



FARMING IN THE ALPILLES

towards more biodiversity-friendly practices

LIFE DES ALPILLES • [LIFE12 NAT/FR/000107] • 2013-2019



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naturel
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des Alpilles



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FOREWORD



Farming has crafted the patchwork of emblematic landscapes that make up the Alpilles Regional Natural Park. It is still the predominant activity and currently covers half of this rural area. With about 1000 highly diverse farms, agriculture in the Alpilles is a very dynamic sector, making high-quality produce (various PGIs and PDOs). Nearly 10 % of the active population lives off agriculture, which is twice the average level of the region.

The Alpilles Regional Natural Park, as laid down in the land-use plan incorporated into its Charter, considers agriculture as the “corner stone” of local development, a major, transversal field in the Park’s actions. Above and beyond preserving landscapes, the aim of the Park is to contribute to the development of a sustainable form of agriculture that is environment-friendly, competitive and employment-generating. The issues of the agriculture of tomorrow, in a context of climate change and the growing interest of consumers in the quality of produce, are of primordial importance for the Alpilles today.

The actions of the LIFE des Alpilles programme, initiated in 2013, are aimed at supporting farmers in the development of their practices. Taking the environment into consideration, in the broad sense, improves the ecological quality of agrosystems while ensuring good-quality production and cost-effectiveness.

This guide presents the fruit of our awareness-raising and experimental actions, carried out in collaboration with many local stakeholders in the four main branches of local agriculture: fruit tree growing, olive farming, wine growing and cereal crops. With this continuous dialogue, the LIFE des Alpilles project has enabled us to propose and test practices to ensure the maintenance of responsible agricultural methods for people and biodiversity: sustainable soil management, alternatives to phytosanitary products, services provided by biodiversity to agricultural habitats. It also gives a voice to all those people, the farmers of the Alpilles, who placed their trust in us to help develop their work.

JEAN MANGION

President of the Alpilles Regional Natural Park,
Mayor of Saint-Etienne-du-Grès

BIRDS, LANDSCAPES AND PEOPLE

The Alpilles Regional Natural Park: a patchwork of habitats

Labelled as a Regional Natural Park in 2007, the centre of this little Mediterranean area of 50,000 ha is crossed by the limestone Alpilles range and it is recognised for the diversity of its habitats and landscapes: woods and garrigues, rocky habitats, dry grasslands, wetlands, traditional farmland ...

Shaped by farming and grazing activities, this mosaic of habitats harbours considerable biological richness, especially in terms of ornithology, justifying the presence of a Natura 2000 protected area for the birds of the Alpilles.

The Alpilles Regional Natural Park



The Alpilles SPA

The Alpilles Special Protection Area is part of the European Natura 2000 network, a broad set of terrestrial and marine natural sites identified for the rarity or fragility of their wild animal or plant species, and their habitats. Natura 2000 aims to reconcile the conservation of nature with socioeconomic activities.

The Alpilles Regional Natural Park

covers parts of 16 municipalities which actively contributed to the LIFE programme and benefit from the direct positive impacts of its actions on their commune: Aureille, Lamanon, Eyguières, Eygalières, Saint-Rémy-de-Provence, Saint-Etienne-du-Grès, Mas-Blanc-des-Alpilles, Les Baux-de-Provence, Fontvieille, Paradou, Maussane-les-Alpilles, Mouriès, Sénas, Orgon, Saint-Martin-de-Crau and Tarascon.



A LIFE project dedicated to protecting the birds of the Alpilles

Like most of our rural areas, the natural heritage of the Alpilles is today confronted with a range of pressures and changes in land ownership, agriculture, visitor numbers and urban or rural development.

At local level, the aim of the Park is to seek solutions for integrating environmental issues into the various policies, projects and human practices or activities (leisure, farming, grazing).

The LIFE project was initiated by and has been managed by the Alpilles Regional Natural Park during the period 2013-2019. The project has developed some forty actions to benefit 13 bird species found in the range that are listed as being of "Community Interest" in the European Birds Directive. The field of action corresponds to the Special Protection Area (SPA), which covers more than half the surface area of the Park.

The actions concern both the conservation of birdlife and the promotion of human activities that contribute to encouraging the presence of the species in the area. By combining these two approaches, the project responds to three main objectives:

- Optimise the relationship between human activities and the maintenance of ornithological biodiversity;
- Facilitate the uptake of ecological issues by local stakeholders;
- Strengthen the ornithological reputation of the area by promoting certain practices

What's LIFE?

LIFE, meaning "L'Instrument Financier pour l'Environnement" is one of the European Union's main financial tools used in the framework of its environmental policy. It supports programmes in favour of the conservation of the environment, the climate and nature.

Since 1992, more than 4500 projects have been co-financed in this way. The LIFE des Alpilles programme is co-funded by the instrument LIFE+ Nature & Biodiversity, which supports projects contributing to the implementation of the European Birds and Habitats Directives and the management of Natura 2000 sites.

The LIFE des Alpilles target species:

- 1 Bonelli's Eagle
- 2 Eurasian Eagle Owl
- 3 European Roller
- 4 Little Bustard
- 5 Ortolan Bunting
- 6 Eurasian Scops Owl
- 7 Lesser Kestrel
- 8 European Nightjar
- 9 Dartford Warbler
- 10 Short-toed Snake Eagle
- 11 Egyptian Vulture
- 12 Tawny Pipit
- 13 Woodlark

Watercolours by Alain Hugues



ENCOURAGING AGRICULTURAL PRACTICES FAVOURABLE TO BIODIVERSITY

Farming is a major activity in the Alpilles Park and shapes its landscapes: farmland covers nearly half of its surface area*

In terms of surface area under cultivation, the main agricultural activities in the Alpilles are fruit tree growing and olive farming (30% of Agricultural Land), areas dedicated to livestock farming and haymaking in the Crau (24% of Agricultural Land) and cereal crops (22% of Agricultural Land). Wine growing covers 9% of the Agricultural Land. This diversity of crops, combined with various types of livestock farming and grazing, are the special feature of the Alpilles.

Promoting alternative agricultural practices

The LIFE des Alpilles project enabled the setting up and monitoring of alternative agricultural practices that are favourable to biodiversity and economically viable in the 4 main agricultural sectors of the area (olive farming, wine growing, cereals and fruit tree growing).

* source: RPG 2016, OCSOL 2014



Tawny Pipit
© A. Audevard





Back in 2013 an inventory was conducted of existing agricultural practices together with a survey of the needs of some forty farmers in the Alpilles. This work highlighted the issues to be studied in depth for each of the four sectors. The RNP organised experience-sharing days with farmers,

Farmers' commitments in the LIFE project:

In 2017, 12 farmers volunteered to test alternative practices, i.e. three farmers per sector. The methodology of the practices was defined participatively by the farmers and their technical partners, then implemented on pilot plots.

- **Fruit tree growing:** stoppage of chemical weed control, management of grass cuttings, preservation of the edges of plots (canals and ditches, turning headlands, hedges), and complementarity between livestock and fruit tree growing.
- **Olive farming:** ground cover management, organic fertilisation and the use of kaolin clay to combat the Olive Fruit Fly.
- **Wine growing:** management of sown and spontaneous ground cover in the inter-rows of plots
- **Cereal crops:** diversification of crop rotation and choice of crop varieties to reduce pressure from weeds, diseases and pests, maintaining maximum living ground cover to limit erosion and improve soil fertility.

This booklet presents the practices tested in this framework, based on the farmers' testimonies.



Adherence to ecological and agronomic issues combined with the economic viability of farms is indispensable for encouraging farmers concerning these changes of practices

technicians and scientists to consider the potential solutions for achieving good biodiversity conservation status within agrosystems.

The 4 broad issues covered are:

- the role of agroecological infrastructures within a farm and also at the scale of a single plot, for all sectors;
- managing ground cover in perennial crops;
- controlling insect pests without pesticides;
- reducing the use of herbicides for cereal crops, while maintaining a living soil.

European forum on alternative agricultural practices

In 2018, the Alpilles Regional Natural Park (RNP) hosted a European forum on alternative agricultural practices. Nearly 160 farmers, agriculture professionals and elected officials, amongst others, took part in these two days of exchange about agricultural practices favourable to biodiversity, especially birdlife. The meeting was an opportunity to present shared experiences and open the date concerning "After LIFE" in the Alpilles. The forum had multiple objectives:

- Raising awareness among local stakeholders about the ecological issues linked to farming;
- Informing about the associations and technical organisations working in the agricultural field;
- Presenting concrete examples, with the sharing of experience in France and elsewhere in Europe.

AGROECOLOGY ON THE MOVE

Agroecology has seen a massive and recent upsurge, both in the French agricultural landscape and in international institutions. It has also become a model for many types of agriculture, with a view to reorienting farming and agri-food systems. We shall summarise its development in Europe and several American countries.

