Centre for Women, Gender and Development Studies

KEYNOTE PAPER

# ENVIRONMENTAL SUSTAINABILITY: WOMEN, PESTICIDES AND AGRICULTURE IN GLOBAL PERSPECTIVE.

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## 1.1 INTRODUCTION:

The sustainable production of food (FAO) is the first pillar of food security. Millions of women work as farmers, farm workers and natural resource managers (Onyemobi 2000). In doing so, they contribute to national agricultural output, maintenance of the environment and family food security (Brown et al 2001). The involvement of women in agriculture have attracted greater attention in recent years. The need to develop a suitable extension service that is gender specific and tailored to women farmers cannot be overemphasized (Odurukwe et al, 2006).

Food and Agricultural Organization has created a Gender and Food Security department. The department examines the relationships between gender and food security through the categories of agriculture; education, extension, and communication; population; rural economics; fisheries; nutrition; forestry; environment; and division of labor (FAO,1995). FAO's Plan of Action for Women in Development (1996-2001) ensures that gender concerns and women participants

are integrated in all relevant FAO projects and activities. It aims to give women equal access to and control of land and other productive resources, increase their participation in decision- and policy-making, reduce their workloads, and enhance their opportunities for paid employment and income (Watterson, 1999).

The term "pesticide" is a composite term that includes all chemicals that are used to kill or control pests. In agriculture, this includes herbicides(weeds), insecticides (insects), fungicides (fungi), nematocides (nematodes), and rodentcides (vertebrate poisons) (FAO,2012). Pesticides are recognized worldwide as a veritable means of controlling pests, at the same time such chemicals are highly toxic to other species in the environment (Venkateswara , 2006; Velisek et al., 2007; NASATCEN, 2011). Over 98% of sprayed insecticides and 95% herbicides reach a destination other than their target species, because they are sprayed or spread across entire agriculture field (Plate 1) (George, 2004).

Pesticide use and exposure among women is a central issue in the move towards a sustainable future. These substances are environmental toxins which have been defined as "chemical compounds that are created and dispersed into the environment specifically in order to kill living creatures known as pests, be they insects, weeds, bacteria, fish, snails, birds, rodents or other forms of life." (1) Agenda 21 clearly outlined an agenda for sustainable agriculture that includes reduced reliance on pesticides through a variety of steps which would reduce exposures, including enhanced reliance on integrated pest management. Pesticides have been used since the early days of modern agriculture. They are biologically active compounds that may pose a grave risk to health during or after their use. The available data, documenting pesticide exposures and related health effects in farmers, especially in pregnant women, are limited (Gawora and Jurewicz, 2005).

This paper then focus on the effects of pesticides applications on women and the way forward for environmental sustainability.

## 1.2 ENVIRONMENTAL SUSTAINABILITY

Sustainability is the capacity to endure. The word sustainability is derived from the Latin sustinere (tenere, to hold; sus, up). In ecology the word describes how biological systems remain diverse and productive over times. For humans it is the potential for long-term maintenance of well-being, which in turn depends on the well-

being of the natural world and the responsible use of natural resources (Wikipedia, 2010). Environmental sustainability is the process of making sure current processes of interaction with the environment are pursued with the idea of keeping the environment as pristine as naturally possible based on ideal-seeking behaviours. An "unsustainable situation" occurs when natural capital (the sum total of nature's resources) is used up faster than it can be replenished. Sustainability requires that human activity only uses nature's resources at a rate at which they can be replenished naturally. Theoretically, the long-term result of environmental degradation is the inability to sustain human life. Such degradation on a global scale could imply extinction for humanity (ISR,2010).

## 1.3 SUSTAINABLE AGRICULTURAL

IFOAM (2013), opined that , sustainable agriculture seeks to achieve three goals: farm profitability; community prosperity; and environmental stewardship. The latter includes: protecting and improving soil quality, reducing dependence on non-renewable resources, such as fuel, synthetic fertilizers and pesticides and minimizing adverse impacts on safety, wildlife, water quality, and other environmental resources (Hjeresen et al, 2002). The use of toxic chemicals is clearly a destructive and dead-end approach to farming.

