The Intrinsic Value and Integrity of Plants in the Context of Genetic Engineering

A Discussion Document prepared for the Ifgene Workshop at the Goetheanum, Dornach, Switzerland 9th – 11th May 2001

Introduction

A few years ago nobody would have seriously considered that public resistance to genetically modified food products would rise so dramatically within such a short time. We will not attempt to single out one cause for this development. It is a combination of several factors:

- the sudden realisation that genetically modified (GM) foods made from maize and soya are already present in many foods without the public being aware of it (no labelling)
- the aggressive propaganda of some multinationals
- the fact that the first transgenic products were hardly of any benefit to consumers (the benefit was mainly for the producers, if at all)
- the development of 'terminator' seeds by Monsanto
- the Pusztai affair, manifesting a tremendous lack of agreement among scientists about the risks of GMOs further along the food chain
- several ‘accidents’: the Starlink maize affair (approved as food for cattle, but found in hundreds of human food items); the damage to caterpillars of the Monarch butterfly by Bt-maize; the double herbicide resistance present in transgenic sugar beet (Aventis); incidents of contamination of regular seed with GM seed.
- the publication by Greenpeace of lists of ‘red’ and ‘green’ (no GMOs) products; the direct actions against GM crops and foods in fields and supermarkets

Resistance is now widespread in Europe and is growing in the USA. Consumer concerns are now taken seriously. This is primarily because there is unanimous agreement that consumers should be free to choose and this automatically includes some form of labelling. Meanwhile it is becoming clear that this ethical demand has tremendous consequences for the whole food chain (problems with segregation, identity preservation etc.)

Officials think that the establishment of an independent international institute for the safety of foods will appease the consumer concerns. But opponents see this as just another move to avoid the important issue, which is not (only) the safety of the final product for the consumer, but the quality of the whole way of production. The official policy till now has been that if the GM product is ‘substantially equivalent’ to a product we are already familiar with then it should be allowed to enter the market without being labelled. The idea of substantial equivalence lies at the root of present forms of risk analysis, but criticism of this idea is increasing (see box 1).

Box 1

Sylvie Pouteau, member of Ifgene in France, has published an article in which she criticises the idea that food quality can be restricted to (material) substantial factors which can be analysed and quantified easily and which have a direct effect on human health (substantial equivalence). Besides a more qualitative equivalence scale she argues for ethical equivalence, referring to the moral value attached to food products. This moral value refers to environmental ethical criteria (sustainability), socio-economic criteria (solidarity), socio-cultural criteria (freedom) and to justice. Thus the whole context of food production is taken into account, not just the product itself.

Sylvie Pouteau: Beyond substantial equivalence: ethical equivalence. Journal of Agricultural and Environmental Values vol 13, no ¾ (2000) 273-293.

Intrinsic concerns with respect to plants

The above mentioned criticism reflects the realisation that in the public debate about GM food, risks for health and for the environment are only some of the consumer concerns involved (we refer to the reports mentioned in the appendix). Besides these extrinsic concerns there are the intrinsic concerns: man's basic attitude towards nature, the sacredness of life (with the genome seen as the blueprint of life), the 'unnaturalness' of genetic engineering, the lack of respect for the intrinsic value and integrity of life. Such ethical concerns go far beyond the traditional risk analyses which are the basis of most existing laws dealing with the genetic modification of plants. The reason is that traditional risk analysis only looks at the consequences, the effects of the genetic modification, whereas the ethical concerns mentioned have to do with the human attitude behind the modification as well as with the modification itself. Even with the genetic modification of animals the discussion usually takes place within the framework of consequentialist, utilitarian ethics. An exception is the law in the Netherlands in which the intrinsic value and integrity of animals plays a prominent role. With respect to plants the Swiss law (Gen-Lex) is an exemplary exception because here the inherent worth or dignity of all living beings ('Würde der Kreatur') is taken into account.

