

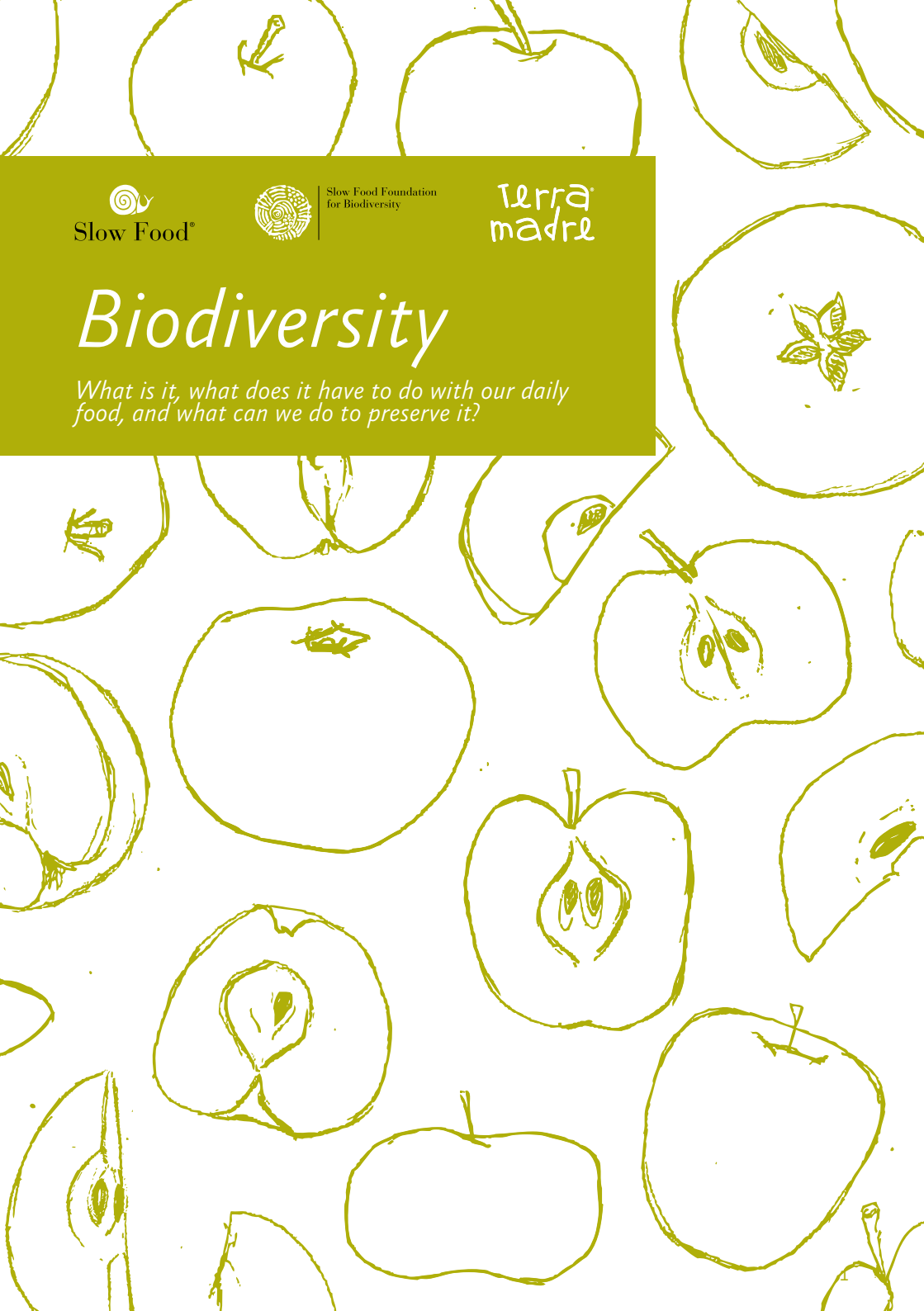


Slow Food Foundation  
for Biodiversity

Terra  
madre

# *Biodiversity*

*What is it, what does it have to do with our daily food, and what can we do to preserve it?*