## 1.4 WOMEN AND AGRICULTURE IN GLOBAL PERSPECTIVE

Women now play a significant role in the agricultural labor force worldwide. The United Nations reports that nearly 80% of economically active women in sub-Saharan African and at least half in Asia, other than western Asia, are now working in agriculture. In Latin America and the Caribbean and in developed countries, these numbers are much lower. In the United States for example, women make up 19% of the agricultural work force, according to the Census of Agriculture. Other sources indicate that there were 128,170 women farm operators in the US in 1978 (5% of all farmers were women). Women farmers working as partners in farming operations are often undercounted because usually the husband is considered the main operator. (Kalbacher, 1982; World's Women, 1991; Moore, 1998).

With more than 500,000 kg of approximately 600 different pesticide chemicals applied annually in the US, and approximately 2.5 million tons applied throughout the world , women farmers and workers frequently are exposed to dangerous pesticides directly when working as pesticide applicators, or indirectly during harvesting, planting and soil preparation (Pamela, 2005) . The International Labour (ILO)Organization has shown that agricultural workers run at least twice the risk of dying on the job as workers in other sectors reporting that tens of thousands of

agricultural workers die each year, and millions suffer injuries, or are poisoned by chemicals. In addition, agriculture mortality rates may be underreported and have remained consistently high in the last decade, in contrast to other dangerous occupations, where fatal accident rates have decreased. While it is known that most farm-workers are routinely exposed to pesticides, relatively few studies have analyzed specific farm activities to pinpoint the extent of exposure by gender. The ILO does point out that the share of women in agricultural employment worldwide is growing in recent years, mainly due to the migration of men to urban centers seeking better opportunities. With women now accounting for 43% of the total workforce in agriculture, it is clear that exposures to pesticides is growing ((Pamela, 2005).

Women are exposed to pesticides not only through agricultural activities but also from exposures in the home, school, workplace and in public spaces. For example, women come into contact with pesticides through washing pesticide-soaked clothes and disposing of empty containers from family members. Some pesticides threaten not only the health of women agricultural workers, but also affect children because of teratogenic or embryo-toxic effects. In addition, domestic exposures can also be widespread due to non-agricultural pesticide use in many areas. For example, in the United States studies have found that approximately 75% of U.S. homes are being found to contain the pesticide chlordane in the breathable air. Over 5% of the homes built before March of 1988 have been found to have air levels of the pesticide chlordane above the "safe" level of 5 micrograms per cubic meter. (School of Public Health, 1987 ) In general, pesticide use is growing, especially in the lawn care industry. In addition, pesticide residues have been found to remain in the daily diet on fruits and vegetables even after they have been washed, peeled, or cored.

In many countries, government extension agents and agrochemical company representatives address the issue of pesticide use in meetings where only men are present These meetings take place at times when women are busy caring for children, doing domestic chores and working in the fields. There is an implicit assumption that women are not concerned with these issues, especially since women have no decision-making power at this level. In many cases it is the husband who has the responsibility for buying pesticides at the cooperative, the market place or from the storekeeper and no information is passed between the husband and wife about safe use. Many pesticide products are not labeled; but even if they are, many women in rural areas are illiterate and would not be able to read the information. (African Women and Pesticides, 1994)

## 1.5 SOURCES OF HUMAN EXPOSURE TO AGRICULTURAL PESTICIDES

Human exposure to agricultural pesticides and the subsequent contamination or poisoning may be occupational, no non-ccupational, intentional, unintentional, or accidental. Also, exposure may be through ingestion (oral), through the skin (dermal) or through inhalation (respiratory). Occupational contamination or

agricultural workers die each year, and millions suffer injuries, or are poisoned by chemicals. In addition, agriculture mortality rates may be underreported and have remained consistently high in the last decade, in contrast to other dangerous occupations, where fatal accident rates have decreased. While it is known that most farm-workers are routinely exposed to pesticides, relatively few studies have analyzed specific farm activities to pinpoint the extent of exposure by gender. The ILO does point out that the share of women in agricultural employment worldwide is growing in recent years, mainly due to the migration of men to urban centers seeking better opportunities. With women now accounting for 43% of the total workforce in agriculture, it is clear that exposures to pesticides is growing ((Pamela, 2005).

