

The ethical aspects of agricultural production and agro-food industry

*Elena Mirela POPESCU, Alina Maria TRUTA, Adrian Gheorghe BASA
Faculty of Agriculture, University of Agronomic Sciences and Veterinary Medicine, Bucharest
59 Marasti Blvd., Bucharest-1, 011464 ROMANIA*

*Agata PACEK, Magdalena DYDUCH
Faculty of Horticulture, Agricultural University in Lublin
13 Akademicka Street, 20-950, Lublin, POLAND*

1. Introduction

Ethics is a systematic and critical analysis of morality, of the moral factors that guide human conduct in a particular society or practice. As agriculture represents an interaction between humans and the agro-ecosystem, agricultural ethics deals with the values, rules, duties and virtues of relevance to both human and ecosystem well-being, providing a critical normative analysis of the moral issues in the sector of human activities.

The general public use daily some "definitions" of ethics and those are:

- (a) Ethics is adherence to the spirit and the letter of the law. People who claim that they "have done nothing wrong" after they are caught in a legal but unsavory action often use this interpretation of ethics;
- (b) Ethics is adherence to a religious belief;
- (c) Ethics is adherence to "community or cultural standards";
- (d) Ethics is adherence to my ideas.

This series is designed to encourage us to think about the wider implications that our work has on society. Some of our choices, ethical or not, are being questioned by people who have visions for agriculture that differ from the prevailing paradigm. We live in a time when many are questioning the priorities of our food production systems and confronting us with our role in it.

Interestingly, people engaged in agriculture, whether as producers, scientists, administrators, legislators, or protestors, all tend to believe that they are on high moral ground. Because they are part of that most noble of human efforts, to feed the people of the Earth, they have a "moral confidence" in their profession and often fail to see the need to examine their choices.

In the words of Paul Thompson (Thompson, 1998), one of the country's preeminent agricultural ethicists: "Agricultural producers and those who support them with technology may have been seduced into thinking that so long as they increased food availability, they were exempt from the constant process of politically negotiating and renegotiating the moral bargain that is at the foundations of the modern democratic society."

Morality refers to the social norms and values that guide both individuals and their interaction with their fellow human beings and communities, and with their environment. In all of these types of interaction there are important values to follow: rules and norms to protect these values, duties implied in social roles and positions that can foster these values and further these rules and human virtues or capabilities that enable us to act accordingly. These moral factors are usually present in religious practices and social structures.

"Moral" and "ethical" used to be interchangeable. The reason they are not interchangeable anymore is because "ethical" has come to refer mainly to right conduct in a profession, so there are: „agricultural ethics”, "medical ethics," "environmental ethics," etc. "Moral" is used more broadly to describe right conduct for everyone, or in some cases, for everyone in a particular society or culture. Most moral theories and standards are deontological, or consequentialist, or based on religious doctrine.

When actual moral values, rules and duties are subjected to ethical analysis, their relation to basic human interests shared by people, regardless of their cultural setting, is particularly important. Moral values may change, and moral reasoning asks whether the practices that are traditionally and factually legitimated by religion, law or politics are indeed worthy of recognition.

Indeed, the development of ethics in the past century has been characterized by a tendency to revalue and overthrow the moral conventions that have guided the interaction between the sexes, between human beings and animals and between human beings and their environment. A more recent task of ethics is to resist those tendencies of globalization, marketization and technologization that erode both biodiversity and valuable aspects of cultural identity - and may even have effects that threaten human rights. Although these tendencies are often presented as value-neutral, they carry with them hidden assumptions that are potential sources of inequity and abuse.

2. Agriculture in general

Over the 10 000 years since the Neolithic Age, human population growth has been correlated with intensification in food production systems, primarily agriculture, which has also greatly modified the world's ecosystems, including rapid technological advances, a restructuring of the resource base, the creation of new and expanded international markets, and closer ties with environmental management.