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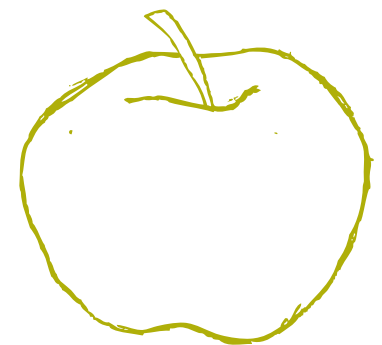
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# First, observe

*"The defense of food products has always been one of the cornerstones of Slow Food's activities. From the Ark of Taste, the first Presidia were created, and the Presidia, in turn, gave way to other projects. Increasing the number of products selected for the Ark has become ever more urgent. If the association loses this sensitivity, it risks losing its raison d'être".*

Carlo Petrini

Slow Food starts with **knowing your region: listening, observing, tasting, recognizing its flavors and aromas.** With our senses and curiosity, we can then become acquainted with other regions and countries: preserving the memory of a trip through a bread, a cheese or a honey; exchanging ideas, products and recipes with convivia in other countries.

It is crucial for any Slow Food convivium, then, is to **discover the good, clean, and fair producers of its own area:** cheesemakers, shepherds, beekeepers, bakers, farmers... Speak with the elderly to record and share their local knowledge, and at the same time seek out the young entrepreneurs who have returned to the land.

The journey to map your local food culture will be filled with excitement and surprises, and result in a list of interesting contacts which can be used in various ways. Traditional products may board the Ark of Taste. Some producers may come

together to start a Presidium. Many other producers can become fully involved in the Slow Food network, even if they do not meet the Ark or Presidia criteria: young cheesemakers with a new cheese to sell directly to consumers; organic farmers' groups that deliver fresh vegetable boxes; livestock breeders attentive to the environment, recycling waste and prioritizing animal welfare; and so on. The important thing is that the producers adhere to good, clean and fair practices: that is, they pay strict attention to quality, the environment and social justice.

After having mapped this extraordinary landscape of humanity, energy and creativity, one can organize many events (dinners, taste workshops, parties, seminars, etc.), develop communications tools (guides, websites dedicated to producers, social network groups, etc.) and initiate projects (Earth Markets, educational activities and tastings with schools, tourist trails, etc.)

The following booklet is designed to help develop a better understanding of some key concepts - from biodiversity to the meaning of good, clean and fair – and some practical advice to identifying producers, selecting products for the Ark, and launching Presidia and Earth Markets.

Happy reading, and enjoy your journey!



# Biodiversity

Slow Food, since its beginnings, has put the defense of biodiversity at the center of its mission. But what is biodiversity, and what does it have to do with our food?

Biodiversity is a recent word. It was used for the first time in Washington in 1986 by an entomologist (Edward O. Wilson). It is a bit of a difficult word that often, unfortunately, is of interest to very few people, mainly those who study it (like ecologists, biologists, or agronomists). In reality it should be a simple concept, because at its essence it signifies nature, life itself, and the diversity of life on many levels - from the smallest and most basic (like genes and bacteria) to animal and plant species, up to the most complex levels (ecosystems). All these levels intersect and influence each other and each other's evolution. Studies from the University of Stanford have compared the species and varieties of an ecosystem to rivets that hold an airplane together. If we remove some of the rivets, for a while nothing will happen and the airplane will continue to operate. But little by little, the structure will weaken and, at a certain point, removing just one more rivet will cause it to crash (Ehrlich, Ehrlich, *The Rivet Poppers*, 1981). Biodiversity is our insurance policy for the future, allowing plants and animals to adapt to climatic changes, attacks by parasites and disease, or the unexpected. A system that is biologically varied is endowed with the antibodies to counter dangerous organisms and restore its own equilibrium. A system based on a limited number of varieties, on the other hand, is very fragile.

