



syngenta

# Stewardship & Sustainable Agriculture

Making it work



# Contents

Syngenta is a world-leading agribusiness committed to sustainable agriculture through innovative research and technology. The company is a leader in crop protection, and ranks third in the high-value commercial seeds market. Sales in 2005 were approximately \$8.1 billion. Syngenta employs more than 19,000 people in over 90 countries. Syngenta is listed on the Swiss stock exchange (SYNN) and in New York (SYT). Further information is available at [www.syngenta.com](http://www.syngenta.com).



## *Introduction*

Introduction	4
What do we mean by sustainable agriculture?	5
Modern solutions	5
Objectives for sustainable agriculture systems	5
Product stewardship	6
Linking environment and agriculture	7
Best use of natural resources	7
Economic sense	7



## *Conservation agriculture*

An introduction to conservation agriculture	8
SOWAP looks to conserve soil and water	9
Proterra solution	9
No-till saves soil and water	10
Wetlands protected	10
Soil stability helps potato profits	11
Sales pitch from soil conservation	11



## *Biodiversity*

An introduction to biodiversity protection	12
Honeybees get to work	13
Reversing the plight of the bumblebee	14
Earthwatch	14
SAFFIE proves new ideas work	15
Waterfowl fly back to clean water	15



## *Water protection*

An introduction to water protection	16
Working watersheds in the USA	17
Forest protection	17
Brasilian springs spout clean water	18
Stewardship in action	18
Audits pinpoint pollution risks	19
Water courses covered	19



### *Integrated crop management*

An introduction to integrated crop management	20
Bridging the GAP	21
Disease models look good	21
Providing sustainable solutions for small-scale growers	22
Beneficial predators save millions	22
Application on target	23
Hawk™ Nozzle	23



### *Safe use & medical stewardship*

An introduction to safe use & medical stewardship	24
Education for life	25
Figures show training success	25
Winning ways with sprays	26
Relief and rebuilding	26
Safe use training in southern Europe	27
Safely covered	27
Incident report focus stewardship efforts	28
Sustainable packaging solutions	28
Locked out of trouble	29
Good practice cascade	29
New guide for knapsack application	30
Surveying safety	30
Doctor training creates healthy dialogue	31
Training message spreads	31

This booklet is divided into colour coded sections to describe activities in the different areas of product stewardship and sustainable agriculture.

# Introduction

## *Introduction to stewardship and sustainable agriculture - putting principles into practice*

Syngenta helps farmers around the world to increase their productivity, their prosperity and to feed, clothe and protect the growing global population. As a company, we are committed to ensuring that it is achieved in a sustainable way, for the long term future of our customers, the environment and our business.

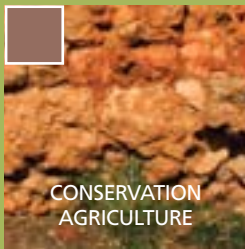
Our innovative products in Crop Protection and Seeds make an essential contribution to providing enough food and fibre for the world's population, which is increasing from 6.5 billion today, to a predicted 9.4 billion in 25 years. To feed this number, together with alleviating existing food shortages, demands at least a 50% increase in future crop yields – and more if the trend for more meat consumption continues in developing countries.

***80% of increases in crop production will have to come from intensification.*** Source FAO 2004.

At the same time, agricultural land is constantly being lost to urbanisation. The only option, to avoid large areas of natural habitat being turned to the plough for food production, is to protect what we have and to continue to increase the quality and quantity of production from existing farmland, with sustainable agriculture at the heart.

***"Agriculture has returned to the top of the development agenda because it lays the ground for economic growth. Agricultural productivity is a key catalyst for rural development".***

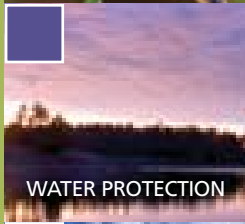
*Michael Pragnell, Chief Executive Officer.*



CONSERVATION AGRICULTURE



BIODIVERSITY



WATER PROTECTION



CROP MANAGEMENT



SAFE USE & MEDICAL

# What do we mean by sustainable agriculture?



Any farming practice inevitably has an effect on the **environment**, the **social** welfare and economic viability of the individuals involved and the rural community.

Sustainable agriculture looks to develop practices that have a beneficial influence on any or all of these factors for example, – to protect and enhance biodiversity, to educate and train

*“Our customers are necessarily committed to sustaining themselves and their agricultural businesses. Syngenta is committed to helping them deliver their goals and adding value to their efforts”*

*Richard Brown, Global Head of Product Stewardship and SA*

individuals in safe practices, to provide higher yields of better quality crops at lower cost, to protect soil and water to reduce rural poverty and improve the quality of life.

In many instances, the elements of Sustainable agriculture can have beneficial effects on more than one of these factors.

## Objectives for sustainable agriculture systems:

- ◆ Make best use of the resources available
- ◆ Minimise use of non-renewable resources
- ◆ Protect the health and safety of farm workers, local communities and society
- ◆ Protect and enhance the environment and natural resources
- ◆ Protect the economic viability of farming operations
- ◆ Provide sufficient financial reward to the farmer to enable continued production and contribute to the well being of the community
- ◆ Produce sufficient high quality and safe food
- ◆ Build on available technology, knowledge and skills in ways that suit local conditions and capacity

Around 40% of the world's harvest is lost to pests, weeds and diseases. Crop protection products help to ensure an abundant supply of healthy food, free from pest damage and disease for consumers all over the world.

## Modern solutions

Some assume Sustainable agriculture is simply turning the clock back to older farming practices. However, this will not necessarily improve the environment, provide bigger incomes for the farmers and rural communities, nor feed the growing world population.

Conservation agriculture plays an important part in delivering sustainable productivity. Managing resources such as soil and water are fundamental to the success of all agricultural systems.

*In 1950 there were 0.5 hectares of cultivatable land per person. This will reduce to 0.15 hectares per person by 2050. Source International Food Policy Research 2004.*

*Long term studies comparing production systems in Denmark showed that organic production, when compared with conventional systems, can reduce yields, increase fuel demand without giving any major environmental benefits, leading to significant losses of income to the farmer. Source LandboCentrum 2003*

New science and new techniques are continually being developed by Syngenta researchers, along with many global collaborative partners, that can help to improve agricultural output.

The key is being able to identify, tailor and implement these Sustainable agriculture techniques to match local requirements, and to encourage and assist growers to adopt the ideas through training and support tools. Syngenta recognises the need to be proactive in identifying potential issues and working with interested parties to develop solutions.

# Product stewardship

Product stewardship is the responsible and ethical product management of our products throughout their lifecycle.

Stewardship starts before the product comes to market. Our products are only sold after thorough scientific evaluation to the highest standards and review of extensive data by regulators.

Our responsibility continues when our products are on the market even if they are out of patent. Syngenta continues to take the lead in stewardship of our longer-established products, such as Gramoxone® and Bicep™, even where there may be many competitors marketing the same compound.

Syngenta is determined to maximize the benefits of its products and services to customers while minimizing any possible risk.

Since 2004 we have run an independent survey to monitor the attitude towards safety amongst crop protection product users. Results show the benefits of over 25 years of stewardship. The vast majority of respondents were well aware of potential risks and 98% stated they had received some form of safe use message within the last three years.

In 2003, the Food and Agriculture Organization (FAO) of the United Nations updated its 1985 Code of Conduct on the distribution and use of pesticides; Syngenta has committed to the code and continues to monitor performance and introduce improvements.



# Linking environment and agriculture



Syngenta believes that modern farming and environmental protection are inextricably linked. Our biodiversity projects worldwide are designed to identify and promote best practice.

This brochure **Stewardship & Sustainable Agriculture – Making it work** highlights just some of the projects Syngenta is involved in around the world where the new Sustainable Agriculture techniques are already making a real difference. We invite you to learn more about our approaches and programmes on Sustainable agriculture, safe use and environmental stewardship.

For further information or to contact Syngenta, please visit the web site: [www.syngenta.com](http://www.syngenta.com)

◀ In a well balanced agricultural system food production and environmental protection can coexist, with potential to enhance biodiversity with improved prosperity for farmers and rural communities. For example, the butterfly population will increase through good field margin management.

## Best use of natural resources

The company's most significant contribution to sustainable agriculture is that its products increase yield from existing farmland. For example Callisto®, prevents weeds from depriving corn of water, light and nutrients.

Reduced reliance on cultivations for mechanical weed control by the use of herbicides, such as Gramoxone® and Touchdown®, can protect soil quality, minimize fuel consumption and cut labour time. This leads to reduced production costs, decreased soil erosion and potential yield benefits.

Syngenta seeds varieties that have the potential to produce a higher yield from the same land area and the same use of resources together with fungicides and insecticides to protect the plant are truly the key to feeding a growing population with Sustainable agriculture.

Fungicides like Amistar® protect numerous different crops from diseases. Cruiser® is one of many Syngenta products that saves food worldwide from devastation by insects.

Furthermore, working with innovative Syngenta Bioline biological products (see page 22) can provide a truly Integrated Crop Management strategy that delivers higher yields of better quality food and improved economic returns for growers, whilst leaving the lightest possible environmental footprint.

## Economic sense

To be sustainable, agriculture must make economic sense, be environmentally sustainable and socially viable. Syngenta recognises concerns about the impact of farming and is active in all these areas.

Syngenta supports Sustainable agriculture through its products, and in specific projects worldwide. The company works closely with farmers and numerous other partners, contributing expertise and sharing results to promote best practice.

