

PERMACULTURE AND BIO-INTENSIVE MICRO-AGRICULTURE: THE BEC HELLOUIN FARM MODEL

Charles Hervé-Gruyer
Co-founder of the Bec Hellouin farm



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The Bec Hellouin farm was created by the husband and wife team of Charles and Perrine Hervé-Gruyer. As trained educator, Charles spent 22 years organizing scientific expeditions on board an educational boat before retraining in psychology and physical therapies. At the same time, he created his experimental farm to test environmentally friendly farming practices and methods, such as permaculture, that were little-known in France at the time. Charles co-leads the research programs at Bec Hellouin farm, run with partners that include the French National Institute of Agricultural Research (INRA) and AgroParisTech. He has acted as consultant during the creation of several experimental farms.

The conventional farming model is increasingly criticized for its negative environmental impacts and inability to feed our planet's ever-growing population with limited resources. Unlike the intensive model, the permaculture and bio-intensive micro-agriculture model developed at Bec Hellouin places nature at the heart of farming. The idea is to produce large amounts from small areas, at the same time replenishing the biosphere and gradually moving away from use of chemical inputs and fossil fuels. Although the Bec Hellouin model was created in a rural setting in northern France, its innovative approach is rooted in the circular economy and is equally suited to application in urban settings, where micro-farms provide myriad services to the local community, such as local produce, environmental benefits, microclimate, social ties, and more.

BEC HELLOUIN FARM

Perrine and Charles Hervé-Gruyer created the Bec Hellouin farm in northern France in 2004. It started out as a large family kitchen garden designed with the idea of becoming self-sufficient in food. At the end of 2006 they set up as professional farmers and two years later they decided to follow permaculture principles, a biomimetic method that was little-known in France at the time. Today, they make a living from their produce (fruit, vegetables, eggs and products such as cider) and from providing training to other people interested in setting up environmentally friendly farming projects. In total the farm employs seven people full time to handle its farming, training and research activities. Sylva, an institute founded by Perrine and Charles, has run studies since 2011 to assess the economic performance of organic market gardening techniques and the impact on biodiversity and soil quality; it works with its scientific partners AgroParisTech, the French National Agronomy Research Institute and the Free University of Brussels.

To find out more:

- *Vivre avec la terre - Manuel des jardiniers-maraîchers*, [Living with the Earth - Handbook for Market Gardeners] Perrine and Charles Hervé-Gruyer, Éditions Actes Sud, 2019
- *Permaculture - Guérir la Terre, nourrir les Hommes*, [Permaculture - Heal the Earth, Feed the People] Perrine and Charles Hervé-Gruyer, Éditions Actes Sud, 2014.

Bec Hellouin farm is an inspiration to many farmers, whether rural or urban. Your model has helped raise the profile of more environmentally respectful farming techniques as well as permaculture. What are the principles behind permaculture and can they help us meet the food and farming challenges of tomorrow?

Charles Hervé-Gruyer: Today's conventional agriculture will be unable to feed everybody tomorrow. Reliance on mechanization and chemicals mean today's farming is based on overexploitation of finite resources (fossil fuels, phosphate mines, etc.). It depletes soils – almost 30% of arable land has been destroyed over the past 50 years – as well as exhausting water resources, drastically eroding biodiversity and contributing to climate warming. This type of agriculture is rapidly destroying our planet. And yet if we look to the future, in 50 years' time oil will have run out or be unaffordable, the planet will be home to over 10 billion humans, with depleted water reserves, less arable land and an increasingly unstable climate. This means we have to look at other paths, other solutions.