The construction of agroecology as a scientific and technical field

Agroecology goes back a long way. The term has been present in the international scientific literature for almost a century. The Russian Basil Bensin was a pioneer in the field. Between 1928 and 1951 he produced several texts, three of which explicitly refer to agroecology in their titles. In 1940 he defined it as “the applied ecology of agriculture. The principles, concepts and methods of research should systematically be applied to four groups of agricultural sciences (plants, animals, economics and rural sociology). The teaching of agroecology should be included in the curricula of agriculture colleges and schools.”

Two other authors published books with the same title, *Agricultural Ecology* (Azzi, 1928; Papadakis, 1938). Subsequently, German zoologists (Friederichs, Tischler) completed this vision with the ecology of biological pests and their parasitoids. In the same vein, other recognised authors came to agroecology from entomology, in particular Miguel Altieri. With C. Nicholls, he contributed to the strengthening of the academic aspect of agroecology in Latin America.

What this historical detour shows us about the path of agroecology is that it is intercultural, with various roots, began formally almost a century ago and became internationalised, is linked to the development of other disciplines, and is strongly marked by certain key individuals.

Approaches and definitions of agroecology

In the last forty or so years, the contours of agroecology have been affirmed. Definitions have evolved to take into account the multiplicity of issues and stakeholders involved in a transformation of agriculture and its relationships with food, the environment and health. Consequently, the subjects of study and actions have also been redefined.

We can distinguish four periods in the international literature on agroecology, presented below by decade.

In the 1980s, several papers and books specified the fundamentals of agroecology (Altieri, 1987; Gliessman, 1990) and described it as “a set of methods and of practices, basis for a revision of the links between agriculture and ecosystems whose aim to ensure the preservation of natural resources. The call for “revision” was accompanied by criticism of the effects of “agricultural modernisation” and a completely new direction was proposed for designing a form of agriculture in partnership with nature. It also returned agriculture to its fundamental character, that of managing living beings. A similar proposition is found in the work of Pierre Rabhi.

In the 1990s, agroecology was redefined as “the application of the concepts and principles of ecology to the design and management of sustainable agroecosystems” (David et al., 2011). The notion of agroecosystem became the fundamental study unit of geochemical flows, transformations of energy, biological processes, and social and economic relations.

In the 2000s, the definition of agroecology came to include the whole food system, in all its multiple dimensions (Francis et al., 2003). After that, Wezel et al. (2009) proposed that agroecology should not be considered as a single scientific core, but as the interface between sciences, practices and social movements. All three areas are required for the implementation of an agroecological programme.

More recently, agroecologists have adopted a more radical and political position in order to develop alternatives to the political and economic powers that have locked food systems and prevented their transformation (Gliessman, 2018), by addressing socioecological systems and social practices.



The various approaches and definitions of agroecology recognised at international level attest to the fecundity and resurgence of the field of agroecology during the last 40 years.

Perceptible changes in the French situation, and abroad...

Recent movements and changes in agroecology in France can be seen through the websites of stakeholders using the term agroecology and the relationships that they establish with others (hyperlinks). The result of this webometric analysis is a map that can be generated at different times. Concretely, we produced two successive images, in 2011 and 2018 (Bellon and Ollivier, 2018), i.e. before and after the emergence of a national programme in favour of agroecology, "Produisons Autrement" (Let's Produce Differently). Comparing them reveals a major change in the landscape of agroecology stakeholders. Beyond our borders, a European association was created in 2015 (<http://agroecology-europe.org/>). In 2017, the Food and Agriculture Organization (FAO) proposed ten elements combining principles and system properties to create an environment favourable to agroecology and make it operational (<http://www.fao.org/agroecology/home/en/>).

During the last ten years there has been a strong trend towards the institutionalisation of agroecology. In France, this includes a legal definition of agroecology, the inclusion of new stakeholders and the creation of networks, the multiplication of individual and joint initiatives (GIEE), and the construction of assessment methods (indicators).

Conclusions and perspectives

The development of agroecology has set off new approaches to innovating, which can lead to participative, transdisciplinary and implicated research. Yet it should not be reduced to a purely scientific approach. Many other stakeholders contribute to this process of transforming agriculture, including professionals, social movements and politicians. Ideas are transmitted by other channels and networks: reference books, videos on the Internet, peer-exchange, training, etc. (Doré and Bellon, 2019).

An agroecological transition is not only a question of techniques, but also social, cultural, institutional, political and economic issues. However, at least two perspectives remain work-in-progress: the valuation of agroecology, and its scaling at different geographical levels. Locally-based governance could be based on: (i) the construction of stronger and more coherent links between agroecosystems and agri-food systems; (ii) the reinforcement of local socio-technical networks; (iii) open and participative processes of learning and innovation, (CESE, 2016).

STÉPHANE BELLON

Member of the Scientific Council of the Alpilles PNR Ecodevelopment, INRA-SAD, Avignon 84914, France (email: stephane.bellon@inra.fr)

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AGROECOLOGICAL INFRASTRUCTURE

Fragilized natural and cultivated areas

The richness of the Alpilles ecology and landscapes is mainly due to the both subtle and unusual assembly of various natural habitats, from cliffs in the foothills through areas of marshes and plains, with dynamic agricultural areas yielding high-quality produce.

With more than 1300 farms, local agriculture crafts the landscapes through its broad diversity of produce combined with various sizes of plots, depending on the sectors concerned, often bordered by hedges. These landscape features, together with farming practices such as soil management and temporary or permanent ground cover are directly linked to the conservation of biodiversity.

In this landscape matrix, hedgerows play an essential role in the ecological equilibrium at the scale of both the agrosystems themselves and their surrounding natural habitats. They maintain an indispensable link between the two types of ecosystems.



Eurasian Scops Owl © J. Blondel



Dartford Warbler © A. Audevard

Inform and act

With the desire to optimise the link between human activities and the maintenance of biodiversity, the LIFE des Alpilles project carried out several actions to raise farmers' awareness of the multiple roles of agroecological infrastructure (AEI), and thus improve the ecological attractiveness of agrosystems:

- the dissemination and putting into practice of management methods for ground cover in perennial crops to increase carrying capacity for beneficial organisms,
- experience-sharing days on the subjects of ground cover in perennial crops and the role of trees in crop growing,
- the planting of more than 6.5 km of layered, multi-species hedgerows on 17 properties in the Alpilles.

After the Second World War, rural land consolidation resulted in a considerable reduction in the number of hedgerows in France. The trend was the same in the Alpilles, with an estimated loss of nearly 30% since the mid-twentieth century. In that post-war context, where the modernisation of agriculture was seen simply as a race for higher yields, the agronomic and ecological roles of hedges were forgotten.

Yet these agroecological infrastructures can harbour numerous plant and animal species, including highly beneficial ones for crops, on condition that they provide a broad enough variety of ecological niches. Their multiple roles in the natural regulation of crop pests, and also in soil protection (reduction of erosion, windbreaks ...), the infiltration of water etc. are widely accepted by the scientific community. It is therefore indispensable to raise farmers' awareness of these various factors.

Increasing the ecological attractiveness of agrosystems

The conservation of these features at the scale of several farms, and therefore a multitude of plots, ensures hosting capacity for a wide range of birds. Each species has its own requirements in terms of habitat, nesting (on the ground, in bushes, in holes, in high branches) and feeding (on the ground, in flight, on the tree trunk, in the branches, amongst the twigs ...). The primary aim is to maintain existing infrastructures, then secondly to create new ones so as to increase the ecological attractiveness of the agrosystems concerned.

Around the plot:

- **The living hedge:** not only a very important nesting site for many bird species but also used as a perch by raptors and European Roller. It acts as a corridor for bats, squirrels and hedgehogs. One kilometre of hedge is home, on average, to 50 birds belonging to between 20 and 40 different species. A network of linked hedges helps increase the biological wealth of the area.

“A complex ecological system is more effective for combatting pests and also more resilient (it returns more quickly to its initial state after being disturbed)”.

MICHEL JAY – CTIFL

- **The grassy strip at the foot of the hedge:** a nesting site for the Woodlark and Cirl Bunting, which are ground-nesters, a corridor for the European Hedgehog, and an area where insects thrive and therefore a hunting ground for birds. It acts as a buffer zone that the farmer maintains once a year, in late summer, and should not be used as a turning area for agricultural machinery.
- **Standing dead trees or old trees with cavities:** the insect larvae living in them attract woodpeckers, which dig out galleries to extract the grubs or make their nest. These nest holes are subsequently used by many other cavity-dwelling species such as European Roller, Little Owl or some species of bats.
- **Fallen dead trees (stumps, piles of wood):** dead wood, even on the ground, produces compost and by day provides damp, dark shelter for many insects and other animals: woodlice, myriapods, spiders, amphibians, small mammals.
- **Brambles:** they provide shelter and roosting sites for many passerines, food for some birds, nesting sites for certain butterflies and refuges for reptiles.
- **Ivy:** it provides berries in the winter, permanent shelter for birds due to its evergreen foliage and finally, thanks to its late flowering, a major source of nectar for pollen-gathering insects at the onset of winter.

