DICK TAVERNE

'Shines long overdue light on the dark corner where dodgy science and dodgy politics meet' Peter Preston

THE MARCH OF UNREASON

Science, Democracy, and the New Fundamentalism

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The Myth of Organic Farming

> Organic farming is sustainable. It sustains poverty and malnutrition.
>
> C. S. Prakash, distinguished plant biologist

According to the Oxford English Dictionary, 'organic' describes compound substances that naturally exist as constituents of animals and plants. All food is organic. It has to be, because all animals, including human beings, are themselves organic and have evolved to digest organic matter. Non-organic, or inorganic, farming is therefore an oxymoron and the phrase 'organic farming' is a meaningless phrase, essentially tautologous. However, the term 'organic' has been appropriated by the followers of a particular movement and given a specialized meaning. Farming and its products only qualify as officially 'organic' if they comply with certain rules and principles. (The rules prohibit the use of most artificial fertilizers and pesticides and animals are to be kept in ways that minimize the need for medicines and other chemical treatments.) Originally based on a particular philosophy of life concerned with man's place in nature that first emerged in Germany in the early twentieth century, these rules are now laid down by a number of certifying bodies. In Britain the main ones are the Soil Association, the voice of organic farming in Britain, and the United Kingdom Register of Organic Food Standards (UKROFS). Outside the United Kingdom, the main controlling body is the International Federation of Organic Agricultural Movements.

Nowadays 'organic farming' commands such wide public support that to question its merits is to question the virtues of motherhood. Nearly every famous chef, cookery expert, and item

about food in lifestyle magazines or on television, takes it for granted that organic food tastes better and is more nutritious and better for our health. Nearly every environmentalist is convinced that organic farming is better for the environment. We are constantly told that it preserves the fertility of the soil, prevents pollution of the water supply by nitrates, and that it will reverse the decline in biodiversity, especially in populations of farmland birds. The British Government subsidizes farmers to convert to organic farming, and in 2002 an official policy commission on Farming and Food[1] recommended that even more money should be spent to ensure that organic farming plays a larger role in agriculture. In Germany, the Minister for Agriculture at the time of writing, Renate Künast, is a member of the Green Party and has declared her objective to be the maximization of organic farming in the European Union. (However, fellow Greens in Britain and elsewhere must have been surprised when she announced, in January 2004, that the German Government would licence the commercial planting of GM crops and that she saw no health risk to consumers). Other EU agricultural ministers seem only too ready to follow her lead where organic farming is concerned and they envisage that in due course over 20 per cent of European agriculture will be organic. Throughout Europe organic farming is expanding annually at rates of up to 20 per cent. However, the figures for growth give a somewhat misleading picture. Not only do they start from a low base, but much of the expansion relates to grassland for feeding sheep and cattle, which requires no special treatment. In the UK the proportion of vegetables grown organically is only 0.5 per cent.

To the ordinary public, the label 'organic' has a reassuring ring, particularly when contrasted, as it constantly is, with 'synthetic'. Eating 'organic' food is like drinking 'real' ale, not *ersatz*, imported, imitation stuff. It sounds safe because it is guaranteed to be GM-free and is assumed to be untainted by nasty, possibly carcinogenic pesticides. Supermarkets promote it, which they would not do unless there were a popular demand for it; it is also clearly to their advantage that the public are prepared to pay premium prices for

it. More and more farmers look to a future in organic farming because its higher prices offer the prospect of higher profits, one bright spot in the otherwise bleak landscape of the agricultural industry in Europe. In fact, domestic supply in Britain cannot keep up with demand, so that over 70 per cent of organic produce has to be imported. (As one of the advertised attractions of organic food is its freshness, clearly most organic food on supermarket shelves does not qualify. Indeed, if one takes into account the air miles flown to bring organic food to European markets, most organic food in the shops cannot be regarded as environmentally friendly.)

