

Chapter 6

An Agroecological Revolution at the *Potager du Roi* (Versailles)

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Abstract Le Potager du Roi is the work of the gardener and agronomist Jean-Baptiste de La Quintinie (1624–1688). For more than 300 years, this productive, innovative and aesthetic fruit and vegetable garden has never ceased to produce food. This article analyses changes in the relationship to nature and the contemporary emergence of an agroecological farming model. Cultivating the Potager du Roi according to ecological norms is not an end in itself but an attempt to find an answer to a crisis which is of an environmental, economic and social nature. Cultivating fruit and vegetables that are beautiful, tasty and good for people's health is a way of restoring meaning to the work of the gardeners. In a context which has become urban, their actions are governed by an agroecological paradigm: the objective is no longer to respond to an aesthetic notion of a tidy and controlled nature, but truly one of caring for the land to regenerate the soil.

Keywords Agroecology · Living-soil · Gardener · La Quintinie
Potager du Roi · École Nationale d'Horticulture

6.1 Introduction: A Place for Producing Food, Walking and Teaching

The Potager du Roi is situated a few dozen metres as the crow flies from the Château de Versailles. Listed as an historical monument since 1926, it was first opened to the public in 1991 and is visited by between 30,000 and 40,000 visitors every year. The garden covering an area of nine hectares is the work of Jean-Baptiste de La Quintinie, the director “of all the fruit and vegetable gardens of the king” under Louis XIV. For more than three centuries, gardeners have produced fruit and vegetables in the Potager du Roi. Elaborately designed it has changed little since it was created in 1683: a central basin, sixteen square vegetable plots or “carrés”

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surrounded by raised terraces for walking, arched passages providing access for the gardeners and storage space for tools and equipment, and very high light-coloured walls bordering small fruit gardens sheltered from the wind. The rigour of the general design is reinforced by architectural rows of espaliered trees. This kitchen garden was originally designed for members of the court of Versailles to stroll in. Two centuries later, its terraces were still the pride of the Ecole Nationale d'Horticulture (ENH) which was founded in 1874 on the site of the Potager du Roi¹: "These magnificent terraces have a total length of 800 m; they form a beautiful promenade which delights visitors" (Nanot and Deloncle 1898, p. 127).

At that time, the students of the ENH did most of the work: "The school does not have any other labour than the students; therefore the nine hectares of the Potager are entirely cultivated by the students, the head gardeners being none other than the instructors in charge of the teaching these young people how to do the work" (op. cit., p. 228). A documentary film produced in 1929 by the Ministry of Agriculture extols the merits of this practical training applied to the full range of gardening tasks: tilling of the soil, irrigation, phytosanitary treatments, the cultivation of fruit trees, the cultivation of flowers in the open and in greenhouses, and general repairs (Benoît-Lévy 1929). Horticultural training has gradually turned away from gardening. The former apprentice gardeners are now simply observers. After the Ecole d'Horticulture moved to Angers in 1994, the management of the Potager du Roi was handed over to the École Nationale Supérieure du Paysage.² Gardening lessons were reintroduced in 1986: the students cultivate a plot during the three years they study at the school. There is also a vocational training course that has been on offer on the site of the Potager since 1989. However, the garden is tended daily by the nine permanent gardeners.³ Seasonal workers are hired during the summer to pick the fruit and do the summer pruning. In the winter, the task of regularly pruning the trees is given to interns. Volunteers help with the fruit picking, the tending of the borders and the maintenance of the ornamental gardens (the rockery and the rose tree alley).

Three new sets of regulations have forced the gardeners to call their practices into question. The law of 12 September 2006 which sets "time limits for re-admission" of the public to a treated plot. When treating against scab, for example, the garden must be closed to the public for between 24 and 48 h after the treatment. Ten sprayings per year were still applied to fruit trees in 2008 to limit this fungal disease.⁴ The law of 17 August 2015 on Energy Transition for Green Growth provides for the banning of synthetic phytosanitary products in gardens open to the

¹The management of this site was entrusted to the ENH in 1873. The garden was therefore no longer under the management of the Administration du domaine du Château.

²Founded in 1976, the ENSP succeeded from the department of landscape design and garden arts of the ENH which was opened in 1945.

³Antoine Jacobsohn has managed the team at the Potager since 2007. There are nine gardeners and four people in charge of the public (shop and visitors' service).

⁴*Nashi* n° 24, May 2009. Scab is a disease caused by the *Ascomycetes* fungi (*Venturia inaequalis* in apple trees and *V. Pirina* in pear trees). It comes under the form of brown stains on the leaves and fruit and a significant drop in fruit production.

public. As employees of the Ministry of Agriculture, the gardeners are also directly concerned by the law on the Future of Agriculture, Food and Forests of 13 October 2014 which is intended to promote agroecology in France. In its conclusions on the *Agroecological Transition*, the Economic, Social and Environmental Council (in French, Conseil Economique, Social et Environnemental—CESE) defines agroecology as “a set of production methods based as much as possible on natural regulating methods so as to combine food production and the reproduction of the resources employed” (Claveirole 2016, p. 24). The notion was included in 2014 in the Rural Code.

We conducted a study at the Potager du Roi to understand the changes in cultivation practices and analyse the factors leading to the emergence of an agroecological awareness in this historical garden which is a farm, an urban park and a school vegetable garden all at the same time. To understand recent changes required examining the gardening values inherited from the long history of this garden. Among the old sources, we must quote the treatise entitled *Instruction pour les Jardins fruitiers et potagers*. This treatise on gardening posthumously published in 1690⁵ is based principally on the experience La Quintinie acquired with the creation of the Potager du Roi. We have used as a reference the *Guide à l'usage des candidats* (Nanot and Deloncle 1898) one of the authors of which, Jules Nanot, was the director of the ENH from 1892 to 1923. For the contemporary study, we have used a series of interviews conducted between February and October 2016 with the nine gardeners then working at the Potager du Roi.⁶ We also consulted the *Petite flore du Potager*⁷ and the *Nashi* (2004–2016), a newsletter on the Potager published by the Conseil du Potager.⁸

6.2 The Heritage: Countering and Surpassing Nature

The early history of the Potager du Roi is greatly marked by man’s control over nature. The head gardeners who succeeded one another constantly strived towards perfection in all of the following domains: the architectural layout of the landscape, hydraulic engineering, soil science, fruit tree cultivation, plant acclimatisation, and horticultural intensification.

⁵2016 for the current edition. From here on, we will refer to this book as LQ.

⁶See in the annex, the table of sociological profiles.

⁷The project initially inspired by Martine Méritan and Antoine Jacobsohn was carried out by Liliana Motta in 2014. The idea was to compile within a single document everything that had been written on the plants cultivated in the Potager. Plans present where the perennial plants are situated and when they were planted.

⁸This council setup in the end of the 1990s and comprising representatives from the Potager and the faculty convened every month. The first issues of *Nashi* published excerpts from the minutes of the council meetings. Stéphanie de Courtois, Marc Rumelhart and Manuel Pluvillage, joined soon after by Antoine Jacobsohn, were its founders.

6.2.1 *A Soil Created from Scratch*

The Potager du Roi was established on marshland in the location called “L’étang puant”, land “of the type one would not wish to find anywhere” (LQ, p. 167). It took five years and all the inventiveness of the gardener-agronomist Jean-Baptiste de La Quintinie to drain the land. The marsh was filled up with silt taken from a neighbouring lake and sand from Fontainebleau brought from the summit of the Butte de Satory. The endeavour was on a scale commensurate with the royal finances. Due to the persistent water-logging of the site, the soil had to be drained by means of an ingenious network of drystone-drains and subterranean pipes. With the massive input of manure, La Quintinie increased the height of all the raised planted patches to help drain the water (LQ, p. 169). Although the Potager du Roi was hollowed out of the ground, it was cultivated in an anthrosol raised by at least 1.80 m above the natural level (Nanot and Deloncle 1898, p. 149). It is now fertile land, enriched by two centuries and a half of natural fertilisers. However, from the 1960s, with the intensification of agriculture, chemical fertilisers were used.

