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Contents

Support

JOS has been founded on the spirit of participation. We have identified a need, worked with stakeholders to ensure that it meets all needs and pursued it till a point of completion. Our work has been voluntary and collaborative. We have much more to do and require your support.

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EDITORIAL: VIGILANT SERVANT LEADERSHIP

Brendan Hoare (bhoare@organicsystems.co.nz), Founder, Governance Board, *Journal of Organic Systems*
31 July, 2011

Over the last 70 years the Organic community has espoused a set of principles on which to farm, grow and live by. We have actively advocated the lifestyle, technologies and means to resolve many local and global issues which are now the titles of best-selling novels and treatise of recent times, *Cradle to Cradle* and *Biomimicry* to name a couple (Benyus 2002, McDonough & Braungart 2002). A carbon economy is exactly what we have espoused for decades. It is nice to feel we were right.

Continuing on a theme in the previous editorial, it is also very frustrating times. It is difficult to celebrate when generations of work is not acknowledged, or actively ignored. The symptoms of frustration abound; little or no research funding for Organic systems approaches is proportioned to our value to the food chain or calculated wider environment benefits and definitely less for the organisations that may organise it. While at the primary school level of education we have some success, we find there is diminishing support at the tertiary level. The situation is not better, it is worse. How could this be? How could we have permitted this to happen? Have we been absorbed, or peaked as a culture, accomplishing what we set out to do. I suggest not; the fun is just beginning, and so too the challenges.

It is fundamentally a leadership issue requiring vigilance and a servant leadership style that engages our entire community. This is the time to critically reflect on our performance and what it is we have become. How do we want to engage in the 21st century, who we want the Organic sector to become or have achieved by the end of its second decade are issues not often raised in leadership forum.

A first leadership step is to recognise and acknowledge that we offer great value and have demonstrated this for several decades. We are rightful participants at the table to discuss the integrated nature of the environmental and food security issues facing us. However, we will have to change our communication strategies and recognise that we have not been very good at communicating and public relations especially amongst ourselves.

Are we willing to go deeper, further and address the complex challenges, knowing that the answers are often found in the profound simplicity of our principles? I certainly hope so. Those who are not should perhaps step aside, and make room for a new generation of leaders.

This requires us to be honest with ourselves, to reflect on the past and re-evaluate our visions for the future, so we can develop a pathway in a direction that allows others to want to be a part of it. In Australia and New Zealand we need help with this. I'd suggest we may have to engage the innovation of people's movements so well evolved in many developing nations to assist us.

We too as a movement must also evolve. For example, we may have been world leaders in environmental standard setting but being certified Organic is now no guarantee that the produce is sustainable, and markets know this. Being a biological farmer is what mainstream, conventional agriculture wants and are working very hard in trying to take our space. If we do not like the 'business as usual' model, then we have to embrace the challenge they place before us by being proactive and welcoming them.

A specific challenge for research and researchers is to truly engage and apply the knowledge. To listen and connect to the will of others is servant leadership and one that our particular community can demonstrate. There is so much potential, why stop at the farm or individual, why not whole watersheds, islands and nations as well as communities and civilizations becoming Organic and our culture based on the principles becoming the common one. I would suggest that this is worth working for.

References

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FUNGAL POPULATION AND DIVERSITY IN ORGANICALLY AMENDED AGRICULTURAL SOILS OF MEGHALAYA, INDIA

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Abstract

The effect of different organic fertilisers (Farm Yard Manure [FYM]; Vermicompost [VC]; Plant Compost [PC] and Integrated Compost [INT], i.e. a combination of FYM, VC and PC in a 1:1:1 ratio) on the population and diversity of soil fungi was investigated in a maize-French bean trial. Fungal populations were much higher in organically fertilised plots as compared to the control and showed a decreasing trend in the order FYM>PC>INT>VC>CTRL. Altogether, 122 fungal species and two sterile mycelia were isolated from all the plots of which 25 fungal genera belonged to Deuteromycotina, seven to Ascomycotina, four to Zygomycotina and one to Mastigomycotina. The most common genera isolated from all the plots include *Penicillium*, *Aspergillus*, *Acremonium*, *Fusarium*, *Mortierella*, *Mucor*, *Paecilomyces*, *Talaromyces*, *Trichoderma* and *Verticillium*. Significant positive correlations between fungal populations and C_{org} were observed in all the organic amended plots. The organic matter level in the organically managed soil systems can play a pivotal role in fungal growth, sporulation and diversity.

Keywords: organic, compost, microbial, fertility, physical properties, chemical properties.

Introduction

In Meghalaya, agriculture is the main stay of the people and about 70% of the population depends on agriculture for their livelihood. During the 20th century, conventional agricultural management, reliant on mineral fertilisers, has been popularised in this area for increasing the yield of crops. On average, the consumption of chemical fertilisers in the State is 18 kg/ha per annum and is concentrated mainly in potato and other vegetables (Meghalaya Agriculture Profile, 2006). Additionally, a large part of the population in Meghalaya still practises shifting agriculture or *jhuming* (Saleh, 1988, Borah, 1999) which has deleterious effect on forest area and soil fertility and has increased the need for chemical fertilisers application to retain soil nutrients. The intensive use of agrochemicals is known worldwide to reduce biodiversity, increase erosion and deplete soil organic matter (Dick,1992) and affect surface and ground water quality, especially through leaching (Schiavon *et al*., 1995; Tate, 1995). Such activities (i.e. *jhuming* and use of chemical fertilisers) in the hilly regions may affect neighbouring regions as well (Ghosh, 2003).

Soil is a most precious natural resources and contains the most diverse assemblages of living organisms. Indigenous microbial populations in soil are of fundamental importance for ecosystem functioning in both natural and managed agricultural soils (O'Donnell *et al*. 1994; Doran and Zeiss 2000) because of their involvement in such key processes as soil structure formation, organic matter decomposition, nutrient cycling and toxic removal (Van Elsas, 1997; Doran and Zeiss, 2000). The community of soil flora and fauna is influenced directly or indirectly by management practices, e.g. cultivation and the use and application of organic and inorganic fertilisers (Bloem *et al*., 1994; Matson *et al*., 1997). A growing number of studies show that organic farming leads to higher soil quality and more biological activity (microbial populations and microbial respiration rate) in soil than conventional farming (Droogers and Bouma, 1996; Mader *et al*. 2002; Girvan *et al.,* 2004). Microbial population size and community structure are sensitive to changes in chemical properties of the surrounding soil (Pansombat *et al.,* 1997; Tokuda and Hayatsu, 2002). Further, considerable evidence indicates that changes in the composition of a microbial community can be used to predict and dictate alteration in soil quality (Van Brugen and Semenov, 2000; Breure, 2005).

Microbial communities, particularly bacteria and fungi constitute an essential component of biological characteristics in soil ecosystems. It has been estimated that 1.5 million fungal species are present in natural ecosystems, but only 5 –10% have been described formally (Hawksworth 2001). Schmit & Mueller (2007) estimated that there is a minimum of 7, 12,000 fungal species worldwide. The actual number of fungi is still unknown; however, only 5-13 % of the total estimated global fungal species have been described (Wang *et al.* 2008). Research on fungal diversity provides a basis for estimating the functional role of fungi in ecosystems. Soil fungal population is favoured largely by organic farming systems (Drinkwater et al*.* 1995; Girvan et al*.* 2004) but not much has been published about its population and diversity in these systems especially in the agricultural lands of Meghalaya. A better understanding of the fungal diversity in soil with different organic amendments may prove crucial in predicting which is best for application.

A precise study on the fungal communities associated with organic farming systems particularly in this poorly studied area can be crucial in appraising the beneficial and harmful aspects of these soil microbes. As such, this study was carried out with an aim to study the fungal population and diversity of organic systems in a maize-French bean field trial.

Materials and methods

Site description

The field experiment was conducted at a lowland experimental block of Agronomy Division, Indian Council of Agricultural Research (ICAR) for North Eastern Hill (NEH) Region, Meghalaya. The geographical location of the study site is 25˚41' 26.7"N latitude and 91˚55'26.2"E longitude and is located at an elevation of 956 m (asl). The climate of the area is humid sub-tropical with temperature ranging from 6˚ C (January) to 30˚C (July) and an annual precipitation of 2320 mm. On an average, 90% of the total rainfall is received during April-October. Soil texture of the experimental site is silty loam (Clay - 32.58%; Sand - 12.83%; Silt – 54.58%).

Experimental design and treatments

For the experimental set up two crops grown in rotation were selected viz., maize (*Zea mays* L.) (May – July) and French bean (*Phasoelus vulgaris*) (August – September). The experimental field was divided into five plots with each having three replicates for the different organic amendment. The net plot size was 3m x 4m. A control plot (i.e. without organic fertiliser) was also maintained. The different organic amendments used include Farm Yard Manure (FYM); Plant compost (PC); Vermicompost (VC) and Integrated Compost (INT) i.e. combination of FYM, VC and PC (1:1:1). Optimum fertiliser dosage was applied to the field as recommended by ICAR (Table 1). The organic amendments were applied twice in a year i.e., early April and late July before sowing maize and French-bean seeds respectively. Seeds were manually sown in rows 25 cm apart at a depth of 4-5 cm. Hand weeding was done to manage the weeds. Both the crops were cultivated under rainfed conditions.

Table 1. Type of organic amendments and doses in the experiment.

Fertiliser	Source	Dose (tonnes/ha)	Dose (kg/plot)
Farm Yard Manure (FYM)	Dried cow dung	5	48
Plant Compost (PC)	Weeds from the field	5	48
Vermicompost (VC)	Earthworm cast	5	48
Integrated Compost (INT)	FYM:PC:VC (1:1:1)	5	48 (16:16:16)

Soil physico-chemical properties

Soil sampling was done from the upper 0 - 15 cm depth at monthly interval from pre-sowing to post-harvest period for a period of two years (2006 and 2007). The soil samples were collected randomly from five different locations (i.e. from the three replicate plots) during each crop cycle under different organic fertiliser treatment. The soil samples from each organic fertiliser treatment were pooled together and mixed thoroughly so as to get a composite sample.

Collected samples were brought to the laboratory sieved through 2mm sieve at field moist conditions and determination of soil moisture content and pH was done. Air dried ground and sieved (0.25 mm) samples were used for the estimation of organic C, total N, available P and K content. Three replicate samples were used for each analysis. Moisture content (MC) was determined by weight loss after drying 10 g of soil at 105°C for 24 hours and expressed as percentage dry weight. Soil pH was measured in a 1:5 water suspension using a portable digital pH meter. Colorimetric method (Anderson & Ingram 1993), micro Kjeldahl distillation and titration method (Jackson 1973), Molybdenum blue method (Allen *et al.* 1974) and the ammonium acetate flame photometry method (Jackson 1973) were applied to estimate organic carbon (C_{org}), total nitrogen (N), available phosphorus (P) and exchangeable potassium (K) respectively.

Fungal population count

For fungal population analysis, serial dilution plate method (Johnson and Curl, 1972) was followed using Rose Bengal Agar medium (Martin 1950) supplemented with streptomycin sulphate. The inoculated Petri plates were incubated in a sterile culture room at 25˚ ± 1˚C. Colony forming units (CFU) were estimated by counting the number of colonies after five days. Fungal colonies formed were calculated on per gram dry soil basis. Fungi were identified according to their macroscopic and microscopic features. Identification at the species level was carried out according to the morphological characters found principally in publications by Gillman (1957), Barnett and Hunter (1972), Domsch *et al.* (1980), Subramanian (1983), Ellis (1993) and Watanabe (1994). Pure cultures of fungi were maintained in test tubes slants containing Czapex Dox agar medium (Raper & Thom 1949) and preserved in deep freezer at -20˚C.

The following indices for fungal species diversity were calculated using the Index of general diversity (*H'*) or Shannon and Weaver (1949) diversity index, $H' = -\sum(ni\ /N\ \log_e ni\ N)$ and the Index of dominance (*C*) or Simpson (1949) index of dominance, $C = \sum (ni/N)^2$.

Statistical analysis

Correlation coefficient was done to test the relationship between fungal population and the soil physico-chemical properties. Difference at $p \leq 0.05$, 0.01 and 0.001 levels were considered as statistically significant. Analysis of Variance (ANOVA) (Tukey's test) was carried out to compare the variation of the fungal population means in the different organic amendments. All statistical analyses were performed using Statistica 6.0 software package.

Results

Fungal population and diversity

Fungal population was comparatively higher in organically amended plots as compared to control. Among all the treatments FYM showed significantly higher fungal population. The fungal population showed the trend in decreasing order as FYM>PC>INT>VC>CTRL. Inconsistent monthly variation in the fungal population was also observed in all the treatments (Figure 1). Significant variation was observed in all the plots (control and organically amended plots) according to Tukey's test (ANOVA) at $p \leq 0.05$ (Figure 2).

