

**PRECISION HORTICULTURE MANAGEMENT FOR MAXIMIZATION
OF FRUIT GROWING ACTIVITY**

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Abstract

Most important, practical aspects and aims for the maximization of fruit growing activity are by using management activities which are specific to this field along with their impact in the economical and ecological performances. It is important to develop the research of new resistant apples varieties and to develop an integrated fruit growing system.

The specific objective of precision horticulture must be understood by the specialists: to create a precision horticulture management available for Romanian growers; to develop an informational system. Sustainability and competitiveness have become key words to horticultural crop producers. Growers need to be efficient in production to stay competitive and they need to conserve and protect soil and water, to be sustainable.

Keywords: fruit growing, management, precision horticulture

Rezumat

Cele mai importante aspecte ale optimizării producției de fructe constau în utilizarea activităților de management specifice acestui domeniu, cu impact în performanțele economice și ecologice. Este necesară dezvoltarea cercetării speciilor rezistente la boli și daunatori și a sistemelor integrate de producție. Obiectivele specifice ale horticulturii de precizie sunt: crearea unui sistem de management valabil pentru agricultorii din România, dezvoltarea unui sistem informatic.

1. INTRODUCTION

Best management practices for orchards include attention to: site preparation, soil management, water management including irrigation and drainage, nutrient management and pest management. For that, it is also important the promotion on national and international market of resistant to diseases fruit varieties.

To be considered a best management practice, an action must maintain or increase crop production while minimizing impact on the environment. In the case of many crops, this means using good management, so that the crop is well-established and healthy. This allows growers to reduce treatments such as pesticides that may affect the environment.

Soil is vital to all crop production, vegetables or fruit. Healthy and productive soil helps crops develop good root systems and reduces crop stress caused by drought or excess rainfall. Intensive production of horticultural crops creates some unique challenges in soil management/2/

2. MATERIAL AND METHODS

Using the precision horticulture methods is a challenge for the growers in Romania. Precision horticulture can be used to increase production efficiency, improve product quality, improve the efficiency of crop chemical use, and protect the environment.

Precise information is important in every phase of production, from initial planning to post harvest. Information requirements include spatial and temporal data on the crop, soil, pests, topography, and weather during the field production phase. During the post harvest phase, temperature, humidity, moisture, and a host of other parameters are important. Some of this information can be gleaned from previous crop records.

Technology is the second critical component of the system. Production equipment and systems must be compatible with the operational requirements of precision agriculture. The foundation of precision agriculture, from the mechanization perspective, is traced to the development of precision seeding and chemical-application equipment. GPS, with differential correction, has proven to be an effective tool to geo-reference features or data in the field. GIS provides the ability to organize data by geo-referenced position. Computers have given us the analysis and control capabilities to develop the comprehensive system needed in site-specific and post harvest process management.

Soil and plant testing will be used to determine the cause of the yield variability, and experimental manipulations will be conducted to optimize yield and management efficiency.

One of the methods is to improve the fruit growing management, to introduce a series of theoretical, methodological and, most important, practical aspects for the maximization of fruit growing activity. This is possible using management

activities which are specific to this field, along with their impact in the economical and ecological performances.

As a result, the consideration of horticultural production in the context of its supply chain, offers some challenging requirements for precision horticulture technologies for all specialists in horticulture in Romania.

In this way, the Romanian growers have more opportunities to produce optimized fruit quality. Using the key elements of information, technology, and management practices such as field scouting, field mapping, variable rate control, yield mapping, and post harvest processing we can improve the quality of crop production. In Romania much of this technology is still in its infancy. More research will be necessary to develop this technology. These techniques include using GIS database structures, handheld data capture devices, remote sensing equipment, database management at different levels in the supply chain.

Other method, for fruit production and quality improvement, is to reduce the pesticide use. One of the way is the breeding and growing of resistant at diseases apple cultivars. Equipment designed for accurate control and delivery of crop chemicals makes modern variable-rate applications possible. In addition, the global positioning system (GPS), geographical information systems (GIS), and computers are key building blocks in this foundation.

3. DISCUSSION

Sustainability and competitiveness have become key words to horticultural crop producers. Growers need to be efficient in production to stay competitive. They need to conserve and protect soil and water to be sustainable.