Perversely, evidence to justify public enthusiasm has proved elusive. The Food Standards Agency (FSA) in Britain, set up to examine evidence about the safety of food and to protect the interests of consumers, has persistently refused to uphold claims for the superiority of organic food, much to the chagrin of the Soil Association. In January 2004 the FSA stated: 'On the basis of current evidence, the Agency's assessment is that organic food is not significantly different in terms of food safety and nutrition from food produced conventionally'.[2] When a complaint was made to the Advertising Standards Authority that recruiting leaflets published by the Soil Association made misleading statements, claiming that organic food tastes better, is healthier, and is better for the environment, the Authority found no convincing evidence to support the claims and the leaflets had to be withdrawn.[3]

It is not surprising that these two independent bodies should find no evidence to support the claims, because in fact public faith in organic food is based on myth. The organic movement has murky origins; its basic principle is founded on a scientific howler; it is governed by rules that have no rhyme or reason; it is steeped in mysticism and pseudo-science; and, whenever it seeks to make a scientific case for itself, the science is shown to be flawed. If organic farming were to be much more widely practised, as its supporters advocate, it would have damaging consequences for farming as a whole, for the world food supply, and for the environment.

Myths and mysticism

The Soil Association was founded in 1945 to promote non-intensive farming methods that preserved the structure and fertility of the soil. Its first President was Lady Eve Balfour, who believed that vital principles were found in manure and that plants grown in manure generated healthier food than that produced by the application of minerals. But the original inspiration for organic farming came from the early twentieth century mystical philosopher Rudolf Steiner, a follower of the German *Naturphilosophen* (e.g. Fichte, Schelling, and others) of the nineteenth century. This was a group whose obscurity of language was exceeded only by the obscurity of its ideas. Indeed, one of its most celebrated philosophers, Friedrich Schelling, averred that 'it is a poor objection to a philosopher that he is unintelligible'.[4] In his lectures on agriculture in the 1920s, Steiner stressed the virtues of manure as a soil fertilizer. He believed that cosmic forces entered animals like cows or stags through their horns, and he developed a concept of feeding the soil through a process of 'biodynamic cultivation',[5] which involved planting according to the phases of the moon and nourishing the soil with cow horns stuffed with entrails. He also taught that chemical fertilizers damaged the human nervous system and the brain.[6]

The mystical origins of the organic movement would be irrelevant if the Soil Association, the main promoter, controller, and defender of organic farming in Britain, did not regularly dismiss scientific criticism by stressing the need to look beyond science to the spiritual or mystical dimensions that farming should take into account. The Director of the Soil Association, Patrick Holden, has dismissed the idea that the achievements of organic farming could or should be scientifically tested, because organic farming is 'holistic, integrated and [represents] joined-up thinking'. The trouble with asking for scientifically based measurements is that the organic, holistic approach is not 'reductionist'. He has deplored the 'obsession with reductionist science: . . . holistic science strays

into territory where the current tools of understanding that are available to the scientific community are not sufficiently well developed to measure what is going on'.[7]

Holden's statement that current science is not sufficiently developed to evaluate organic farming echoes almost exactly comments made by the editor of *Alternative Therapies* (see Chapter 2, p. 43) to the effect that the intrinsic qualities of alternative medicine cannot be measured by contemporary scientific methods. Rejecting the methods of science as 'reductionist' makes assessment of the effectiveness of organic farming impossible, because only by changing one factor or variable at a time can cause be related to effect. But the organic farming lobby, like supporters of alternative medicine, do not believe in the scientific method. Both practices have virtues, it seems, that can only be detected by intuition; they are both revealed as based on a belief in magic or mysticism, not reason.

A lack of concern for scientific evidence, indeed for simple facts, is also evident in the basic credo of the contemporary organic movement, which is the belief that synthetic chemicals are bad and natural chemicals are good. This belief inspires the rules of the movement and pervades the writings of its devotees. It is an extraordinary belief. First of all, it ignores the fact that a molecule is a molecule; the product is the same, whether it is made by a man-made synthetic process or by a natural one. Secondly, it denies elementary chemical truths: that many synthetic chemicals are beneficial. Conversely, many natural chemicals can be poisonous. Anti-bacterial drugs like sulphonamides or isoniazid, which kills the tubercle bacillus, are synthetic. So is the painkiller paracetamol. Poisonous chemicals found in nature include ricin, aflatoxin, and botulinum toxin. In every case, whether the chemical is beneficial, harmless, or harmful will, as the Swiss Renaissance physician Paracelsus observed centuries ago, depend on the dose. Too much of anything, including water, will kill you; very small doses of arsenic do no harm, and indeed there is evidence that they can actually do good. The belief in the goodness of what is natural and the sinfulness of what is man-made is part of the

'back-to-nature' philosophy that regards science, and its attempts to control or improve on nature, as one of the baneful influences on humankind. It overlooks the fact that cholera, plague, starvation, and any number of other scourges of humankind were afflictions of nature that synthetic medicines and technical advances have enabled us to control.

