Sustainable Development in Education of Horticulture

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Abstract

Sustainable development in education of horticulture imposes envolvement of new system in education of agricultural experts (in particular vegetable growers); include – etical view off point to the reality of production,synthesis of traditional practices (crop rotation, mixed crops, etc.), the love to the land inherited from ancestors and modern scientific achievements from this perspective which will have a positive environmental effect over the agrarian ecosystems and the environment in general. From this perspective lectures and practices should be based on the principles of integration of different systems and methods of production; this will include sustainable management of fertilizing and irrigation; energy use associated with production; integrated control of pests with sustainable application in the farms. These principles should be presented in a special section entitled "Sustainable Growing of Vegetables" which will form the basic knowledge related to the topic; they should be incorporated in a suitable place in the respective sections for individual crops where developed of details with active participation of trained people.
In order to overcome the specified problems and ensure sustainable development of the sector its necessary to provide well-trained people who know not only the traditional technologies used at present but also the principles of sustainable agriculture as well, especially related with keeping natural resources to next generations.

Key words: sustainable development, horticulture, students, training

List of abbreviations used in the manuscript:
***SED**-Sustainabe education development,**UN**-United Nation,**ESSD**- Environmentally Sound and Sustainable Development,**IFOAM** International Federation of Organic Agriculture Movements , **PDRA**- Program for Development of Rural Areas, **MAF**-Ministry of Agriculture and Food*

Introduction

The principles of sustainable development are universal and can be studied and implemented with success in agriculture and in particular the training of personnel dealing with similar specific activity. According to the definition of the World Commission on Environment and Development viable, stable or Sustainable development is such development that satisfying the needs of today's society without threating future generations

of scarcity of goods for their needs. The (requisitely) holistic and interdisciplinary approaches to introduce Education for Sustainable Develeopment (ESD), the attention to achieving tangible results, the involvement of local communities and the bottom-up approaches, the importance of partnerships and networking, the capacity building, the innovation of the initiatives, the attention given to building a framework favorable to Sustainable Development (SD), tutoring (tutor as mediator) and VCEN (values/culture/ethics/norms). Such a development in the training of well-trained agricultural staff (in particular producers of vegetable production) means that should look for a synthesis of traditional practices (crop rotation, mixed cropping and etc.) and inherited from our ancestors love for the land with modern achievements. Research investigation in this direction, which would have a positive environmental effect on both nature and agroindustry. In this connection temptation of teaching material should be based on the principles of integration of different systems and production methods that include sustainable management of food and irrigation system, integrated pest control implemented in a sustainable farm.During the UN Conference related to environment and development in Rio de Janeiro in 1992 a definition was accepted in relation to the stable, i.e. sustainable development; this means development which meets the needs of modern society with no danger presented with regard to future generations and possible deficiency of produce covering the needs of these generations. A so-called "Agenda 21" was published with the topic of "Environmentally Sound and Sustainable Development"(ESSD). This included 40 chapters and 115 different programs for stable development for all activities. In the 14th of these paid special attention directed toward "sustainable agricultural production and rural development"; 12 different programs were included creation, popularization and training of people in relation to technologies which help the conservation and rehabilitation of land.(14)

Sustainable life depends of ethics of interdependence and the end of one-sided and short-term behavior. Both of them belong to systemic behavior and receive support from social responsibility of humans and their organizations, such as enterprises, countries, non-governmental organizations, or families. Methodologically, it can be supported also by De Bono's methods of 'lateral thinking', 'six thinking hats' and CoRT (Cognitive Research Trust). (13,6,2,3).

Higher education institutions training people for the sphere of Bulgarian agriculture in the 1990s (in 1987 in the Agricultural University in Plovdiv an agro-environmental centre was opened; it became a member of IFOAM in 1993 and had as a basic task the preparation of people and support of biologically-friendly agriculture in the country) we had the start of introduction of environmental elements in the programs and independent disciplines related to study plans; a number of handbooks were published in relation to this (8;10; 11). The ecological training of agricultural producers is already a prerequisite for receiving subsidies in relation to measure 214 "Agro-Environmental Payments" associated with the PDRA (Program for Development of Rural Areas) (Article 20 of Ordinance No. 11/2009).

The analysis of Hadzhieva (2007) of the period 1997-2005 showed that Bulgarian agriculture was still far from being sustainable and we had to pay attention to pollution, use of manure, soil erosion, income and productivity in the field. This finding has not lost its importance and it was established also in the National Plan for Development of Biologically-

Friendly Agriculture During the Period 2007–2013 (MAF); there in the second section of the analysis on weaknesses we see "problems related to training, education and consultancy services regarding biologically-friendly agriculture". This means its very important to pay more attention to the introduction of students studying in this field to the specifics of the sphere; to analyze the current status of the problem, examine more closely the international experience and specify goals for a more successful application of sustainable development.