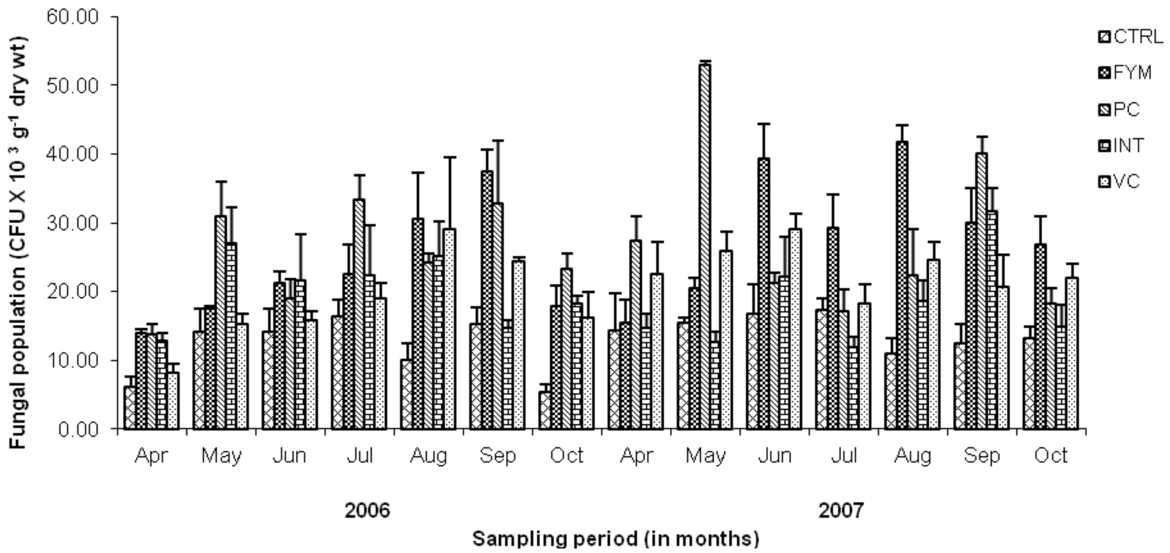

Figure 1. Fungal population in maize/French-bean field soils under different organic treatments. Mean ± SE shown. (CFU = Colony forming units; CTRL = Control; FYM = Farm yard manure; PC = Plant Compost; VC = Vermicompost; INT = Integrated compost.)

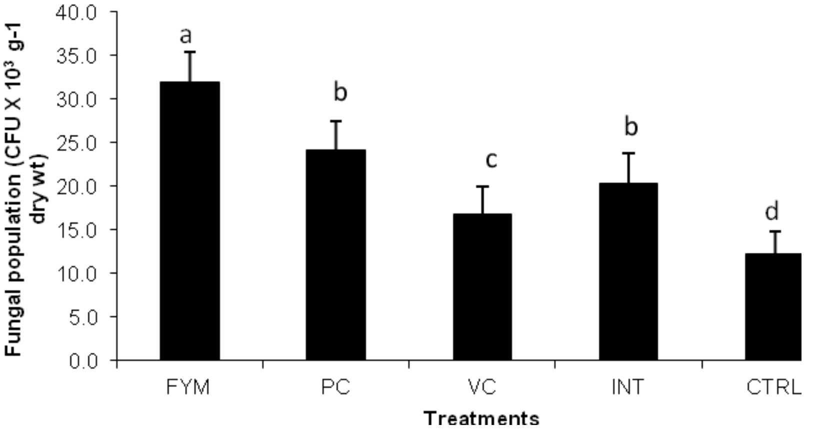

Figure 2. Effect of organic amendments on the fungal population in maize/French bean field soils. Mean ± SE with the same letter on top do not differ significantly. (CFU = Colony forming units; CTRL = Control; FYM = Farm yard manure; PC = Plant Compost; VC = Vermicompost; INT = Integrated compost.)

In this study, altogether a total of 122 fungal species and 2 sterile mycelia were isolated from all the plots. The list of fungal species isolated from the different plots is depicted in Table 2. During the maize crop cycle, 111 fungal species were isolated; however, 82 fungal species were isolated from the French-bean crop cycle. Comparing the two crop cycles no significant variation in the fungal population was observed. Nevertheless, fungal species was comparatively higher during maize crop cycle than the French-bean crop cycle. Maximum fungal species were isolated from FYM treated plot i.e. 77 species and least from control plot, i.e. 52 species. Shannon diversity index (Figure 3A) showed that PC plot showed a slightly higher species richness value (2.50) than FYM plot (2.45). Simpson index of dominance (Figure 3B) showed a higher value in the CTRL plot and the lowest value in PC treated plot.

The fungal species isolated belonged mostly to Deuteromycotina (25 species) followed by Ascomycotina (7 species), Zygomycotina (4 species) and Mastigomycotina (1 species). Two species belonging to Mycelia Sterilia were also isolated. At the genera level, *Penicillium* (24 species), *Aspergillus* (8 species), *Acremonium* (6 species), *Fusarium* (6 species), *Mortierella* (6 species), *Mucor* (6 species), *Paecilomyces* (4 species), *Talaromyces* (4 species), *Trichoderma* (4 species) and *Verticillium* (4 species) and were found to be among the most common. At the species level, the dominant species are mainly the cellulose-degrading fungi belonging to Deuteromycotina except for *Pythium irregulare*. These includes *Aspergillus flavus, A. niger, Fusarium oxysporum, Humicola fuscoatra, H. grisea, Penicillium janthinellum, P. lanosum, P. rubrum, P. simplissicimum, P. verrucosum, Phoma eupyrena, Pythium irregulare, Trichoderma koningii,* and *T. viride* (Table 2).

Table 2. List of fungal species isolated from soils treated with different organic fertilisers under maize/French-bean rotation. (CTRL = Control; FYM = Farm yard manure; PC = Plant Compost; INT = Integrated compost, VC = Vermicompost.)

Species	Maize					French-bean				
	CTRL	FYM	PC	INT	VC	CTRL	FYM	PC	INT	VC
Absidia corymbifera	-	-	-	+	-	-	-	-	-	+
Absidia cylindrospora	-	+	-	-	-	-	-	-	-	-
Absidia glauca	-	-	+	-	-	-	-	-	-	-
Absidia spinosa	-	-	+	-	-	-	-	-	-	-
Acremonium butyri	-	-	+	-	-	-	-	-	-	-
Acremomium cerealis	+	+	-	+	+	-	+	-	+	+
Acremonium furcatum	-	+	+	+	-	+	+	-	-	-
Acremonium fusidioides	+	+	-	-	+	-	-	-	-	+
Acremonium kiliense	-	-	-	+	+	+	+	+	+	+
Acremonium strictum	-	+	+	+	+	-	-	+	-	-
Alternaria alternata	-	-	+	-	-	-	-	-	-	-
Alternaria citri	+	-	-	-	-	-	-	-	-	-
Alternaria longipes	-	+	+	-	-	-	-	-	-	-
Anthroderma cuniculi	+	-	+	-	-	-	-	-	-	-
Anthroderma insingulare	-	-	+	-	+	-	-	-	-	-
Aspergillus clavatus	-	-	-	+	-	-	-	-	-	-
Aspergillus flavus	+	+	+	+	+	+	+	+	+	+
Aspergillus fumigatus	+	+	+	-	+	+	+	+	+	+
Aspergillus japonicus	+	-	-	-	-	-	-	-	-	-
Aspergillus niger	+	+	+	+	+	+	+	+	+	+

Aspergillus oryzae	-	-	-	+	-	-	-	-	-	-
Aspergillus wentii	-	-	+	-	-	-	-	-	-	-
Aspergillus versicolor	-	-	+	-	-	-	-	-	+	-
Beltrania sp.	-	-	-	-	+	-	-	-	-	-
Chaetomium sp.	-	-	+	-	-	-	-	-	-	-
Cladosporium cladosporoides	-	+	+	+	+	-	+	+	+	+
Cladosporium herbarum	-	-	+	+	+	-	+	+	+	-
Cladosporium macrocarpus	-	-	-	-	-	-	-	+	-	-
Cochliobolus sativus	+	-	-	-	-	-	+	-	-	-
Curvularia pallascens	-	-	+	-	-	-	-	-	-	-
Cylindrocladium scoparium	-	-	+	-	+	-	-	-	-	-
Fusarium moniliforme	-	-	-	-	+	-	-	-	-	-
Fusarium oxyporum	+	+	+	+	+	+	+	+	+	+
Fusarium redolens	-	-	-	-	+	-	-	-	-	-
Fusarium semitectum	-	+	+	-	+	-	-	+	+	-
Fusarium solani	+	-	-	-	-	-	-	-	+	+
Fusarium sporotrichioides	-	-	+	-	-	-	-	-	-	-
Gliocladium catenulatum	+	-	+	+	+	+	+	+	-	+
Gliocladium roseum	-	+	+	+	-	-	+	+	+	-
Gongronella butleri	+	+	+	+	+	-	+	+	+	+
Gymnoascus ressii	-	-	-	-	-	-	-	-	-	+
Helicosporium sp.	-	-	-	-	+	-	-	-	-	-
Helminthosporium sp.	-	-	-	+	-	-	-	-	-	-
Humicola fuscoatra	+	+	+	+	+	+	+	+	+	+
Humicola grisea	+	+	+	+	+	+	+	+	+	+
Hyphomyces chrysospermus	-	-	+	-	+	-	+	+	+	-
Mammaria echinobotryoides	-	+	-	-	+	+	+	+	-	-
Monilia sitophila	-	+	+	-	+	-	-	-	-	-
Mortieralla alpina	-	-	-	+	-	-	-	-	-	-
Mortierella elongata	-	-	+	-	+	-	-	-	-	+
Mortierella gamsii	+	-	+	+	+	+	+	+	+	+
Mortierella hyalina	-	-	-	+	-	+	-	-	-	-
Mortierella nanna	+	-	-	-	-	-	-	-	-	-
Mortierella parvispora	-	+	-	-	+	-	-	-	-	+
Mucor circinelloides f. circinelloides	+	+	+	-	+	+	+	+	-	-
Mucor circinelloides f. griseo cyanus	-	-	-	-	-	+	+	-	+	-
Mucor hiemalis f. hiemalis	-	-	-	-	-	-	-	-	+	-
Mucor hiemalis f. silvaticus	-	-	-	-	-	-	+	+	+	+
Mucor mucedo	+	+	-	+	+	-	+	-	+	-
Mucor racemosus	-	+	+	+	+	-	+	-	-	+
Myrothecium cinctrum	+	+	+	-	-	-	+	-	-	-
Myrothecium verrucaria	-	+	-	-	+	-	-	-	-	-
Nannizia incurvata	+	-	-	-	-	-	-	-	-	-
Nannizzia grubya	+	+	-	-	-	-	-	-	-	-
Nectria ventricosa	-	-	-	-	-	+	+	-	-	+
Oidiodendron echinulatum	-	+	-	-	-	-	-	-	-	-
Oidiodendron truncatum	-	+	+	-	+	-	+	-	+	+
Paecilomyces carneus	-	+	+	+	+	+	+	+	+	+
Paecilomyces lilacinus	-	-	+	-	-	-	+	-	-	+
Paecilomyces variotii	-	-	-	-	-	-	+	-	-	-
Paecilomyces marquandii	-	-	-	+	+	+	+	-	+	+
Penicillium atrovenetum	+	-	+	-	-	+	-	-	-	-
Penicillium brevicompactum	+	+	+	+	+	-	+	+	+	+
Penicillium canescens	+	-	+	+	+	-	-	+	+	+
Penicillium chrysogenum	-	+	+	-	-	-	-	+	+	-
Penicillium citrinum	+	+	+	-	-	-	-	+	-	-
Penicillium daleae	+	+	+	+	+	+	+	-	+	+
Penicillium decumbens	-	-	-	-	+	+	-	-	-	-
Penicillium digitatum	-	-	-	-	+	-	-	-	-	-
Penicillium fellutanum	-	+	-	-	-	-	+	-	+	+
Penicillium frequentans	+	+	+	+	+	+	+	+	+	-
Penicillium herquei	-	+	+	-	+	+	+	+	+	-
Penicillium implicatum	-	-	-	-	+	-	-	-	-	-
Penicillium janthinellum	+	+	+	+	+	+	+	+	+	+
Penicillium jensenii	+	+	+	+	-	-	+	+	+	+
Penicillium lanosum	+	+	+	+	+	+	+	+	+	+
Penicillium nigricans	-	-	-	-	-	-	-	-	-	+
Penicillium regulosum	-	-	-	-	-	-	+	-	-	-
Penicillium restrictum	+	-	-	+	-	-	+	-	-	-
Penicillium rubrum	+	+	+	+	+	+	+	+	+	+
Penicillium simplissicimum	+	+	+	+	+	+	+	+	+	+
Penicillium stoliniferum	+	+	-	+	-	-	-	-	+	-

Penicillium variabile	-	-	-	-	-	-	-	+	-	-
Penicillium verrucosum	+	+	+	+	+	+	+	+	+	+
Penicillium waksmanii	+		-	-	-	-	-	-	-	-
Phialophora cinerescens	-	+	-	+	-	-	-	-	-	-
Phialophora festigiata	-	-	-	-	-	-	+	+	-	-
Phoma eupyrena	+	+	+	+	+	+	+	+	+	+
Phoma medicagnis	+	-	-	-	-	+	+	-	-	-
Plectosphaerella cucuneria	-	-	-	-	+	-	-	-	-	-
Pseudoeurotium zonatum	-	-	-	-	+	-	-	+	-	-
Pythium aphanidermatum	-	+	-	-	-	-	+	-	-	-
Pythium intermedium	+	+	+	-	+	+	+	+	-	+
Pythium irregulare	+	+	+	+	+	+	+	+	+	+
Ramichloridium schulzeri	-	+	-	+	-	-	+	-	-	-
Rhizopus stolonifer	+	+	+	+	+	+	-	+	+	+
Scopulariopsis brumptii	-	+	-	+	-	-	-	-	-	-
Scopulariopsis stercoraria	+	-	-	-	-	-	-	-	-	-
Staphylotrichum coccosporum	+	+	-	+	+	-	-	+	-	+
Talaromyces emersonii	-	-	+	-	+	-	-	-	-	-
Talaromyces helicus	-	-	-	+	-	-	-	-	-	-
Talaromyces stachyspermum	-	-	+	-	-	-	-	-	-	-
Talaromyces wortmanii	+	-	+	-	-	+	-	+	-	+
Torula herbarum	-	-	-	+	-	-	-	-	+	-
Trichoderma hamatum	-	+	-	-	-	-	-	-	-	-
Trichoderma koningii	+	+	+	+	+	+	+	+	+	+
Trichoderma polysporum	-	+	+	+	-	-	-	+	+	-
Trichoderma viride	+	+	+	+	+	+	+	+	+	+
Verticillium albo-atrum	-	+	+	+	+	+	-	+	-	+
Verticillium chlamydosporium	-	-	-	-	+	-	-	-	-	-
Verticillium dahliae	-	+	-	-	-	-	-	+	-	-
Verticillium nigrecens	-	-	+	-	-	-	-	+	-	-
White Sterile mycelium	-	-	+	+	+	+	+	-	+	+
Yellow sterile mycelium	-	-	-	-	+	+	-	-	-	+

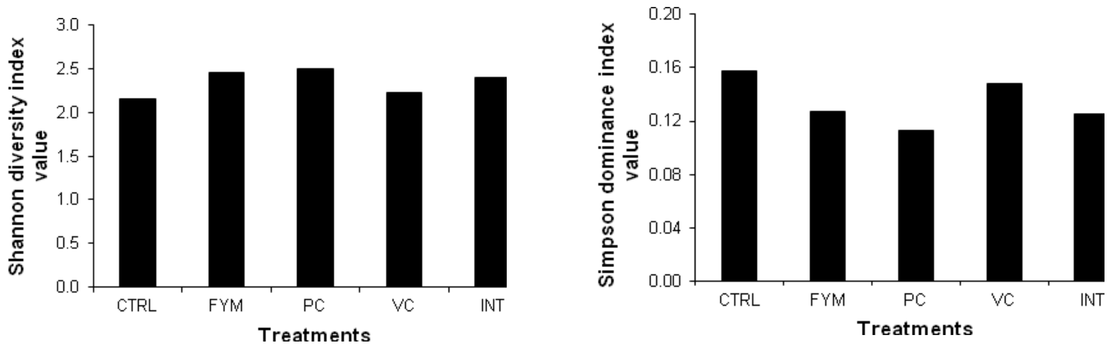

Figure 3. List of fungal species isolated from soils treated with different organic fertilisers under maize/French-bean rotation. (CTRL = Control; FYM = Farm yard manure; PC = Plant Compost; INT = Integrated compost, VC = Vermicompost.)

