

# Abstracts

## Day 1

### Organic agroforestry: eco-functional intensification

*Prof. Martin Wolfe (ORC/Wakelyns Agroforestry)*

Agroforestry is a concept of integrated land use that combines elements of agriculture and forestry in a sustainable production system. An emphasis on managing rather than reducing complexity promotes a functionally biodiverse system that balances productivity with environmental protection. Organic agroforestry has the potential to meet the demand for ecofunctional intensification – working with and through existing natural processes to achieve increased outputs while maintaining ecosystem services.

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### Modelling of cider orchard intercropping

*Paul J. Burgess and Oldrich Vylupek (Cranfield University)*

Many UK apple orchard growers are seeking to minimise their use of chemical inputs. One method for maintaining revenue within a reduced chemical system is to introduce intercropping. However the yield interactions between the apples and the understorey crop are complex and occur over a long-time period. Simulation models, primarily based on an understanding of the competition by trees and crops for light and water, provide a method of predicting yields and aiding decision-making in the absence of large-scale experiments. Hence the objective was this project was to determine if Yield-SAFE (a simulation model of tree and understorey crop growth) could be used describe cider orchard intercropping.

It was possible to modify the Yield-SAFE model to describe fruit yields. Site management (e.g. trees per hectare), tree (e.g. tree height and diameter, canopy area, assumed dry mass of standing tree), tree management (e.g. pruning policy) and apple yield data (e.g. number of apples, mean fresh weight per apple) from existing cider apple orchards in Herefordshire were used to parameterise the model. Following a process of iteration to improve the accuracy of predictions, the Yield-SAFE model was able to provide sensible estimates of apple yields and the interactions between apple trees and crops through a tree rotation. There is therefore the potential to use the model to examine the effects of different tree spacings and understorey crops on yields or economic output.

*Acknowledgement: the above MSc study was supported by Heineken UK*

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### The HONE project: a novel approach to grower-centric learning and technology transfer as part of a strategy for more sustainable top fruit production in the West Midlands

*Emily Durrant (The Bulmer Foundation)*

Cider fruit production must evolve with shifting external pressures in order to remain profitable and attractive to growers. Some of the fundamental assumptions of the past 30 years may no longer be sustainable.

A widening knowledge gap, coupled with a minimal research budget, has left the industry in search of a new approach to research and dissemination. Whilst top-down knowledge transfer in cider fruit has historically been strong (owing mostly to the dominance and ethos of the market leader and a simplistic supply chain), this approach is now out-moded and lacking in both efficiency and diversity - essential components of any research programme.

In times of austerity a more effective strategy is required. Together, the market leader and the industry trade association (NACM) have devised long and short term research strategies which make use of available research grants, multi-stakeholder engagement and partnership-working.

Launched in early 2011, the Herefordshire Orchards Network of Excellence (HONE) forms part of this strategy and is designed to rectify the balance between top-down and bottom-up knowledge creation and transfer mechanisms and in doing so, give growers the opportunity to have a hand in determining their own orchard futures.

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## **Comparing the sustainability within UK agriculture: agroforestry's potential**

*Adrian Morley (Forest Farming (UK))*

This presentation is based on research, which developed a methodological approach to compare the sustainability of five hypothetical arable systems. Each system represented varying degrees of human technological intervention and integrated land use approach including SAF. A maximum sustainable agroecosystem, primarily self-regulating with some human intervention, was used as a benchmark for evaluation.

System influence diagrams were used to inform the development of a structured hierarchy organising 200 indicators obtained from a structured literature analysis (SLA); this was the framework for a sustainability assessment spreadsheet computer model used for the comparison. Predominantly qualitative data from the SLA was used to derive normalised indicator scores for each agricultural system. Composite scores were derived for each main factor concerning sustainability as well as an overall sustainability score.

The results showed that SAF was consistently the most sustainable agricultural system. Weighting sensitivity analysis and controlled variations on the computer model parameters showed no change in the sustainability ranking of the agricultural systems. The results suggest that the ecologically engineered inclusion of trees within a non-compartmentalised and integrated land-use, leads to the greatest potential for increasing the sustainability of UK arable agriculture. Furthermore, it signifies that this approach allows conservation and ecosystem services to be incorporated into agriculture without land being taken out of production.

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## **Trees for transition to a low carbon future**

### ***Robin Walter (Trees for Transition)***

The Trees-for-Transition initiative draws together the many benefits of trees and woods and shows how they can help our transition to a low-carbon and resilient society.

Faced with the challenges of climate change, resource depletion and financial crisis, we need to find better models for sustaining ourselves - models which protect and strengthen our life-support systems and communities. Transition Towns show how people can engage with these issues at an appropriate scale.

The role of trees and woods in this transition operates at many levels. The 3 aspects of sustainable development are seen as a hierarchy, with Environment as fundamental, supporting Society, which in turn generates the Economy (unlike the normal portrayal of these as equal factors). Of course trees and woods can provide all these benefits simultaneously in various combinations.

- Environmental benefits of trees are concerned with biodiversity, carbon, protection and pollution – these make life of all sorts sustainable
- Social benefits of trees include health, recreation, community and landscape – these improve our quality of life
- Economic benefits of trees derive from products, rural and urban development and employment – these contribute to sustainable living

Agroforestry offers a unique opportunity to realise these multiple benefits at all levels.