This paper aimed to envolve principle(SED) to produce well-trained people who know not only the traditional technologies used at present but also the principles of sustainable agriculture as well, especially related with keeping natural resources to next generations

1. Special Characteristics, Problems and Specifics of Vegetable Growing

Fresh and processed vegetables are important and permanent part of the food of modern humans; their consumption around the world is growing constantly. Vegetable growing is a part of the general agricultural practice but it is a specialized activity and has a number of special characteristics. The most important of these are the following:

- Use of cultivation facilities (basic and complex) for growing and production in general or for a specific period of their vegetation;
- Growing by preliminary development of seedlings;

The specifics of Bulgarian vegetable growers can be grouped as follows:

- small-scale and fragmented growing with low level of specialization;
- keeping the significance of family gardens, natural and semi-market farms;
- significant reduction in agricultural production volumes;
- low quality and yields for produced vegetables due to the failure to comply with agro-technical requirements on the part of agricultural producers;
- higher requirements to quality and hygiene presented by importers.

1.1.Specifics of the Field

he production of vegetables is associated with high costs and this means higher prices of final products; this brings difficulties associated with sales. There is also some negative influence presented by the direct subsidies per hectare of land which forces agricultural producers to start growing crops with lower costs per land unit.

- Loss of traditional foreign markets due to changed external trade situation and poor competitiveness of Bulgarian agricultural product on the internarional market;
- Real threat for Bulgarian producers to be replaced as basic suppliers of fresh produce to large supermarket chains;
- High prices of Bulgarian vegetables which makes canned products impossible to sell in the local market;
- Limited assortment for companies due to the lower purchasing power of the bulgarian population and use of home made produce;
- In production of vegetables exisct many problems such as a lack of effective organization of production activities (still have low technological level, production with high costs, high prices of seeds, mineral nutrituon, plant protection chemical products, price of water for irrigation; absence of mechanical tools and use of human labour in relation to crops

gathering, etc.); there is a low level of organization among producers (presently there are only two authorized organizations of vegetable growers- greenhouse producers and Producers of sweet pepper); there are no trade agreements between producers and traders for the sales of final products;

- There are low prices for final products; low quality of vegetables; there are lack of people willing to work in agriculture and there are people who are poorly trained. These problems in combination with unfavourable climate conditions during the vegetation period for vegetables (hailstorms, heavy rains and floods, early autumn frosts, etc.) bring, on one hand, to reduce areas for vegetable growing, and on the other hand, we have lower volumes in production during the recent years.

1.2Analysis of the Sector's Current Status

The adaptation to the new competitive environment is caused by the high social and economic price and the EU funds covered only a part of it. The benefits related to these has a limited influence due to the complex and clumsy procedures related to the provision of funds;

The field of vegetable growing was included in the common economic sphere of EU with no specific preparation. The strong competitive pressure represents a serious danger for the existence and development of the sector;

In order to overcome the specified problems and ensure sustainable development of the sector its necessary to provide well-trained people who know not only the traditional technologies used at present but also the principles of sustainable agriculture as well, especially related with keeping natural resources to next generations.

This imposes training of agricultural experts (in particular vegetable growers); include -synthesis of traditional practices (sowing turnover, mixed crops, etc.), the love to the land inherited from ancestors and modern scientific achievements from this perspective which will have a positive environmental effect over the agrarian ecosystems and the environment in general. From this perspective the presented study materials should be based on the principles of integration of different systems and methods of production; this will include sustainable management of fertilizing and irrigation; energy use associated with production; integrated control of pests with sustainable application in the farms. These principles should be presented in a special section entitled "Sustainable Growing of Vegetables" which will form the basic knowledge related to the topic; they should be incorporated in a suitable place in the respective sections for individual crops where developed of details with active participation of trained people.

1.3.Sustainable Management of Natural Resources in Relation to Vegetable Growing

The successful application of principles for sustainable development in the sector are possible after the following was realized:

- analysis of climate factors in Bulgaria;
- good knowledge of the genetic fund related to vegetable growing;
- introduction of power and water saving technologies;
- lower dependence on fossil fuels and greater sustainability with regard to climate change;
- consideration of social and economic aspects.

After analyzing climate factors the agro-technical activities should be synchronized by the following:

- Optimization of the period for sowing and transplanting – temperature, lighting duration , light intensity, rainfall patteren and intensity, winds, etc.
- There should be spesific selection of suitable soil type for vegetable farms
- The natural resources should be considered – their volume, distribution and quality.

The modern power and water saving technologies are some of the most pressing innovations in the field of vegetable growing and they should be based on the following:

- Good knowledge of biological requirements of different vegetable crops;
- Energetic effeciancy, quality and quantity of production;
- Protection of ground water resources;
- Limiting the greenhouse effects by biodegradable mulches, envolvment of high teqniques to reduce energy loss, modern lightining system, CO2 enrichment, using og bumbell bees(Bombos), etc;
- Introduction of good agricultural practices – use of manure, rotation of crops, etc.

One of the ways for reduction of the anthropogenic pressure is the wider use of organic fertilizers. This is very much needed with regard to vegetable growing where the produce is consumed in its fresh form and processed form by people. The most important basis for biologically-friendly farming are the products obtained through composting, timining ,etc. (12).