It is therefore clear that the leaders of the organic movement on the whole do not care about scientific comparisons and prefer intuition and mysticism, and, not surprisingly, are happy to ignore elementary chemistry to base their doctrine on a false distinction between natural and synthetic chemicals. But does their devotion to mysticism and indifference to science necessarily discredit the whole organic movement? Since farming only qualifies as organic if it complies with rules made by the Soil Association or by UKROFS, perhaps the most important questions are whether these rules make sense and whether, in practice, farming in accordance with them has the merits claimed.

Rules with no rhyme or reason

Unfortunately, the rules themselves are inconsistent, arbitrary, and reveal no coherent set of principles. The use of some pesticides is allowed, for example spraying with *Bacillus thuringiensis (Bt)*. This is the same *Bt* bacterium whose insect-resistant genes have been transferred to maize, soya, cotton, and other genetically modified plants, yet the Soil Association is one of the principal Green lobbyists campaigning against its use in GM crops. The official position of the organic movement, confirmed by its rules, is that the presence of a particular *Bt* protein within a plant as the result of genetic modification is dangerous, but the organic farmer can spray the plant with *Bt* spores containing that same protein. In both cases, the bacterial *Bt* protein protects the plant from its insect pests. Nothing could more clearly illustrate the topsy-turviness of the Soil Association's make-believe world.

However, when crops are genetically modified to incorporate a *Bt* gene, particular pests are specifically targeted by the insertion into the plant of one or two genes that code for the toxic protein that affects those pests and no others, so that the minimum amount of harm is done to other non-target insects or to natural predators of that pest. For example, the gene for the *Bt* protein that kills one species of caterpillar is used in plants that are attacked by that caterpillar and the gene for another toxic protein that kills a particular beetle larva is used in plants for which those larvae are the main pest. By contrast, when the organic farmer sprays *Bt* spores onto his crops, the spray contains a mixture of toxins, since the *Bt* bacterium produces some 130 different toxins, each of which is active against a particular kind of insect. Such sprays are not specific in their effect. They are more likely to affect non-target insects (i.e. beneficial insects) than the toxic protein expressed by a *Bt* gene in a GM plant. The organic farmer also has to spray repeatedly, which is expensive; transgenic *Bt* plants do not have to be sprayed. Thus, the Soil Association rules in this case explicitly discourage the better environmental practice.

Another arbitrary rule permits the use of the inorganic compound copper sulphate as a fungicide. Although the use of copper compounds in agriculture was due to be prohibited across the European Union from March 2002, limited use has been permitted until 2006 at the express request of the organic movement. Why do the organic rules allow the use of copper fungicides on potatoes, when they prohibit the use of better, well-researched, and safer fungicides? Copper-based fungicides are less effective against late blight, and are more toxic to insects, than any of the more modern classes of fungicides. They are also more persistent in the environment and more damaging to the soil. The only reason for a plea for their continued use seems to be that they are the oldest in regular use and are venerated because they are traditional.[8]

Even if its rules are illogical, contradictory, and arbitrary and even if the central philosophy of the movement itself is based on a fundamental scientific error, it is still possible that, by accident as it were, organic farming actually works and that its effects are

beneficial. The public, and, one suspects, most organic farmers, do not care about the philosophy behind the rules, and few will have heard of Rudolf Steiner. But people clearly see practical merits in organic food, since they buy it even though it costs more. A survey in 1997 showed that 83 per cent of consumers bought organic food to avoid pesticides; 75 per cent on the grounds that it is kinder to the environment; 70 per cent were concerned about the intensive rearing of animals; 68 per cent bought it because of the taste; and 36 per cent expressed worries about BSE. Since that survey, another commonly expressed concern is about GM food: consumers buy organic food because it is GM-free.[9] Surely people 'know their onions' and if they like it and are prepared to pay a higher price for it, it must have some merit?

