

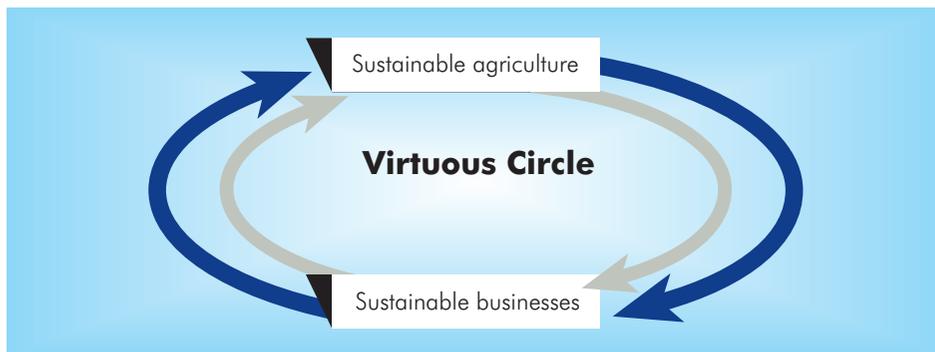
Using research and development to improve agricultural productivity

Introduction

The population of the Earth is growing at a fast pace. In 1950, 2 billion humans lived on the planet. By 2006, this had increased to 6.5 billion and by 2025, the world's population is expected to reach 8 billion people. This growth in population is expected to be in urban areas, not rural. This leads to a higher calorie demand per person associated with dietary changes. It puts a heavy burden upon the world's limited resources and further increases pressure on rural communities in the struggle to increase agricultural productivity. In 1960 one **hectare** of agricultural land was required to grow food to feed two people. By 1995 one hectare was required to feed four people and by 2025 the same area will need to feed five people.

Feeding this growing demand requires **sustainable** solutions for agriculture across the world. This involves balancing the need to produce food with concerns for the environment.

Sustainability is a '**virtuous circle**'. If agriculture uses sustainable solutions it will be able to meet the needs of future generations and become the type of farming which future generations want to inherit. As sustainable businesses grow, they develop better methods and solutions to support farmers and growers around the world. Both communities and businesses benefit and local economies grow.



Sustainable businesses

Syngenta is a leading global agricultural business committed to sustainable agriculture through innovative research and technology whose customers are in the **primary sector**. Syngenta is a relatively new company formed by the **merger** of the agricultural divisions of AstraZeneca and Novartis in 2000. Syngenta's **goal** is 'to be the leading global provider of innovative solutions and brands to growers and the food and feed chain'. This provides the business with its direction as part of the virtuous circle. The company offers its customers a choice of chemistry, seeds and biotechnology products.

More than 19,500 people work for Syngenta in over 90 countries around the world. Its main activity is producing products that protect crops from weeds, diseases and pest infestations, and breeding and selling seeds of new crop varieties. This enables agricultural land to be used for the sustainable production of food.

CURRICULUM TOPICS

- Research and development
- Market and product orientation
- Business growth
- Sustainability



GLOSSARY

Hectare: metric unit of measurement of land, 10,000 square metres or 2.47 acres.

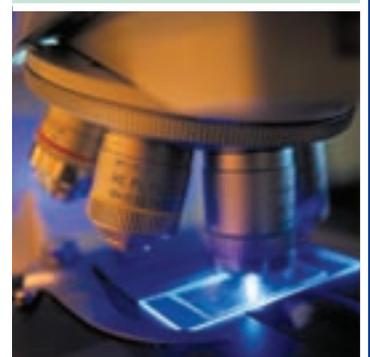
Sustainable: agricultural solutions that maintain resources, productivity and profitability and are environmentally friendly into the future.

Virtuous circle: a form of renewal in which sustainable activities in agriculture create sustainable businesses within the agricultural sector.

Primary sector: industries concerned with the use of natural resources such as farming, mining or quarrying.

Merger: the joining of two or more companies.

Goal: broad statement of purpose, providing a direction for an organisation.





GLOSSARY

Research and development (R&D):

advances in science and technology that lead to new and improved products and services.

Business-to-business (B2B):

transactions between companies rather than between companies and consumers.

Competitive advantage:

what differentiates an organisation from its competitors and gives it commercial edge.

Compounds: chemicals that combine two or more elements.

Patent: the legal right to the sole making and selling of an invention for a particular number of years.

Biodiversity: the number and variety of plant and animal species that exist in a particular environmental area; the problem of preserving and protecting this.

Research and development (R&D) into plant breeding and plant protection products by companies such as Syngenta is essential to ensure higher agricultural productivity. Without crop protection products it is estimated that 40% of arable food production would be lost to pests and diseases. Syngenta works in partnership with over 150 organisations worldwide to research and develop sustainable agriculture practices.