The most famous example is the Irish Potato Famine of the mid-nineteenth century. In 1845 a fungus attacked the potato crop, destroying entire harvests for many years and causing the death or emigration to the United States of a million and a half people. The famine was the result of only a single variety of potato being cultivated in Ireland. The resistance that allowed Irish potatoes to strengthen and survive was a result of the diversity of the thousands of varieties of potatoes from the Andes and Mexico. Without this biodiversity today, potatoes would probably not be one of the main crops of the world. This episode was the first warning to humans of the dangers of genetic uniformity, but one that was unfortunately unheeded.

In the history of the planet, everything has a beginning and an end, and in every era, many species become extinct. However, never at the horrifying rate of recent years,

one that is a thousand times greater than previous eras. In one century over 250,000 varieties of plants have become extinct, and, according to Wilson's estimates, the will continue to vanish at the rate of three species every hour (or 27,000 a year) (Wilson, *The Diversity of Life*, 1992).

In the summer of 2012, after a thorough study of many years, the prestigious University of Exeter declared that the earth was undergoing its sixth mass extinction (with the fifth - 65 million years ago - the dinosaurs disappeared) (Sanders, Van Veen, *Indirect commensalism promotes persistence of secondary consumer species*, 2012).

Yet there is a substantial difference between this extinction and those of the past: the cause. For the first time, humankind is responsible. Humans continue to destroy rainforests, allocate vast areas to monoculture, pave over the land, eliminate natural barriers, pollute waters and grounds with chemical pesticides and fertilizers, and accumulate plastic in the oceans. However, not all human activity destroys nature. The small-scale farmers, shepherds, fishers that know and respect the fragile balance of nature are the earth's last true custodians. They have worked with and within their ecosystems over the millennia, changing them as they did so.



## If biodiversity disappears what will happen to our food?

Together with wild flora and fauna, many domesticated plants and animal breeds selected for their milk or meat will also disappear. According to the FAO, 75% of edible plant varieties have been irreversibly lost. In the USA the figure is 95%.

Today 60% of the world's food is based on three cereals: wheat, rice and corn (FAO, *The State of the World's Plant Genetic Resources for Food and Agriculture*, 1996). But not on the thousands of rice varieties selected by farmers that once were cultivated in India and China, or on the thousands of varieties of corn that were grown in Mexico, but on the few hybrid varieties selected and sold to farmers by a handful of multinationals. Mechanization is the enemy of diversity. Industrial agriculture by nature needs uniformity and high productivity, in other words, monocultures. Since the 1950s agricultural production has gradually orientated to depend on an ever-smaller number of species and varieties, selected to respond to the needs of the global market. They have no connection to individual territories, but rather, are able to be produced in many possible environments, have good resistance to handling and transport, and a uniform



taste. For example, in comparison to the thousands of varieties of apples selected by farmers, only four commercial varieties represent 90% of the global market.



Still, these varieties represent a great potential for the future of our agricultural systems. The varieties defined as **native** or **local** are the result of selections (natural or man-made) in specific areas. They are characterized by being well-adapted to the environmental conditions of their area, and for this reason normally have fewer requirements for external inputs, like water, fertilizers or pesticides, because they are more rustic and therefore resistant to environmental stresses. Their potential to thrive in their original territories (like in desserts or the mountains) make them important agricultural resources and essential tools for food sovereignty. It is not a coincidence that these varieties are often connected to the culture of a local community (through customs, recipes, knowledge, dialect, etc.).

The first intention of Slow Food was to look after **domestic biodiversity** (also called **agrobiodiversity**). Meaning not just the panda or the monk seal, but also the Karakachan sheep; not just the edelweiss, but also the horned potato of Bamberger.

Plants and domestic animals have **origins** in several areas of the world (potatoes and tomatoes in the Andes, goats and wheat in the Fertile Crescent, eggplant and pigs in Asia, etc.). They have traveled the world and adapted to the climates and soils that they have found in every corner of the planet, changing a little, crossing with others, integrating into specific **territories** and communities and influencing **culinary traditions**. Think of tomatoes, that were domesticated in the Andes and then crossed the ocean to then adapt to many European territories, diversifying into many different varieties and giving life to symbolic dishes of the Mediterranean, such as pizza, pasta with tomato sauce, Greek salad and gazpacho.

