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The need for organic farm forestry and the potential for organic timber

The conscious management of trees on farms and eliminating the use of agrochemicals are two means of increasing agricultural sustainability. Both have clear benefits, though either farm forestry or organic agriculture alone is only half way there. It is only a small step from one to the other, making 'organic agroforestry' a complementary, more durable and diversified production system. Both acknowledge the positive aspects of the other, but an integrated approach appears to offer additional advantages. A further development is towards the certification of organic timber. Conventional plantation and farm forestry routinely use herbicides and occasionally pesticides and fertilizers, and research looking at the uptake of herbicides by woody weeds indicates that what is applied on or near a tree will be deposited in the timber. Such issues are of special concern for example, in tree rows in conventional agricultural fields which may experience numerous spray passes annually, and further investigations are required. The need for an organic timber standard is proposed

Agroforestry and organics, complementary solutions to the problems of modern agriculture

Organic production is now increasing rapidly, receiving much publicity and a rising market share. Farm forestry or agroforestry is a complementary alternative to 'conventional agriculture' but continues to receive much less attention. Both have roots that go back at least 50 years to early awareness that 20th century food production was unsustainable. Both use environmentally beneficial methods of farming, making the most of natural systems, cycles and/or products. Both promote diversity, in what is produced, in supporting more local wildlife, and often in a more varied landscape. Both ensure a healthy agriculture through sustainable techniques, better for humanity and the environment.

Agroforestry is more than just the addition of agriculture and forestry, being a science and a practice that aims to blend the best of each into balanced, long-term farming systems. Agroforestry is the original agriculture before we started to clear all the trees for bigger fields and farms. Some practices are old, others new. Forests and orchards often need weeding, and sheep, not herbicides can keep the weeds down, making the most of the herbage and fertilising the trees. Tree rows give shelter from persistent winds to crops and livestock, while producing valuable timber. On pasture or arable land, wide-spaced trees or tree rows take up little land, while producing timber, fuel, fruits and fodders. Hedgerows can be 'enriched', road and river sides and field corners planted, making the most of 'lost' space.

Trees have many effects on the farming system, both productive and protective (e.g. Wolfe and Pasiecznik, 2000). Fast growing poplars and willows produce timber, pulp or fuel. These can also be mixed with quality hardwoods, which fetch a good price, and likely to increase in the future as world supply declines. Walnut, cherry and chestnut also produce valuable annual fruit crops, providing income during the decades before harvesting the timber. On poorer sites, conifers may be most suitable. Trees also protect the environment and increase biodiversity. They shelter crops, grass and livestock from the wind, increasing production. They help recycle nutrients with their deep roots and annual leaf fall, and some even fix nitrogen reducing the need for fertilisers. There is generally an increase in the numbers and range of insects, birds and mammals that are 'beneficial' to the farming system, e.g. more birds also help keep insect pests at bay reducing the need for pesticides. Reducing the need for external nutrients and pest control makes trees especially beneficial in organic systems.

Either organics or agroforestry alone is only half way there, however. Organic agriculture without trees will not help sequester carbon or reduce the demand for timber from remaining natural forests. Growing trees with agrochemicals will still poison the environment affecting biodiversity and human health. It is only a small step from organics to agroforestry or vica versa, making 'organic agroforestry', the perfect, sustainable, diversified production system, and the economic and environmental benefits of organics and agroforestry combined are clear to be seen.

The agrochemical problem in wood from conventional farm forestry and plantation forestry

The issue of agrochemicals in timber has been poorly investigated to date. Only a few examples are provided here, whereas a detailed literature review would surely reveal many more. What is clear is that there is deposition of pesticides in the wood of a tree if applied nearby, and that these will be released from the timber at a later date. The exact nature of this movement in potentially harmful chemicals and possible effects on human health and the environment, however, require further investigation.