Syngenta invests almost US\$800 million (about £500 million) each year in research and development to improve ways of growing and protecting crops. This case illustrates how the use of science for research and development into new products has helped to build Syngenta as a leading global agribusiness.

Developing products to meet markets

Syngenta operates in markets where transactions take place between companies rather than direct to consumers. These are known as **business-to-business (B2B)** markets. This is why some people might not be aware of the company's name. However, Syngenta touches nearly 95% of the world's population through its products and activities. Within these markets, Syngenta uses its R&D knowledge, creativity and skills to give it **competitive advantage**.

The development of a new crop protection product or a new plant variety takes many years and requires a large investment both of people and capital. Syngenta's R&D invests over \$2 million per day to ensure it has a pipeline of new products coming to market and to keep it ahead of its competitors.

The role of R&D

As society develops, consumer demands change to reflect different needs. Consumers want to choose from a range of fresh, high quality products. To meet these needs in a sustainable way farmers have to balance environmental concerns with the need to produce food. Within Syngenta research and development are two separate, but closely integrated, functions.

Research

Research is a systematic investigation to seek answers to agricultural problems. Scientists such as biologists and chemists develop technologies which may eventually lead to new products. For example, chemists investigate thousands of different **compounds** to see if they have the potential to be a new crop protection product. Once a suitable compound is identified, then development takes place.

Development

Development involves turning the research findings into a product. Development scientists perform tests on the compound to see how it operates in realistic growing conditions. It can take at least 9 years for a product to reach the market. This is a very costly process. Syngenta can only achieve a return on its investment once the new products reach the market. A new product and its active ingredient are **patent** protected to ensure payback of R&D costs, but this protection only exists for a limited time. Consequently, Syngenta concentrates on fully patentable products to ensure payback and profit.

Research and development at Syngenta involves developing new products and supporting existing products. For example, it has extended the way in which products can be used and has improved their environmental profile. Syngenta's main goals for research and development are:

- to provide the most effective products for farmers and growers that are also safe for human health and the environment
- to develop the best new plant varieties to gain higher yields and quality in a range of soils and weather conditions
- to maximise crop productivity whilst maintaining and improving farmland **biodiversity**.



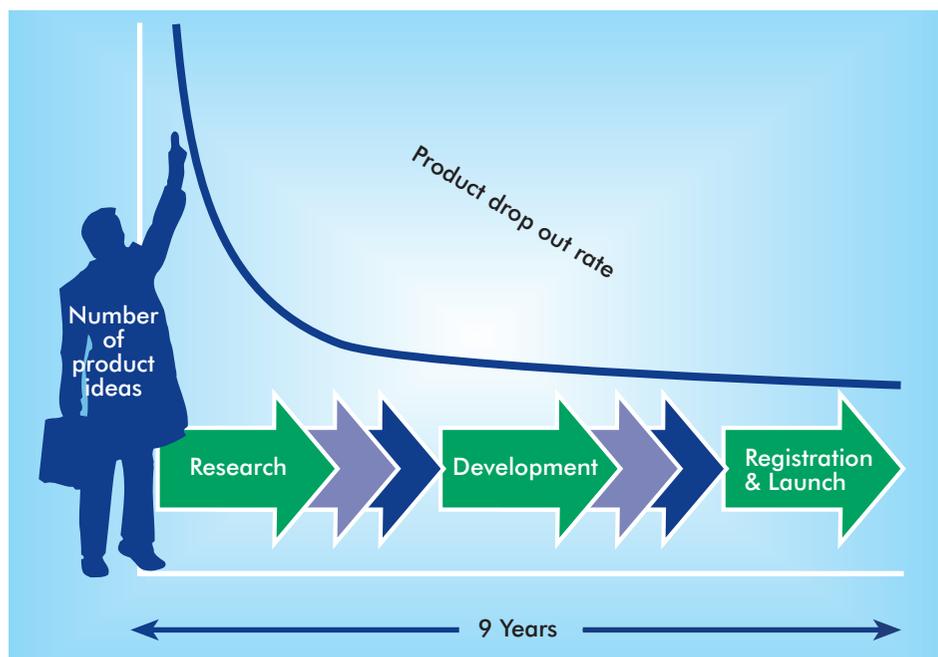


New product development

Finding a new compound and bringing it to market is a long process. Here are the main stages of the R&D process:

1. **Identify new areas.** The research needs to identify areas of opportunity. In crop protection this often starts with chemistry. Chemists look for new compounds which will overcome existing problems or where resistance to existing products has developed in pests or diseases.
2. **Test the new ideas.** Biologists then test the compounds to see if they have the active potential to become products whilst ensuring environmental safety.
3. **Trial in specific conditions.** Researchers and developers test whether the compounds would work in various conditions, for example, in open fields. By a process called formulation development the active ingredients become a product that farmers can use.
4. **Product safety.** Environmental scientists ensure that products are safe to use. This is an assessment which goes on throughout the above process.
5. **Support users.** When the products are launched, Syngenta provides support for farmers. This helps them use the products in the most effective way.