Quite unlike the overexploitation model, permaculture takes its inspiration from nature, accepting that nature is amazingly wise and can create abundance seemingly from nothing. Human installations modelled on the natural world is the permaculture path to living sustainably, on a planet whose finite and limited capacities we are increasingly aware of. First set out in 1978 by two Australians, Bill Mollison and David Holmgren, permaculture quickly spread among "greens" in the English-speaking world. Its advocates were communities with little formal agricultural training, motivated by a desire for self-sufficiency and often living on society's margins. Permaculture tended to be adopted in family or collective gardens, for growing fruits and vegetables, and was at times dismissed as simply a great way for amateurs to enjoy gardening. But just because that was what happened in the past, there is no reason to limit it to these types of applications in the future. Bec Hellouin was one of the first farms to incorporate permaculture ideas into large-scale organic farming. We are market gardeners and arborists, and we also raise small livestock. But people are increasingly talking to us about designing systems on a larger scale, for cereals and cattle for example. Permaculture ideas can help us to completely rethink our agricultural system. Permaculture gives us the tools we need to design sustainable human systems that take their inspiration from nature and living ecosystems. Once you start to observe nature you realize that natural ecosystems comprise a vast number of components that relate to each other through an extremely dense web of relationships:

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what is waste for one is resource for another because nature works in loops. If we want our human installations to be sustainable, this has to be designed-in from the outset so that every component can interact properly, allowing us to achieve maximum energy efficiency and productivity with minimum inputs and resources.

How does the Bec Hellouin farm integrate this approach in its commercial organic farming operations?

CH-G: By forcing us to look closely at the relationships between the farm and its surroundings, a permaculture mindset enabled us to create a farm that is as autonomous and resilient as possible. Producing its own resources makes it less dependent on the outside world, meaning that it is better able to deal with crises, whether these be climate-related or social and economic upheavals. We are trying to create a diversified environment that mixes cultivated plants with trees and animals, a system that we call agro-sylvo-pastoral. We've created a microclimate, the amount of organic material is fast rising and soil quality is improving. This also helps us to manage our water efficiently. We avoid evaporation by making sure soil is never left bare,



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using straw to keep it covered. However, this water-responsible approach does have its limits and we still have to water during very dry spells. But instead of using water from the utility network or drilling a well to abstract groundwater, we try to divert and store as much water in every possible way, just the same as we try to capture sunlight. We've dug 25 ponds at our farm and created a system of swales, which are trenches with a bank on one side that follow the contours of the land. Instead of running off, water now leaches into the soil. Our approach is heavily inspired by permaculture; we start by trying to minimize resource use, and next we set out to produce in a manner that is natural and zero cost.

But permaculture is not our only source of inspiration. Although it did help us to sketch out the main guidelines for our farm, as permaculture's founders were not themselves farmers, we also had to look elsewhere for farming techniques that aligned with our goals. We looked all around the world – at ideas from Japan, the UK, Cuba and the USA – to try and identify the most natural possible farming practices. We were looking for systems that use no fossil energy, relying on human- or animal-powered machinery, and had in many cases stood the test of time. From the carefully groomed agriculture seen in Japan and Korea to bio-intensive micro-agriculture in the USA, we try to leverage synergies between elements of proven and highly efficient practices. It is this combination of farming techniques inspired by miniature smallholdings that has made us so productive. *Maraîchage biologique*

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permaculture et performance économique [Organic market-gardening and economic performance], a study we ran with INRA and AgroParisTech from 2011 to 2015, provided science-based validation for our practices. In 2015, 1,000 square meters of market garden at Bec Hellouin grew produce worth €55,000 at market (whereas organic market-gardening in France produces average returns of around €30,000 per 10,000 square meters). And we've progressed since then. The more time we devote to a plot of land the more its productiveness increases, to the extent that in polytunnels we're sometimes seeing yields of up to €200 per square meter. There have also been very positive impacts on biodiversity: the farm attracts more birds, including rare species, insects and earthworms than the surrounding land. This type of micro-farm can produce an abundance of quality food for humans and act as a biodiversity oasis. There are currently seven of us making a living from the farm's three activities: farming, permaculture training and research programs.

Your farm is in northern France, in a rural setting in Haute-Normandie. Can urban farms learn from your model?