Functional biodiversity

Functional biodiversity is the component of biological diversity considered as "useful" because of the ecological services it provides to crops (ecosystem services). The presence of birds, bats or insects helps the farmer to work organically by controlling pests.

A study carried out in Bourgogne by the National Agronomic Research Institute and French Wine Institute has highlighted the effect of the immediate environment of agricultural plots on the abundance and species-diversity of birdlife. Crop plots close to hedges host large numbers of birds, unlike the others.

Planting hedges in the Alpilles in the framework of the LIFE project



Inside the plot:

- **Large, isolated trees inside the plot:** indispensable hunting hides for raptors and European Roller, if they have cavities they also serve as nesting sites for Little Owl, Scops Owl and European Roller.
- **Dry stone walling, sheds and other small buildings:** nesting sites for Little Owl, House and Tree Sparrows, and Black Redstart. They are also thermoregulation sites and lairs for emblematic reptiles such as the Ocellated Lizard.
- **Strips of ground-cover:** a soil with ground cover and good mowing management gives a range of vegetation heights, hosting a wide diversity of insects. Ground cover includes inter-rows between perennial crops and strips of flowering plant cover in cereal-growing plots.

All these features contribute to the variety of landscapes and available ecological niches. They therefore help to increase the biodiversity of agro-systems.



European Roller
© A Rocha



"I did various training days in the framework of the LIFE project, in particular on bird habitats and agroforestry. To date, the measures put in place in my plots inside the Park are as follows:

- maintenance of scattered trees (spontaneous Holm Oak saplings) in the plots;
- maintenance of spontaneous plant cover on the embankments;
- listing of the plots as an LPO site.

I'm looking into a major hedge planting project (6 km of hedgerows) in the plots situated in the commune of Maillane. The hedges will also be planted to preserve the hunting ground of the large raptors of the Alpilles. »

HENRI DE PAZZIS, farmer

RECAP:

- Conserve or foster a patchwork of habitats.
- Avoid disturbing these natural habitats (hedges, strips of ground cover, brambles) from March to July, the main period of activity for wildlife.
- Conserve large old trees and dead trees, whether standing or fallen, both around and inside the plot.
- Conserve a grassy strip between the foot of the hedge and the crop (in addition to the turning area).
- Include strips of plant ground cover in perennial crops and in annual crops (green manure, honey-producing plants).
- Remember to place a substitute nest box if a building or old tree with cavities needs to be removed.

PLANT-COVER IN PERENNIAL CROPS: AGRONOMIC AND ECOLOGICAL CHALLENGES

In the Alpilles, the practice of plant ground-cover has developed in various ways, in function of the produce concerned and the technical choices made by the farmers. Plant cover is generally natural and spontaneous. It can either be regularly mown and left on the ground or destroyed by shallow working of the soil. These are alternative practices to chemical weed control.

In orchards

It's a widespread practice, although chemical weed control is commonly used. The aim is to manage, on the one hand competition between spontaneous plants and the fruit trees, and on the other hand access to the orchard for various operations (pruning, treatments, fertilisation, harvesting etc.)

The agroecological practices concerned are:

- maintenance of the planting row, generally by tilling the soil;
- mowing (by shredding) and grazing (periods of sheep grazing) in the inter-rows.

The challenge is to reduce the number of mowing operations so that the plant cover can fully play its role from both an agronomic and an ecological point of view (see below).

In olive production

Permanent plant cover is an averagely widespread practice. It is more common in winter than summer due to competition with the trees for water.



The advantages of plant cover

Agronomic virtues

- Stimulates the biological activity of soils and improves their fertility.
- Protects soils from erosion and also high temperatures.
- Uses the spontaneous flora to indicate any deficiency or excess of mineral elements in the plots (principle of bio-indicator plants) and enables the technical regime to be adapted accordingly.
- Favours the penetration of rainwater.
- Improves the structural stability of soils: porosity, permeability ...
- Improves the carrying capacity of soils.
- Makes the roots of trees and vine stocks go deeper (feeding with minerals and water).
- Increases levels of organic matter.

Ecological virtues

- Reduces or even eliminates herbicide treatments.
- Maintains ecological continuities.
- Favours the presence and development of beneficial arthropods such as ground beetles, other beetles, spiders, grasshoppers, etc. which combat pests biologically and thus limit the use of phytosanitary treatments.
- Provides food resources for macro-insectivorous birds

“The diversity of vegetation layers (in the orchards) shelters various insects and spiders with different periods of activity. This ensures that the aphids are combatted in different seasons.”

MICHEL JAY – CTIFL

Bonus for birdlife

Principal bird species whose presence is favoured by ecologically managed plant cover practices: Woodlark, European Roller, Lesser Kestrel and many passerines, especially in winter.

The creation of refuge areas for wildlife through differentiated mowing management enriches biodiversity; for example: colubrids, lizards and vipers - the exclusive prey of the Short-toed Snake Eagle – or Red-legged Partridge and European Rabbit – the staple diet of Bonelli's Eagle.

The agroecological practices concerned are:

→ **Maintenance by shredding**, in function of plant height, leaving the shredded plants on the ground. Can be complemented by one or two rounds of sheep grazing.

→ **Deep and shallow tilling of the soil**, often together with the incorporation of olive waste and shredded pruning trimmings.

The difficulty is to reconcile the development of plant cover and the provision of organic fertilisation, which is highly important for olive production.

In vineyards

Inter-row plant cover is a relatively uncommon practice among vine growers whose land is situated on dry hillsides. It is often natural, spontaneous and allowed in winter to limit the risks of erosion and leaching of nitrates.

Plant cover can be managed by mowing or even sheep grazing in two key periods: before the vines' vegetative rest phase and before budding. The aim is to show the interest of managing plant cover in combination with the global maintenance of the vineyard so as to ensure high- quality production.





MAINTENANCE OF PLANTING ROWS IN IRRIGATED ORCHARDS

TESTIMONY OF

Thierry Auzas

15 ha of apple and pear orchards in Orgon



I had the opportunity to be equipped with hydraulic discs in 2005. For 3 or 4 years I mechanically maintained rows prior to being committed to organic farming in 2009.

Going back to methods historically used on the farm, I was better able to deal with ivy growing on the strip using my 4 or 5 discs while maintaining the mound on the planting line for gravity fed irrigation. I earth up once during the season and disk twice a year. The intensity of the work was built up progressively ●●●

Principles and objectives

- Reduce use of herbicides.
- Limit weed competition, particularly perennials with regard to tree nutrition (water and nitrogen).
- Enhance the ventilating of the bottom of trees (fungal risk reduction).
- Facilitate the control of voles (easier predation, disruption of colonies, etc.).

“With my orchards managed in compliance with the Integrated Fruit Protection scheme, I wanted to improve the control of perennial weeds by tilling”

THIERRY AUZAS



Bonelli's eagle

... (angling of the discs and depth of tilling) in the beginning to preserve the shallow root system.

Concerning the limitations encountered, the size of my tractor (40 HP) was not a constraint in terms of power nor was the row spacing: I work in the pear orchards with a 2.80-meter row spacing. However, I have to be careful about not hitting anything with all the pipes around the hydraulic power system. So, this slows the forward speed and I only work one side at a time.

Forward speed also depends on the planting distance in the row. Under 1.20 meters, you need to slow down considerably.

Generally speaking, the tree base is never perfectly cleared.

The sensor which works the hydraulic return mechanism is also triggered by touching well developed plants (goosefoot, sorghum). Manual control should be used so as not to miss these plants.

We do likewise for the maintenance of new orchards to limit the risk of damaging young trees. We use manual control to avoid hitting the tree trunks.

Overrun orchard with competition from plant cover along the planting row on Serge Avy's farm (photo taken in winter)



TESTIMONY OF

Serge Avy

200 ha of apple and stone-fruit trees in Maussane and Cavaillon

While we historically abandoned mechanical maintenance of rows in favour of chemical weeding (1 sprout inhibitor-foliar application combination once a year in May) for well-known reasons including easy implementation and shorter work time, the first conversion to organic farming practices, initiated in 2017, has brought us back to using disc blades on front-end loaders! In an established apple orchard, the "Sandwich method" was implemented, with disking 2 times consecutively on both sides of the trees, followed by mowing in the rows in season using an offset tool.