**Agriculture plays a crucial role in addressing the needs of a growing global population and is inextricably linked to poverty eradication, especially in developing countries. Sustainable agriculture and rural development are essential to the implementation of an integrated approach to increasing food production and enhancing food security and food safety in an environmentally sustainable way.**

Paragraph 40 of the Implementation of World Summit on Sustainable Development. Johannesburg 2002.

# Conservation agriculture

Fertile soil is the basis for growing crops, yet vast quantities are lost every year due to soil erosion. Looking after the soil is paramount for sustainable food production. Conservation agriculture employs a set of basic principles to protect and conserve soil in best condition for productive cropping now, and in the future. Soil degradation affects many areas particularly sloping ground. Loss of soil quality often forces farmers to seek new ground, which can lead to the clearing of forested areas and habitat loss, for example as seen in hilly areas of South East Asia.

Conservation agriculture is based on using the minimal cultivation necessary to successfully establish and grow crops. Zero tillage may be practiced on some soils; other soil types and some crops may require some cultivation to achieve a seedbed and remove soil compaction. In all instances the aim is to:

## Minimise soil disturbance

- ◆ Minimal soil disturbance improves soil structure and soil health, with more micro-organisms and soil fauna.
- ◆ Carbon sequestration within the soil profile decreases greenhouse gases such as carbon dioxide by retaining the carbon in the soil profile.  
*Source [www.fao.org/landandwater](http://www.fao.org/landandwater)*

## Keep the soil covered

- ◆ A growing crop, green manure or dead mulch reduces wind and water erosion of soil.
- ◆ Soil cover retains moisture and improves water infiltration.
- ◆ Manage cover crops and stubbles to avoid weed growth and setting seed.

## Reduce reliance on inputs

- ◆ Minimising soil tillage reduces the amount of fuel energy and time required for crop sowing. Conservation Agriculture practices can also be adopted to manage the inter-row areas in perennial crops.

Syngenta research and experience is helping many stakeholders and the company sponsors projects around the world to demonstrate that the principles of conservation agriculture can be successfully employed by farms of all sizes and types. These range from wheat farms in the EU, corn and soya farms in Brazil and the USA, to potato farms in Columbia and rice fields in China, along with subsistence farmers in the developing world.





# SOWAP looks to conserve soil and water



The SOil and WAtEr Protection (SOWAP) project aims to provide farmers with crucial conservation agriculture answers to halt further soil loss and solutions to counter impacts on the local environment and ecology. The three-year, €4m project – jointly funded by the EU Life programme and Syngenta, supported by other stakeholder partners – seeks to provide scientific evidence to support European Union (EU) agricultural and environmental policy decisions for a practical legislative framework.

Over 40% of UK farmland is officially categorised as being ‘vulnerable’ to soil erosion. An estimated three million tonnes of soil is washed into rivers and drainage systems annually – silting up the gravel-bed spawning grounds of fish, encouraging weed and algal growth that starves water of oxygen and increasing the risk of flooding.

The project involves sophisticated monitoring of soil and water movement on sites in the UK, Belgium, France, Czech Republic and Hungary, comparing standard farm practice alongside new

conservation agriculture minimum-tillage techniques and other innovative cultivation solutions.

The emphasis is on providing flexible and economically viable solutions, which local farmers will be prepared to adopt. The program has already shown that growers can redress further soil loss with conservation agriculture techniques, and create sustainable farming systems.

SOWAP works in close collaboration with ProTerra to provide a pan-European solution to soil and water management using conservation agriculture in both annual and perennial crops. For further information visit the web site:

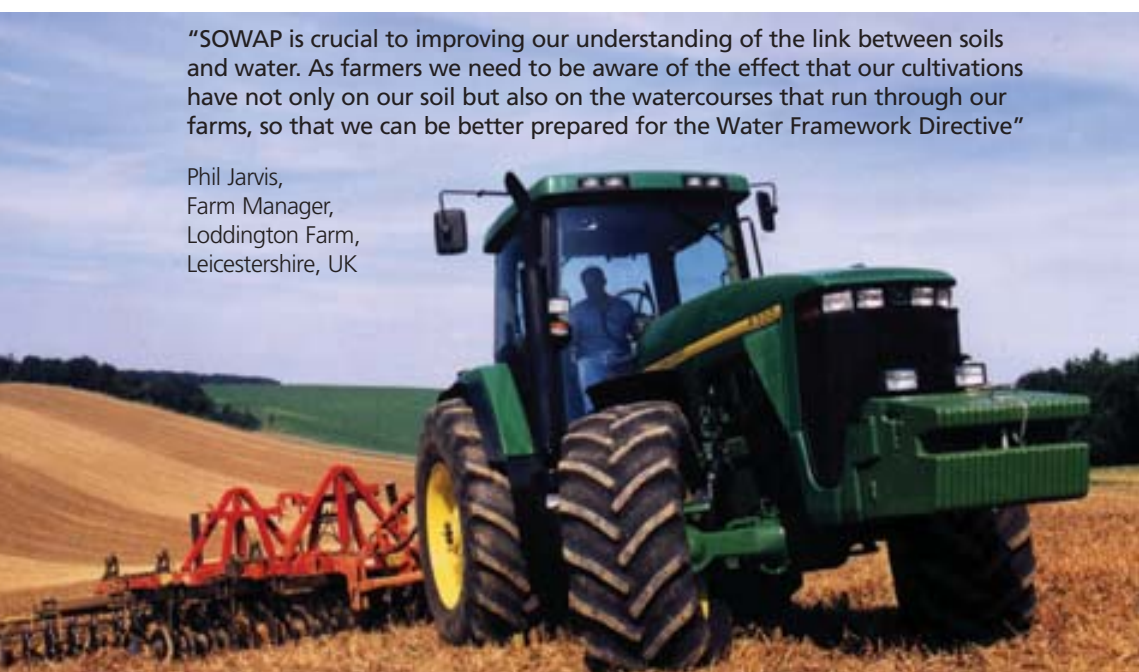
[www.sowap.org](http://www.sowap.org)

### A comparison of tillage techniques

Belgium, 2 years accumulative soil erosion in tonnes/hectare	
Shallow non inversion tillage	7.14
Deep non inversion tillage	15.05
Inversion tillage (plough)	28.19

“SOWAP is crucial to improving our understanding of the link between soils and water. As farmers we need to be aware of the effect that our cultivations have not only on our soil but also on the watercourses that run through our farms, so that we can be better prepared for the Water Framework Directive”

Phil Jarvis,  
Farm Manager,  
Loddington Farm,  
Leicestershire, UK



## ProTerra solution



Olive and vine growers in southern and eastern Europe have traditionally relied on repeated, intensive cultivations to keep their crops free of weeds that compete for vital moisture and nutrients. The result is to leave bare, loose soils dangerously vulnerable to erosion. Increasingly severe rainstorms have resulted in widespread soil loss, threatening the viability of many vineyards and olive groves threatening life and property

The Syngenta-led ProTerra project seeks to demonstrate the economic viability and agronomic advantages of a Conservation Agriculture approach, integrating the use of beneficial green manures planted between the crop to enhance rainfall infiltration. These manures can be removed with Gramoxone® before they compete for moisture, whilst retaining the all important root structure to stabilise soils. Green manure options also offer the chance to further enhance biodiversity. For further information visit the web site:

[www.proterra.eu.com](http://www.proterra.eu.com)

# No-till saves soil and water

Net income of maize farmers in the Guangxi region of China can increase by over \$100 per hectare when growers establish the crop without tilling the soil, but using Gramoxone® to control weed growth, compared to the conventional sowing and cultivation to control weeds. Trials by the Guangxi Maize Research Institute and Syngenta also showed soil erosion on the conservation agriculture no-tillage system was 43% lower than the conventionally grown crop.

Crop yields in the field experiment were broadly comparable between the conventional local farm practice and the lower cost Gramoxone® no-tillage system. However severely yields were reduced by more than 50% – where

weeds were not controlled following no-tillage sowing. Furthermore, soil loss was significantly more in the conventional plots and, because of the low cost of using a herbicide compared with hand weeding, the best farm income was seen from the Gramoxone® plots.

Maize is one of the staple crops in the Guangxi region. With more than 80% of the crop planted on vulnerable sloping fields and rainfall averaging over 1,200mm a year, soil erosion is a primary concern.

For further information on the Guangxi Maize Research Institute project contact the Weed Science Society of China [www.wssc.org.cn](http://www.wssc.org.cn) [www.paraquat.com](http://www.paraquat.com)



More than 85% of cropping in the Leshan area of Sichuan province in south-west China is now established with no-tillage techniques, including wheat, rice and oilseed rape in the rotation. The result has been higher yielding and better quality crops, with oilseed rape yields increased by 7%, wheat by 8% and there was over 50% reduction in rice sheath blight. The labour saving no-tillage techniques have significantly reduced costs and also enables family members to gain further income from other activities. Furthermore, the Dongpo District Agriculture Bureau has shown it saves 20% of valuable water in the paddy field system – around 1.5 million litres per hectare.

	Yield (Kg per ha)	Net income (\$ per ha)	Soil erosion rate (% reduction)
Conventional tillage	5,706	416	0
No-tillage	2,656	206	50
No-tillage + Gramoxone®	4,920	517	43

Yield, income and soil erosion benefits of no-tillage maize growing in the Guangxi region of China. *Source: Guangxi Maize Research Institute*

# Wetlands protected



More than 3,000 farmers have been involved with a Syngenta Conservation Agriculture joint initiative to protect the environmentally sensitive Donana National Park in southern Spain – a UNESCO World Heritage Site and one of the most important wetlands for migratory birds travelling through Europe and Africa.