The increase of the population, the continuous rise of the life standards, the necessity to develop the food industry and the need to intensity the export of same fruit-growing products in great demand on the external market, put in front of Romanian research the necessity for creating varieties and hybrids with a much greater efficiency: richer in vitamins, parotids and lipids, with taste and technology qualities better than those of the existent varieties.

For this reason, apple varieties with genetic resistance at diseases have been created on witch the number of the chemical treatments decreased with 50%.

In the world, there are 26 of such varieties and Romania, with its 6 homologated varieties, occupies one of the top-ranking positions in the international research, order to achieve this objectives.

At the same time with the introduction in cultivation of the resisting varieties, it is imperative to study the causes which can lead to reduction or even to the growth of the resistance at diseases of the apple trees, respectively the resistance at *Venturia inaequalis* and *Podossphaera leucotricha*. As a rule, nutritional disorders that inhibit growth and yield only slightly are not characterized by specific visible symptoms. Symptoms become clearly visible when a deficiency is acute, a growth rate and yield are distinctly depressed.

Diagnosis may be complicated in field growth plants when more than mineral nutrient is deficient or when there is deficiency of one mineral nutrient and simultaneously toxicity of another.

In order to make more precise visual diagnosis, it is helpful to acquire additional information, including Ph soil, results of soil testing for mineral nutrients, weather condition and the application of fertilizers. In some instances the type and amount of fertilizer to be used can be recommended on the basis of visual diagnosis immediate. In other instances, visual diagnosis in an inadequate basis it is important for making fertilizer recommendation. It offers the possibility to focusing further attention on chemical and biochemical analysis of leaves and other plants part of selected nutrients.

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**THE IMPACT OF THE AGROTECHNOLOGIES ON THE RIVERS BASINS. CASE
STUDY – THE IMPACT OF THE LIVESTOCK BREEDING
ON THE IALOMITA RIVER BASIN**

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Abstract

The experiments and the analysis studies of the territory, as well as the environment projects based on the ecological equilibrium observance have highlighted the concept of environmental sensibility, lately.

The method of the ecological sensibility analysis of a territory used in the present research assumed the geo-hierarchical overlapping of the territorial plans, thus getting the evaluation resultant map of the environmental components vulnerability on different pollution levels, function on the type, intensity and nature of charge. For exemplification, the potential impact in the Ialomita river basin under the dangerous action determined by the livestock breeding on the studied territory has been analyzed.

The resultant thematic map with regard to the vulnerability of the territory to the livestock breeding activity allows the choosing of the optimum designing site of such an investing objective, to which the ecological risk to be minimum.

Keywords: environmental sensibility, vulnerability, thematic map.

Rezumat

Experiențele și studiile de analiză a teritoriului, precum și proiectele de mediu ce se bazează pe respectarea echilibrelor ecologice, scot în evidență în ultima perioadă de timp conceptul de sensibilitate ambientală. Metoda analizei sensibilității ecologice a unui teritoriu folosită în cercetarea de față a presupus suprapunerea geoierarhică a planurilor teritoriale obținându-se harta rezultantă de evaluare a vulnerabilității componentelor de mediu pe diferite niveluri de poluare în funcție de tipul, intensitatea și natura încărcării. Pentru exemplificare s-a analizat impactul potențial în bazinul hidrografic al râului Ialomița la acțiunea periculoasă dată de societățile zootehnice existente pe teritoriul luat în studiu. Harta tematică rezultantă cu privire la vulnerabilitatea teritoriului față de activitatea zootehnică, permite alegerea amplasamentului optim de execuție a unui astfel de obiectiv de investiție la care riscul ecologic să fie minim.

1. INTRODUCTION

The experiments and the analysis studies of the territory, as well as the environment projects based on the ecological equilibrium observance have highlighted the concept of environmental sensibility, lately.

The method of the ecological sensibility analysis of a territory used in the present research assumed the geo-hierarchical overlapping of the territorial plans, thus getting the evaluation resultant map of the environmental components vulnerability on different pollution levels, function on the type, intensity and nature of charge. For exemplification, the potential impact in the Ialomita river basin under the dangerous action determined by the livestock breeding on the studied territory has been analyzed.