The benefits of agriculture have been immense. Before the dawn of agriculture, the hunter-gatherer lifestyle supported about 4 million people globally. Modern agriculture now feeds 6,000 million people. Global cereal production has doubled in the past 40 years, mainly from the increased yields resulting from greater inputs of fertilizer, water and pesticides, new crop strains, and other technologies of the 'Green Revolution'. This has increased the global per capita food supply, reducing hunger, improving nutrition (and thus the ability of people to better reach their mental and physical potential) and sparing natural ecosystems from conversion to agriculture.

For the first time, the development of the food and agriculture sector is being conceptualized globally as indeed it must be. For example, a fiscal crisis in Asia may depress farm prices in North America, a crop failure in Latin America may raise prices in Africa, while a high production may have the reverse effect, leaving surpluses in granaries unsold, environmental pollution in one nation may reduce timber yields in another, a food-borne disease originating in one farmer's field may cause disorder in several continents. As a result of these developments, all societies have some point of convergence with one another. Conformity to *Codex Alimentarius*, standards is becoming mandatory, as a result of the formation of the World Trade Organization.

Agricultural practices determine the level of food production and, to a great extent, the state of the global environment. Agriculturalists are the chief managers of terrestrial 'useable' lands, which we broadly define as all land that is not desert, tundra, rock or boreal. About half of global usable land is already in pastoral or intensive agriculture. In addition to causing the loss of natural ecosystems, agriculture adds globally significant and environmentally detrimental amounts of nitrogen and phosphorus to terrestrial ecosystems, at rates that may triple if past practices are used to achieve another doubling in food production. The detrimental environmental impacts of agricultural practices are costs that are typically unmeasured and often do not influence farmer or societal choices about production methods.

By 2050, global population is projected to be 50% larger than at present and global grain demand is projected to double. This doubling will result from a dietary shift towards a higher proportion of meat (much of it grain-fed) associated with higher income. Further increases in agricultural output are essential for global political and social stability and equity. Doubling food production again and sustaining food production at this level are major challenges. Doing so in ways that do not compromise environmental integrity and public health is a greater challenge still (Tilman et al., 2001).

3. Ethics in food and agriculture

There are some ethical values in agricultural production that should be taken into account and those are:

The value of food. Food is essential for the survival of human beings and neglecting the universal right to food lead to hunger. Both formal ethical systems and ethical practices in every society presume the necessity of providing those who are able to obtain food and enabling those who are unable to feed themselves to receive food directly. Failure to do so is considered an injustice, an unethical act, whereas the elimination of hunger and malnutrition is deemed.

The value of enhanced welfare. In the present, every nation state recognizes the need to enhance the welfare of its citizens. Such improvements in welfare also advance human dignity and self-respect. While charity is sometimes necessary to respond to desperate and pressing situations, it cannot provide for long-term improvements in welfare, which can only be accomplished by providing people with access to skills, capital, employment, education and opportunities. For sustainable agriculture and rural development to flourish, a viable rural infrastructure must be in place, together with an enabling policy environment.

The value of human health. Human health is improved through the elimination of hunger and malnutrition. The protection of human health also involves ensuring adequate nutrition and safeguards against unsafe food.

The value of natural resources. All human societies recognize the importance of natural resources, which are parts of the natural world used to produce food and other valued goods and which are necessary for our survival and prosperity. Clearly, no particular use of such resources should undermine the other legitimate uses to which they might be put, now or in the future.

The value of nature. Nature itself must be valued. As people power to modify nature grows, there is also an increasing recognition of the beauty, complexity and integrity of nature, and of the limits to humans restructuring of the natural world. The Convention on Biological Diversity (1992) not only recognizes the value that may be placed on particular organisms but also confirms that nature itself must be valued for what it is.

In conclusion, can be said that those values define in part who we are and what we should do.

4. Types of agriculture and ethical aspects

4.1. Conventional agriculture (intensive agriculture)

After the Second World War, farming changed and became more intensive. It changed because of the need for farmers to maximize production.

Conventional agriculture can be technically defined as an increase in agricultural production per unit of inputs (which may be labor, land, time, fertilizer, seed, feed or cash). For practical purposes, intensification occurs when there is an increase in the total volume of agricultural production that results from a higher productivity of inputs, or agricultural production is maintained while certain inputs are decreased (such as by more effective delivery of smaller amounts of fertilizer, better targeting of plant or animal protection, and mixed or relay cropping on smaller fields).