In the workshop we want to deal with the intrinsic concerns. We want to convene this workshop with the traditional pluralistic attitude that is characteristic of Ifgene. We want to create a free cultural space, in which a real dialogue can take place. All viewpoints are part of the cultural resources of society. We would like to welcome them all, including so-called non-scientific views. With questions such as this we believe that the biologist's view of life is not a neutral, objective view, having a privileged position. Working in this way we hope to show how ethical questions can be taken seriously within the public debate, without the debate being usurped by legalistic frameworks.

Main issues with respect to consumer intrinsic concerns about GM foods

In the appendix a number of reports about the social and ethical aspects of GM food are mentioned. What are the main issues in these documents? And how are these issues related to each other?

1. The concept of naturalness

The intrinsic value (inherent worth) of nature or natural entities is not explicitly mentioned in most reports (see point 3 below). A central feature in all the documents is the question of the **(un)naturalness** of genetic engineering, either in a more theological context, or in a more ecological context. It seems important, therefore, to discuss this theme. In the reports it is discussed at different levels, or in different contexts:

- the level of human (cultural) activity versus nature untouched by humans (all human activity becomes unnatural).
- the level of crossing species barriers with GM versus traditional methods of breeding (degrees of naturalness, reductionism, etc).

- the aesthetic level: unnatural is equated to uncommon for human perception, not normal (creation of blue roses).
- the normative level: the natural is good, and deserves our respect. Genetic engineering as a violation of species integrity.
- the level of nature as experienced directly by the senses and nature transformed in the laboratory or the factory as being unnatural.

It is striking that a very important meaning of 'natural' is not mentioned in these reports, namely natural as equivalent to the species-specific 'nature' of a plant or animal. This meaning is also expressed in the German words 'artgerechtes Verhalten'. There is evidence that this meaning is at the root of the resistance to GMOs in organic agriculture (see box 2).

Box 2

Ton Baars, Edith Lammerts, Mirjam Matze and Henk Verhoog (supervisor) of the Louis Bolk Institute are working on a project about the meaning of 'naturalness' within organic agriculture. Most reports mentioned above fail to see that nature is a concept which always includes a value component. Valuation (not only of nature) has three dimensions: a cognitive one (one's view of nature and man's place in nature), an emotive one (one's basic attitude towards nature) and a normative one (ideas or principles about how we ought to act with respect to nature). Most of the objections to the unnaturalness of genetic engineering are only based on scientific views at the cognitive level, without taking into account the other dimensions. These other dimensions are mentioned in the reports, but only casually and not systematically. The scientists from the Louis Bolk Institute are now reconstructing the view of nature in organic agriculture along these lines. The rejection of genetic engineering in organic agriculture has a cognitive component which is ecologically and holistically inspired, with man as an inherent element of the ecological system. There is an emotive component in the sense that nature (natural entities) is seen as a partner with whom the farmer should co-operate. This is based on a positive attitude towards (the wisdom of) nature. Genetic engineering is seen as a process in which nature is forced to do what humans want, instead of eliciting a reaction in which the natural entity retains its relative independence (autonomy) as a partner. Finally, the normative component follows from the view that natural entities have an intrinsic value, have a value-of-their-own which should be respected. The normativity does not so much lie in the 'wildness' of nature, untouched by humans, but in respect for the 'otherness' of nature. The question then becomes whether genetic engineering does violate the characteristic nature, the integrity, the characteristic way of being of natural entities (plants, animals, species, ecosystems). Respect for species barriers is part of this. Summarising we could say that, in organic agriculture, genetic engineering is believed to be unnatural because the technique does not fit into the holistic view of nature, because it does not seem to fit into a harmonious relationship with nature as a partner and because it does not respect the characteristic nature (way of being) of living organisms.