Each of these reasons will be considered separately. But the fact that people buy it is no more proof of its merits than the fact that most people's belief in it proves the merits of astrology, or homeopathy, or that there is a link between MMR and autism. The philosophical reasons for supporting organic farming are part of the 'back-to-nature' syndrome. Like the practice of alternative medicine, they are based on the belief that 'nature knows best' and that what is natural must be good. It is a belief that betrays a certain nostalgia for a mythical golden age of small-scale and simple farming and pure and wholesome farm produce, before modern technology interfered with nature and spoilt the Arcadian countryside. Such a paradise never existed. In the days before intensive farming, when farmers did not use pesticides or artificial fertilizers, food supplies were constantly endangered through climatic and environmental fluctuations and crops were frequently lost to pests and diseases. Agriculture was associated with grinding poverty, intensive labour, and low yield. The poor quality of much food, together with infectious diseases, contributed to a much shorter life span of the general population. Malnourishment was rife. In Britain, for example, 60 per cent of potential recruits for service in the Boer War, in 1900, were rejected by the army because of their low stature and weight, as the result of an inadequate diet.

In the last fifty years, since synthetic chemicals came to be widely used, our life expectancy has increased by seven years or more. Healthier and safer food, together with better health provision, has improved our physical well-being and increased longevity, and modern agriculture deserves much of the credit.[10]

The virtues of 'natural farming' and the 'back-to-nature' cult appeal strongly to the media, who treat the Soil Association as an authority deserving at least as much respect as the Royal Society. After all, the organic people are the good guys trying to give us wholesome food and save the countryside. When, therefore, the Soil Association produces research it has commissioned to justify its claims, no interviewer ever asks if there is any independent verification. But if we want to know how organic food compares with other food, we need objective comparisons that compare like with like. It is only too easy to parade specious comparisons that are superficially persuasive but totally misleading. Farms vary enormously in different parts of the UK, let alone in different parts of the world. Wind and rainfall vary, so do the soil, the hedgerow structure, the weeds, and pests, and all of them affect the efficiency and environmental impacts of a farm. How the produce from one farm compares with another also depends on the quality of management, which is probably the most important factor that affects the impact of a farm on the environment. If someone sets out to farm in an environmentally friendly way, it is likely that he or she will succeed. Indeed it is because many people take up organic farming for environmental reasons that many organic farms have a good record for promoting birdlife and biodiversity. But the same results can be obtained by other farming systems, if they too are managed with the same dedication. According to the Rothamsted Research Institute, 'where one tries to match the farm type, the butterfly and bird numbers can be as good on a conventional farm as on an organic farm'.[11] Proper comparisons should therefore be between organic and conventional plots farmed by the same farmer. Fortunately, several such comparisons have been made and, moreover, they have compared performance over a sufficiently long period of time to eliminate accidental factors.

Does organic food taste better?

As polls show, most people believe it does. In blind tests, however, there is a common confusion between organic produce and freshness, and the public has not been able to distinguish organic from conventional food.[12] Such scientific tests produce a result at such variance with so many people's declared experience, including that of many food experts, that it seems to require some explanation. One reason may well be a common confusion with freshness.

Organic food often tastes better because most home-grown organic products are fresher, for the simple reason that they have a short shelf-life. In the case of chickens, there is some confusion between organic and free-range: many people assume that free-range chickens must be organically reared. Again, local variables can produce different results, because of differences in the soil, weather, and management practices. For example, in a comparative study of different farming systems at Boarded Barns at Ongar in Essex, a panel carrying out blind tests found that organically produced bread had a mustier taste and did not taste as fresh as bread from conventionally produced grain or that produced by integrated farm management.[13] The fact remains that the Advertising Standards Authority, with no vested interest in its conclusions, found the claim that organic food tastes better was not supported by evidence and academic studies came to the same conclusion.

Is organic food healthier?

This is one of the most important questions since the main reason people give for buying organic food is to avoid pesticide residues. The Soil Association plays on these concerns, as do a number of other campaigning organizations that have helped to create a food-scare industry. For example, in November 1998 the Consumers' Association magazine *Which?*, under the heading 'Pesticide Concerns', carried a story that test results from animal studies linked high doses of pesticides with cancers, hormone

disturbances, and birth defects. It did not mention that high doses of anything cause harm, or that official reports on the concentrations of pesticide residues in food found that the amounts present were so low as not to constitute a hazard to health.

