed to the First Global Water Disclosure Report (2010)

Thirsty Foods

The Water Footprint Network has provided an estimate of the amount of water needed to produce some of our common foodstuffs:



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A slice of bread needs 40 litres of water

(most of this comes from wheat, 1kg of which requires 1300l of water)



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A glass of beer needs 75 litres of water



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A cup of coffee needs 140 litres of water

“I am convinced that only if we take advantage of all technological opportunities can we safeguard the global food supply in the long term... we now need a second green revolution”

Sandra E. Peterson
CEO of Bayer CropScience AG

Feeding a growing world population

If left unchecked, diseases such as late blight can devastate a potato crop (as it did in the Irish potato famine), and insects such as caterpillars and whitefly can so badly affect the quality of a crop that it cannot be sold. In fact, without crop protection, nearly half of the world's harvest would be lost to pests and diseases.

To play our part so we are able to feed not only today's population but the estimated 9 billion people in 2050, Bayer CropScience continues to develop innovative crop protection solutions to help safeguard harvests and increase productivity from existing arable land. It is estimated that by 2030 we will need to see at least a 50% increase in food productivity. We therefore need to use all of the tools at our disposal.

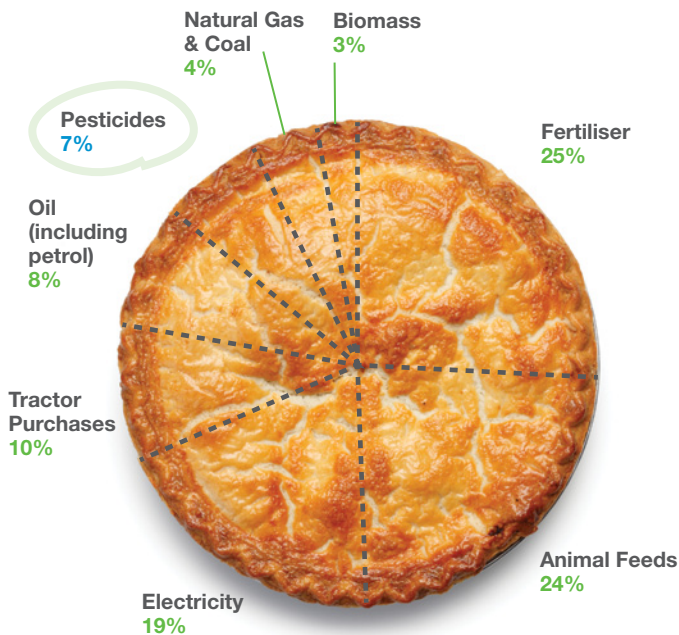
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Crop Protection and Climate Change

All activities have the potential to impact on the environment. Agriculture and crop protection are no exception, and all farming systems, whether they are 'conventional' or organic, will have an impact. It is estimated that globally, the agricultural sector accounts for around 14% of total greenhouse gas emissions. In the UK, Defra reported in 2008 that less than 7% of agricultural emissions come from crop protection products. This compares with a contribution from the use of fertilisers and electricity in agriculture of 26% and 19% respectively.

However, this relatively small amount of carbon emitted in the production of crop protection products could be seen as a form of 'carbon investment' with healthier crops photosynthesising more, trapping more CO₂ and producing more food and other useful products.



A Cranfield University study into the contribution of crop protection to greenhouse gas emissions concluded that for one kilo of CO₂ equivalent invested in the manufacture and use of pesticides, at least 10kg of CO₂ is removed from the atmosphere as a result of yield increases attributed to that pesticide use.

For every 1kg of CO₂ equivalent invested in the manufacture and use of pesticides, at least 10kg of CO₂ is removed from the atmosphere as a result of yield increases attributed to that pesticide use.

Cranfield University
2009



A further benefit of crop protection is that it enables **as little land as possible to be used to produce the food we need**. This is hugely important from a climate perspective as bringing new land into agricultural production produces large quantities of greenhouse gases such as CO₂ and nitrous oxide, and allows more land to be available for environmental and amenity use.

What is Bayer doing?

By continuing to research and develop innovative crop protection solutions, Bayer is helping to protect yields and quality and ensure that we can grow as much food as required on as little land as is practically possible here in the UK. This is sustainable intensification in practice.

Bayer looks to work across its own business functions and with external bodies to tackle the issues raised by climate change, by:

- Minimising our own carbon footprint. For example, at our production sites, between 1990 and 2005, **we have cut our greenhouse gas emissions by more than a third**, through improved energy efficiency, and the application of new technologies and chemical processes.
- Bayer is working with a range of partners as part of the **Min-No project**, to look at ways of reducing nitrous oxide emissions, a greenhouse gas three hundred times more damaging than CO₂, from agricultural systems.
- Bayer CropScience is also working to **develop new varieties** of crops, including oilseed rape, maize, and wheat that are more stress-tolerant and produce higher yields. Such work will also involve the use of biotechnology as consumers become more comfortable with its use in agriculture.



Crop Protection = Climate Protection!

Climate change represents one of the major global challenges of our time.

Through the Bayer Climate Program the company is driving forward its activities to reduce its climate footprint and respond to climate change. The Bayer Climate Check, for example, is a new tool for reducing CO₂ emissions in production processes.



Bayer's work in these areas has been recognised globally, and we have achieved the **top international ranking** in the **Carbon Disclosure Leadership Index**, which lists the companies that display the greatest transparency in climate reporting.

Furthermore, Bayer has again been recognised as **"best in class" in sustainability** as described by the **Dow Jones Sustainability World and European Indices**.

Looking ahead, Bayer continues to explore innovative ways of tackling the issue of climate change. One such example is research into a novel process where the greenhouse gas CO₂ is used as a raw material for the production of plastics.

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