

# Pesticides Use in Rural Settings in Romania

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**Abstract**—The environment pollution with pesticides and heavy metals is a recognized problem nowadays, with extension to the global scale the tendency of amplification. Even with all the progress in the environmental field, both in the emphasize of the effect of the pollutants upon health, the linked studies environment-health are insufficient, not only in Romania but all over the world also. We aim to describe the particular situation in Romania regarding the uncontrolled use of pesticides, to identify and evaluate the risk zones for health and the environment in Romania, with the final goal of designing adequate programs for reduction and control of the risk sources. An exploratory study was conducted to determine the magnitude of the pesticide use problem in a population living in Saliste, a rural setting in Transylvania, Romania. The significant stakeholders in Saliste region were interviewed and a sample from the population living in Saliste area was selected to fill in a designed questionnaire. All the selected participants declared that they used pesticides in their activities for more than one purpose. They declared they annually applied pesticides for a period of time between 11 and 30 years, from 5 to 9 days per year on average, mainly on crops situated at some distance from the houses but high risk behavior was identified as the volunteers declared the use of pesticides in the backyard gardens, near their homes, where children were playing. The pesticide applicators did not have the necessary knowledge about safety and exposure. The health data must be correlated with exposure biomarkers in attempt to identify the possible health effects of the pesticides exposure. Future plans include educational campaigns to raise the awareness of the population on the danger of uncontrolled use of pesticides.

**Keywords**—Pesticides, health effects, Romania, Saliste.

## I. INTRODUCTION

**P**ESTICIDES contain the active principles and products conceived to act upon fundamental processes of living organisms and as a consequence have the potential to kill or fight pests.

The ecological deliberate effect of any of the pesticide is to

protect the population from certain harmful pests, through the decrease of this abundance. They are considered essential for protection of crops against insects, rats and natural pathogenic agents, but at the same time they may accumulate in the environment and involve serious risks for human and animal health, especially when contaminate the drinking water.

The environment pollution with pesticides and heavy metals is a recognized problem nowadays, with extension to the global scale the tendency of amplification. Spread in the environment these elements can be traced in different factors (airs, water, soil – vectors of propagation from where they are taken over by all living organisms, vegetable or animals [4,8]. Through the ingestion of the food, water, breathe and another process, the polluted elements (pesticides and heavy metals) gain access the human body, where can produce severe disorders [12]. The pesticides are included in a large spectrum of organic micro pollutants which have ecological impact. Although terrestrial impact of the pesticides exist, the most important way thought which these cause ecological impact, is contaminated water throughout the leakages of pesticides. The exposure of the population to pesticides as the results of their extensive utilization in agriculture represents the most important way of exposure for the rural population. The potential risks for man are mainly cancer, genetic disturbances and irreversible deterioration of the immune system [1,2,5,11].

Risks upon human health may appear as a result of direct or indirect exposure, improper or accidental utilization especially for agricultural purposes, for maintenance of green spaces or other activities [1,2]. The effect of indirect exposure of people that live in the areas where these substances are pulverized and dispersed in the air or of consumers (pesticides residues on agricultural products or in water) may be even worse especially for vulnerable groups [3,10]. Recent studies showed the specific sensibility of fetuses whose neurological development was affected where mothers were exposed to pesticides [9,11].

It is imperative to take into consideration the risks for the environment that appear as a result of excessive and involuntary introduction of chemical substances in water, air and soil with injurious effects upon plants, wild flora and fauna, upon the quality of the natural environments and biodiversity in general [6,12].

At the same time the modern society is based on utilization of a large scale of fertilizers, biocides, food supplements, insecticides, pesticides and herbicides with benefic effects in obtaining higher quality and food security levels.

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Responsible utilization guarantees the presence on the market of food products, fruits and vegetables of high quality at low prices accessible to all consumers.

There are three ways in which pesticides can enter the human body [7]:

- through the skin or eyes (dermal route),
- through the mouth (oral route) and
- through the lungs (respiratory route).

## II. METHODS

An exploratory study was proposed to determine the magnitude of the pesticide use problem in a population living in rural settings in Transylvania, Romania. The selection criteria for the population were elaborated first by the research team. Several aspects were considered:

- main economic activity in the area to be selected: agriculture and animal husbandry
- population under study being accessible to research team members (both geographical and cultural)
- population under study being relatively stable
- lack of other pollution sources such as industrial sites or other economic activities apart from those mentioned above.

