



syngenta

Enhancing Biodiversity

Proactive management
of biodiversity in intensive
agriculture



Contents

Introduction	Increasing food security in a sustainable way	3
The importance of biodiversity	The vitality and value of biodiversity	4
	Biodiversity and agriculture are intimately linked	5
	The importance of pollination	6
	Evaluating and monitoring biodiversity	7
Opportunities	Biodiversity enhancement in agriculture	8
	Increased productivity alongside sustainability initiatives	9
Our contribution	Our contribution	10
	Our approach	11
Our biodiversity initiatives	Solutions for Sustainable Intensive Agriculture (SIA)	12
	Operation Pollinator - Ten years of practical experience	13
	Targeted implementation of Ecological Focus Areas	14

About Syngenta

Syngenta is one of the world's leading companies with more than 26,000 employees in over 90 countries dedicated to our purpose: Bringing plant potential to life. Through world-class science, global reach and commitment to our customers we help to increase crop productivity, protect the environment and improve health and quality of life.

Syngenta believes that farmers can produce enough to meet the world's needs for food, fuel and fiber and safeguard the only planet we have for future generations – if we take a system-wide approach that links technology, land and people. These three elements build the foundation for a sustainable production system in which technology enables better solutions for farmers to increase productivity and profitability, to improve resource efficiency, and contribute to food security. Agriculture depends on biodiversity, which is necessary for productive farming basics such as pollination, healthy soil structures, and a broad range of crop varieties.

Increasing food security in a sustainable way

Since the 1950s, a series of research, development and technology transfer initiatives have increased agricultural production and delivered greater food security around the world. These initiatives, known as the “Green Revolution”, are credited with saving over a billion people from starvation. It involved the development of high-yielding crop varieties, expansion of irrigation infrastructure, modernization of management techniques, distribution of hybridized seeds, synthetic fertilizers and crop protection to farmers.

Since then, agriculture has seen big changes in production methods, including increased mechanization and farm consolidation. These developments have been accompanied by reductions or even the removal of margins, hedges, ponds and other uncultivated areas rich in biodiversity.

Today, European agriculture is at a crossroads. Sustainable food security is at the heart of any discussions and solutions, because we must halt the loss of biodiversity and the degradation of ecosystem services and at the same time meet a growing food demand. This is why the overarching objective for reform of the future Common Agricultural Policy (CAP2013) is sustainable competitiveness. The aim is to achieve an economically viable food production sector, in balance with sustainable management of the EU's natural resources of water, soil and biodiversity.

A sustainable European agriculture is of strategic importance for:

- food security and safety
- the environment
- climate change mitigation

Resource efficiency will be a priority as land used to produce food may compete with land use for energy and both may compete with land which supports biodiversity or provides ecosystem services such as pollination.



Environmental gains alongside productive agriculture: managed field margins and healthy food production

The vitality and value of biodiversity

To many, the term biodiversity brings to mind the plants and animals of uncultivated prairies and forests, but it is much more - it is the basis for our well-being.

We depend on biodiversity for essential aspects of agriculture. Most of our crops depend on various pollinators; beneficial insects and fertile healthy soil structure which have multitudes of microorganisms as the variety of food we eat comes from the genetic diversity of such crops. At least 40% of the world's economy is derived from biological resources, says the United Nations Environment Programme (UNEP).

The services that nature provides us with, such as clean water and fresh air, fertile soil and food, are not only crucial for the well-being of humankind, they also represent a huge economic value. According to some economists, each year we lose a significant part of our GDP quite simply because of the loss of biodiversity.

Today, biodiversity loss is considered an enormous challenge. The European Commission has warned that around one in four species is currently threatened with extinction. To protect biodiversity and to halt biodiversity loss the EU made a strong commitment in its 2020 strategy. Proactive management of farmland biodiversity will be essential for meeting EU biodiversity targets. With CAP2013 the EU is proposing incentives to farmers for the implementation of greening measures. The three main measures are: a) creating ecological focus areas, b) crop diversification, and c) the maintenance of permanent pastures. These three measures will represent a third of future direct payments to farmers.

