

2. znanstvena konferenca z mednarodno udeležbo

**Konferenca VIVUS – s področja naravovarstva, kmetijstva, hortikulture in živilstva**

»ZNANJE IN IZKUŠNJE ZA NOVE PODJETNIŠKE PRILOŽNOSTI«

24. in 25. april 2013, Biotehniški center Naklo, Strahinj 99, Naklo, Slovenija

2nd Scientific Conference with International Participation

**Conference VIVUS – Environmentalism, Agriculture, Horticulture, Food Production and Processing**

»KNOWLEDGE AND EXPERIENCE FOR NEW ENTREPRENEURIAL OPPORTUNITIES«

24th – 25th April 2013, Biotechnical Centre Naklo, Strahinj 99, Naklo, Slovenia

## **Biodiversity as a production factor for farming, experience from southern France**

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### **Abstract**

Farming enterprises are like others affected by the financial crisis. It is sometimes difficult to cope with momentary cash deficit, while animals and land still need to be taken care off. I will present in this paper how biodiversity can be used as an opportunity for breeding cattle, by reducing financial charges and increasing income. For this, I have visited a farm located in the Montagne noire, in southern Tarn, France.

There are two aspects in the farm strategy : First, the use of abandoned lands on steep hills, formerly used when agriculture was not mechanized, before the second world war. These lands allow qualitative benefits for the cattle : foot health and treatment of parasites, as well as quantitative benefits since it saves grass resource in the regular farm meadows.

Another aspect is the use of european funds aiming to biodiversity preservation : the Natura 2000 funds, and agri-environmental measures. The cattle (horses and donkeys) are involved in the maintenance of an open land that helps biodiversity, after a mechanized treatment of bushes. The funds cover extra costs of fences, machines, and other costs.

Globally the benefit is about 1/3 of the total income in our example, which is good for farmers that are ready to work in a different way, on specific terrains. It's also an opportunity to participate to biodiversity. Curiously, lots of farmers invited to initiate new contracts did not want to take advantage of biodiversity to improve their income.

Finally, I also present shortly in this paper, an other type of opportunity : The methanation of farm waste (mainly dejections), in the same region of France.

**Key words** : biodiversity, benefits for farming, animal health, plant molecules, natura 2000, agri-environmental measures

## Introduction

Our students learn to be farmers or agricultural technicians and counselors; Therefore we are talking a lot of new opportunities in agricultural enterprises. Our speciality is agro - environment. We teach our students how to deal with new requirements and opportunities related to sustained development in agriculture.



Figure 1 : Midi-Pyrénées region in Southern France. The blue dot is the location of our school. Nearby is Castres and the Montagne Noire.  
Source: IGN geoportail.fr 2013

Environment is a source of wealthiness: To illustrate this affirmation I will introduce my presentation with the history of Pierre Fabre laboratories. Pierre Fabre was at the beginning of his career a pharmacist in Castres, a small town of Tarn. In 1959, he created cyclo 3, a phlebotonic medicine based on a dry extract of *Ruscus aculeatus*.

This astonishing little bush develops in dry woods and hills, in southern and central Europe, western Asia and northern Africa. Its rhizome has circulatory properties, it is a vasoconstrictor, giving it's reputation of the plant that gives light legs. This bush, that grows on infertile and abandoned badlands, has given mister Fabre the opportunity to develop his own pharmaceutical business.

Today Pierre Fabre laboratories employs 6700 persons in France and 3300 worldwide. The figure of affair is 931 Millions of euros in France and 988 Millions in the international. It is the third pharmaceutical group in France and one of the biggest enterprises in Midi Pyrénées apart from Airbus industries.

Could all this have happened without the fantastic biochemical and biological wealthiness of this infertile lands? Is it worth taking care off these so called "unproductive" ecosystems?



Figure 2 : General aspect of *Ruscus aculeatus* and detail of twig with flower.  
Source: wikipedia – the free encyclopedia 2013

## 1 Economical and technical problems in M. Hervé's enterprise

### 1.1 M. Hervé's enterprise

Now I will illustrate the idea of using biodiversity as an opportunity with an example in agriculture, I will talk about M. Hervé and his “pharmaceutical” grazing lands for horses and donkeys.