CH-G: The truth is that our model is in fact based on lessons from urban farming. The American gurus of bio-intensive micro-agriculture, Eliot Coleman and John Jeavons, borrowed heavily from the rich tradition of market gardening in 19th century Paris. Producing large quantities from small spaces dotted around the inner city, Paris' market gardeners were able to supply the city with quality fruit and vegetables all year round, even exporting as far afield as London. Paris' pioneering urban farmers left considerable written records, and these are a real inspiration to us. Perfected first in the royal gardens at Versailles then in 19th century Paris, these techniques were further developed in the United States before returning to France at Bec Hellouin, and they are now widely used in many urban agriculture projects. The way these ideas have been handed down to us does not mean that we're looking to the past. We've taken a new look at them in the light of knowledge unavailable to our forebears. Today, urban farming is a movement spreading around the world. Cities in both hemispheres are examining how to develop urban farming, which will become essential. If we experience a crisis in fossil fuel supplies, if the flow of food transportation is suddenly cut off, Paris only has enough

food stocks to last three days. Expanding urban farming can be part of a response when setting out to make our cities more resilient.

The miniaturized, non-motorized agriculture that we practice at Bec Hellouin definitely has its place in urban settings because the idea is to produce a lot from a small area. Small city gardens, even people's lawns, can turn out to

be extremely productive. We have a very diverse range of people who come here for training: people with an urban farming project, city-dwellers looking to start a new life in the country, local government policymakers and landscape gardeners interested in how to transform decorative spaces into food-producing spaces. We have worked to help create an outstanding example in Versailles, run by one of our former trainees, Gilles Degroote, working with Nature et Découvertes. The Gobert pond (1685) was originally created to supply water to the royal kitchen gardens and was reengineered last year to become a permaculture-inspired urban micro-farm.

But growing in cities is subject to a different set of constraints than those applying in the countryside. The availability and cost of land, for example, are very different. What do you think are the conditions needed to produce in towns and cities in ways that align with the principles you advocate?

CH-G: It is true that feedback from the numerous municipalities we are in contact with shows that, despite a real commitment to see projects like this get off the ground, more often than not actual yields are not particularly high. Shared city gardens sometimes do not produce very much because they are tended by urbanites with little knowledge of gardening, and even less of agriculture. We advocate the incremental professionalization of city farming, the idea being to ensure that residents who want to reconnect with small-scale food production can be supported by skilled professionals, helping them to increase their yields and set up projects that are more overtly successful. Just this year (2019) we published a practical handbook (*Vivre avec la terre - Live with the Earth*) that summarizes the core techniques and concepts guiding our methods, particularly in terms of how these transfer to urban settings.

There is no avoiding the fact that produce grown in urban settings costs more because of the scarcity and price of land, resources that have to be brought in from outside and, critically, because city farmers will be forced to pay far higher rents for their land than a colleague in the countryside. An urban farm will probably have difficulty surviving solely from selling its own produce and will always be dependent on support from the wider community. The fact is that, beyond their food-growing roles, these new types of farm provide additional environmental and social services to their localities, and it is only right that they receive payment for this. Urban farms also produce social ties and wellbeing, they bring nature back into the city, create jobs, food security,

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microclimates and so on. Studies have shown the positive impact a productive green island can have on human health. There are other studies indicating that greening the city is the best way to cut vandalism. All these services they deliver fully justify municipalities either providing a subsidy or supporting them in other ways.

There's nothing wrong with trying to introduce new sources of income other than just farm-grown produce. These are new practices and they must be thought of as part of a larger whole. At Bec Hellouin, the knowledge we acquire in the course of our research programs and the training we deliver all align with wider society's underlying needs. You should never hesitate to explore alternative ways of funding your activities. For instance, micro-farms in towns and cities can offer guided tours in return for an entrance fee.

Ultimately, the critical challenges that urban farming has to address are the following: professionalization, unambiguous support from the local community and reinvention of the economic model.