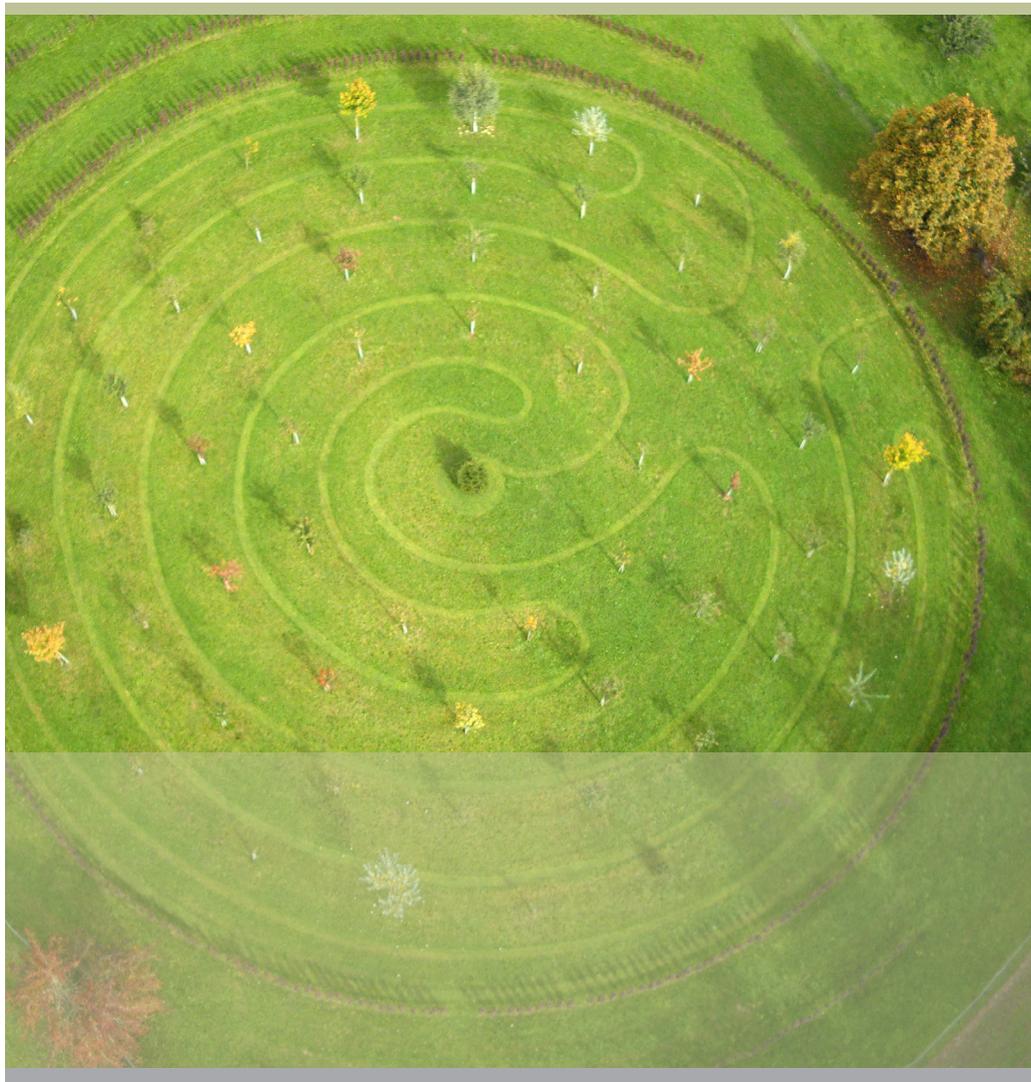


# Circles of discovery



## The need to know more

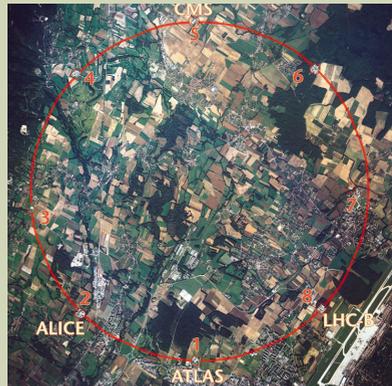
Bruno Mendes does not own a car. Instead he travels mainly by public transport and rents from a car-share scheme when passenger services are impractical. He is very selective in his shopping, seeking labelled organic products where possible.

As a trainee at CERN (the European Organisation for Nuclear Research), Bruno has just completed a study into changes in Switzerland's natural areas. This drew him into the challenges, conflicts and choices of land management and efforts to improve communication and understanding.



