

## **Agroforestry in Europe**

Reports on:

### ***1. Presentations at the European Parliament during the First European Agroforestry Conference***

and

### ***2. Summaries of presentations at the First European Agroforestry Conference 'What Priorities for European Agroforestry?'***

#### ***1. Presentations at the European parliament during the First European Agroforestry Conference Brussels, 9 – 10 October 2012***

Delegates from over 20 countries attended. Scientific presentations were made and a delegation presented a case at a session of the European Parliament “Agroforestry Trees for a Sustainable European Agriculture”.

#### ***Background***

Agroforestry (AF) covers a range of production systems which mixes trees with crop/animal production. It means an integrated management of the trees, the crops or the pastures (with animals). The positive effects overall are an increase in the productivity of the land area. Combinations of trees with crops have been documented to result in a 20 to 40% increase in wood biomass plus agricultural products from a given area. For example, growing 100 ha of poplars in combination with wheat gave an output equivalent to 140 ha, if the trees and wheat were each grown as mono cultures. Similarly, a plot of 100 ha of walnut trees in combination with cereals (wheat) gave a wood plus crop output equivalent to 133 ha that would be required if each crop had grown separately. Combined production is improved because of

- (a) better use for available light over the whole year on a given area
- (b) better nutrient capture by deeper rooting trees.

However, tree spacing is very important so as to prevent excessive shading of crops. Spacing of 11m x 5m for walnut trees had negative effects on wheat but 11m x 9m or greater was positive. Agro forestry trees develop more extensive root systems and can help to reduce nitrate loss to the environment by up to 75% over the life of the tree. A density of 50 – 100 trees/ha can store 1 or 2 tonnes of carbon. This has a commercial value for people who deal with “sustainable production”. The financial final contribution of the trees will be significant but after 50 – 60 years. The current traded price of carbon CO<sub>2</sub> is €28/tonne and projected to be €100/t in 2030. Growing trees in combination with crops or pastures also provides many ecological services, reduced wind speeds, riparian zone protection, soil conservation, increased biodiversity of birds and invertebrates.

#### ***Summary of EC Parliament presentations:***

**MEP Gaston Franco**, chaired the meeting at the parliament. He urged a greater communication between farmers and foresters stating that the new CAP would introduce a set of complimentary measures to meet their needs and the needs of society for food, biodiversity and biomass production. As biodiversity increases with

agroforestry and trees bring their own flora pollinators (bees), he stated that a proportion of the CAP “greening” measure would be set aside for agroforestry.

**M. Angeles Benitez Salas** DG, Director of ‘Sustainability, Quality of Agriculture and Rural Development’, recognised the role of agroforestry. The old programme set aside 7% of budget for environmental projects, some 19 of which were approved with agroforestry elements involving 3744 people. She stated there is a need for a greater uptake. She emphasised the need and importance of adequate training of farmers to develop viable networks of agroforestry and research to generate new knowledge and also to communicate more widely with farmers. The value of improved sustainability is difficult to communicate but must be done. Agroforestry systems must be profitable, be compatible with modern machinery and be intergenerational.

**Stephen Briggs**, UK farms on 235 ha, has planted 52 ha with apple trees grown with cereals (90 trees/ha) as a means of diversification and for soil conservation.

**Dominique Chalumeaux** from the French Chamber of Agriculture, mentioned the network of 16 experimental plots on 80 ha with agroforestry as demonstration area for French farmers.

**Antonia Andugar**, Senior Policy Adviser, COPA & COGECA mentioned priorities for rural development as restoring ecosystems on marginal land with high social components and providing biomass for energy to reduce CO<sub>2</sub> emissions. Agroforestry offers opportunities to diversify income streams and increase overall land productivity. The challenges for farmers are water usage, mechanisation, supporting existing extensive agroforestry (traditional systems) and legislation affecting tree planting and harvesting. She defines agroforestry systems to mean “a land use in combination with extensive agriculture”.

**Jana Polakova**, Senior Policy Analyst in Institute of European Environmental Policy (IEEP). Agroforestry systems of trees grown in wood pastures is a traditional pasture system of extensive agriculture in large areas of Europe, bringing benefits of soil and water protection with biodiversity of all life forms. Many systems of agriculture have semi natural features such as hedges. These systems provide much public good services as well as providing food, fibre and energy sources. The pillar 1 of CAP allowed for direct payments with specific eligibility criteria but there has not been enough uptake due to a lack of knowledge on the scheme. Post 2014, the CAP should allow for a single measure to create AF and provide for collaborative efforts among farmers at a landscape scale. She also emphasised cross compliance measures and the need for improved advisory systems and training.