Intensification that takes the form of increased production is most critical when there is a need to expand the food supply, for example during periods of rapid population growth. Intensification that makes more efficient use of inputs may be more critical when environmental problems or social issues are involved. In either case, changes caused by intensification are to be understood conceptually in contrast to extensive adjustments, which involve increases or decreases in the amount of inputs used.

Increasing crop productivity in intensive (conventional) agriculture caused:

- environmental degradation (soil degradation and erosion, pesticide and fertilizer pollution of soil and waters, salinity, etc.),
- specialisation (loss of genetic diversity),
- excessive use of natural resources,
- diseases (rapid spread through monocultures),
- toxic materials entering the human food chain (pesticides, antibiotics),

- loss of jobs (big tractors do the work of many farm workers).

Ethical aspects in conventional agriculture

A characteristic of the contemporary world is the need to find new solutions to problems raised in all fields of human activity, particularly to the fundamental problems of the food production and environmental protection. One of the reasons for this is, on the one hand, the environmental degradation caused by inadequate methods of natural resource exploitation and agricultural production management, and various unbalanced activities of human society, and, on the other hand, the diminution of certain energy sources that have been the basis of intensive technologies applied during the past century (Negrila, 2005).

In numerous cases, dramatically increasing crop productivity in modern agriculture has been accompanied by environmental degradation (soil degradation and erosion, pesticide and fertilizer pollution of soil and waters, salinity, etc.), a decrease in biological diversity, social problems (elimination of family farms, over-concentration of land, resources and production, growth of agribusiness and its domination over farm production, change in the rural/urban migration patterns), and an excessive use of natural resources. Modern farming has become highly complex, with crop yield gains depending on intensive management and continuous availability of supplementary energy and resources. Thus, progress towards self-sustaining, resource-conserving, energy-efficient, economically viable and socially acceptable agriculture is warranted (Mc Neely and Scherr, 2003).

The production, transformation and distribution of food and agricultural products are generally accepted as routine aspects of daily life around the world. Therefore, such activities have rarely been addressed within ethics. But food and agriculture, and the economic benefits that derive from participation in the food and agriculture system, are means to ends that are inherently ethical in nature.

4.2. Sustainable agriculture

Sustainable development integrates environmental, economic, and social interests in a way that allows today's needs to be met without compromising the ability of future generations to meet theirs. In the agriculture and agri-food sector, sustainable development means a way of producing and processing agricultural products that can be carried out over the long term, in a manner that supports or enhances the high quality of life.

Sustainable agriculture looks for:

- protecting the natural resource base; preventing the degradation of soil, water, and air quality; and conserving biodiversity;
- contributing to the economic and social well-being of the population;
- ensuring a safe and high-quality supply of agricultural products;
- safeguarding the livelihood and well-being of agricultural and agri-food businesses, workers and their families.

The pursuit of sustainable agriculture will also require substantial increases in knowledge-intensive technologies that enhance scientifically sound decision making at the field level. This can be embedded in physical technology (for example, equipment and crop varieties) or in humans (for example, integrated pest management), but both are essential.

Substantially greater public and private investments in technology and human resources are needed internationally, especially in low-income nations, to make agricultural systems more sustainable (Tilman et al., 2001).

Ethical aspects in sustainable agriculture

The ethics of sustainable agriculture explores a systematic approach to practical ethical analysis applied to intensification, and aims at integrating ethical principles into different domains.

Human food needs provide the basis for a utilitarian argument for intensification, while the moral concept of virtue addresses people's duty to work for the good of society. A rights-based analysis then reveals how individuals' pursuit of such good can be constrained by the rights of others. The ethics of food and agriculture is a form of commitment to feeding the world.

4.3. Biodynamic agriculture

Biodynamics is the oldest form of organic practice. As well as good organic methods, we use a set of eight homeopathic-like animal, mineral and plant based preparations, in time with the rhythms of the Earth, Sun, Moon, planets and constellations.

Biodynamics is that part of biology which deals with vital force. "Bio" comes from the Greek word which means life. "Dynamic" means a moving force. So we can say that Biodynamics life is as a moving force.