2. The hegemony of scientific arguments

It is important to realise that what has been said in the last box about the value component in every concept of nature also applies to how scientists or biotechnologists think and feel about nature. Their concept of nature is usually not made explicit in debates about GM food. In this context the use of scientific critique in a moral context is striking in several

of the publications mentioned. Compare the following statement in the report of the Nuffield Council on Bioethics:

> "After examining all the scientific evidence in the light of these ethical considerations, the Working Party takes the view that the genetic modification of crop plants, as so far developed, does not differ to such an extent from conventional plant breeding or other human interventions with the natural world as to make the process morally objectionable in itself" (p.124).

By putting all emphasis on the cognitive dimension only, and because of the hegemony of scientific thinking as a source of truth in our culture, the impression is created that such a criticism is somehow value-neutral and objective. This also comes to the fore in the very common view among biotechnologists that the intrinsic concerns are irrational, emotional, or that intrinsic concerns about our food (plants in particular) are not moral concerns, but aesthetic concerns, by which they usually mean to say that such concerns are 'mere matters of taste'. It is only in 'Engineering Genesis' that this view is explicitly criticised (see box 3).

Box 3
Bruce & Bruce (Engineering Genesis) write: "For many years there has been a tradition among many scientists and people of a rationalist frame of mind, to dismiss intrinsic ethical arguments as non-rational and emotive" (p.81). The authors put much emphasis on dissolving this kind of polarisation, by showing that intrinsic ethical arguments are by no means limited to religious and environmental groups: "The advocates of genetic engineering are likely to be just as much influenced by their own intrinsic beliefs and prior value commitments about the nature of life, humanity and the environment as are its opponents" (p.82). Examples of such beliefs and values are: the belief in reductionism, belief in the inevitability of scientific progress and that this is for the good of humanity (anthropocentric normative view).

This raises a number of interesting questions with respect to the deeper philosophical presuppositions underlying genetic engineering, especially relating to reductionism and holism and the values associated with the choices made here. It would be interesting to scan the biotechnological literature for hidden values. Values may be hidden in the metaphorical if not rhetorical language used (the genome of Arabidopsis as the holy grail of plant biotechnology is one example; reading the Book of Nature is another one). If the level of values is the one at which human beings really meet each other, we should be fully justified in asking the following questions. Can genetic engineering ever be reconciled with a holistic approach to nature? Can the results of the genetic engineering approach be reconciled with (say) a more Goethean approach to nature? Can the use of genetic engineering techniques be reconciled with the concept of nature underlying organic agriculture?

Box 4 Definitions
In an *anthropocentric* bio-ethical theory only human beings have intrinsic value, i.e. have a value-of-their-own which can never be reduced to just an instrumental value. In a *zoocentric* theory sentient (vertebrate) animals are included as also having intrinsic value. In a *biocentric* theory all individual living beings have intrinsic value because they all have a good-of-their-own. In an *ecocentric* theory the emphasis is on species and ecosystems as having intrinsic value, not the individual organisms.

3. **The dignity of non-human organisms**

In connection with the Swiss law it is necessary to go into the concept of 'the dignity of non-human organisms' ('die Würde der Kreatur'). In 1998 Philipp Balzer, Klaus Peter Rippe & Peter Schnaber published a so-called expert opinion on this matter: 'Menschenwürde vs. Würde der Kreatur. Begriffserklärung, Gentechnik, Ethikkommissionen', Alber Verlag, Freiburg. A slightly revised English version was published in the Journal of Agricultural and Environmental Ethics (Vol. 13, no 1-2), with comments by Dunja Jaber, Robert Heeger, Frans W.A. Brom and Ben Mepham. The authors (Balzer et al.) think that the concept of the dignity of non-human organisms needs to be defined independently from the concept of human dignity. The concept assumes that we are morally accountable for non-human living organisms for their own sake; they have (contrary to machines) an inherent (intrinsic) value. Living organisms have a good of their own, pursue individual goals (they have ends in themselves) and can be described as organic units. This also applies to organisms cultivated or bred by man. The authors believe that ascribing inherent value to non-human organisms does not mean that it is an absolute value; it does not exclude the possibility of weighing goods against one another. Thus far this corresponds to the biocentric approach (see box 4 above). But when it comes to the question of the implications for genetic engineering the authors come to different conclusions.