There are over 2000 species of bee in Europe: many of these are important pollinators of fruit, vegetables and arable crops



Biodiversity and agriculture are intimately linked

As over half of European land is managed by farmers, the farming community has an increasingly important role to play. Farmers, who are the custodians of the land, are on the front line and have the technology to deliver cost efficient conservation of natural resources across Europe.

Agricultural ecosystems provide humans with food, forage, bioenergy and medicines essential to human wellbeing. Enhancing farm and landscape biodiversity also supports the restoration of agricultural ecosystem services to provide:

- Pollination
- Pest control
- Maintenance of soil structure and fertility
- Nutrient cycling and hydrology services

Measures to train and encourage farmers to manage field margins more effectively will deliver important gains for biodiversity and the restoration of ecosystem services.

A well-managed agricultural landscape will play a significant part in helping the EU to meet its commitment to halt the loss of biodiversity by the end of this decade.



In olives targeted Ecological Focus Areas can provide essential habitat for beneficial insects to support integrated pest control

The importance of pollination

Pollination is an essential ecosystem service in agricultural landscapes. Approximately 80% of European crops depend directly on pollinating insects, such as solitary bees, honey bees and bumble bees, hoverflies and butterflies. The value of insect pollination to the global ecosystem is estimated at around €153 bn per year (€ 14.2 bn for Europe).

However, the number of pollinators in Europe has been and is still declining at significant rates. The decline has been linked to habitat loss, diseases and viruses, changes in agriculture practices and urban sprawl among other factors. While farm landscapes often lack the diversity and abundance of flowers, that pollinators require, extensive research has shown this trend can be reversed. Requirements for supporting a pollinator community include diversity in foraging habitats, with diverse, rich nectar and pollen nutrition, as well as adequate nesting areas.

It is therefore essential to proactively manage ecological focus areas to create urgently needed habitat for pollinating insects. In particular wild bees, contribute significantly to the pollination of a large array of crops. Recent research shows that improved pollination can significantly increase yield and quality for crops depending on insect for reproduction. These crops include many of the fruits and vegetables we eat every day, as well as various mass flowering crops, such as sunflower and oil seed rape.

In melon and many other crops improved pollination can have a direct impact on crop yield and quality



Evaluating and monitoring biodiversity

Evaluation of biodiversity in agricultural landscapes is required for three main reasons:

- To understand what is there in agro-ecosystems
- To discover trends in population size and understand what processes were driving that change
- To determine the impact and effectiveness of agri-environmental measures

In practice, even in the most uniform agricultural areas, it is impossible to measure every aspect of biodiversity. Because of the complexity of biodiversity, incomplete taxonomic knowledge and high cost of biodiversity assessments and monitoring programs, monitoring typically relies upon a small number of indicators for which data are available.

Inventories often provide the basis for the development of practical, cost-effective monitoring programs and an initial biodiversity assessment. An inventory is a stock take at a given point in time. Usually the intention is to compile comprehensive information on the current state of an organism, such as the presence or absence of a species or ecosystem component.

Long-term monitoring programs usually focus on indicator species and changes in state (system dynamics). Representative indicator species (such as bees, earthworms and birds) can be measured. The data on these selected species can often provide valuable indication whether there is suitable habitat for a whole range of species. Monitoring programs compare measurements at different places and times. Re-measurement is a key part of monitoring programs.



Biological monitoring allows not only the quantification of rates of change but, together with experimental and modelling approaches, also improves understanding of the drivers and processes of change, and allows the development of better strategies to protect biodiversity

Biodiversity enhancement in agriculture

The biggest opportunity to enhance biodiversity in agricultural landscapes is to increase the quality and amount of edge habitat. This is land given over to uncropped areas such as field margins, field corners and buffer zones. In policy terms these areas are called ecological focus areas. Additionally, optimized principles of integrated pest management, soil tillage practices and a more balanced approach to maintain soil fertility can improve beneficial organisms in cropped fields and surrounding landscapes.

Extensive research shows that managed field margins have many benefits.

Biodiversity benefits:

- Boost the number of pollinating insects
- Increase earthworm populations and activity
- Support practical integrated pest management (IPM)
- Provide food sources for birds and small mammals
- Reintroduce local plant species

Additional benefits:

- Avoid soil erosion
- Protect water courses
- Carbon sequestration
- Enhance and support recreational areas
- Support ecotourism

In vineyards targeted Ecological Focus Areas can reduce soil erosion and protect water



Increased productivity alongside sustainability initiatives

Independent research shows that environmental measures and productive farming can co-exist in the same field. Proactive management of relatively small areas of land can significantly enhance on-farm biodiversity.