Soil physico-chemical properties (pH, MC, C_{org}, N, P and K)

The pH of the soil in the present investigation was found to be acidic. The pH was significantly increased by FYM application. Moisture content and C_{org} was significantly increased by PC application. Again, FYM treated plot showed highest total N, available P and exchangeable K content. Least nutrient content (N,P,K) was observed in the CTRL plot (Table 3). Significant positive correlations of fungal population with C_{org}, total N, available P and exchangeable K was observed in all the organically treated plots (Table 4).

Table 3. Physico-chemical characters of maize/French bean field soils with standard error (SE). The range of the values are given in parenthesis. (CTRL = Control; FYM= Farm yard manure; VC = Vermicompost; INT = Integrated compost; PC = plant compost; MC= moisture content, OC= organic carbon, AP= available phosphorus, K= exchangeable potassium, TN= total nitrogen.)

	Treatments				
Properties	**CTRL**	**FYM**	**PC**	**INT**	**VC**
pH	4.683 ± 0.031 (5.1- 4.1)	5.470 ± 0.028 (5.9 - 4.7)	5.305 ± 0.031 (5.9 – 4.7)	4.886 ± 0.028 (5.6 – 4.4)	5.155 ± 0.017 (5.8 - 4.5)
MC (%)	22.98 ± 0.091 (28.70 – 20.50)	24.81 ± 0.244 (28.47 – 20.90)	25.74 ± 0.266 (31.33 – 22.20)	23.85 ± 0.102 (26.17 – 21.17)	24.10 ± 0.162 (26.70 – 20.50)
OC (%)	1.205 ± 0.014 (1.477 – 0.847)	1.449 ± 0.015 (1.793 – 0.856)	1.651 ± 0.014 (1.860 – 1.144)	1.400 ±0.014 (1.644 – 1.113)	1.382 ± 0.018 (1.779 – 0.851)
TN (%)	0.250 ± 0.006 (0.368 – 0.130)	0.431 ± 0.008 (0.658 – 0.280)	0.360 ± 0.008 (0.568 – 0.252)	0.309 ± 0.007 (0.540 – 0.200)	0.388 ± 0.008 (0.625 – 0.253)
AP (µg-1)	16.936 ± 0.028 (21.60 – 13.80)	28.671 ± 0.022 (43.60 – 16.80)	21.279 ± 0.034 (31.60 – 16.20)	24.036 ± 0.029 (38.00 – 15.10)	20.107 ± 0.023 (30.60 – 14.40)
Ex K (%)	0.028 ± 0.000 (0.051 – 0.006)	0.040 ± 0.001 (0.122 – 0.029)	0.039 ± 0.000 (0.098 – 0.014)	0.034 ± 0.000 (0.091 – 0.015)	0.047 ± 0.001 (0.106 – 0.025)

Table 4. Correlation coefficient (r) values among fungal population with soil physico-chemical properties in control (CTRL), farm yard manure (FYM), vermicompost (VC), integrated (INT) and plant compost (PC) under maize/French bean rotation. (FP = Fungal population; MC= moisture content, OC= organic carbon, AP= available phosphorus, K= exchangeable potassium, TN= total nitrogen; AM = ambient temperature; RF = rainfall; a, b, c = significance level within each column at 0.10, 0.05 and 0.01 respectively; NS= not significant.)

Treatments	pH	MC	OC	AP	K	TN	AT	RF
CTRL	NS	0.63 a	0.68 b	NS	NS	NS	NS	0.56 a
FYM	0.54 a	0.77 b	0.73 b	0.66a	0.63a	0.62 a	NS	0.61 a
PC	NS	0.60 a	0.77b	0.64 a	0.65 a	0.55 a	NS	0.57 a
INT	NS	NS	0.65 a	0.58 a	0.63 a	0.57 a	0.60 a	0.57 a
VC	NS	0.62 a	0.79 c	0.60 a	0.70 b	0.60 a	0.55 a	0.60 a

Discussion

Fungal population and diversity

Results from the present investigation showed that the increase in the available nutrients in FYM amended plots resulted in maximum fungal population as indicated by significant correlations ($p \leq 0.05$, 0.01 and 0.001) with soil pH, MC, C_{org}, N, P, K and rainfall. Significant correlations between fungal population with C_{org} and rainfall in all the organically amended plots noticeably indicate that organic carbon level in the soil and precipitation play pivotal role in fungal growth and sporulation. However, in the control plot as well, correlations between fungal population and C_{org} and rainfall suggested that the plant residues returned to the soil and the death and decay of organisms provided the necessary organic carbon necessary for the fungal communities in this particular plot where there is no input of organic amendments. Greater microbial populations in FYM treated plots as compared to chemically amended plots were reported by Venkateswarlu (2000) and Sharma *et al.* (1983). Application of farm yard manure to agricultural fields can be viewed as an excellent way to recycle nutrients, maintain soil quality and in harbouring higher fungal populations.

Inconsistent monthly variation in fungal population in all the plots could be due to the different stages of the crop growth, the type and amount of organic amendment supplemented and the degree of decomposition of the organic amendment. During the crop growing stages nutrient uptake by the plants increases and this resulted in insufficient or depletion of nutrient availability for the fungi. As such, fungal population decreases when the crop growth is at its peak. In our study, cultivation was done from April to October and the field is left fallow during the winter season. Lower fungal population in the pre-harvest (i.e. April) is attributed to lack of vegetation and organic amendment input during the winter months. Even though the treatments were done in the same plots during the study period, the rows were not established in exactly the same location and the timing of fertiliser input was not same in both the years. This could be another factor for the uneven distribution of soil nutrients and hence, inconsistent monthly variation in fungal population and diversity. Song *et al.* (2007) indicated that difference in the establishment of rows during the field preparation leads to alteration of microbial communities.

Higher fungal species during the maize crop cycle is due to the fact that maize cultivation provides adequate plant cover which creates favourable microclimatic conditions for the profuse growth and sporulation of the fungal species. On the other hand, a relatively longer growth period of the maize plant is also another aspect which can influence the fungal species composition as compared to the French bean crop cycle. It can be proposed that incorporation of organic manures directly have an impact on the soil properties, the plant growth which inturn influence the fungal population and species. Hackl *et al.,* (2000) indicated that the plant species growing on the soil also equally influence the population and species composition of the soil fungi.

Addition of fresh plant residues and the amount of residue returned from the standing crop increases the organic matter accumulation in the soil. Microbial activity occurs at a faster rate when maximum organic matter and favourable conditions are available. This is reflected by higher fungal species diversity and richness in PC amended plot. As such, utilisation of weeds and other crop residues (in the form of PC) from the field act a good source of organic fertiliser both for the population and diversity of the fungal species. Higher Simpson index value of dominance in the control plot indicates the presence of more dominant species in this plot. Conversely, the result from the control plot helps in estimating and identifying the indigenous fungal population and diversity of the study site.

The genera isolated in this study are active in decomposing and thrive best in decaying organic debris (Domsch *et al.* 1980, Subramanian 1983). Since the fertilisers used in this study are of organic origin as such, these fungi are commonly isolated. On the other hand, frequent occurrence of these species in all the plots is also attributed to the fast growing nature of these species, similar soil properties, the same type of rotation and the land use history. As dilution plate method was followed for fungal population estimation *Penicillium* sp. were detected in higher frequency as compared to other species. This is in agreement with the finding of Domsch *et al.* (1980) who also showed that soil washing technique can however reduce the frequency of *Penicillium* sp.

Organic manures when applied to the soil supply readily available substrate to the cellulose decomposing fungi. This could be one explanation for the dominance of Deuteromycotina species in the organically amended plots in this study. Nonetheless, *Pythium irregulare* and *Fusarium oxysporum* known as the most pathogenic species of its genus (Domsch *et al.* 1980) were also the dominant species isolated from all the plots. This finding is consistent with Abawi and Widmer (2000) who showed an increase in pathogenic fungi with organic fertiliser application. However, these pathogenic fungi did not cause any severity to the crop plants throughout the study period. The occurrence and dominance of antagonist fungal species i.e. *Trichoderma viride, Penicillium* sp. and *Aspergillus* sp. in our study might have aid in antagonising the pathogenic species and reduce the disease severity which these fungi can inflict on the crop plants studied. As these species were largely isolated from the organically managed soils in this study, enhancing the use of organic manures in a long run may perhaps prove crucial for large scale control of many soil-borne fungal diseases. This is of paramount importance in organic farming systems where soil fungus itself acts as a biological agent which can help in excluding the use of synthetic fungicides.

Soil physico-chemical properties (pH, MC, C_{org}, N, P and K)

The acidic nature of the soil under study was influenced by rainfall ($p \leq 0.05, 0.01$) as heavy rainfall causes leaching out much of the basic forming cations (Ca^{2+}, Mg^{2+}, K^+ and Na^+) leaving mostly H^+ and Al^{3+} cations which are largely responsible for soil acidity. Conversely, FYM amendment plays an important role in improving the soil quality by buffering the pH of the soil whereby, they increase the basic cations. Parham et al. (2002) showed that the soil pH increased significantly in the plots treated with cattle manure while chemical fertiliser application resulted in slightly lower pH values. Maximum moisture content in the PC treated plot is due to higher accumulation of organic matter with this treatment. Accumulation of organic matter in the surface soil and vegetation cover (i.e. plant compost) is highly effective in checking soil evaporation which increases the soil water holding capacity. It can be also be hypothesised that fresh plant compost application accelerates rapid decomposition thereby, increasing microbial respiration (Coyne 1999) which might have led to increase in the soil moisture content level. Coyne (1999) indicated that most of the organic C in soil comes from decomposition of plant residues and as green plant residues consists mostly of water (Brady and Weil 1996) they undergo decomposition at a much faster rate compared to the complex nature of animal manures. Thus, PC treated plot resulted in higher C_{org} in this study. Perrucci *et al*. (1997) also showed that burying crop residues in soil could help limit the gradual depletion of soil organic matter and improve chemical properties of the soil. Farm yard manure is a potentially important source of nitrogen (N), phosphorus (P), potassium (K). As such, significant increase in total N, available P and K contents with FYM addition in our results is directly related to the large content of these nutrients in this compost. This is in agreement with the findings of Motavalli *et al.* (2002), Plaza *et al.* (2004) and Sadej and Przekwas (2008).

Conclusions

From our study it can be concluded that (i) organic fertilisers particularly farm yard manure (FYM) and plant compost (PC) have better impact on the fungal population, its diversity and the physico-chemical properties of the soil than not adding an organic amendment. The study conducted however, have some limitation where the soil sampling was confined only to selected experimental plots. There is need for a wider study area so as a complete representation of the fungal diversity and beneficial aspects of these significant microbes in organic farming systems is acquired. This will enable augmentation and promotion of organic agriculture in the region.

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THE BETTESHANGER SUMMER SCHOOL: MISSING LINK BETWEEN BIODYNAMIC AGRICULTURE AND ORGANIC FARMING

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> "*Dr. Ehrenfried Pfeiffer … will be in charge of demonstrations, assisted by members of the Bio-dynamic Association and others … As Dr. Pfeiffer's activities are world-wide, the opportunity of securing his services for a full week is a rare and important one*" Lord Northbourne (1939e, p.1).

Abstract

Biodynamic agriculture and organic farming have been regarded as having different provenances and having arisen independently. The present account introduces the 'missing link' between the two. In 1938 Ehrenfried Pfeiffer published the milestone book on biodynamics: *Bio-Dynamic Farming and Gardening*. In 1940 Lord Northbourne published *Look to the Land*, the work that introduced the term 'organic farming'. In the summer of the intervening year, Pfeiffer travelled from Switzerland to Northbourne's estate in Kent, UK, and presented for British farmers a nine day course on biodynamics, the Betteshanger Summer School and Conference on Bio-Dynamic Farming, 1-9 July 1939. Pfeiffer was supported by the pre-eminent biodynamic scholar-practitioners, Otto Eckstein and Hans Heinze. Dr Scott Williamson of the Peckham Experiment was the sole British lecturer at the Betteshanger Summer School. For the UK Bio-Dynamic Association, the Betteshanger Summer School was the highlight of the year. Northbourne and Pfeiffer had collaborated on the Farleigh Experiment in 1938, and Northbourne had travelled to Switzerland in January 1939 to arrange Pfeiffer's visit. War broke out less than eight weeks after the Betteshanger Summer School. Northbourne's manifesto on organic agriculture, *Look to the Land*, was published in May of the following year. The book took the Steinerian and biodynamic view of 'the farm as an organism' as its central tenet and adopted it as the nominative motif for 'organic' farming. The book offered to the Anglophone world an account that was secular and distanced from any Anthroposophic or Germanic roots. Subsequently, Northbourne sought to bring Pfeiffer to the UK but Pfeiffer's next and final visit was in 1950. The Betteshanger Summer School and Conference on biodynamics has been otherwise unreported. As this account demonstrates, Betteshanger was a stepping stone from biodynamics to organics. Northbourne sponsored Pfeiffer's visit and the Betteshanger biodynamics conference in 1939, and the following year he introduced his term 'organic farming' and its philosophy in his book *Look to the Land*.