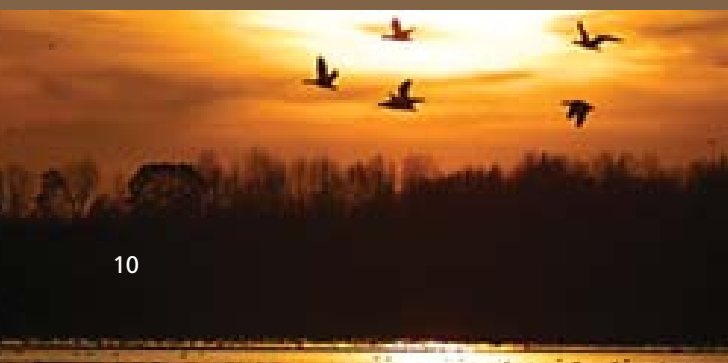
New techniques to cut soil erosion from olive groves could avoid the loss of valuable wildfowl wetlands.

The Donana Project, co-funded by the EU LIFE programme, was designed to redress serious soil contamination of the wetlands from olive groves and intensively cultivated farmland, using a combination of weed cover to protect soil structure and, crucially Gramoxone® herbicide treatments to assure crop productivity. The project has provided practical solutions for local farmers, backed with in depth scientific evaluation to quantify and prove the results.

After just three years of working with farmers, results have already seen a significant reduction in erosion and improvement in water quality running into the Donana wetlands. Furthermore, most farmers in the region now practice their own soil management plans. The project has received a very positive assessment from the LIFE evaluation committee, and the granting of a new 'Sustainable Wetlands' LIFE initiative to the same project partners, with funding of more than €500,000.

For further information on the Donana wetlands sustainable agriculture project visit the LIFE projects website:

[www.europa.eu.int/comm/environment/life/home.htm](http://www.europa.eu.int/comm/environment/life/home.htm)



## Soil stability helps potato profits

By cultivation Colombian potato growers traditionally move an estimated 2,000 tonnes of soil per hectare, to achieve a yield of 15 tonnes of potatoes. Growers look to create a deep seedbed for planting seed tubers, and then continue to move the surface to control competitive weeds. The result is to leave a fragile soil structure highly vulnerable to wind and water erosion; in Colombia an estimated 20 tons of soil per hectare are lost every year, with up to 100 lost in extreme cases.



Falling yields and uneconomic production for growers has put at risk the future of 17,000 families in the Cundinamarca region, dependent on potatoes for their livelihoods. With urgent action required to prevent further soil loss and improve the fortunes of growers, Syngenta has joined efforts with the Environment Authority, Corporación Autónoma Regional, to develop a training programme of new non-tillage techniques, innovative direct sowing and the use of cover crops to protect soil structure.

The programme will hold over 200 workshops, reaching more than 4,000 small farmers across the region. Engaging growers with proven practical techniques that reduce costs and labour demands, whilst delivering equal or improved yields, creates an immediate physical benefit.

But longer term, these activities on around 8,000 hectares of potato cropping could decrease soil loss by 480,000 tonnes over the next three years, as well as increasing important water retention in the drainage basin by 360 million litres.

## Sales pitch from soil conservation

A project to help farmers in the mountainous Philippines municipality of Lantapan to tackle soil erosion, has had the hugely beneficial spin-off effect of bringing together local vegetable growers into a new marketing group. The Centro PagLambu group is now looking to sell their produce, grown using sustainable conservation agriculture techniques, as a premium brand to restaurants and supermarkets.

Lying at the foot of the Philippines second highest mountain, Mt. Kitanglad, Lantapan produces some of the region's finest and highest value vegetables. But soil erosion from the intensively cultivated slopes is a major problem, exacerbated by the expansion of banana growing operations in the highland areas.

In an effort to stop the loss, the Lantapan Landcare Association has worked in partnership with Syngenta, to develop a comprehensive fully Integrated Crop Management (ICM) training programme that helps farmers learn the concepts of conservation agriculture, and see how they can be used in traditional farming systems. Recognising that truly sustainable farming systems demand far more than crop production alone, the programme covers aspects including record keeping, accounting and business planning, one day a week over a 22-week period.

The idea of Centro PagLambu – which means Centre for Progress – was borne from the first 40 farmers to complete the TCM course. The group uses the marketing line '*Caring for the land for a sustainable harvest*' and has established its own training facility to further cascade their knowledge to other growers.



# Biodiversity

Agriculture is the major user of land globally. Managing this land for food and fibre production inevitably has an impact on the native biodiversity. The intensification of agriculture, to satisfy the demands of an ever increasing world population, has increased the pressure on both flora and fauna.

Striving for the right balance between productive farming and protecting the environment is one of the principal goals of sustainable agriculture. Syngenta is now actively working with other interested stakeholders to research, develop and promote farming systems that both protect and, where possible, enhance the environment and biodiversity.

Many of the initiatives clearly demonstrate the opportunity for farmers to balance economic and efficient food production, with environmental management to promote biodiversity. Proactive environmental management of non-food producing areas, such as field margins and set-aside, can mitigate the effects of agriculture and, if managed effectively, can turn back the clock for lost biodiversity – with little or no loss in farm productivity.

Furthermore, Syngenta is looking to integrate biodiversity enhancement to many of its other sustainable agriculture initiatives, using land areas designated for water protection to create new habitats to support a host of different plant, insect and bird species, for example. Conservation agriculture has been shown to increase soil organisms, providing new food sources to support farmland birds, showing economic farming and environmental protection can coexist in the same field.





▲ Nectar is the building block for insect biodiversity and crucial for the bee – one of nature's most important pollinators.

## Honeybees get to work

A lack of flowering plants and pollen has left honeybees in France going hungry through the key months of June to August, when they should be laying down crucial food reserves for the winter – and commercial honey stocks for beekeepers. There are an estimated 1.35 million beehives and nearly 70,000 beekeepers across France.

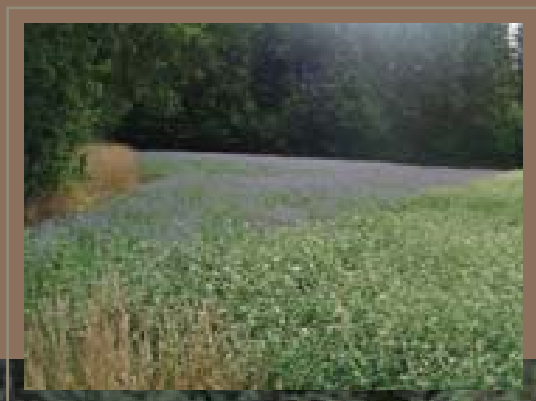
Following a decline in honey productivity, Syngenta instigated a new project in 2003 to investigate sources of pollen and nectar on arable farms, and create a series of measures to redress the shortfall. Initial pollen collections on the farms selected for Réseau Agéris (see page 19), identified as part of a dedicated Syngenta sustainable agriculture initiative, demonstrated the

existing common practice open-field arable system was proving inadequate for beekeeping.

Now, working with local beekeepers and experts, the project has recognised the simple enrichment of non-crop set-aside areas with flowering food resources, including sainfoin, mustard, buckwheat and Phacelia, along with field margins sown with grasses and clover and hedges planted including rose species, can fill the bees' needs. Just 0.3 hectare of flowering set aside was quickly found by worker bees and provided sufficient supplement for hives installed on a 200ha farm.

Training for farmers and advisors on the demonstration farms – which have doubled in number since the project's start – includes environmental management to enhance and improve biodiversity, along with safe use of plant protection products to mitigate risk to foraging bees.

Farming the land to provide the 30 to 50kg of pollen required for each colony, along with 100kg of nectar for honey production, creates healthier hives more able to cope with disease and harsh winters, as well as more productive hives for beekeepers.



◀ Planting non-cropped areas with nectar rich flower species provides the necessary food sources for honey production and a healthy insect population.



# Reversing the plight of the bumblebee

Bumblebee populations on UK arable farms have declined by more than 70% over the past 30 years, primarily through loss of vital nectar food resources and nesting sites as cropping patterns have changed. One of the 20 species found in the UK has disappeared altogether, and three other species are on the verge of extinction.

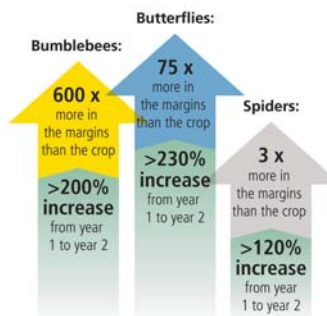
Now Syngenta has pioneered and funded Operation Bumblebee – a major UK-wide initiative to put back the necessary habitat and revive the fortunes of the bumblebee, along with butterflies and other beneficial insects that thrive on pollen and nectar.

Operation Bumblebee provides farmers and advisors with the training, skills and Syngenta technical support to successfully establish and manage a specially designed seed mixture, rich in pollen and nectar food sources.

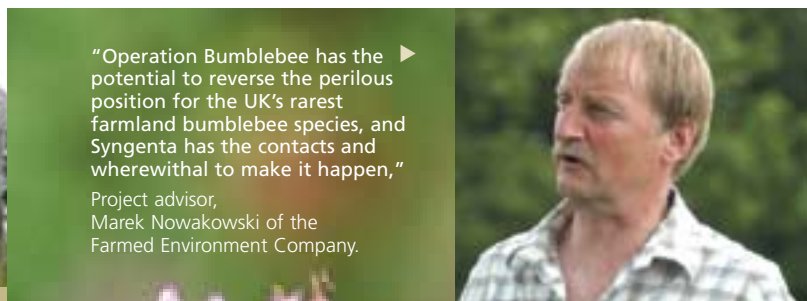
Establishing a patchwork of bumblebee friendly havens on areas of unproductive farmland – often along field edges, difficult to work corners or low yielding soils – provides huge environmental benefit, with little or no effect on farm productivity. In fact, when coupled to points gained for UK agri-environment scheme payments, the environmental areas can become both biodiversity rich and financially profitable.