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poisoning has been identified as the most serious problem associated with the use of agricultural pesticides, especially in developing countries. Nonetheless, the effect of accidental contamination can be very serious and even fatal. More than 400 people reportedly died in Iraq in 1972 after eating bread that had been prepared from cereals treated with a fungicide (Olurominiyi, 2011).

Also, at least 37 people reportedly died of endosulfan poisoning in Republic of Benin during the 1999/2000 cotton growing season. In 1958, all members of the family of a local chief who is a prominent cocoa farmer at Okebode in southwestern Nigeria were hospitalized after eating a leaf vegetable undergrowth of a cocoa farm that was earlier sprayed with lindane. In 2004, carbofuran pesticide residues found on several batches of noodles manufactured in Nigeria may have resulted in 23 reported cases of vomiting and one death (Olurominiyi, 2011).

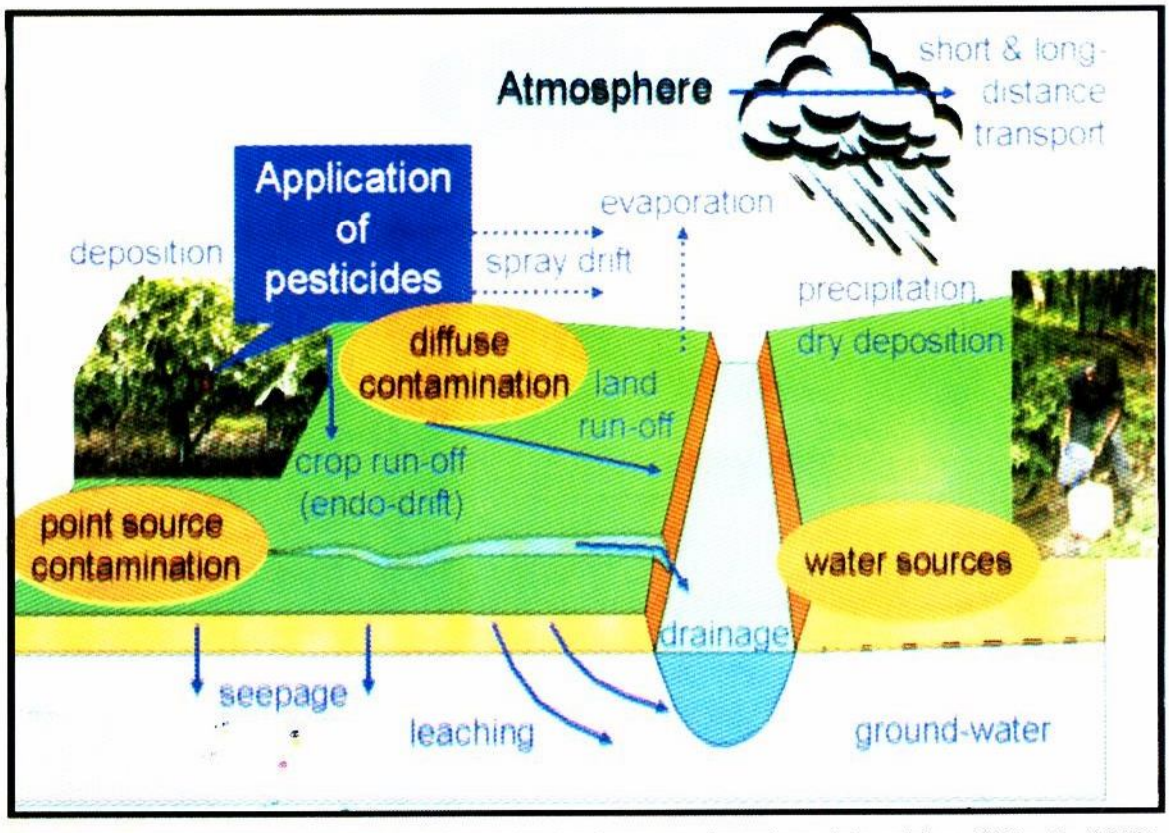


*Plate 1: Pesticide pathways: The Effect of Pesticides Application on Agriculture, Adapted from Wikipedia (2010).*