6.2.2 *A Model of Organisation and Beauty*

The Potager du Roi was La Quintinie’s magnum opus. The garden had to answer the king’s ambitions. It is a kitchen garden, but it is also a garden intended for walking in and for enjoying the spectacle of nature created by the hand of the gardener. The correct layout of the garden resides in its proportions—in length a raised patch “must not exceed more than one and a half times its width”, to present a “pleasing aspect” (p. 195) the beds are strictly aligned. In his lexicon of “gardening terms” (pp. 85–151), La Quintinie lists a profusion of words relating to the alleys: “a straight alley”, “beaten alley”, “trimming”, “levelling” and “raking or levelling an alley”. The immaculate tending of the alleys and the freshly tilled soil reflect an aestheticism of order and tidiness:

Neatness must shine in every place and serve as a lustre in the alleys as well as the tilled soil [...]. This neatness contributes to a universally perfect décor and invites the *curious* for a pleasant stroll. (p. 912)

Two centuries later, the aesthetic criteria have not changed. If one is to believe the director of the period, the “fine layout” has not wavered and continues to be the pride of the Ecole Nationale d’Horticulture:

A splendid, verdant and floral setting with nine hectares of horticultural plantations and gardens organised according to a perfectly methodical and elegant layout the symmetry and regularity of which is heightened by the alleys and walls. It would be impossible to find anywhere else such a perfect model of a fruit and vegetable garden. (Nanot and Deloncle 1898, p. 117)

6.2.3 *Eliminating Canker and Weeds*

“Eliminating weeds” are recurring words in La Quintinie’s treatise. This bears witness to the tenacity of the weeds and the work they give to the gardeners. La Quintinie constantly warns against this scourge. The gardener must be particularly vigilant in the month of May:

This is when the gardeners need to pay special attention to avoid the garden from being overrun [...]. The weeds (*méchantes herbes*) will quickly smother all the good seedlings, the garden alleys will become wild and the trees will be overrun. (LQ, p. 873)

The work on the surface of the soil reconciles agronomic and aesthetic objectives: “I constantly recommend tilling, for the good of the soil and the plants as well as for the view” (LQ, p. 235). “The more frequently the better”, he adds in his short guide of gardening maxims (p. 59). He recommends that at the foot of each tree, the soil should be tilled four times a year: in spring, at the summer solstice, at the end of August and just before winter sets in.

The weeding hoe is the implement for light tilling, harrowing or hoeing. It was the main weeding implement used until the 1960s, and then herbicides were used for a period which lasted forty years. The former head gardener, who arrived in 1969, immediately after graduating as an arborist witnessed this revolution: “After two years of doing nothing else but hoeing, I introduced the use of herbicides. It was one of the techniques that made it possible to cope with the constant reduction in staff at the Potager du Roi”.⁹ The testimonials of the gardeners concur regarding the general use of herbicides:

Herbicides were sprayed in March–April everywhere in the orchard: at the foot of the trees, between the rows, in the tilled soil, everything was sprayed, the alleys too. We would allow time for the products to take effect. There was a systemic herbicide, a total defoliant and an anti-germinator. That took care of the problem for the whole year. (Laurent)

The Ecole d’Horticulture was famous for studying weeds and even had a chair dedicated to weeds which was successively held by Jacques Montégut¹⁰ and Philippe Jauzein. Within the framework of research on the “protection of plants”; the Potager du Roi became the home of a “unique collection in France of annual and perennial weeds for teaching and research purposes”.¹¹

To care for the trees, La Quintinie recommends principally manual interventions: “cut off with a knife” the canker and cover the branch with cow dung, “clean the tree” of its caterpillars, catch the rats with traps. But when the problem is too severe,

⁹*Nashi* n° 13, November 2006.

¹⁰He wrote *Pérennes et vivaces. Nuisibles en agriculture*, 1983, published by the Jean Manuel Department at the SECN.

¹¹Philippe Jauzein, interviewed by Stéphanie de Margerie in 1995 within the context of the “Potager 2000” project. Fourteen people were interviewed about how they perceived the Potager du Roi following the departure of the ENH: the head gardener, teacher-researchers, a lecturer in landscape architecture and several people from administration.

he does not hesitate to eliminate the plant itself. As in the case of “cankorous trees” and of stunted trees with “shrivelled leaves, often full of greenfly and ants; we then refer to the tree as worthless, it baulks, it is scraggly, it must be uprooted” (p. 136).

Among the incurable diseases affecting our trees, I count the first to be old age, for example, when a pear tree or plumb tree has served thirty, forty or fifty years, one must consider it to have reached old age and decrepitude. Having thus lived its life and ended its career, there is no hope of a return to health, it must be uprooted, new soil must be brought in and new trees planted. (LQ, p. 791)

Fruit trees today are preserved until a much more advanced age. The oldest trees were planted in 1880.¹² This is one of the main differences with the seventeenth century.

Gummosis is the second incurable disease against which La Quintinie recommends “cutting the diseased branch two or three inches above the afflicted part” (p. 118). Against “tingidae” (*Stephanitis pyri*) which attacks the leaves of pear trees, La Quintinie tried all sorts of remedies without success:

I have used all sorts of concoctions with strong, acrid, corrosive and strong-smelling ingredients, such as rue, tobacco, salt, and vinegar to cleanse the leaves and branches. I have used oil as advised by some *curious* and sulphurous smoke as advised by others [...]. (LQ, p. 791–792)

The research laboratory created in 1893 at the budding school of horticulture contributed to the emergence of new knowledge in the domain of phytosanitary treatments. Jules Nanot refers to studies “on the spraying of copper sulphate over the forcing frames to eliminate woolly aphids, etc.” (Nanot and Deloncle 1898, p. 118). As everywhere else in France, these treatments saw their heyday in the 1960s and 1970s. In the beginning of the 2000s, so-called reasoned cultivation emerged, with a more targeted approach to treatment and less frequent spraying. The Potager then went from twenty-two to eleven sprayings of the fruit trees per year,¹³ but this still remained far from the practice of agroecology:

The first year [2005] I was concerned about the treatments. We did two sprayings just for greenfly, one spraying for jumping plant louse before the month of June, and sprayed a mite killer and three larvicides against codling moth. (Laurent)

The head gardener justified these actions in the name of protecting the fruit tree heritage: “We do not intend to convert to organic cultivation in the near future for reasons relating to the conservation of historical shapes of fruit trees”.¹⁴ The architecture of the trees contributes to the remarkable character of this garden.

¹²They are two rows of 20 Verrier palmettes with five and six branches which can still be seen in the Cinquième des Onze. According to the *Petite flore du Potager*, op. cit.

¹³Jacques Beccaletto, 2006. “Où nous en sommes dans la gestion phytosanitaire du Potager du Roi”, *Nashi*, n° 13.

¹⁴op. cit., 2006.

6.2.4 *Fruit Tree Aesthetics*

La Quintinie attaches a great deal of importance to the pruning of fruit trees: “The curious of fruit trees have always considered pruning as a crowning achievement in gardening. [...] Everyone cuts but few prune” (LQ, pp. 539, 541). The cultivation of fruit trees is a major theme in his treatise. There are recommendations on how to place trees and prune them, concerning the fruit, grafting and the management of fruit tree nurseries.

The objective in fruit tree pruning has to do with production (yield, early growth and quality of taste) and aesthetics: “to help the trees yield the best fruit; and [...] make them more attractive in appearance than if they would be if they had not been pruned” (LQ, p. 66). The care given to trees contributes to the layout of the garden: “The beauty of training trees consists of ordering to the right and to the left the branches which can sprout on any side and to avoid confusion, empty spaces or intersecting branches (p. 71). What La Quintinie also refers to as “brightening up a tree” (p. 94).