Operation Bumblebee builds on the experience and success of the Buzz Project which was set up to scientifically assess environmental options for farmers and sponsored by Syngenta, Unilever and UK Government (Defra). These projects have demonstrated that pro-active management of dedicated environmental areas will achieve far greater results for biodiversity than wide-scale de-intensification of farm production. When integrated alongside conventional arable areas farmed for profit, Syngenta Operation Bumblebee creates a truly sustainable solution.

For further information, visit the Operation Bumblebee web site [www.operationbumblebee.co.uk](http://www.operationbumblebee.co.uk)



◀ The Buzz Project provided the independent research to validate the relative value of environmental management options for field margins. Funded by Syngenta, Unilever, Birds Eye Walls and Defra, it highlighted the value of legume and wildflower mixes to benefit bees, butterflies and insects.



Syngenta and Operation Bumblebee have teamed up with Earthwatch Institute to promote conservation measures on farms and raise awareness of the issues and opportunities for biodiversity conservation in modern, sustainable agriculture. Earthwatch is an international environmental organisation that engages people worldwide in scientific field research and education to promote the understanding and action necessary for a sustainable environment.

Learn more at [www.earthwatch.org](http://www.earthwatch.org)





www.rspb-images.com  
Chris Gomersall



▲ Minor changes to crop management can have major beneficial impacts on farmland wildlife, but farmers need the confidence and commitment to make them work.

## SAFFIE proves new ideas work

Farmers can manage crops and non-cropped areas more effectively to significantly enhance biodiversity, without compromising yields or farm profitability, according to interim results of SAFFIE (Sustainable arable farming for an improved environment), the UK's largest single environmental management project.

The project has already identified farmers that could halt, or even reverse, the decline in skylark populations by leaving small plots of bare soil in the growing crop. In crop skylark plots have produced 49% more fledglings a year compared to conventional crops, at a cost of just \$3 – 4.50 per hectare. The concept of skylark plots was first pioneered at the Syngenta Jealott's Hill International Research Centre.

Other biodiversity benefits are being scientifically evaluated by SAFFIE researchers, including the management of field margins and the practical implications of new best practices for Integrated Crop Management identified and developed by the project team.

Operating on more than 26 farms and 10 research sites, SAFFIE is sponsored by Syngenta, along with industry project partners including supermarket retailers Sainsbury and Morrison, the National Trust, the Royal Society for the Protection of Birds and the UK Government. Results from SAFFIE are already helping to shape Government environmental policy and farming practice, with the project planned to complete in 2006.

For further information on SAFFIE visit the web site [www.saffie.info](http://www.saffie.info)



## Waterfowl fly back to clean water

The clean waters of Chesapeake Bay in the USA have provided an ideal habitat for millions of migrating wildfowl, along with over 2,500 other native species. The loss of around half the wetlands and associated forest-buffered streams around the bay had seen waterfowl decline by 70 to 80%, according to estimates by specialist wetland conservationists in the charity Ducks Unlimited.

Now, working with selected farmers Syngenta and Ducks Unlimited have started the long process to reverse the trend, by initially restoring grass buffers. When established alongside upland ditches, streams and field edges, these native warm season grass buffers use up nitrogen, to prevent it reaching groundwater, and collect polluting soil particles before they reach the Bay.

Syngenta research has shown the use of Touchdown® herbicide can control non-native cool season grasses, such

as fescue, so the desirable native species can be successfully established. Studies have shown a clear link between grass buffers and enhanced duck habitat in the Chesapeake Bay.

The alliance with Ducks Unlimited is further demonstrating the link between sustainable agriculture and wildlife conservation in the Prairie Pothole Region of the Dakotas. Around two-thirds of North American wild ducks are hatched and reared in these wetlands, but with the increasing conversion of native grass areas to arable farmland has significantly reduced nesting duck populations.

Spring tillage during crucial nesting periods has been a primary cause, but a switch to autumn-sown winter cereals has been shown, in Canada, to enable 35 times more ducks to successfully nest. Syngenta is seeking to help Ducks Unlimited to provide economic and practical agronomic solutions that will help farmers in the Dakotas to make the transition to winter cereals.

For further information on Ducks Unlimited, visit the web site: [www.ducks.org](http://www.ducks.org)

# Water protection

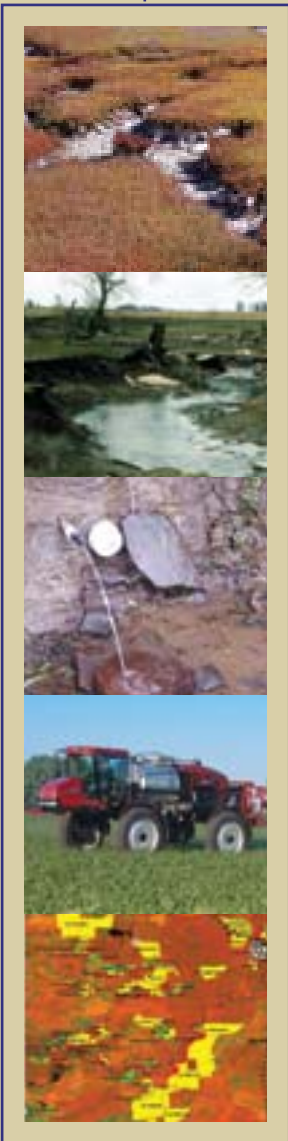
Agriculture places the highest demand on water than any other use. With a growing population demanding food production, water availability will have to be managed carefully. Making best use of limited water resources and protecting the quality of water sources are crucial issues to address.

At present agriculture uses 70% of water extracted from ground and surface sources. About 20% of the world's cropped area is irrigated, which produces 40% of food grown. It is therefore vital that agricultural use of water is optimised, and that water draining from farmland does not contaminate water supplies.

Syngenta is involved in a range of studies to minimise the risk of water pollution. Water protection is a key element in the conservation agriculture studies designed to provide farming systems that reduce soil erosion and aid soil moisture conservation in arid areas (*see page 8*).

Syngenta also supports river bank projects, creating buffer zones that have the dual benefits of supporting wildlife and providing a buffer between crops and water courses to prevent water pollution from farming activities.

Minimising the risk of crop protection products entering water courses or underground aquifers is an important component of any water protection strategy. Syngenta works with stakeholders to identify potential issues and develop steps to mitigate the risks; practical measures can effectively keep crop protection products in the field where they are necessary and protect the quality of water resources.





▲ The Working Watersheds project has demonstrated that sympathetic management can bring about dramatic results in environmental enhancement, with benefits for all concerned.

Images courtesy of Trees Forever.

## Working watersheds in the USA

Planting trees, shrubs and grasses as buffer zones alongside streams and rivers has proven effective in intercepting up to 90% of sediment and chemical runoff before it enters water systems – along with reinvigorating the natural flora and fauna. Trees Forever, which pioneered the techniques and ideas across the mid-Western states of Illinois and Iowa, has now extended the Iowa Buffer Initiative into a comprehensive watershed approach.

Sponsored by Syngenta, the Iowa Farm Bureau Federation and others, sites vulnerable to erosion and water pollution that are selected for the Working Watersheds project can be

eligible for up to \$2,000 in cost share funding for planting projects. Trees Forever field coordinators work directly with farmers using a flexible menu of conservation practices to achieve successful results – 90% of trees planted in its projects survive.

Working Watersheds demonstrates the effectiveness of buffers and other conservation practices, including stream bank stabilisation and constructed wetlands. The program goals include improving water quality and, enhancing economic benefits, with some sites focused on producing wood-based crops for specialty markets.



For further information visit the web site

[www.treesforever.org](http://www.treesforever.org)

*Benefits of tree, shrub and grass buffer zones alongside streams and rivers include:*

- ◆ Decreased runoff from fields
- ◆ Prevent soil erosion
- ◆ Filter and purify water
- ◆ Create a wildlife habitat
- ◆ Provide new on-farm income
- ◆ Enhance visual aspects
- ◆ Increase awareness of water quality issues

## Forest protection

The Eco-Quetzal project in Guatemala is looking to protect the environment, biodiversity and the sustainability of Latin America's second most important rainforest. The mist forest is one of the last remaining refuges of the country's National Bird – the quetzal – and National Orchid – the Monja Blanca.

Creating a viable sustainable agricultural system is essential in preventing further deforestation by nomadic farmers in search of new land. More effective and safer use of crop protection products is crucial to maximise production and minimise risk of environmental damage.

With the Agricultural Ministry lacking funds for farmer training within the project, Syngenta has developed and funded the packages to train many of the farmers, as well as instructors to go out to isolated mountain villages and encourage best practice.

Working with Government and non-governmental organisations (NGOs) has demonstrated to the local population that nature conservation and economic prosperity through sustainable agriculture can work in practice.





## Brazilian springs spout clean water



Water availability and water quality are now key issues facing the Brazilian government and the country's farmers. In some areas adverse effects have been so severe that once productive farmland has been subject to periods of prolonged drought and disastrous yield loss, with farming families forced to leave. A survey in 2004 showed that in some areas up to 90% of field water sources were contaminated.