Biodynamics has a holistic world-view that sees the influence of planetary rhythms on the growth of plants and animals as of equal importance to a purely chemical analysis.

In the last hundred years, there have been several major developments on the land:

- the increasing mechanisation of agriculture;
- the sense that nature is becoming degraded and losing its vitality;
- the pollution of the environment;
- the signs of illness in trees;
- violent changes in the weather.

Biodynamic agriculture is an advanced organic agriculture system that is gaining increased attention for its emphasis on food quality and soil health. Biodynamic agriculture was the first ecological farming system to develop as a grassroots alternative to chemical agriculture.

A basic ecological principle of biodynamics is to conceive of the farm as an organism, a self-contained entity. A farm has its own individuality. Emphasis is placed on the integration of crops and livestock, recycling of nutrients, maintenance of soil, and the health and wellbeing of crops and animals. The farmer is part of the whole also. Thinking about the interactions within the farm ecosystem leads to a series of holistic management practices that address the environmental, social, and financial aspects of the farm.

The main aspect of biodynamic agriculture is that food raised biodynamically is nutritionally superior and tastes better than foods produced by conventional methods.

Today biodynamic agriculture is practiced on farms around the world, on various scales, and in a variety of climates and cultures. Biodynamics can be understood as a combination of “biological dynamic” agriculture practices. “Biological” practices include a series of well-known organic farming techniques that improve soil health. “Dynamic” practices are intended to influence biological as well as metaphysical aspects of the farm (such as increasing vital life force), or to adapt the farm to natural rhythms (such as planting seeds during certain lunar phases).

Biodynamic farming is practiced on a commercial scale in many countries and is gaining wider recognition for its contributions to organic farming, food quality, community supported agriculture, and qualitative tests for soils and composts.

The contribution of biodynamic to organic agriculture is significant, however, and warrants more attention.

4.4. Organic agriculture

New concepts regarding sustainable agriculture systems are currently being applied under the term of “organic agriculture”.

“Organic agriculture is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives. To the maximum extent feasible, organic farming systems rely on crop rotation, crop residues, animal manures, green manures, off-farm organic wastes, and aspects of biological pest control to maintain soil productivity and tilt, to supply plant nutrients and to control insects, weeds and other pests” (Litterick and Watson, 2003).

Organic agriculture is known under different names, including biological, ecological and biodynamic agriculture. The terms “biological” and “ecological” are generally favoured throughout mainland Europe, whereas the United Kingdom and the United States prefer “organic”. Biodynamic agriculture is a specialised form of organic agriculture, which is part of a whole philosophy encompassing education, art, nutrition, religion and agriculture (Toncea, 2000).

Farmers, growers, environmental campaigners, consumers and policy-makers are increasingly concerned by the problems created by conventional, industrialised agriculture, and question whether organic agriculture could address some of these problems or improve aspects of food and farming systems. A strong organic market has particularly developed in many Western European countries in response to consumer demand, and these markets continue to grow as the quality improves and the amount of available organic produce increases (Litterick and Watson, 2003).

Although in 1965 only 0.1% of the total EU agricultural area was farmed organically, by 2001 the percentage exceeded 2% and in 2004, 3.4% of the land area in managed organically. The growing interest and activity seem to be related to the current financial pressures on agriculture and the changing public perception of agricultural industries. The difficult financial climate in agriculture is a significant driving force behind the increasing interest in organic production, since current farm-gate prices for organic produce can be considerably higher than those for conventional produce. There is a strong perception among the population that organic food is better, safer and healthier, and people choose to buy organic food for these reasons. There is also increasing evidence that some of the practices associated with conventional agriculture are creating environmental problems (pollution and loss of

biodiversity), and many people buy organic food because they feel that it is better for the environment.

Ethical aspects in organic agriculture.

Organic farmers, as a group, have a serious moral obligation to come together and agree on a strong and rich statement of the many values it provides, or has the potential to provide, the public.

These values and the mutual ethical principles which preserve them are the real "soul" of good farming as an honorable and indispensable vocation (www.soulofag.org).