The main benefits of this activity are manifested by the following:

- Composting is a process by which the organic materials such as cut grass, leaves and food waste and vegetable peels are decomposed in a way which is controlled by people. The obtained product (compost) is used for return of nutrients to plants, benefit microorganismus and fertilizing the soil in farms.
- Composting allows limiting the volume of domestic waste which is daily directed to trash bins; at the same time we will have enhancement of soil characteristics in the farm; humus will be formed and the structure of the soil will be enhanced.

The humanity faces a great problem – continuous reduction of water resources. Therefore, water economy, especially with regard to vegetable growing has a great significance. The successful realization of such activity is based on:

- knowing biological requirements and environmental needs of plants; this is a basis for water saving.
- suitably selected and regulated systems, depending on grown crops.
- irrigation during the late afternoon when evaporation has its lowest intensity; moreover, will have water economy of 50% and the same water efficiency.
- mulching in order to have limited evaporation.
- collection of rain water in barrels, vessels, tanks or other units.
- grass which is allowed to grow a little bit higher is more resistant to drying and will bring water economy if compared with low-cut grass.
- Opitimization of plant distance planting, will reduce water loss.

1.4.Sustainable Vegetables Farm

In relation to farming, different commercial products for protection of plants are used (herbicides, fungicides, insecticides, etc). This, however, brings permanent pollution of water, soil, final products and, respectively is danger to the people health.

The provision of enough vegetables with no use of such chemicals at present is not realistic. Despite this there are alternatives which can be used and the volumes can be reduced. This will reduce the risk for consumers and the environment. These are the following:

The traditional practices of vegetable growers from the past are extremely valuable asset nowadays. The farmers of the past applied agro-technical methods which, on one hand, were a tool to have compact use of land, and on the other hand, protected the crops from pests (1). The main principle here is that prophylactics of diseases is better than their treatment:

- The maintenance of suitable air conditions (often ventilation in the case of cabbage seedlings growing and more sparse planting in order to avoid spread of mildew (Peronospora parasitica (Pers.) Fr.)
- Late sowing of peas lead to reduce the percentage of seeds eaten by pests (Bruchus pisi).
- Suitable rotation of crops
- Fencing diseased sections Channel by canals, uprooting and burning of ill plants if decay was noticed on asparagus (Rhizoctonia violacea Tul. & C. Tul.)
- Planting onions, garlic, basil, lavender and other similar plants can repel some insects due to the volatile compounds they release (repellents, phytoncides, etc.)
- Use of windbreak plants.
- Growing crops which benefit each other's development through vegetation, etc.

The control of pests related to the sustainable farm growing is realized through a number of practices (Vogtmann, 1990; Panayotov, 2003; Karov et al.)

- Weeding of plants at a certain interval can bring avoidance and reduction of weeds development and spread.
- Use of mulching by organic and biodegradable chemicals.
- Use of traps for pests (pheromone and light traps, attractants, etc.)
- Treatment using plant chemicals (extracts) from blossoms, pine bark, some herbs or regular hoeing of the land.
- Use of parasites and antagonists; it is necessary to introduce integrated principles intergated pest management in relation to the protection of vegetable produce: multi-aspect environmental approach associated with the control of pests which is coordinated with pest bio-cycles and the way they communicate with another organisms and their competitors which exist in the environment; parasites and super parasites, antagonists, etc.

Donot not forget a the social and economic aspects which have their influence in relation as:

- Maintenance of historical and cultural inheritance related to the field.
- Maintenance of social and economic livelihood in rural areas as a tool for the preservation of population in these areas.

- Relationship between producers and consumers.
- The role of education and increase of awareness in relation to the encouragement of sustainable horticulture development.

Conclusion

Although there is no universal definition about what a sustainable system is, sustainable development and sustainable agriculture (including sustainable vegetable growing) the most simple should be defined as one which is directed toward the economic, environmental and social sphere. The applied technologies should meet the following conditions:

- They should be financially substantiated with sufficient profit which will maintain the interest toward such a production;
- They should be environmentally friendly, i.e. they should not affect negatively the existing bio-systems in the surrounding environment; they should try not only to protect this environment but also work for its maintenance and improvement;
- The direct producers should have a sufficient level of information, education and training in order to have proper realization of activities.

The objective reality – the membership of Bulgaria in the European Union; the constant extension of international economic, political and other links; the more intensive development of alternatives related to conventional agriculture, regardless of how it is called around the world (environmental, sustainable, biologically-friendly, etc.) put the vegetable growers in Bulgaria in a dynamic, competitive and complex environment. The natural resources and the prestige based on high quality are their important advantages; this in combination with better training and popularization in the field of sustainable vegetable growing realized in the educational institutions at different level is a basic prerequisite for future development.

The final goal should set is that each of the participants in the process (producers, professors and students) should to be harmoniously connected, so that they could most effectively realize their full potential in relation to the creation of agricultural units growing vegetables which are based and work according to the principles of sustainability as this will form a new farming culture.

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