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SUSTAINABLE AGRICULTURE: A NEW GENDER APPROACH AND CHALLENGES FOR EDUCATION

1. Introduction

Sustainable agriculture has evolved from three perspectives: a system of production to achieve self-reliance in food production; as a concept of stewardship; and as a vehicle for sustaining rural communities. Shifting from a concentration on production-focused agriculture to a focus on rural development poses various challenges to the traditional agricultural education system. Education should put the environment into the broader social context of education in sustainable development, which is an essential precondition for raising public awareness, changing consumption patterns, and building a responsible and active attitude amongst people in their relationship with nature. Unfortunately, public support for agricultural higher education in the Ukraine, as well as in other Central and Eastern European (CEE) countries, is weakening. Traditional agricultural university education alone cannot meet future challenges for rural areas in the fields of management, conservation and agribusiness. The agricultural educational system should make a leap from pure university education to a greater emphasis on non-formal adult education, in order to influence a wide range of stakeholders, including those in academia, in farming and non-farming rural areas, policy makers and the private sector.

The fact that the ecological component of formal education in agriculture has been strengthening for the last ten years reflects the greater awareness of the need to conserve soil and water. In the National Agricultural University many initiatives have been carried out. However, the complexity of the challenge requires access to disciplines far beyond traditional agriculture. The scope of education in sustainable agriculture should extend beyond education and include "life-long learning" for the whole of society. Building the foundation of civil society will promote sustainable agriculture. The changing role of civil society and the increasing role played by women in the promotion of sustainable agriculture, phenomena that have been observable for some time, have not yet been incorporated into agricultural education yet. Participation in non-governmental organizations can also become an important part of continuing agricultural education. There are few ecologically orientated NGOs and even fewer with the promotion of ecologically friendly agricultural practices as a focal point.

The Centre for Sustainable Development and Ecological Research at the National Agricultural University was created in order to disseminate principles of sustainable development in Ukrainian agriculture and has promoted cooperation between researchers, students, farmers and professors. Activities regarding reducing the use of pesticides as the primary principal of ecological agriculture should focus on environmental education and raising ecological awareness among different stakeholders in rural areas. Case studies on a gender approach in the promotion of sustainable agriculture and ecologically friendly methods have been carried out in the Centre for Sustainable Development and Ecological Research at the National Agricultural University. These studies had several objectives:

- Describe the status and trends in pesticide use in the Ukraine,
- Identify sectors involved, those that should be involved, and identify changes required to implement a policy reducing the use of pesticides,
- Investigate whether there is gender equality in rural areas,
- Test whether health risks from intensive agricultural practices are greater for women than for men,
- Relate what role women play in implementing the principles of sustainable agricultural,
- Strengthening the capacities of farmers, their communities and organizations and other stakeholders, and promotion of increased awareness and responsible action.

2. The key ecological problems in the Ukraine caused by agriculture

The key problems of land degradation, soil and water contamination, and loss of biodiversity have seriously damaged not only the environment, but also the health of the population. These problems affect women and children in particular and have contributed to depopulation of rural areas.

Soil is contaminated by chemical pesticides, heavy metals and acids, and radionuclides. Over 11% of cultivated land is polluted by pesticide residues, which is primarily a result of past practices [*National Report...*, 2002; *Environmental Performance Review*, 2000; Sozinov, 2001].

The Ukraine used to produce and consume high quantities of pesticides and chemical fertilizers. Their introduction began before the Second World War and began to expand rapidly in the early seventies, continuing to increase until the early nineties. The Ukraine, Moldavia, Russia and Uzbekistan together account for 72% of the use of pesticide products in the Commonwealth of Independent States (former Soviet Union) [*Environmental Performance Review*, 2000; *Pesticide Action Handbook*, 2003; Stefanvska and Pidlisnyuk, 2002; Pidlisniuk et al., 2004]. The period of the most intensive application, specifically highly toxic and persistent organochlorines, were the years 1986–1987, when the level of use reached 3–4 kg/ha of arable land.

Many cases of pesticide poisoning happened during that period, but information was very restricted, and even now remains difficult to access. Recently, information has come to light about massive levels of poisoning in the 1970s–1980s that affected women in five sugar beet farms in the Cherkasu region, where polychlorcamphene was used to control the pests *Curculionidae* and *Chrisomelidae*. The intensity of the treatment, the lack of protective clothing and labels, together with the absence of any safety information or training, were common phenomena. Women were not warned that they may be adversely affected by pesticides.

Pesticide production and use have both dropped significantly during the last ten years. In 1997, 24,000 tonnes of pesticides were applied, compared to 19,000 tonnes in 2001 [*7th International...*, 2003; Drozda, 2001]. The decrease results not from ecological concern, but from an increase in the appearance of new pesticides on the market that are effective at considerably lower concentrations and from economic realities, which mean that agricultural enterprises and farmers cannot afford to buy pesticides at previous levels.