Family managed farming, organic and conventional, is in crisis in many areas because policy makers and the general public do not know what values would be lost if industrial agriculture swept the field of all family operations. Until recently organic agriculture has been almost exclusively family-sized operations. Many of the values located in organic farming will have an extremely difficult time surviving in an industrial context.

When industrial firms co-opt the technical recipe which entitles their market product to organic certification, the neglect of a whole range of other values is almost, but not necessarily, certain.

The industrial operations are likely to continue the degree of commitment to environmental, labor, farm family, rural community and farm animal welfare values which has been traditional to their community culture. And successful family operations, in scaling up, will be strongly tempted to imitate the community culture rather than to preserve their own tradition.

The industrial segment hoping to profit by new genetic technologies find the market for foods derived from genetically modified organisms (GMOs) threatened by the success of the principle of free choice in foods represented by the "organic section" in the grocery store. The GMO community has launched an open attack on the value of family farming. It needs to be defended explicitly.

If public policy makers can be guided by an explicit, broadly supported consensus on the values and ethics of organic farming, so can the individual members of the organic farming community.

Like all agriculture, organic agriculture has three basic **goal values**:

- **sufficient,**
- **healthy,**

- **sustainable food supplies.**

In addition, all farmers face a range of basic values which can be helped or hurt due to their choice of tools, and by their involvement in practices and social institutions which define and limit their choice of tools. Examples of these are decent incomes and healthy living conditions for farmers, laborers and neighbors, beauty of the environment and animal welfare.

Organic and Sufficient Food Supplies

Organic agriculture makes a unique contribution to food sufficiency by developing, testing and retaining in actual practice ways of producing food which are capable of adding to local food sufficiency, also called "community food security," a sufficiency that is secured when food is locally grown and with cultural practices with less short-term dependency on distant or interruptible resources.

The value of sufficient food supplies for all consumers and at prices which are accessible to all, especially for the poor people belongs to agriculture as a whole. Different forms of agriculture contribute to that value in part.

Organic agriculture's contribution is much greater than the portion of the consumer demand it serves. Organic agriculture provides a potential escape from the greatest risk to food sufficiency in providing locally confirmed models of food production which are significantly less unstable, in crisis situations, than industrial models easily disabled by the interruption of indispensable supplies of seed, biocides, fertilizers and capital.

Recently defenders of GMOs have resuscitated conventional attacks calling organic agriculture an elitist enterprise serving a tiny up-scale market and incapable of feeding large populations. How much of the world organic agriculture could feed depends on how many people want to eat organic food, how much it would cost and how much of the resources of land, labor, inputs and energy the world wants to devote to it. This is really an argument about future food sources.

Right now organic farming does not have the job of feeding the world. But given that populations are increasing and the form of farming which produces the highest yields with the least use of the limited resources is often organic agriculture, its future importance to sustainably sufficient food supplies is great.

Organic and Healthy

Organic is Delicious: Organic farms can produce delicious fruit and vegetables more readily than most large conventional growers and that is too evident to argue about.

Get rid of the chips and candy and put out bowls of fruit and kids and not only them will eat what is delicious. The contribution to current and future health of the population is immeasurable.

Organic is Clean: The policy of organic agriculture to avoid application of toxic chemical biocides is perhaps the most outstanding public value in its professional code. Most of those biocides, which are applied deliberately with known residues and tolerance levels set to avoid "most" harmful side-effects, are justified by the claim that food cannot be grown profitably, in adequate quantities, and shipped long distances without them.

It is never denied that these residues are an ethical problem. A huge regulatory process is expensively maintained to make this risk/benefit tight-rope walk plausibly safe. Organic is evidence that the "necessity" of running the risks is not so necessary after all.

Organic is Anxiety-Free

As a direct consequence of its refusal to use toxic chemicals, consumers do not need to walk the risk/benefit tight-rope. The federal regulatory process which established the "tolerances" for residues of these toxic chemicals can produce anxiety in reasonable people wishing to eat conventional products.

Organic Agriculture is Sustainable

Creating a New Vision of Farming distinguishes between sustainability of the end product, namely the perpetual supplying of sufficient quantities of food and fiber, and sustainability of the means used to produce it. Renewability of those means and the husbanding of the renewability is the key to sustainability of the means.