This is how in 10,000 years of the history of agriculture, **farmers' knowledge** has given life to thousands of varieties and breeds that are the expression of cultural diversity and the ecology of a territory, which, in turn, has given rise to a great diversity of gastronomy. A diversity shown through shapes, tastes, scents, colors, recipes, preparations and rituals; a fundamental richness to protect the culture of a community, but also to guarantee a diet that is varied, enjoyable and healthy.

The Ark boards plant and animal species, but also **processed products**, because, together with plant and animal biodiversity, an economic, social, and cultural heritage (in the form of cheeses, cured meats, breads and sweets) is also disappearing. Created to conserve fresh food – like milk, meat, fish, grains and fruits – the number of processed products is infinite, the result of knowledge passed from generation to generation in every corner of the world, the result of creativity and craftsmanship. The smallest variations can give life to very diverse products. Think of the thousands of types of cheeses, originating from the same three ingredients (milk, rennet and salt). Or cured meats, where sometimes the only thing that changes is the butchering technique, a spice or the wood used for smoking. Artisanal techniques of transforming foods allow us to obtain particular products that, even more than the raw ingredients, tell the story of a local culture while leaving the producers less affected by seasonal cycles or the fluctuations of the market. Often, it is possible to safeguard local plant and animal varieties by promoting and selling the processed products associated with them (a cheese or cured meat can save a livestock breed, a bread can save a type of grain, etc.).

To preserve this rich heritage, Slow Food created the **Ark of Taste** as a place to record – before they are lost - plant species, animal breeds and artisan products (such as breads, cheese or cured meats) that are tied to the cultures, histories and traditions of communities around the world.

The Ark of Taste is a catalogue of products, but Slow Food has launched another project to work directly with the producers: the Presidia.

**Presidia** producers work to safeguard a traditional product at risk of extinction (a product from the Ark), a traditional technique at risk of being lost (of fishing, livestock raising, processing or farming) or a threatened rural area or ecosystem.

Other important instruments to safeguard, defend, and promote biodiversity are the **Slow Food gardens**, developed with families, communities and schools.

Furthermore, to bring together small-scale producers and consumers, Slow Food promotes **Earth Markets** around the world.

The fight to save biodiversity isn't just any battle. It is a fight for the future of the planet. We can all do something, in our part of the world, every day.

Let's not focus on what has already been lost, but what we can still save.



# The tree of food

For Slow Food, food represents the coming together of many different aspects which interact with each other.

Imagine a large tree, with deep roots that extend in all directions, with a thick trunk and branches that reach upward, laden with leaves, flowers and fruit.

The roots are securely anchored to a region, a climate, an altitude, and a certain exposure to the sun.

But a region is not only soil, climate and geography. It is also culture, knowledge and artisanal techniques. And there are many other roots that go down and spread outward in all directions: food is the expression of a language, music, poetry, community rites.

The roots are deep, and in their journey they cross with those from other trees, bringing them into contact with different cultures, languages and histories. These underground meetings enrich our tree.

From the roots, we move upwards. The trunk of the tree represents the support necessary for good production: fair for workers and clean for the environment.

Then there are the branches, flowering and full of fruit, that represent taste, smell, sight, touch; cooking, which can be traditional or innovative; all that which makes food a desirable experience. Food is also nutrition, with vitamins and minerals, proteins, carbohydrates and fats. It is physical and spiritual balance.

Slow Food considers all these elements together as a balanced whole.

Every product represents seed, the earth, culture, environmental and social sustainability, nourishment and taste.



# What it means

## Ecosystem

An ecosystem is a set of plant and animal organisms that interact with each other and with the environment that surrounds them. Ecosystems include, for example, a lagoon, river, forest or pasture. Each ecosystem seeks to maintain its equilibrium. If this equilibrium is interrupted, the ecosystem adapts. A lake in a cold country, for example, has plants and animals adapted to the area, but if the climate changes, some species will leave and be replaced by others that are more adapted to the new climate. The equilibrium of an ecosystem can be altered or destroyed by numerous human activities (pollution of the soil, water or air, diversion of waterways, overbuilding, introduction of foreign species, agricultural activities, etc.).

