STUDY ON THE APPLICATION OF ENVIRONMENTAL PROTECTION METHODS IN CEREAL FARMS FROM IASI COUNTY

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ABSTRACT
Environmental issue is one of the scientific community concern, reflected in conferences at national and international level, symposia and conferences in which were discussed consistent identification procedures for reducing the impact of pollution.
Agriculture, with industry, may become one of the major sources of pollutants with negative impact on environmental quality through degradation or destruction of ecosystems.
Also, intensive farming lead to soil and water pollution by the excessive use of fertilizers, pesticides, and irrigation water (poor quality and quantity), especially on arable land too loose by applying various works.
The authors have proposed to identify and analyze environmental methods applied in grain farm from Iasi County.
The research methodology was based on statistical survey with written questionnaire that were distributed to a panel of 12 farms of different sizes, of which three farms fall within the 1-100 ha, 3 farms within the 101-500 ha category and 6 farms within the 501-2000 ha category.
Analyzing the results it was found that the production technology of cereals within farms with large areas of land is focus on minimizing CO_2 emissions.
In this respect, for example, the doses of chemical fertilizers is determined depending on the supply of soil with N, P, K, analysis repeated periodically and the experts' advice, crop residues are chopped and incorporated into the soil, which reduces CO_2 emissions, etc.

Keywords: environmental protection, grain farms, pollution

INTRODUCTION

Agri-environmental measures have two *main objectives: reducing environmental risks associated with modern farming and preserving nature and cultivated landscapes.*
In areas with intensive agricultural production, measures are focused on reducing environmental risks (reducing fertilizer or pesticide inputs) and also protecting nature. In more extensive farming areas, measures tend to focus on continuing or re-introducing traditional farming practices with a view to nature protection (Agri-environment Measures - Overview on General Principles, Types of Measures, and Application, 2005; DOSSKEY M. G., 2002).
The *Best Management Practice* measures are individual or combinations of management, cultural and structural practices that researchers, have identified as the most effective and economical way of reducing damage to the environment, such as:

✓ *Permanent vegetative cover.* Improves water quality by establishing permanent vegetative cover on farm or ranch land to prevent excessive runoff of water quality or soil loss.

✓ *Animal waste management system.* Improves water quality by providing facilities for the storage and handling of livestock and poultry waste.

✓ *Stripcropping systems.* Improve water quality by providing enduring protection to cropland causing pollution.

✓ *Terrace system.* Improves water quality through the installation of terrace systems on farmland to prevent excessive runoff of water or soil.

✓ *Diversion system.* Improve water quality by installing diversion on farm and ranch

land where excess surface or subsurface water runoff contributes to a water pollution problem.

✓ *Grazing land protection system.* Improves water quality through better grazing distribution and better grassland management.

✓ *Waterway system.* Improves water quality by installing a waterway to safely convey excess surface runoff water across fields at non-erosion velocities into watercourses or impoundments.

✓ *Cropland protection system.* Improves water quality by providing needed protection from severe erosion on cropland between crops or pending establishment of enduring protective vegetative cover.

✓ *Conservation tillage systems.* Improves water quality by use of reduced tillage operations in producing a crop. The reduced tillage operations and crop residue management need to be performed annually.

✓ *Stream protection system.* Improves water quality by protecting streams from sediment or chemicals through the installation of vegetative filter strips, protective fencing, livestock water facilities, etc.

✓ *Permanent vegetative cover on critical areas.* Improves water quality by installing measures to stabilize source of sediment such as gullies, banks, field borders, or similar problem areas contributing to water pollution.

✓ *Sediment retention, erosion and water control.* Improves water quality through the control of erosion, including sediment and chemical runoff from a specific problem area.

✓ *Improving an irrigation and or water management system.* Improves water quality on farmland that is currently under irrigation by installing tailwater return system, converting to a different system to reduce pollutants, or reorganizing existing system to also reduce pollutants.

✓ *Tree planting.* Improves water quality by planting trees to treat critical areas or sources contributing to water pollution.

✓ *Fertilizer management.* Improves water pollution through needed changes in the fertilizer rate, time or method of application to achieve desired degree of nutrient control in critical areas contributing to water pollution.

✓ *Pesticide management.* Improves water quality by reducing the use of pesticides to minimum and manage pests in critical areas to achieve the desired level of chemical contributing to water pollution (CESTTI RITA, SRIVASTAVA JITENDRA, JUNG SAMIRA, 2003).

MATERIAL AND METHOD

The objectives of the paper aimed to identify and analyze environmental methods applied in grain farm, from Iasi County, Romania.