**Photo:** Bruno at the supermarket  
© Gordon McInnes

One of the world's largest scientific research bodies, CERN explores the world of fundamental physics. CERN's internationally famed Large Hadron Collider — the world's biggest particle accelerator — forms a 27 km circle of discovery 100 m below ground. Launched in 2008, many hope that it will help unlock the basic workings of the universe.



**Photo:** Large Hadron Collider location near Geneva © CERN

Switzerland widely seen as an unchanging landscape of soaring snow-covered mountains, dark forested hillsides, lush productive valleys and deep calm lakes. But like all countries, Switzerland changed markedly during the twentieth century and continues to adapt to social, economic and technological developments. These have impacts on Swiss trade, the balance of urban and rural areas and Switzerland's unique natural and human-influenced landscape.

In 1950, Switzerland had some 15 million fruit trees, mainly arranged in orchards around villages and forming semi-open mosaics. By 2000 this had fallen to 3 million, most cut down to provide housing and more profitable farmland or pastures. Over this period, apples were increasingly imported to meet demand. In recent years, however, with growing awareness of the health and environmental impacts of intensive growing and lengthy transport of food products, the Swiss have started to demand a return to locally grown and organically produced food. And supermarkets and other suppliers are responding.

Traditionally, apples were grown on large, 'high-stem' trees in well-spaced orchards with around 100 trees per hectare where hay or cereal can also be produced. Such trees went out of fashion in the second half of the twentieth century. They were replaced by 'low-stem' trees, grown closely together in lines, 500–1 000 per hectare, trained on wires like vines and standing about one to one-and-a-half metres tall. Low-stem trees can be maintained and harvested more efficiently than high-stem ones and hence, in an increasingly competitive world, became more profitable for most farmers. High-stem trees usually need to be harvested on tall ladders or hydraulic platforms, which can be dangerous and therefore raise concerns for workers' safety.

High-stem and low-stem apple trees can be grown with or without artificial fertilisers and pesticides, meaning both types of tree can be certified for organic production. Farmers can range in focus from high intensity, non-organic, low-stem production to totally organic high- and low-stem production.

The area of land used for organic farming doubled over the period 1996–2004 and in 2005 reached 11 percent of the total agricultural area of Switzerland. This is significantly higher than the 4 percent of total agricultural area in EU-25 in the same year. The area of organic farming grew most rapidly in Switzerland after 2000 as farmers and suppliers responded to increasing awareness of and demand for organic produce.

Bruno is particularly concerned about the impact of food production on the natural world. He therefore agreed to explore the issue further, meeting a farmer, a bird expert and representatives of a local supermarket to see how apple production and supply influence the three dimensions of biological diversity: genetic variety, species abundance and richness, and ecosystem composition and function.

### Choosing apples

Astonishingly, Switzerland has some 2 000 varieties of apple, although Bruno would hardly guess it from a visit to most Swiss supermarkets. Varieties such as Golden Delicious, Gala and Maigold predominate. Often imported, they are expected to be in perfect condition since



Photo: © Fotoagentur AURA

most people still judge apples by their looks rather than taste. Many other varieties struggle to

The domestic apple, *Malus domestica*, is considered to have evolved from the wild apple, *Malus sieversii*, which still grows in the Tien Shan mountains of Kazakhstan. The largest city of Kazakhstan and until 1997 its capital, Almaty, was initially called Alma-Ata meaning 'Father of all apples'. The original wild apple evolved into some 20 000 varieties worldwide as it was taken from place to place, grown and consumed by peoples and animals over thousands of years (see also R. Deakin *Wildwood A Journey through Trees*. London: Hamish Hamilton 2007).

maintain quality and quantity from year to year. Some have become less available as a result; some have disappeared from commercial supply altogether.

As Bruno recognises, we face a variety of questions as consumers. Where should we shop? Should we opt for organic or conventional produce, local or imported supplies? How can we avoid unnecessary packaging? What do we know about products and their environmental impact? How much should we spend?

Asked how much he would pay for organic produce, Bruno reflects on recent purchases. 'I'm willing to pay 20 per cent more for organic products, in particular the locally produced ones,' he responds, 'since they are healthier and better for the environment'.

Surveying the choice of apples commonly on offer, however, it's

hard not to feel that the market is failing both consumers and the environment. Price signals that encourage suppliers and shoppers to favour limited foreign imports over diverse local alternatives can produce unfortunate results, including reducing biodiversity, emitting pollutants and greenhouse gases, and diminishing consumer choice and enjoyment.

Encouragingly, however, things appear to be changing. Supermarket chains such as COOP in Switzerland are responding to consumer demand for more variety, more consideration of the environment and human health, and more product information. COOP cooperates with *BioSuisse* and *ProSpecieRara*, to promote a wider range of locally grown, organic products including apples.