A typical example of the case made against the use of pesticides was a detailed indictment published by a leading figure in the Soil Association in *The Guardian*.[14] She complained that pesticide residues 'have become a routine ingredient in our diet'. In the year 2000, '67 per cent of the grapes, 72 per cent of the apples and 71 per cent of the pears we ate contained residues. . . . As a working rule of thumb, at least 40 per cent of all the fresh fruit and vegetables we eat contains residues, often multiple residues, of several pesticides and, not infrequently, illegal ones'. She acknowledged that fewer pesticide residues were found in the UK than in other countries, but suggested this was because our system of monitoring was less rigorous. She also conceded that an Advisory Committee regulates the pesticides that may be used by growers, and that its chairman is independent, but she noted that several of its members have done work or acted as consultants for chemical and biotechnology companies and inferred that the committee therefore has a vested interest in approving pesticides. Her conclusion was that the Advisory Committee is in the pocket of the companies, who, it seems, are quite happy to poison us for the sake of profits.

Some of the residues in our food, her article revealed, are of chemicals like organophosphates, 'infamous for their devastating effects on the central nervous system.' We should not only be concerned with the effect of residues in pears, apples, and grapes already mentioned, but also strawberries, peppers, and chocolates, spinach, celery, carrots, oranges, potatoes, oily fish, and wholemeal and multigrain bread. The Government's rationale for its approval system, that huge safety margins are built in, was dismissed out of hand, as was the idea that the public is not at risk if there is no evidence of harm. As usual the BSE experience was cited to show how mistaken this approach has proved. The Government is also at fault, she maintained, for not giving the control bodies a remit to encourage organic farming. Finally, the conclusion was reached

that consumers are left with two principal choices: 'You can switch to organic ... (her association with the Soil Association is not mentioned). Or you could just accept that every third mouthful of food you eat contains poison. Are you up for that?' As this kind of alarmism is not uncommon, it is not surprising that 86 per cent of consumers wish to avoid all pesticide residues.

Now it might, at first sight, seem sensible to ensure if possible that there is no residue at all of anything poisonous in food. But the writer, like all pro-organic anti-pesticide campaigners, forgot the message of Paracelsus: it all depends on the dose. At no time does she mention the concentration of any of the residues found. Detection itself is not enough to justify expressions of horror. If it were, warning us that one mouthful in three contains poison is not being nearly alarmist enough. In fact *every* mouthful of food contains some poison, as does every sip of water. 'Carcinogenic' substances are routinely consumed by all of us in the form of natural chemicals made by plants to repel predators, but amounts are so small they do not harm us. Potentially harmful chemicals including arsenic are found in many foods and in drinking water, but the quantities are, usually, too small to cause harm. There are some dioxins in every breath of air we take, but again in such small amounts as to be insignificant. In fact they may actually do good (see p. 72).

It is worth quoting a review by Sir John Krebs, chairman of the Food Standards Agency, published in *Nature* (a journal in which inaccurate or unfounded statements are seldom left uncorrected): 'A single cup of coffee contains natural carcinogens equal at least to a year's worth of carcinogenic synthetic residues in the diet'. He points out the disparity between public fears about food and the facts:

> dietary contributions to cardiovascular disease and to cancer ... probably account for more than 100,000 deaths per year in Britain. Food poisoning probably accounts for between 50 and 300 ... pesticides in food, as well as GM food, are not responsible for any deaths.[15]

The distinguished microbiologist Bruce Ames states that Americans eat 1500 milligrams of natural pesticides a day, an amount

about 10,000 times greater than their daily consumption of synthetic pesticide residues.[16]

One reason why the public is acutely conscious of pesticide residues in food is that we have become much better at measuring the very small amounts present. As most people cannot distinguish between micrograms and picograms, more sensitive tests, which should provide reassurance, paradoxically frighten people instead.