## ***2. Summaries of presentations at the First European Agroforestry Conference***

### ***‘ What Priorities for European Agroforestry ? ’***

1. ‘Evidence and explanations for the unexpected high productivity of improved temperate agroforestry systems’ *by Christian Dupraz (France)*

This presentation involved the assessment of some long-term experiments in France. It was shown that land could produce up to 40% more with agroforestry systems. Cereals, particularly winter cereals, benefited greatly from agroforestry systems. The cereal yields were far more consistent too. Trees are used to shade crops in very sunny areas. Analysis also included an investigation into the ability of trees at different spacing to capture light.

2. ‘Agroforestry systems: a land use option to enhance productivity, environmental and social benefits in forestlands ‘ *by Mosquera-Losada (Spain)*

In Spain silvopastoral systems involve cows in the North and goats in the South. Both graze between trees. The leaves, nuts and fruit are used to supplement lack of fodder in some years and locations. This is also done in Portugal. *Pinus radiata* are also used. Mediterranean and Atlantic systems are examined. The systems promote biodiversity and carbon sequestration. With well-managed grazing fire hazards are reduced. Spain wishes that the CAP would give greater recognition to the environmental positives of this silvopastoral system and provide sufficient inducements.

3. ‘Extant vs. new agroforestry systems: a policy perspective ‘ *by V. Papanastasis. (Greece)*

The old systems tend to be in small holding s in Southern Europe. They involve oak and cereals, wood pasture, grazed olive groves, lopped mulberry for fodder. Many of these farms and systems have been abandoned with the emphasis on funding ‘new’ agroforestry systems that produce high quality timber using rows of trees etc. These new systems tend to favour high productivity sites in Northern Europe. Greece would like to see CAP encourage the restoration of these abandoned farms and systems and a recognition of the strong environmental contribution that the provide

4. ‘Integration of agroforestry in agriculture and landscape reclamation ‘ *by D. Freese. (Germany).*

Research ‘INKA BB’ is focusing on drought mitigation. Research also aims to provide buffer strips, shelterbelts, land reclamation and recultivation. Training farmers into the various systems, demonstration plots and educational literature are provided. Long-term publications to update and inform practitioners are also needed. Agro forestry systems can be used to tackle climate change issues. There is also a focus on the build up of biomass within soils. Germany also wants to look at old agroforestry systems with a view to reintroducing them where appropriate.

5. ‘State of Agroforestry systems in North America’ *by M. Jacobson. (Pennsylvania , USA).*

Agroforestry systems in North America are 100 's of years old. But 'new ' agroforestry systems can be traced back to the 1930's during the 'dust bowl' years when shelterbelts were needed. Interest in agroforestry systems really took off in Canada and the USA in the 1990's. Many state agencies were set up to further its progress. There are many university courses now. Surveys were carried out to determine why there was not a greater take up. Most popular systems were those that provided environmental benefits. Negatives included lack of profits, additional expense and lack of financial assistance. Lack of knowledge and demonstration plots were also blockages. The four areas that would help greater take up were 1. Education, 2. Financial support 3. Markets for agroforestry products 4. Greater agency collaboration.

6. 'Future wood pasture: Integrating trees into evolving grazing systems in Northern England.' By P. Muto.(England)

This presentation focused on a 'Site of Special Scientific Interest' (SSSI) where juniper was growing wild but was under pressure from grazing in remote areas. There was poor natural regeneration of the juniper and a project was put into place to help the woodlands recovery. Grazing practices have changed from cattle to sheep, from well-managed herds to free roaming. There is also a new practice of 'droving ', which puts additional pressure on remote woodlands. Another project involved encouraging natural regeneration in wood pastures using 'gengour' enclosures. Gorse thickets and livestock removal were examined. Fire was a problem with the gorse thickets and it could also harbour rabbits. Bracken was also a problem. Supplementary tree planting was necessary. High density grazing for a short period can have beneficial effects for natural regeneration.

7. 'Short Rotation Coppice within agroforestry - options and limitations'. By N. Lamersdorf. (Germany).

In response to the EU 'Renewable Energy Directive (RED) each EU country should achieve 20% renewable energy consumption by 2020. Short Rotation Coppice (SRC) can help achieve this through species like poplar and willow. There are also environmental pluses on the landscape level with regard to fewer pesticides needed, less fertilizer, less leaching of nutrients and less erosion. A project was conducted to analyse the nitrogen pulses produced during planting and harvesting to determine any negative impacts. The negative impacts could be addressed with appropriate management techniques. Transpiration can have an effect on water tables. It was considered likely after the project results emerged that there may be greater acceptance of SRC if the scale was smaller and perhaps with more species in an agroforestry context.