A region in Transylvania, Romania was selected: Saliste. This region is situated in Transylvanian plateau. The region is well known for the traditional economic activities such as agriculture and sheep husbandry. Both activities imply the use of pesticides, an uncontrolled activity in rural settings. The health effects of the pesticides exposure in Romania are not well studied and we considered this to be a priority for Romania. First step of the investigation was to interview of the significant stakeholders in Saliste region: the PR person from the City-Hall, the priest, the family doctors. Information regarding aspects of the community such as: maps of the region, demographics, social determinants of health, infrastructure and traditions was gathered. Using the information from the interview, a questionnaire was designed and a convenient sample from the population living in Saliste area was selected. Questions were asked about: demographics, medical history, work history, indoor exposure, work exposure, habits (such as smoking, drinking, dietary habits). 50 people were selected and the response rate was 82% (n=41). The participants were informed about the goals of our research and were invited them to fill in the questionnaire.

## III. RESULTS AND DISCUSSIONS

The data we collected was analyzed. Here is a summary of the results:

- all the participants were adults (mean age=58, range 32, the youngest participant was 40, the oldest was 72);
- 39% were females ; 42% did not have a high school degree;
- 51% declared that they drink alcohol once a month;

- 25% were smokers (the mode value of the number of cigarettes smoked=20);
- the medical history most often mentioned was chronic respiratory diseases, cardiovascular diseases and diabetes.

The exposure of the participants to pesticides was evaluated. All the selected participants declared that they used pesticides in their activities.

66% of the participants declared that they owned the farms where they live and work, most of them for more than 30 years. In Saliste area, the work in farms was done mostly manual. Most of the farms were small farms (95% of the surfaces between 500 squared meters and 0.5 hectares).

When asked about the purpose of the use of pesticides, the participants declared more than one purpose: for controlling the weeds and tree fungi (92%), insects affecting crops (58%) and insects affecting animals such as sheep (91%). 10% of the participants declared the use of pesticides in their homes.

When asked about whether they prepared or personally applied pesticides during their lifetime, 97.6% of the volunteers answered YES to both questions. They declared they annually applied pesticides for a period of time between 11 and 30 years, from 5 to 9 days per year on average. Thus, 31.7% declared applying pesticides between 11 and 20 years, 24.4% between 21 and 30 years and only 5% applied pesticides for more than 30 years. The process of preparing and applying pesticides took from 5 to 9 days per year for 63.4% of the participants. The pesticides were applied mainly on crops situated at some distance from the houses but high risk behavior was identified as the volunteers declared the use of pesticides in the backyard gardens, near their homes, where children were playing.

Open ended questions were used to collect information on the types and names of the utilized pesticides. The list below contains the names of the most utilized pesticides: Lindan, Forlin, Gamaex, Malathion, DDT (not in use anymore) and other commercial products such as Calipso, Curzate, Carbetox, Mopsilan, Decis, Neucidol, Oleicarbeto, Captadin.

The knowledge of the participants regarding the use of pesticides was also evaluated. In conclusion, the pesticide applicators did not have the necessary knowledge about safety and exposure. The use of the protective equipment was inadequate in most of the cases according to our information. Protective equipment was changed at the end of the working day; the applicators did not use goggles while spraying pesticides; wearing gloves was not a common practice and the clothes were washed along with the rest of the family laundry. Face, hands and arms were the most exposed body parts while preparing and applying pesticides.

They applied pesticides in uncontrolled quantities and conditions in their backyard farms, with children playing in the same area. They did not know about the decontamination procedures in case of accidents.

The real incidence of pesticides poisoning is not well known. Estimates are that the real number of severe pesticide poisoning is over 1 million per year, with a death rate of 0.4 – 1.9%; it was estimated that work related exposure is 70% of the total. In Europe, the incidence of acute pesticide poisoning

is not well known and varies from one country to another. National statistics based on the official reports from the health authorities in Western Europe say that there are approx 3 cases per 1 million inhabitants. The evaluation of the exposure represents a critical factor that limits the interpretation of some studies results: the direct measurements of exposure (air concentration and biological measurements) are not available in most of the cases.

Even with all the progress in the environmental field, both in the emphasize of the effect of the pollutants upon health, the linked studies environment-health are insufficient, not only in Romania but all over the world also. To achieve these desiderates will take a very well organized system. The accent must be put on the relation between the exposure from the environment pollutants and the health of the patients. The symptoms and the diseases must be evaluated in terms of present and past exposure to environmental pollutants and the exposure sources must be analyze in terms of their effect on the population health.