Of course public concern about pesticides is not, I believe, only due to anti-pesticide propaganda from the organic movement. It is part of a phobia about carcinogens for which Rachel Carson also bears responsibility, through her claim that organochlorines such as DDT caused cancer. Today there is a widespread belief that there is an epidemic of cancer caused by various forms of environmental pollution, including pesticides. In fact, most forms of cancer are associated with smoking, obesity, and sunshine and are otherwise connected with the fact that we live longer. Overall, cancer rates are in decline, particularly when lung cancer induced by smoking is removed from the detailed age-related statistics.[17] It is significant that cancer rates among farmers are about half the average, although farmers are more exposed to pesticides than the rest of us. It is also interesting that the incidence of cancer of the stomach, which is likely to be related to diet, has declined by 60 per cent in the last fifty years, a period during which the use of pesticides in agriculture has increased.[18] Fear of pesticide residues in food is one more example of a health scare without foundation.

Low-dose beneficial effects or the 'hormesis' effect

Ironically, there is persuasive evidence that low concentrations of many toxic chemicals may actually have a beneficial effect. The phenomenon of hormesis, or low-dose beneficial effects, is widely observed and accepted.[19] It seems that the hazards of low-level exposure to pesticides may have been overestimated and scientific and regulatory approaches to pesticide management are being reconsidered by toxicologists.

Examples are, of course, familiar. A small dose of aspirin mitigates a headache and can help prevent heart attacks, but a larger dose can kill. Fluoride in small doses strengthens teeth and bones, but it is a poison. Sunshine is good for us if we protect ourselves against overexposure, but causes melanomas and other skin cancers if we do not. A little bit of dirt helps stimulate your immune system. Most encouraging of all, moderate consumption of wine protects against cancer and cardiovascular disease, although overindulgence can be fatal. It is not generally realized that this dose-related effect called 'hormesis' is also known to apply to many supposedly toxic chemicals, including arsenic, dioxins, some pesticides and fungicides—and even diluted factory effluent and radiation.[20] In fact, a little bit of poison or pollution can do you good, and serves to reduce the incidence of cancer. Over 30 separate investigations of about 500,000 people have shown that farmers, millers, pesticide-users, and foresters, occupationally exposed to much higher levels of pesticide than the general public, have much lower rates of cancer overall.

By demanding total elimination of all pesticide residues from our fruit and vegetables, the organic movement promotes an unreasonable fear of chemicals and scares us about non-existent dangers. The public is not made aware of their beneficial effect on our general health.[21]

Is organic farming better for the environment?

Another reason given for buying organic food, to some its main attraction, is that organic farming is friendlier to the environment. Many people buy organic for the same reason that they recycle paper and glass: they feel that they are being responsible citizens and are doing their bit to preserve birds and butterflies. Organic farms do show environmental benefits, in that more birds and butterflies as well as other insects inhabit them than most conventionally farmed land. Indeed, the idealism that makes many people take up organic farming should not be discounted. They want to preserve and encourage biodiversity and believe that

organic farming is the answer. One of the virtues of their rules is that UKROFS and the Soil Association specifically require organic farmers to aim for environmental benefits, to maintain soil fertility, rotate crops, avoid pollution, and show concern for animal welfare. Organic farmers set out to manage their farms to achieve good environmental effects and it is not surprising that they do so.[22]

Because I argue that organic farming has no scientific basis and has many disadvantages, I want to make it clear that I admire the achievements of many small organic farmers in improving the environment. I share their aims and indeed many of their dislikes. Factory farming, for example, of chickens and livestock is a deeply repulsive practice and, in the balance we have to strike between the economic interests of human beings and respect for nature and its creatures, I regard the low prices of poultry and meat, which we owe to factory farming, as too high a price to pay. I agree with the aim of the organic movement to reverse the damage some of the practices of intensive farming has caused to biodiversity.

However, as the evidence demonstrates, this is a matter of management, not of the system, and it can be achieved by other means than organic farming. The effect of different farming systems on the environment was tested at Boarded Barns in Essex in a meticulously conducted comparison of organic farming, conventional farming, and integrated farm management (IFM)—a system that specifies exacting standards of landscape, hedgerow maintenance, large field margins, and insists on high standards of animal welfare. Indeed, IFM incorporates all the attractive features of organic farming without its ideological absurdities. The study was sponsored by Aventis, but the work was done by a number of independent universities, institutes, and environmental organizations, including the British Trust for Ornithology, the Essex Farming and Wildlife Advisory Group, and the Essex Birdwatching Society.[23] The effect of the different systems was compared over a ten-year period, an important feature, since it takes many years to assess the effects of changes in agricultural practice.