8. 'Valuing the carbon sequestration potential of European agroforestry' by J. Aertsens. (Belgium)

The value of agroforestry systems in sequestering carbon is examined. The value is estimated using the 'avoided cost' approach. Climate change mitigation is examined using agroforestry systems, introducing hedges, reducing tillage and using cover crops will all help and could sequester up to 37% of EU carbon emissions. However

agroforestry systems have the greatest potential and could sequester up to 90 % of the total potential of the measures studied on its own. Taking into account climate change mitigation only it is estimated in 2012 that the value is 282 euros / hectare. This will rise to 1007 euro / hectare in 2030. It is expected that the potential of agroforestry will be recognised in the coming decades.

9. 'Scotland's woodland expansion target – Can agroforestry play a part?' by *Mike Strachen. (Scotland)*

Scotland has set a target of 10,000 hectares of afforestation annually for the next 10 years. The Government has bought 4,000 hectares, representing 44 farms. Farmers see it as a threat. A survey was carried out with farmers and they wanted the following – 1 A 10% limit on the gross area for planting. 2. Riparian areas should be the main focus for planting. 3. Training in woodland skills needed. 4. Better integration of farming and forestry. 5. Agroforestry was seen as having potential. 6. Farming and Forestry policies needed to be integrated more. 7. Grazing woodlands could relieve the burden on pasturelands.

A report with 24 recommendations was issued. It was decided that the focus should be away from good agricultural ground. That there was scope for creating woodlands where grazing is planned as a management objective. It is estimated that there is approximately 2.69 million hectares of land in Scotland suitable for woodland expansion. There is also a proposal that woodlands will be opened up for silvopastoral systems. There are different types of woodland being proposed including orchards.

10. 'Food systems under population pressure and running out of fossil fuels: any options left ?' By M. Visser. ( Belgium)

Energy efficiency is a priority facing EU countries in the coming decades. Reducing inputs into systems while maintaining output is the target. Agroforestry can achieve this through greater efficiencies in land use. Harnessing solar energy through crops and in turn livestock is perhaps the best way forward.

11. '*Quercus ithaburensis* silvopastoral systems in Greece' by *A Pantera. (Greece)*

This species of oak was grown extensively in the past and the wood was used for fuel and the acorns were used as fodder and in tanning leather and the production of dyes. The woodlands are disappearing and are increasingly being replaced by olive trees. The few remaining areas are under threat from fire and overgrazing. Black truffles have been found in some of the old woodlands. Some of the trees are over 300 years old. It is important that the value of these woodlands is recognized and are protected. It is hoped that land may be put into this type of woodland rather than having it removed.

12. 'Olive agroforestry: an inverse approach to agroforestry' by *A. Rosati. (Italy).*

The EU has over 4 million hectares of olive agroforestry.. The harvesting of the olives can be expensive so many of these olive plantations are declining or are being abandoned. A project was undertaken recently growing wild asparagus (5000/ha) and producing chickens (2 cycles/year at 1000/ha) for meat under the olive tree canopy. The chickens destroyed olive suckers, weeded the ground area, did not damage the prickly asparagus, did not damage the olive trees, they fertilized the trees through their excrement. Saving 250 kgs of NPK / hectare. The chickens put on more weight more quickly as they were less stressed from birds of prey due to the cover of trees. The chickens could command a premium price for their free-range origin. In addition olive yields were unaffected.

13. 'Role of Macaronesian Forests in hydrology and rural development in the islands.' *By JC Santamarta – Cerezal. (Canary, Azores, Cape Verde and Madeira Islands).*

Agriculture and tourism are the main economic activities in these islands. Many tourists are looking increasingly towards ecological experiences. The woodlands could be developed more in order to exploit this interest. The forests serve an important role in preventing and reducing soil erosion. The importance of water on these islands is very important and one of the main sources is through fog precipitation on trees.