The diversity of forms increased over the centuries and was the pride of the Ecole d’Horticulture at the end of the nineteenth century: it “is maybe the most beautiful collection of fruit trees in France if one considers the number of species and varieties, the vigour of the trees and the variety of their forms” (Nanot and Deloncle 1898, p. 160). The collection of the Potager currently comprises 68 shapes of fruit trees representing the evolution of this art since the seventeenth century. They are listed in the *Encyclopédie des formes fruitières* (Encyclopaedia of Fruit Tree Forms) published in 2001 by Jacques Beccaletto who was the head gardener of the Potager du Roi at the time. He describes most of the known forms in France: their origin, their architecture, their training. Many of them did not exist in La Quintinie’s time and were invented in the nineteenth century: the unilateral horizontal cordon (circa 1840), the Verrier espalier with four, five or six branches (circa 1850), the lozenge created at the ENH circa 1880, etc. The training times can be very long: “I had to wait twenty-five years to completely finish Legendre espaliers planted in 1969” (Beccaletto 2001, p. 143). This ancient form described in 1684 by the parish priest of Hénouville¹⁵ replaced, between the end of the 18th and middle of the nineteenth century, the bush pear trees installed by La Quintinie in the Grand Carré. These espaliered trees surround each vegetable patch and amplify the architectural dimension of the garden. At the time, La Quintinie was against this form of fruit tree that presented too many constraints: “In the past we used to make espaliered trees, but this practice has almost disappeared, they were hard to maintain and provided a very mediocre yield [...] It is more profitable to grow bush trees” (LQ, p. 218 et 99). The espaliers of the Grand Carré are a reference today for

¹⁵The form described back then comprised seven or eight main branches. The one described by Jacques Beccaletto in the Potager du Roi has five.

the agronomist and historian in charge of the conservation of this heritage.¹⁶ Changes remain possible nevertheless: the head gardener proposed in 2000 “the Beccaletto modified V palmette”, an adaptation of the so-called D. Bouscasse fan-shaped palmette (Beccaletto 2001, p. 104). Aesthetics are once again referred to in justifying this choice: “the opening of the angle is increased to seventy degrees, and the horizontal branches are reduced to the number of five, to maintain the visual effect produced with the forms in the vicinity of the Grand Carré”.

6.2.5 *Producing Out of Season*

The art of “hotbeds” enables the inventive gardener to have a productive garden in all seasons: “The endeavour requires great effort and expense but the pleasure of seeing in the midst of snow and in cold winter weather an abundant supply of excellent large green asparagus shoots more than makes up for this” (LQ, p. 917). With the royal stables nearby, the horse manure was abundantly used to fertilise the soil and accelerate production. La Quintinie dedicates an entire chapter to this topic since this input is one of the mainstays of his system: “In truth, these types of manure are wonderful to use in our gardens, especially in winter; one might say they replace the great star which breathes life into all things” (LQ, p. 244). They were still greatly used in the nineteenth century: “Annually, to constitute the layers on which we cultivate the early fruit and vegetables, flowers and ornamental plants, we used the manure of 50 horses” (Nanot and Deloncle 1898, p. 152).

A first hothouse was built in 1730 under the direction of Louis Le Normand for the cultivation of pineapples then recently introduced in France. “To heat the hothouses required between 700 and 1000 francs’ worth of wood each year; other hothouses were built in 1752” (op. cit., p. 33). More hothouses were built in the eighteenth and nineteenth centuries for the forcing of fruit and vegetables: there were nine at the end of the nineteenth century, including one for the cultivation of pineapples, the others being “dedicated to the forcing of strawberries, green beans, or the wintering of ornamental plants” (p. 129). The hothouses were dismantled in 1994 when the ENH moved to Angers, marking the end of cultivation in pots.¹⁷

¹⁶Comment by Antoine Jacobsohn. The head architect of historical monuments defers to the head gardener of the Potager du Roi on matters concerning live plants. We are not aware of the existence, for this garden, of any written documents describing the nature of the living heritage preserved as a historical monument.

¹⁷There remain approximately 800 m² of cultivations sheltered in old horticultural hothouses reconverted for vegetables. There is an area for seedlings (40 m²), a few plantations in open ground (solanaceous plants), a small hothouse planted on the initiative of a gardener who is an enthusiast of tropical plants and a space reserved for the plantations of students.

6.2.6 *Intensive Monoculture*

The “Figuerie” was created by La Quintinie and was an object of his pride: a garden dedicated to figs, designed on the model of the Orangery, with 700 potted fig trees sheltered each winter. The original plan of the Potager also features a melon patch (Melonnière) and a plum orchard (Prunelaye). La Quintinie avoids “mixing species”:

I find it preferable because it is easier for picking and avoiding the loss of fruit. [...] I do not mix species. [...] only apricot trees with peach trees, and I do the same with plum trees which I also mix with peach trees. (LQ, p. 487)

This model of monospecific gardens became widespread in the nineteenth century with the cultivation of pineapples: “We produced 800 pineapples per year at the Potager” (Nanot and Deloncle 1898, p. 59). This monoculture was accompanied, however, by a great diversity of fruit species and varieties. There were 14,515 trees and 1177 fruit varieties comprising 565 varieties of pears and 309 varieties of apple trees cultivated in 1898 (op. cit., p. 160). However, the modernisation of agriculture after the Second World War which introduced standardisation and a reduction in the number of species and varieties cultivated also affected the Potager du Roi. The varieties most sought after on the market were privileged for teaching purposes. In the case of pears, for example, the ‘Doyenné du Comice’ was massively planted in the 1960s and 1970s. Today this variety is found everywhere in the garden.

The former Potager du Roi remained the perfect example of an ordering of nature: the soil, inadequate for cultivation, cold and waterlogged, had become a fertile and well-drained piece of land, its trees were trained following strict architectural shapes, and the alleys were traced out to facilitate strolling. This type of layout designed by La Quintinie was perpetuated for 300 years, but the Potager du Roi as it was then is now out of step with emerging agroecological issues. This is what Antoine Jacobsohn, in his position as head gardener, expresses in his *Dialogues avec La Quintinie* when he writes: “It is this intention to control nature, which was one of your projects, and which has become the source of one of our current difficulties” (Jacobsohn and Petzold 2017, p. 66). For the last ten years, the Potager du Roi has indeed become more “green”: some alleys have been planted with grass, and the bare earth is disappearing under flowers.

6.3 *Imitating Nature: Three Major Upheavals*

From the end of the 1990s, the gardener in charge of fruit production tested environmentally friendly methods to reduce the number of phytosanitary treatments of the trees: the breeding and dispersion of psyllids to favour auxiliary insects, pheromone traps, saccharose sprays (INRA protocol), etc. But soil management

remained a problem because of aesthetic issues: “We are testing all the cultural and technical possibilities to radically reduce the quantity of herbicides used in the Potager du Roi. [...] This necessary change in practices is accompanied by a general change in the appearance of the garden. We are shifting from a neat garden to one which is less neat and more natural”.¹⁸ Changes in cultivation methods followed three major trends which we shall successively analyse: the reinforcement of diversity, the reintroduction of animals and the regeneration of the soil.

6.3.1 “*Breaking Monoculture*”

We now know the link between the diversity of an agroecosystem and its resilience against pathogens. At the Potager du Roi, the monoculture of apples and pears inherited from the Ecole d’Horticulture encouraged certain diseases such as scab, which is particularly troublesome in fruit tree cultivation. Diversification in fruit cultivation since the 2000s is aimed at developing collections—diversifying the number of species of modern and historical varieties—and at achieving environmental objectives such as privileging resistant varieties and mixed planting.

The collection of fruit varieties was supplemented in 2000–2001 with the planting of 412 different varieties: 211 apple trees and 201 pear trees.¹⁹ The dream of Manuel Pluvinage, who was then the head gardener of the Potager du Roi²⁰ was to “present a living catalogue of the different fruit and vegetables in existence from the time of Louis XIV to our days”.²¹ The plum tree was reintroduced in 2006. The same year, Antoine Jacobsohn brought about the “massive return of peaches” with the planting of forty varieties.²² New vegetables were cultivated and tested in thematic exhibitions on the diversity of egg plants, gourds and peas,²³ etc. The best tasting and looking varieties were kept.