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## **Agroforestry for ammonia abatement**

### ***Bill Bealey (CEH)***

80% of the UK's ammonia emissions come from animal manures either from livestock housing, storage or spreading – a further 10% is from inorganic fertilisers. Housing and manure sources emit as point or small area sources. Agroforestry systems have an important role to play in reducing ammonia emissions and effects. Ammonia impacts occur in the rural environment, so that landscape structure has the capability to buffer these effects. By planting trees around or downwind of sources or having livestock within the planted forest can mitigate against the release and deposition of ammonia into the environment. Implementations of these strategies have been shown to potentially decrease the amount of ammonia emitted to the wider atmosphere and potentially 'shelter' sensitive ecosystems. Under best case scenarios, agroforestry ammonia abatement systems can decrease ammonia emission by up to 45%. Additional benefits have also been quantified including carbon sequestration, improved standards of animal welfare (for silvopastoral systems), and the potential returns for the farmer providing enhanced resilience and competitiveness. The potential for a national planting policy of agroforestry systems for ammonia abatement needs to be further supported by quantitative theoretical and experimental evidence to underpin the wider policy and practical developments.

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## Day 2

### Eco-functional intensification of orchards: forest gardens and the Permaculture Design Approach

*Andy Goldring (Permaculture Association)*

Permaculture seeks to design sustainable human settlements that combine soil, plants, animals, water and other components in an integrated productive system. The intention is to meet human needs on the smallest land area possible, to enable the re-wilding of large tracts of currently cultivated land.

A central contribution of permaculture is the assemblage of highly diverse multi-species plantings which yield food, fuel, fibre, medicinal and other products, as well as ecosystem services such as soil-building, climate and rainfall stabilisation, and pollination. Forest gardens are an excellent example of how this can be achieved. Forest gardens are an ancient form of food production with a rich heritage in tropical and semi-tropical zones. In cool temperate climates, their development is much more recent, inspired by the gentle innovator Robert Hart.

The presentation will provide a brief overview of the permaculture approach, how forest gardens 'fit' into a wider landscape approach, and detail our current research work to capture in situ evidence from new and existing forest gardens in the UK, through our ten year Forest Garden Trials.

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### Land-based Architecture - Localism by necessity

*Steven Johnson (The Architecture Ensemble)*

The term "Localism" seems to be on everyone's minds at the moment. For some architects and builders, making use of local materials and energy sources has been on the agenda for some decades now but, even for them, how the current government will eventually define their idea of localism remains a mystery. Planners, architects, and developers have been left to grapple with how to work while government discusses the ramifications of the wish to rebuild the planning system through giving more power to communities. They now seem to be back pedalling as they are coming to realise that power to communities could lead to a freeze on development as, given the choice, communities tend to resist change. This is where land-based architecture could be extremely useful. Development that is directly tied to the use of the land would, by necessity, lead to a broad and genuine form of localism and communities may see how they could directly benefit from development that is derived from the environment and economy of the local area. With this in mind, combining agroforestry with sustainable architecture seems to make perfect sense as it could demonstrate a genuine way of re-creating a symbiosis between man, his communities, and nature.

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## Forest based products as a tool for economic development of Community Forest User Groups in Dolakha, Nepal

*Roger Cozens (Greenacres Consultancy)*

### Fairwild Collection

Wild collection is the primary way of producing natural ingredients for cosmetics, essential oils, traditional medicines and food products in a forest environment.

An estimated 50,000 – 70,000 plant species are used in this sector throughout the world. The great majority of these species are obtained through collection from the wild habitat. Plants harvested from natural populations continue to be the most important source of medicine to cover the primary health care needs of more than two third of the world's population. Despite alternative sourcing strategies by cultivation, the herbal industry is still very dependent on wild collected plants as raw materials for food, medicine and cosmetics (It was estimated by WWF/IUCN that over 90% of all plant species used come out of wild collection and that in terms of volumes traded over 70% have their source in wild collection and only around 500 plant species are commercially cultivated today).

Certification of sustainable collection methods can provide incentives for conservation of important habitats and strengthens local economies. The FairWild Standard is a unique guidance tool for fair sourcing and trade practices and effective resource management of all plants, lichens and fungi collected from the wild. It includes comprehensive provisions for ecologically sound, socially fair and economically viable resource management practices, making it a true sustainability standard. These standards help contribute to poverty alleviation and conservation of biodiversity requirements.

Within Nepal there is a need to develop a certifiable management system to secure wild collected plant resources and their habitats in order to safeguard the basic source of plant based raw material for the international market. This will contribute towards the integration of the principles of sustainable development into the country policies and programmes and reverse loss of environmental resources.

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## Putting working trees (pollards) back into contemporary agriculture

*Ted Green MBE (Ancient Tree Forum)*

Open tree landscapes (many of them pollards or cut trees) with shrubs and grassland grazed by stock were once common in the UK. There is evidence of the cutting of pollards in the UK dating back 3,400 years and in northern and central Europe at least to 1800 years ago. Across many parts of Europe and Turkey extensive areas function in this traditional, sustainable way especially where it is difficult to make them more intensive. In lowland Britain, hedges still retain relict pollards but they feature frequently in boundaries in many parts of France and Spain.

Pollards – or ‘working trees’ are trees cut by man for multiple products for many uses. The trees are not usually felled but the crowns are worked on a cycle in long term sustainable systems. As a bi-product the tree produces annual leaves and bi-annual twigs that fertilise

the ground in an eco-functional way linked by fungi especially mycorrhizal fungi and other micro-organisms in the soil.

Trees provide many benefits on farms – they provide shelter, contribute to animal welfare and help conserve good soil condition and drainage but pollards also provide long term sustainable products. They are part of our ancient European cultural heritage are important for biodiversity and create beautiful distinctive landscapes.

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### **International perspectives on tree fodder**

*Ian Lane (Pastures, Fodder and Feed Resources Specialist, Ian Lane Associates)*

Various tree fodder systems will be illustrated including *Leucaena* hedgerows from Malaysia; *Leucaena* on terrace risers and various fodder trees and systems from Nepal, and collection of fallen leaves of *Paulownia* from China. The speaker will then lead a discussion on designing tree fodder systems for UK.