a. Contrary to other biocentric theories the authors think that not all organisms possess the same inherent value (non-egalitarian view). This is a point for discussion. An alternative view is that all living organisms have a prima facie inherent value, and only when there is a clash between the human good and the good of a non-human organism do the differences between the goods of different organisms begin to count.

b. A biocentric approach usually applies to individual plants and animals only, not to species or ecosystems. Thus criticism of crossing species-barriers is usually not seen as an infringement of the inherent value at the level of the individual plant or animal, but at the species level. Each individual plant or animal also belongs to a certain species (or breed), with certain species-specific traits. Looking for 'indisputable criteria' there are three possibilities according to the authors:
   - The original, unchanging nature of the species is referred to as a standard. With this standard it becomes difficult, however, to make a distinction between traditional breeding methods and genetic engineering.
   - The integrity of the genetic make-up is taken as standard. Here the question is whether the own good of a living being can be identified with genetic integrity. The authors conclude that the genome is only one of many conditions that influences the organism. This goes against the prevailing view in molecular biology where genes are considered to be the most important natural entities and the organisms somehow their slaves.
   - The standard could be the uninhibited development of (the normal) species specific functions. This would not necessarily forbid making transgenic organisms such as giant trout. Those who think it does, make an aesthetic judgement, which is not based on an infringement of the inherent value of the organism. One could object to the making of giant trout because one wants to protect the natural species (ecocentric argument), but not on the basis of the (biocentric) inherent value argument. The same applies to a plant which has been made resistant to herbicides;

when this does not hinder the plant's growth and reproduction there is no infringement of its dignity.

c. The authors conclude that in the field of genetic engineering, the criteria for the dignity of non-human organisms are more likely to be relevant to transgenic animals than to plants or micro-organisms: "Given the release of transgenic plants or micro-organisms into the environment, the public discussion is properly focused on an assessment of the risks concerning the protection of health, species diversity, and environment". Here the authors refer to the book by Reiss and Straughan, the first report mentioned in the appendix of this discussion document. So this comes down to the view that only extrinsic concerns are important with respect to plants.
It may be the case that a biocentric approach with respect to plants is more difficult to accept for some people than with animals, because the biocentric approach centres on individual organisms (see box 5).

Box 5
In a Dutch study ('De aard van het beestje') about the role of the naturalness argument with respect to the genetic modification of animals Thijs Visser & Henk Verhoog (1999) defended the view that contrary to a zoocentric theory, the 'good of its own' in a biocentric theory refers to the 'nature' of individual animals. But this concept of nature has several levels: the level of being alive, the level of animality, and the level of the species-specific nature of the animal. All these levels have to be taken into account at the level of the individual animal. In a widely used (in the Netherlands) definition of the integrity of the individual animal by Bart Rutgers & Robert Heeger [in Marcel Dol et al. (eds), Recognizing the intrinsic value of animals, 41-52. Van Gorcum, Assen, 1999] we can find all these levels mentioned: "The wholeness and completeness of the animal and the species-specific balance of the creature, as well as the animal's capacity to maintain itself independently in an environment suitable to the species" (p.45). With plants we have the level of being alive and the level of the species-specific nature of the plant. And it may well be that compared with animals (and certainly compared with humans) in plants the level of the individual organism is less important than the level of the species and the environment in which the species lives. But this does not mean that we cannot speak about 'the good of its own' of a plant. The biocentric theory invites man seriously to look into the differences between the natures of (species of) micro-organisms, plants, animals and humans. It may be that these differences in the beingness of natural entities cannot be found at the genomic level, that we need more phenomenological methods of the whole organism to find this out.