The current application rate of pesticides is in the region of 0.7–1 kg/ha of arable land. In 2001, expenditure on pesticides was

US\$120 million. The Ukraine operates a pesticide registration system, which includes 378 pesticides [*List of Pesticides...*, 2002]. Organophosphates and synthetic pyrethroids are the most common groups used against insect pests: by weight diazinon is the most widely applied, followed by alpha cypermethrin and deltamethrin. Among herbicides 2,4 D is the most common.

There has been a general decrease in the level of toxic residues found in soil and food, with a reduction in the frequency of the presence of organochlorines in soil by 71% and in crops by 83% since the peak period of the application of chemicals.

3. National Policy on pesticides

Registration of pesticides and fertilizers, whether local or imported, is compulsory and is the responsibility of the Commission of Chemical Security in the Ministry of Ecology and Natural Resources. Two main laws regulate pesticide consumption: the Pesticide and Agricultural Chemicals Law, adopted in 1996, and the Crop Protection Law, adopted in 1998.

The past ten years has seen some changes in the monitoring of pesticide consumption. In the past this was under the remit of the Ministry of Agriculture, which has subdivisions in all regions. The regional subdivisions kept records of use, from which the Ministry of Agriculture estimated the demands for pesticides. The ministry lost this responsibility in the mid-1990s and since then satisfying demand has been left to the market. The Protection Association will now partly take on the function of estimating demand. This association has 49 members from foreign companies, local producers, as well as pesticides dealers and distributors in the Ukraine. Some experts consider that this association is promoting the interests of foreign companies.

4. The problem of obsolete pesticides in the Ukraine

Pesticides continue to be one of the most serious problems in the country. Pesticide residues, including highly toxic and persistent DDT and HCH can be found in the soil, water and crops in all regions of the Ukraine. The principle source of soil pollution is misuse of pesticides and mineral fertilizers and improper storage of pesticides.

A significant factor contributing to contamination is the existence of stocks of obsolete pesticides, which leak through the soil into ground water. Total stocks exceed 13,520 tonnes (Table 1) and are found in 25 regions, although the amounts vary considerably from region to region.

Table 1. Stockpiles of obsolete pesticides in the Ukraine [1]

	Group of pesticides stored		
	Prohibited pesticides	Out of date pesticides	Unknown substances
Number of chemical products	58	165	—
Weight in tonnes	3,428	1,509	8,582
Total weight in tonnes	—	—	13,5704

Source: *National report...*, 2002.

The largest stock levels, 1,820 tones, are in the Kyiv region, posing extreme dangers for the three million residents of the capital city. Most of these stockpiles accumulated in the 1970s from temporary storage, and the storage conditions have deteriorated dramatically. Many pesticides are stored outdoors, and their containers are broken and leaking [Pidlisnyuk et al., 2004; 7th *International...*, 2003; Drozda, 2001].

In spite of the fact that the majority of highly persistent and toxic pesticides were banned in the Ukraine in the 1980s, some remain in use. Outbreaks of pests like locust (*Locusta migratoria*), cutworms (*Agrotis segetum*), stem and seed weevils (*Curculionidae*), wireworms (*Elaterridae*) and grubs (*Melolonthidae*) have occurred in the last five years. To deal with these pests, 1,000 tonnes of obsolete pesticides have been used, including methafose, 40%, BCH 25%, Dursban 40,85 c.e. (chlorpyrifos).

5. A gender view on the use of pesticides

These agricultural pressures and pressures of economic transition have contributed to a deterioration in the health of the whole Ukrainian population, and to negative demographic changes. In particular, people in rural areas seriously suffer. Depopulation in rural areas began in 1982, ten years earlier than in urban areas.

To alleviate environmental and social problems, especially aspects of chemical pesticide contamination, Ukrainian agricultural planning and practice must adopt policies that promote sustainability. Chapter 14 of Agenda 21 clearly highlight the importance of agricultural policies in reducing pesticide use, exposure to pesticides, and promote the adoption of integrated pest management and biological controls. It stresses the importance of public participation and awareness raising, and of giving special consideration to women's needs. What is the situation in the Ukraine? Can women play an important role in implementing sustainable agricul-

ture? Is there gender equality in rural areas? Are the health risks from intensive agricultural practices greater for women than for men?

Women constitute the majority (54%) of the rural population in the Ukraine, and play an important role in the agricultural labour force, as well as in the production and preparation of food for their families. Yet they are clearly discriminated against economically:

- The average earnings of women are only 70% of those of men,
- More poor households are headed by women,
- More than 43% of rural unemployed are women,
- Of the women with relevant higher education, only 5% are directors of agricultural state farms, while of the similarly educated men, 50% hold such a post,
- On private farms, only 173 women are in managerial positions,
- Employment conditions are worse for women, who undertake 65% of agricultural labour,
- Including their domestic responsibilities, rural women work 16 hours a day,
- Female agricultural workers are widely involved in pesticide application.