Some ecosystems are the result of human activities and need a constant management. For example Europe's farmland consists of a huge diversity of pastures and meadows, ranging from Mediterranean scrub to north-west Atlantic moorlands and floodplain and wooded meadows of the Baltic, but also olive and chestnut groves and orchards.

## Species

A species is a group of organisms capable of interbreeding and producing fertile offspring. Each species is genetically distinct from others and recognizable thanks to its specific morphological characteristics (shape and color of flowers, fruit, leaves, buds, etc. in the case of plants; or build, hide, horns, tail, etc. in the case of animals). Over the centuries, individuals within a species evolve to develop useful characteristics in order to adapt to different environments. For example, cattle living on hardy terrain have developed short robust legs, thick hides and are relatively small in order to graze on demanding landscapes. Plants in arid climates have developed the capacity to bear fruit even in times of water shortage.

The apricot is a species, whereas the Shalakh apricot is a variety typical of an Armenian region; the sheep is an animal species, whereas the Kempen sheep is a breed typical to the southeast of the Netherlands.

In the case of wild species (those that develop spontaneously), there is no human

intervention in cultivation or breeding, and so here we speak only of species, with no reference to varieties or breeds. For example, the baobab is a species but there are no specific varieties of baobab, unless humans begin to cultivate it, selecting ecotypes and varieties.

Beyond common names, every plant and animal has a scientific name. The eighteenth century Swedish botanist Carl Linnaeus proposed the method still in use today to identify organisms. To simplify the naming process and avoid confusion, Linnaeus proposed to assign two names to each species: two Latin terms, the first, beginning in upper case, indicates the genus, the second, in lower case, indicates the species.

Some examples of species: Apple: *Malus domestica*; Potato: *Solanum tuberosum*; Goat: *Capraircus*; Sheep: *Ovis aries*.



## Cultivated variety (or cultivar)

A variety (or cultivar) is a set of cultivated plants, clearly distinguishable by their morphological, physiological, chemical and qualitative characteristics. A variety is stable, maintaining its distinctive characteristics even when it reproduces (through seeds or tissue, such as with grafting).

Native or local varieties are well identifiable and usually have a local name. These often arise from selection by individual farmers or communities and are characterized by good adaptation to the environmental conditions of an area. They are consequently more hardy, resistant to stress and have less need for external inputs such as water, fertilizers, etc. They are closely linked to the culture of a community (customs, recipes, knowledge, dialects). For example, some native varieties are the Carla apple (Italy), brown beans from Öland Island (Sweden), Lorient cabbage (France) and the Akkajidaikon radish (Japan).

In Europe native varieties are normally registered in national registries (and automatically in an official European catalogue), by the local ministry, regional authority or by request of other public entities, scientific institutions, associations or individual citizens and companies (subject to favorable opinion of the regional authority or relevant official body). The varieties are registered after an evaluation period. Registration is a form of public protection and different to a patent, which is a private registration that allows a monopoly on the use and sale of the propagation material.



## Plant population (Ecotype)

An ecotype is a population within a species (usually reproduced with seeds) that is genetically adapted to a specific territory, usually of a limited size.

This definition resembles that of a native variety (or cultivar). The difference is that ecotypes do not have a precise genetic identity, stable and defined, and they are not part of official classifications or registers. However they are very important for the protection of cultivated biodiversity. In the future, if they are adequately studied and well selected, they may enter into the classification of a cultivar. For example, the various populations of pink apples from the Sibillini mountains, grown in Marche (Italy).



## Breed

The concept of a breed is one of the most controversial within the natural sciences. Farmers play an essential role in identifying and defining a breed; a livestock breed is one that is recognized as such by a group of farmers. According to scientist Jay Laurence Lush, for example, "no-one is authorized to assign a scientific value to this term. It is the farmers' word, which we must accept as the correct definition." That said, a breed can be defined as a group of domestic animals from the same species with defined and identifiable exterior traits (passed on to descendants through heredity), which can be distinguished and separated from others of the same species on the basis of visible characteristics (size; color of coat or plumage; shape of the head, limbs, horns, tail, etc.).