The resultant thematic map with regard to the vulnerability of the territory to the livestock breeding activity allows the choosing of the optimum designing site of such an investing objective, to which the ecological risk to be minimum.

2. MATERIAL AND METHOD

The working methodology comprised three important aspects:

1. choosing the agricultural terrain with different grades of sensibility;
2. impact evaluation;
3. compatibility analysis.

The method of the ecological sensibility analysis of a territory uses geo-hierarchical overlapping of the territorial plans, thus getting the evaluation map of the environmental components vulnerability on different pollution levels, function on the type, intensity and nature of charge. For exemplification, the potential impact under the dangerous action determined by the livestock breeding has been analyzed.

The territories individualization with a certain sensibility to a given action has been done by following three procedural phases:

- the analysis of the reference territory knowledge;
- the individualization of the environment systems and the connections between them;
- the territories classification as the study object.

The choosing criterion of the reference territory was fundamented on the critical confronting principle of a standard area with different characters, function on the physico- biotic aspects or/and urban or productive existing or potential arranging on that territory.

Next, there was created a database well-informed with regard to the physico-biotic data of the studied territory and, then completed with data referring to the productive arranging existent in the area.

In order to create the database, the information were collected from different sources, such as the regional thematic cartography, statistic data, monographies, direct dialog with the population of the area, with the landowners, and the owner of the productive companies who, in time have taken actions on the respective area.

For this purpose, thematic maps have been elaborated for each situation:

- topographic, soil usage, pedological, geolitical, surface waters, depth waters, protected areas, urban arranging, productive arranging.

The working scale was 1:25 000 and a general evaluation of the *antropic action extend* of the reference area was done. It was also done a population census function on the age, natural resources of the area, productive firms in the area, the economical firms classification in three categories – industrial, extractive and agricultural, the classification function on the size, productive capacity etc.

Particularly, a special attention was paid to the antropic activity selected or to the selected domain and it resulted that the ecosystem was affected by the polluting action of the livestock breeding. Such a transfer and harmonization procedure of the territorial data allowed the achievement of some thematic maps for each considered ambient component affected by the considered antropic action.

3. RESULTS AND DISCUSSIONS

The last lecture phase of the territorial reality is represented by the individualization of the reference ambiental systems and their components, function on their tolerance to the antropic activity.

The individualization of the antropic activities (livestock breeding) that can alter the environment was done on different answer levels of the territory to the antropic action (livestock breeding action).

For example, from agronomical point of view, damages caused to the agricultural territories in relation to the cations contribution (K, Na, P, N,

etc.) that can modify the ph were determined. There are also some other situations when pollution can be directly produced by discharging the animals residua into the emitent, the microorganisms, the nitrates and polluted depth waters in case of the permeable soils.

In case of high slopes territories, where livestock breeding farm are present, beside the environmental impact previously presented, there are also present soil erosion degradation phenomenon.

In other terms, there was established a convenient scales of values or of quality which is called ecological sensibility scales of the territory (low, medium, high) on which bases, each environment component was evaluated for each modification in particular. For each action (project), for the same thematic, the ecological sensibility scales of the territory were determined (Table no. 1).

Table 1. The conventional scales of the qualitative evaluation of the resources relative to the physico-biotic and built systems

Sistemul fizico biotic

High sensibility area	Park-dedicated areas of instability, waters, permeable terrains, forests
Medium sensibility area	Areas with medium risk of instability – high, medium-permeability soils – high, trees or vinegard terraces
Low sensibility area	Stable areas with medium stability – low, soils with medium permeability – variable, terrains with pastures and hay-fields

Built system

High sensibility area	Street areas Touristy interest areas, industrial areas and urban centers
Medium sensibility area	Areas with livestock breeding companies and the respective loading given by dejections; in this areas the minimum distances required for new livestock breeding locations must be taken into account.
Low sensibility area	Empty areas

In operational terms, the synthesis maps got through the territory sensibility analysis evaluate critically the thematics of the reference unit by the geo-hierarchical overlapping of the thematic maps based on the McHarg method. The thematic maps got represent the description on bidimensional support of all considered ambient components, as well as the qualitative classification, function on the sensibility to a given action, the representation scale being 1: 25 000 (Fig.1, Fig.2).