Women play an important role in the agricultural labour force and in food production on family land, growing around 60% of fresh vegetables. Across the Ukraine, there are 12 million smallholdings, which occupy

Table 2. Results of a survey of 50 women about the risks that pesticides pose to their health, Borodianka, Kievka region*

	Yes (%)	No (%)	Not sure (%)
Do you think pesticides are seriously injuring your health?	13(26)	27(54)	10 (20)
Have you observed any illness due to pesticide exposure?	5(10)	41 (82)	4 (8)
Do you know the possible health effects of exposure to pesticides?	15(30)	25(50)	10(20)
Do you think there could be a relationship between breast cancer and pesticide exposure?	6 (12)	42 (84)	2 (4)
Is it important to wear protective clothing?	23 (46)	16 (32)	11 (22)
If faced with an a serious threat of pests to a harvest, is it justifiable to use an obsolete pesticide:			
(a) on a large agricultural enterprises	42 (84)	6 (12)	2 (4)
(b) on a small farm	13 (26)	17 (34)	20 (40)

Source: own research of Center for Sustainable Development and Ecological Education, 2001.

15% of agricultural land, largely under the responsibility of women. In Western Ukraine, where around 40% of husbands work abroad, women buy and apply pesticides. A survey of 50 women of childbearing age investigated the extent to which women understand the possible routes of exposure to pesticides and the potential impacts on their health. All those interviewed apply pesticides on their family farm (Table 2).

This questionnaire indicates that Ukrainian women are not strongly concerned about pesticide exposure. Exposure is routine, because, unlike in Western countries, little attention is paid to occupational risk factors. The results of studies of the potential impacts of pesticides on women's health are not publicly available and the medical profession has little interest in the problem.

Information on pesticide poisoning notoriously underestimates the effects and no regular monitoring of the effects of pesticides on health has been carried out in the Ukraine. However, studies indicate that exposure to pesticides has been associated with cancer of the breast, testes and ovaries. The link between pesticide use and a range of problems in a woman's reproductive system have been shown in other studies. Results from research have indicated an increasing incidence of miscarriage and delay in time to pregnancy among female agricultural workers exposed to pesticides. The most widely used herbicide in Ukraine is 2,4-D, which has been found to disrupt the hormone endocrine. Carbamate and organophosphate insecticides have been reported to increase rates of premature birth and spontaneous abortion. Other pesticides such as aldrin, dieldrin, chlordane and toxaphene can also disrupt the reproductive hormone cycle. A significant proportion of hormone disrupting pesticides, including pyrethroids and carbamates are used in the Ukraine. Links between pesticide exposure and degenerative nervous diseases have also been demonstrated. In 1997 a comparative analysis of the distribution of diseases among women and men were published in the Ukraine.

Ontological diseases are frequently found among women of working age. Over the last seven years, the frequency of breast cancer has increased by 17.5%, womb cancer by 13.1%, ovarian cancer by 3.5%. An analysis of the distribution of diseases in Ukrainian women raises concern that some diseases are caused by pesticide exposure.

Ukrainian women, especially those in rural areas, are most affected by environmental degradation. These women are primarily those who dig land contaminated by radionuclides and pesticide residues, in order to grow potatoes (the second staple crop in the Ukraine) and spray pesticides without wearing protective clothing.

The important role of public participation, NGOs, women's role in promoting environmental awareness and stimulating legal and institutional frameworks, needed to promote ecological farming and alternatives to pesticide use, cannot be stressed enough,

There is a great need for public awareness and dissemination of information. The risk to health from environmental contamination by pesticides highlights the importance of public 'ownership' of environmental education. This is a challenge for university education.

6. Choices for the future

It is important to make the educational and institutional changes necessary to meet challenges. University professors should not be satisfied with just a traditional format of teaching and should remember they train professionals to work in the rural community. Raising ecological awareness and education regarding the promotion of good agricultural practice among different stakeholder groups should be actively supported.

In agricultural universities new courses should balance their scientific approach with subjects from the humanities, including environmental ethics, introduced into the curriculum [Pidlisnyuk and Stefanovska, 2004].

Understanding of the importance of gender issues in the promotion of ecological agriculture should be emphasized in professional training. Agricultural professionals for the XXI century should combine a strong scientific background with an understanding of humanities and the ability to work in the social environment. Our role is to promote sustainable agriculture by supporting producers and educating and informing consumers. We have a goal to educate and train those who protect natural resources and provide models of the effective and efficient management of natural resources.

To achieve this goal partnership will be needed. Partnership and collaboration with systems of agricultural educational, partnership between different agricultural education systems, partnership with the private sector: partnership with a range of other stakeholders, including NGOs, farmer organizations and consumers. Local education institutes (universities, colleges of agriculture) should work alongside non-governmental organizations and public to broaden access to and develop ecological agriculture, including Integrated Pest Management and biological control as key goals.

Women's role in the promotion of sustainable ecological agriculture should be always taken into consideration. The active participation of women, as partners, decision makers, educators and beneficiaries of sus-

tainable ecological agriculture should be promoted [*Women's Caucus...*, 2002–2004; Pidlisnyuk et al., 2003].

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