The basic threat to sustainability of sheer product would only be a population increase (or concentration in a small area) so great that available agricultural resources could not feed the population regardless of the means chosen. Demographic research suggests that it is the industrial displacement of farmers and laborers from farming which leads them, because of their ensuing poverty and infant mortality, to choose larger family sizes. A form of organic farming in developing countries which gave stable farm families assurance of a safe future

with only a few healthy children would be the best contribution to sustainability. Organic farming contributes to this scenario also by reducing the family's debt exposure and the threat of loss of the farm.

Organic Agriculture is Efficient

Or can be. Because much of organic farming is still in innovative or experimental form, it may be terribly inefficient, especially in the use of the farmer's personal time and energy.

Organic is Safe

The rejection of toxic chemicals and a careful use of organic fertilizers demonstrate organic farming's potential of being ideally safe.

GMO Community Opinions about Organic Agriculture

Recent GMO community attacks on organic farming have discussed the risk of e-coli infections from organic fertilizers, complete with quantitative estimates of the risk.

Inherent risks are those unavoidably connected to a tool, such as toxic residues when toxics are deliberately applied.

Accidental risks are risks that are usually avoidable by more careful policies. The e-coli risks are avoidable by proper composting, the toxic risks are inherent in the need for the chemical to be toxic.

Some opinions about Organic Agriculture

Some specialists have already criticised certain ecological agriculture principles and practices.

There are ethical interpretations of the biological control of pests, diseases and weeds:

- Is it ethical to manipulate some organisms against others, to 'set' them against each other, in a controlled biological battle ('living versus living')? Insufficiently assessed and often unpredictable, risk involves: the possible negative impact of "biopesticides" or "mycoherbicides" on useful soil wildlife; the pathogens used also having a potential negative effect on useful entomofauna; some predators and parasites mechanically disseminating certain pathogens; people's health being endangered, including the health of those involved in manipulating pathogens used for biological control.

- Furthermore, ecological activists are anxious about problems posed by the deliberate or accidental introduction of species displaced from their own environment. Invasive species are generally regarded as serious dangers to native flora and fauna.
- The expansion of organic agriculture systems based on lower inputs may lead to lower production per land unit. Therefore, cultivated lands should increase to meet the population's food demand. Unfortunately, the land resources currently available are relatively limited and are therefore unreliable as a significant means of increasing the amount of food and agricultural produce.
- Organic agriculture principles prohibit the use of genetically modified organisms. Yet, it has often been proven that the latter can efficiently control several pests, diseases and weeds, with no expensive polluting chemical intervention and no crop damage. By using genetically modified organisms, agricultural technologies become simpler and less expensive for farmers and poorer countries, agricultural activities become more efficient, production costs and selling prices decrease, and the polluting impact of agricultural technologies on the environment, agricultural produce and consumers is low (Roman et al., 2007).

5. Conclusions

During the last centuries, there were appearing newer and newer types of agriculture. Nowadays, we cannot talk about only one type of agriculture because the population is continuously growing and that increase causes changes in agricultural intensivity for satisfying the human necessities.

We have to think primarily about the effect of this intensivity on the environment, biodiversity and human beings.

Intensification, while a necessary condition to produce more food, does not by itself ensure access for all sufficient and adequate food. Whether intensification can ensure such access depends in part on where and how intensification takes place.

Historically, the most common and effective extensive adjustment in agricultural production has been to increase or decrease the area of land planted. The contrast between intensification and extensive adjustment is intended to indicate the contrast between two broad strategies that human beings have had for affecting their food supply, rather than concepts applicable to economic or technical analysis of specific cases.

All types of agriculture cannot coexist one without the other because of economical, social, ecological factors. For example, we cannot depend only on organic agriculture because it is not possible to obtain enough food for all the people in the world and also we cannot depend only on conventional agriculture because there are some negative effects of that type of breeding on the environment (pesticides, chemical fertilizers, biodiversity etc.).

It cannot be claimed that ethically sound development has been achieved when close to 800 million people continue to be severely malnourished.

