
Sustainable Agriculture

Society Religion and Technology Project

A Report to the 2002 Church of Scotland General Assembly

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Deliverance (i.e. Motions) passed by the General Assembly

The General Assembly

34. Affirm the importance of moving to more sustainable forms of agriculture, including both integrated and organic farming systems, and urges HMG to provide more incentives and assistance for farmers to do so.

35. Urge HMG to submit the health and nutritional claims of organic agriculture to independent scientific research and evaluation.

36. Encourage members to adopt more sustainable food purchasing practices, as far as they are able, emphasising food which is grown locally, which is seasonal, and using more environmentally sustainable methods.

1. Introduction

In the three years since the SRT Project reported to the General Assembly on genetically modified crops and food in 1999, there has been widespread discussion about the methods and technologies we should use in our future

agriculture. "How should we make our food better?" is a question on the lips of lay person and expert alike. We are all concerned about food. In reaction to pesticides, BSE and the GM food controversy, there has been a growing interest in what are called sustainable agricultural practices, and in particular in "organic" methods and products. Does this, as some believe, represent the trend for the agriculture of tomorrow, majoring more on health and environmental care than production efficiency, or is just trendy, strong on a lifestyle and imagery but short on practicality, as others argue? SRT has contributed to the working group of the Church and Nation Committee which is reporting to this Assembly on some of the wider lessons learned from the foot and mouth outbreak of 2001. The present SRT report focuses on the particular question of what represents a sustainable approach to agriculture.

There has been a tendency to polarise the answer as though it were a simple question of alternatives - organic or GM. In reality it is more complex, with many factors to take into account. In weighing these up, which underlying principles should take priority? There are three main criteria and corresponding approaches, each with their advocates. In a highly competitive international climate, one argument maintains that it is essential to continue intensive methods, focused on high inputs, efficiencies and yields in order to compete on the global market? A second sector sees the future requiring a far greater emphasis on environmental protection with alternative sustainable approaches, for example using greatly reduced chemical inputs, sensitivities to soil quality, and careful habitat management. A third group regards such changes as insufficient, agriculture needing instead a revolution to break the mould of the past 50 years, by moving to a different philosophy of agriculture altogether, as embodied in organic farming methods. These three approaches are broadly described as intensive, integrated and organic.

Are these either/or questions, or is the best policy way forward some combination of all of them? Amongst these various approaches, what is the part, if any, for a range of emerging biotechnologies like targeted genetic modification, plant and animal genomics, marker assisted selection, and sophisticated new approaches to soil science? This report examines each of three methods in turn with their good and bad points, but examines organic agriculture in more depth in view of its particular claims.

This report draws upon SRT's detailed involvement with agricultural biotechnology since 1993, and its wider insights on theology and environmental care, food and agriculture over the past 25 years. SRT has been involved in numerous discussions on sustainable agriculture before and since its 1999 report. Its Engineering Genesis working group has focused especially on these issues in preparing the new edition of our book. They featured prominently in a parallel study for Evangelical Alliance chaired by the SRT Director, recently published in the book "Modifying Creation". SRT has close ongoing links with the agricultural sector, for example through membership on the Care for the Protection of the Environment Committee of the Scottish Agricultural College (SAC). It is in continuing discussions on research and policy in the fields of organic agriculture, reduced environmental impacts and

genetic modification, and has taken part in a number of conferences and consultations on sustainable agriculture.

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2. High Input, High Output Intensive Farming

The current debate has arisen against a background of half a century of application of industrial methods to crop agriculture, which arose out of the situation at the end of the Second World War. There was not enough food to go round and people were all too aware of the fragility of food supply. This led to the impetus to produce more home-grown food, and to increase yields by use of breeding technologies, chemical inputs, mechanisation and systems management. Very large increases in yields were achieved. For example by the late 1980s improved wheat varieties enabled bread to be produced from British-grown wheat, with a marked reduction in imports.