The report listed as its most important finding that the particular farming system used had less direct impact on key areas of

biodiversity than was earlier supposed. Overall, the best results came from IFM, many of whose techniques have now become common practice for conventional farmers. By most environmental tests—soil quality, effect on bird life, numbers of mammals and insects—it scored at least as well as organic farming, and overall it was the best in terms of biodiversity. It also required less fuel and was more efficient in its use of labour than organic farming. The latter was superior in only one respect: the high premium prices for organic food made it more profitable. One of the important findings was that 80–85 per cent of animal life in any farm exists in the field margins and hedgerows and that the effects of pesticide application on the cropped area is of little significance. Thus any system that maintains margins and hedgerows is likely to be as good for biodiversity as any organic field.[24]

What people care about most is the effect of farming on birds. (The Royal Society for the Protection of Birds is one of Britain's richest charities). Yet evidence for the effect on birds of different farming systems is difficult to establish. The main difficulty is that large fluctuations in bird populations have occurred in the past and we do not know why. For example, the recent decline in song birds may well be partly due to cats, whose numbers have increased by 50 per cent in the last 20 years to some 8 million. Domestic cats, it is estimated, are to blame for the deaths of some 300 million young birds and small mammals every year. Some bird populations go up (sparrowhawks), while others go down (tree sparrows). Any decline in a bird population is automatically blamed on intensive farming, while no one has yet suggested that it is responsible for any increase.

A number of studies have also been done on the effect of different systems on soil fertility, soil structure, and on nitrate pollution of waterways, but these too are broadly inconclusive. One verdict of a comprehensive review of the literature is 'that little or no benefits follow from current organic procedures. . . . the supposed destruction and erosion of the soil in Britain [which led Lady Balfour to found the Soil Association] no longer occurs and the

case for supporting organic agriculture on this basis is not justified'.[25]

Among the most important causes of damage to the environment, rarely stressed and completely ignored by the organic movement, are the tractor and the plough. On organic farms, weeds are controlled by frequent mechanical weeding. But the tractor and the plough damage worms and insects in the soil, cause soil erosion, release more carbon dioxide into the atmosphere, disturb nesting birds, use more fossil fuels, and are in every way less beneficial to the land than the no-tillage, or low-tillage farming made possible by genetically modified, herbicide-tolerant crops. These, it has been estimated, reduce greenhouse gases by over 80 per cent per hectare (see Chapter 4, p. 104 below). In winter the number of birds on no-tillage fields exceed by many orders of magnitude the number of birds found on organic fields.[26]

Efficiency and the future of farming

Possibly the most telling indictment of organic farming is its inefficiency—its high cost and its wasteful use of land. The facts cannot be seriously disputed. One study purporting to show that organic and conventional corn yields were identical omitted to mention that it required twice as much land to achieve the same yield. In an occasional year yields from organic farms can be equivalent, but since the organic process depends upon a ley period in which clover and grass or alfalfa are grown to allow nitrogen fixation and provide the soil with nitrogen to be ploughed in, total yields have to be compared over a continuous number of years. An experiment which made a valid comparison of yields from organic and conventional produce at the same farm reported that the yields from organic wheat, beans, and peas were only 60–70 per cent, and of oats 85 per cent, of conventional yields.[27] The Boarded Barns study routinely reported that organic wheat yields using animal manure were about 50 per cent of those of conventional wheat. The evidence is overwhelming: yields of most crops from organic farms are about 20–50

per cent lower than from conventional farming. That is why organic food costs more.

Does it matter? The argument frequently advanced by the organic lobby is that we have become obsessed with efficiency. The consumer is sovereign, and if the consumer likes organic food, does it matter if it is less efficiently produced and costs more, since many people are prepared to pay premium prices? If organic farmers can make a good profit and build an enclave of prosperity in a landscape of depression, surely organic farming should be encouraged. If consumers want it, that is justification enough for organic farming.