d. Looking at the discussion about the dignity and/or integrity of living organisms in the literature it is striking how often a reference is made to aesthetics, suggesting that moral questions only play a role when "it makes a difference for the organisms involved". The organisms themselves must somehow experience it negatively when human beings infringe upon their integrity. Otherwise it is "between the ears of the observers"; it is a problem for humans, not for the organisms themselves. This seems to be the underlying position in the paper by Balzer et al. Here we touch on interesting philosophical questions about the relation between subject and object, not only in aesthetic and moral evaluation, but also in the gathering of knowledge itself. From another point of view including an anthroposophical one it could perhaps be said that one can discover as much dignity in the outside world as the human being experiences

within him- or herself. An answer to these questions touches on the view of the authors that the dignity of man and of other creatures should be kept apart from each other.

4. Some possible directions for discussion in the workshop

Based on the issues mentioned we can distinguish a number of questions which could help us to focus our discussion in the Ifgene workshop about the intrinsic value and integrity of plants (feel free to reformulate these questions or add new ones to the list):

- What does it mean to be a plant (for instance in comparison with an animal)? What is the relevance of such 'ontological questions' (dealing with the real 'nature' of a living entity) for ethics?
- What is our (human) relation to plants? If it is one of reciprocal interdependence, how can we structure this relationship in such a way that the plant is considered to be a real partner? Under the conditions of agriculture: is the integrity of the plant also affected if the farmers cannot earn their living from it?
- What does the specific concept of integrity mean with respect to plants (integrity referring to the wholeness, the completeness, its species-specific nature, the balance of the organism with the environment)? Is the concept of 'becoming'("Werden") important here? Can we also speak about genetic integrity or the intrinsic value of the genome?
- To say that a plant has intrinsic value implies that a plant has moral relevance for us, not only because it is useful to us in an instrumental way but also because it has a value of its own. A plant does not feel pain as animals do, so what makes it morally relevant?
- Can we imagine situations in which the plant's 'value of its own' immediately manifests itself to us (for instance in aesthetic experiences)? But what does the aesthetic experience say about the plant itself? Is the experience not just between the ears of the observer?
- What is the role of human feeling (emotion) in becoming aware of a world of qualitative experiences?
- Can we do (scientific) research and cultivate plants in such a way that we do not violate the 'nature' of the plant? (referring to discussions about the (un)naturalness of genetic engineering, where the meaning of 'natural' as referring to the characteristic 'nature' of a plant (animal, etc.) is often neglected).

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Appendix

Public resistance to GM foods has led to reflection by specifically established committees and by philosophers. We give a summary of some recent reports and/or books to put our own debate at the Ifgene meeting into a wider context. The emphasis is upon what is said in these reports about plants and upon the intrinsic concerns.

1. The biologist Michael Reiss, active in both UK governmental committees and EURSAFE (European Society of Agriculture and Food Ethics), together with the philosopher Roger Straughan published the book 'Improving nature. The science and ethics of genetic engineering' (1996).

These authors were probably the first to introduce the distinction between extrinsic and intrinsic moral concerns in this debate: "Genetic engineering may…be thought to be either intrinsically wrong in itself, or extrinsically wrong because of its consequences". Thinking in terms of risks and safety typically belongs to the extrinsic concerns. With new technology a large amount of uncertainty is always involved with the prediction of risks; that is why scientists always play a major role in the risk assessment. Ethics comes in when the risks have to be weighed against the benefits. With respect to plants the main extrinsic concerns have to do with the ethical principle of fairness: consequences for small farmers, vulnerable economies, patenting and using genetic resources from poor countries.

Regarding the intrinsic concerns the authors say that they are seldom voiced with respect to plants, but they are theoretically possible if people object to, for example, the creation of blue roses as being unnatural. The grounds for these objections "might be more aesthetic than moral (e.g. 'that's not how roses should look' rather than 'it's wrong to do that to roses')" (p.156).