The research methodology was based on statistical survey (written questionnaire) with multiple choices.

Surveys, in their various forms, are considered the most appropriate techniques to ensure the research for obtain information. The quality of investigations depends on the quality of selective sampling, which mainly comprises of determining sample and questionnaire development for gather the information.

The sample is a random collectivity drawn from the general collectivity from which to retrieve information for further generalization of the findings. It is a selective part of a whole, whose property or behavior, the researcher wants to know (BURGESS TH., 2001)

Questionnaires with a total of 16 questions were distributed to a panel of 12 farms of different sizes, of which three farms fall within the 1-100 ha, 3 farms within the 101-500 ha category and 6 farms within the 501-2000 ha category.

In terms of juridical form, farms which participated in the study were: one Individual Authorized, 2 Individual Enterprises, 5 Limited Liability Company, two Agricultural Companies and two Joint Stock Companies.

RESULTS

In the agricultural units with grain profile were identified environmental measures such as:

- ✓ for the quantity and type of chemical fertilizer applied will be considered: regular testing of soil, the plant needs for nutrients, foliar analysis, soil moisture, previous crop, specialists recommendations;
- ✓ fertilization should be done in fair weather conditions (to prevent leaching), in an appropriate stage of plant growth (for a rapid absorption) and at correct dose. Groundwater present a major pollution with nitrates, which, in excessive concentrations are considered a health risk;
- ✓ in the farms, a part of chemical fertilizers can be replaced with manure, so it can be reduced the costs with cereals fertilizer, but also soil and water pollution;
- ✓ the quantity of manure applied will take into account: soil texture, soil moisture, nutrient content of manure, nutrient needs of culture, the amount of fertilizer applied;
- ✓ the methods that can be used to control weeds, insects and diseases in cereals, other than chemical treatments are: cultivation of varieties / hybrids resistant to diseases and pests, crop rotation, elimination of diseased plants, hand weeding, mechanical weeding, biological control (predators, parasites and pathogens, pheromone), traps in culture;
- ✓ incorporation of vegetal waste;
- ✓ in farm storage of fertilizers and pesticides will be done inside the building with concrete floor and systems designed to eliminate leakage;
- ✓ waste will be sent to authorized deposit or to recycling programs (KANAGY D. A., 1999; Council Regulation (EEC) No 2078/92).

On the question *"How often is soil tested (analyzed) in your farm?"*, 16.67% of the farms responded that every year, 50% at 4-5 years, 8.33% at 6 years and 16.67% rarely or never.
To the question *"What methods were used for application of chemical fertilizer on your lands / crops?"*, 25% answered – on the soil surface without incorporation, 75% on the soil surface with incorporation, 58.33% while sowing and 33.33% foliar application. Ferti irrigation was not used in the farms that participated in the study *(Figure 1).*
When asked *"What factors were taken into consideration for the decision on the amount and type of applied chemical fertilizer?"*, 50% responded that soil testing, 25% the cost of fertilizer, 16.67% soil moisture, 33.33% the previous culture, 66.67% culture requirements, 33.33% the specialists advice, 8.33% recommendations of their friends. No farm has considered the foliar analysis on the quantity and type of applied chemical fertilizer (*Figure 2*).
Five farms also holding livestock sector, apply manure on the land in quantities between 10 and 60 tonnes per hectare based on: soil texture, nutrient content of manure, nutrient needs of culture, the amount of applied chemical fertilizer, chemical fertilizer cost and quantity of manure resulting from their own farm. A single farm tested manure for nutrient content before being applied.