Efficiency does matter. It affects the health of low-income families. Even in a prosperous society like Britain we should not ignore the importance of cheaper ways of producing food, provided they are not based on intolerable breeding conditions for animals. Prosperous (and vocal) middle-class consumers may not care about price, but the poorer you are, the more the price of food matters. Pesticides keep down the cost of fruit and vegetables and if the organic lobby prevails they will become more expensive. People in the lower-income groups will buy less fruit and fewer vegetables; this is all the more important since they are now exhorted to eat more of them to help control obesity. Moreover, the more pervasive the propaganda that more expensive organic food is 'safer and healthier', the greater the pressures on poorer families to buy food they can ill afford. Their diet will suffer and they will lose the protection against cancer that a healthy diet provides. More of them will die younger compared with the rich. Our model should not be Marie Antoinette making dietary recommendations to hungry Parisians.

Even from the farmers' point of view, it is doubtful whether a system that depends on premium prices paid for food of no superior quality can provide a sound long-term basis for a viable agricultural industry. Today's premium depends on the organic market being a niche market. As the number of organic farmers increases, encouraged by government subsidy, the premium will fade away. In 2001, 18 new organic dairy farms in England came

into operation and their produce overwhelmed the small market for organic milk, forcing the price down from 30p to 24p a litre, only a penny more than the price of milk from conventional farms. The new farms produced smaller yields at higher cost and inevitably some organic milk farmers went out of business. The same fate might befall organic farmers growing other crops.

There is also an ethical issue. At the moment, supermarkets benefit from high prices for organic produce. There is an element of deception when companies boost profits by promoting the sales of more expensive products that do not reflect better value. Supermarkets claim they are providing what customers want. However, far from educating their customers to get value for money, they encourage them to buy organic food. Imagine the outrage if multinational agri-business exploited consumers in the same way.

The environment also suffers if farming is inefficient. Organic farming wastes good farmland. Since Europe produces an excess of food as a result of efficient farming, farmers can be encouraged to set aside half their land for environmental purposes, for woodland or fast growing willow plantations which can be coppiced frequently and the wood used as fuel. Such plantations, with their undercover of weeds, bird-nesting sites, and mammal and insect refuges, are more effective at promoting biodiversity than any organic farm, use less fossil fuel, and produce much less carbon dioxide. They are already a common feature in many European countries.[28]

However, all these considerations are minor compared with the needs of the world as a whole. The poorest farmers in Africa and Asia are already organic farmers: they do not use pesticides or artificial fertilizers because they cannot afford them. The Green Revolution passed them by, which was one of its failures. The organic movement seeks to go back to the days before the Green Revolution. It cannot help eliminate the pests and diseases that destroy nearly half the crops in Africa, or the development of drought-resistant crops that can grow on arid or semi-arid land. It cannot even match the yields which conventional farming already

achieves today. What is more, in many parts of the world the only way in which inefficient organic farmers can feed a growing population is by cutting down more tropical forest: for example, Mexican farmers currently 'slash and burn' three million acres of virgin tropical forest a year.[29] Organic farming may satisfy the whim of the rich European or American consumer; its extension to the developing world would be a disaster. As the Indian biotechnologist, C. S. Prakash,[30] has correctly observed: 'The only thing sustainable about organic farming in the developing world is that it sustains poverty and malnutrition'.

Scientists, who know that there is no intellectual case for organic farming and who are fully aware that its principles are based on myths and untruths, frequently say they have nothing against it: good luck to the farmers who make profits from it and to consumers who are happy to buy it. I believe this position is morally untenable. Truth matters, and if an important industrial activity is based on nonsense we should say so. We should not encourage superstition but expose it. When medicine is based on voodoo science, the danger is not only to the health of patients who may be misled, but to the way we approach the problems of life. Organic farming is based on pseudo-science and it is important that this should be publicly recognized. One of the main purposes of education is to teach children to think straight and to distinguish the true from the false. Woolly thinking about food and farming is as much a manifestation of unreason as belief in homeopathy.

Nor should we be indifferent to a movement which makes it less likely that poorer families will improve their diet and more likely that they will suffer ill health as a consequence. It is an indefensible part of government policy, influenced by the power of the multi-million pound organic farming lobby, to subsidize this harmful nonsense. Above all, protestations that we care about world poverty ring false when prosperous nations protect their own farmers with subsidies and penalize subsistence farmers in the developing world. To promote organic farming and exacerbate the shortage of productive land compounds hypocrisy.