Nowadays, a tremendous effort is necessary to more precise define a correlation between environment and health and the current project is a contribution to the effort of achieving these result. In the light of those presented, the importance of the project at the national and international level is well established. Both from the scientific and the economic/administrative point of view and the strategy of durable development, the problematic of the exposure to heavy metals and pesticides in the rural areas is considered to be a priority in EU countries but especially at the national level. One important aspect is to identify and evaluate the risk zones for health and the environment in Romania, followed by the adequate programs for reduction and control of the risk sources.

Romania wishes to reduce the risk to population and environment from the use of pesticides, to replace the hazardous substances with safer alternatives (including other substances besides the chemical). It also aims at reducing or banning pesticide use and at encouraging ecological agriculture. Pesticide control, monitoring and research, comparative assessment for the replacement of hazardous substances will be encouraged. Moreover, training campaigns for the pesticide users and distributors will be organized, regarding their control and handling. Another measure provided by the European Commission relates to the ban on pesticide aerial spraying.

#### IV. CONCLUSION

We now have information about the magnitude of the problem in the community we investigated. An epidemiological study will follow in order to assess the health effects of the pesticides exposure in the selected population. The data on the environment impact of uncontrolled use of pesticides in the region (in particular soil and water) and health data will be correlated with exposure biomarkers in attempt to identify the possible health effects of the pesticides exposure. Future plans include educational campaigns to raise the awareness of the population on the danger of uncontrolled

use of pesticides.

The health programs assume the elaboration of education for health strategies and even social marketing for the purpose of modifying attitudes and behaviors of those exposed to pesticides. This means the development of educational programs and implication of the entire community the "learned lesson" may be transferred in areas cu similar problems.

Romanian alignment to practices and the EU requirements will be facilitated from the point of view of the scientific and technological level in the domain of environmental monitoring. Possible disasters on long term may be prevented. Public will be better and completely informed about problems created by contamination with pesticides and heavy metals. Population confidence in data concerning environmental pollution from areas at risk will increase.

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#### REFERENCES

- [1] Alavanja, M. C., Sandler, D. P., McDonnell, C. J., Lynch, C. F., Pennybacker, M., Zahm, S. H., Mage, D. T., Steen, W. C., Wintersteen, W., Blair, A. (1999). Characteristics of pesticide use in a pesticide applicator cohort: the Agricultural Health Study. *Environ Res*, 80(2 Pt 1), 172-179.
- [2] Alavanja, M. C., Sandler, D. P., McMaster, S. B., Zahm, S. H., McDonnell, C. J., Lynch, C. F., Pennybacker, M., Rothman, N., Dosemeci, M., Bond, A. E., Blair, A. (1996). The Agricultural Health Study. *Environ Health Perspect*, 104(4), 362-369.
- [3] BERRY C., 2000. The realities of pesticide use. *Pest Manag.Sci.*, 56 (11): 947-949.
- [4] BOTTRELL D.R. 1980. Integrated Pest Management. Washington, 120 pp.
- [5] BRAR D.S., KHUSH G.S., 1993. Application of biotechnology in integrated pest management. *J.Insect Sci.*, 6 (1): 7-14.
- [6] CAMBERS D.L., 1977. Quality control in mass rearing. *Annu.Rev.Entomol.*, 22:289-308
- [7] CIOCHIA V., ISAC GR., STAN GH., 1993. tehnologii de creștere industrială a câtorva specii de insecte auxiliare folosite în combaterea biologică a dăunătorilor. Ed. Ceres, București.
- [8] COBB P.P., 1997. Biorational suppression of pests in landscapes. *J.Agric.Entomol.*, 14 (3): 333-337.
- [9] Coble J, Arbuckle T, Lee W, Alavanja M, Dosemeci M. (2005). The Validation of a Pesticide Exposure Algorithm Using Biological Monitoring Results. *Journal of Occupational and Environmental Hygiene*, 2: 194-201.
- [10] Kirrane EF, Hoppin JA, Umbach DM, Samanic C, Sandler DP. (2004). Patterns of pesticide use and their determinants among wives of farmer pesticide applicators in the Agricultural Health Study. *J Occup Environ Med*, 46(8):856-65.
- [11] Samanic C, Hoppin JA, Lubin JH, Blair A, Alavanja MCR. (2005). Factor Analysis of pesticide use patterns among pesticide applicators in the Agricultural Health Study. *Journal of Exposure Analysis and Environmental Epidemiology*, 15 (3), 225-233.
- [12] White KE, Hoppin JA (2004). Seed treatment and its implication for fungicide exposure assessment. *Journal of Exposure Analysis and Environmental Epidemiology*, 14(3): 195-203.