As would be expected, spraying trees directly with certain herbicides will cause their death, and many have been used effectively for controlling woody weeds, applied as basal bark treatments, stem injection, foliar sprays or aerial applications. However, treatments below phytotoxic levels are also observed to have impacts on wood structure. Spraying of 2,4-D or 2,4,5-T caused the formation of an unusual wood, with narrow, thick-walled

vessels and reduced cell wall thickening in axial parenchyma (Robnett and Morey, 1973). Pesticides applied to trees are also found deposited in cells in the xylem tissue, and these are assumed to be retained, so also to be found in heartwood as the tree ages. However, further research is required to assess the levels of deposition, and the correlation of pesticide concentrations in tree growth rings with known applications on an annual basis.

Applying agrochemicals to crops is likely to lead to some uptake by adjacent trees in and around fields, either directly by the leaves or stem from spray drift, or by the roots from leaching. Whereas the amounts taken up will be small each time, the long term affects from repeated spray passes, annually or even several times a year, could be significant but have yet to be quantified. This is an area of potential future research that should be considered, especially in non-organic silvoarable agroforestry systems.

Some effects on human health from the release of chemicals in wood have been researched and quantified. Pesticides are released from wood when it is burnt. Meat is contaminated if 'smoked' over treated timber (Watson, 1958), also, it is assumed, from wood containing agrochemicals. Hardwoods killed by herbicide treatment during land clearance contain significant quantities of the chemicals used, and are sometimes burnt as fuel. In one study, measurable amounts were released during burning in hearths, especially in smouldering fires, though it was calculated that the levels did not pose a risk to human health (Bush et al., 1987).

Concentrations of pesticides in timber are also observed to increase as the wood dries, though such changes, including decomposition, movement and decay have not been adequately studied. Thus, although it is inferred from related research that pesticides are likely to be present in timber used in furniture, construction and crafts, etc., the amounts and their availability are not yet known. Many wooden items are commonly handled, and there are also a number of wood products which come into direct contact with foodstuffs or the mouth, and if transfer of agrochemicals from the timber surface is shown to occur, then these may be identified for special attention on health grounds (Pasiecznik, 2005). Examples include firewood for smoking foods or burning in homes, fruit and vegetable crates and boxes, wine and spirit barrels, baskets, chopping boards, fruit bowls, dining tables, kitchen utensils (or parts thereof), and toys that are likely to be sucked by infants.

Myths surrounding the need for organic timber

"But all timber is organic, isn't it?" is the most common response when starting a discussion on the need for a certified standard for organic timber. "Well, no" must be the reply, based on examples presented in this paper. Sure, timber from 'natural' or virgin forests will be 'organic by default', but trees from plantations or non-organic agroforestry may well contain agrochemicals in the timber.

"Nobody uses chemicals in forests do they?" is another. The most commonly used are herbicides during land preparation, though spot applications with a knapsack sprayer have largely replaced aerial spraying where it did occur**.** Pesticides are also used against some insect and fungal attacks, such as MSMA injected into standing trees against pine beetles (Maclauchlan et al., 1988), and many others on seedlings in the nursery or before out-planting. Whereas the concentrations may be low, these use is widespread and impacts are recorded (e.g. Ghassemi et al., 1981), and multiply this over the vast areas that plantation forests cover, and the quantities are significant. Higher concentrations have also been observed higher up the food chain, for example with arsenic in woodpeckers feeding on beetles killed by MSMA. No studies have been found, however, on the evolution of this chemical in the timber, during growth and post-harvest. It is also worth noting that plantation forests cover many watersheds draining into reservoirs used to supply drinking water, and a review of the presence of such chemicals in these water bodies is also needed.

Even when the above arguments have been accepted, a further myth is peddled, that of: "but no-one will be interested in organic wood anyway; wood isn't eaten and people will not see any health benefit". The reply is again a firm "no". Clothes are not eaten for example, but the dramatic rise in sales of organic cotton clearly shows that people will pay more for non-edible goods to reduce chemical use. The market for organic Christmas trees and 'fair trade' craft items all confirm this trend. In addition, as this paper presents, there are actual and potential negative health effects from the use of wood that contains agrochemicals, so the argument can be seen as flawed on both counts. Organic paper may become the new organic cotton for example, produced from organic trees and by not using environmentally damaging processes.