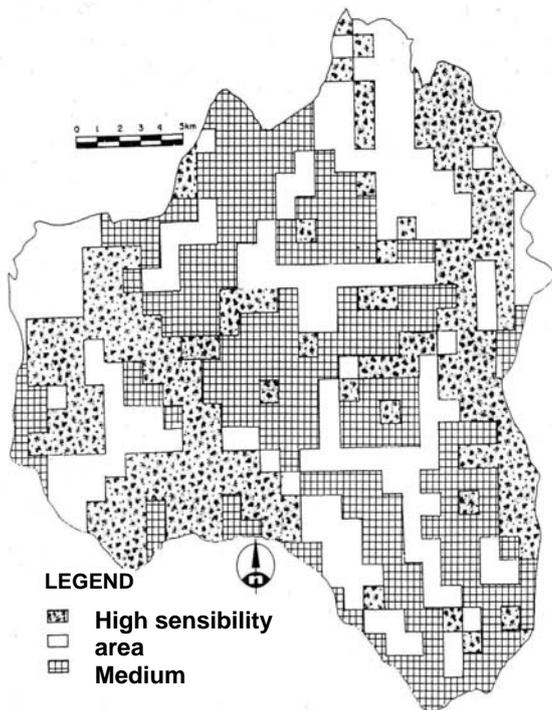


Figura 1 –
Synthesis map of the built system

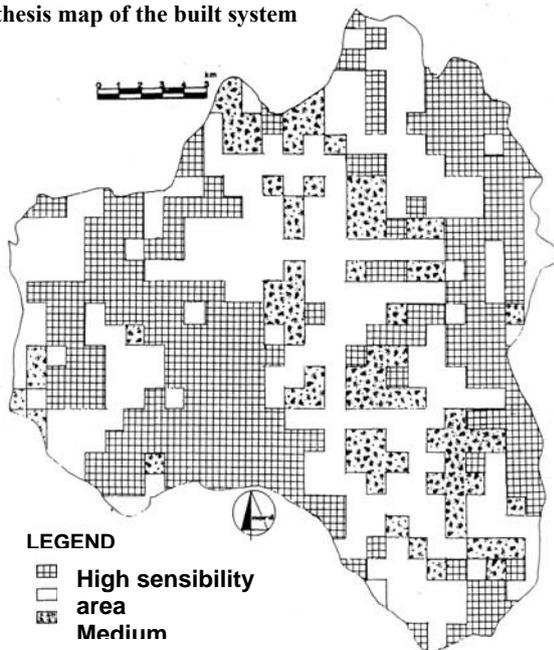


Figura 2 –The final synthesis map of the physico-biomatic factors and of the built system

4. CONCLUSIONS

The study finality was that of indicating and validating a methodological proposition for the potential and actual sensibility analysis of the territory and, of preevaluating the specific interventions of reducing the impact on the territory given by the agro-technology, so that, the development of the productive activity of the agro-zootechnical companies should not be limited.

The environmental components analysis relative to the reference territory were individualized and described as main characteristics of the antropical and physical environment. The geo-hierarchical overlapping allowed to obtain some resultant maps able to represent a juridical criteria with regard to the susceptibility degree of the territory, with regard to some livestock breeding companies locating.

The synthesis map represent a complex of criteria and recommendations with regard to exigencies used in successive evaluation of compatibility between the types of livestock breeding companies and the territorial typology.

Locating a livestock breeding company within a territory can be done only if the territorial transformations do not exceed some limits from the point of view of the natural resources that can be affected.

As a result of the research done and referred to the reference territory, it resulted that its sensibility to the antropic action (livestock breeding) presented the following percentage:

- high sensibility = 45.20 % ;
- medium sensibility = 38,00 % ;
- low sensibility= 16,80 % ,

Meaning that, the areas which can receive a loading given by the intensive-type livestock breeding are very little. Under the present conditions, there was obtained a classification of the territory sensibility for each of its examined components, by using the geo-hierarchical overlapping of the thematic plans in their complexity.