M Hervé's leitmotiv is to use the mechanisms of the living to increase productivity. This is a story of a modest but brilliant man that uses new opportunities in his agricultural enterprise. Let's first read this presentation of M Hervé's business on his website:

“The adventure at 6 kph with your family, with your children even toddlers, live a timeless adventure. Leave for caravan pulled by a peaceful draft horse, go hiking together with affectionate and cunning donkeys: for you, privileged stopping places, a protected countryside and all the forest of the Regional Natural reserve of High Languedoc. With friends, alone, in family, discover the magic of plants, by participating in a weekend or in a botanical hike on several days. (...) A secret country of forests and bocages, authentic meetings with people by, 50 horses and donkeys as companions of adventure.” (J-L Hervé website presentation, 2012,1)

### 1.2 Some problems hinder the enterprise results

M Hervé and his wife breed beautiful Brittany horses and donkeys for their business. Since the crisis of financial capitalism in 2008 less clients came to enjoy the peaceful services of M. Hervé's animals. But M. Hervé found a very clever solution. He knew that environment is a source of wealthiness.

Hervé 's donkeys suffered from obesity by over eating the rich grass of low lands around his farm. And in winter, the clayey ground created foot diseases. The grass was also in bad condition due to the mud and standing about from animals.

## 2 Solutions found using the “unproductive lands”

### 2.1 Historical aspects

Brothers Passebosc were breeding sheep on communal terrains: 50 Ha of meadows on steep and dry limestone hills

In the sixties, there were outraging political and fiscal encouragement for planting ugly and unproductive these places - coniferous trees instead of the dry meadows and moors.

Passebosc brothers got upset and bought the communal terrain, saving these incredibly diverse habitats for about 50 species of grass species, and all the animal (insects, birds) living exclusively here.

In the beginnig of the years 2000, the brothers were touched by the crisis. They ceased their activity, and M Hervé decided to be candidate for rental of these lands.



Figure 3 :Montagne noire - Le désert de Saint ferréol  
Source : Julien Forichon 2008

### 2.2 Animal health and meadow preservation

The donkeys needed more dry vegetation, diverse food as well as harder ground for the health of the feet

Winter was a good season to let donkeys and horses take care of the abundant vegetation on the invaded meadows. In summer, these dry hills would be totally burnt by the sun and the food very scarce.

“Use the mechanisms of the living to increase productivity” is m Hervé's idea: the donkeys started to graze on the *Ulex europaeus*, which is an abundant source of nitrogen, like other rhizobium symbiotic Fabaceae.

This Fabaceae is grazed by donkeys despite its sharp thorns. The plant is a weed in many countries like New zealand, because of its potential for colonization. However it's very

interesting for its nitrogen source.

Dry winter grass would provide cellulosis. M Hervé simply gave them three balls of hay in the winter because his wife was worried about them.

On an other part of his lands where he let the big draft horses for grazing in the moors, M Hervé saved not less than an incredible 6,5 tons of hay. And his low lands meadows could rest and avoid from being crushed by the big horses.

Biodiversity is an open air pharmacy. Furthermore, M Hervé observed the donkeys and horses did not suffer anymore from parasitism. He didn't need to give them treatments, since the meadows itself provided lots of molecules useful for the self- medication of animals.

### 2.3 Europe's agricultural measures for environment, and Natura 2000 funds

In addition to the advantages already cited, M Hervé could benefit from public money.

As a true believer of biodiversity advantages, M Hervé had since a long time started to let old trees for insects and owls, water ponds for batracians and hedges for birds and soil protection. PHAE bonus is paid to M Hervé for these “ecological surfaces”. Chemical herbicide is prohibited and fertilization is limited on these areas. M Hervé receives 75 euros / ha / year for 5 years.

The NATURA 2000 areas : Europe helps biodiversity to create wealthiness.

EU started in the years 1990 a vast program of identification of areas with high interest for biodiversity. Then environmental measures were created to preserve these sites called “natura 2000 sites” Financial bonuses were given to the land owners and the user of the land such as M Hervé.



