“Can Arable Be Permacultural?”

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Brief Bio & Intro

I have a background in world religions and classical philosophy, specializing in the ancient Indian traditions. I am a Researcher and part-time farmer whose interests include permaculture, agro-ecology, organic farming, urban horticulture and traditional farming systems from around the world. I manage a charity urban gardening project in London and farm with oxen at New Gokul, Hertfordshire.

I am undertaking postgraduate research (MRes) at the Centre for Agroecology, Water and Resilience at Coventry University located at Ryton Organic Gardens in Warwickshire.

Research Title: “Investigating the potential of applying permaculture principles and methods to UK arable farming.”

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The ***Centre for Agroecology, Water and Resilience*** (CAWR) is driving innovative, transdisciplinary research on the understanding and development of resilient food and water systems internationally.

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Arable, Agriculture: Definitions

Agriculture from Latin *ager,* “field”, refers to the management of fields

Arable from Latin *arare*, “to plough” (in modern Italian a plough is an “aratro”)

Basic features of arable agriculture:

- Involves tillage/cultivation of the soil
- Field (as opposed to forest/wood/tree) based
- Dominated by annual plants, especially grasses

Permaculture: Definitions

“A philosophy of working with, rather than against nature; of protracted and thoughtful observation rather than protracted and thoughtless labour; and of looking at plants and animals in all their functions, rather than treating elements as a single-product system” (Mollison, B. (with Slay, R. M.) 1991: 1)

“The conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability and resilience of natural ecosystems” (Mollison, B. 1979: ix)

Agriculture & Permaculture: Incompatible? Is Agriculture the Problem?

“Gamboling about the plain and forest, hunting and living off the land is fun. Farming is not” (Manning 2004)

“Sustainable agriculture is an oxymoron” (Hemenway 2006)

“10,000 years of conflict between agriculture and nature” (Cox 2008)

“With the adoption of annual crops as the staple foods in our diet, humankind has indeed lived the biblical curse” (Shepard 2013)

“We have to accept that agriculture is an artefact and must always be artificial” (Tudge 2014)

Arguments for Incompatibility:

- Soil disturbance/exposed soil is not the norm/is uncommon in nature
- Perennial plants dominate wild ecosystems, as opposed to annuals
- Monoculture is uncommon in nature, biodiversity of flora is the norm
- There are historical examples of agricultural failure, both ancient (the Fertile Crescent) and recent (the Dust Bowl)
- Agriculture leads to poverty, malnutrition/famine and disease
- Agricultural societies have been characterised by more inequalities, hierarchies and conflicts
- Agricultural civilizations require constant expansion: imperialism has agricultural roots

Arguments Against Incompatibility:

- Extent, method and consequences of soil disturbance/tillage varies depending on the arable system
- Annual/perennial divide is unhelpful/unrealistic: annuals are no less “natural” than perennials. Domesticated plants and animals are simply plants and animals that live in symbiosis with humans
- An arable farming system does not necessarily involve monoculture and lack of diversity
- There are examples of successful, sustainable farming systems (at least until the recent industrial age) in Europe, India, China, Japan and elsewhere
- Disease/famine/malnutrition/poverty not necessarily the result of agriculture
- Inequalities, hierarchies and conflicts are common to all societies
- Imperial cultures are all agricultural but is agriculture the cause of imperialism?

Arable Permaculture?

- The goal of “arable permaculture”, by definition, must be “the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability and resilience of natural ecosystems”
- The arable permaculture system should differ from other permaculture systems by virtue of being characterised by a different ecology, one which is dominated by domesticated annuals, grassland and herbivores
- It has to be a mixed farming system ideally suited to local soil, climate and flora/fauna
- It must include important perennial plant elements, whether in the form of trees (e.g. agroforestry, orchards/groves, hedgerows) or perennial pasture/grasslands: it cannot be entirely dominated by annuals
- Agriculture must remain connected with/must include other primary activities: horticulture, forestry, foraging/gathering, hunting/fishing

A Basic Model

For England/Northern Hemisphere/temperate climates:

- Agriculture: the symbiotic alliance between humans and herbivores
- A dynamic interaction between arable land, grassland and herbivores – with each element dependent on the others
- Cultivated grasses (mostly cereals) and legumes as the annual crop staples, complemented by other annual crops (e.g. brassicas) suited to local conditions, livestock needs and crop rotations/maintenance of soil health/fertility
- In England, during the Agricultural Revolution, some of the characteristics of this model were in place: integration of arable land and grassland, folding livestock on arable fields, maintenance of fertility, crop diversity and rotation

New Gokul Farm: Arable Permaculture in Action?

- New Gokul Farm is part of Bhaktivedanta Manor, the Hare Krishna Movement's HQs. Located in Aldenham, near Watford, Hertfordshire
- This is a mixed farm with around 60 cows/oxen/bulls/calves. 100+ acres of pasture/hayfields and 9 acres of arable land. "Cow protection" is practiced: animals are used solely for milk and labour
- I have been at the farm since April 2012 and am currently in charge of a 4 acre arable field
- I have successfully introduced cultivated grasses/forages, a wide range of brassicas/Winter crops. Grains were introduced this season.
- My crops feed the animals and supply the farm shop and temple kitchen on a weekly basis.