Keywords: Organic agriculture, biodynamic farming, conference, 'Bio-Dynamic Farming and Gardening', 'Look to the Land', Lord Northbourne, Ehrenfried Pfeiffer, Viscount Lymington, Earl of Portsmouth, Otto Eckstein, Hans Heinze, Albert Howard, Farleigh Experiment, Haughley Experiment, Kent, Bio-Dynamic Association.

Introduction

Dr. Ehrenfried Pfeiffer (1899-1961) published *Bio-Dynamic Farming and Gardening* in 1938 (Plate 1). It was the culmination of a decade and a half of experimental agricultural work of the Experimental Circle of Anthroposophical Farmers in which the indications of Rudolf Steiner (1861-1925) were put to the test and the results formalized (Paull, 2011b). Steiner had presented his Agriculture Course of eight lectures plus associated discussion sessions, to an audience of 111 attendees from six countries, over a ten day period, 7-16 June 1924, in Koberwitz (now Kobierzyce, Poland) (Paull, 2011a). Steiner described it as: "a course of lectures containing what there is to be said about agriculture from an anthroposophical point of view" (Steiner, 1924b, p.9). He stated that "the lectures should be considered first of all as hints, which for the present should not be spoken of outside this circle, but looked upon as the foundation for experiments and thus gradually brought into a form suitable for publication" (Steiner, 1924b, p.10).

Pfeiffer was, at this time, the Director of the Bio-chemical Research Laboratory of the Natural Science Section of the Goetheanum, also known as the Free University for Spiritual Science (Lorand, 1996; Pfeiffer, 1938a). The Goetheanum, located near Basel is the international headquarters of Anthroposophy. The Natural Science Section had been charged by Rudolf Steiner with the task of developing the "hints" of his Agriculture Course at Koberwitz through to public dissemination (Steiner, 1924b). It was Pfeiffer who, with his book *Bio-Dynamic Farming and Gardening* published in 1938, brought the "hints" of the Agriculture Course into “a form suitable for publication”. The course itself had, in the meantime, been transcribed and translated from the notes of course attendees (Steiner, 1929).

In the period from 1924 to 1938 the name ‘bio-dynamic’ was evolved and the practices were tested and formalized. Pfeiffer’s book *Bio-Dynamic Farming and Gardening* was the ‘coming of age’ as well as the ‘coming-out’ of bio-dynamics. The book was published in 1938 in at least five languages: English (Pfeiffer, 1938a); Dutch (Pfeiffer, 1938b); German (Pfeiffer, 1938c); French (Pfeiffer, 1938d); and Italian (Pfeiffer, 1938e). Steiner had presented his Agriculture Course on a single occasion in the summer of 1924; a few months later on 28 September he entirely withdrew from public life due to illness; and he died on 30 March 1925 (Collison, 1925; Whitehead, 2010). His injunction to the Koberwitz group had been to put his ideas to the test, and, when there were empirical results to share the proven practices with the world. Pfeiffer took on that mission and it became his life’s work.

Lord Northbourne (1896-1982) published *Look to the Land* in 1940 a book in which he coined the term ‘organic farming’. The book was a manifesto of organic farming, and he wrote of the contest of “organic versus chemical farming” (p.81). Northbourne’s terminology of ‘organic farming’ was promptly adopted internationally. Jerome Rodale published the first ‘organic’ journal, Organic Farming and Gardening, in the USA in 1942. The Australian Organic Farming and Gardening Society was founded in Sydney in 1944 (Paull, 2008). Eve Balfour (1943) quoted Northbourne’s book extensively in her best selling book *The Living Soil*. Composting advocate, Albert Howard (1944), adopted the ‘organic’ terminology as did Pfeiffer (1952).

Northbourne stated in *Look to the Land* that “the 'bio-dynamic method evolved in accordance with the recommendations of the late Dr Rudolf Steiner. The … method has been highly developed in the course of some fifteen years' work on the Continent, and its effectiveness may be said to be proved, though its supporters would be the last to claim that there is no more to be learnt about it” (p.173). He included in his “Select Bibliography” (p.195) Pfeiffer’s *Bio-Dynamic Farming and Gardening*. Other than the two aforementioned references to biodynamics by Northbourne, there is otherwise no indication of any linkages between the authors or the books.

The present account reveals the ‘missing link’ between these two milestone books for biodynamics and organics. A nine day Summer School and Conference was organised by Northbourne and held at his estate in Kent. The chief presenter was Ehrenfried Pfeiffer and he was assisted by leading bio-dynamics advocates of the day from ‘the Continent’. Pfeiffer’s book appeared in 1938; the joint Betteshanger Summer School and Conference on Bio-Dynamic Farming was held in 1939; Northbourne’s book appeared in 1940.

Betteshanger preparations

Lord Northbourne met Ehrenfried Pfeiffer, though not for the first time, in November 1938. Northbourne wrote in a letter to Viscount Lymington:

> “I got an opportunity to meet Dr. Pfeiffer in Kent … I am left wondering how it might be possible to induce Dr. P. to spend more time in England. He is worth anything. I hope in time to form an interested group in E. Kent. We have plenty of lively people - genuine farmers” (Northbourne, Lord, 1938a, pp.1-2).

Northbourne wrote that:

> “I am tremendously interested in the plan for getting Pfeiffer over here in the summer; and prepared to do all I can to bring it about ... I could make a firm offer to run it here, and to take responsibility for administrative details” (1938b, p.1).

He wrote of his enthusiasm, that “this is the most attractive idea I have come across for some time, & I will do all in my power to promote it” (Northbourne, 1938, p.2). He added that “I am not aware of any <u>established</u> bio-dynamic farm or garden nearer than 43 miles” although “Hugh Finn (10 miles) is starting” (p.2).

It appears that Northbourne had been preparing for the Betteshanger Summer School for 12 months prior to the event. Of his farm, he states in a letter that:

> “Neither the farm nor its attached market garden had hitherto been run on the bio-dynamic method … Nevertheless some thirty-six heaps of very varying materials, size, shape and age were available for inspection … Experimental work on the farm and market garden had been started nearly a year previously, so some mature examples were available” (Northbourne, 1939a, p.9).

Six months before the Betteshanger Summer School, Northbourne travelled to Switzerland to meet Pfeiffer. He reported that:

> "I had a very good day with Pfeiffer in Switzerland on the 20th of this month [January 1939]. I have now got fairly complete details of lectures and the general arrangement of the Course; also work which it is desirable to do on the farm by way of preparation. I am making arrangements for the necessary assistance from the B.D.A.[1]" (Northbourne, 1939b, p.1).

Betteshanger announcements

In February 1939 Lord Northbourne announced a: "Summer School and Conference on Bio-Dynamic Farming" to be held at his estate: "Home Farm, Betteshanger" in Kent, from "Saturday 1st July to Sunday 9th June 1939, inclusive" (Northbourne, 1939e, p.1).

The invitation advised that: "The purpose of the School is to give some British farmers the opportunity of meeting Dr. Pfeiffer and his colleagues, and of learning something of their work" (p.1). The number of attendees "will be limited to 40" (p.1), and those "by invitation only" (p.2). The "chief feature of this work has been the practical application of every-day farming problems of a remarkable insight into the processes of nature, and sympathy with living things … The School will have primarily a practical basis" (p.1).

Northbourne drew up a "Preliminary List for Invitations". That list included five lecturers (Table 1) and 50 potential invitees. These 50 were classified into three sets as: "Suggested by B.d.A. (London)" [sic] (N=22); "Suggested by Lord Lymington" (N=8); and "Suggested by Lord Northbourne" (N=20) (Northbourne, 1939d).

Table 1. Scheduled lecturers for the Betteshanger Summer School (Source: Northbourne, 1939d). (In the event, Schamhart did not appear).

Lecturer	From
Dr. Pfeiffer	Switzerland
Dr. Eckstein	Switzerland
Dr. Scott Williamson	England
Dr. Heinze	Holland
Dr. Schamhart	Holland

Pfeiffer's visit had been announced six months previously in the bi-annual *News Sheet of the Bio-Dynamic Method of Agriculture*, the "Organ of the Bio-Dynamic Association (B.D.A.) for Soil and Crop Improvement" (BDA, 1938). At the Second Annual General Meeting of the Bio-Dynamic Association, the Betteshanger Summer School was identified as the key biodynamic event of 1939:

> "The main feature of 1939, the Secretary said, was the impending visit of Herr Pfeiffer, which would be entirely devoted to a Summer School to be held at Lord Northbourne's estate near Deal, Kent. About forty farmers and gardeners, all invited, were expected to attend the school, the aim of which was to promote the knowledge of the application of the bio-dynamic methods to the special conditions of Great Britain. Herr Pfeiffer would give daily lectures and conduct demonstrations and visits; the list of lecturers would include: Dr. O. Scott Williamson (Peckham), Dr. E. O. Eckstein (Dornach) and Dr. O. Heinze[2] (Loverendale, Holland)" (BDA, 1939, p.5).

The UK *Bio-Dynamic Association* had, at this time (June 1939), 111 members of whom 55 "were active farmers or gardeners" (BDA, 1939). The Meeting acknowledged Northbourne's initiative and expressed "its gratitude to Lord Northbourne for the trouble he has taken in arranging the Summer School for July and to wish the School every possible success" (BDA, 1939, p.6).

Betteshanger lecturers

The biodynamics lecturers that Northbourne recruited for the Betteshanger Summer School were the leaders in their field. Three of the lecturers were the pre-eminent biodynamic scholars of the period. Dr. Ehrenfried Pfeiffer and Dr. E. Otto Eckstein travelled from the Goetheanum, Dornach, Switzerland, and Dr. Hans Heinze travelled from the Loverendale biodynamic farm at Walcheren in Zeeland, the Netherlands.

Ehrenfried Pfeiffer had recently published *Bio-Dynamic Farming and Gardening* (1938a). In his invitations for the Summer School, Northbourne echoed Pfeiffer's book title: 'Summer School on Bio-dynamic Farming and Gardening'. Pfeiffer's book was the first comprehensive account of bio-dynamics to be published and it was the outcome of fourteen years of intensive experimental collaborative research by anthroposophic farmers and researchers.

[1] Bio-Dynamic Association (B.D.A.) for Soil and Crop Improvement; Great Britain, sometimes contemporaneously abbreviated as B-d.A.
[2] 'O. Scott Williamson' should have read 'G. Scott Williamson'; 'O.Heinze' should have read 'H. Heinze', (Hans).

Pfeiffer states that: "The bio-dynamic movement developed out of the co-operation of practical workers with the Natural Science Section of the Goetheanum", and he named Otto Eckstein and Hans Heinze as two such co-workers in that development (Pfeiffer, 1958, p.9).

Hans Heinze worked with Pfeiffer at the Natural Science Section, Goetheanum, Switzerland from 1928. He was appointed as Director of Holland's biodynamic showcase farm, Loverendale, in 1936 (von Plato, 2003). Loverendale was one of the first farms in the world to convert to biodynamics, that decision being made in 1926, and it occupies a proud place in the history of the theory, practice and development of biodynamics (Loverendale, 2009; von Plato, 2003).

Members of the UK's *Bio-Dynamic Association for Soil and Crop Improvement* (BDA) (established 1938) would have been familiar with Pfeiffer from his regular contributions to their *News Sheet of the Bio-Dynamic Method of Agriculture* (established 1935, and predating the BDA), and also from Pfeiffer's previous visits to the UK in 1936 and 1938 (M. MacKinnon, 1936, 1939). Otto Eckstein and Hans Heinze were both contributors to the bi-annual *News Sheet* (e.g. Eckstein, 1938; H. Heinze, 1939) (Plate 1).

The fourth lecturer at the Betteshanger Summer School was Dr. Scott Williamson (1884-1953) who was the co-founder, with his wife Dr. Innes Pearse, of the Pioneer Health Centre (1926-1950) at Peckham (London). The pair practiced biodynamic farming (Reed, 2003), and they advocated for an awareness of the close link between diet and wellness (Pearse & Williamson, 1931). With the Pioneer Health Centre they put their philosophy into practice. The record of the Centre's implementations and outcomes were presented in *The Peckham Experiment* (Pearse & Crocker, 1943). The authors asked: "Have you ever thought that health may be infectious? That it might spread through a community? … It happened at Peckham" (Pearse & Crocker, 1943, dj). Theirs was a memetic approach, that wellness memes could be contagious, and contrariwise, that poor dietary choices could also be a matter of imitation and contagion:

> "The child, quick to imitate, tends to esteem the 'prepared' foods above those which are derived from more natural sources. His values are all disturbed … Whim and the shopkeeper become his guides to nutriment" (Pearse & Williamson, 1931, p.56-57).