Intensive arable farming follows a linear model, which typically puts in high fertiliser levels, protects seed from disease before planting with a fungicide, removes weed competition from the field with a herbicide, uses disease-resistant varieties. A farmer may spray five or six times in a growing season. There may be prophylactic use of agrichemicals as an economic precaution in order to maximise yields. To recoup the high input costs of chemical inputs and machinery, high yields of good quality crops are indeed essential to this approach. The driver is to compete at global market prices. This requires maximisation of unit size, the externalisation of costs to the environment, and a narrow focus on production. Unless they are cost-effective in themselves, environmental features tend to be viewed as externalities which might be funded by grants. GM crops would be worth the additional cost of seed if they provided for control of pests, weeds and diseases using less chemical inputs, and the farmer would argue that it also reduced the environmental impact by comparison with multiple spraying.

In a globalised context, this approach is seen by some as the only one likely to be able to compete in major commodity crops in the international markets. This approach is more typical of regions of England like East Anglia and Lincolnshire than Scotland, where the soil quality and climate are less favourable, but there are nonetheless some significant Scottish users. Compared with the pre-war situation, intensive agriculture has led to very much higher yields and cheaper food, but at what wider cost? In parallel with this, cheap and rapid transport and sophisticated sourcing and distribution systems have also brought a much wider diet to the tables of many people.

These same trends have however also been seen as the root of the present agricultural crisis. The domination of a 'production and efficiency' mind set has caused serious negative impacts on the environment and wildlife which have for many prompted a re-examination of our ways of practising agriculture. It has brought a considerable loss in biodiversity. Insect and weed seeds, which provide food for many birds, have been greatly reduced. Hedges have been removed to make room for larger machinery, yet non-crop plants

often provide important habitats. There are high levels of waste and nutrient loss into the water courses. Soil organic matter content has decreased. Erosion can also be a problem. Such effects have also been exacerbated by a round about of EC subsidies and quotas, and a constant pressure to reduce prices and lower overhead costs. This in turn has meant less people on the land and concerns about the long-term viability of the rural areas with poorer yielding sectors. In combination these various factors have led many Christians to see this approach as incompatible with care for God's creation. The Currie Commission report on the future of agriculture after foot and mouth disease comments "Beyond any doubt the main cause of this decay has been the rise of modern, often more intensive farming techniques." Its recommendation of a major change to sustainable alternatives reflects a broad feeling that we cannot continue the intensive route unchecked.

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3. Integrated farming

The name embraces a wide variety of arable farming systems which have been developed within the context of mainstream agriculture, but which aim to be sustainable in one way or another. The contention is that present systems of agriculture are capable of adaptation in much more environmentally sustainable ways, without necessarily calling for so complete a revolution as that entailed in the organic approach. Quite a lot of the broader claims which have popularly become associated with the word "organic" would apply to these methods also. The high media profile given to organic systems and their claims to the moral high ground, have tended to mean that there is less public awareness of integrated farming methods, but in agricultural terms they may prove to be of greater significance. The environmentalist, Jonathan Porritt, has predicted that "the boundaries between what we now describe as 'organic', 'chemical' or 'GM', are likely to soften; whatever the descriptor, all production systems will be bound by the same discipline of sustainability".

Integrated systems aim to produce food profitably, whilst safeguarding the environment by a balanced and holistic approach to farming, which considers all aspects of food production. This includes the site and landscape, the nutrient status and structure of the soil, crop rotation, variety choice, pest, weed and disease control, conservation, energy use, waste disposal, and also the management, auditing and monitoring of the entire farming process. In principle, its scope of its practical application is as wide as organic, but it sets out from a different starting point and philosophy.

Plant varieties are carefully chosen for disease resistance, aiming to reduce pesticide usage to when outbreaks occur. This contrasts with a high input system, where spraying is used as an insurance, just in case. Soil is analysed for its nutrient status and a field analysed into zones. More controlled amount of fertiliser added accordingly, reducing the surplus run-off. Particular attention is paid to the conservation of wildlife on the farm, including hedge and pond management, and woodland conservation. By careful monitoring inputs it aims to use inputs with precision and wasting nothing. Whereas

organic agriculture formally proscribes transgenesis, integrated methods would allow GM crops if there was merit in doing so. GM crops could be used which targeted specific nutritional, health or environmental improvements. For example, engineered traits might be favoured which improved nutrient uptake or conferred resistance to particular fungi, but not GM crops tolerant to broad range herbicides.