Together with drip irrigation, shade and competing established orchards have contributed to controlling ground cover, except in the planting row, where weeds grow up to the lower branches. This could possibly impede the circulation of air and light for the bottom part of the trees. In grafted orchards this spring I tilled 6 times. The light which reaches the soil contributes significantly to weed growth. In this case, I even had to use 3 different tools: a hydraulic non-reversible plough, disc blades and an offset mower, without being satisfied with the result. Due to the presence of goosefoot, fleabane, various grasses and even perennials I was obliged to have some manual clearing too. In addition, it turns out the equipment available to me today cannot be used in peach and apricot orchards in the Crau. The stoniness of the land impedes mowing and the planting rows (high mounds) lead to excessively sharp differences in height.

RECAP :

Various techniques can be used to maintain the planting row:

- Tillage: by loosening the topsoil (brushes, cultivators ...) or more deeply (non-reversible plough), we pull out the roots of the weeds which dry up and die. This type of maintenance is favoured when there's a mound to be upkeep.
- Destruction of ground cover using tools to mechanically kill the weeds.
- Mowing grass cover with an offset mower limits the height of the herbaceous layer without destroying it, enabling the possibility of maintaining plant cover over the entire surface area-
- Often labour intensive.
- Considerable investment in equipment for large orchards with the acquisition of high-performance tools to reduce work time.



REDUCE MOWING IN IRRIGATED ORCHARDS

TESTIMONY OF:

Thierry Auzas

15 ha of apple and pear orchards in Orgon

Principles and objectives

- Stop the use of synthetic herbicides.
- Decrease the impact of mowing between rows.
- Improve the health status of the orchard and potential production quality.
- Promote biodiversity by limiting disturbance to or destruction of favourable habitats for beneficial organisms.
- Encourage pollinators by favouring the presence of flowering herbaceous plant cover.



My Guyot pear orchard is about 50 years old and has been farmed organically since 2009. The feet of the trees are tilled, but surrounding plants persist. In terms of mowing,

before 2018 I used to do the following:

- shredding of pruning trimmings in the winter;
- close mowing of grass to reduce risk of early April frost;
- 1 or more shredding operations (depending on the climate that year) in April, May and June as soon as grass grows too high (40cm) and prevents getting around on foot
- shredding for the harvest in early July;
- autumn shredding before pruning

«I was able to halve the number of rounds and mowing operations while modifying my practices and leaving some plant cover during certain times of the year.» **THIERRY AUZAS**

“Nitrogen input can be reduced by appropriate management of plant cover.” **GILLES LIBOUREL – GRAB**

Implemented systematically over the entire plant cover surface area, these methods involve going back and forth in the rows since tools are too narrow to mow the whole row.

In the framework of the LIFE des Alpilles project, after discussions held in 2018 with technicians, I adjusted my methods:

- the low risk of frost early in the year enabled me to eliminate that mowing.
 - mowing to enable phytosanitary monitoring is limited to one round per row. An unmown strip of 0.5 to 1-metre was therefore preserved to the east of each row from March to early July.
 - in July I mowed the entire surface area for the fruit pickers' rounds
- I personally never noticed anything in particular using this method, except the presence of flowers. It saved me money because of the reduced number of mowing rounds. All you have to do is reduce mowing, which is easy enough!

The only difficulties I can see are changing people's habits and the possible hindrance of treatment penetration and air circulation if the strip of grass is very high and very thick.»

Example of an appropriate mowing regime

- Shredding of pruning trimmings every other row, second row shredded 1 month later;
- Anti-frost mowing only in function of weather forecast;
- Mowing to access trees (monitoring, thinning) every other row or maintaining an unmown strip in every row;
- Pre-harvest mow every other row 15 days before harvesting and the other row the day before harvesting.

RECAP

- “Mowing” refers to any grass cutting practice, regardless of the tool used, although the impact on wildlife increases from the trimmer to the mower, the mulcher, and the shredder. Depending on the situation;
- Combine and adjust methods:
 - keep unmown areas (every other row, 1 strip in each row, etc.)
 - put off as long as possible the first mowing in the springtime to ensure a maximum presence of beneficial organisms;
 - reduce the number of mowing operations in the year.



WINTER GRAZING IN ORCHARDS

TESTIMONY OF:

Pascal Coupard

producer of organic pears and apples in Orgon, with 12 ha of orchards
- 10 ha of pear orchards and 2 ha of apple orchards.

Principles and objectives

- Traditional practice in Provence, but not very common in the Alpilles.
- The orchards provide a free source of food to sheep in exchange for "ecologically" weeding and cleansing the orchards.
- Grazing significantly reduces the number of rounds of mechanical work required in the orchards, with just 1 or 2 mowing rounds
- Phytosanitary treatments (particularly herbicides) are reduced.

« On a 4-ha plot of organically farmed pear trees, ivy has become problematic, sometimes reaching the tops of the trees. To such an extent that the only organic farming solution for me was to eliminate the ivy using pruning shears and sometimes even a power saw!

Through the LIFE programme, the Alpilles park project manager suggested trying a flock of sheep to help me with my ivy problem. At first coordinating with the shepherd was complicated. He was expected to come in December 2016 and didn't come until March 2017. This delay really disturbed my schedule since as long as the flock hadn't come I couldn't shred the pruning trimmings (that would also have shredded the grass which would be of no interest for the sheep). Furthermore, the shepherd was at the end of his rounds in the area and the sheep only stayed a couple days, which wasn't enough to sufficiently get rid of the ivy.

The following winter I came to an agreement with another shepherd, who came from the Var due to the drought. This was a much more successful experience. He came by in December and stayed longer on the land. This time the sheep ate much more ivy. In addition, I got a rotary hoe and I did a good job clearing around the feet of the trees. All in all, today I am finally countering the ivy issue! »

"The sheep mow the grass and help me contain the ivy without any inputs. This means fewer rounds using tools, less pollution and less soil compaction." PASCAL COUPARD

RECAP

- Grazing periods for sheep:
 - during vegetative rest period for apple and pear trees, which are low-stem, i.e. after harvesting (end of October) and before bud burst (late February/early March);
 - throughout the year for medium or high-stem orchards, such as olive or almond groves.
- The last mowing between the rows must be sufficiently long ago for the grass to be high enough when the sheep arrive. If this condition is met and the trees are in vegetative rest, the sheep won't affect the trees.



Sheep grazing in an almond grove in winter at Mouriès les Alpilles

TESTIMONY OF:

Pierre Clerc

fruit grower, vine grower and herder in Thor (Vaucluse)

« In the old days, a herder came every winter to my orchards and vines with his flock of 200 sheep. When he retired, I bought 20 or so of his sheep to continue this practice, which I found interesting. At the time being, I have a herd of 40 animals. I put them in the apple orchards just after harvesting. The sheep then eat the fruit affected by the codling moth, grass and also scabbed leaves. They clean out the hedges, the crannies and under the trees. It would seem that there is a lower presence of codling moths, mainly on early varieties.

For the last few years I haven't been adding any extra fertilisers or soil amendments. I think that this has had a positive effect on the nutritional qualities of the fruit. It's true that the fruit are of smaller calibre, but direct selling adds value and the fruit can be kept longer. The sheep are removed from the apple trees just before bud burst. They are then introduced into my vineyards. »

“A result of the sheep grazing or the absence of applying fertilisers is that the flora has changed, and is much richer in legumes.” **PIERRE CLERC**



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PLANT COVER IN VINEYARDS A STEPPING STONE TOWARDS AGROECOLOGY

TESTIMONY OF:

Emmanuelle Milan

vine grower, Domaine Milan in Saint-Rémy-de-Provence

Principles and objectives

- Cultivated vines represent a significant reserve of food, particularly for the macro-insectivorous birds targeted by the LIFE project.
- Plant cover is a powerful tool for reaching this objective, but not the only one.
- Managing shelter for beneficial organisms around cultivated fields will have complementary effects (hedges, isolated trees).



« We have a wine estate of 22 ha. We have always worked the soil: ploughing, under and in the middle of the row with the preconceived idea that grass is in competition with vines. Whereas climatic conditions, soil erosion, the disappearance of insects and other living beings prove that this method is obsolete.

The vines suffer, yields are smaller and diseases proliferate. This issue led us to reconsider the practice of plant cover in our vines, with the objective to provide biodiversity in a monoculture system, to enrich the environment, to limit soil compaction and to give new life to our land.

We therefore put in place, firstly on 2 ha in 2014 and then the entire estate in 2015, plant cover made up of 6 to 8 species with 70% of leguminous plants including: broad beans, peas, mustard, phacelia, oats, rye, radishes, etc, a mixture we prepare ourselves. We sow this mixture with a special seed drill to sow directly into the cover crop. This means that we can sow without preparing the soil beforehand.

“We have also observed a greater presence of birds, in terms of both diversity and numbers.” **EMMANUELLE MILAN**

PLANT COVER CYCLE AT THE DOMAINE DE MILAN WINE ESTATE



NOV. DEC. JAN.

We sow directly a mixture containing 70% of legumes in the autumn.



FEB. MAR. APR.

We let the grass develop and the plants blossom, then seeds set.



MAY JUNE JUL.