The choice of fruit cultivars planted for production took into account resistance to cryptogamic diseases: “*We have practically no more ‘Golden Delicious’, we are gradually uprooting the trees. It is one of the apples which is most sensitive to scab*” (Laurent). The ‘Doyenné du Comice’ pear, also very sensitive to scab, was replaced by the ‘Beurré Diel’, the ‘Beurré Superfin’ or the ‘Duchesse d’Angoulême’, which are seldom contaminated by this mushroom.

¹⁸Jacques Beccaletto, *Nashi* n° 13, November 2006.

¹⁹According to the “Petite Flore du Potager du roi”, op. cit.

²⁰Manuel Pluvinage is an historian by training. He was in charge of the Potager du Roi from 1999 to 2007.

²¹“Le Potager du Roi fait peau neuve”, *Le Parisien*, 21 March 2002.

²²*Nashi* n°13, November 2006.

²³See: “Légumes de génie” (2002), “L’épopée des courges” (2005), “Du fayot au mangetout” (2010).

More recently, more diversification was experimented within the most prestigious part of the garden: espaliered peach trees were introduced in the Grand Carré to replace old pear trees: “*I would like to grow peach trees, apricot trees, almond trees and cherry trees. To work with fruit which we know can be viably cultivated organically*” (Laurent). Peach trees therefore introduced a break with monoculture but which maintain through their shape (an adapted horizontal palmette) the pleasing layout of the espaliered trees.

The gardeners also tested plantations of small fruit in rows, at the foot of the fruit trees: “*We are replanting blackcurrant and gooseberries, we’re trying to introduce new fruit*” (Laurent). Bushy shrubs, like the goji (*Lycium barbarum*) were introduced. Among the new varieties selected, the gardeners identified plants that naturally fertilise the soil, such as sea buckthorn (*Hippophae rhamnoides*) and cherry elaeagnus (*Elaeagnus multiflora*), two species which fix nitrogen from the air (Jacobsohn and Meynard 2015, p. 15).

Lastly, vegetables were planted as alley crops among the fruit trees, thus contravening the precepts of the Ecole d’Horticulture according to which “on the same piece of land one does not mix trees and vegetables harmful to one another” (Nanot and Deloncle 1898, p. 161).

6.3.2 Welcoming Animals

Domestic fowl were recently introduced²⁴ on the initiative of the students of the school of landscape architecture. It took several years for the idea to be accepted: “The students are requested to take away the chicken coop and its occupants”, can be read in a *Nashi* newsletter of 2004. The Council of the Potager du Roi ruled “against installing domestic, or any other animals within the confines of the school or the Potager. [...] to ensure the safety of the public and the health of the animals”.²⁵ Several months later, however, the department of ecology of the ENSP introduced geese in one of the more remote parts of the garden to implement its gardening project: “the goslings should help us manage the grass in the Duhamel meadow-orchard until the beginning of the summer. If the experiment is a success, we are thinking of doing the same in the Fruticetum, which is difficult to gain access to because of the dense grass. We could set up a collection of ingenious stiles”.²⁶ In 2012, the head gardener of the Potager published in the same newsletter an excerpt from the *Spectacle de la nature* by l’Abbé Pluche (1739) referring to remedies against “caterpillars, worms, snails and all other insect pests”: “You should release

²⁴It should be mentioned that a farmyard with fowl was included in the plan of the gardens in 1690.

²⁵*Nashi* n° 7, September 2005.

²⁶Comment by Marc Rumelhart, then head of the Ecology Department, reported in an article on “Student Gardening”, *Nashi*, n° 6, June 2005.

lapwings or plovers after having clipped their largest feathers. They will work from dawn to dusk cleaning everything up”.²⁷ Abbot Pluche gained his knowledge of gardening from Louis Le Normand, who was the head gardener of the Potager du Roi at the time. Antoine Jacobsohn does not exclude the possibility that poultry may have been used in the Potager du Roi from the 1730s.

The illegal poultry regained its status as a garden animal after the launching of an interschool competition for garden animals in the Potager du Roi in 2012.²⁸ The challenge was, “How to welcome animals in the garden”. A comfortable chicken coop now houses ten hens cared for by the students. Their contribution, however, is limited to tending a small enclosure of 2000 m². But they are inspiring new projects in the minds of the gardeners:

For us, the hens could be precious allies against the Asian hornet. We could consider putting at least a part of the apiary with the hens. (Bertrand)

For me, the garden is great but it lacks life. I would like to have chickens to scratch the grass, to eat the worms fallen from the trees, to weed certain patches and to cut the grass. (Laurent)

Sparrows play a similar role as the farmyard poultry, but their presence in the Potager is less controversial. Although they peck at ripe fruit, they are also extremely efficient at “cleaning” trees of their insects when they feed their young in the spring. The *Nashi* lauds the titmouse in its new section on animals²⁹: they are “very important helpers for gardeners. They swallow several kilograms of insects during the breeding season and can help avoid the use of pesticides”.³⁰ With the collusion of a local nature association (Association des Naturalistes des Yvelines), the gardeners have installed nesting boxes for birds like the titmouse in the garden, and birds are regularly seen nesting in the garden. Welcoming the presence of birds is part of the more integrative vision of the agroecosystem.

Bees also benefit from this vision of a generous nature. Their presence ensures the quality of the fruit production. Conscious of this complementarity, the young gardeners have trained in beekeeping.

Many things can be done with bee-hives. It is a part of the job of a vegetable gardener and tree-grower to keep bees. And when you go to see the bees, you have to be calm. (Bertrand)

The beehives which used to be kept behind a wall by a beekeeping association are now in “transhumance”. The gardeners move the hives to optimise pollination of the fruit trees and to promote the natural image this conveys to the public:

²⁷Abbé Pluche, p. 157, quoted by Antoine Jacobsohn in “De l’utilité de la volaille domestique au Potager, en 1732 et aujourd’hui?”, *Nashi* n° 30 (January 2012).

²⁸An initiative of the Picorama student association which was supported by the Department of Ecology of the ENSP.

²⁹Antoine Jacobsohn introduced the section “Notre faune” (Our Fauna) in the new layout of the *Nashi* inaugurated in 2010.

³⁰Jean-Pierre Thauvin, *Nashi* n° 30, January 2012.

The transhumance of the hives reassures us. It also shows people that there is life in the garden with bee hives moving around it, and that if we move the hives we are careful about spraying because we don't want to kill them. I think the presence of hives in the garden reassures people. (Laurent)

For the introduction of the “insect helpers”, a “composite hedge” sixty metres long was planted in 2000 following a training course organised by the Technical Joint Trade Centre for Fruit and Vegetables (in French, Centre Technique Interprofessionnel des Fruits et Légumes—CTIFL).³¹ It shelters a mixture of indigenous and ornamental species, according to the model recommended by CTIFL (Centre technique interprofessionnel des fruits et légumes 2000). The hedge is intended to “attract the insects and fauna near the fruit trees” to “fight against pests” explains a sign. Fifteen years later, the gardeners are thinking of doing the same thing in other parts of the garden, based on a model inspired by the “high-biodiversity fruit hedge” (Leterme 2014, p. 134). These multilayer hedges restore a degree of complexity to the air (helper insects) and to the soil thanks to root secretions which stimulate micro-organisms.

The development of plant cover and the reduction in tilling has made a new actor indispensable: the cat which preys on field mice and voles.