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**THE RISK MITIGATION AND CONTROL COMPONENT OF HYDROLOGICAL
RISK MANAGEMENT. THE MAJOR CONCEPTS.**

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Abstract

The concepts of risk, hazard and vulnerability are defined and discussed as background to focusing on the scope of hydrological risk management. Approaches to hydrological risk management are reviewed, first of risk assessment with its two major components of ‘objective’ hazard determination (which includes hazard identification, approaches to statistical hazard determination and the question of uncertainties related to meteorological and catchment conditions as well as to data attributes) and ‘subjective’ risk evaluation (which includes the perception of risk and the concept of acceptable risk). Thereafter risk mitigation and control are discussed. These are made up of hazard modification by manipulation of primary and secondary processes and vulnerability modification, for example, by forecasting and warning systems.

Keywords: risk, management, prediction

Rezumat

Conceptele de risc, hazard și vulnerabilitate sunt definite pentru a putea avea o baza de plecare atunci când vorbim despre gestionarea riscului hidrologic. Gestionarea riscului hidrologic este revizuită, prin evaluarea, în prima fază, a riscurilor cu cele două mari componente, una obiectivă iar cealaltă subiectivă, și avem aici, determinarea obiectivă a riscului (care include identificarea riscurilor, pentru abordările statistice ce ne ajută să preconizăm pericolul și întrebarea legată de incertitudinile date de condițiile meteorologice și de captare a excesului) și subiectivă de evaluare a riscului (care include percepția de risc și conceptul de risc acceptabil). Iar în cea de-a doua fază se pune problema reducerii riscurilor și de control a acestora prin manipularea corectă a proceselor de vulnerabilitate, de exemplu, sistemele de prognoză și avertizare.

1. INTRODUCTION

What are common perceptions of risk?

The term *risk* implies to them, typical answers include that it encompasses the concepts of

- predictability (that a hydrological event will occur)
- probability (how often it will occur within a given time frame) and
- forecastability (when a hydrological event will occur); it is also about
- hazards (of extreme rains, floods or droughts) and
- vulnerability (which sectors or areas suffer more than others) and includes
 - exceeding critical thresholds
 - variability from year to year
 - sensitivity (of a hydrological response to a given trigger) and
 - magnitude (how severe the hazard will be); furthermore, it embraces
 - concern for a changing future, and how hydrological responses may change with future climates or land uses, as well as
 - assessment (of damage, from both objective and subjective perspectives)
 - avoidance (by structural and non-structural means) and
 - adaptability; as well as being about

- preparedness for a hazard; with all these attributes surrounded by a great deal of

- uncertainty, not only on *how* uncertain a risk determination is statistically, but also *why* we are unsure of the answers from our calculations.

Equally important are assertions that hydrological risk can be exacerbated by human actions, both through intensification of land use as well as extensification and land degradation, and that risk extends to aspects of both water quantity and water quality.

2. MATERIAL AND METHOD

HYDROLOGICAL RISK MANAGEMENT. THE BASIC CONCEPTS

To the person in the street, risk management is the process that attempts to reduce risk both in the short and long term by enabling choices to be made on the best course of action under a given range of situations. More scientifically in Integrated Water Resources Management, but still in generic terms *Risk management provides a formalised framework within which decision makers (and stakeholders . . . author’s addition) can compare the harm caused by risks with the benefits associated with the risk, in order to choose appropriate risk reduction measures*(Fairman *et al.*, 1998).

In regard to a generic policy of risk management Gilard (2002) has identified three interrelated components, viz.

- *risk prediction and forecasting*, which would include the scientific basis of risk identification and estimation

- *risk prevention*, which would include control actions and alternatives through structural means (e.g. building levees) and non-structural ones (e.g. changing land use practices), with these two ‘legs’ of policy largely influenced by the

- *risk culture*, which will vary between different societies and their levels of economic development, as well as with the individual within a society, in what is acceptable or not in terms of risk (Figure 1).

From Plate’s (2002) more engineering oriented hydrological perspective

Risk management is a methodology for giving rational consideration to all the factors affecting the safety or operation of large hydraulic structures (e.g. dams) or systems of structures (e.g. a city’s stormwater system or a region’s multi-reservoir watersupply/demand system).