Because the intrinsic concerns apply to the whole field of genetic engineering the authors discuss these concerns in separate chapters. Those about 'unnaturalness' are dealt with in chapter 3. The argument is reduced to the following form: "Nature and all that is natural is valuable and good in itself; all forms of genetic engineering are unnatural in that they go against and interfere with Nature, particularly in the crossing of natural species boundaries; all forms of genetic engineering are, therefore, intrinsically wrong" (p.60). Biological arguments against this view are mentioned: species change over time (although very slowly) and exchange of genetic material between populations of different organisms does occur in nature, though this is an exception (evolutionary arguments), and no single universally accepted criterion of the term 'species' exists. The authors also admit that the academic debate about the meaning of species may be of little significance in the context of the public debate about genetic engineering.

But even if it is accepted that genetic engineering is unnatural, what is wrong about this morally? So-called natural events are not automatically good ('Nature red in tooth and claw'). To think so is to commit a naturalistic fallacy.

The authors conclude that "Claims about the 'unnaturalness' of genetic engineering, therefore, do not appear to have much ethical significance, resting as they do upon unclear language and unsound reasoning" (p.64).

Arguments claiming that genetic engineering intrinsically involves disrespect for nature do not fare better. Using reductionist methods does not automatically imply disrespect on the side of biotechnologists: "Do genetically manipulated tomatoes exhibit any more or less disrespect for Nature than the amateur gardener's 'stringless' runner beans or F_1 hybrid cabbages?" (p.67).

In the fourth chapter the authors give theological arguments a fair treatment. But genetic engineering can be both defended by theological arguments (man seen as co-creator with God) and rejected. It can be argued that humans have a theological responsibility, even a duty, to use genetic engineering to root out imperfections in the natural world, including those found in humans. Those who reject it do so because it gives humans too much power, they start 'playing God' without having the wisdom of God (human arrogance, blasphemy). Behind this usually lies the idea that Nature as God's creation is good in itself. In between the extremes are those who think that there is nothing inherently wrong with genetic engineering but that we should proceed with great caution.

2. The book 'Engineering Genesis. The ethics of genetic engineering in non-human species', is the outcome of the multidisciplinary 'Society, Religion & Technology project' of the Church of Scotland, edited by Donald and Ann Bruce (1999). Several biotechnologists participated in this project.

With respect to the argument of 'playing God', and the role of human beings as stewards, guardians, trustees in their responsibility towards nature, it can be defended by pointing out that science and technology are proper human activities under the God-given mandate to cultivate and reorder the creation. The question then becomes whether it is not arbitrary to draw a line at the level of genetics. The same can be asked from a more humanistic perspective. What makes genetic engineering different from other human interferences in nature? The argument that genetic engineering is unnatural is problematic because any statement about it implies value assumptions. The concept of naturalness as something given, external to humanity or as wilderness is hard to justify. The authors think however that if there is any meaning in the idea that genetic engineering is unnatural one must look at the differences between genetic engineering and traditional means of breeding animals or cultivating plants:

> **"…experimenting with the basic elements of life in test tubes is seen as more of a challenge to the natural created order and the laws of nature than conventional breeding methods. The very nature of the procedures involves the reduction of the complex ecological system into its constituent parts which are then manipulated in isolation, or introduced from outside. For some it may pose the question of whether it demonstrates a fundamental lack of reverence for God or for life itself" (p.91).**
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> **It is the notion of the relatedness of all life which comes up in this intrinsic concern. This is both a feature of the Old Testament and of ecological holism (based on the idea of a natural wisdom present in nature). It is the fear that through genetic engineering intricate organismic and ecological balances may be upset.**

The authors pay a lot of attention to the basic question of whether transgenesis violates inherent natural barriers among species in the given order of nature. God made 'everything after its kind' and the authors ask whether this biblical idea of 'kind' is at all related to biological species concepts.

> **Are species barriers inherent in the natural order or are they just artificial (human constructs)? Is the differentiation and balance of species which has come about through evolution not something intrinsically valuable? The authors conclude that "The idea of the natural (or divine) wisdom of the natural order is an important principle" (p.95). Here it is important to distinguish between the act of transgenesis (crossing natural barriers between species in a deliberate way) and the effect of transgenesis (a sheep with some pig genes is still primarily a**

sheep, it has not become a different species). Has the genome an integrity of its own? Is it somehow the 'essence' of the organism, or a blueprint of life?