14. 'Plantations of High value timber – Agroforestry systems in Modern production: 14 years of experience in the Federal State of Vaden – Wurttemberg /Germany' *by R. Luick. (Germany).*

In the 1950's Germany had 1.5 million hectares of orchards. This is now reduced to 350,000 hectares. Agroforestry has attracted a lot of interest due to historical and cultural reasons, ecological reasons and low intensity systems that may be applicable now. A project with 7 sites using fruit trees with a total area of 10 hectares was set up in 1997. Grass was mown for the first 10 years. The objective is to grow veneer quality timber on a 50 to 60 year rotation. Walnut, cherry, apple and pear are grown with a target diameter of 50 to 60 cm. The findings so far suggest that for such high quality timber a variety of species is recommended. The markets are unpredictable and currently there is greater demand for paler / whiter timber. Production can start after around 40 years. Desirable lengths are 2.2 meters 'door length' knot free. Trees are planted at 400 trees /hectare and are pruned every second year. At age 10 reduce numbers to 200 to 300 trees per hectare. The target is around 80 to 100 trees per hectare. The trees tended to be disease free.

15. 'Integration of trees in the agricultural landscape of Switzerland - a linkage between traditional and modern agro forestry'. *By M. Bauer. (Switzerland)*

Trees in the arable agricultural landscape were traditionally very common. Intensification of farming has seen the number of standard trees reduced by 80% since the 1950's. There is an effort now to tie in traditional systems with the new agroforestry systems. Farmers can apply for subsidies as long as fruit trees are planted. A new body called 'IG Agroforest' was set up to coordinate agroforestry developments. Its first convention took place in 2012; there are plans to meet people in the timber industry with a view to producing quality timber. Trial plots are needed.

Areas that have erosion of water protection issues are the areas that agroforestry has its greatest potential. Friendly food production areas are also presenting possibilities.

16. 'Is basal tree area a useful indicator for predicting tree – crop interactions in silvoarable systems? Long-term observations in a walnut (*Juglans* spp.) experimental site'. By P. Paris. (Italy).

Arable crops grown within tree systems will have issues in relation to yields. How are the crop yields affected by tree canopies? Trees planted in 1992 were intercropped with wheat then with clover and finally with a natural meadow. Tree diameters were measured both for DBH and for the crown. Results show that for 50 trees per hectare wheat productivity decreases by 80% at a plantation age of 23 years. With 83 trees per hectare 80% reduction was achieved after only 17 years.

17. 'CAP and agroforestry: a new approach by habitat efficacy.' By Y Babory (France)

The CAP structures have been largely unfavourable to trees. Many hedgerows and individual trees in rural areas have been removed. Land under trees was not eligible for CAP premiums and therefore large areas were cleared. Trees up to recently have been barely tolerated until agroforestry came along. The first pillar of CAP should protect existing trees and the second should favour planting of more trees by farmers. Currently bird populations are measured and give a good indication of the current ecological status of an area. 'Habitat Ratios' were measured and gives a good indication of tree cover and landscape elements. This method can assist in gaining a holistic approach to large areas and cater and tailor grant applications accordingly.

### **Poster presentations**

There were 34 posters presented accompanied by a 3 minute 'blitz' presentation.

18. 'Tree fine root dynamics and carbon sequestration potential in a Mediterranean agroforestry system' By R. Cardinael. (France).

Agriculture globally accounts for 14% of the CO<sub>2</sub> emissions. Agroforestry systems are known not only to capture CO<sub>2</sub> but also to transfer it to deep soil horizons. Trenches were dug in 1995 and the tree roots were measured to estimate the amount of carbon sequestration occurring due to root growth in agroforestry systems.

19. 'Agroforestry brings free range chickens back to their natural habitat' by M. Bestman. (Holland).

About 20% of Dutch farms with laying hens have a so-called free-range area. In reality very few animals are seen outside. 'Feather pecking' is an indicator of animal welfare. This was measured on 63 flocks of organic laying hens. Shelter areas of more than 1 meter high are needed to entice the animals outside. Feather pecking ended once 66% of the animals were tempted outside. Silvopastoral systems are being developed for a network of farmers through an initiative called 'Trees for Chickens'.

20. 'Farmers network for fodder trees and multifunctional land use'. By N Van Eekeren (Holland).

This was started in the south of the Netherlands. It is looking at the multifunctional use of trees, trying to achieve a positive balance. Crops such as grass and maize are grown with trees. The dairy sector was targeted; the aim was to create a third crop on dairy farms next to grass and maize. Willow was planted on 2011. Hazel, black alder and robinia were also used. The willow leaves from 4 different clones were baled in 2012. The digestibility of the leaves is under view due to the tannins. Goats will graze the regrowth. Another presentation was included in this talk, which examined the 'Role of woody components on productivity of extensive silvopastoral systems'. This presentation was made by N. Van Eekeren also. Oak with shrub species was examined in relation to their potential to provide forage for animals. It was estimated that at least 60 to 80 trees per hectare were needed. The amount of wildlife also benefited greatly particularly birds.

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