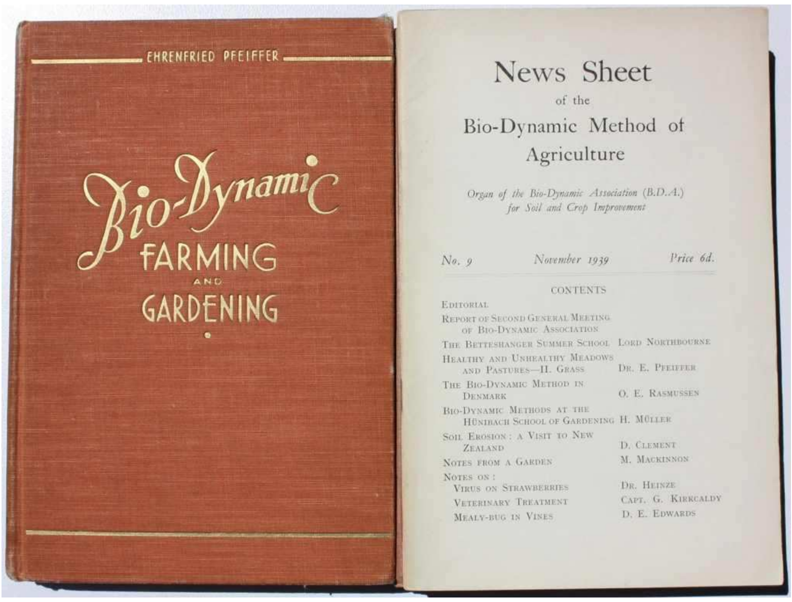

Plate 1. Pfeiffer's 1938 *Bio-Dynamic Farming and Gardening* (left) and Northbourne's 1939 report of the Betteshanger Summer School in the *News Sheet of the Bio-Dynamic Method of Agriculture* (No.9) (right) (Photo: J. Paull).

It was an enviable line up of talent that Lord Northbourne recruited for the Betteshanger Summer School of July 1939. Although not foreseeable at the time, it was one that was never to be repeated, and, in the chronicle of UK biodynamics history, it remains an event without peer.

Betteshanger programme

The programme for the Betteshanger Summer School and Conference on Bio-Dynamic Farming included the opening address "Essentials of the Bio-Dynamic Method" by Dr. Ehrenfried Pfeiffer. Further lectures by Pfeiffer included "The Soil a Living Organism" and "The Farm a Biological Organism" (Northbourne, 1939e, p.3). The lecture topic of Dr. Scott Williamson of the Pioneer Health Centre at Peckham was "The Biological Requirements of the Human Organism" (p.3) (Table 2). Albert Howard was intentionally not invited. Northbourne in considering a "British non-B-d A[3] lecturer" wrote that: "On the whole I think not Sir A. Howard" (Northbourne, 1939c).

Northbourne wrote of the biodynamic Summer School that:

> "About forty people attended … They formed an admirably diversified assembly. There were people already familiar with the bio-dynamic method and those who had hardly heard of it. There were farmers and gardeners of very varied experience with a sprinkling of members of College[4] and Advisory staffs" (Northbourne, 1939a, p.8).

The nine day programme of the Betteshanger Summer Course included, besides the formal lecture content, "four mornings and two afternoons … devoted to practical work" (Northbourne, 1939a, p.8) and "Two days were occupied by excursions to farms" (p.9).

Table 2. Programme of lectures for the Betteshanger Summer School (Northbourne, 1939e, p.3).

Date	Topic	Presenter
1 July	Essentials of the Bio-dynamic Method	Dr. E. Pfeiffer
2 July	The Soil as a Living Organism	Dr. E. Pfeiffer
3 July	The Farm as a Biological Organism	Dr. E. Pfeiffer
4 July	The Biological Requirements of the Human Organism	Dr. Scott Williamson
5 July	The Health of Livestock and its Dependence on Feeding the Soil	Dr. E. O. Eckstein
6 July	Discussion of Lecture	
7 July	The Fertility of the Earth: Its Preservation and Renewal	Dr. E. Pfeiffer

Farm visits included: "the nearest bio-dynamic establishment"; "a large scale intensive mixed farm"; "a large-scale mechanized farm"; and the University of London's teaching farm at South-Eastern Agricultural College, Wye (Northbourne, 1939a, p.11). As the then Vice-Chairman of the governing body of the South-Eastern Agricultural College (SEAC, 1940), Northbourne was well positioned to claim, of the College farm at Wye, that: "This is remarkable as a commercial mixed farm which has made a handsome profit for a succession of years" (Northbourne, 1939a, p.11). The programme included a demonstration of the biodynamic treatment of fruit trees. Northbourne mentions the use of the biodynamic preparations: #500, #501 and #508. He comments that the stirring procedure "tends to arouse a certain amount of mystification and even skepticism in the uninitiated" (Northbourne, 1939a, p.10).

Northbourne (1939a) comments that "there was plenty to do" and also: "plenty to say". Relating the conviviality of the event, he commented that:

> "It is extraordinary how many nice points invariably arise when a few are gathered together to perform any of the absorbing tasks associated with bio-dynamic farming and gardening" (p.10).

Discussions were scheduled to follow all lectures. Field work "will be carried out on the farm" (Northbourne, 1939e, p.3). Northbourne advised that: "Although the farm has not hitherto been worked on bio-dynamic methods, the necessary material for field work and demonstrations will have been prepared in advance" (p.3). Field work would additionally include "opportunities for instructions to farm workers" (p.3).

Viscount Lymington (writing later as the Earl of Portsmouth) described the Betteshanger Summer School:

> "It was one of the most exciting weeks I ever spent. We would work part of the day on his bio-dynamic methods, and then both for recreation and refreshment Pfeiffer would lecture to us in the evenings" (Portsmouth, 1965, p.84).

Northbourne describes Saturday 8 June 1939 as a festive event:

> "The last Saturday afternoon and evening were occupied by a large party at The Home Farm for members and all farm and estate workers and their families, in all some 200 souls. Sports and games, tea, a play given in the barn by the boys of Betteshanger school, supper and dancing provided a gay and harmonious conclusion to what must remain, at least to most of those who were present, a very memorable week" (1939a, p.11).

In the shadow of the unfolding international events of the time, Northbourne wrote of:

[3] 'B-d.A' is the UK Bio-Dynamic Association.
[4] Lord Northbourne was at the time a Governor of South-Eastern Agricultural College, Wye and Chairman of the Board of Governors of Swanley Horticultural College.

> " … the spirit of friendliness, happiness and unity which prevailed. That was a striking and perhaps not the least important feature of the school. It is true to say that for nine days the possibility of war was scarcely alluded to; things more real and more constructive absorbed attention" (1939a, p.8).

World War II

By the time Northbourne's account of his biodynamics Summer School appeared in print (November 1939) the bucolic memories of the proceedings must have seemed like a visitation from a distant era. Europe had by that time plunged into a bloody maelstrom from which it would not emerge for six grim years[5].

The following year (1940) the Bio-Dynamic Association lamented that "the conditions of war have made it impossible to hold meetings or to arrange conferences and lectures". They nevertheless proclaimed that "the knowledge of the bio-dynamic methods has steadily spread" (BDA, 1941a, p.11). At the Third Annual General meeting of the BDA (20 April 1940): "The Chairman expressed his regret at the absence of Dr. Pfeiffer who had been unable to obtain a French transit visa for his journey from Dornach" (MacKinnon, 1941, p.4). The proposal that "Dr. Pfeiffer should be appointed official adviser to the Association" was "unanimously adopted" (p.4).

Biodynamic Praise for *Look to the Land*

The Editorial in the *News Sheet of the Bio-Dynamic Method of Agriculture* of the wartime joint issue dated November 1940 and April 1941, urged its readers to read Lord Northbourne's "recently published" book *Look to the Land,* "and also to make it as widely known as possible among their friends by recommending its inclusion in public libraries" (BDA, 1941c, p.3).

A five-page review of Look to the Land in News Sheet of the Bio-Dynamic Method of Agriculture expressed the favourable and hopeful view:

> "Lord Northbourne has not been tempted to seek for a superficial solution in the form of palliative schemes. He has endeavoured to keep in view the situation as a 'whole', and to lead the way to a saner outlook on life and a truer sense of values as the only secure basis for reform. It is a stimulating book, and we hope that it will find a place, not only on the bookshelf, but in the minds of all who have the good of the land and the people at heart" (BDA, 1941b, p.17-18).

The Farleigh Experiment

Leading up to the Betteshanger Summer School of 1939, there were two precursor events, namely a summer weekend at Farleigh, and the Farleigh Experiment. These events served as feedstock for the process leading to the Betteshanger Summer School.

Personal correspondence between Lord Northbourne and Viscount Lymington reveals that here was already, in 1938, a 3-way experiment underway in Britain comparing various farming methods, namely; "Sir Albert Howard's methods"; the Steiner method under the direction of Dr. Pfeiffer", and thirdly, "the most approved and up to date methods of fertilisation with artificial manure only". (Lymington, 1938b).

The plans for this experiment date back to 1936 (Lymington, 1936). Lymington stated in personal correspondence that "just under 100 acres of ordinary farmland" was devoted to the experiment (1938b). Regarding the inclusion of "artificial manure" in the comparison, he elaborated that "it is entirely necessary to include the latter because until one gets a side by side comparison your over intellectual skeptic will never be convinced" (1938b).

The "Farleigh Experiment" (so called by Northbourne, Lord, 1938c) was the outcome of an initial meeting, on 11 August 1936, at Farleigh Wallop of eight participants including Albert Howard (Lymington, 1936, p.1). A longitudinal multifactorial experiment was proposed: five fields x five different crops x three management styles per field x seven years (1936-1942)[6] (1936, p.1-2). There was a further planning meeting on 15 November 1936 which included both Pfeiffer and Howard (p.4).

There was subsequently a summer weekend meeting in 1938, at Farleigh, with twelve participants, which included Lymington and his wife Bridget, as well as Northbourne, Howard, Pfeiffer, and George Stapleton (Portsmouth, 1965, p.88, 89). Lymington described this as: "The point at which we began to coalesce" (Portsmouth, 1965, p.88).

[5] WWII: 1 September 1939 - 2 September 1945.
[6] i.e. a 5x5x3 factorial design x7 years.

The Farleigh Experiment was a venture with joint input from Lymington, Northbourne, Howard and Pfeiffer. Recalling those events, Lymington wrote of the discussions that:

> "Walter Northbourne's quiet way of enunciating a wise but unpalatable thought on a stubborn fact we had overlooked gave weight and direction" (Portsmouth, 1965, p.89).

Recalling the diplomacy and the quiet contestation of the occasion, Lymington noted: "At one moment Howard said to Pfeiffer, 'Which of our two methods will give the best results?' to which Pfeiffer replied, 'I think they will be much the same'" (Portsmouth, 1965, p.89)[7].

Of these bold plans, Lymington wrote that:

> " … two things prevented us going further than the second year with it. It was only in the spring [*circa* March 1939?] following our summer meeting [c. June 1938] that we could begin to apply the compost to the planted crops. Before the autumn [c. September 1939] of that year war-clouds were lowering" [dates added] (Portsmouth, 1965, p.89).

Besides the impediments of timescale and impending warfare: "The other inhibitor was lack of money. We could get no official scientific backing. We ourselves, singly and collectively were anything but rich" (p.89). The Farleigh Experiment was viewed as providing impetus for a later similar venture: "The Haughley experiments … under Lady Eve Balfour, were an indirect result" of Farleigh (Portsmouth, 1965, p.89).

Northbourne was not involved in the establishment of the Farleigh Experiment. Northbourne introduced himself to Viscount Lymington in a May 1938 letter in response to Lymington's newly published book Famine in England (Northbourne, 1938). Of the book, Northbourne wrote: "To praise it would be presumptuous. To say that it is timely would be to put the matter far too mildly" (1938). Of himself Northbourne wrote: "I have been a farmer at heart all my life, and one in practice since 1921". He commented that "I have become increasingly convinced" of the need for "reform of our monetary system and ideology", although he added that "I am not a 'social creditor' nor a 'fascist''' (1938). Northbourne's own views on the subject appeared that month as 'A Plain Approach to World Economy' in the anthroposophic journal *The Present Age* (Northbourne, Lord, 1938e).

Lymington's *Famine in England* was critical of "the school of artificial manuring" (1938a, p.157). The book urged that "we must return to and improve on the practice of our ancestors" (p.128). Like Steiner before him, and Northbourne after him, Lymington cited Kings' 1911 book *Farmers of Forty Centuries* (Lymington, 1938a, p.138). *Famine in England* railed against the most recent directions that agriculture was taking where "the natural heritage of ten thousand years is wasted in two generations" (p.201).

Famine in England warned of "the dangers of treating plant growth as a chemical mixture", adding that "sulphate of ammonia and many other artificial manures are likely to kill the earthworm and bacterial life of the soil" (Lymington, 1938a, p.158). Lymington claimed that "we have in the last thirty years introduced a system of soil and plant poisoning unequalled in folly" (p.159). He stated: "That right feeding of soil and animal can make disease negligible has been proved by Sir Albert Howard in India, and Dr. Pfeiffer in Holland, and elsewhere" (p.159).

Lymington drew close to, but did not quite reach, a formulation of, and the coinage of 'organic farming'. He wrote of Germany's:

> " … pioneering work as the protagonist of artificial fertilizers. The appalling result of this showed in 1914-18 when a large part of her population starved … This could not have happened if she had farmed her land *more organically* … If we were to return to good and only semi-intensive *organically manured agriculture* we would be saved from that disaster, and would be independent of artificial aids in future crises [italics added]" (1938a, p.137).

Lymington, like Steiner before, and Northbourne after, made the point that "The soil is not a factory … It is a living thing" (p.52). Lymington's writings had the benefit of input from his viewing the practical application of biodynamics, as well as feedback from Albert Howard. He wrote that:

> "Every year from 1935 until the war I would do a pilgrimage to the lovely little Dutch island of Walcheren. There Pfeiffer, as Steiner's agricultural lieutenant, had charge of two biodynamic farms [Loverendale] … Once I took Sir Albert Howard with me" (Portsmouth, 1965, p.85).

[7] On 10/2/1943 Viscount Lymington (Gerard Wallop) succeeded to the title of the Earl of Portsmouth (Rayment, 2008) and was thereafter known as Lord Portsmouth.