Integrated agriculture has many different expressions including agri-environment schemes promoted by the Government. For example, since 1993 Scottish Natural Heritage has promoted the TIBRE project (Targeted Inputs for a Better Rural Environment) to use the best of new technology to reduce environmental impacts of intensive systems. Such systems claims to be more flexible than organic farming and need not have a long conversion period. This may be an attraction for many farmers. Because it is not governed by a tight set of 'rules' it can also be harder to regulate and to market, since integrated systems do not have one all-embracing label equivalent to "organic". The Currie Report found some integrated approaches pitched at too high level to achieve large penetration into mainstream farming practice. It argued that they are appropriate as a "top tier" for especially sensitive environments, but are rather too expensive and cumbersome for more general uptake in the farming community. It recommended major financial investment to enable a lower level "entry point" into a less demanding system, which may be made gradually more sustainable later on.

For some Christians, integrated farming represents a suitable alternative to intensive agriculture on the one hand and the more radical and uncertainties aspects of organic farming. It still allows such methods as chemical inputs and genetic modification. At best it would aim to go with the best of agricultural methods and technology and avoid the worst. It might be criticised for remaining too close to intensive systems and merely ameliorating some of their excesses. For some, this would not go far enough, and a more revolutionary path would be seen as the way ahead.

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4. Organic Agriculture

1. What is organic farming?

Organic farming lies at the opposite end of a spectrum of approaches from intensive agriculture, but has some radical distinctions from all the others. While it shares some similar practical aims with integrated farming, organic agriculture it is qualitatively different. It is not so much about not using synthetic pesticides and fertilisers, as representing a different philosophy of agriculture. It is a holistic, integrated system of farming based on the management of the natural ecosystem and its processes, so that crop production is in balance with the ability of the soil to release nutrients. Synthetic fertilisers are unnecessary because of the way organic methods manage the soil, its microbes and nutrients, as summed in the phrase 'feed the soil and let the soil feed the plant'. Indeed, soluble "inorganic" fertilisers which

directly feed the plant are seen as impoverishing the soil. Instead of fertilisers, wastes from crop residues and manure become nutrients for crop products. Thus, unlike intensive arable systems, most organic farming includes livestock as an integral part of the system. Rotating the use of a field with carefully chosen species enables nutrients to be recycled within the system. Crop health is to be maintained by natural systems of pest, weed and disease control, using rotations, mechanical weeding and various ingenious planting patterns which exploit the natural pest and disease resistance of certain plant combinations.

It is a more human-intensive approach. To maintain such a system requires considerable care on the part of the farmer. The above description is an ideal and it is not always achieved. At times the system fails, and under such circumstances organic farmers are allowed to use some specified older pesticides as a last resort, for example to control potato blight. Initially the potential use of genetically modified organisms (GMO's) was unclear, but a decision was made in 1996 explicitly to reject them. The main grounds are ideological. A sharp ethical line is drawn between selective breeding and genetic modification. The former is said to present a more natural way of agriculture, respecting the distinctions of species which have evolved. GM is seen as a disruption of inherent balances which was intrinsically wrong regardless of any apparent benefits. The second is that mixing genes across species is seen as inherently more risky than selective breeding, or that not enough is known to predict the long term implications of GMO's. This argument is not primarily evidential - it would be very difficult to prove - but conceptual, associating one type of agricultural intervention with higher risks than another. Organic organisations have been actively campaigning for the eradication of all use of GMOs and oppose the current farm scale trials programmes. There are some, however, who are sympathetic to organic agriculture but who question the long term wisdom of rejecting all GM applications in principle.