"It'll never be commercially viable" or "it's just not practically feasible" are then the final attempts from the cynic. They said that organic food, then organic cotton, would never have a significant market share for those reasons, and just look at the exponential increase in production and sales to prove that wrong, even in the face of antagonistic subsidies and lobbying. Timber certification received the same comments, and that too is growing steadily. Nursery managers are often the first to say that it is not possible to produce organic seedlings, yet systems for the production of organic crop transplants have been around for decades and standards are almost finalised for the production of organic ornamental plants.

Clearly producing organic timber is possible, and can make money as well as making sense. Further research is still required to confirm the validity of some of these assumptions, and in so doing, should allow a number of such statements as quoted in this paper to be applied generally and accurately. It is apparent, however, that many common beliefs are merely 'myths', and there is significant modern relevance to the need for organic forestry and

agroforestry, and organic wood and wood products.

The future for certification of organic wood and wood products

Organic wood will clearly become a mainstream commercialised product with the coming decades, though sadly very few people, organic or otherwise, seem to have yet become aware of its pending importance. HDRA – the organic organisation have sidelined proposals on the topic since 1998, and the Soil Association Woodmark continues to be open to criticism by not specifically banning the use of chemicals over the thousands of hectares of forests that it certifies. The current Forestry Stewardship Council (FSC) standard is short of what is needed for a truly sustainable and organic standard for the production of wood and wood products, as it does not totally exclude the use of chemicals merely that efforts are made to reduce their use. Also, commercial interests and lobbying mean that more stringent criteria are unlikely to be adopted and they may even enforce other unethical compromises. Consumers do not want more labels (Browne et al., 2000), but that new ethical concerns are incorporated in the standards of existing labels.

The Soil Association, has however, been working towards a new 'Organic Forestry' standard, which may meet environmental and consumer requirements, though detailed information on the criteria is not readily available. A pilot assessment was conducted in Denmark in 2001, and the Barritskov estate is certified to sell round wood, sawn timber and firewood as organic (Jones and Farfung, 2001). However, an agreed final standard has been rejected once by the Soil Association Standards Board, and a revised version may be approved later this year or next. It is likely to cover woodlands specifically, being 'FSC +', i.e. requiring a successful FSC assessment with the addition of other criteria, and whether farm forestry will be covered is not yet clear. The Woodmark scheme does certify areas of trees in farmland in Africa, where only the timber is certified, but this would be complicated by additional organic criteria as then the whole system would need to be assessed.

As for the development of certifiable organic farm forestry, organic wood from trees on organic farms would be possible by extending the coverage of existing certification to wood and wood products. At present, Christmas trees can be certified organic, grown as a perennial crop, but only up to 8 m tall. What happens if these trees are left to grow, or if such large trees are pulped for (organic?) paper, posts or poles? Also, when orchards are certified organic, why is only the fruit certifiable and not the wood? There is an existing standard whereby wild fruits from a forest can be certified organic, but not any wood products. The issue of conversion may be problematic in wood products, however, as an existing tree may already contain agrochemicals in the timber, which will remain even if the production system surrounding it becomes organic. Ambiguity remains, and it is important that all such issues are dealt with in any future certification schemes.

The stages required for achieving a market for organic wood is the same as for the development of any new product. A standard is required that will allow the certified production, processing and trade of organic timber and wood products. Involved organisations need to inform consumers that 'not all timber is organic' and related realities concerning wood production, including that on farms. Consumers will then need to demand from commercial suppliers that they are offered adequate quantities of such organic wood and wood products and at reasonable prices.

Standards for organic timber production are being developed, more interest and information is being generated, and the demand is surely not far behind. Organic farmers and all farmers practicing farm forestry will need to consider these arguments and developments in the years to come if we are to achieve the aim of organic agroforestry, a truly sustainable land-use system.

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