Does it make a difference for (some) consumers knowing that human genes are inserted into plants or that genes of a ritually unclean animal (e.g. the pig in the case of Jews) are used? In an influential report in the UK the Polkinghorne Committee (1993) argued that the genetic material is copied so many times that a 'dilution effect' takes place. Almost no DNA molecules from the original source are left. It could even be produced synthetically. Such arguments are based on the chemistry of transcription. It is doubtful whether critics would accept this view of the identity of the gene. The gene is transferred because it has a very specific function, as in the case of the production of human proteins in the milk of sheep and cows. The Polkinghorne Committee marginalised the intrinsic concerns by emphasising the **principle of substantial equivalence**; when two products are substantially equivalent labelling would not be necessary:

> "This displayed a fundamental failure on the part of the regulators to appreciate that the nature of public concern is more to do with wider value questions than scientific arguments about limits of detection and equivalence. Such labelling addresses only those concerned about risks to health from actually eating GMOs. Anyone who objects to genetic modification on ethical or religious grounds, because of agricultural practices, or the environmental risks from growing modified foods, is still left with no choice about eating foods to which they object, and so the basic injustice has remained" (p.185).

The authors conclude that labelling should be according to the production process, not the measurable presence of genes.

3. The next report to be mentioned appears in the same year as the book 'Engineering Genesis', but it is explicitly critical of the intrinsic concerns. It is a report by the Nuffield Council on Bioethics: 'Genetically modified crops: the ethical and social issues' (London, 1999).

The conclusion of the report is that there are no ethical objections to GM food other than any direct or indirect risks to human health or the environment. Because the argument of unnaturalness is a view held only by a minority it cannot be a relevant principle for the formation of public policy. Only human welfare, consumer choice and rights as well as questions of justice are relevant. "It is the *deleterious consequences* of our farming techniques to our environment and human health, not their 'unnatural' character that should occupy us" (p.123).

The world into which GM crops are being introduced is one in which farming is already in many ways a decidedly unnatural activity:

> **"The 'natural/unnatural' distinction is one of which few practising scientists can make much sense. Whatever occurs, whether in the field or a test tube, occurs as the result of natural processes, and can, in principle, be explained in terms of natural science…Is a plant acceptably natural or 'organic' if it has been successively bred to have a particular gene complement, but unnatural and not 'organic' if precisely the same gene complement has been arrived at through laboratory processes? We can see no reason in ethics to draw a distinction" (p.15).**
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> **About the intrinsic concerns the report says that these are issues which are 'ethical' in a different way, they arouse great passion, feelings less of moral concern than of disgust and revulsion. Also Heidegger's idea that "the world possesses a meaning that we can only understand if we approach the world in a receptive mode, in the way the poet, the artist or the traditional peasant does, not**

in an 'industrial' way" (p.16) is dismissed, because there seems little justification for banning GM crops on these grounds when the rest of society travels so substantially in the direction Heidegger opposed.

It is praiseworthy that the committee so explicitly states its own assumptions: "This report is grounded in liberal, scientific values and takes a broadly utilitarian approach to ethics, a starting point which is shared by most people in the UK" (p.3). With such an approach it's not surprising that the authors do not pay much attention to the ethical status of the natural world itself or to the basic human attitude towards nature.

The authors subscribe to the principle of substantial equivalence: "…where products derived from GM sources are chemically indistinguishable from non-GM products we do not think it necessary nor practical to make universal labelling a statutory requirement" (p.127).