Organic farming aims to produce good yields without needing artificial inputs, while emphasising harmony with nature, biodiversity, soil health, energy conservation, food quality, farm animal welfare, and the avoidance of environmental pollution. Its origins date back to pioneering work in the 1930s and 1940s of Sir Albert Howard, Lady Eve Balfour and others. The term organic defines a particular form of production process rather than a product as such. Unlike integrated or intensive farming, it has developed into a system which is quite strictly defined by a set of minimum rules set by the UK Register of Organic Food Standards (UKROFS). These have to be adhered to allow the use of the term "organic". Within these rules, there are several approaches, regulated by different bodies, of which the most prominent is the Soil Association. It is a system to which the farmer has to "convert". This is a process requiring a minimum of two years, usually with grants available, before the farmer can gain accreditation to sell produce labelled as "organic", and is subject to monitoring thereafter. While

aiming to be pure according to its own definitions, organic produce has to accept the reality that it may contain traces of pesticides and foreign gene constructs because of the proximity of other farmed systems and there are appropriate levels set in the rules.

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2. Evaluating Organic

On the face of it these are some very good ideas and concepts, compatible with many Christian concerns about the environment and much else. One major problem is how effective it would be on a large scale. It is generally harder to obtain a high predictable yield of good quality using these systems. Supermarkets are also geared to a continuous supply concept which is less sensitive to small scale production and seasonal effects. Organic food frequently costs more in the supermarket because it tends to have more variable yields and be significantly more expensive to run than current conventional systems. There is an argument that the comparison is distorted because the conventional crops appear artificially cheap because they do not include their costs to the environment and to health. Most people buy by the price at the shelf, however, rather than the full life cycle costs. It is also not clear that this correction would be enough in itself to make organic the more economic option. On the other hand there seems considerable scope for research investment into organic methods to give substantial improvements in yield. One recent comparative US study of intensive, integrated and organic apple production showed that encouraging yields were possible. The Government should therefore put priority into significantly increased research effort in the organic sector.

A main practical attraction for farmers is that it is a crop which carries a premium because some people are prepared to pay more for what they regard as better food or food grown in better ways. Indeed public demand for organic products has risen considerably since the late 1990's, and the trend looks fairly stable. If demand increased very greatly the premium may fall, but at present the organic sector remains a relatively small part of the UK agriculture. Organic proponents are uncomfortable with the fact that large amounts of organic food are at present imported to meet consumer demand, because of environmental impacts from the transportation and because it sits awkwardly with the concept of food produced in the local environment. This indicates that there is considerable scope for expansion of this sector. How much is open to debate. Proponents say the aim should be that 30% of UK agriculture is organic by 2010, and eventually 100%.

Such an uptake would, however, represent a major change for the organic system from a radical alternative run by committed enthusiasts to a mainstream farming system, and introduce significant uncertainties. It is a common experience in technology generally that

scaling up may generate unexpected problems. The concept of organic farms is small, local and sensitively managed. Would the concept survive being operated at something akin to industrial scale and by perhaps less committed farmers? Organic systems tend to be less tolerant of neglect and poor practice. There are also significant economic and supply risks. No one knows if 56 million people could be fed organically or whether we could afford whatever this would cost. These are unknowns which must be taken into account. Applying the precautionary principle implies some caution about seeing organic systems as the whole future. As with all systems, scaling up would need to be applied stepwise and with careful monitoring for problems.

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3. Is Organic Really Better for us?

Because of the nature of the claims which are made about the superiority of organic food, some discussion is necessary. The environmental claims of organic agriculture seem to have definite merit, certainly by comparison with intensive agriculture. In a Scottish context, whether it is markedly better for biodiversity, pollution levels and general environmental good than well managed small scale mixed farming or integrated systems is at present less clear, but the general environmental picture is good, as would be expected for an approach which gives this top priority.

At present there is little evidence one way or the other for the claim that organic food is necessarily safer or better for health, however. Such comparisons are very difficult to make. It is claimed to be more healthy because it uses an intrinsically better way of growing crops, and that synthetic chemicals make food inherently worse. The philosophy of organic agriculture speaks of concepts like "vitality", which are difficult to define in any meaningful scientific sense. There are tests such as the pattern of crystallisation of copper chloride salts which are said by proponents to indicate the better vitality of crops grown by organic rather than conventional means. The problem is that such claims as these are at the borderline of the conventional scientific way of evaluation. Indeed some scientists regard it as well beyond the borders. As with the church authorities in Galileo's time there is a danger of saying that our dogma says certain things are so, therefore the scientific evidence will prove it. It will be difficult to determine whether they represent anything more than a faith statement of what believers believe about a system, or something which has a more objective validity.