Although currently the GMO production became more popular, we cannot blindly succumb to trends. We have to consider only contemporary social necessities and be aware of influence on each agricultural type for the ecosystem and future generations.

Although used and even consumed in production, natural beings, plants and animals are the sacred gifts of Creation, given for our use, not abuse. They are worthy in themselves of being treated with respect. Their diversity and the harmony of their coexistence are good and should be protected.

What we observe today and call globalization refers to a number of disparate processes affecting different groups of people in different ways. Some will find that these processes generally produce positive results, while others may experience only negative implications. But an ethical point is that we need to know not only where we are going at present, but also where we want to go.

Finally, we have to find the answer to that ethical question:

WE LIVE FOR EATING OR WE EAT FOR LIVING?

Now is the time to act!

References:

Cristea M.D., 2006. Biodiversitatea. Bucharest, Editura Ceres, ISBN: (10) 973 40 0748 3; (13) 978 973 40 07 0748 6.

Diver S., 1999, Biodynamic Farming & Compost Preparation, ISBN: 800 346 9140.

Hugo F. Alrøe, John Byrne, Leigh Glover., 2005. Organic agriculture and ecological justice: Ethics and practice. CAB International.

Levin S.A., 1988. An Ecological Perspective on the Introduction of Genetically Engineered Organisms into the Environment. In Dayan A.D., Campbell P.N. and Jukes T.H., 1988. Hazards of Biotechnology – Real or Imaginary. London, Elsevier Applied Science: 13-19.

Litterick A.M. and Watson C.A., 2003. Organic Farming. In Thomas B., Murphy D.J. and Murray B.G., 2003. Encyclopedia of Applied Plant Sciences. London, Elsevier Academic Press: 934-945.

Mc Neely J.A. and Scherr S.J., 2003. Ecoagriculture – Strategies to feed the World and Save Biodiversity. Washington D.C., Island Press, 279p.

Negrila M., 2005. Cercetari privind elaborarea unui sistem de agricultura durabila pentru conditiile din Dobrogea. PhD Thesis. Bucharest, University of Agronomic Sciences and Veterinary Medicine, Bucharest, Faculty of Agriculture, 286p.

Roman Gh.V., Nistor Elena, Toader Maria, 2006. An ethical approach to organic agriculture- A strategy to feed the world, to protect natural ecosystem and to save biodiversity. Bucharest, Education in Bioethics and Human Rights in Romania, UNESCO, 303p-313p, ISBN-10 973-0-04447-3; ISBN-13 978-973-0-04447-8.

Roman Gh.V., Nistor Elena., 2007. Organic Agriculture – Strategy to feed the world, protect natural ecosystems and save biodiversity. Timisoara, Bioethics in life and environmental sciences.

Rosca I., Muresan F., Trotus E., Udrea A., Popov C., Brudea V., Bucurean E. and Voicu M., 1999. Stadiul actual si directiile cercetarilor privind utilizarea feromonilor sexuali de sinteza pentru culturile de camp. Bucharest, Agris Publishing House, 155p.

Thomas B., Murphy D.J. and Murray B.G., 2003. Encyclopedia of Applied Plant Sciences. London, Elsevier Academic Press, 1319p.

Toncea I., 2000. Practical Guide of Ecological Agriculture. Bucharest, Ceres Publishing House, 192p.

B.A.B.A.S., 1999. Ethical Aspects of Agricultural Biotechnology. Cambridge Biomedical Consultants, ISBN 90 76110 05 0.

F.A.O., 2001. Ethical issues in food and agriculture. Rome, F.A.O. Ethics Series 1, ISBN 92-5-104559-3.

F.A.O., 2004. The ethics of sustainable agricultural intensification. Rome, F.A.O. Ethics Series 3, ISBN 92-5-105067-8.

<http://www.bioetica.ro>

<http://www.csus.edu/indiv/d/dundons/Orgnsoul.htm>

http://ec.europa.eu/agriculture/qual/organic/index_en.htm

<http://www.fao.org>

<http://www.nature.com>

<http://www.peagreenboat.co.uk/index.htm>