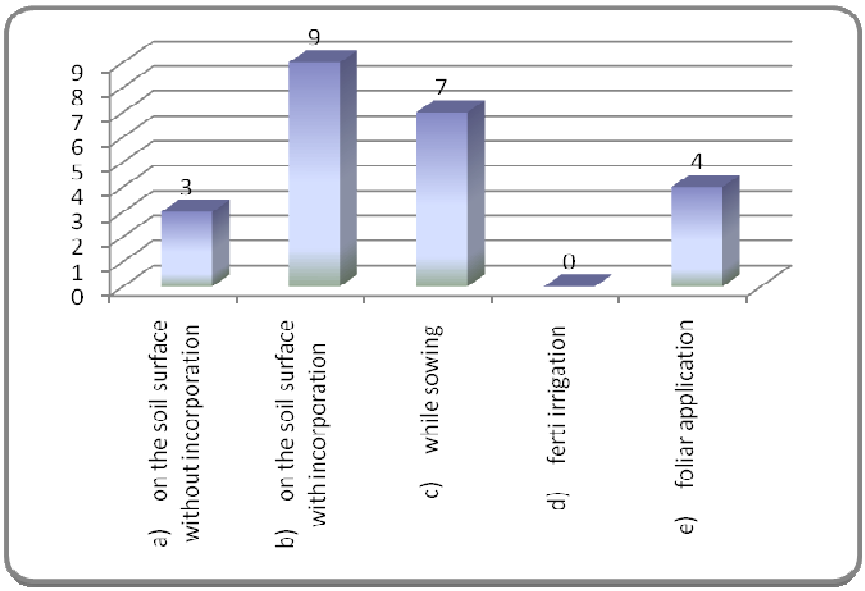

Figure 1. Methods used for application of chemical fertilizer on lands / crops

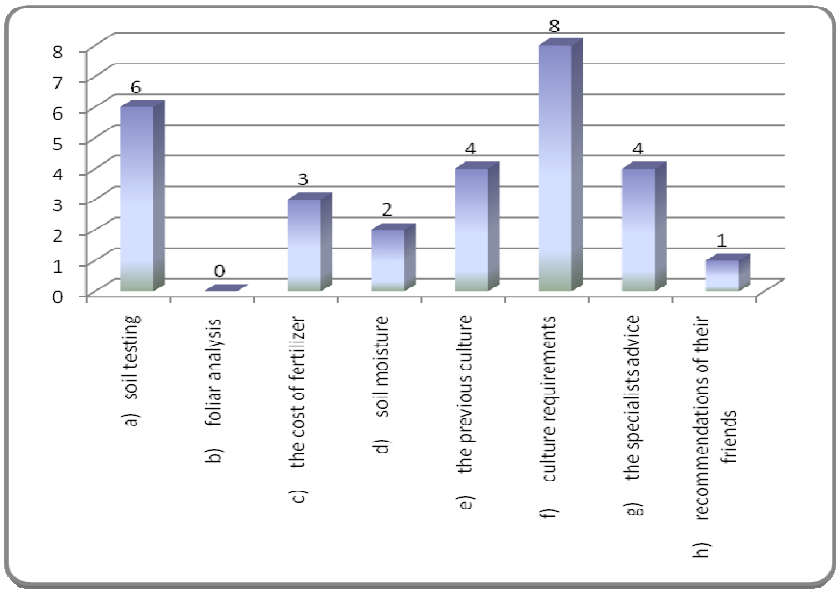

Figure 2. Factors taken into consideration for the decision on the amount and type of applied chemical fertilizer

Among the methods used to control weeds, insects and diseases in cereals, the largest share is hold by chemical treatments (83.33%) and mechanical weeding (66.67%). A percentage of 58.33% are using traps in crops and crop rotation, 25% cultivate varieties / hybrids resistant to diseases and pests and 8.33% (especially farms with small areas of land) are using manual weeding.

Biological control (*predators, parasites and pathogens, pheromones*) and removing diseased plants are not used on analyzed farms (*Figure 3*).

On the question *"How are managed crop residues (straw, stalks, haulm, etc.) in your farm?"*, 58.33% said they are baled, 50.00%, embedded in the soil, 41.67%, chopped and scattered on the field and 25% collected. In no farm, crop residues are left on the ground, scattered on the ground without being crushed or burned *(Figure 4)*.

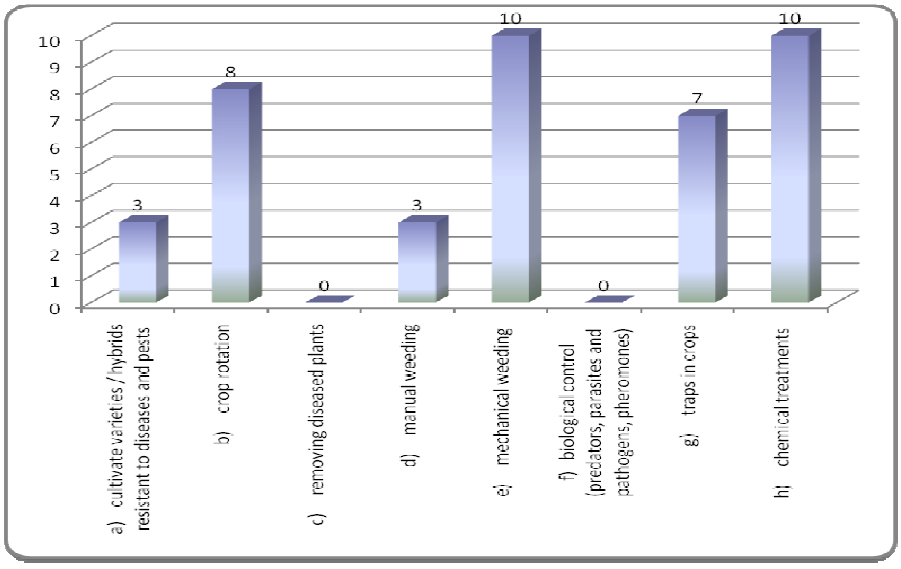

Figure 3. Factors taken into account when deciding on the methods used to control weeds, insects and diseases in cereals