Some people buy it because they feel that it is more "natural". As all farming systems are artificial when compared with the original landscape of Britain, the 'natural' argument is only relative and perhaps somewhat nostalgic. Organic farming is not a return to pre-war farming. It is a different system. It makes use of good quality, up-to-

date cultivars, and even allows some limited use of older pesticides in certain situations. The notion of natural food may simply express a sense that recent intensive methods have gone too far in their intervention, without asking too many questions about *how* natural food is supposed to be. Organic farming does not by definition imply 'pure' products, and is facing some safety questions of its own from the Food Standards Agency, for example over micro-organisms in manure and mycotoxins in grain. There is an undoubted appeal for many people that organic food represents a more attractive and sustainable concept than food produced by intensive methods.

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6. Organic ideology and the spiritual dimension

Whilst many farm organically because they see it as a better way of farming, and some even because it is a promising niche market to get into, for some organic is truly a movement with an ideological thread, a political goal, or a spiritual expression. Its pioneers saw it as an alternative to the political philosophies and cultural decrepitude of the inter-war years with a 'revivified' rural life. Today it is being promoted as a post-industrial, holistic alternative to the over-application of reductionist science. It finds common cause with the environmental movement, which generally regards it as being the best expression of the principles of environmental sustainability within the field of agriculture.

A seminal paper by Lady Eve Balfour also reveals that although the organic movement has some Christian roots, it also drew on the anthroposophical ideas of Rudolf Steiner and similar movements earlier last century. It included concepts like vitality, energy flows and balances which are speculative and sit awkwardly both with scientific and biblical understandings. Lady Eve claimed that 'The energy manifesting in birth, growth, reproduction, death, decay and rebirth can only flow through channels composed of living cells, and when the flow is interrupted by inert matter [meaning in this case inorganic fertilisers] it can be short circuited with consequent damage to some parts of the food chain.' Such notions have strong parallels with the cluster of beliefs commonly called New Age. While would certainly be an exaggeration to describe the organic agriculture as New Age as such, there are many for whom its underlying values represent the motivation in seeking to demonstrate a valid and viable alternative. For them, the ideology is much more explicit and integral.

There have been many environmental theologies advanced as the basis of care for God's creation in the 30 years. SRT has itself played a pioneering role, notably in Ruth Page's concept of companionship with nature as a necessary corrective to the sometimes too "top down" view of environmental stewardship. In recent years we have addressed the challenge of technology and environmental care in terms of a balance of intervention and conservation between two contrasting and complementary pictures in Genesis 1 and 2.

Genesis 1 describes the creation in elemental terms with the strong language of dominion to describe human relations with the creation. Men and women are commanded by God to 'fill the earth and subdue it' and to 'rule over' fish, birds, livestock, creeping creatures, and 'all the earth' (Gen. 1:26-28). This stresses God's calling to humankind, made in God's image, to express God-given gifts and creativity in transforming the natural world. Thus we may say that to practice technology, in its broadest definition of the 'practical arts', is a fundamental part of being human. This is expressed in passing in numerous ways throughout the Old Testament – in agriculture, irrigation, building, mining, metallurgy, ship-building, and all kinds of skilled crafts. Genesis 2 counterbalances this picture of intervention by describing human relationship to creation within the subtler context of a garden which we are to work and to care for (Genesis 2:15). Cultivation implies work and intervention, but it places more emphasis on the horizontal dimension. We are fellow creatures, in a good garden of which God is the owner. Care for our fellow creatures and the overall systems of what God has created should thus act as a restraint on human ambitions.

Thus in these creation accounts we find a creative tension between notions of development and conservation, which does not have a simple resolution. God calls us to work to find a dynamic balance between the two as one of the tensions of the Christian life on earth. There is a further dimension that human beings are also fallen from the relationships which God intended - with God, our fellow humans and also with the creation. Our stewardship and companionship of the earth has been spoiled and the whole creation groans as a result. It will not be restored to a contemporary environmental idyll or social utopia, but awaits God's final salvation in the parousia.