Deforestation of slopes, devastation of vegetation alongside rivers and poor land management has aggravated the situation. Water that appears as springs, or fountainheads, is disappearing at an alarming rate.

Working with farmers and Coopaval, Syngenta has instigated a project in 2004/2005 to protect springs from further degradation and to provide an ample supply of clean, quality water. The project looks far beyond the boundaries of crop management and crop protection, to seek a comprehensive sustainable solution.

The programme looks to replant selected natural vegetation above springs, to enhance water infiltration to the soil, reduce runoff and soil erosion and cut down on evaporation. Coupled with this, conservation agriculture and other measures are designed to improve the moisture

◀ Working with local communities to provide financial and educational assistance can resurrect permanent clean water supplies by protecting springs.

holding capacity of the soil and reduce rapid runoff.

Social initiatives are also taught as part of the programme, to reduce the risk of water contamination, including village housing design, household waste disposal and livestock management.

Coopaval President, Dilvo Grolli, believes the project has made a significant impact in improving drinking water supplies and quality of life for rural villages. "I particularly appreciate private enterprise when its activities create a balance between economic and social aspects. Syngenta is a great example of this mentality," he stated.

The project team has also identified that, in some instances, it is possible to rebuild springs and provide a new clean water resource for rural communities. Working with villagers to recover their springs instills new commitment to look after and protect them for the future.

The Aquaviva (living water) project has already received an industry association prize for innovative sustainable agriculture projects.

## Stewardship in action

In Germany, Syngenta has designed a good farming practice programme specifically for the maize herbicide Terba™ (terbuthylazine), with positive results for the protection of ground and surface water.

The recommendations for Terba™ include limiting the rate of use to 750g ai/ha per year, only permitting use in the spring and selling only in mixtures (mixture partners are required to improve effectiveness, to ensure satisfactory levels of control are achieved). On extremely vulnerable and carstic soils (calcerious soils prone to erosion). In co-operation with regional authorities Syngenta actively recommends the use of alternative solutions.

Extensive regulatory monitoring of water resources has shown no instances of water contamination when the product has been used in accordance with the label recommendations. Investigations by Syngenta and Government bodies into any findings have indicated point source spillages and surface water entry into damaged wells

as the causes, highlighting the need to concentrate on these areas (see page 19).

Consistent with the 'Precautionary Principle' and 'Resource Protection' as adopted by regulators, the German regulatory authorities granted a 10 year product approval, until 2015, confirming the approach is a sustainable concept.

Image courtesy of Case IH.



# Audits pinpoint pollution risks

French farmers in the Syngenta Réseau Agéris project are coming under the spotlight of an intense environmental audit to identify risks of water pollution. Working with auditors to develop a personal action plan to redress any issues has provided a real-life model for other farms. A dozen farms have undergone the process and are actively involved in the project.

To highlight and mitigate the risk of water contamination from farming operations, the project has teamed up with the farmer-run research organization, Arvalis Institut du Végétal. The initiative uses an in-depth audit to highlight current farm practices that could have an impact on water quality from point source pollution – Aquasite®, to a farm field scale from diffuse losses – Aquaplaine® – and at a wider geographical area, covering the whole water catchment zone – Aquavallée®.

Auditors, working with the Agéris farmers, then devise a series of measures to reduce identified pollution risks, but which are practical for the local farmers. For example, the audit has highlighted the need for some farms to create new storage and sprayer filling facilities. To tackle point source pollution in many instances relatively simple measures have been devised to make cost effective improvements.

The aim is to give answers that are economically viable for the farmers, practical to implement and will deliver results in reduced risk of water pollution and enhanced environmental management.

For further information visit the Arvalis web site: <http://www.arvalisinstitutduvegetal.fr>



▲ French research has shown audits to identify potential environmental risks on farms are only effective if they provide practical solutions as well.



▲ Identifying areas at risk of water pollution can help banana growers avoid watercourse contamination when spraying crops to protect yield and quality.

## Water courses covered

Banana exports to the lucrative European markets are a crucial source of income for Colombian farmers in the Magdalena District. But the diseases Black and Yellow Sigatoka can render the crop worthless for the export market.

The sheer scale of the region's plantations makes aerial application of fungicides such as Bravo®, the only practical route to get the crop protected at the right time. But the application technique has posed a risk to water courses and drainage channels crossing the plantations.

Now Syngenta has instigated a simple but highly effective strategy to help growers mitigate the risks. Firstly Ecoaguas created a series of colour coded maps for plantation owners and aerial spray operators, which clearly marked 'Green' areas of low risk; 'Amber' areas requiring buffer zones to protect water courses and 'Red' areas unsuitable for aerial spraying.

Secondly, the development of new vegetation planting schemes alongside the water courses has been shown to intercept over 97% of the aerial spray before it reached the water.

Furthermore, the river bank planting with native vegetation has enhanced biodiversity in the plantations and also significantly slowed weed growth in the water courses.

# Integrated crop management

The development of sustainable farming systems demands a holistic approach that encompasses the best practices for growing healthy and profitable crops, including the use of crop protection inputs where they will deliver beneficial results.

Increasingly Syngenta is seeking to develop locally adopted systems that fully integrate its portfolio of products alongside good agricultural practice, including seeds, biological agents and biotechnology, to provide integrated solutions. This often involves training in gaining optimum benefit from our products through more effective application and novel ideas for better crop production.

There are three levels of integrated management, which hold the same core principles at different points of crop production:

- ◆ IFM – Integrated Farm Management, where the focus is on overall farm management
- ◆ ICM – Integrated Crop Management, where the focus is on growing specific crops
- ◆ IPM – Integrated Pest Management, which focuses on the control of a specific pest or disease.

Effective IPM and ICM rely far more on accurate forewarning of risk, and evaluation the best course of action. New decision support systems are essential tools to assure the most judicious use of crop protection inputs.

The rapid global uptake of the latest communication tools, including the internet and mobile phones has revolutionised the speed with which information for improved management can be delivered to growers; even across Africa, Asia and South America SMS text messaging is now an important way of spreading news at the press of a button.

The goal of all of these projects is the enhanced production of high quality farm produce, farmer welfare and practical conservation.





## Bridging the GAP

Portuguese farmers are under increasing pressure to not only produce crops to the high standards and regulation for the EurepGAP certification that is essential to access valuable markets of northern Europe,

but also to grow at lower costs than ever. Growing to Good Agricultural Practice (GAP), which incorporates IPM and ICM, is now an essential component of farming systems.

Over the past three years Syngenta has established an entirely new protocol of technical help and advice on product use to help customers meet these GAP requirements effectively and economically. The Syntagro IPM/ICM support programme was developed to improve production in vines, but has since been extended to cover fruit, vegetable, olives and cereals.

The programme – now producing branded produce under the Syngenta Signia™ banner – also offers broad assistance on overall farm business and environmental issues, to develop truly sustainable systems.



## Disease models look good

New disease prediction models being developed by Syngenta will prove essential in the fight to prevent Soybean rust decimating the crop. Losses from the first outbreak of Soybean rust in the USA could reach up to \$1.3bn, according to estimates from the United States Department of Agriculture. The cost is predicted to rise up to \$2bn in subsequent years, depending on the severity of disease, weather conditions and the effectiveness of growers in controlling the disease.

US fears are based on the experiences of growers in Brazil where, left untreated, Soybean rust will prematurely defoliate the crop in as little as nine to ten days – resulting in 60% to 100% yield loss. However, where growers acted early and decisively, the disease has been effectively controlled; with record soybean crops predicted where more than 90% of the area has been treated with fungicides, thanks to the Sentinel project.

Once the disease has gained a foothold in the southern states, experts warn it will act as a reservoir of infection blowing north each season. With disease prevention shown to be the only really effective measure to protect yield, Syngenta has been actively involved with researchers and disease pathologists in monitoring for the presence of spores and assessing weather conditions that could encourage the disease. When both factors are prevalent, growers will have advance warning of the need to protect the crop.

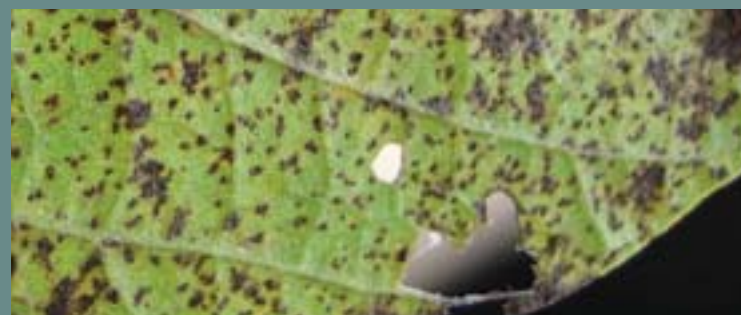
Warnings are posted on the website [www.soybeanrust.com](http://www.soybeanrust.com) and can be sent direct to growers through modern mobile communication routes.

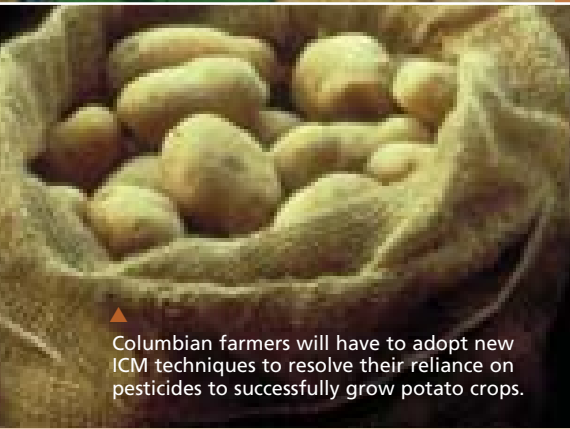
Early warning of impending disease infection allows growers to make better use of preventative fungicides at lower application rates. If disease is identified at its early stages in the lower crop canopy application rates will need to be higher and more

aggressive curative fungicides employed. When disease has become established in the crop, it will effectively be too late to protect the leaves and yield.