Figure 5 : The natura 2000 areas in Montagne noire – Tarn  
Source : INPN website 2013

By chance for M Hervé, the 50 Ha he rented were classified as natura 2000 area

The dry hill meadows, abandoned by modern mechanized agriculture, were threatened by the growing of bushes such as *Ulex europaeus*, *Rubus fruticosus*, *prunus spinosa*, *crataegus monogyna*. As these bushes occupied space, the shade invaded the meadows and biodiversity was significantly reduced.

The biodiversity of herbaceous plants : *Anthyllis vulneraria*, *Arabis hirsuta*, *Brachypodium pinnatum*, *Bromus inermis*, *Campanula glomerata*, *Carex aryophyllea*, *Carlina vulgaris*, *Centaurea scabiosa*, *Dianthus carthusianorum*, *Eryngium campestre*, *Koeleria pyramidata*, *Leontodon*

*hispidus, Medicago sativa ssp. falcata, Ophrys apifera, O. insectifera, O. militaris, O. morio, O. purpurea, O. ustulata, Polygala comosa, Primula veris, Sanguisorba minor, Scabiosa columbaria, Veronica prostrata, V. teucrium, Bromus erectus, Fumana procumbens, Globularia elongata, Hippocrepis comosa, Adonis vernalis, Euphorbia seguierana, Festuca valesiaca, Silene otites, Stipa capillata, S. joannis.*

Some animals: *Papilio machaon, Iphiclides podalirius (Lepidoptera)* ; *Libelloides spp., Mantis religiosa (CORINE land cover data, 2013)*

The specific measures for this site concerned the preservation of herbaceous vegetation, and progressive re-opening of areas invaded by bushes.

The land owner received 100% bonus for payment of fences, shelters and water points for animals. M Hervé receives for 5 years:

- 146 euros / Ha / year for maintaining the grazing with his own animals, on areas with less than 30% bushes. Note that M Hervé is paid for this while he already benefits the advantages previously cited: less hay in winter, better health for his animals...
- 253 euros / Ha / year for mechanized treatment of bushes in areas with > 30% bushes

This natura 2000 measures open the right to benefit from classical CAP bonuses such as ICHN and DPU (mountain area bonus and classical culture bonus) which adds: 126 euros and 130 euros / Ha / year

Overall, public funds allows M Hervé to have 43000 euros per year. This adds to 95000 euros of income from tourism. The public funds represent a little more than what he takes out to pay him and his wife an income.

Therefore when I asked him if he was a kind of “biodiversity maintenance agent”, he answered, yes of course and very proud of doing this... But he is before all a very good horse breeder!

## 2.4 Why few farmers follow this example

The question we may ask is why other colleagues of M Hervé didn't try these new opportunities to occupy the ancient lands, on these dry and steep slopes , invaded by bushes, forgotten by so called modern agriculture and food business that messes up cows and horses, pesticides and vitamins...

Well they think it's too complicated and many are not culturally in favor of biodiversity as an opportunity for business. For instance many sheep breeders in the pyrenees didn't appreciate the bears we “borrowed” in slovenia to breed with local bears to save them from extinction.

But there are also good news. A couple of sheep breeders will have a nice opportunity to use another “unproductive” land, near M Hervé. A public organism called CREN (national conservatory for nature) will buy 60 Ha of dry meadows, and rent it to them. They are aiming to the same goal as M Hervé.

## 3 Methanation in agriculture: Bonus income and protection of the environment

### 3.1 Interest of methanation

Methanation is a degradation of organic molecules by microorganisms. Without oxygen, methanogenic bacteria produce methane CH<sub>4</sub> and CO<sub>2</sub>. It requires heat for a good development of bacteria. It is a natural process that occurs inside the cow's paunch.

In agriculture, the main interest is to digest animal dejections in order to produce energy before recycling of the nitrogen in the field. The product keeps its NPK composition (N is mainly mineral and directly available for plants) , is non smelling , easy to spread with traditional equipment. Energy is both electricity production through a generator, and heat. Electricity is sold

to EDF and heat reduces costs.

From the environmental point of view, it avoids CH<sub>4</sub> being emitted in the atmosphere and all saved energy is a renewable energy.

1 m<sup>3</sup> of biogaz contains 60% methane, 1 m<sup>3</sup> methane is equivalent to 1 L fuel which yields 10 kWh of energy.