COOP supermarkets sell up to 12 varieties of apple, all grown

*BioSuisse* ([www.bio-suisse.ch/en/index.php](http://www.bio-suisse.ch/en/index.php)) is an umbrella association of more than 30 organic farming organisations and over 6 300 organic farms in Switzerland. *ProSpecieRara* ([www.prospecierara.ch](http://www.prospecierara.ch)) is a Swiss foundation established to maintain the cultural and genetic diversity of plants and animals through on-site conservation, raising awareness and encouraging the supply of rare varieties, including apple varieties, to consumers.

in Switzerland, of which several are rare varieties promoted under the *ProSpecieRara* label. And to guide and foster interest among customers unfamiliar with unusual varieties, COOP provides information on each, explaining the name, source and taste.

### **What organic farming can do for biodiversity...**

But what is actually available locally? And why is regional organic produce preferable to imported alternatives? To answer these questions, Bruno travelled to Schwander Farm in northern Switzerland.

Situated at the south end of Baldegg Lake, the farm has been in the Schwander family for over 100 years. It covers 6.5 hectares, including 1.5 hectares of woodland. Hedges of willow, hazelnut, sloe and hawthorn provide fruit for birds. Vegetable plots produce no less than 35 varieties of tomato and 60 different vegetables. And low- and high-stem orchards (with 250 large apple trees) yield 42 varieties of apple. It is, in short, a place of considerable diversity.

Robert Schwander took the farm over in 1992, initially working it part time as his father had done. In a



**Photo:** Bruno, Robert and Michael with Danielle, the interpreter  
© Gordon McInnes

bid to make a better living from the farm, he decided in 1995, initially for solely economic reasons, to develop organic produce to supply an emerging niche market and to sell directly to customers. In 1997 he decided to go totally organic and has never looked back. Robert's farm is certified organic not only to the standards of the national scheme, *BioSuisse*, but also to the more demanding standards of *Demeter*. He sells each week at local markets and sales continue to grow year on year.

*Demeter* (named after the Greek goddess of fertility) is an ecological association that coordinates a network of certification organisations world-wide. *Demeter* is based on what it calls biodynamic agricultural methods as conceived by Rudolf Steiner in 1924 and subsequently developed by various research organisations and farmers. *Demeter* standards require that a farm is completely organic, using seed/plant material certified or approved by *Demeter* and making no use of artificial fertilisers or pesticides anywhere on the farm. For more information see: [www.demeter.net](http://www.demeter.net).

It is a grey November day when Bruno visits Schwander Farm to meet Robert, his wife Rita and Michael Schaad of SVS/BirdLife Switzerland. They are standing within the new orchard, which Robert has prepared as a series of concentric circles. The outer circle contains 800 self-standing, low-stem apple trees, which Robert calls 'column trees'. They are of the variety Pomfital, which produces a red-fleshed apple. Inside is a circle of birch, willow, walnut and ash.

Towards the centre stand separate circles of high-stem cherry, pear and apple trees.

Robert guides Bruno slowly across the farm, quietly explaining the layout, why he planted the tree circle, what he has to do to comply with *Demeter* standards and Swiss ecological quality subsidies, what he sees as the benefits of organic farming and what he has done to enhance the attraction of his farm for wildlife.

SVS/BirdLife Switzerland is a member of BirdLife International, a global network of conservation organisations focused on the conservation of birds, their habitats and global biodiversity. Michael Schaad, conservation officer and head of projects on 'nature and agriculture', joined the visit to Schwander farm to provide background information on the impact of changing farming practice on birds and other species. For more information see: [www.birdlife.org/worldwide/national/switzerland/index.html](http://www.birdlife.org/worldwide/national/switzerland/index.html).

Recent research demonstrates that organic farming delivers significant benefits for biodiversity. Many flowers, birds and mammals, such as bats and invertebrates found on farmland, benefit from organic farming due to management practices that are central (but not exclusive) to organic farming. They include prohibiting or reducing the use of inorganic fertilisers and pesticides, attention to soil quality and fertility, increasing the quality and quantity of non-crop habitats and field boundaries, and preserving mixed farming with diverse crop rotation.