Cats are the only solution. A few good hunters generally ensure a balance. We need to ask to be allowed to introduce cats, its a global approach. If we introduce permanent plant cover without cats, it may fail because there are too many rodents. [...] Last year, I had a skirret patch, everything was eaten. (Simon)

Animals in the garden can also provide traction. Some thought was given to this notion in 2007, following discussions with wine growers working with animal traction.³² Demonstrations of the use of donkeys were programmed in 2012 for the *Saveurs du Potager* event organised with the Anerie Bacotte (donkey farm).³³ Animals can advantageously replace machines because manoeuvring on small plots is hard on the machines and damages the trees. To be dependant on motorised equipment also generates an economic and environmental cost. In January 2016, the team at the *Potager du Roi* took in two female donkeys for traction work. They proved to be efficient in earthing up asparagus, but the experiment ended before it was possible to explore other ways of using donkeys: “*The idea was to reduce the number of machines and the use of fuel, and to switch to animals. The aim was to seek autonomy. But we realised that with an animal, you don't just turn the ignition key*” (Annie). Animals also ended up being less useful since the intention was to reduce tilling.

³¹During this training session, the person in charge of fruit growing, helped by a gardener, caught and listed the insects living in the “composite hedges” (comment by Olivier Gonin, former gardener at the *Potager du Roi*).

³²*Nashi* n° 15, May 2007.

³³The Anerie Bacotte has developed a “natural garden” in Bois-le-Roi which is cultivated using animal traction.

6.3.3 *Protecting and Nourishing the Soil*

The soil bears the marks of changes in cultivation practises and of the relationship of gardeners to the living world. The repeat photographs opposite (Photos 6.1 and 6.2) give a clear idea of the extent of the changes. The Grand Carré, photographed in February 1991, presents bare earth treated with herbicides. A repeat photograph taken in March 2016 shows that the grass has taken over the alleys and the spaces at the foot of the palmettes. In the Legendre Garden (Photo 6.3), cardboard covered by wood chips follows the rows of pear trees. Between the rows, green fertilisers alternate with vegetable beds with generous quantities of mulch.

The protection of the soil of the Potager du Roi started with the grassing down in 2005. The aim was to reduce the consumption of herbicides and to improve the quality of the environment for the public. Interest in the benefits for the soil itself came later. Grass was planted in the most attractive cultivated plots for the benefit of the visitors, making them more accessible via mowed walkways. The grassing down reconciled environmental as well as public access objectives. This was gradually implemented on all of the sixteen plots. The phytosanitary treatments were thus moved away from the vegetable plots of the Grand Carré. The alleys themselves were grassed down, except for the “croix centrale” (central cross), to retain the imprint of the original layout.

Once again, in order to reduce the spraying of herbicides, different plant covers were tested along the rows of fruit trees: grass cropped with a cutter, green manure crops (*Trifolium suaveolens*, *Trifolium incarnatum*) or perennials (*Medicago sativa*, *Hieracium pilosella*). In 2013, the so-called sandwich method³⁴ was tested on extended fruit tree forms which could not be easily accessed for mechanised maintenance: a green fertiliser was planted along the rows of trees which were separated by grass. Between the two, a twenty-centimetre-wide strip was tilled to break up rodent galleries and limit competition from the grass. Organic mulching based on jute and wood was experimented with in 2006 at the foot of the fruit trees, but this soon proved to be too expensive: “For the Lelieur Garden alone, 600 m of mulching was laid down at a cost of approximately 2000 euros requiring 200 h of labour”.³⁵ The ENH laboratory, in addition to conducting the phytopharmaceutical studies mentioned earlier, was already researching on “the use of mulches in horticulture” (Nanot and Deloncle 1898, p. 118). La Quintinie himself was not hostile to using mulch:

People who live near forests gather leaves, not only to use them as cover, as I explained, but also to let them rot in a hole, the manure thus obtained is very good and can be used as compost. (LQ, p. 892)

³⁴Tschabold Jean-Luc, “Le système sandwich”, *AlterAgri* n° 67, September–October 2004.

³⁵François Moulin, former head gardener in charge of fruit cultivation. *Nashi* n° 12, September 2006.



Photos 6.1 and 6.2 Repeat photographs of the northern terrace of the Grand Carré (Potager du Roi). February 1991 above (© Marc Rumelhart), March 2016 below (© Pauline Frileux). Observe the bare earth, treated with herbicides, then the grassed down alleys and rows of espaliered trees framing each plot

A change began in 2013: the mulching and plant cover were no longer just a way of managing weeds; they became a key elements in the new cultivation practices. The first attempts at cultivating under plant cover were made by gardeners from the “ornamental” section, inspired by a workshop on the Figuerie garden.³⁶ They tried to convert the former “green carpet” which had been cultivated for several years into a flower meadow. Beds of permaculture inspiration were planted in front of the buildings of the Ecole du Paysage with vegetables and edible flowers. The soil was no longer tilled, but simply scratched on the surface. It was protected by a thick layer of straw mulch to nourish a rich vegetation (Photos 6.4 and 6.5). This model was replicated in different ways in the other gardens of the Potager: crushed

³⁶An international workshop session conducted by Karin Helms and Stefan Tischer, landscape architects.



Photo 6.3 To regenerate the soil, cardboard covered in wood chips is placed under the Verrier palmettes. The spaces between the rows are mulched and planted with vegetables to diversify production (© Pauline Frileux, Jardin Legendre, March 2016 on the left, December 2016 on the right)



Photo 6.4 “Ornamental and vegetable” beds of permaculture inspiration are cultivated on the former green carpet of the Figuerie, in the Potager du Roi (© Pauline Frileux, March 2017)

mulch³⁷ or straw mulch at the foot of the fruit trees, green fertilisers, no tilling and direct seeding.

Recent changes in cultivation practices are signs of a real paradigm shift: the objective is no longer to manage weeds to ensure the garden “looks neat”, but to care for the soil in order to regenerate it. Current gardening practices are now part of a more integrated vision of the agroecosystem which encompasses wild and cultivated flora and fauna. The agroecological transition in the Potager du Roi has been facilitated by a certain discouragement in the war against weeds, whether by

³⁷A crusher was purchased in 2008 to recycle waste from the pruning of the fruit trees that used to be burnt. A complement of crushed mulch is provided by the Urban Community of Versailles Grand Parc for the price of its transport.



Photo 6.5 “Ornamental and vegetable” beds, details (© Pauline Frileux, September 2017)

chemical or mechanical means. Another factor has been that three head gardeners went into retirement within a period of three years: the head gardener in charge of fruit trees in 2009, the one in charge of ornamental plants in 2010 and the one in charge of cultivations in 2011, after 42 years working in the *Potager du Roi*. The departure of these three head gardeners totally changed the established order in a short time resulting in freedom of action for the new generation of gardeners.

6.4 The Conditions for the Emergence of an Agroecological Paradigm

The emergence of agroecology in the *Potager du Roi* finds its origins in the personal motivations of each gardener, as we shall see later: agricultural production (increasing yields), economy of means (reducing the number of arduous tasks), the environment (limiting energy consumption), biodiversity (favouring soil fauna), but also for reasons of health and the improved flavour of the fruit and vegetables.

6.4.1 A Crisis Situation: An “Indescribable Jungle”

The calling into question of existing practices is often accelerated in times of crisis. The invasion of wild vegetation following the end in the use of herbicides in 2006 overwhelmed the *Potager du Roi*:

We soon found ourselves overrun by an indescribable jungle. We had to adapt, to find the machines to clean it up. So we made major purchases of brush cutters and mowing machines to try to catch up. (Laurent)

The end of the use of herbicides came in the wake of the ENSP project which raised the question of “changes in cultivation practices, namely in the phytosanitary domain which required reconciling efficiency with the admission of the public”.³⁸ But the decision taken by ENSP, itself under the obligation to comply with the injunctions of its supervising ministry, ended in failure. Phytosanitary treatments were resumed in 2007 upon the request of the head gardeners:

To switch from professional weeding techniques as practised in horticultural farms to using no herbicides at all is inconceivable. That is why in the orchards there will be localised treatments against resistant weeds such as couch grass, bindweed, knotweed and wormwood... when their presence becomes overwhelming. Basically, what remains to be defined is the general aspect of the garden and especially the orchard we want for the future. (François Moulin, 2006³⁹)

The end of the use of herbicides followed the departure of the head gardener in charge of cultivations, in 2011. It is still perceived by some gardeners as a loss of control over nature and a calling into question of their know-how. The Potager no longer corresponds to the aesthetic standards they had been taught:

When growing vegetables you still have to hoe. Irrigation and weeding ensures success. If you leave the weeds, they take the water and the nutrients, they compete, and you get stunted vegetables, small yields, and the garden isn't attractive to visitors, everything is spoiled. (Annie)

The same applies to the life expectancy of the trees and the quality of the harvest. The end of the treatment against scab favoured the spread of the fungus. Over and beyond a certain concentration, a cancerous derivative renders the diseased fruit unfit for consumption, even for the production of fruit juice. The gardeners were therefore forced to throw away tons of contaminated pears and apples. Apart from the financial cost, one can understand their disappointment at losing their harvests. But since the law of 12 September 2006,⁴⁰ phytosanitary treatments have become incompatible with admitting the public to the garden.