Ehrenfried Pfeiffer, 1940

The year after the Betteshanger Summer School there was a failed attempt to get Pfeiffer back to the UK. The effort was ultimately thwarted by the refusal of the French authorities to grant Pfeiffer a transit visa (he would have been coming from Switzerland).

Viscount Lymington (1939b) wrote to Pfeiffer that:

> "I am Vice-Chairman of the County War Agricultural Committee which is responsible for the whole farming policy of about a million acres. The line I am taking is to try and snatch some form of salvation from disaster and encourage a type of cultivation which will enable us to have the land after the war in a better state of fertility with a more natural balance than it has today … I have many times in the last few weeks longed to have you here and to ask your advice on many of the questions coming up".

Lymington assured Pfeiffer that:

> " … we will do our utmost to see that you get a visa. Please do not hesitate to quote myself or Lord Northbourne as an introduction. I am certain also that the Ministry of Agriculture could be got to approve" (1939b).

Lymington had previously written to Northbourne that:

> "I think it would be possible to go privately straight to the ear of the Minister, as I am fairly confident that he, at least, is thoroughly sympathetic" (1939a).

Lymington advised Lady MacKinnon, the secretary of the BDA, that he had written to Pfeiffer in New York and Dornach and for her to be assured that:

> "I would pull every string possible to get him a visa to come to this country to advise us during the war. Personally, I can think of no more important visitor we could have than Dr. Pfeiffer" (1940a).

Northbourne received a letter in April 1940 indicating the frustrations of wartime travel: "It is sad now that Pfeiffer cannot come - but there it is" (Lymington, 1940c). Lymington had planned for 21 April, 1940 "a practical demonstration in the making of compost … for a small garden or allotment … all garden waste and refuse can be used to make thoroughly good humus" (Lymington, 1940b). In that letter, he described Pfeiffer as "a very great gardener and farmer from Switzerland" who is "not only one of the greatest agricultural experts alive but also a most practical man" (Lymington, 1940b). That meeting never happened:

> "Our Allies, the French, with whom we have such perfect co-ordination and understanding, have refused the transit visa to Dr. Pfeiffer. Quite why, I cannot think, for anyone less politically minded I have never met" (Lymington, 1940c).

It appears that Pfeiffer's 1940 visit was scuppered only by the French. Pfeiffer was advised that:

> "I had got the Minister of Agriculture to agree to come to meet you … I think the Minister fully realises the importance of your work … We are still carrying on your work" (Lymington, 1940d).

The planned demonstration eventuated, despite the absence of Pfeiffer (Lymington, 1940c).

A Preference for Biodynamics, 1942

In a presentation at Oxford in 1942 Northbourne advised the meeting of his preference for biodynamics:

> "You will see that I am prejudiced in favour of the B-D [Bio-Dynamic] method, and if asked 'how <u>best</u> can our ideas be expressed in terms of farm management ideas' could only answer accordingly; though I don't pretend to understand it fully" (Northbourne, 1942, p.6).

He related to the group that: "I have spoken of organic farming as if it were something clearly defined, without reference to the actual processes employed" (1942, p.6). He declared that: "I think we can adopt two principles. It is, of course, their translation into practice which is difficult". His principles were, firstly, "The need for diversification, and the <u>inherent</u> value of self-sufficiency within a limited area"; and secondly, "The necessity of maintaining fertility by organic manuring alone". (Northbourne, 1942, p.5).
Northbourne identified three methods of practising organic farming

1. "The first I will dismiss rather briefly, calling it for convenience the Wibberley method";
2. "The second category I call the Indore-Hunza-Chinese method - Chinese for short"; and
3. the third is the Bio-dynamic method of Rudolf Steiner" (1942, p.6).

This Oxford meeting that Northbourne addressed and before which he declared a ‘prejudice’ for bio-dynamics was of “agricultural philosophers” or “ecological thinkers” (Portsmouth, 1965, p.77). It was the third meeting of the group “A Kinship in Husbandry” (Gardiner, 1942, p.2).

A brief account of the informal group called the Kinship in Husbandry is given here to partly counterbalance Conford’s (2001) account, which, seems to the present author, to place more weight on this group than its character, chronology, function, intent, and output would appear to warrant.

The Kinship dates from 1941, a year after *Look to the Land*. According to Rolf Gardiner: “The first document was a letter sent out on April 22, 1941, to twelve men who, at the time, were not known to one another even by name, and who have become the nucleus of the Kinship” (1942, p.1). A later account states more circumspectly that: “Not all were known to each other personally before we met” (Gardiner, 1972, p.198).

Rolf Gardiner (1902-1971) was the ‘founder’ and sometime chronicler of the Kinship in Husbandry (Gardiner, 1972). He was, unfortunately, a careless writer prone to intemperate and exaggerated statements, and so his reportage needs to be considered as provisional. The editor of Gardiner’s posthumous anthology states that “Often … the writing has a quality of superabundance which time and discipline in the craft of writing would have curbed” (Best, 1972, p.xii); there is no suggestion that such temperance ever materialised. Oxford historian, Arthur Bryant (1899-1985) wrote of Gardiner, that, despite “all his great virtues”, he was “incorrigible”, “childishly illogical, intemperate and wrong”, and that he was possessed of an “incurable itch for putting pen to paper - a thing he is ... little fitted for by training, discipline and experience” (Bryant, 1943).

The first meeting of the Kinship group was on Sunday 21 September 1941 at the University of Oxford in the rooms of historian Arthur Bryant, at Queen’s College. The final meeting was on Friday 28 February 1947 in London (Gardiner, 1972).

The purposes of the Kinship were essentially agrarian. They did not specifically mention, by name, or advocate specifically for, either bio-dynamic or organic farming. The statement of Purposes of this loosely structured group included:

* “To define and strengthen post-war opposition to every activity that treats man as a machine and earth as an inanimate factory plant”;
* “To show how unbalanced and monicultural [sic] farming ... is robbing the earth of health and man of vitality”;
* “To advocate … the virtues of husbandry … and the conservation by the living of that which they inherit from the dead and hold in trust for the unborn”;
* “To set the need for fresh, unprocessed food … above profit-making” (Kinship, 1942, p.1,2).

The purposes of the Kinship group also spoke directly against “Germany’s schematic brainsickness [sic]” which “is destroying civilization” (Kinship, 1942, p.2).

A copy of the statement of purposes held at King’s College, London, annotated in the hand of Arthur Bryant, bears the inscription “A Fellowship of Ecology” as an alternative name for the group. The statement clarifies that:

> “The Kinship is in no sense an executive or political body but merely an association of those who in their private or public capacities are seeking a common goal … are waging the same isolated fight against abstract tyrannies and are reaching by different roads the same conclusions … against a mechanistic and destructive organisation of society” (Kinship, 1942, p.3).

The Kinship was “a living society of friends” (Kinship, 1943, p.1). E. F. Bozman, editor at J.M. Dent book publishers, wrote that “we are an informal association and there is no machinery for dealing with this question of membership” (1943b). Northbourne wrote to an associate: “How can you suggest ‘resigning’ and what would it mean? I can’t see the Kinship as the sort of thing one joins or resigns from” (Northbourne, 1943b).

The Kinship group was a source of fellowship for Northbourne. Bozman described his role: “Northbourne … he is the moving spirit behind the Kinship” (1943a, p.1). According to Northbourne, it was Rolf Gardiner “who after all invented it if anyone did” (1943d, p.1). That concurs with Portsmouth’s statement that: “It was Rolf who was the prime instigator in forming the Kinship in Husbandry” (1965, p.90).

For Northbourne, the Kinship offered the company and fellowship of other contrarian agrarian writers. Northbourne wrote of the important role that this fellowship played for him:

> "I am rather on the 'quietest' side … I value very highly the effect on individual members of the fact of association in the kinship [sic]; no doubt because it has saved me from so much feeling of loneliness. If it has done as much for others, the repercussions of its mere existence must be appreciable and may be great" (Northbourne, 1943c, p.2).

A meeting was described by Northbourne as "not only friendly and enjoyable but also purposeful" (Northbourne, 1943a, p.2). Of the group at least three, Northbourne, Lymington and Gardiner explored and practiced, to some degree, biodynamic faming.

Ehrenfried Pfeiffer, 1944

Pfeiffer had moved to the USA late in 1940 with his family (Selawry, 1992). The Pfeiffers had been invited to settle at Kimberton, Pennsylvania, by Alarik and Mabel Myrin, and to manage 335 hectares of their farmland on biodynamic principles, and with the opportunity of setting up a biodynamics training facility (Koepf, 1991).

By early 1944 there had been an irreconcilable falling out between Myrin and Pfeiffer. Pfeiffer (1944, p.1) wrote that:

> "It was a hard blow both to me personally and to the cause of biodynamics in this country that I had to separate from the Kimberton Farms project. The owner of this place however has become rather difficult recently".

There was an attempt to induce Pfeiffer to set up biodynamic demonstration farm in the UK. Contemporaneous with the falling out between Pfeiffer and Myrin in the USA, Northbourne and Lord Portsmouth were exploring options for inducing Pfeiffer to move to the UK. Northbourne wrote that "I feel a bit uncertain on the financial side", and he stated that "Pfeiffer would need to be assured a living wage". Northbourne suggested sounding out Pfeiffer on such a move (1944, p.1).

The Secretary of the Bio-Dynamic Association, Mabel Murchison, responded to a proposal letter from Northbourne, "thank you for the encouragement that your letter has given one" and assured Northbourne that he could "depend upon the full support of the B.D. Association in such a scheme as you outline" (Murchisson, 1944, p.2). She added that "good work could be done in England if it should be possible to get Dr. Pfeiffer here" (p.1).

A few days after receiving Northbourne's correspondence, Portsmouth (1944a) wrote to Pfeiffer with a proposal:

> "I have seen both Lady MacKinnon and Northbourne … I learn that your great experiment at Kimberton has taken a disappointing turn. Now the point of this letter is really to make a very tentative suggestion. … Roughly it is this. As you know there are many of us who would deeply welcome the idea of having you more or less permanently with us. Would you be willing to consider such a possibility? Naturally it would be a question of ways and means".

Portsmouth then ventured some specific thoughts on the "ways and means". He nominated a farm of 136 acres, which he said included 30 acres of woodland, and that he had "recently put in order and have since been farming myself". He clarified to Pfeiffer that:

> "We would require to find you, or build you a suitable dwelling house close to the farm. It is of course quite possible that we might find an even more suitable farm for you than this … If it could take place, naturally we should like it to be a long term demonstration and as permanent as possible a centre for the diffusion of bio-dynamic knowledge of farming and of farming practice" (Portsmouth, 1944a, p.1).

Nothing came of this plan. Pfeiffer had, in the interim, borrowed funds in the USA and purchased a 300 acre farm near Chester in New York State. Pfeiffer wrote that:

> "The farm will be managed according to our ideas and will become in due time just what we want to demonstrate: namely a self supporting family farm on the biodynamic basis. We are on the new farm since April … My thoughts are very often with you and your country, and I only hope that the recent undertakings will soon lead to a final breakdown of the german [sic] opposition and Nazism" (Pfeiffer, 1944).

Portsmouth responded to Pfeiffer's letter that:

> "For our sake over here, I was deeply disappointed to read its contents, but on the other hand I am more than glad that your work in America has not been brought to an end … We shall not give up

> hope of being able to run one small farm here in post war years under your supervision and instruction. In the meantime, we are getting weary of civilization's long drawn out *felo de se*[8]. We can only hope that the end will soon be in sight" [italics added] (Portsmouth, 1944b).

Post WWII, the opportunity for revisiting the proposal to have Pfeiffer emigrate to Britain never resurfaced. In the USA Pfeiffer suffered some health challenges which compounded his financial situation, and which at one point he described as "terrible" (Selawry, 1992, p.32). Pfeiffer did revisit the UK once, in 1950, during which time he toured "as President of the Bio-Dynamic Association" and attended a "European Husbandry Meeting" that had been organised by Lord Portsmouth (Gardiner, 1972, p.199). According to Hans Heinze (1962), the 1950 visit was Pfeiffer's last visit o Britain.

The Secularization of Biodynamics: *Look to the Land*

In 1938, both Northbourne and Pfeiffer had expressed aligned sentiments. Pfeiffer stated that "the cultivated field is a living organism, a living entity in the totality of its processes" (Pfeiffer, 1938a, p.35). Northbourne had written that: "The starting and finishing point of the process is the soil, itself a living thing" (Northbourne, 1938d).

This confluence of sentiments came to a head with the Betteshanger Summer School and Conference on Bio-Dynamic Farming. However, less than eight weeks after the Betteshanger Summer School, Britain was at war with Germany and the opportunity for Anglo-Germanic co-operation was severely truncated. When the second edition of Pfeiffer's *Bio-Dynamic Farming and Gardening* was issued in 1940, the original title-page inscription, "Translated from the German by Fred Heckel", had been erased in its entirety.

There was also the apparent handicap of biodynamics being coupled with Anthroposophy. This mystical element was a cause for disparagement. Albert Howard derogated biodynamics as the 'muck and mystery school' according to Clunies-Ross (1990, p.126). Rudolf Steiner had been aware that the entanglement of a differentiated agriculture (the yet to be named 'biodynamics') with the esoterica of Anthroposophy was a potential impediment to its uptake. Steiner's own solution was to prescribe that everything be put to the test prior to embarking on any advocacy and to let the results speak for themselves (1924a).

When proffering a review of Pfeiffer's *Bio-Dynamic Farming and Gardening* to the *National Review*, Lymington declared that: "I feel that it is a book well worth having some notice taken of it". He simultaneously disavowed and endorsed: "I am not a Steinerite, and indeed know nothing of their various esoteric theories, but I have known Pfeiffer for some years as a very wise and practiced farmer, and an acute observer of nature" (Lymington, 1938c).