Walking through Schwander farm, these principles and their positive effects are immediately evident. The high-stem trees provide perches and protective cover for birds. Older trees provide cavities



**Photo:** Bruno and Robert continue their discussions © Gordon McInnes

Various research institutes help Robert and farmers like him to develop their organic farms, for example the Research Institute of Organic Agriculture (FiBL, [www.fibl.org](http://www.fibl.org), based in Switzerland, Germany and Austria), which was visited in the preparation of this story. Among its research projects, FiBL has established at its base in Frick an experimental plot of low-stem apple trees where it is systematically researching how to improve the productivity and quality of organic orchards through good soil management, the cultivation of disease-tolerant apple varieties and the planting of wildflowers and hedging plants to promote beneficial organisms and control pests (see: [www.fibl.org](http://www.fibl.org)).

for birds' nests. The ground cover in the orchards is varied with patches of open ground and ponds. It is also mowed regularly to keep the vegetation short as much as possible. The soil is treated to *Demeter* standards to ensure it is rich in organic nutrients and micro-organisms to maintain its health and fertility.

Robert leaves some apples on the trees for the birds. This all provides food and structure beneficial to plants and insects, and attractive to

birds. As a result, Robert has seen a return of several birds to the farm, including green woodpeckers (*Picus viridis*) and common redstarts (*Phoenicurus phoenicurus*), which Michael confirms are good indicators of a biodiversity-friendly habitat.

Common redstarts, despite their name, became increasingly rare in the late twentieth century as their habitats disappeared. They prefer open woodland and high-stem orchards where they benefit from somewhere to perch

Both rare and common bird species have been monitored in Switzerland since 1990 as part of species monitoring within the Swiss Biodiversity Monitoring Programme (BDM) ([www.biodiversitymonitoring.ch](http://www.biodiversitymonitoring.ch)).

Trends in the abundance of common birds in different habitats — agricultural, forest, wetland and alpine — have been mainly positive, particularly over the past 10 years. Thirty-eight species of bird common in agricultural ecosystems declined some 20 per cent between 1990 (when consistent monitoring began) and 1998. They had declined much more dramatically in the period 1950 to 1990 when bird populations collapsed widely in Europe and North America due to the shift to intensive farming and the use of pesticides. Since 1998 they have recovered to slightly better than their 1990 levels.

The Swiss data are included in the European Common Bird Index, which is one of the 26 indicators selected for monitoring Europe's progress towards the target of halting biodiversity loss by 2010 (<http://biodiversity-chm.eea.europa.eu/information/indicator/F1090245995>).

overlooking uncovered or lightly covered ground in which they can find insects to eat.

With excitement and satisfaction, Robert mentions that he has seen a hoopoe (*Upupa epops*) on the farm. Hoopoes are brightly coloured birds with black and white barred wings and tail feathers, pale orange-brown bodies and a dramatic orange crest with black tips. They used to be quite common in southern Europe and Switzerland but declined with the reduction in orchards in the second half of the twentieth century. Like the green woodpecker and common redstart, they are gradually reappearing in Switzerland.

### **And what biodiversity can do for farming**

But the returning species aren't the only ones benefitting from Robert's farming methods. It's clear, rather, that a complex interdependence exists between human wellbeing and the diversity of life in surrounding ecosystems. For Robert and other local farmers, biodiversity isn't only treasured because of its intrinsic beauty but because it is essential to their livelihoods.

Of all human activities, farming is perhaps the most dependent

on biodiversity. By their very existence, wild plants and animals provide opportunities for cultivation or domestication. Genetic variance in breeding stock facilitates selection and breeding for specific purposes, which is more important today than ever, as reliance on an increasingly narrow gene pool increases vulnerability to environmental change.

Equally important, biodiversity delivers services that are essential for sustainable agricultural production, including pollination, soil decomposition, fermentation and natural pest control. Replacing these natural service providers with man-made alternatives would often be hugely costly and sometimes impossible. Seen in this light, Robert appears to be investing wisely in the future for his family and community, rather than simply indulging his love of the natural world.

Reflecting on his endeavours, Robert talks calmly, with little emphasis in his voice but a sparkle in his eye that reveals his passion for his farm, the approach he has adopted and the satisfaction that brings him. He is clearly thinking long term in the development of his farm. Neither he nor his children will see the full benefits

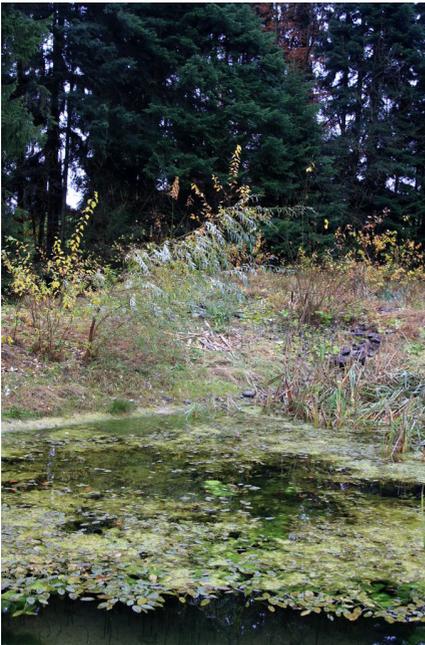
of the fruit trees he has recently planted. Apple trees produce about 10 kg of fruit after 4–5 years, about one tonne of apples every other year after about 30–40 years, and as much as two tonnes of apples every other year after 100 years.