For further information visit the website [www.soybeanrust.com](http://www.soybeanrust.com)

- ▼ Soybean rust can decimate crops almost overnight, unless leaves are protected ahead of disease infection. Syngenta spore monitoring traps will provide growers with a valuable early warning system.





▲ Columbian farmers will have to adopt new ICM techniques to resolve their reliance on pesticides to successfully grow potato crops.



▲ Training knapsack spray operators in simple measures that they can use at home will significantly reduce risk and improve crop protection.



## Providing sustainable solutions for small-scale growers

Potatoes are the principal crop for the many thousands of small-scale Columbian farmers in the highland region of Boyaca. After years of frequent cropping in tight rotation, pests and diseases have built up to the point where growers are increasingly reliant on the ever-greater use of crop protection products to achieve economic yields of a marketable quality crop.

To ensure that growers were using the products in an appropriate and sustainable farming system, the innovative PAS (Pequeño Agricultor Syngenta) programme was developed

to train farmers and certify their new skills with local authority endorsement.

The three-year project has already nearly achieved its target to train 45,000 growers to the approved standard. The training, principally supplied in alliance with local authorities and farmer associations, is aimed at small-scale potato and corn growers, typically with less than three hectares of cropped land.

The training is specifically aimed to ensure growers make the best use of crop protection products within their management programmes and ensure

they are used safely. Participants are judged on their adoption of good practices, which is currently running at a significantly improved 60%.

Training tools include booklets, posters and a series of presentations to use in training sessions, along with the provision of personal protective clothing, plasticised cards to remind growers of key points during every day operations and crop management aids.

The project opens the possibility for the sale of certified produce from certified growers across the region.

## Beneficial predators save millions

The closed, controlled conditions within glasshouses create the ideal environment to practice Integrated Crop Management (ICM). Syngenta Bioline has pioneered pro-active ICM techniques to monitor pest numbers in a range of commercial glasshouse crops, which can predict the optimum time to introduce the company's

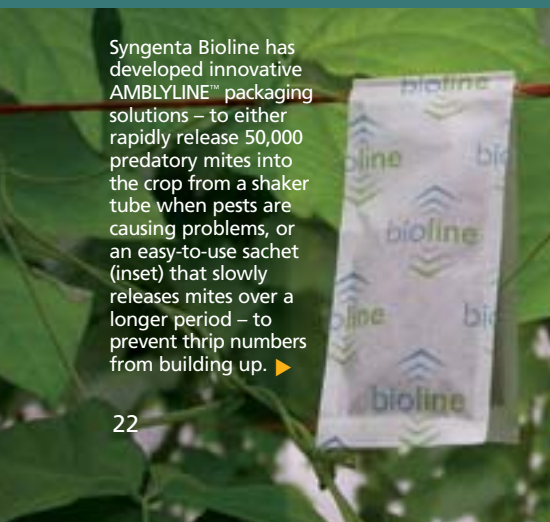
beneficial biological controls, or when there is the need to first use crop protection products.

Syngenta has recently developed a pheromone trap specifically for the early identification of Western Flower Thrip – a pest that has caused damage in excess of \$120m a year in cut and

pot flowers, tomatoes and peppers across Europe. The traps, which use the lure of sex pheromones to attract male and virgin female thrips within three days of emergence, ensure the early detection of a potential pest problem.

At low thrip populations, growers can put down Amblyline™, which contains the predatory mite *Amblyseius cucumeris* that will effectively control damaging thrip species. If the pheromone traps detect high levels of thrip infestation, however, growers can first spray the crop to get thrip populations back under control, before using Amblyline™ to keep the crops thrip-free.

For further information on Syngenta Bioline biological control options visit the web site [www.syngenta-bioline.co.uk](http://www.syngenta-bioline.co.uk)



Syngenta Bioline has developed innovative AMBLYLINE™ packaging solutions – to either rapidly release 50,000 predatory mites into the crop from a shaker tube when pests are causing problems, or an easy-to-use sachet (inset) that slowly releases mites over a longer period – to prevent thrip numbers from building up. ▶





# Application on target

Ensuring pesticides hit their intended target not only ensures the best level of control from the minimum chemical input, but also reduces the risk of environmental pollution. Syngenta is working with farmers and advisors to help improve the accuracy of spray application at every level – from hand application using knapsack sprayers, to the very latest in high-tech, air-assisted crop sprayers.

In Morocco, for example, a specific Syngenta application training programme was developed to help the country's tomato growers meet tough EurepGAP protocols, which enables them to export produce into lucrative European markets. The package included demonstrating the benefits of calibrating sprayers – to know precisely how much had been applied – and the importance of uniform application onto the tomato plants. Both these elements are crucial in minimising the risk of crop protection product residues remaining at harvest.

Russian apple growers in the south of the country were encountering increasing problems controlling scab, which was seriously affecting crop quality and saleable yield. Grower training days were set up to show how the sprayer's maintenance, set-up and operation – along with the crop's husbandry, including pruning – could have a dramatic impact on the spray deposition within the crop; and consequently the level of disease control.

The grower training programme has served to reduce costs – since more effective use of products may avoid the need for repeat applications – and improve the value of crops through better quality produce.

Furthermore improved application techniques can also help operators avoid spray drift, ensuring more of the spray stays in the crop where it will have the greatest intended effect and significantly reduce any environmental implications outside the crop.



✦ Syngenta application specialists can use novel tools, such as water sensitive paper and ultra-violet light detectable tracer, to demonstrate in-crop spray application techniques that can help operators achieve a better result.

## Hawk™ nozzle

Recognising how the way a product is applied can make the crucial difference in the results achieved by growers has led to Syngenta developing a whole range of spray nozzles designed specifically to help products work more effectively and minimise environmental loss. The Hawk™ nozzle, for example, is designed to create a fine droplet which sticks more effectively to fine blackgrass seedlings, and sprays in a forward facing direction to ensure more spray hits the target weed. The novel variable pressure design allows operators to reduce spray drift without compromising spray quality and results.



# Safe use & medical stewardship

Throughout the world Syngenta is committed to raising standards in the safe and effective use of crop protection products and minimising health impacts.

For over 30 years Syngenta and its predecessor companies has been identifying the challenges of safe use, creating solutions and implementing them via stewardship programs.

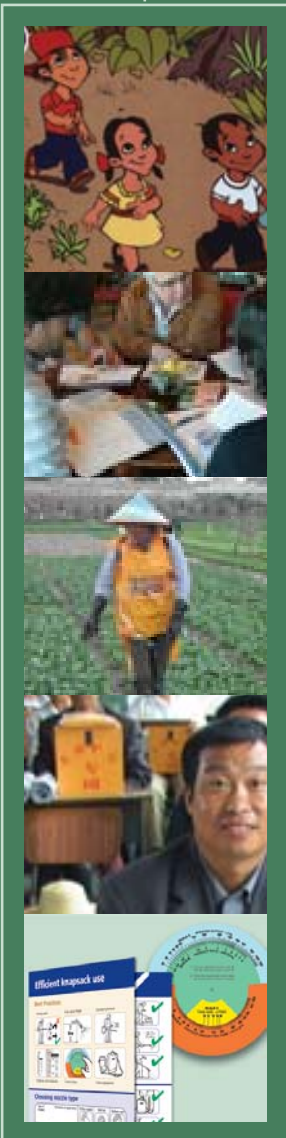
Syngenta trains around 1.3 million farmers every year in the safe handling, storage and application of crop protection products. The company provides advice on all aspects of safe use from transport and storage through to protection during use and disposal of containers.

Syngenta has worked to develop personal protective equipment in many parts of the world, designed to meet the specific requirements in different locations and for varying grower groups, and has promoted its use through research, free trials and demonstrations.

With experience from around the world, Syngenta medical and toxicology experts regularly train doctors and staff at hospitals and poison control centres in the specialist areas of diagnosing possible health effects from exposure to crop protection products and establishing the best course of treatment for patients, along with detailed preventative health programmes.

Syngenta partners with many organisations all over the world to ensure that the impact of our stewardship programs are maximised. The primary Syngenta aim is to continually raise standards of safe use in pursuit of long term sustainability for all customers and users.

Through the use of independent surveys we identify the successes of our stewardship programs and put in place processes to improve identified weaknesses in the use and storage of our product range.



# Education for life

Over the past 17 years, the LUPPA project has trained over 400,000 maize farmers from across South Mexico in the safe use of Gramoxone® and Gramocil™. The training has been designed to prevent accidents and obtain the best results with the products.

Now, the LUPPA project has been extended to include a new package, specifically designed to teach children of elementary school age about care for the environment and the importance of the safe use of crop protection products – for their families and their futures.



To engage the children and get the serious messages across in an exciting and informative way, the project has developed the Guardianes del Campo (Guardians of the countryside) – a series of cartoon characters and their pet, Cuatín. Using educational tools including brochures, flip-charts and colouring books the characters explore good practice and safe use to protect health.



The programme encourages children to discuss what they have learned from Cuatín and his friends, to ensure they follow what he is advising. The project has the backing of health and education authorities from the Chiapas region, where it intends to initially provide training for 1,500 students.