It's at this time, late May, early June that we flatten the grass using a Rolofaca roller.



AUG. SEP. OCT.

Everything is incorporated into the soil after the grape harvest...



This sowing is carried out in the autumn once rains have started, in other words in November these past few years. We let the grass grow and plants blossom, then seeds set. It's at this point in late May, early June that we flatten the grass using Rolofaca roller. This mulches the soil, a mulching that decomposes slowly through summer and autumn. It's all incorporated into the soil after the grape harvest.

Advantages of this practice:

The soil is never bare. It is protected in winter by the cover crop and in the autumn by mulching; humidity is maintained in the soil which is essential for the proper functioning of microbial life;

The soil itself is cooler and the vine is better off, especially in periods of high temperatures;

We have also noted better results during drought years, reflected by better yields in our vineyards.

Vine growing in the Alpilles and the practice of plant cover

- Surface area under vines: 1132 ha of which 77% are organic.
- Carried out in the foothills of the Alpilles, mainly the north eastern side and to a lesser extent the south.
- Plant cover between rows:
 - most vine growers maintain plant cover solely during the winter period to protect the soils against the risk of erosion and reduce the risk of nitrates leaching into runoff water.
 - a minority of vine growers practice permanent plant cover.



PHILIPPE POUCHIN



TECHNICAL OPINION

Philippe Pouchin

As former production manager of an 80-ha Coteaux d'Aix-en-Provence wine estate, Philippe Pouchin was confronted during the 1990s with plant cover that had been set up before he arrived. Obligated to learn to control its effects, he came to think of plant cover in vineyards as a complex system that broke with conventional practices.

« By maintaining plant cover in the inter-rows, the vine grower favours the activity of fungi, thus slowly but regularly transforming carbon as would leaf litter in a forest. The underground interactions between the vine and the plant cover enable the exchange and recycling of nutrients, and a new food balance for the vine. On the other hand, under the planting row, light tilling of the soil reinforces the development of bacteria and the rapid mineralisation that the vine needs to favour the growth of its foliage and not hinder fermentation. Managing the process involves all the stages of vine-growing. From planting to harvesting, you have to think of viticulture not as a construction, but rather as the interaction of a whole set of actions aimed at creating a "hardy and resilient" vineyard that is a better response to current preoccupations in terms of climate change. »

RECAP

For successful plant cover:

- Favour the production of large quantities of biomass, either by sowing a cover crop or by natural plant cover. The management of this biomass needs to be considered case-by-case.
- Another practice that can be chosen is to have plant cover on alternate rows but take care with machine harvesting and the difference in carrying capacity of the two systems.
- The biomass can be controlled using a rotary crusher, Rolofaca roller or equipment to bury it fitted with discs or a subsoiling plough.
- Grazing is possible, even desirable, but only in winter.
- The balk should be free from competition. Located in this area (± 80 cm), soil fertilisation will be better developed by the vines.
- Foliage should only be tied or cut off if really necessary.
- Pruning should be done to favour the movement of sap and encourage vigorous growth.

RECONCILING PLANT COVER AND ORGANIC FERTILISATION IN OLIVE GROVES

In olive tree growing, the management of plant cover in the olive groves and organic fertilisation pose certain problems for producers. That's the reason for the experiments carried out on two olive growers' farms, organised and monitored by agroecologist and technical consultant Karim Riman together with TERO, a consultancy specialising in agroecology.

Principles and objectives

- Control plant cover to avoid penalising olive production.
- Activate the life of the soil.
- Ensure better mineralisation of organic matter to favour tree growth and fruiting.

Description of the experiments

The study concerned:

- on the one hand a comparison between 100 % organic fertilisation and 100% mineral fertilisation, accompanied by differentiated management of plant cover;
- on the other hand improved irrigation, ensuring better distribution of water inputs: the tree is encircled by a drip hose with low-flow drip emitters placed at least 50 cm from the bole, instead of having two high-flow emitters (more than 10 litres/hour) at the roots of the tree.

The experiment set up on Jean-Benoît Hugues' farm in Mourières:

On one whole plot: competition from grass and weeds is reduced at the start of the season by disking both sides of the tree in December (after the harvest), keeping about 50 cm from the bole of the tree to avoid damaging the main roots. This area stays tilled until late June or July, stage I2 (fruit 8-10 mm in diameter). Organic fertilisation applied.

On a neighbouring plot: plant cover is left on the planting rows and inter-rows and the plot is not tilled but grazed by sheep, which leave in early May at the latest. If necessary, the shredder is used before harvesting. Mineral fertilisation applied.



FEEDBACK:

Jean-Benoît Hugues,

olive grower in Les Baux-de-Provence, 45 hectares of Baux-de-Provence valley
Protected Designation of Origin (PDO) olive groves and 65 hectares in the Crau plain



CATHERINE & JEAN-BENOÎT HUGUES

"We're going to develop this practice everywhere, including our olive groves that are conventionally farmed."

JEAN-BENOÎT HUGUES



During conversion to organic farming total plant cover was the easiest solution to manage. But the result observed was a lower yield and less growth of the olive branches in spring. This led us to have doubts about organic fertilisation, and indeed organic farming in general, and to start de-converting part of the estate. Hence the idea of this experiment to assess conditions for maintaining plant cover with organic fertilisation.

Here are my conclusions:

• Advantages and constraints of this practice:

I spent more time tilling the soil compared to total plant cover, which was previously trimmed by sheep and had to resort more often to mechanical shredding instead (2 rounds in 2017, more like 3 or 4 in 2018).

Change of watering method: the use of more drip emitters was an investment, but the new method (irrigation all around the tree) had a clear effect on tree growth and the size of the olives in 2017, which was a particularly dry year.

• Observations and results obtained

Measurement of the nitric nitrogen in the soil revealed:

- better assimilation of the organic nitrogen at the end of the winter
- a very clear difference between the two 2 zones, the tilled one and the one with plant cover, which gave a better understanding of the competition exerted by the plants on the nutrition of the tree at the start of the season.
- growth of branches: no difference compared to the plot fed with mineral fertiliser.
- I also observed good branch growth as early as April 2017, preparing a good harvest for 2018; the same thing in spring 2018, preparing for the 2019 harvest.
- yields in 2017 were much higher than in previous years.
- the differential between the 100% organically manured test plot and the plot fed with mineral fertiliser was less than 10%.

• Jean-Benoît Hugues' perspectives:

Working with organic products and managing plots with partial plant cover are now prerequisites for our production system. We still have to work on the regularity of the olive trees' production: that will inevitably involve perfecting the pruning method."





TESTIMONY OF

Philippe et Sylvie Manassero

olive growers in Mouries

« The grove was converted to organic farming with a strategy of total plant cover for practical reasons, easy mowing and not having to deal with the Crau pebbles. The drip irrigation system (double hose) was buried. Fertilisation was organic, using pellets. We observed the same things as on Jean-Benoit Hugues' farm: less vigorous growth of the trees and a loss of yield, and asked ourselves whether to go back to chemical weed control and using synthetic fertilisers. In addition, analysis of the soil showed it to be very rich in organic matter and mineral elements, captured first and foremost by the plant cover and therefore of little benefit to the tree. The change we made: tilling the soil to a depth of 15-20 cm right under the trees after harvesting using a rotary power harrow (Renieri brand) highly suited to stony soils, enabling us to limit weeds (especially perennial plants like ivy and brambles) and work in the organic product. Plus a complementary disking or tine harrowing. »

The result is beyond doubt three years after setting up this practice: a significant increase in the production and growth of the trees despite a very dry year in 2017.

PHILIPPE MANASSERO

RECAP

- These practices are suitable for the Mediterranean climate and shallow soils that tend to dry out:
- tilling of the planting rows and partial tilling of the inter-rows from the end of the winter until late June to early July.
 - maintenance of functional biodiversity ensured by plant cover in the inter-rows and over the whole plot from July to February.
 - a changed arrangement of the drip emitters for better watering of the root mass.



MANAGE THE IMPACT OF PESTS **WITHOUT PESTICIDES**

In fruit tree growing, the impact of certain pests like Codling Moth on apples and pears, or the Olive Fruit Fly leads to a sometimes substantial use of pesticides.

A bonus for wildlife...

- Spraying clay on olive trees while reducing the use of insecticides against Olive Fruit Flies, is also beneficial for maintaining populations of Orthoptera (grasshoppers, crickets, etc.), butterflies and moths, beetles (scarabs and chafers), spiders and lizards.
- Reducing treatments is also beneficial for birds including Bonelli's Eagle, Woodlark, European Roller, Lesser Kestrel, Scops Owl, Dartford Warbler and Tawny Pipit

Increasing numbers of farmers using alternative methods to limit the use of phytosanitary treatments. In addition to their recognised effectiveness today, these methods preserve the environment and particularly wild wildlife. The use of chemical products in apple orchards has a direct impact on the biological richness of the land plots. Birds are pertinent biological indicators used to study the environmental impact of farming practices.