## 1.6 HEALTH IMPLICATIONS OF PESTICIDES USED: WOMEN IN FOCUS

Adverse effects of chemical pesticides have been reported on both the abiotic and biotic components of the environment (Ghimire, 2001). The former are exemplified by residues in soil, air, water, food etc. and the latter by phytotoxicity, residues, vegetation changes etc. in plants and physiological deformities, diseases, mortality, population changes, genetic disorders etc. in mammals, avian, insects and other organisms(Ubuoh et al,2011). Entry of pesticides into the food chain coupled with their bioaccumulation and biomagnifications trigger effects of unforeseen consequences. To escape from these harmful effects, the concept of organic farming was emerged from the conference of Atlanta in 1981 (Ghimire, 2001).

Clearly pesticides pose health risks for women. In general, most pesticides have not been adequately tested for safety. Pesticide exposure is one of the most widely studied occupational risk factors, with the United Nations Environment Program estimating that accidental pesticide poisoning causes 20,000 deaths and 1 million cases of illness per year worldwide (Health in the Americas,1998). In general, data on pesticide poisoning is notoriously underestimated. Pesticides have been implicated in human studies with leukemia, lymphoma, a plastic anemia, soft tissue sarcoma and cancers of the breast, brain, prostate, testis and ovaries.. The International Agency for Research on Cancer has found "sufficient" evidence of carcinogenicity in eighteen pesticides and "limited" evidence in an additional sixteen pesticides (Health in the Americas,1998).

Studies have shown a link between a variety of reproductive health impacts in women and pesticide exposure. Studies have documented increased incidence of miscarriages, stillbirths and delayed pregnancy among women agricultural workers and wives of men employed in pesticide mixing and spraying. There is also evidence of increased risk of birth defects from parental exposure to pesticides, although the extent of this risk is uncertain. (Schetler,2000) Specific herbicides, such as 2,4-D and 2,4,5-T, disrupt estrogen cycles in women and can cause menstrual-cycle problems in animals. Carbonate and organophosphate insecticides have been reported to increase birth prematurely and spontaneous abortion rates. Other pesticides such as aldrin, dieldrin, chlordane and toxaphene can also disrupt reproduction hormonal cycles. (American Journal of Industrial Medicine, 1997).

Other recorded health effects from research with women in the field include acute effects such as dizziness, muscular pain, sneezing, itching, skin burns, blisters, difficulty breathing, nausea, nail changing color and sore eyes. Women with potential exposure to pesticides at work or at home took longer to get pregnant than women without pesticide connections. Pregnant women living in a migrant, farm-worker community in California participated in the study. Although all women were pregnant, women who worked in agriculture, lived within 200 feet of

agriculture fields or used pesticides in their home took significantly longer to conceive than those who did not have these pesticide exposures. Many studies have found a relationship between pesticides and male fertility, including effects on sperm health and longer time to pregnancy (Harley et al, 2008).

DDT was one of the most widely used chemicals for controlling insect pests on agricultural crops and controlling insects that carry such diseases as malaria and typhus. The presence of DDT in the environment is generally a result of contamination due to past production and use and subsequent movement from sites of application to land, water, and air. Although there is a diminishing trend of DDT use worldwide since the 1970's a number of countries still use the substance for malaria control. DDT has been proven to cause cancer in laboratory animals, therefore the U.S. Department of Health and Human Services has determined that DDT may reasonably be anticipated to be a carcinogen. (ATSDR,1997). The analysis of links between breast cancer and pesticides began with Israeli scientists examining the connections between the significant drop in breast cancer that took place between 1976 and 1986 and the policy to ban several organochlorine insecticides and a result of concerns about health impacts of exposures to a derivative of DDT, lindane and a-HCH. (Cox, 1996, Cole et al., 1997). Subsequent research has continued to explore the relation between these substances and breast cancer risk, with evidence that xenohormones can cause damage to DNA. There is clearly a pressing need for long term comprehensive studies that look at the impacts of these exposures throughout a women's life cycle. (Davis et al., 1998).