Christians should therefore beware of two opposing secular pressures. One is the drive of determinism which promotes scientific rationality as an idol, autonomous from the guidance of God's laws and wisdom. Christians rightly oppose a "technicist" attitude which sees things only for their functional or economic value, or as nothing more than a reductionist scientific description. Many see this error expressed in intensive agriculture, in which an unmitigated dominion over fellow creatures expressed in an efficiency and production orientation which ought to have been restrained the parallel responsibility of care for God's wider creation.

Less familiar is the opposite concern reflected in a rise of what some have termed neo-pagan views which sees nature as quasi-divine instead of created, and not to be tampered with lest 'she' strike us back. Even if not reverting to mother goddess terminology, it rests on an assumption that 'nature knows best' holding an exaggerated concept of pristine nature which tends to be static and fatalistic. A cultural trend in this direction has been noticed before in what people mean by 'God'. Human intervention and scientific endeavour is flawed unless it stays close to natural patterns. In contrast a Christian view of nature is morally ambiguous, perhaps fallen, and on occasion dangerous to human well being. It is not necessarily a good guide

Thus a Christian understanding has mixed views about the basis for organic agriculture. Many of the concepts involved in both integrated and organic agriculture resonate with a Christian understanding of care for God's creation. These include respect for the natural world, care of the soil, health and wholeness, holism and connectedness, permanence, the recycling of wastes and responsibility for future generations. On the other hand, the more speculative claims about organic agriculture are problematical. Acting in harmony with nature's patterns and to 'balance the energies' against disruptions by inorganic chemicals seem to play down the validity of human creativity against an idealised view of nature. They borrow terminology like 'patterns' and 'energies' from science, but give them very different meanings. There is also an implicit idealism about human solutions, which it shares with some secular ecological thinking, which fails to take sufficient account of human fallenness. Christians may differ quite strongly with some of the movement's interpretation of such concepts and the world view they fit into. But we should see this is as an opportunity to bear witness to Christ and engage in dialogue concerning the spiritual dimension in agriculture and environment, rather than something to steer clear of. From Old and New Testaments, the patterns of the natural world furnish any number of examples and pointers to God and to care for creation, yet humans can also intervene to adapt them to our purposes under God. This is not exclusive to organic methods. Organic should not be seen as necessarily more ethical than any integrated methods of farming. Both reflects a desire to do things better, reacting to the over-technologisation of food production.

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7. Some Conclusions about Sustainable Agriculture

Food is fundamental to human survival and well being. We have to eat to live and we have to produce food to eat. Producing food is therefore fundamental to any community of people. To the extent that we do not grow our food ourselves, we are in a dependent situation on others outside the community. To function properly this requires stability, trust and a measure inter-dependence. Food is also connected with health and poverty. Too much, too little, and the wrong balance of nutrients in the diet all affect human health, as do good or bad food processing and preparation. These are linked to poverty and how much we can afford to spend on food. In past generations a large proportion of the population spent much of their energy and lives in providing food. Trends over centuries means that in the UK, hardly anyone now earns a living from growing food, though a significant number do so in processing, transport, retail and catering in the food sector.

All food is derived from God's creation. In God's rich provision for human needs, we are given the creation to use, but within limits. The efficient use of God's creation, soil, water, crops, nutrients, minerals, livestock makes for good stewardship of creation, husbanding it well for the poor as well as the rich. But the too ready import of industrial motifs from mechanical and chemical production processes has brought a functional view of agriculture and its resources, which sits awkwardly with the concept that God's creation,

its creatures, processes and ecology, have intrinsic value. Providing food involves parts of God's creation being both products of nature and products of human industry, but a proper balance has been lost between them. The functional, formulaic approach of the physical sciences fits less well with complex living systems. We have concentrated on certain features of food security, efficiency and lowered costs which have been the main drivers since the Second World War graphically brought home the perils of food insecurity. These trends seem to many to have gone too far. It is probably the case that we cannot afford for food to stay as cheap as it is, because it costs too much in other ways.