Lastly, the law on the future of agriculture makes agroecology a “national priority” which the gardeners of the Potager, employees of the Ministry of Agriculture, must address in spite of not having received the relevant training:

Who has been trained in agroecology? I have a BTA⁴¹ in crop protection, in other words, the intensive treatment of crops. I have a “phytosanitary” certificate, that's what I know. But none of us is able to guide people in this new approach. (Annie)⁴²

³⁸Projet d'établissement de l'ENSP Versailles, 2005–2015.

³⁹*Nashi* n° 12, September 2006.

⁴⁰The law concerning the “time limit for re-admission” (see introduction, page 3).

⁴¹Agricultural technician's certificate (in French, Brevet de technicien agricole).

⁴²ENSP meeting, January 2017.

6.4.2 *An Economic Driver: Reducing Costs and Increasing Production*

The profitability of the Potager du Roi has been a recurring issue since its budget has been shared with the Ecole d'Horticulture. In 1875, "The rapporteur of the budget parliamentary commission requested that the cultivation of collections and experiments should be replaced for the most part by cash crops" so as to ensure the income of the Potager du Roi compensates for the school's expenses (Nanot and Deloncle 1898, p. 186). The authors added: "Clearly, this request has not been fully complied with; however, it is obvious that this could not have been the case since it would have been to the detriment of the teaching, the future of the establishment and its reputation". A century later, the administration expressed the same wish: "For the ENSP, the Potager is a heavy burden, production must be increased".⁴³

Whereas the gardeners were instructed to produce more, the reduction in treatments resulted in a sharp decline in fruit production: 47 tons in 2002, 12 tons in 2014 and only 5.5 tons of fruit harvested in 2016. Higher profits obtained by selling processed products (jams and fruit juices) made it possible to compensate for the drop in production. The gardeners also sought to save on labour not directly profitable, such as weeding. This resulted in continued grassing down as well as mulching, "*which will enable us to save time, in the long term we intend to compost everything on site*" (Mathieu). A second response was to introduce more profitable vegetables and herbs in the fruit gardens which also introduces a diversification of the agroecosystem (Photo 6.6).

We have to slightly re-adapt all of the agroforestry principles here. The basic principle is to cultivate between the rows. [...] the principle is to increase the profitability of a plot. [...] So we said to ourselves, let's try to grow vegetables between the trees. (Bertrand)

There is a lot of space at the foot of a fruit tree which can be used and must be made profitable, and that is why we now plant blackcurrants and gooseberries at the foot of the fruit trees. We are going to plant mixes of herbs to occupy the soil, to have a permanent cover which also ensures a certain profitability while making the site more attractive. (Laurent)

A third approach involves leaving the soil untilled, which helps reduce costs by reducing fuel consumption. Experimenting with sowing under plant cover is a way of "*reducing labour through adjusted and more agronomically rational farming techniques*" (Bertrand).

⁴³Excerpt from an interview of the General Secretary (Stéphane de Margerie, 1995).



Photo 6.6 Mulching and planting of perennials in the row of spindlebush pear trees. Collection of apples and pears in the Quatrième des Onze, in the Potager du Roi (© Pauline Frileux, May 2016)

6.4.3 An Ecological Driver: Natural Cultivation

Green manure crops are sown to regenerate the soil, and the gardeners are seeking to adapt their machines for sowing under plant cover without tilling. *“There is something to be said for plant cover, for maintaining the mycorrhiza. You can only achieve this with plant cover* (Bertrand). The notion of living-soil has gradually taken among the gardeners and changed the way they relate to machines.

Permaculture is not tilling the soil. Above all, I see it as preserving the soil. Most of the places have been tilled... I have even tilled some plots three times a year, which is already two times too much! (Pierre)

The environmental policy of reducing inputs, as we have seen, was not accompanied by a change in the way spontaneous species were perceived. The gardeners no longer used chemicals, but they still had to deal with the weeds. Partial grassing down and tillage remained part of the idea of making the garden “look neat”.

We switched to mechanical weeding at the foot of the trees [in 2012]. That solved the problem for about 80% of the orchard, except for the voluminous forms, for example where we adopted the “sandwich method”. It was in response to the fact that we couldn’t weed [...] The first years we would mow once a month and last year we mowed only four times, which kept everything clean. (Laurent)

In 2005, in a letter addressed to the ENSP, two experimental gardeners in residence at the Potager du Roi, Liliana Motta and Sébastien Argant rebelled against the sterile aspect of the Potager: “On our path”, they explain, “are deserted plots of bare earth and amputated trees. [...] We have the impression we are tending a cemetery”. Their gardening approach involves all kinds of living elements: Liliana Motta collects “plant pests” (Motta 2014) and Sébastien Argant loves well nourished soils in which “worms work instead of the gardener” (Argant 2003, p. 363). Within the scope of the student gardening activities, the two experimental gardeners initiated observation work of spontaneous vegetation on plots with or without tillage.⁴⁴ The innovative nature of their approach, especially regarding soil management methods, drew the attention of the head gardener at the time who wrote the following about student gardening: “It is clear that the logic of clean gardening combining morality and the total absence of weeds is no longer in practice here. [...] the criteria is no longer the importance of production nor the visibility of the work but the environmental quality of the practices” (Pluvinage 2003, p. 148).

Other experimental gardeners have campaigned for a “natural vegetable garden”, especially Yves Gillen, referred to as a cutter of reeds and “liberated gardener” (in French, “Jardinier affranchi”) (Bertrand-Gillen 2009). He has taught future landscape architects the art of making good compost, how to use the grelinette garden fork and the straw cutter to cover the soil, as well as how to trim borders and tend alleys. Other events contributed to instilling alternative practices: the installation of Yvonne’s “lasagne” in a corner of the Grand Carré with all the garden waste—“*a big lasagne with extraordinary biodiversity*” (Yvonne)—or the Orties’ Folies gardening festival held in 2010 with conferences by Gilles Clément, Jean-Paul Collaert and Bernard Bertrand on “the benefits of the nettle and wild plants” and the different uses of nettles in agriculture.⁴⁵

In the beginning, I kept saying, “We must go organic”. It was complicated [...]. I said “organic”, because it was a way of working without treating, but in fact it wasn’t the organic aspect I was interested in, because when you cultivate organically you treat. [...] We aren’t cultivating organically but “naturally”. That’s what’s interesting, working naturally, we don’t need to treat. (Yvonne)

These pioneers paved the way for agroecology in the Potager du Roi. Two recent events finally tipped the balance in the transformation of the team’s perception of the living environment: the accidental encounter with the professional association of living-soil market gardeners⁴⁶ (in French, Maraîchage sur Sol Vivant or MSV) and exchanges with the French Canadian Stefan Sobkowiak, promoter of the “permacultural orchard”. The MSV network was created in 2012 upon the initiative

⁴⁴*Nashi* n° 10, June 2006.

⁴⁵*Nashi* n° 26, January 2010.