Field methodology at New Gokul: guided by broad permaculture principles and design methods

- Complete dependence and integration with livestock, from the reliance on manure to the use of draught animals
- Complete exclusion of any conventional industrial method
- Polyculture, crop rotation and ecological intensification
- Crop selected to be ideally suited to local conditions
- Cultivation of crops designed to provide a complete diet to the local community
- The on-farm processing and manufacturing of raw materials
- The inclusion of perennials in a system dominated by annuals
- Selective, purposeful and minimal tillage and cultivation

Practical Examples & Methods: Grains/Cereals

- Cultivation of ancient annual cereal varieties (spelt and wheat) which produce lower grain yields, but exhibit a range of highly desirable attributes: low fertility requirements, very substantial biomass/straw productivity, co-existence with arable weeds, provision of wildlife habitat and the modest production of higher quality grain
- Grown in rotation, no more than once every 4 years (albeit rotation could include other grain types). Cultivation of traditional catch crops, such as stubble turnips
- Other grain producing crops, including “false grains”/”pseudo grains” such as buckwheat and amaranth

Practical Examples & Methods: Legumes

- Large acreage devoted to legumes, a higher percentage than both conventional and organic systems
- Important for soil fertility, pollinators and nutritional outputs from the land
- Same crop can be used both fresh and dried (e.g French Green Beans)
- Winter broad beans and peas seem to be the most suited
- Vetch grown as a cover and fodder crop
- Clover grown as companion plant, cover and fodder crop

Practical Examples & Methods: Three/Four Sisters

- The Three (or Four) Sisters method is a traditional Native American companion planting method: a polyculture of squash, maize and beans (with sunflowers or tobacco as a Fourth sister in some variations)
- Very popular amongst permaculturalists/often mentioned in the literature
- I have experimented with a field scale arable version
- Mixed, interesting results. Squash/Sunflower/Corn seems to be the best combination
- Goal: all crops grown from seed, great diversity and abundance of outputs. Potentially a source of fresh vegetables (courgettes, marrows, sweetcorn), oilseeds (sunflower and squash seed), winter vegetable and fodder (pumpkins), grain (corn seeds)

Practical Examples & Methods: Fodder Crops

- Arable land is dedicated to growing food for both humans and domesticated animals
- Unlike conventional arable farming, staple crops, especially grains, are designated for human consumption. Herbivores should primarily feed on what they are designed to eat and on what humans cannot possibly eat: grass
- Dedicated fodder crops include: perennial fodder crops, annual grasses/Winter cover crops (ryegrass/vetch), Winter catch crops (stubble turnips, radish), main crop brassicas
- There are plenty of dual purpose crops: brassicas (such as kale, turnips, radish), sweetcorn, squash etc…
- Agricultural waste and by-products: cereal straw, corn stalks, damaged/unsold potatoes, vegetable cuttings/waste, overgrown marrows etc… Through livestock, all biomass can be turned into energy, food and manure.
- Weeds: all bar a couple of weeds on our fields are edible to cattle and at times purposefully harvested

Practical Examples & Methods: Animal Draught

- Arable systems require energy for cultivation and tillage and animal draught is the ideal source
- It integrates arable land, grassland and herbivore; creates a closed, sustainable, clean energy cycle; animal driven tillage is kinder to the soil than tractors and heavy machinery
- Common objection to animal draught – that it would require a lot of additional land to grow feed for draught animals – is misguided
- Whilst perfectly compatible with permaculture principles, a country wide adoption of animal draught would involve great changes and challenges – e.g. need for re-ruralisation/massive increase in agricultural labour, there is a skills/knowledge shortage
- Another valid option is the production and use of on-farm biofuel/alcohol from crop waste/surplus or dedicated crop: there are already some examples of this in the permaculture movement

Practical Examples & Methods: Weeds

- Domesticated crops on arable fields must co-exist with undomesticated plants that thrive in the same soil and environment: weeds
- Weeds should be seen as an inevitable management challenge (and even as a potential resource) but never as an absolute problem
- Management options: 1) Weeds as fodder; 2) Weeds as food: Fat-hen (Chenopodium album L.) and Pigweed/Common Amaranth (Amaranthus retroflexus L.); 3) Cultivation; 4) Mulching; 5) Weeds as a “ley” or “green manure”
- Weeds as a guide for the farmer: Fat-hen and Pigweed are wild relatives of quinoa and domestic amaranth. The latter two crops should therefore thrive on our soils. Amaranth (both vegetable and grain varieties) has been tested on our field and grows very well. It will cross with the weed and unique local varieties should develop over time.

Conclusions

- Agriculture is the fundamental, necessary and most important activity of mankind
- Permaculture and agriculture are not incompatible
- Permaculture needs to offer a critique of arable farming, both preindustrial and industrial, without promoting its abandonment
- Arable farming can be reformed, improved and innovated through permaculture theory and methodology

Thank you for your attention

LET’S DISCUSS!