Farming has always impacted on the environment. Intensive agriculture has increased the impact, and is high in its use of non-renewable energy, is highly interventionist and produces substantial wastes. Some consider it 'violent', reflecting the traditional view that farming is a struggle against the forces of nature. They advocate a paradigm shift to what they regard as more benign, lower energy, information-rich sustainable farming systems, inspired by a belief in the possibility of farming in harmony with nature. For some these ideals find partial practical expression in organic farming. Others do not see the need for so radical an alternative, and look to see how conventional methods can be adapted to achieve results that might be equally good in terms of sustainability.

The words sustainable, integrated and organic have all come to mean several things. They are in danger of becoming Humpty Dumpty words which mean whatever the speaker wants them to mean. Sustainability of *what*, we may ask? Each of the different approaches sees different priorities for what needs sustaining. The word "organic" has several definitions including a particular class of chemicals or the defined system of agriculture described above. But it has also become a connotation word which conveys a general impression or a lifestyle choice, which embraces things which go far beyond the practices and ideals of organic agriculture. Farmers markets, locally grown produce and food boxes are not the sole preserve of any one form of agriculture. It is also quite a problem to disentangle what is truly a characteristic of organic agriculture from a range of other sustainable methods of agriculture which aim at rather similar things, and might claim to be equally "natural". A lot that is claimed for organic would be equally true of several other methods.

Organic as a practical system well worth trying on a larger scale and seeing how sustainable it is in economic practical and environmental terms. If it were a substantial percentage, say 30%, it would raise some new problems of scale and widening its practice from a relatively small group of dedicated enthusiasts to the wider farming community which may compromise the standards in practice. In general it would be environmentally a good thing, but its nutritional and health claims are much more uncertain. These may be a question of what you believe to be the case rather than things that can be proven, though it is worth trying to test the claims scientifically as far as possible. The system is not infallible because soils, local pests, diseases, weather, and the practice of the farmer all represent great variability. There also remains the risks that it may not prove economically viable on a large

scale or provide enough food. These are unknowns, but precaution suggests we should expand the rate of uptake at a level from which we could draw back if its undoubted promises proved to be seriously hampered by its potential concerns.

Rather than embrace organic agriculture as the exclusive choice, the conclusion of this report is to advocate the range of alternatives which could be defined as environmentally sustainable and which have hopes of proving economically and socially viable. This would certainly include organic methods, and encourage their much greater development in Scotland and the UK generally, but it would also embrace a range of alternatives described above. These offer a more flexible approaches which would not adopt a fundamental rejection of chemical inputs or genetic modification under the right circumstances. Indeed, the absolute prohibition of GMO's by organic systems is seen by some as a mistake. It is argued that some of the cultivars currently approved for organic use have had no less invasive origins, and in some cases GM technology could, in the view of some, achieve things very helpful to organic systems.

For the Christian consumer who is concerned about where our food is coming from and wants to have a more ethical approach to food purchasing and consumption, buying organic food will have strong attractions. Christians should be aware that less radical alternatives also exist, which may be equally good. The picture is not simple. Organic products tend to be expensive, which puts them effectively out of the reach of the poor. While demand exceeds UK supply, a lot of organic produce has unfortunately to be flown in from abroad. It would also be misleading to imply that simply by buying organic 'you've done your bit'. There are other important ethical considerations, such as sourcing fairly traded goods, eating products primarily in season, buying locally, not shopping at out-of-town supermarkets.

Even if the underlying ideals and ideologies may differ from those of Christian exponents. Organic systems and integrated farming both offer alternatives of sustainable agriculture, and a means of expressing Christian environmental responsibility and social justice more than conventional intensive approaches. In the case of organic agriculture, Christians should be wary of the conceptual package and its philosophical undergirding and quasi-religious elements. But the same applies to all farming approaches and movements where they deviate from Christian principles. While integrated farming may not have an explicit ideology, it too has its more subtle assumptions, which also need to be evaluated in a biblical light. The challenge is to develop approaches that enable Christians to farm in a way that reflects Biblical principles yet remain in farming, and provide a basis for a stronger prophetic voice in the agricultural arena.

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