⁴⁶In June 2015, one of the founders of the association Maraîchage sur sol vivant came to the Potager du Roi for a meeting organised on site with the association Atelier Paysan. Surprised to see vegetable patches in the Figuerie, he invited the gardeners to talk more about its cultivation.

of farmers who wanted to regenerate their soils. It works on the principle of a sharing of experimental practices to test agronomic theory in the field. The vegetables are cultivated without tillage, under thick cover of non-decomposed organic matter. In December 2015, the gardeners of the Potager attended the MSV annual conference.⁴⁷ They met Marcel Bouché, one of the few earthworm specialists in the world (Bouché and Lavelle 2014), as well as the agronomist and market gardener Konrad Shreiber who claims that “composting is polluting”.⁴⁸ Under this provocative slogan, he recommends the use of fresh organic matter to activate fungi in the soil that produce glomalin, a molecule essential to the composition and maintenance of soils. In the spring of 2016, the entire team visited the vegetable farm of François Mulet, one of the founders of the network. For him, “*the reference is the earthworm, if it is present, all the rest is there*”. This excursion organised by the gardeners themselves bears witness to a dual decentering: renewed interest in vegetable production in itself and the desire to test the cultivation techniques inherent to the field of permaculture.

At the same time, the gardeners in the fruit section met Stefan Sobkowiak.⁴⁹ His ethic: “share the surplus with people and nature”, a surplus which he estimates at between 5 and 10% of the yield. Birds are “allies” he attracts with sunflower seeds and more than 150 nesting boxes installed in his orchard. This French Canadian’s approach consists of “maximising biodiversity” while increasing production and reducing labour and inputs. His orchard is therefore designed around trios associating a tree which fixes nitrate in the air (a leguminous tree), an apple tree and a pear or plum tree. The absence of any contact between two identical varieties limits the propagation of pests, and the leguminous tree naturally fertilises the soil. Against scab he sprays whey, a by-product of cheese. “We aren’t seeking perfection, just a balance”. The grassed surfaces are seen as a “resource deserving proper management for insect helpers”. Small fruit and vegetables are included in the rows and compose “grocery alleys” which provision the members of the orchard association. These two permaculture approaches adopted by professionals have in common the fact that they experiment with ecological, productive and efficient techniques. The combination of these three aspects finally convinced the team of the Potager du Roi.

⁴⁷Emmanuel Blot and François-Xavier Delbouis, “Continuer d’avancer avec le réseau Maraîchage sur sol vivant”, *Nashi* n° 41, March 2016.

⁴⁸Conference of 30 July 2015 during the “Paysages in Marciac” festival organised by the association Arbres et paysage 32. See excerpt on YouTube.

⁴⁹See the documentary directed by Olivier Asselin, *Le verger permaculturel. Au-delà du bio, 2014*.

6.4.4 *A Social Driver: Promoting the Profession of Market Gardener*

Agroecology entered the Potager du Roi through vegetables in the “ornamental and kitchen garden” borders of the Figuerie (cf. *Supra*, Sect. 6.3.3), totally changing the distinctions made between the cultivation of fruit and vegetables and between tree and vegetable growing. The growing of fruit trees has always benefited from a prestigious image at the Potager du Roi. For La Quintinie, it was among the “masterpieces of gardening”: “the training of all sorts of trees, the beauty and singular benefits of each fruit, the correct ripeness” (LQ, p. 78). His successors were great tree specialists: “the Le Normands⁵⁰ were talented arborists” (Nanot and Deloncle 1898, p. 33), le Comte Lelieur⁵¹ an “expert arborist” (op. cit., p. 46) author of a treatise on fruit trees (*La Pomone française*, 1815). Auguste Hardy,⁵² the first director of the Ecole Nationale d’Horticulture, was also an “eminent arborist” (op. cit., p. 88) author of a treatise and founder of the “école de poiriers” at the Potager du Roi. Lastly, Jules Nanot, the second director of ENH, was in charge of the teaching fruit tree arboriculture. These directors who succeeded one another up until the beginning of the twentieth century contributed to the reputation of the Potager du Roi as a fruit garden. The trained trees contribute to the garden’s architectural layout and confer an historical dimension through the collection of fruit tree forms, contrary to the vegetable production which for the most part is simply cultivated according to an annual cycle.

The excellence of the vegetable and fruit production used to depend on the acclimatisation of new vegetables and early fruit and vegetables, which are no longer objectives in this age of sustainable development. Halfway between practising horticulture and agriculture, the gardeners of the “vegetable” sector are finding it difficult to define themselves professionally: “*We are not classic market gardeners, we are in a market garden*”⁵³ (Simon). The Potager stopped being a member of the association of market gardeners at the Chamber of Agriculture: the subscription fee was too high (10% of the vegetable budget), but above all, the visits of the association’s agricultural consultant revealed the extent of the differences between the Potager and the market garden profession:

We do not resemble a market garden at all. He laughs when he visits us: we don’t have any high-yield vegetables, we have trees which are planted every 20 metres which prevent us from using a tractor, we have varieties he’s never seen... we aren’t market gardeners. Market gardeners today produce no more than five different vegetables. We have 460 different varieties and a hundred species. (Annie)

⁵⁰François Le Normand and his two sons François and Louis, followed by his grandson Jacques-Louis all managed the Potager du Roi from 1691 to 1782.

⁵¹Le Comte Lelieur managed the Potager du Roi from 1804 to 1819.

⁵²Auguste Hardy was the director of the Potager du Roi from 1849 to 1891.

⁵³In reference to the book by Jean-Martin Fortier, 2015, *Le jardinier-maraîcher. Manuel d’agriculture biologique sur petite surface*, Écosociété.

This diversity of varieties, which is difficult to justify strictly in terms of production, has become an asset in terms of biodiversity. The vegetables have proved to be more rewarding than the trees when it was necessary to invent techniques which do not involve the use of pesticides or tilling, as in the case of the *Figuerie*. Excellence in market gardening is gauged today by the gustative quality of the produce. Cultivating without pesticides is also about producing beautiful, tasty vegetables, and it is about pride in the “market gardening” profession.

6.4.5 *The Driver of Food Production: Beautiful Tasty Fruit and Vegetables*

“Obtaining a crop” is one of the founding principles of the permacultural project. “The ultimate reward is to be able to consume what we grow” writes one of the founders of the movement, David Holmgren (Holmgren and Cochet 2014, p. 172). Food production creates a positive retroaction which stimulates the gardener. At the *Potager du Roi*, it forges the identity of the team, irrespective of the garden sections. The war waged by the gardeners against weeds has therefore contributed, in spite of themselves, to diverting them away from their core activity:

It’s wearing for the staff, especially the arborists. Because on the *Grand Carré* we spend 90 h a year just clearing underbrush. On the other plots it’s even more, we spend 350 h clearing per year. So practically a quarter of the year is spent clearing underbrush. And that is physically tiring. It wears out the staff and the equipment. (Laurent)

The gardeners in charge of the ornamental section do not like maintenance work either:

When I arrived, I spent my time watering, hoeing and cutting. [...] Weeding the gravel paths all day, I did that for years, I now realise it’s pointless. Maintaining gravel paths and trimming boxwood isn’t inspiring. (Arnaud)

Tending the alleys was still an occupation widely shared in the 1970s, according to Jacques Beccaletto⁵⁴:

At the *Potager du Roi*, in the past, the gardeners would spend the last hours of the week cleaning up the garden [...]. All the staff, those in charge of the vegetable patches, the green spaces, and the fruit, would spend the last hours of the working week doing the same thing, raking the gravel of all the terraces and alleys.

But this is no longer the case: the gardeners in the ornamental section claimed the right to grow vegetables after the head gardener went into retirement. This enjoyment at producing food contributed to renewed cultivation practices: “*It’s more pleasant to start the day by picking courgettes rather than spending all*

⁵⁴Jacques Beccaletto, “Une histoire de graviers”, *Nashi* n° 31, May 2012.

morning clearing the undergrowth at the foot of the trees” (Bertrand). As we have seen, vegetables now grow between the rows of fruit trees and in the flowerbeds.