Northbourne's *Look to the Land* delivered a message congruent with Pfeiffer's 1938 book and with the 1939 Betteshanger Summer School, while nevertheless excising any Germanic or Anthroposophic heritage, although his book did acknowledge (on page 173) the efficacy of biodynamic practices. Northbourne's was a secularized British manifesto which presented fresh insights while drawing much from biodynamics including its nominative core motif of 'the farm is an organism'.

Concluding Remarks

Rather than biodynamics and organics arising independently, a direct unbroken lineage can be drawn from Koberwitz, Poland, via Dornach, Switzerland, to Kent, UK; and from Rudolf Steiner, via Ehrenfried Pfeiffer, to Lord Northbourne.

The Betteshanger Summer School and Conference on Bio-Dynamic Farming was hosted by Lord Northbourne at his farm in Kent. Betteshanger was the stepping stone from biodynamics to organics. A year before Betteshanger, Pfeiffer had published *Bio-Dynamic Farming and Gardening,* finally manifesting Steiner's 1924 injunction to bring the Koberwitz 'hints' into 'a form suitable for publication'. Then, less than a year after the Betteshanger Summer School, Northbourne published *Look to the Land* in May 1940. It was a secularized account of issues raised by Pfeiffer's book and the Summer School. Excised was any evident Germanic, esoteric, mystical or Anthroposophic provenance. *Look to the Land* jettisoned the rituals and recipes of biodynamics, as well as any Steinerian framing of the Betteshanger Summer School, while nevertheless propagating much of its essence.

Northbourne's *Look to the Land* provided a practical and philosophical underpinning for 'organic farming'. It was fully decoupled from Anthroposophy, and it pitted 'organic farming' versus 'chemical farming'.

[8] Anglo-Latin: suicide.

Northbourne stood on the shoulders of both Steiner and Pfeiffer to see further, and to project his organics meme to a broader and worldwide audience. Northbourne presented biodynamics as one way of practicing organics, and that is the view that has prevailed.

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COLLECTIVE ACTION FRAMING GENETIC ENGINEERING RESISTANCE IN NEW ZEALAND

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Abstract

The genetic engineering resistance movement in New Zealand constructed strategic and meaningful interpretations of why the genetic engineering technique is problematic and what can be done about it. There are four central interpretations – explored here as collective action frames – that were used by key movement activists in their mobilisation activities. These four frames describe genetic engineering as 'involving a wide range of issues', 'risky', 'unnatural' and as 'all about the ownership of life'. The characteristics of these frames are explained in this paper, along with an analysis of why it is that activists were able to achieve widespread resonance through their deployment of them. The successful framing and articulation of movement grievances is a critical movement activity for engagement of civil society in issues of great importance.

Keywords: biotechnology, framing, social movement, activism.

Introduction

Opposition to genetic engineering (GE) began internationally in the USA, with concerns being raised as early as the 1970s when rDNA (recombinant Deoxyribonucleic Acid) techniques were first developed (Barinaga, 2000; Osgood 2001; Schurman 2004). But it was the landmark Diamond v. Chakrabarty court case decision of 1980, which ruled that living organisms could be patented that saw concerns about GE accelerate, eventuating in the first protests against GE in the USA in 1993 (Osgood 2001; United States Patent and Trademark Office 2008; Wiegele 1991). By 1995 a movement of opposition had developed in the United States, and concerns had spread around the world, including to New Zealand (Lynas 2004; Nash 2000; Osgood 2001; Schurman 2004).

It was during the years 1996 through 1998 that the public and political profile of GE began to increase in New Zealand (Southward & Howard-Clark 2000). The first grassroots group opposing GE emerged in 1998: Revolt Against Genetic Engineering (RAGE), which later changed its name to GE Free New Zealand (in food and environment) in 2000 (Southward & Howard-Clark 2000). RAGE was a nationwide organisation that formed as an umbrella group for over 85 groups whose interests hinged primarily on matters related to health, environment and consumer rights (Southward & Howard-Clark 2000), which reflects the wide array of concerns about GE. Māori, religious groups, animal rights activists and those involved in the organic community were also expressing apprehension over GE technology. However, it was not until late in the 1990s that GE became an issue firmly planted on the political agenda of this country, and widespread in the minds of New Zealanders.

Public concern and awareness of GE in New Zealand can be traced to several factors. First, GE food had been sold in this country for some years without public awareness, and second, the Government had already allowed 238 GE field trials to take place by 1999, again, largely without public knowledge (Legat 1999: Weaver & Motion 2002). Third, much concern was being expressed over the lack of testing of GE foods being sold as well as the lack of any labelling indicating which goods contained GE or GE derived products (Weaver & Motion 2002). The year 1999 proved to be a pivotal one for GE politically with the first GE crop sabotage taking place on potatoes grown at Lincoln University, and the newly elected Labour coalition Government announcing that it would be taking action on the demands made in a petition earlier presented to Government for a Royal Commission of Inquiry into GE (MfE 2001; Southward & Howard-Clark 2000; Tanczos 1999). The GE resistance movement awareness raising stage transformed into a peak period of activism from late 1999 through to late 2003.

The years of mass mobilisation around an array of oppositions to GE in New Zealand included some of the largest numbers of people converging in protests and at rallies. The point of my research was to explore more closely the politics that occurred within this movement, through the experiences of activists who played important roles in the activities and campaigns undertaken as part of the wider movement. In particular I wanted to know about the structural qualities of the inner hub of movement activists, and the cultural meaning-making that was used to mobilise and maintain movement support. It is this latter aspect of my research that will be elaborated in this paper, through focusing on the collective action frames, or the "modes of attribution and articulation" of movement grievances (Snow & Benford 1992, p137).

Materials and methods

Eighteen key movement activists were interviewed in 2005. Initial research participants were identified through their high profile in association with GE resistance in the mass media, with a snowball technique used to identify further participants following the first interviews. Interviewees were asked to consider the pivotal role and significance for the movement of those they chose to nominate when making their decisions. Put differently, nominations were not necessarily based on friendships or close personal ties, but on the perceived importance of the individual. Ultimately, participants varied widely in age, were evenly split in terms of gender, came from a range of employment and ethnic backgrounds, but tended in the vast majority to be highly, formally educated (those that did not have formal education of a high standard were nonetheless exceedingly well informed and educated individuals). In a number of instances, activists had expertise closely allied with the field of new biotechnology. Research participants were furthermore affiliated with a wide and varied range of organisations, and most often had multiple group affiliations.

Although the research sample of eighteen appears small compared to the overall number of people involved with the GE resistance movement, these individuals represented a diversity of positions and approaches. As such, even if a wider sample of individuals had been participants in this research, I do not expect that the findings relayed in the following would have altered in any substantial way. Additionally, by the accounts of those interviewed for this research, those comprising the movement core have in fact been a small (but varied) group.

The interviews were non-standardised, semi-structured, and involved questions useful to both frame analysis and social network analysis. Interviews were most often conducted face-to-face. The interviews generated over 400 pages of transcript, which required a robust organisational system to code data. Ritchie, Spencer and O'Connor's (2003, p219) framework technique, a "matrix based method for ordering and synthesising data" was used for this purpose. As well as providing an excellent system for dealing with data, this technique was well suited for framing analysis.

The identification of frames is an area that has been critiqued as a methodological shortcoming of the approach – there is no one particular technique for the measurement of frames (König 2009a). By adopting Ritchie et al's (2003) framework coding system however, the way that data was categorised meant that frames, like themes, became quite evident. This approach was combined with a second, which is useful for the purpose of identifying who activists saw as movement antagonists and protagonists, in other words, for locating identity constructs. This second technique suggested by König (2009b) involved finding all occurrences of first and third party references in transcripts and inputting them into a matrix according to who was being referred to. Locating identity is a core aspect of collective action framing work.

Framing, founded in the work of Erving Goffman, can be understood as "individual 'sense making activity' that via processes of social interaction and communication can become collective understanding" (Chesters & Welsh 2002, p3). A frame can therefore be understood as an "interpretive schemata that simplifies and condenses the 'world out there' by selectively punctuating and encoding objects, situations, events, experiences and sequences of actions within one's present or past environments" (Snow & Benford 1992, p137). While numerous frame-types exist, the focus here is on one particular type: collective action frames.

Collective action frames provide an interpretation of the world, but have a very strategic purpose as well: the mobilisation of individuals toward challenging an existing view and effecting change (Benford & Snow 2000; Snow 2004). In the words of Snow (2004, p385), collective action frames are intended to "activate adherents, transform bystanders into supporters, exact concessions from targets, and demobilize antagonists". There are different ways of understanding the components of a collective action frame. Snow and Benford's (1992) description is elaborate and useful for the analyst of frames. They refer to collective action frames as comprising four areas: accentuation, punctuation, attribution (prognostic and diagnostic) and articulation (Snow & Benford 1992). For the sake of simplicity and brevity however, I refer here to a model for understanding the components of collective action frames as developed by Gamson (1992) and used by others including Kornblum (2008). Gamson's (1992) approach incorporates three elements: identity (who the 'we' is and who the 'they' is), injustice (what the perceived issues are) and agency (how it is that the injustices can be addressed). These frames are specific to a given social movement, and are revealing in terms of the culture of that movement.

Results and Discussion

Four collective action frames were prominent in the transcribed conversations with GE resistance movement key opinion leaders. Each of these four frames is outlined here, with quotations from activists used to demonstrate them. To begin, GE as encompassing a wide range of issues is explored as a collective action frame.

GE encompasses a wide range of issues

The wide ranging character of GE – the number of different areas that this biotechnology technique potentially touches – was a common theme in participant discourse:

> People get very emotional about the ethics of it [and] the religious aspect – people talk about our planet and playing god and stuff like this. It just touches on so many questions: the place of science in our society, the social mechanisms for ensuring science doesn't run amok. So in that way it's incredibly complex, and an incredibly emotional question... (Gavin).

Gavin relays a number of quite philosophical concerns. Jason also noted concerns that are pitched at a more abstract level: "issues of globalisation, global social justice and sustainability, and a direction for humanity [which are] all converging in [GE] technology". However, most commonly it is GE and food or environment that is noted as being most implicated in concerns with the technology. This wide array of concerns expressed among those questioning GE in New Zealand is described by Heidi:

> There were people that were very concerned about the environmental impacts of cross pollination and gene transfer; there were people that were very concerned about corporate control, the loss of democracy; people very, very concerned about things like whakapapa, and much more sort of esoteric kinds of links to who we are as human beings.

With such an array of concerns, why then was this mobilisation effort pitched primarily around GE food and the environment? Herring (2008, p464) noted a separation between the "white" industrial and the "red" medical applications of biotechnology, and that activists understood this:

> Opposition activists understood this bifurcation of interests between food and other applications. It was not in their interest to mobilize opposition against drugs that involve rDNA technology.

Although referring to European activists, the statement applies equally in the New Zealand situation. Activists were both empathetic and strategic in their interest to mobilise recruits while minimising the possibility of marginalisation at the same time. The strategy of targeting GE in food and the environment as central issues was a purposeful move, given the emotive associations with medical-related technologies and for the sake of simplicity in relaying messages. Linda explains the emotion element, followed by Grant explaining the importance of a simple message:

> we weren't necessarily pinned down solely about food and environment, we were also concerned about the wider issues: corporate control, GE in drugs, and all the issues of laboratory containment, and whether or not there was such a thing as containment ultimately. So I mean those sorts of things were actually sidelined on purpose I feel quite early on, because of the emotive issues of people playing on the GE cures for illness, and yeah sure, who wouldn't want to take GE insulin if it was going to save your life? (Linda)

> There are the other things [like] medical applications where we haven't really focussed... For a long tie it was deliberately excluded from the campaign in order to make it simpler, in order to get more people on board. It was a lot harder to argue with people who think that the cure for Cystic Fibrosis is in gene therapy, and so we've never really campaigned hard on that, and that's going to be very difficult to do. You get the argument that you are sort of killing people by not allowing it and it's sort of morally very difficult to argue against it (Grant).

The strategic implications and moral conflict implied in both Grant and Linda's comments is situated within the recognition of the wide range of issues that GE touches on. Individual activists' concerns and interests varied substantially, with this tendency for considerable variation being evident in the remaining three collective action frames.

GE is unnatural

The second collective action frame positions GE as unnatural, as something that is in opposition to nature, a contaminant. Jason's interest in GE was engaged when he saw that biotechnology developers were trying to convince people that GE was no different to anything done before, despite genetically modified organisms (GMOs) being deemed novel (or not natural) organisms subject to patenting:

> It was the falseness of the argument that persuaded me, that they claimed this was something that was no different, and everybody knows we've done it before, and yet it was transgenic. And my limited knowledge at that time of genetics made me think, well, moving genes between species is a very interesting issue. Where do you draw the line?

Jason highlights a "falseness of the argument" that poses GMOs as novel organisms and yet at the same time, as not significantly different or new.

The GE is unnatural frame is enhanced by subscription to the view that the Earth and everything in it is interconnected, with the manipulation of one element having effects that emanate outwards to affect other elements in the world. Activists commonly argued that when such manipulation occurs at a genetic level, repercussions could be profound: "very small amounts can actually alter [things] quite severely" (Barb). Concerns about manipulating genes, and moving genetic material were voiced frequently, as in this example from Hilda:

> what we're opposed to – it's very specific – [is] moving genes around between different species that could never conventionally breed; it could never happen in nature. Rat genes don't move to lettuces and lettuce genes don't move into horses.

Nature will do what nature does in its own time argues Hilda.

The term contamination came up regularly in association with the GE is unnatural collective action frame. GE in foods is equated with contaminated food, with concerns of insufficient testing and adverse results of testing GE food being cited. Dissemination of information about these matters was a tactic drawn on by many activists, as was arguing for a thorough labelling regime for GMOs. New Zealand does have a labelling regime, but it has been regarded as not going far enough. Linda explains her views on GMO labelling insufficiencies along with her frustrations:

> the Food Safety Authority Australia and New Zealand labelling ... means nothing, i.e. one percent of allowable contamination, and GE oils and sugars and starch is not labelled at all. So [the New Zealand Government] found ways of allowing most of the crops that are being produced in mass in America without any labelling. ... how do you know whether it's GE canola oil or what the hell it is? You can't tell.