## Figures show training success

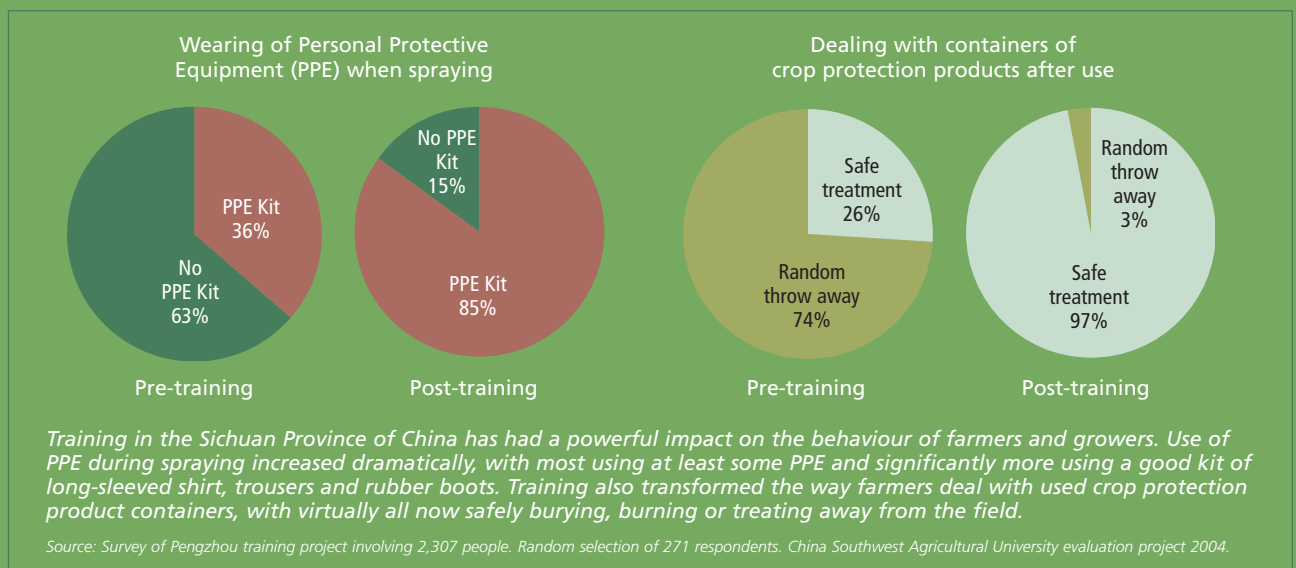
In Nicaragua, a training initiative started by Syngenta in collaboration with the Ministry of Health and Nicaragua Avanza has had dramatic effects in cutting the number of acute health incidents related to crop protection products over the past three years. Operated in association with local hospitals and doctors, incidences in the Matagalpa and Jinotega regions covered by the project have fallen from over 400 in 2001, to around 100 in 2004.

The greatest declines have been in the occupational cases – down from over 100 in 2001 to less than 40 – and a 90% fall in accidents – reduced from around 90 a year to less than ten. Both these areas have been specifically addressed the training courses.

The good practice encouraged by the training include improved product handling and personal hygiene after use to avoid skin contact, as well as the correct use of protective equipment and clothing.

Self harm incidents account for over half the instances of acute intoxication, but have also been significantly reduced by the programme e.g. through better understanding of the importance of safe storage. In 2002 over 80% of agrochemicals were stored within reach of children; after the training programme over 95% are stored in locked containers.

The Nicaraguan project has reached over 20,000 workers across Matagalpa and Jinotega, with more than 1,400 workshops.





## Winning ways with sprays

For the past 25 years Syngenta has sponsored and organised the UK Farm Spray Operator of the Year (FSOOTY) competition. Run in association with the national Farmers Weekly magazine, the prestigious awards are designed to encourage and promote the best practice in spraying techniques – to ensure the safety of operators and the environment, along with improving results through better application.

The competition includes elements of training and education for all spray operators, along with a series of topical tips and articles to provide good practical tips from regional winners across the country. Syngenta has compiled the best ideas over the years into a handy booklet for spray operators.

The FSOOTY Awards are a key element of the voluntary initiative, which has already proven highly effective in demonstrating that the UK farming industry can deliver high quality food without damage to the environment.

Tim Bennett, President of the National Farmers Union said: “The FSOOTY winners epitomise today’s professional farm sprayer operators, with incredible attention to detail to ensure that everything is done correctly. Their performance is an inspiration to others.”

“They demonstrate that best practice can deliver efficient, cost effective and above all safe crop spraying, with good environmental care.”

◀ FSOOTY Winner Michael Donnachie covers over 8,000 hectares a year with his sprayer. Even with the most modern equipment, operator skill is still integral to achieving safe and effective results.

## Relief and rebuilding

Immediately after the Asian Tsunami in 2004, Syngenta donated \$100,000 to the country disaster relief funds in India, Thailand, Indonesia and Sri Lanka. In India we were part of the direct relief effort, with our staff delivering blankets, kerosene lamps and mosquito coils in Nagapattinam, one of the worst-affected areas.

Just weeks later, Syngenta established its in-house Tsunami Fund to secure additional resources for the reconstruction effort. In three short weeks, the fund received almost \$20,000.

Syngenta knowledge and tools have supported the public health efforts of the World health organization (WHO) and its local networks to rebuild communities in the worst affected areas:

- ◆ In Aceh, Indonesia, materials, training and safety equipment for 400 spray operators was provided.
- ◆ In Sri Lanka Syngenta enabled 158 farming families to plant their rice on time; 99% of the paddy land directly affected by the wave yielded to normal expectations.
- ◆ In India and Thailand the fund helped provide expertise on reclamation strategies for those areas affected by salt water.

Using our local companies to provide support directly to those affected or local agencies enabled Syngenta to maximise the benefits to local communities.

# Safe use training in southern Europe

Greek farmers use Gramoxone® as an important management tool for weed control in olives, potatoes, vines, vegetables, top fruit and orchards. The product has a key role in conservation agriculture, to protect soil and water resources (see page 9).

To ensure growers use the product safely and effectively, Syngenta has embarked on a comprehensive stewardship programme, addressing the entire process from factory through to farm use. The programme covers all aspects of safe handling, transport, storage and use in the field.

In 2004, over 1,000 farmers and agronomists attended personal training packages, with many more supported through training literature. Where required at the training sessions, farmers have received protective coveralls, face shields and gloves for future use.

The stewardship programme in Greece has included amendments to the product label to highlight safe use and best practice for storage and handling, including the introduction of clear and easily understood pictograms to assist operators. The safe use of the product is reiterated at all farmer meetings, along with new literature on display at retail units where farmers buy the product.

Training extension workers in Portugal is spreading the message on safe spray application. ▶

Training has initially been focused on the island of Evia, to provide a full evaluation of the positive effects from the stewardship programme. Results will enable a relevant and beneficial programme to be delivered across Greece and the rest of Europe.



## Safely covered

The use of the correct Personal Protection Equipment (PPE) can make a significant difference in reducing operators' potential exposure to crop protection products. In many instances a simple long-sleeved shirt, long trousers and boots has been shown to provide perfectly adequate and effective protection.

Syngenta research, at the Central Sciences Laboratory in the UK and Hohenstein Institutes in Germany, has confirmed cotton and poly-cotton fabrics used in most farm work clothes are suitable materials, as well as highlighting opportunities for enhanced new designs and materials.

Developments in new PPE – such as special jackets providing extra protection to the back and legs of knapsack spray operators, for example – are fully evaluated and, where they offer a practical and useable advantage, are recommended and made available during Syngenta operator training programmes.

Studies in South America report that, before training and availability of PPE, over half of knapsack sprayer operators use no protection. After training initiatives, however, over 80% will wear long sleeved shirts, with the vast majority wearing plastic poncho style and plastic backside covers. Both simple measures which have been shown to reduce exposure very effectively in Brazil.

◀ Providing personal protective clothing still requires training to ensure it is effectively used.



# Incident reports focus stewardship efforts

Syngenta has initiated a new global medical stewardship campaign, to help standardise reporting of adverse health incidents (AHI) relating to pesticide use. The system will be a key element in programmes designed to address the root causes of such incidents through preventative education and training programmes.

The Syngenta AHI Management initiative is focusing on representative areas in developed and developing countries and covers a broad range of users, from smallholder knapsack operators, to plantations and large-scale farming operations.

The project involves establishing partnerships with hospitals, poison control centres and other authorities who already collect AHI data and assisting them in gathering information in a consistent way. The system looks to record not just the product involved, the type and severity of the incident, but also the possible link to exposure, the circumstances involved and the outcome.

A special focus on specific products can serve as example of overall usage, and determine the relative importance of different products involved in health incidents.

Improved reporting of AHIs will enable Syngenta to focus stewardship efforts on key issues, tailor and improve training programmes and direct product development. Being able to accurately compare and contrast regions and countries will allow learning from best practice and implementation in other regions.

Being able to identify changes that occur over time, along with a link to measuring the success of stewardship programmes, aims to reduce the total number and the severity of incidents. Results will be shared with a variety of stakeholders and will form the basis of improvement plans for the future.



## Sustainable packaging solutions

Farmers around the world are getting better at safely disposing of waste, including empty crop protection chemical containers. But there remains the need for training initiatives globally to improve general practice.

The Syngenta stewardship survey across 16 countries revealed 65% of farmers do wash out empty containers, but only 20% are using the recommended triple rinse system and draining the washings into the spray tank to minimise risk of environmental pollution during container disposal. Stewardship elements in every Syngenta training programme drive home this message.