Figure 1 Components of a risk management policy (adapted from Gilard, 2002)

Risk mitigation

Risk mitigation and control constitute the second major component of risk management (Figure 6.4). Natural hazards cannot be avoided, neither can risk be totally eliminated, but society and individuals must learn to cope with the hazards and reduce their vulnerability to them. By definition (own, adapted from several sources)

Risk mitigation considers setting up alternative measures to reduce the impacts of a hazard by minimizing its destructive and disruptive effects, thereby lessening the scale of the disaster. It

attempts to find practical and workable strategies and solutions for minimising risk at scales ranging from international to national to local.

In evaluating alternatives, optimisation approaches may be implemented in developed countries. They may not be a workable solution in developing countries, where the alternatives nevertheless have to satisfy criteria of safety vs cost and one has to ask ‘how much can be prevented for how little’. An important component of risk mitigation is the process by which decisions are made in risk/disaster management, and this process will be based not only on technical criteria, but also on intuition and political priorities (Plate, 2002).

Two main mitigation strategies can be followed (Smith, 1996), viz.

- *hazard modification*, i.e. modifying the physical processes that create or constitute the hazard, involving some degree of direct confrontation; and

- *vulnerability modification*, i.e. reducing the impact of the event by rendering the human environment less vulnerable to, and more prepared for, the event.

Hazard modification

Hazard modification is a form of pre-disaster planning which may be viewed from two perspectives.

- ***By manipulating primary processes***

Physical event modification aims at reducing the damage potential associated with a particular hazard by some degree of physical control over the primary processes of the event involved. Theoretically, through forms of environmental control, the causes of a hazard could be suppressed (Smith, 1996) by diffusing the releases of energy or materials over a greater area and/or period of time (e.g. the stimulation of cumulus clouds to reduce rainfall intensity and increase rainfall duration). However, with the current state of technology the suppression of natural events such as those causing large scale flood events is not yet possible or, alternatively, produces uncertain results. The use of such a strategy is, therefore, still very limited.

- ***By manipulating secondary processes***

Event modification can also be achieved via a strategy of manipulating the secondary processes that cause a hazard, rather than attempting to attack the root cause. In the case of floods, for example, instead of trying to manipulate the rainfall event, the runoff generation processes could be

manipulated using land phase management, building conservation structures such as contour banks and terraces, or by ensuring that river channels are cleared or canalised for more efficient dispersal of flood waters. Hazard resistance is another form of event modification which involves the construction of defensive engineering structures such as flood control dams (which are purposely kept empty before the flood) or levees. Other methods include the setting of building codes and retrofitting older structures (Plate, 2002).

Vulnerability modification

Vulnerability modification is a more intricate process that involves the interaction of several different interrelated factors that need to act in tandem in order to reduce the impact of a hazard event. Vulnerability modification is concerned with human reactions toward a potential hazard and involves, inter alia, the changing of human attitudes and behaviour. Hazard loss reduction may be achieved through the implementation of several different measures which include:

- community preparedness programmes,
- forecasting and warning systems and
- legal and financial measures...which

ideally should be linked into one interrelated programme.

• Preparedness

Preparedness is defined as those pre-arranged emergency measures which are to be taken to minimise the loss of life and property damage following the onset of a hazard. Preparedness programmes involve the detailed planning and testing of prompt and efficient responses by both individuals and groups to hazards that have either been forecasted or have occurred. Preparedness programmes focus on public education and awareness, evacuation plans, the provision of medical and food aid as well as shelter for evacuees. Long term preparedness programmes have been implemented successfully in many developed countries. Authoritarian political and under-resourced financial frameworks in many of the less developed countries have limited the development of good preparedness programmes there (Smith, 1996).

• Forecasting and warning systems

Forecasting and warning systems have become increasingly important in recent decades. This can be attributed to the scientific advances in information and communications technology, such as satellites, which have improved forecast

accuracy and increased the efficiency of warning systems. However, in some cases warnings are based on predictions only, as the processes or hazards are not yet sufficiently understood to provide forecasts.

The fundamental differences between forecasts and predictions are vital to remember.