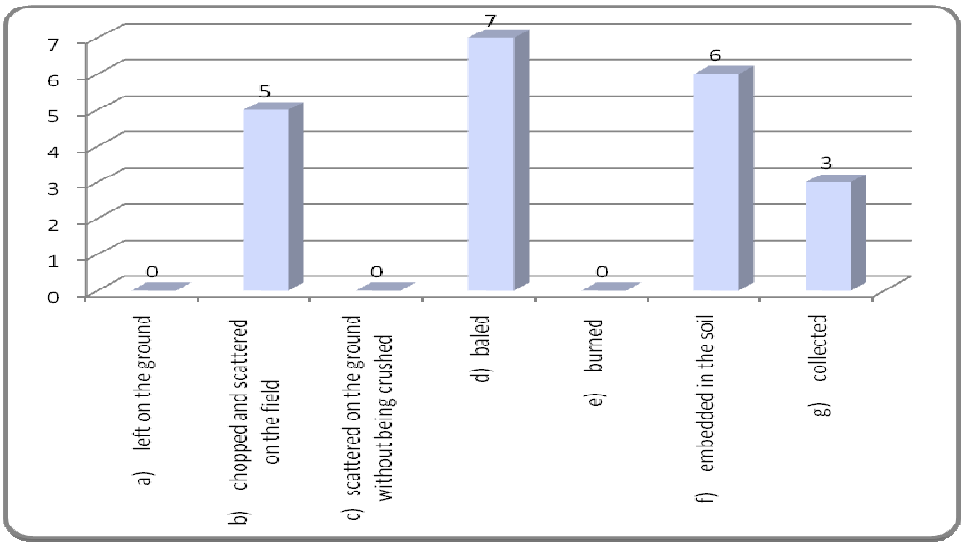

Figure 4. Managing crop residues (straw, stalks, haulm, etc.) in grain farms

Other methods used in environmental protection in Iasi County farms are: *spreading straw on the land (mulching) (41.67%), intercropping / tapes / strips, protection belts, drainage works (8.33%).*

Land terracing or green fertilizers are not used on studied farms.

Storage of fertilizers and pesticides in large farms is done inside the building with concrete floor, designed with containment to eliminate leakage and waste products of the farm are sent to authorize warehouses for hazardous waste or to recycling programs. Diesel fuel is stored in sealed tanks.

Also, in farms with livestock sector, wastewater is discharged into retention basins built inside the farm.

Small farms do not store hazardous substances and are not actively manage wastewater, which is eliminated by natural drainage.

Over two fifths of the analyzed farms (those with large areas of land) have their own strategy on environmental management.

CONCLUSIONS

1. The technology of cereals production in agricultural holdings with large areas of land (over 1000 ha) focuses on minimizing CO_2 emissions. Thus, the dose of chemical fertilizer is determined by soil analysis which is done periodically, and following the recommendations of specialists. Also, crop residues are chopped and incorporated into the soil, which reduces CO_2 emissions.

2. In the analyzed farms, are respected environmental measures such as: fuel is stored in sealed tanks; in the farm, some chemical fertilizers are replaced with manure, to reduce the costs of grain fertilizer as well as soil and water pollution; storage of fertilizers and pesticides in farm is done in construction with concrete floor, with systems designed to eliminate leakage, waste products of the farm are sent to authorized warehouses for hazardous waste, or to recycling programs, waste water is discharged into retention basins built inside the farm.

3. Farms with small areas of land don't have their own strategy on environmental management and use very few methods of environment protection.

4. Some methods of environment protection are not used in the studied farms (*ferti irrigation, foliar analysis to determine fertilizer needs, removing diseased plants from crops, biological control (predators, parasites and pathogens, pheromones), green manure, land terracing).*

ACKNOWLEDGEMENTS

„This work was cofinanced from the European Social Fund through Sectoral Operational Programme Human Resources Development 2007-2013, project number POSDRU/I.89/1.5/S62371 „Postdoctoral Schole in Agriculture and Veterinary Medicine area"

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