The survey, of over 4,000 farmers, also found over 85% made positive efforts to dispose of containers, with the Syngenta training programmes around the world making a significant contribution to reduce the number of containers discarded in the field. In Brazil, including waste disposal in all training programmes has resulted in more than 60% of all packaging now disposed of through approved routes.

Syngenta initiatives, to reduce, reuse and recycle in its drive to minimise waste, include:

- ◆ Packing products in returnable and refillable containers.
- ◆ Bulk packs for safe and cost-effective local distribution to growers in small quantities, using purpose made take-home pots. Bulk packs are returned for refilling or recycling.
- ◆ Chemical formulations designed to reduce the volume of packaging required.
- ◆ Innovative packaging materials, such as water soluble sachets which dissolve in the spray tank, which minimise handling of chemical and avoid waste disposal.
- ◆ Optimised pack sizes minimise the amount of waste.

Syngenta also operates recycling schemes in Spain and Portugal to co-ordinate central collection points for recyclable plastics and help growers achieve EurepGAP protocols. In the UK, a voucher scheme helps to fund the costs of plastic container recycling for growers striving to meet new waste legislation.



## Locked out of trouble



▲ "I keep the key with me at all times".

An intensive training initiative and the provision of lockable storage containers by Syngenta has been attributed as a primary reason for a 38% reduction in suicide cases related to agrochemical poisoning in the Pengzhou region of China from 2003 to 2004, according to a report by the South West Agricultural University. Suicide attempts accounted for over 96% of all poisoning cases.

The World Health Organization (WHO) launched a new initiative in 2005,



primarily aimed at preventing intentional deaths that result from the misuse of crop protection products, along with awareness to reduce unintentional incidents.

Self-harm among poor, isolated farmers in rural locations is also of major concern in villages across Sri Lanka. Linked to the WHO initiative, the voluntary network, Sumithrayo, in conjunction with the International Association of Suicide Prevention (IASP), has now instigated a secure storage project to assess the role of locked boxes in minimising risk, funded by Syngenta.

The project team has distributed 100 metal boxes to two villages in each of the Hettipola and Lunugamvehera regions. In the first year of the project there were no suicides recorded in any of the four villages, when one per month would be an expected level.

Accompanied by training and raising awareness of issues – along with



▲ "This box saved my daughter's life". ▲

extensive support to help individuals and families at perceived high risk – the boxes have won widespread approval in the communities. Recognising their value, families without the boxes have been requesting one.

Assessment of the initial Sri Lankan project results by the team, and by Crop Life International, have shown additional benefits, including improved product storage that keeps bottles and labels in good condition – avoiding problems of misuse and wastage – and security from theft. Improved agrochemical stock management also ensures farmers need only buy the products required.

In September 2005 Syngenta sponsored the IASP conference in Durban, South Africa. In closing the final workshop session, Lars Melhum, President of the ISAP, said: "measures to reduce pesticide suicide, including secure access, has the largest global potential to reduce suicides today".

## Good practice cascade

In Africa nearly 2,000 farmers, extension workers, Agricultural Development Programme staff and Government officials have been trained by the Syngenta Stewardship team in safe handling and appropriate use of crop protection products, focused on estates and plantations across Nigeria, Cameroon and the Ivory Coast over the past two years.

The team has also worked with international banana plantation-owning companies, to ensure sprayer groups have

been trained in safe and accurate application techniques to achieve the best results and the minimal risk of environmental damage.

Targeting the training at estate managers, key staff, spray team leaders and influential extension workers provides a cascade of good practice and safe working practices to a far wider audience.

# New guide for knapsack application

In many parts of the world knapsack sprayers are the most common way of applying crop protection products, particularly for small-scale growers

looking to protect a limited and often only source of food and income. Now Syngenta and sprayer manufacturers, Hardi International, have teamed up to develop a *Best Practice Guide for Knapsack Application*.

The kit includes a Kalibottle to quickly and accurately calibrate correct sprayer output, along with a Dose Calculator to work out how much product to use. The result is to ensure sufficient agrochemical is used to achieve the required pest control, but not too much as to compromise crop and environmental safety.



The guide aims to help smallholders operate more safely and improve results with knapsack applications. The leaflet contains essential information on the 'dos and don'ts' – from sprayer maintenance, nozzle selection and correct application, to protective equipment, product handling and sprayer cleaning.

Following the clear pictures and diagrams in the guide, reinforced by short text and keywords, will help millions of growers around the world to achieve better results and spray more safely.

◀ Pictorial guides and simple to use practical training aids ensure sprayer operators know how to achieve better and safer results.

## Surveying safety

A major global survey of farmers' spraying operations will provide valuable information to further improve training programmes and recommendations that will assure the safety of operators and the environment. Commissioned by Syngenta, the independent research focused initially on knapsack sprayers in tropical countries has been extended to cover 16 countries across Europe, South America and Asia.

The survey of over 6,000 operators has already highlighted that, in most

instances, operators understand the risks involved with handling crop protection products and are paying close attention to application practices and personal protection during mixing. However, it has also revealed more work is needed to educate and help with secure storage and safe disposal of containers after use – which is now being integrated into Syngenta programmes.

In many of the countries, interviews were targeted at knapsack spray users,

often on small units of less than half a hectare. Yet nearly half of those interviewed had attended training sessions over the previous year, and 98% had learned something in the past three years.

The detail of the questions included revelations that personal hygiene during spraying was lower among operators in Ireland than those in South Asia – a timely reminder of the need for continual training even among perceived developed markets.

Storage of agrochemicals (%)						Child access to stored pesticides (%)					
Locked chemical store	11	54	1	6	16	Never accessible	64	61	58	35	59
Farm warehouse/barn	8	29	10	17	17	Accessible but out of reach	13	20	13	45	25
Shed outside the house	39	13	45	39	42	Accessible but told to stay away	21	18	29	20	16
Open air outside	3	0	34	24	10	N/A	2	1	0	0	1
In the house	24	2	10	13	11						
Others	15	2	0	1	4						
	China	France	Mexico	Philippines	Global		China	France	Mexico	Philippines	Global

*The Syngenta global survey of stewardship and safe product use, involving over 6,000 farmers in 16 countries so far, has revealed distinct differences in farmer activities, and highlighted the need to adapt training programmes accordingly.*

*Source: Syngenta Global Stewardship Survey, 2004/05*

## Doctor training creates healthy dialogue

▲ Doctor training programmes keep health professionals up to date with the latest developments to minimise risk of misuse of crop protection products.

Training of doctors and health professionals to recognise and treat incidents of accidental or deliberate poisoning with crop protection products is a pivotal activity of the Syngenta Medical Stewardship programme. A major initiative has been taking place across the Asia-Pacific region in recent years, including China, Indonesia, Pakistan, Philippines, Thailand and Vietnam.

The training programme has evolved to include educating doctors on the role and use of crop protection products within the agricultural community for food production. The aim is to make

them more aware of the range of products available, the ways that operators use these and to help identify potential problems in use.

Raising awareness of the factors that can lead to misuse has helped health professionals integrate measures into the preventative health programmes for rural communities in many countries. The global Syngenta Medical Stewardship network can help to quickly spread the best ideas and practices worldwide.

Doctor training and working with health professionals at a national, regional and

local level also provides a rapid feedback and better understanding of issues relating to product use and misuse they face at ground-level. Highlighting problems enables the industry to develop practical solutions, including changes to label wording recommendations, to improved packaging design or storage and application advice to minimise risks.

The Syngenta training programme continually develops, to keep doctors and health workers up to date with the introduction of new products, along with results of exhaustive product safety assessment.

## Training message spreads

When the Ministry of Agriculture in China established its 'Non-Hazardous Food Action Plan', Syngenta supported the initiative with a safe use training programme that has already provided help, advice and series of support tools to over 30,000 participants.

But by targeting training at key farmer groups, crop protection product retailers and grass roots extension workers, the messages on safe use have spread far further. Studies have shown each key farmer influences a further 24 farming families, with retailers influencing an average 83 families and extension workers 96 families. With an average of two farm labourers per family, the sphere of influence from each training session is immense.

Independent evaluation of the Syngenta training programme by the China South

West Agricultural University has shown that even where farmers were well versed in what and when to spray, significant improvements were made in the use of personal protective clothing during spraying, the maintenance of sprayers to avoid leakage and the safe handling and disposal of packaging.

The evaluation report highlights that before training 90% of farmers undertook limited personal hygiene steps after spraying; following the training programme 85% now washed and changed clothes. Pre-training 75% of farmers just discarded containers in the field; after training 86% took appropriate measures to dispose of them safely.

The report added: "The grass-roots training model has proved to be an effective way of safe use technology



and concept extension. We recommend continuous implementation and further spread of this mode in future farming training."

"The necessary enhancement of farmers' safe use awareness and behaviour needs continuous support and contributions from foresighted enterprises like Syngenta."

Syngenta Crop Protection, P.O.Box CH-4002 Basel, Switzerland

For further information on Stewardship & Sustainable Agriculture please contact: [responsible.stewardship@syngenta.com](mailto:responsible.stewardship@syngenta.com)

'Amistar', 'Amblyline', 'Bicep', 'Bravo', 'Calisto', 'Cruiser', 'Gramocil', 'Gramoxone', 'Hawk' and 'Terba' trademarks are the property of the Syngenta group of companies. 'Aquasite', 'Aquaplaine' and 'Aquavallee' are registered trademarks of Arvalis. The Syngenta wordmark is a trademark of Syngenta International AG.

© Syngenta International AG, 2006. All rights reserved. Editorial completion – May 2006.

Designed & produced by Kre8tors LLP