• **Predictions** are based on statistical theory, which uses the historical records to estimate the probability of occurrence of events. Predictions are, therefore, based on average probabilities (e.g. a 1:10 year rainfall event does not imply an occurrence of once in 10 years, but rather of 10 times in 100 years) and give no indication of when (i.e. in which season or year) a particular event may occur (a 1:10 year event may recur in successive years).

• **Forecasts**, on the other hand, tend to focus on individual events where the physical processes or statistical interlinkages are relatively well understood (Smith, 1996) to the extent that, depending on the nature of the event being forecast, it is possible to provide information about its timing, location and magnitude. Forecasts are thus able to reduce sources of uncertainty and hence diminish risk.

In hydrology and water resources, forecasting is used to modify the a priori probability distribution of future time series of hydrological information (e.g. of rainfall, runoff or level of dams) and demands (e.g. irrigation, urban/domestic) based on the concept of the ‘now’ state (e.g. present flow in a stream or level of a dam or current water demands) and projected future states (e.g. a season ahead). Forecasting is undertaken to enhance the operational reliability of a water resources system in regard to (say) environmental flow releases, irrigation demands, inflows to dams or groundwater recharge. Figure 2 illustrates the potential benefits of reducing uncertainty in a reservoir operation through forecasting.

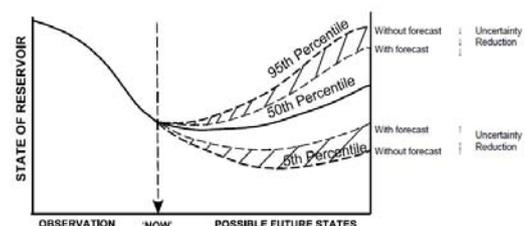


Figure 2 Schematic illustration of the reduction of uncertainty in a reservoir operation through application of forecasting techniques

Key questions on forecasting as a vulnerability modifying tool revolve around

- the *skill of the forecast* (i.e. is the decision made with the aid of a forecast better than simply assuming median or persistence trends?)
- the *accuracy* of the forecast (i.e. how well it compares with what was observed, in hindsight)
- the *lead time* of the forecast (i.e. how far ahead can the forecast be made)
- the *deterioration* of its reliability as time progresses (e.g. Lumsden et al., 1999)
- the *benefits* of the forecasts with current forecast skill and accuracy (e.g. Hallowes, Schulze and Lynch, 1999) and comparing current forecast skills with results from *perfect forecast accuracy* (Lumsden et al., 1999).

• ***Legal and financial measures***

Legal and financial measures are designed to either avoid the settlement of individuals or communities into areas of high risk, or to provide aid that is able to accelerate the recovery of affected communities. Legal measures involve land use planning that is designed to prevent the participation in certain activities in high risk areas, i.e. they are a form of non-structural control (Smith, 1996).

3. CONCLUSIONS

The framework was set by examining approaches to hydrological risk management, first of risk assessment with its two components of ‘objective’ hazard determination (including the many questions surrounding uncertainties) and subjective risk evaluation (including the roles of perception and acceptable risk) and thereafter of risk mitigation and control, which is made up of hazard modification (e.g. manipulating runoff) and vulnerability modification (e.g. preparedness and forecasting).

General hydrological hazard indicators are resented first, followed by statistical hazard indicators of ‘deprivation’ and ‘assault’ events in regard to droughts and floods. The question of using short data sets and of hazard modification through land use practices also receive attention. The final examples illustrate an application of vulnerability modification through seasonal forecasts of runoff and show potential hydrological impacts of climate change as a future hazard with associated risk. The paper illustrates, throughout, the amplification of the hydrological system of any climatic hazard.

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**DIRECTIONS REGARDING CONVERSION OF CONVENTIONAL AGRICULTURE
IN ECOLOGICAL AGRICULTURE**

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Abstract

Organic systems aim to re-create natural systems. Natural systems support several competing species, so that no single species has a consistent advantage. This is contrary to the main objective of modern agricultural systems where the enterprise, to be viable, must maintain a permanent advantage. Requirement to restrict the excess of chemical's agricultures practice has imposed promotion of some strategies which through accepted principles to established alternatives to ecological agriculture. Any farm, either agronomic or animal breeding for reach to be named ecologic must cross a period, longer or shorter, of conversion. Ideas on ecological agriculture differ and various concepts exist (e.g., ecological or organic agriculture, biodynamic agriculture). Its simplest definition is understood as an agricultural system that is based on ecological principles and applying ecological practices to maintain soil fertility, to manage crop and animal health, and to keep soil and water in a good condition.