The interest in consuming vegetables led to ending the use of herbicides to clear the alleys sooner. The subject of food is ever present when talking with the gardeners who constantly evoke the tastiness of their produce.

Our carrots aren't the same as those you buy in the shops, not at all the same. When I pick a carrot, it smells of carrots, you taste it and it really tastes of carrot. When you buy a carrot in a shop, it's hard, it's orange and that's all it is. (Annie)

The 'Noire de Crimée' is a very fragile plant [a tomatoe] which attracts mildew, but we keep it because it's an exceptional variety, we can't do without it. (Pierre)

In this regard, the gardeners of the Potager are the rightful heirs of La Quintinie, who paid a great deal of attention to the selection of delicious varieties so as to “give people pleasure, but most of all to contribute to their good health” (LQ, p. 344). “Exceptional flavour” is also the objective sought by Stefan Sobkowiak with his “permacultural orchard” (Asselin 2014). The gustatory quality of the vegetables produced by the Mulet brothers was a key factor in the adoption of living-soil gardening principles by the gardeners of the Potager du Roi:

They have cauliflowers that are more than 30 cm in diameter. [...] They are very dense, beautiful cauliflowers. The radishes are so big, you think they must be hollow. Not at all, they're delicious, very sweet. (Bertrand)

The level of excellence attained by these gardeners, in terms of the “neatness” of the cultivated beds and the flavour of the vegetables, two essential criteria at the Potager du Roi, has made no-till cultivation credible.

Permaculture is also “a positive approach to weeds” (Holmgren and Cochet 2014, p. 94). According to this principle, gardeners experiment cultivating in combination with spontaneous plants which are no longer in competition, but which provide protection.

In the bed along the wall, there is some borage that has reseeded, and I had planted lettuces between the fledgling borage plants in the beginning of spring. That was interesting [...]. I picked the borage, the first leaves were delicious, you cook them like spinach [...] So I picked everything, the wild borage and the planted lettuce. (Simon)

The Potager now sells wild plants along with carrots and leeks:

In the spring when we didn't have much to sell, we were glad to find the wild plants. The sorrel, borage, goosefoot and orache, anything wild we could make bouquets with. (Yvonne).

What I find most interesting are the wild plants, without necessarily cultivating them [...] In the beginning of spring, I love to walk among the rows and pick any wild plants that can be harvested for sale. Patience dock, bittercress... We should maybe think of ways of producing these plants. (Simon)

Permaculture also involves a different approach to dealing with green waste. In the past, waste was either burnt or disposed of, more recently it was composted,

now it is recycled as food: “*We re-use the leaves, we make cakes with turnip, radish and carrot tops. To think that you can consume practically everything is really something else*” (Yvonne).

Agroecology has therefore gradually entered the Potager du Roi. The gardeners who were reluctant about organic cultivation finally spearheaded an integrated vision of the agroecosystem. Conversions among the gardeners varied in time and according to different motivations such as not having to use pesticides, optimising crops and recycling living matter. All the same, this agroecological conversion did give rise to disagreements among the gardeners. Two gardeners, for example, refused to attend a training course on phytosanitary treatments. Conversely, from 2007, the director of the Potager du Roi decided to experiment with the spraying of phytostimulants to compensate for the end of treatments on a test plot. At the time, he was unable to convince his team. It took ten years to carry out this agroecological transition. Online resources, especially filmed conferences, contributed to disseminating knowledge about permaculture and agroecology. The expectations of the students and visitors regarding ecological and innovative cultivation practices have also played a part which remains to be evaluated. However, the gardeners who have the most developed this approach deplore certain deficiencies in terms of water consumption, the use of treated seeds or the purchasing of straw. Changes are slow in coming and at the same time they are occurring very quickly given the scale of this radical change: “*We don’t have any solutions... in the long term for the voles, for the perennial weeds, or for diseases such as canker and mildew. We are somewhat at a loss*” (Annie). The trees have been directly affected by the discontinued use of fungicides which has made the ecological transition even more difficult. But then, the ageing fruit trees need to be replaced anyway. As we have seen, in recent plantations disease-resistant varieties and a mixture of different species have been privileged, which bodes well for future yields.

6.5 Conclusion

Agroecology at the Potager du Roi has been engendered by an economic crisis (reduced budgets), a social crisis (lowering of the status of the gardening profession) and an ecological crisis (biological unbalances, loss of biodiversity). In spite of the garden’s singular nature as a farm, a conservatory of trained fruit trees, an historical garden and a school garden, the development of agroecology in the Potager du Roi follows the same reasoning which is emerging in the rest of the country due to “the imperative need to reduce production costs”, the desire to promote the farming profession, and the need “to improve the fertility of the soils” (Claveirole 2016, pp. 30–34).

The agroecological transition takes inspiration from agroforestry, permaculture and living-soil market gardening. The new farming techniques are questioned in terms of their agronomic relevance and their aesthetic impact, which is important given the historic nature of the site and the fact that it is open to the public. Plant

cover provides flowery borders, and the layout of the grassed down alleys highlights the architecture of the garden. Ecology is establishing a new aesthetic dimension the balance of which depends on attention to thresholds and transitions.

Whereas the prohibited use of herbicides imposed on the gardeners in 2006 ended in failure, individual experiments inspired by permaculture have finally been adopted all over the garden and have succeeded in gradually converting the entire team. The “green carpet” metamorphosis of the *Figuerie* demonstrates the relevance of conducting a life-size trial in a prestigious site. The gardeners from the ornamental section which has suffered neglect since the departure of the *Ecole d’Horticulture* have so far played an essential “pioneering role” in the launching of these movements (op. cit, p. 26).

The agroecological revolution of the *Potager du Roi* is apparent in the renewed attention to the soil which bears witness to a change in the way of perceiving nature. It closely relates to a new social balance within the team of gardeners: a vertical organisation with a strong hierarchy (head gardeners) is gradually giving way to a horizontal organisation in which all the gardeners are at the heart of a self-governing process.

Profile of the Gardeners Interviewed in 2016

First name ^a	Arrival at the Potager du Roi	Section	Age group	Training, career path	Main subjects of interest in the garden
Annie	1994 (seasonal employment since 1991)	Vegetables. Head gardener since 2011	[45–55]	Certificate in crop protection and floriculture. Teacher in a secondary horticultural school	Showing the diversity of vegetables. Teaching the general public
Pierre	1998	Vegetables	[35–45]	Certificate in garden and green space management	The hothouse, Japanese vegetables, historical varieties, guided tours
Mathieu	1998	Vegetables	[35–45]	Certificate in science and laboratory techniques	Simplification of farming techniques to save time, driving farm vehicles
Yvonne	2006 (intern in 2005)	Vegetables	[55–65]	Art and fashion design. Farming	Cultivating with natural methods,

(continued)

(continued)

First name ^a	Arrival at the Potager du Roi	Section	Age group	Training, career path	Main subjects of interest in the garden
				certificate (reconversion). Chairwoman of family garden association	lasagne gardening, recycling, sale of produce in the Potager du Roi shop
Laurent	2006 (seasonal worker since 2005)	Arboriculture	[25–35]	Certificate in landscape planning	Optimising production, the permacultural orchard, gardening with chickens
Simon	2006	Vegetables	[25–35]	School of architecture, courses in botany	Wild plants, mixed lettuce, no-till cultivation, plant cover
Arnaud	2010 (intern in 2003 then seasonal worker since 2007)	Ornamental	[25–35]	Certificate in vegetable and flower growing in hothouses	Permaculture, electroculture, edible flowers, combined cultivation of flowers and vegetables, gardening with students
Bertrand	2010 (seasonal worker since 2007)	Ornamental garden and mechanical workshop. Arborist since the end of 2015	[25–35]	Certificate in farming mechanics	Adapting farming tools and machines, living-soil market gardening, sowing under plant cover, apiculture
Justine	2009	Arboriculture	[25–35]	Certificate in flower and vegetable production, certificate in landscape planning	The relationship to animals

^aThe first names have been changed to preserve anonymity

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