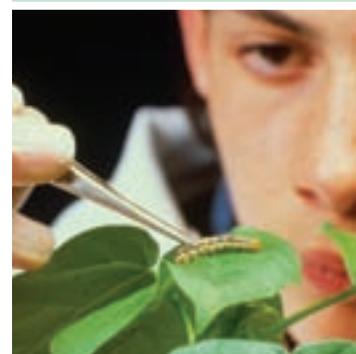
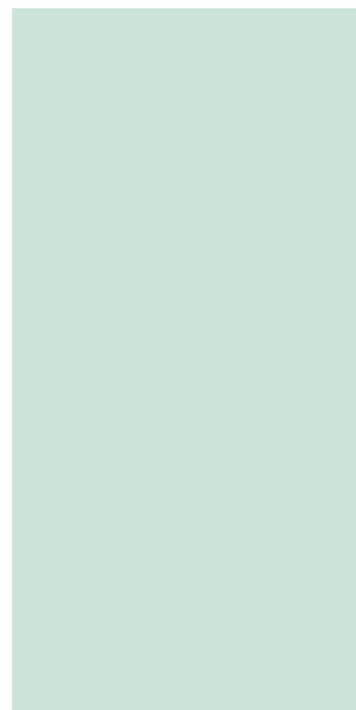
During the phases of research and development, a large number of compounds and plant varieties will be dropped because they do not meet the high standards required by the company and the Government regulators.



R&D and environmental sustainability

Much of Syngenta's R&D focuses on the development of new products for farmers and growers, but the company also invests in environmental projects. These demonstrate how highly productive, profitable agriculture can go hand-in-hand with biodiversity and environmental sustainability. For example:

- **SOWAP (Soil and Water Protection) Project:** Soil erosion is a huge problem in arable farming, particularly when ploughed fields are subject to heavy rainfall. In Europe, around 200 million tonnes of soil per year is washed into lakes, rivers and roads, causing pollution and reducing agricultural productivity. Working with around 25 project partners across Europe, Syngenta led a 4-year project demonstrating how the practice of 'Conservation Agriculture' - reduced soil disturbance, permanent soil cover, and diverse crop rotations - can reduce erosion by 60% or more. When applied correctly, Conservation Agriculture reduces water pollution and improves farmland biodiversity, whilst maintaining crop yields.



SOWAP
SOIL & WATER PROTECTION





GLOSSARY

Relationship marketing:

building and developing relationships with customers in a way that takes a long term view of their needs.

- **Operation Bumblebee.** Bumblebee populations on UK arable farms have declined by more than 70% over the last 30 years. This is because of changing ways in which crops were grown, which led to the loss of vital nectar food resources and nesting sites for bees. One of the 20 native species of bumblebee has disappeared altogether. Three others are on the verge of extinction. Operation Bumblebee involved more than 5 years of research by Syngenta into the habitats for bumblebees, butterflies, spiders and other insects on farms. The research involved a number of test sites within the UK. The edges of fields (field margins) were cultivated to create biodiversity sites. Scientists at Syngenta designed a special pollen and nectar seed mixture that included wild flowers and clovers. Farmers are trained to establish and manage these mixtures along the field edges. The impact upon the bee population was clearly beneficial. Managing field edges in this way also produces major environmental benefits on farms whilst maintaining high food production. If farmers manage their farms this way they qualify for payments from the Department for Environment, Food and Rural Affairs (Defra). In this way among others Syngenta has helped farmers to improve the environment.

Farmers get full product support. For example, Syngenta trains over one million farmers each year worldwide in the safe use of its products. Syngenta’s representatives in the field use **relationship marketing** skills with farmers for repeat business. It also provides farmers with the confidence to try new products and innovations as and when they are launched.

Conclusion

With the rapid growth in world populations and developing economies, there are increasing demands upon limited resources.

This makes the need for research and development vital for effective sustainability. Syngenta’s approach is about providing sustainable solutions. At the centre of its approach to R&D is the use of science. This creates knowledge and allows Syngenta to develop added-value products and services. Syngenta ensures that its business is able to respond to industry demands in a competitive world.

Syngenta’s work also benefits society. Successful R&D programmes help Syngenta build its competitive advantage and benefit the next generation of farmers and consumers. Its developments have helped improve the lives of many rural communities around the world. Improvements in agricultural productivity enable farmers to live healthier, safer and more prosperous lives and provide consumers with cheap, high quality food.



Questions

1. Provide two examples of businesses known to you in the primary sector.
2. Explain what is meant by a ‘virtuous circle’.
3. Explain what is meant by R&D. What are the outcomes arising from effective R&D?
4. Describe and then evaluate the advantages provided by R&D for Syngenta. How does this affect its position within the marketplace?