Linda advocated a consumer choice approach, whereas others, including Jason and Shane encouraged directly targeting producers that use GMOs. Jason argued that individuals should phone up companies and question GE content in their products, whereas Shane opted for a more direct action approach, which included noisy protests outside companies that use GMOs. The rationale for the direct action tactic is explained by Shane in relation to protests aimed at Inghams chicken products through targeting Kentucky Fried Chicken stores:

> we knew that we could do actions in some way that would have an economic effect on their company. And basically it's money: you can lobby as much as you want and you can affect their image, but they'll only listen to you as much as that means they will lose money.

All in all, a variety of tactics existed which can be linked in with the GE as unnatural collective action frame. However, there is one remaining perspective which was strongly supported by activists: if GE is unnatural and equated with risk, organic production is the antithesis. Organic methods of producing food in harmony with the environment are seen as natural and safe.

The organic industry in New Zealand experienced massive growth, in part as a result of the debate occurring in this country over GE (MfE 2001). Dean discussed how people seem to want to reach out to nature, but do not seem to know how:

> people are reaching out for nature, but they're doing it in a very industrial kind of controlled way, and so they don't know what organics is, but they know somehow if you pour all this poison on the food it somehow is going to affect me and my family. So people are reaching out back to nature in the most peculiar kinds of ways [like] through the conservation movement, through buying organic food, but not actually doing it. And organics is actually a practice: it's not a knowledge based system.

While there was widespread support among movement activists for an organic future for New Zealand, there was variation in terms of how to actively support this vision. Grant for example raised concerns about people not being able to afford to buy organic foods, yet he himself still supported this vision. Nonetheless, pursuing the organic route was positioned as the natural alternative to a risky technology. GE as risky constitutes a further collective action frame.

GE is risky

Linda described GE as a "time bomb", and as:

> an accident waiting to happen, and the more we piss about playing around with E. Coli and god knows what else, which is what is happening, then the more likely we are to create what people are most frightened of.

The thing that "people are most frightened of" according to Linda is an accident that might not be remediable: if something goes wrong, is it possible to fix the problem? Shane described GE as "potentially one of the most dangerous of all manifestations of capitalism because it's potentially irreversible – [at least] certain aspects of it [are]". Adding to the sense of risk surrounding GE, was concern that we do not know enough about the technology:

> What about the unknowns? We don't know enough. What about the soil bacteria? What's going to happen to this genetic material when it is excreted from cows and ends up on the field and that sort of thing? (Kirsty).

The lack of knowledge and uncertainty with GE was reinforced for activists by the lack of transparent reporting of GE science. Uncertainty and transparency translated to a lack of trust in GE, with misinformation and misleading debates being problematic. Hilda described an example where information was manipulated to suit the situation:

> It's hugely significant that the ability to patent living things is now there and the thing that I always find really amusing is how on the one hand, the genetically engineered crops are so different and so unique and so cutting-edge that we can patent them, and if they move around we can bill you even though you don't want this contamination. So they say that on the one hand [and] on the other hand when it comes to the food, as soon as you process the fields of GE canola, the fields of GE maize or whatever into food, then it's referred to as "substantially equivalent". The GE food is so similar it doesn't need labelling. So, it's like you know, pull the other one please.

Just as GE was seen as a contaminant in food, in the environment GE was also seen as a contaminant and therefore a risk.

Environmental 'contamination' is seen as a threat in many ways, including to biodiversity and to primary producers who do not wish to use GE technology. Moreover, there is uncertainty over who would be financially responsible if a contamination incident did occur. It was common for movement activists to draw on overseas examples of GE contamination and use these as exemplars for what could happen in this country:

> the biggest threats in terms of GE are biodiversity threats, such as the contamination of Mexican corn. That's a real threat to global food security and global biodiversity in terms of food crops, and that's the biggest risk; whether it's rice in Malaysia, whether it's soy, whether it's wheat. 'Cause in diversity is stability, and in terms of the biology of our food supply, and in terms of the ecology of the Earth as well, biodiversity is crucial (Gavin).

Arguments about contamination correlate to arguments about the containment of GMOs:

> it's still a very crude science, and the results are so unpredictable, and why stick it out in the environment where it can do all sorts of things and you can't predict and you can't control [it]? If you are going to do the research, do it where you can contain it (Kirsty).

The issue of how much containment, if any, is acceptable is a "dividing line" for the movement according to Kirsty. There are those who completely jettison GE, and others that are accepting of some GE experimentation and research so long as it is adequately contained. Kirsty describes a situation where she visited a facility with GE cows and became concerned about containment measures:

> There was no disinfectant for our shoes and we were walking into this room that has cow tissue and blood products all over the floor – it's where they actually do the kind of post-mortem if you like – and that had open doors out onto the main yard which was covered in cow dung, and then there was a fence, and then there were the cows. So there was just no real containment.

As a result of Kirsty's experience, her view shifted from GE in containment as acceptable to it not being acceptable. This shifting of perspectives was not unique – a number of movement participants relayed similar experiences.

Collective action framing around GE as risky was not limited to the realm of food and environment. In relation to medical research and applications, concern was emphasised in relation to cross-species experimentation, pharmaceutical crops, bio-pharming and ill-fated medical experiments and accidents. How to address these many areas of risk around food, environment and medical applications was a question that activists had differing responses to. Many activists placed responsibility squarely with the State to tighten up on regulation, others advocated consumer activism approaches, while still others who had little faith in the Government to adequately deal with these matters argued that direct action – crop sabotage for example – is the only real worthwhile option. For those activists positing crop sabotage, those responsible for developing these technologies that tamper with plant, animal and microorganism genetics would be directly targeted. New biotechnology developers, driven by neoliberal capitalism, were in many respects viewed as being at the core of the problems with GE.

GE is all about the ownership of life

GE technology as equating to the ownership of life comprises the last of the four collective action frames, a frame that is firmly focussed on the developers of GE technology. In this frame, all of the reasons given by GE technology protagonists for pursuing GE are deemed irrelevant, because the real reason this new biotechnology technique is being promoted by these bodies is profit and power:

> [GE technology has] got very little to do with human health or ecological health or biological health, because you're dealing with a greed machine basically; an oligopoly kind of mechanism that's hell bent on power basically (Dean).

Dean expresses here what most activists referred to at some point: that GE is essentially a technology used by corporations to make money by controlling life at the molecular level. Such sentiments are shared by Grant: "to me it was an example of a technology that didn't really give anything to the people or the environment, but was a rather oppressive technology, a dangerous one, that has a huge amount of unknown risks and very little benefits". GE science was viewed as oppressive and driven by the commoditisation and ownership of life.

For some central movement activists, it is issues tied up with ownership and commoditisation that are at the nub of their oppositions. These kinds of objections can be seen in Amber's comments:

> I first became aware of the issues mainly because of the concerns that Māori communities had around intellectual property, and around the biopiracy or the thieving or the stealing of, or misappropriation of Māori intellectual property and knowledge for the benefit of multinationals, and of course GE is a big part of that through bio-prospecting.

Dean also commented on GE ownership issues as they relate to indigenous peoples, as well as more broadly:

> I am certainly aware of the whole issue around food, and intellectual property as it pertains to indigenous people, and exploration of what indigenous means and ownership and how this is unfolding ... I mean the same companies are now privatising, buying up water companies, moving into food, and they're quite clear what they want, which is total control of the food cycle.

The central claim of this collective action frame is that those working with GE technology development are not doing so out of philanthropic desire to help people or the environment, but to create profit through developing patents, and through bio-piracy and intellectual property for their own benefit: "GE is nothing if not all [about] corporate ownership of life effectively" (Heidi). In a similar vein, Shane referred to GE as just part of the wider-liberal agenda of privatisation:

> It's market environmentalism. GE is the neo-liberal idea of privatising everything; going into the area of life and that everything can be sold through the market.

Ben, who shared the same kinds of views as Shane stated that people have come to realise what is going on with ownership, and are consequently beginning to turn their backs on GE food:

> It's not in [the public's] best interests to have their food supply organised by the big companies and their genetic engineering products. ...there's just this whole swing of public mood against excessive technology, which I think that this is, and I think that's what the public has generally come to see.

> And people say “well what the hell do we want it for anyway?”.

As with previous collective action frames, activists thoughts on how to approach the GE issue from this particular angle was varied. There were those who advocated a complete rejection of GE, as well as the promoting of sustainable, organic based systems. To do both of these things could begin quite simply:

> probably one of the most radical things you can do is have an organic home garden. The most radical thing that you can do in your daily life that empowers yourself and your community around you and your children and families is actually don’t lock into the industrial food system ... financially (Dean).

In providing your own produce, you are not supporting the multinational biotechnology industry.

Conclusion

In summary, collective action framing has been an important task for key movement participants, a task which has involved some very strategic thinking and investment of time into researching and understanding the GE technique and its implications. These frames highlighted how GE technology is multifaceted, raises moral dilemmas and involves myriad tensions. Moreover, detailing the concerns and claims made as collective action framing indicated the complexities and challenges of political and public engagement in contentious scientific and social issues. Despite such diversity of issues and views, three basic levels of consensus emerged: an emphasis on food and environment matters over others, organic practices as the preferred alternative, and an overall concurrence on the general theme of these collective action frames. Achieving this agreement involved negotiation between activists, as well as a generalising of concerns in order for a basic level of consensus to be tentatively available, even though for those involved the issues are much more intricate. It is challenging to express in a succinct and clear way to the wider public, particularly when the mass media is the critical vehicle of information dissemination, the kinds of apprehensions around the science that many of these social actors shared. Thus it is the clear communication of succinct ideas that can successfully recruit and mobilise individuals toward political action that is a cornerstone goal of framing, and one that was achieved in this movement as evident in the multitude of events that happened around the country.

The multiple views and rationales seen in collective action framing have achieved an increased credence for GE technology injustice or grievance articulation simply given the variety of approaches. It is not difficult to argue to conclusion a debate based on a single rationale or perspective, but is near impossible to do so when a debate is multifaceted and ever-emerging as knowledge becomes available and perspectives continue to shift. As a move away from the solidarity based movements of the past toward globally networked movements occurs, and as issues involving science becoming more complex with wider reaching implications, the role of activists in skilfully constructing collective action frames that make such issues more transparent becomes ever more necessary. The awareness raising and subsequent potential engagement of the wider public in issues that have implications for society, is critical in a world where big business interests increasingly influence aspects of our everyday existence.

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BOOK REVIEW

Willer, Helga and Kilcher, Lukas (editors) (2011) The World of Organic Agriculture. Statistics and Emerging Trends 2011. FiBL-IFOAM Report. IFOAM, Bonn and FiBL, Frick

Did you know that, by the end of 2009, there were 1.8 million organic producers in the world with 37.2 million hectares under organic management and a value of US$54.9 billion for organic food and drink sales? And that the largest organic markets are in the USA, France and Germany, with the highest per capita expenditure on organic products in Denmark, Switzerland and Austria?

You can read it all, and much more, in 'The World of Organic Agriculture - Statistics & Emerging Trends 2011'. It is an authoritative piece of work, which takes the utmost care to report accurate and up-to-date data every year. In the world of organic agriculture, this is not always easy, as many countries don't have any official data, and any information available is gathered by volunteers. One of the delightful characteristics of this report is that the authors/editors are keen to let you know where problems with the data are most likely to occur by pointing out inconsistencies or gaps and by highlighting priorities for future data collection.

This report is part of an annual series that started in 2000. The data are based on country reports, written by experts in the area of organic agriculture in each country – almost doubling from 81 contributors in the first year to 160 in the present report, 75 per cent of the total number of countries in the world. Figures in the reports are then compiled into tables of all shapes and forms, some of which global – 47 in total, with an additional 38 figures and 7 maps - getting the most out of the available data for who-ever is interested. Usefully, the country reports of most continents are summarised in an overview of that continent.

The data mainly report the number of farmers and the land area under organic production and, for some countries, the area under different crops and forms of management. Estimates of the domestic market value, imports and exports are included where available. For those who are afraid of figures, it should be said that the book is still very readable. Each country report is set out in approximately the same sections, which include the size of the organic industry, organic standards and certification, the organic market (export and/or domestic), policy issues relating to organics, and research and extension in organic agriculture.

But then, there is enough flexibility to include topics that some authors have found important to discuss, such as organic action plans in Europe, and key actors in China. Although the series was originally published to provide statistics about, and show trends in, organic agriculture for as many countries in the world as possible, the book also includes other topics. This year, there are sections on "Standards and Regulations" and "Organic Beekeeping". In other years, topics have included "Organic Wild Collection", "How Organic Agriculture Contributes to Sustainable Development" and "Organic Aquaculture". The book concludes with an article by the Chief Executive Officer of the International Federation of Organic Agriculture Movements about achievements made by the organic movement and the challenges ahead. This article points out that, perhaps, it is time for the organic industry to start focussing less on certification than it has in the past, and more on policy making.

The book makes a great deal of effort to be of maximum use to the reader. For example, at the back of each article, a list of links relevant to the article is included, together with suggestions for further reading material of relevance to the topic. At the end of the book there is a list of all contributors to the data collection, allowing readers to easily identify organic experts around the globe.

For whom is the book written? In the first place it is a mine of information for those who need data on organic agriculture. Not only for those who teach or study organic agriculture, but perhaps in particular for those who do business in this area. It is an invaluable source of information for those who trade organic products, to see where developments are taking place or are likely to take place in the future. And it is certainly a must for policy advisors and policy makers, as the books brims not only with data about the growth in the industry, but also provides insights into the most promising areas of growth and the bottlenecks in growth.

The website http://www.organic-world.net/yearbook-2011.html provides considerably more detail about the different topics, so that it will be easy to decide if this book is for you. It can be obtained for Euro 50 via https://www.fibl-shop.org/english/shop/show.php?sprache=EN&art=1546.

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