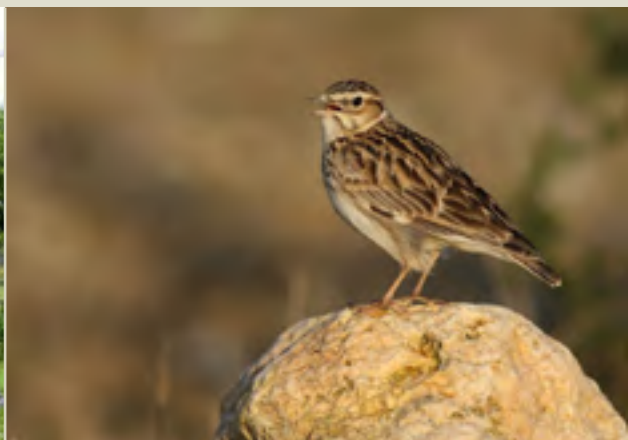
Some examples of alternative practices to phytosanitary products include:

- spraying white clay against Pear Psylla and Olive Fruit Fly (see page 35);
- sexual confusion, applied to apple and pear trees against Codling Moth and Oriental Fruit Moth;
- placing wavy cardboard strips to trap Codling Moth Larvae;
- controlling Red Mites, either naturally regulated by the spontaneous development of predator mites or by releasing beneficial organisms;
- setting up nest boxes to promote the presence of macro-insectivorous birds and bats (see next page).

The number of bird species and their abundance are clearly higher in organically farmed orchards than in conventionally grown orchards.

(Bouvier et al. Environ Toxicol&Chem, 2011)

Woodlark © D. Ledan





SETTING UP NEST BOXES IN ORCHARDS

TESTIMONY OF:

Jean Luc Valentini,

fruit grower in the Drôme, 15 ha of peach, apricot and cherry trees, the latter two organically grown.

« I started setting up my first nest boxes in 2015, when I was dealing with Skin Budworm in a peach orchard. So I set up a series of nest boxes on the edge of my orchard. From the very first year, tits came and the results were amazing! I was really lucky since I was able to see quick results with a nearly 80% nesting box occupancy rate and the disappearance of budworms. Today thanks to the intervention of Agribiodrôme, I have about 60 nest boxes for tits set up on the edge of the orchards and in the middle of the trees. We chose to use simple and easy to set up nest boxes, based more or less on the model already set up in nearby research centres (CTIFL, INRA Gothenon, TAB Platform) with the objective of making the greatest number at the lowest cost: a couple planks of woods and some tubes and off we go. »

Principles et objectifs

- Reduce phytosanitary treatments by setting up nest boxes to promote the presence of beneficial organisms (tits and bats).
- Adapt nest boxes to farming conditions (resistance, ease of mounting, monitoring and upkeep).
- Ensure technical monitoring for upkeep and feedback.



Great Tit in a peach orchard with a high density nest boxes



«Setting up perches and nesting boxes in agrosystems can be complementary to the long term managing and restoring of habitats to accommodate a functional biodiversity. For example, a tit prospect 1100 trees a day and 95% of the prey it feeds on is made up of caterpillars. Certain raptors feed on voles, such as the Eagle-Owl, Barn Owl and Kestrel.»

MICHEL JAY – CTIFL

TESTIMONY OF:

Brice le Maire,

project leader within Agribiodrôme



With the launching of Ecophyto 2 and the motivation of fruit tree growers, Agribiodrôme is working on reducing treatments while seeking increased agroecosystem functions. Further to experiments demonstrating the potential of beneficial organisms, Agribiodrôme has already built and set up 3000 nest boxes. I have just finished the second season of occupancy readings on 1600 nest boxes and shelters I progressively set up (high density -on average 10 nest boxes for tits + 10 bat shelters per hectare) over the last 3 years in orchards and since 2018 in vineyards.

The results are very encouraging with an occupancy rate varying between 40 and 100 % depending on the plot. It's much more than I thought. Ecosystems really respond to the nest boxes being set up, even in "commercial" orchards. ».

“In setting up 3 couples of tits per hectare, you can see a 23% reduction on average in Red Budworm and apple tree Codling Moths.” **BRICE LEMAIRE**

RECAP

In order for the setting up nest boxes on farming plots to become a common and effective practice you need to:

1. Get nest boxes adapted to farming conditions: inexpensive, easy to install and to monitor.
2. High density installations to have maximum occupation potential, i.e. 10 nest boxes/shelters per ha (if point 1 is followed, it's not a real obstacle).
3. Make sure to monitor occupancy rate once a year to get a return on investment (it's occupied = it works).
4. Mounting precautions: for tit nest boxes, mount 1 meter minimum from the ground. Orientation isn't so important if mounting is done in a tree in the orchard. For bat shelters, mount on a pole if possible, unobstructed, at least 2 meters minimum the ground. Several shelters on the pole facing different directions.

SPRAYING CLAY TO COMBAT OLIVE FRUIT FLIES

TESTIMONY OF:

Jean-Benoît Hugues,

olive grower in Baux-de-Provence, 45 hectares in Baux-de-Provence valley Protected Designation of Origin (PDO) and 65 hectares in the Crau plain.

« Taking into account the evolving demands of clients, we must not only produce Baux-de-Provence valley PDO olive oil, but it must also be certified organic. I can imagine that considering the level of quality of our product, the organic label will be essential in a couple years. Given the breeding capacity of the Olive Fruit Fly, I think it's difficult to find a natural predator, present at the right time to counter the harmful effects of this parasite on the final end product (olive oil).

I've thus been working these last 12 years on developing an alternative in the form of spraying clay over the entire tree. It consists in applying a fine mist of clay, without any trickling, in view of covering the leaves and the fruit. The physical barrier is interesting since it can be applied proactively using "standard" tools. As such, We adapted a sprayer to obtain a powerful, laminar flow.

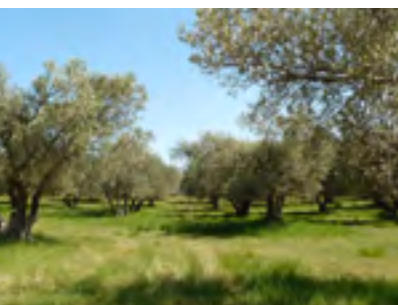
Concerning the implementation of the clay, I had to admit that this work is somewhat like a painter's (!): careful spraying, without any wind with considerable quantities of water to really cover the olive tree's surface area. Provided that leaching by rain, wind erosion and the development of the fruit are compensated by repeated applications, efficiency is comparable to synthetic insecticides. Probably spraying tools will improve to make applying the clay easier. We'll find natural products to increase the clay's adhesion to the olive skin (surfactants).».

Principles and objectives:

- Alternative to chemical pest control.
- Create physical barriers to prevent damage to the olives.
- Cause visual confusion for the pest and disturb its movements.
- Keep covered in the summer, during the females' active period.

"This is the best there is at the moment in terms of effectiveness, while preserving the environment."

JEAN-BENOÎT HUGUES





In the Alpilles

→ In the mid-2000s, numerous producers initiated the conversion of their orchards to organic farming and adopted the clay technique to protect against fly contamination

Have a sprayer adapted to olive growing

In 2014, the Alpilles olive trees were particularly affected by the Olive Fruit Fly. Based on LIFE financing, a clay sprayer was developed and adapted to provide optimal preventive treatment in olive groves against this pest. Through an agreement with RNP, the Les Baux Valley Professional Olive-growers Group (GOPVB) ensures the operating and the maintaining of this machine.

This specially designed prototype for use by olive growers, has specific techniques to fine-tune the application of the clay. The localisation of clay on the fruit is optimised depending on the vegetative stage of development in view of avoiding spray drift into the atmosphere while remaining effective with maximum treatment performance. The machine's manufacturer, the company HERVE et Mauricio, presented the machine to the public during the Park's festival in 2015 and at the Provence agricultural trade fair in 2018. Numerous demonstrations with farmers were presented over the years in connection with the GOPVB and the Les Baux Valley Professional Olive-growers Group (SIOVB)



RECAP

Positive points:

- effective protection including from dalmanellosis (this control technique prevents the olives being bitten);
- technical ease of product spraying: constantly protect the olives starting from their receptive period up to the harvest;
- product is not harmful for the sprayer;
- improved resistance of the tree to heat and hydric stress due to a reflective layer.

Limiting factors:

- mastering the treatment (in terms of spraying technique), a key point for method effectiveness;
- high cost, particularly for lower pest pressure years, when strictly preventive protection must still be maintained;
- the need to respray in the event of rain which washes off the clay;
- the technique is not lethal and just “pushes” the pests somewhere else.