The Swiss Ordinance on low input farming entitles Robert to a subsidy if he sets aside at least seven per cent of his land for nature. In fact Robert sets aside a quarter. Close to the new circle, he has prepared two ponds that

attract grass snakes (*Natrix natrix*) and sand lizards (*Lacerta agilis*) as well as various dragonflies.

'I've prepared this pond as a gift to nature. Since it's not considered productive, I don't get any subsidy for this part of the farm', explains Robert. He has also prepared hides for hedgehogs, log piles with burrow holes for bees and bird boxes around the orchards to help attract wildlife.

Robert planted the circles of trees, first as an orchard for producing fruit but also to develop into a maze as a tourist attraction. He joined with other farmers in the area to develop a tourist trail, with the maze, small restaurants and other features scattered across the slopes around Baldegg Lake. Such innovations are expected to attract people to the area and enhance the incomes of



**Photo:** Schwander Farm Pond  
© Gordon McInnes



**Photo:** Schwander Farm Log-pile  
© C. Girard

farmers — further evidence of the valuable services that biodiversity provides.

### **Some answers and more questions**

Bruno has come a long way from the atom-smashing circle 100 metres under the fields of western Switzerland to the landscape forming circle in the fields of northern Switzerland. On the way, he has met many people, had lots of discussions, enhanced

his knowledge of the benefits of organic farming for biodiversity and collected new information to help him choose his next apples.

His awareness has improved but the choice is no easier. Just as happens in the exploration of subatomic physics, as questions are answered they reveal even greater complexity — in this case in the interactions between ecosystems, the economy and society in the production and consumption of organic apples.



**Photo:** FiBL Experimental Plot © Gordon McInnes

## Apple favourites

Everybody in Switzerland involved in the making of this story was asked about their favourite apple. The following were selected:

- Berner Rose: Switzerland 1888, a sweet, juicy eating apple, stores well (COOP staff and Thomas)
- Topaz: Czech Republic 1993, crisp, sharp, juicy (Céline, Robert, Michael)
- RubINETTE: Switzerland 1966, both sweet and sharp (Rita)
- BEFFERT: Switzerland 1815, a sweet, juicy apple (Olivier)
- Wide range, especially spicy, tart!! (Franco)
- Also wide range! (Nicolas)
- Gala: New Zealand 1934, sweet, slightly tart, eating apple
- Boscop: Netherlands c. 1856, aromatic, tart, crisp, stores well, sweetens in storage
- Maigold: Switzerland 1944, sweet, juicy, slightly acidic, stores well (last three all Evelyne)
- Braeburn: New Zealand 1950s unique combination of sweet and tart flavours (Kathrin)



**Photo:** Bruno's apple pie is ready for the oven  
© C. Girard

## Apple favourites (cont.)

Bruno's favourite recipe for apple pie using several of his favourite apples — Gala, Golden Delicious and Topaz:

One portion of crusty pastry,  
pricked with a fork, peel,  
core and slice the apples into quarters,  
prepare a base of grated hazelnuts,  
place the apples in a circle on the hazelnut bed,  
take 1–2 dl milk,  
1 egg and 2–3 soup spoons of sugar,  
mix in a bowl and add to the pie,  
sprinkle cinnamon on top,  
place in oven at 180 °C for 30–40 minutes.

Enjoy!



**Photo:** The final product! © C. Girard

## **Acknowledgements**

This story was prepared with Kathrin Schlup, Christian Schlatter and Céline Girard (Swiss Federal Office for the Environment (FOEN), EEA National Focal Point for Switzerland) with additional help and advice from Evelyne Marendaz and Thomas Göttin (FOEN), Rita und Robert

Schwander (Schwander Farm), Franco Weibel and Oliver Balmer (FiBL), Urs Hintermann, Adrian Zangger and Nicolas Martines (Hintermann & Weber), Michael Schaad (Birdlife Switzerland), Simona Matt, Matthias Kuratli and Pascal Schutz (Coop Switzerland), Danielle Friedli (Freelance interpreter), Mike Asquith and Gülcin Karadeniz (EEA).

Front cover photo: Schwander Farm Tree Circle © Fotoagentur AURA

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