It is broadly acknowledged that implementing environmental measures on commercial farms are essential to achieve the EU's 2020 biodiversity targets and protect natural resources – primarily clean water and fertile soil.

The challenge to achieve sustainable food security is to balance the quality and quantity of agricultural production, together with environmental performance. Future farming systems will need to integrate practices capable of protecting natural resources and responding to climate change.

Practical implementation of the EU's greening measures will be crucial to move to a more sustainable farming system. European farmers will need financial incentives and training to broaden their focus from the production of crops to managing additional requirements around the provision of environmental public goods and services.

The three main tasks to resolve are how to:

- translate scientific findings into targeted policy to support best management practices
- adapt practice locally to protect natural resources and respond to climate change
- train farmers and stakeholders to develop the additionally skills required



To deliver environmental value at large scale and low cost Ecological Focus Areas need practical agronomic management. This includes crop protection to manage arable weeds and farm machinery to be efficient

Our contribution

Our ambition is to help growers deliver greater food security to an increasingly crowded world in an environmentally sustainable way. That calls for a step change in productivity and resource efficiency – on both the world's 5 million large farms and its 450 million smallholdings.

We believe it can be done, but it will need a system-wide approach that links people, land and technology. These are the foundations for a sustainable production system. Technology enables better solutions that allow farmers to increase productivity and resource efficiency in sustainable rural economies.

Action on food security cannot wait. Just to keep pace with population growth, global average yield per hectare will have to rise. To achieve this, we need to overcome many challenges and dilemmas that are best addressed by working in partnership with farmers and other organizations.

Improving farm productivity

- Enabling the right choices
- Accelerating innovation
- Sharing knowledge

Reducing agriculture's environmental footprint

- Preserving the land
- Saving water
- Protecting biodiversity

Building rural prosperity

- Building markets
- Valuing farm work
- Community development

A system-wide approach that links people, land and technology



Our approach

Syngenta aims to develop practical tools for farmers to promote Sustainable Intensive Agriculture. By collaborating with multiple stakeholders, we look beyond single disciplines to create complete solutions. And increasingly we look beyond yield alone to complete solutions that benefit both people and land.

Integrated solutions

We are moving beyond single scientific disciplines and products to develop value chain solutions

Yield & quality

To help growers deliver greater food security, we are developing optimized crop solutions to grow more from less.

Sustainability

Through collaboration with multiple stakeholders we are contributing to reduce agriculture's footprint and developing a more sustainable farming system.



By collaborating with multiple stakeholders, we look beyond single disciplines to create complete solutions

Solutions for Sustainable Intensive Agriculture (SIA)

Due to the scarcity of natural resources, climate change, a growing world population and the physical limitation of productive agricultural land, the continued development of sustainable intensive agriculture is essential to maintain the future quality and quantity of agricultural products for European consumers. Using the current available productive land more efficiently through intensive agriculture can avoid the need for agricultural expansion into the remaining natural habitat that is vital for biodiversity and carbon storage, as would be the case with less productive lower intensity systems. It will also resist pressures on land occupancy from non-agriculture sectors.

In the face of a growing global population and an increasing demand for food in Europe and worldwide, we believe that agriculture should focus towards ensuring food security through strong policy mechanisms based on societies' needs and by greater focus on investment in innovation.

Sustainable intensive agricultural systems create opportunities for continuous improvements in productivity, environmental quality and human wellbeing across the agricultural supply chain.

Syngenta demonstrates that it is feasible and practical to achieve a balance between implementing biodiversity initiatives on and around the farm and meeting the growing economic demands of farming to deliver a secure and sustainable food supply for Europe and, in turn, help to feed a growing world population.

Syngenta provides practical solutions and trains farmers across Europe. Today, Operation Pollinator has been adapted to local conditions and implemented in already 13 countries



Operation Pollinator. Ten years of practical experience

Operation Pollinator demonstrates that environmental management and intensive agriculture can co-exist in the same field. Instigated by Syngenta and supported by universities, governmental bodies, food producers and NGOs, Operation Pollinator has helped growers across Europe successfully establish and manage essential habitat for pollinating insects on commercial farms.