4. A critical reaction to the last report is given by the Food Ethics Council, an independent council for ethical standards in food and agriculture: 'Novel Foods: Beyond Nuffield' (1999)

In this report the ethical matrix developed by Ben Mepham is applied to GM food crops and functional foods. In this matrix the normative principles of respect for wellbeing (health and welfare), autonomy (freedom/choice) and justice (fairness) are applied to the biota (the living environment), the producers (farmers in developed and developing countries) and the consumers. Application of this matrix leads to a much more critical evaluation of the risks and benefits than is given in the report of the Nuffield Council on Bioethics.

5. The Task Group on Public Perceptions of Biotechnology (European Federation of Biotechnology) published the report 'Ethical Aspects of Agricultural Biotechnology' in 1999 (Den Haag)

The report states that conclusions from public opinion surveys concerning applications of biotechnology are that:

- Usefulness is a precondition of support.
- People will accept some risk if the application is (a) useful and (b) morally acceptable
- Moral concerns act as a veto regardless of views on risk and use
- If risk is less significant than moral acceptability in shaping public perceptions, then public concerns are unlikely to be alleviated by technically based reassurances and other policy initiatives dealing solely with risks.

The group takes as its starting point the need to look both at the consequences of any proposed course of action and at relevant intrinsic considerations before reaching an ethical conclusion. These intrinsic concerns are believed to be of considerable importance, partly because of their wide-ranging nature and partly because they appear to be felt by significant proportions of the general public in EU countries. The intrinsic concerns distinguished are:

1. ***Tampering with nature*: What makes genetic engineering so different from other interferences with nature that it is morally objectionable? The group points out that conceptions of Nature and what counts as 'natural' and 'unnatural' are never merely descriptive; they always have some normative component, prescriptions about what is morally right and wrong to do to the natural world. The ethical issues at stake here centre around the moral status of Nature. Nature can be seen as benevolent and intrinsically good, as hostile and intrinsically bad, and as neutral (with modern biotechnology as a neutral technique which can be used for good or ill). Shallow ecology does not question anthropocentrism and reduces the ecological crisis to a set of concrete problems. Deep ecology, on the other hand, is based on the belief that the human species cannot be separated from the rest of nature (ecocentric perspective).**

2. ***Naturalness and unnaturalness, especially with respect to breaching natural species boundaries*: What is the ethical status of species (microbes, plants, animals, humans)? Genetic engineering may be seen as a violation of the natural integrity of species. The same biological objections are mentioned as in the book by Reiss & Straughan; also the naturalistic fallacy is put forward. But according to the Task Group "In any useful sense modern biotechnology does involve a significant departure from what has gone before. It therefore lays itself open to the charge that it is 'unnatural'" (p.11).**
3. ***Hubris*: playing God.**

An interesting question is why the public perception of food biotechnology is significantly different from other (say medical) applications of modern biotechnology:

> "The critical character of public attitudes towards food biotechnology is probably the result of a synergy between the cultural and symbolic functions of food, the capacity of genetic technologies to destabilise cultural archetypes, and most people's relative ignorance about biology and how agriculture uses plant and animal breeding to improve crops and farm animals" (p.18).

6. The last report we want to mention is called "An ethical foundation for genetic engineering choices". It was also published in 1999, by the Danish Ministry of Trade and Industry.

> **This report adds an interesting argument to the ones we have already considered. It says that the natural can be understood as synonymous with natural mechanisms, but it can also be understood in a wider sense, i.e. as the overall coherency of which all organisms are part, and which has both a physical and an historical dimension. Living organisms should also be respected in their capacity as parts of a spatial and temporal entirety. Nature and the overall coherence (mutual dependence) of life are perceived as vulnerable. This is why demands are made for respect for the integrity of living organisms. Everything living has an integrity that can be encroached upon and destroyed. This entails a distinction between destructive and creative intervention, between considerate and reckless changes. The right to integrity concerns respect for dependence and encompasses both ecosystems, plants, animals and human beings. Besides the utilitarian ethical view and discourse ethics (dealing with the social process of ethical reflection) the authors distinguish an ethics of integrity as important when dealing with genetic engineering.**