A **breed** can be defined as **native** when its characteristics are linked to a specific area where it has developed or naturally adapted over time (for cattle, it takes at least six generations to fix the characteristics of a breed). Some examples of breeds are Mirandaise cattle, a beef breed originally from Gers, a department in the Midi-Pyrénées region of France; the Saluzzo white hen from Piedmont, Italy; and the Villsau sheep

from Norway's northwest coast, one of the oldest sheep breeds still surviving in Northern Europe.

Native breeds adapt better to the climatic, geographic and socioeconomic conditions of a place and, even in extreme environments, they require less attention and less food.

For a breed to be officially defined as such, it must be registered. The registration of a breed occurs only following a request by a group of farmers.

Breeds originate in specific places, but in some cases - and this usually happens because some of their characteristics are particularly useful - they are exported to other parts of the world. A breed might be at risk of extinction in its native area but common in other parts of the world, like the Toggenburg goat, originally from the Swiss canton of St. Gallen but now found in many other Alpine regions.

In the Ark of Taste, it is always important to link the breed to a food product, such as meat, milk, a cheese or a cured meat.

The *Worldwatch List of Domestic Animal Diversity*, published for the first time in 2000 by the United Nations Food and Agriculture Organization (FAO) and Environmental Programme (UNEP), is a reference point for domestic breeds at risk of extinction around the world. According to the report, every week the world loses two animal breeds raised by humans, we have already lost a thousand breeds over the past century and a third of those still existing (over 2,000) risk disappearing in the next 20 years. Once a breed is extinct, it is gone forever.

One of the greatest dangers to domestic animal diversity is the export of animals from the global north to the global south, which often leads not only to hybrids but also the complete replacement of local breeds, which are considered to be less productive than those from industrialized countries.



## Animal population

A population is group of individuals from the same species with similar characteristics. A population can be more or less homogenous. As with breeds, the role of farmers is fundamental. They can recognize a population on the basis of visible



characteristics (coat or plumage, size, shape of the horns or tail, etc.) and behavior (productivity, fertility, etc.).

A population is to a breed what an ecotype is to a variety, being less stable and not officially recorded in a genealogical register.

Examples of native populations are the Mushunu chicken in Kenya and the Roccaverano and Cilentana goats in Italy.



### *New commercial varieties and hybrid plants*

Farmers have always selected plants (by observing attentively which fields give the best harvest or which plants produce the biggest fruits) or done **crossbreeding** to obtain plants with the best characteristics. Hybrid plants are varieties or ecotypes that derive from the combination of genetic material from different species. Hybridization can occur naturally or through human interaction (in the practice of genetic improvement).

All varieties of strawberry, for example, come from an ancestor born in Brest, in France, in 1766, from the cross of an American strawberry (*Fragaria virginiana*) and a white Chilean strawberry (*Fragaria chiloensis*) brought to Europe by an engineer in the service of Louis XIV (only five plants survived the six month-long sea voyage).

Since the 1950s though, agricultural production has been progressively focused on a dwindling number of species and varieties, created in response to the global market and therefore as disconnected as possible from their original territory, able to be mass produced in a greater number of environments and climates, with the ability to be handled and transported, with standardized tastes suitable for all kinds of consumers. These are known as commercial hybrids.

For example, the great success of the Golden Delicious apple, one of the founders of commercial varieties, is related to its “easy” flavor and lack of sharpness (it is a sweet and aromatic apple).

Most of these **commercial hybrids** (created to meet the needs of the market) are covered by **patents**. This does not prevent farmers or hobbyists from acquiring and growing the seeds. The patent simply means that some of the price paid for the seeds will go to the patent holder (which can be private or public).

But, there is something that farmers cannot do when cultivating commercial hybrids: they cannot collect and save seeds from their own harvest to use for the next year. In fact, the way hybrids work is that the first generation of the purchased seeds (called F1) will be better than the parent generation and have the desired characteristics, but the second generation (F2) will contain a mix of characteristics, almost always worse than the previous one (F1). Farmers, therefore, must buy new seeds every year.