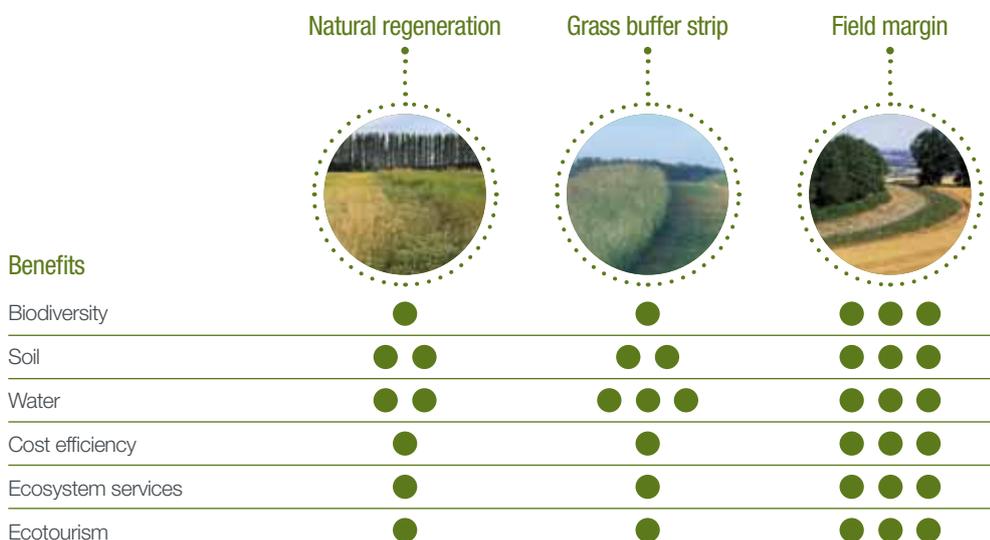


Successful implementation:

- On-farm in 13 countries
- More than 2500 participating farmers
- Supported by multiple stakeholders
- Recognized by institutions

Based on scientific research and practice, farmers are provided with:

- Targeted seed mixtures
- Agronomic protocol
- Training



Proactive management of field margins delivers many benefits

Targeted implementation of Ecological Focus Areas

With the concept of Multifunctional Landscapes Syngenta is moving the discussion on biodiversity and protection of natural resources from the single measure per field to an assessment of the landscape, and from single-function to multifunctional benefits.

Syngenta's approach aims to identify and solve multifunctional landscape issues to improve resource efficiency in a practical manner. Building on the success of Operation Pollinator to enhance biodiversity, the concept of multifunctional field margins integrates the protection of natural resources and the enhancement of ecosystem services. The proactive management of uncropped areas on commercial farms is one of the most important environmental assets agriculture can provide to take care of our unique natural capital and the ecosystem services it provides.

Through collaboration with many stakeholders Syngenta is developing practical tools based on sound science and thorough research. The protocols of multifunctional field margins are adapted for local conditions and cropping systems to assure successful implementation. Roll-out is often supported by partners along the value chain. Today Syngenta already has on-going pilot projects across Europe in oilseed rape, sunflower, apples, pears, melons, vines and olives.

Creating multifunctional field margins within the rural landscape increases resource efficiency and will make a significant contribution towards a more sustainable farming system of the future.

A practical and integrated approach to improve the ecological value of farmland and maintain farm profitability







Syngenta International AG
Corporate Affairs EAME
Schwarzwaldallee 215
P.O. Box
CH-4002 Basel
Switzerland

www.syngenta.com
info.sia@syngenta.com

Bringing plant potential to life

Syngenta International AG, Basel, Switzerland.
All rights reserved

Edition: October 2012

Paper produced from well-managed forests
and other controlled sources.

® Registered trademarks of a Syngenta
Group Company
™ Trademarks of a Syngenta Group Company

The SYNGENTA Wordmark, BRINGING
PLANT POTENTIAL TO LIFE and the Purpose
icon device are trademarks or registered
trademarks of a Syngenta Group Company