The french government annouced in March the starting of the «*énergie méthanisation autonomie azote*» plan. According to the government, in the end of 2012, there were 90 methanation systems installed in farms in France. The goal is to reach 130 projects a year between 2013 et 2020.

### 3.2 Examples in the Midi-Pyrénées region

Aria énergie is a engineering consulting firm located in Toulouse. They develop methanation project adapted to farm equipment. They developed the project of GAEC Rousset.

The GAEC Rousset in Lozère (Massif central) produce 3900 tons per year of cow dejections melted with straw. The animal dejections and straw fibers are transformed into methane; the result is a solid fertilizer that's spread in the farm fields.

225 250 m<sup>3</sup> of methane are burnt each year in a cogeneration engine that produces:

- ▲ 446 000 kWh of electricity sold on the main circuit.

- ▲ 366 000 kWh of heat totally used on the farm: warm water for calves, heating for two houses, drying of hay and the heating of the methanation process.

Overall, methanation is a local development tool, because the farmer and local enterprises can participate to the work. It is a source of energy for the farm, and a source of income. It requires an investment of 800 000 euros HT, and receive 36% of public financial support

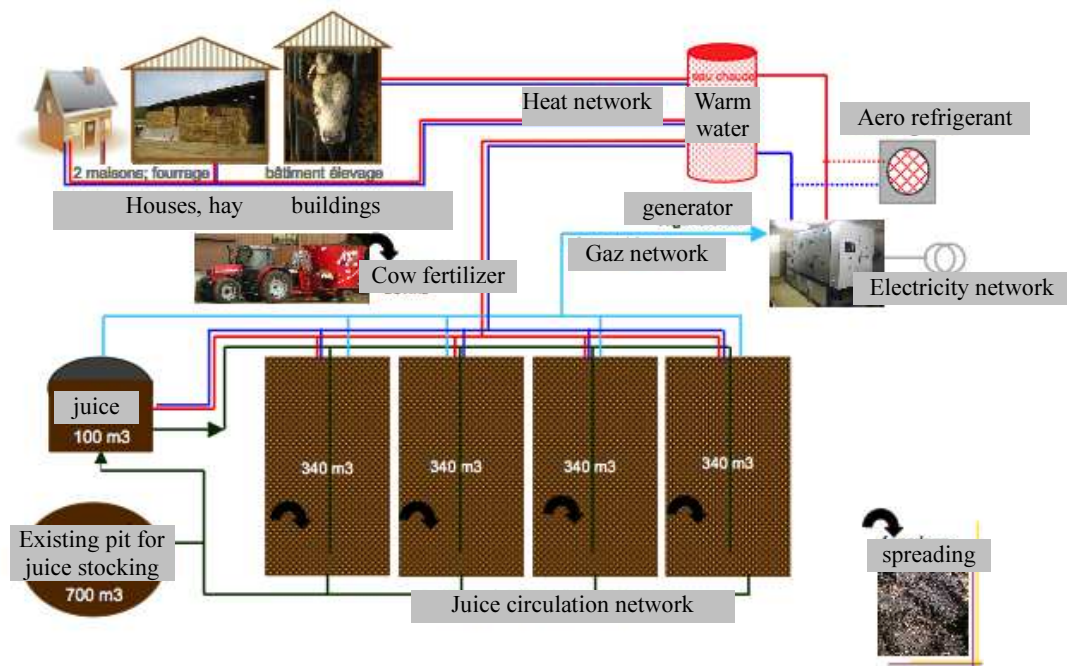


Figure7 : Methanation system in GAEC Rousset  
Source : Aria énergie, octobre 2012

## Conclusion

There are many under - exploited opportunities lying in the field of agriculture. This economical sector is more than any other in charge of the preservation of environment : Healthy food, preserved ecosystems and less pollution of soils, water and atmosphere.

Farmers should be encouraged to use all the mechanisms – financial and technical – going in this direction.

I believe more and more people will work together to protect the incredible diversity of plants and animals we have in our beautiful Europe, and will know how to exploit all the benefits of it.

I hope to find here in Slovenia opportunities to meet people that understand the meaning of “Biodiversity as a production factor for the enterprise”.

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