### *Animal hybrids*

Hybrids are the offspring resulting from parents of different species or sub-species that have sufficient structural and genetic similarity to be able to reproduce together. Examples of interspecific hybrids, between two species of the same genus, include the mule, the offspring of a male donkey and a female horse, or a hinny, the product of a female donkey and a male horse. Usually these crosses result in sterile offspring. When hybrids occur between different breeds or populations from the same species, they are known as intraspecific, or more commonly as crossbreeds.

This is the case with the cross between Landrace and Large White pigs, or between Friesian and Montbelliard cattle. The result often improves certain aspects (greater vigor, strength, fertility, productivity, etc.) that are less developed in the parents. This phenomenon is known as “hybrid vigor”; essentially the best characteristics of both breeds are heightened.

Any animal breeder can develop a cross, but it is hard to stabilize the characteristics obtained from the first cross through successive generations. Crosses can be for genetic reasons (to improve or create a breed within a species) or, more frequently, for commercial purposes (generally to generate animals destined for slaughtering). All breeders practice crossing to “balance the books.” For example, dairy farmers need fertile cows in order to produce as much milk as possible. If they have less productive females with fertility problems, the solution is to cross them with crossbred animals or other beef breeds to encourage impregnation (more likely in the case of crosses) and to obtain beef calves of good quality (the Belgian Blue is often used for this purpose).

Large specialized businesses and multinationals, known as breeding companies produce semen for generating animals with particular characteristics (especially pigs, but also poultry). The reproductive patterns are kept secret, and the semen resulting from their selections is marketed under the company’s own brand. Large-scale industrial farmers can look through a catalog and choose semen that will guarantee, for example, pigs with specific performances or optimal cuts of pork, succulent but lean, adapted to the demands of the market.

# To find out more

## Books

**Marie-Monique Robin, *The World According to Monsanto*, 2009**

The author addresses the impact of GMOs and modern agro-industrial products on farmers' communities, following the case of the Monsanto company. A documentary by the same name has also been made.

**Michael Pollan, *The Omnivore's Dilemma*, 2006**

The main question humans face in front of food is no longer "Which food can I eat?", as it was from the origin of our species to even just few decades ago. Those with money available have access to a huge variety of food, from everywhere and in every season. Nowadays the main question is: "Where is my food from and how has it been produced?" From the same author we also suggest *The Botany of Desire* (2001) that explores the delicate theme of interaction between humans and the environment through case studies of consumption of some plant species.

**Yvonne Baskin, *The Work of Nature. How the Diversity of Life Sustains Us*, 2005**

Baskin introduces principles of ecology by collecting examples from around the world to explain the role of biological diversity in ecological systems, and how its loss will affect the environment.

**Jared Diamond, *Guns, Germs and Steel*, 1997**

Why are some populations more developed than others? According to Diamond, the answer is in the role of geography and agriculture (and not in genetics). In order to prove this thesis, the famous anthropologist traces a fascinating path through the history of agriculture and domestication with an interdisciplinary approach. From the same author we also suggest the recent *Collapse* (2005) in which Diamond uses case studies to analyze the failure of certain societies.

**Rachel Carson, *The Silent Spring*, 1962**

The book documents the effects of pesticides on the environment, particularly on birds. For the first time, Carson, already famous for her writings, wrote a book of condemnation. It accused the chemical industry of spreading misinformation, and public officials of accepting industry claims without investigation. The book had significant success in contributing to the ban on DDT.

## Films

**Yann Arthus-Bertrand, *Home*, 2009**

A documentary on the environment, biodiversity, agriculture and climate change produced by Luc Besson. It was distributed in 50 countries for World Environment Day. It is based almost entirely on bird's eye view images and can be viewed on YouTube in several languages ([www.youtube.com/watch?v=eoto5FC4gSM](http://www.youtube.com/watch?v=eoto5FC4gSM)).



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