Many studies worldwide have reported the presence of DDT and its metabolites in samples of breast milk. In Delhi, a breast feeding infant receives 12 times the acceptable limit of DDT and in Brazil 4 times that limit. In Zimbabwe, studies in some regions have found all the samples of breast milk contaminated with DDT. In China for example, most children take in DDT from breast milk at levels 5 to 10 times higher than internationally accepted maximums, even through these chemicals have not been used or produced in that country since 1983. (WEDO, 1998). Low birth weight and premature babies have been found to have higher levels of DDE in their blood compared to normal, full term babies. Higher levels of DDT have been found in mothers of premature babies.

## 1.7 PROBLEMS OF THE USE OF PESTICIDES BY WOMEN:

Current problems include the fact that many women agricultural workers are unaware of all of the adverse effects of pesticide use. Even where they are aware of the problems few understand about specific adverse effects and most described ill-effects in general or vague terms according to Pamela (2005).

(I) In many countries , these pesticides are stored in homes in areas easily accessible to many family areas.

(II) Agriculture tends to be excluded from many national labour laws and is not subjected to any comprehensive international standard where regulations exist, they are often sporadically applied due to inadequate legal provisions, low levels of unionization and insufficient labour- inspection.

(III) Often women pesticide applicators cannot read labels and do not follow instructions.

(IV) Most users do not use protective clothing because it is unsuitable for the climate, unavailable or too expensive. Studies of women in Asia have found that they often are unaware of the existence of such equipment.

(V) In many agricultural settings, there are no washing facilities in the field where worker spray pesticides, and workers seldom wash even when pesticides spill on their skin.

(VI) In Africa there are reports that rural women often reuse pesticide containers for storing or transporting their crops.

Thus, the need for actions outlined in Agenda 21 remain pressing: women and pesticide use (Pamela, 2005):

> *"that there should be increased public awareness of sustainable agriculture in women's groups, that governments should disseminate to farming households more information involving "reduced use of agricultural chemicals" and train women's groups, farmers and extension agents in alternative non chemical ways of controlling pests are of significance. Economic considerations must be taken into account related to the costs to women of health problems due to exposures to pesticides both for themselves and the family as well as the issues of women as consumers of pesticide products."*

## 1.8 CONCLUSION

It is confirmed that pesticides are used to kill insects, weeds, and other unwanted living things. The effects of pesticides are not only limited to the plants to which they are applied. They also affect human, animals, and the environment. The scientific research that describes the impact of pesticides indicates that pesticides affect reproduction, growth, neurological development, and the function of the immune and endocrine systems. This then calls for urgent need for mitigations for environmental sustainability.

### 1.8.1 STRATEGIES FOR REDUCING AGRICULTURAL PESTICIDE CONTAMINATION

Several strategies that have been suggested to reduce agricultural pesticide contamination and its effects include :

(i) comprehensive risk communication and education programs,

(ii) the use of appropriate personal protective clothing,
(iii) the discontinuation of calendar spraying,
(iv) selection of disease-resistant hybrids,
(v) and the adoption of Integrated Pesticide Management (IPM): IPM emphasizes non-chemical and cultural cultivation pest control strategies such as removal of diseased plant parts, crop rotation that may disrupt the life cycle of pests, and biological control such as the use of insect predators.
(vi) While the need exists to prevent or reduce agricultural pesticide contamination and its effects world-wide, special attention needs to be paid to developing countries for several reasons. These include :
    (1) the observations that three-fourths of the estimated annual instances of pesticide poisoning and pesticide-related deaths occur in developing countries, and that these countries represent the fastest growing market for agricultural pesticides.
    (2) Also, the adverse human health effects of pesticide poisoning are particularly high in many of these countries because of the low nutritional status, and the scarcity of heath care facilities especially in the rural areas where most of the agricultural activities occur.

Above all, there is need for increasing awareness of potential exposure to pesticides and their harmful effect among workers, especially among women. This may lead us to the principle of green chemistry which implies designing of chemicals, processes and reactions to reduce environmental and health hazards at source and to enhance sustainability, particularly through the molecular design of chemicals (Anastas and Warner, 1998). Green chemistry then encompasses a range of scientific and technical developments aimed at ameliorating the chemical industry's environmental and health impacts through the use of biopesticides.

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