Trapping the flies: a complementary practice

Protecting against olive fruit fly damage is based on monitoring pest dynamics. Over the past years, the SIOVB, in partnership with the Centre Technique de l'Olivier (the technical centre for olive trees), has been monitoring a surveillance network of Olive Fruit Fly populations in the Alpilles.

Pheromone traps are placed in about 15 plots throughout the area.

Readings are carried out twice a week to monitor the evolution of flights and alert olive growers on the potential of pests. This tool helps producers decide whether to renew protection in their groves.



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REDUCING THE USE OF HERBICIDES IN CEREAL GROWING AND MAINTAINING A LIVING SOIL

Cereal production in the Alpilles, is closely associated with fodder crop and oil protein plant production. On numerous farms this production is accompanied by keeping livestock: cattle, sheep or horses. In this case, one of the objectives sought by the farmer is the herd's self-sufficiency in food.

The presence of animals further diversifies crop rotations with temporary meadows and also cereal and protein crops for self-use. Crop rotations reduce the pressure from bio-aggressors by creating a break in the biological cycle of fungi, pests and weeds and thus limits the use of phytosanitary treatments. Some farmers are starting to abandon ploughing in favour of direct sowing.

Stopping tillage combined with permanent ground cover offers the advantage of activating soil life, improving fertility while protecting against the often hostile climate of the Alpilles (heat, drought, sometimes torrential rains, erosion, etc.).

However, farmers often resort to herbicides however to weaken the plant cover in which wheat is sown. The whole challenge is to reduce as much as possible or to eliminate the use of chemical weed killers.

There are about 1000 ha of cereals grown in the Alpilles.

Les avantages des couverts végétaux

Agronomic assets:

- increases the biological activity of the soil;
- improves soil structure;
- limits inputs because of the natural increase in fertility;
- ensures higher usable reserves by increasing water infiltration due to soil porosity linked to the root system; limiting erosion, etc.

Ecological advantages:

- provides food and shelter for rich and diverse insect life (the prey of numerous bird species);
- complementary to restoring and maintaining a network of rural hedgerows, including strips of plant cover in cereal fields, placing of perches for raptors etc.

Bonus for birdlife

- The reduction in phytosanitary treatments is favourable to birdlife: Lesser Kestrel, Woodlark, Tawny Pipit, Little Bustard...



DIRECT SOWING INTO PLANT COVER COMBINED WITH LIVESTOCK FARMING

TESTIMONY OF

Laurent Tramier,

300 ha of sheep farming and cereal growing without irrigation
in Saint-Rémy-de-Provence.

« Wanting to reduce surface stoniness, I switched to mulch sowing, then to direct sowing, that's to say a system that does away with all tillage of the soil. In the beginning I used a dead plant cover system. In other words, before planting wheat, I completely destroyed the Alfalfa cover. Today I don't completely destroy it but weaken it to keep it living in the wheat. Today, I use much less glyphosate (1.5l/ ha on average against 7-8l for dead grass cover), combined with graminicides at the end of winter.

The advantage of this system is always keeping the soil covered retains humidity and limits erosion. In addition, the Alfalfa grows back after the wheat harvest. I can therefore harvest the seeds in September or have my sheep graze there in autumn. This has also allowed me to save money on nitrogen, excluding the first application.

There is a definite advantage to livestock farming: in addition to the added value of the Alfalfa regrowth after the reaping the wheat, it is also useful for cleaning the land plots in which there is high Ray Grass pressure and thus greatly reduces the use of herbicides. In the future I would like to continue these practices and try White Dwarf Clover cover combined with wheat at the time of sowing in plots where I don't have any living cover yet, without having to use herbicides in the spring. »

Principles and objectives:

- Reduce use of herbicides.
- Promote fertility of cultivated land.
- Protect against erosion and strong sunshine in Mediterranean regions.
- Optimum soil cover without tillage.
- Sow directly in living Alfalfa crop cover.
- Sustain life in the soil, which often lacks organic matter in Provence.

“Sowing directly into living crop cover, with its better resilience to hydric stress has produced an average increase in my yields of 20% and a decrease in my fuel consumption.” **LAURENT TRAMIER**



Little Bustard
© S. Baudouin

TECHNICAL OPINION

Mathieu Marguerie,

Agribio 04

« The techniques of sowing directly into ground cover are among those practices that are difficult to master but have shown their robustness under Mediterranean conditions, particularly in systems without irrigation. In organic farming, the practice of sowing directly into ground cover is constrained by the lack of means of regulating the ground cover in place.

Wheat is rarely sown in a standing Alfalfa cover crop, unless you accept a loss of yield due to competition for water between the cover and the primary crop. The perennial leguminous plant is therefore regulated by repeated disking or scalping before sowing the cereal. The aim of recent work by Arvalis in southwest France was to regulate an Alfalfa cover in which a very widely spaced (30 cm) wheat crop had been sown using GPS-guided mowing equipment.»

RECAP

- Practice that provides permanent ground cover, without ploughing.
- System that provides good resistance to hydric stress.
- Difficult technique to master.
- Technique limited in application for organic, non-frost-sensitive systems in the current state of knowledge and practice.

MANAGING GROUND COVER WITHOUT HERBICIDES OR PLOUGHING

TESTIMONY OF:

Gilles de Becdelièvre

manager of the Mas Saint-Ange in Eyguières, 200 ha of cereal crops, including 150 without irrigation.

« I run my farm using direct sowing, so without ploughing the soil. Up to now, the vast majority of the destruction of my cover crops was done using herbicides, in particular glyphosate. This enables me not to disturb the structure of the soil with mechanical tilling. However, in the framework of the LIFE project, I tried out mechanical destruction without ploughing, but disking instead, comparing it to a control using glyphosate.

I did the test in February 2018 on a ground cover sown in late August 2017 based on a mixture of annual plants: Radish, Fenugreek, Phacelia and Niger seed. Destruction by disking at a depth of 5-10 cm is quite effective on the cover species, but they need to be clean and therefore growing well. It's tricky to mechanically destroy – using disks or rollers – certain rampant or deeply rooted weeds present in the cover.

So, for mechanical destruction to work, the cover needs to be well developed, which is not easy in a very dry Provençal climate, with moreover systems of limited access to irrigation. In addition, to reduce weed pressure I'm intending to reintroduce Alfalfa or Sainfoin into my rotation. That will enable me to manage them as semi-permanent covers that I won't completely destroy before sowing a wheat crop so as to leave them "alive" amongst the cereal. »

Principles and objectives

- Sow cover plants in crop rotations to protect and feed the soil.
- Destroy these covers without herbicides or ploughing.
- Increase soil fertility.
- Combat erosion.
- Enhance the life of the soil.
- Maintain or increase levels of organic matter





“Perennial cover plants are more drought-resistant because they are better established, and I don’t have to re-sow them every year in complicated climatic situations”.

TECHNICAL OPINION:

Mathieu Marguerie,

Agribio 04



The examples obtained in the region by studying famers’ practices or performing experiments show that mastering the destruction of cover plants without herbicide or ploughing depends on successfully growing of the cover (few or no weeds) and successively using sometimes complementary equipment (rollers, discs, scalpels). Succeeding in destroying cover plants without tilling the soil or herbicide remains very tricky. Shredding or rolling could be possible for some types of cover with sufficiently developed growth habit.

The destruction of covers infested by weeds often involves the repeated use of different equipment, with no guarantee of results. In the absence of herbicides, it can sometimes prove necessary to go back to the plough. Some farmers are turning towards “semi-permanent ground cover” systems (Sainfoin or Alfalfa) that involve leaving the cover alive in the next crop. (see p. 39). »



“To succeed in these practices, it is therefore indispensable to consider both the selection of cover plants suited to your context and equipment that will enable efficient mechanical destruction.”

RECAP

- Practice requiring well established cover plants for successful mechanical destruction.
- For successful cover plants, crops first need to be rotated to limit weed pressure
- Annual cover plants are unreliable irrigation.
- Some farmers are therefore turning towards semi-permanent ground cover

GROWING CEREALS ORGANICALLY ENHANCING BIODIVERSITY

TESTIMONY OF:

Henri de Pazzis,

wheat grower in Saint-Rémy-de-Provence. 40 ha of land in Maillane in the plain and 3.5 ha, previously abandoned, in the hills of Saint-Rémy-de-Provence



In this former fallow land, which I've restored, I've let some oak saplings regrow, which will be useful for the birdlife, as well as leaving many trees around the plot.

As far as I'm concerned, my rotation is based on 4 years of Alfalfa followed by alternating wheat and Chick Pea crops for another four years. Like that there's a balance of interest between leguminous plants and the cereals, which require a lot of nitrogen. I plough after the Alfalfa, as shallowly as possible and avoid doing so at other times in the rotation.

I grow ancient varieties that are really interesting from the point of view of biodiversity. I started re-growing them on my farm with the aim of making bread from them afterwards. Agronomically, I've observed that though they're certainly not very productive, their yields are quite stable from one year to another, despite the climatic conditions, which can be changeable. Their stems are tall, so they can easily get knocked over, but even on the ground they're quite easy to harvest.

The Apt Miller's Wheat that I grew this year was 1m70 tall, for example. Despite the rainy spring in 2018, I didn't get much Septoria Leaf Blotch on my ancient varieties because the fungus didn't manage to reach the ear of the wheat due to the height of the stem. The appearance of ancient wheats is very attractive and different to modern varieties.

Principles and objectives

- Have a global vision of the production system going beyond simply the framework of the plots.
- Stop using herbicides: ancient varieties are less affected by weeds.
- Put organic matter back in the soil thanks to the height of the wheat straw.

"I've entered into a collaboration with the LPO (Birds Protection League): we've set up an "LPO refuge" on 4 ha of land, inside the Park. The aim is to plant hedges over the rest of the farm (some forty hectares) and make the whole thing a refuge." **HENRI DE PAZZIS**





“My aim is to preserve and develop as much as possible the biodiversity next to the plots.” **HENRI DE PAZZIS**

Varieties suited to the Provençal context

The resilience of organic cereal systems in Provence is generally characterised by a high degree of diversification in crop rotation. This provides agronomic robustness, in particular with the sowing of leguminous plants, which contribute nitrogen to the system. The growing of ancient varieties of common wheat has been precisely studied in Provence. Four years of organic farming experimentation on the capacities of ancient and modern varieties to resist hydric stress revealed the agronomic behaviour on the two types of varieties. Although their yield is relatively insensitive to hydric stress, the ancient varieties remain less productive than the modern ones, even under highly stressful conditions regarding a lack of rainfall or nitrogen. On the other hand, they are richer in proteins and provide taller straw. The best way to add value to these varieties is to transform them into bread or flour, especially in the case of smaller farms.

RECAP

- Practice aimed at high resilience with regard to the Provençal climate
- System close to agroforestry at lower cost (making use of tree regrowth or the existing environment)
- Growing of ancient varieties: very specific markets, often combined with transformation on the farm or in collaboration with organic millers
- Economic development appropriate for small farms



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FURTHER READING (MAINLY IN FRENCH)

www.parc-alpilles.fr

www.life-alpilles.com

Fruit tree growing

Planting-row ground cover:

- **Guide Ecophyto Fruits – Guide pour la conception de systèmes de production fruitière économes en produits phytopharmaceutiques**, édition GIS Fruits, 2014:
- Guide méthodologique – pp 33-34
- Fiches techniques n°7, 8 et 9, pp 46 à 55

Inter-row ground cover:

- **Practical guide “Bandes fleuries vivaces – un outil pour améliorer le contrôle des ravageurs en vergers”**, n°1114, August 2018, available on request from GRAB or downloadable from: www.grab.fr.

Grazing:

- **“Des vergers, des vignobles, des brebis et des hommes”**, collection of farmers' testimonies published by Les réseaux d'élevage, December 2012, at: idele.fr
- **“Le pâturage en verger”**, reference booklet s published by the IRAEE (Inter-Network Agriculture-Environment-Energy, in Provence-Alpes-Côte d'Azur), 2017, at: www.jediagnostiquemaferme.com
- **“Gestion de l'herbe et pâturage ovin en verger de prunier”**, Alexandre Laflotte, AREFE (East France Regional Fruit-growing Experimentation Association), 2015.
- **DÉPASSE project: “Développement des cultures Pérennes ASSociées à l'Élevage”**, contact: Bio de PACA annelaure.dossin@bio-provence.org
- **ARBELE l'ARBré dans les exploitations d'ÉLEVage herbivore**, CASDAR programme, 2014-2018 www.agrooof.net, keywords: élevage, arbrèle
- **Pâturage des cultures pérennes**, at OSAÉ, the agroecology website: osez-agroecologie.org

Vine-growing

- **“L'enherbement permanent de la vigne”**, fact file, French Wine and Vine Institute, at: vignevin-sudouest.com/publications
- **“Favoriser la biodiversité dans ses vignes”**, technical guide at: www.biopaysdelaloire.fr
- **“Taille de la vigne, un savoir en construction”**: supagro.fr/web/UserFiles/File/supagro-florac-taille-vigne.pdf
- **“Agriculture de conservation”**: <http://agriculture-de-conservation.com/>

Olive-growing

Plant cover/fertilisation

- **L'olivier, ouvrage collectif**, CTIFL, chapter 2: aspects agronomiques
- **Fertilisation of the olive tree:**
Technical file, Afidol: <http://afidol.org/oleiculteur/fertilisation>
Technical file, Vaucluse Chamber of Agriculture: www.docdeveloppement-durable.org/file/Fertilisation-des-Terres-et-desSols/9_Ferti_oliviers.pdf
- **Olive grove plant cover:**
<http://afidol.org/oleiculteur/enherbement-du-verger>
- **Soil tilling:**
<http://afidol.org/oleiculteur/sol-enherbe-ou-travaille>.

Treatment with clay

- **Technical file, Afidol:**
http://afidol.org/wp-content/uploads/2015/03/Appliquer_une_barriere_minerale_2014.pdf

Cereal-growing

Cover crops

- **“Gestion des couverts végétaux sans herbicide en conditions méditerranéennes”**, at: www.bio-provence.org, keywords: “PEI Couverts végétaux: les expérimentations des producteurs de PACA”; technical management: Agribio 04
- **“Accompagnement du développement des techniques de semis direct et de semis direct sous couvert en condition méditerranéenne”**, CASDAR project at: <https://paca.chambresagriculture.fr>, keywords: “semis direct sous couverture végétale”; Alpes de Haute Provence Chamber of Agriculture 04 / Arvalis / Agribio 04

Wheat growing

- **“Essais de variétés modernes et anciennes de blé bio”**, at: www.bio-provence.org, keywords “essais variétés blé”; Agribio 04/ Arvalis/Luberon RNP

Agroecological Infrastructure

- For the Little Owl in the Alpilles and the region: **“Observatoire interparcs de la Chevreche d'Athena : bilan 2016”**, Olivier Hameau and Marie Rospars, Faune- Paca Publication n° 63
- **Recueil d'expériences:** www.lpo.fr/agriculture-etenvironnement
- **Guide technique biodiversité dans les vignes en pays de Loire:** www.biopaysdelaloire.f, keyword: vigne
- **Website of the Biodivine LIFE project:** www.biodivine.eu
- **“Biodiversité et régulation des ravageurs en arboriculture fruitière”**, Jean-Michel Ricard - Alain Garcin - Michel Jay - JeanFrançois Mandrin, 2012, éditions du Ctifl
- **“Nest boxes, models and setup & monitoring conditions: practical guide”** “Installation de nichoirs/abris dans ma parcelle”, Agribiodrôme. 2018.

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- **CERPAM** (Alps-Mediterranean Centre for Pastoral Studies and Projects)
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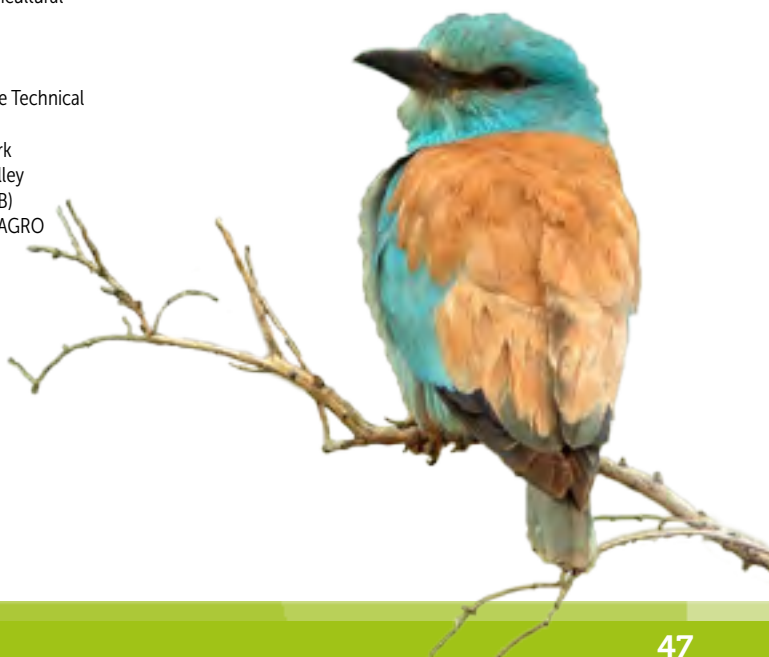
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Contacts Alpilles Regional Natural Park, 2 boulevard Marceau 13210 Saint-Rémy-des-Provence, France • +33 (0)4 90 90 44 00
www.parc-alpilles.fr • Facebook @pnralpilles • www.life-alpilles.com • life@parc-alpilles.fr • Facebook @LifeAlpilles