Keywords: organic agriculture, synthetic chemicals, ecological agriculture.

Rezumat

Scopul sistemelor organice este de a readuce sistemele naturale. Sistemele naturale contin cateva specii competitive, astfel ca toate prezinta avantaje. Orice ferma, fie agricola sau animala, pentru a ajunge sa fie numita ecologica trebuie sa parcurga a perioada mai lunga sau mai scurta de timp, perioada de conversie.

1. INTRODUCTION

Consumers and producers of organic products understand ‘organic agriculture’ to be the production of food and fiber without the use of synthetic chemicals.

However, there is more to organic farming than just doing away with artificial inputs.

Organic farming aims to minimize inputs to create an agricultural system that is as near as possible to a self-perpetuating or closed system of production.

However, some nutrients are removed when the crop is harvested, so some inputs in the form of composts and green manure crops are added to replace these nutrients. Other natural substances may also be added to stimulate biological activity in the soil.

Organic farmers rely on natural methods of pest and disease control and crop nutrition. A high level of understanding is needed of the life cycles and interactions of crops, livestock, weeds, pests and diseases.

Problems that may arise need to be pre-empted (rather than reacted to).

This requires a high level of management, achieved through a variety of techniques:

- creating environments that encourage beneficial species to keep pest populations in check;
- selecting crop varieties that discourage or are resistant to pests and diseases;
- using management tools such as crop rotations and companion planting to inhibit or repel pests and diseases.

‘Certification’ means having your farm and farming methods inspected to confirm that they meet the certifier’s standards for organic farming.

It is essential to develop an understanding of the certification process and the requirements of certifying organisations, well before your first case or tray of fruit is marketed.

Organic systems aim to re-create natural systems. Natural systems support several competing species, so that no single species has a consistent advantage.

This is contrary to the main objective of modern agricultural systems where the enterprise, to be viable, must maintain a permanent advantage.

Several management tools are available to help organic farmers to achieve this: Pest and diseases management, Weed management, Soil management and crop nutrition.

2. MATERIAL AND METHOD

Extension educators have been promoting various Integrated Crop Production (ICP) techniques. Many producers, farm managers, professional agronomists and crop consultants have used ICP practices selectively, but few are implementing the total ICP package.

The principle for setting up ecological agriculture is to match ecological technology measures (the combination of ecological and engineering measures) to local conditions.

It involves using systematic management methods, grass and tree planting technology, improvement of medium and low farmland and overall use of rural energy resources in order to tackle and improve the ecological environment.

Principles of ecological agriculture applicable to conventional farms that are to be converted into ecological farms as well as to already ecological working farms.

Methods of observing production factors and their interactions in order to establish planting plans, fertilizing plans and to make decisions about density, species and varieties of plants and animals. Alternative methods to increase permanently soil fertility, animal health and plant vigor. Emphasis is laid on practical fieldwork.

3. RESULTS AND DISCUSSIONS

Ideas on ecological agriculture differ and various concepts exist (e.g., ecological or organic agriculture, biodynamic agriculture). Its simplest definition is understood as an agricultural system that is based on ecological principles and applying ecological practices to maintain soil fertility, to manage crop and animal health, and to keep soil and water in a good condition.

Others may give the simple explanation of it being agriculture without the use of chemical inputs (e.g., synthetic fertilizers, pesticides and herbicides, or hormones). Yet others see it as much more than that and, for instance, understand it as a vision on healthy products and as a way of life.

Ecological agriculture is a reaction and an alternative to some of the strategies which have been used by government and donors during the

last 50 years, and which have had a damaging effect on rural society and agricultural ecosystems.

These damaging strategies include farming technologies which degrade the natural resource base and require high levels of external inputs (including toxic chemicals), and agricultural research and extension services which are based on the notion that technology should be developed by specialists and transferred to recipient farmers through messages and demonstrations.

Requirement to restrict the excess of chemical's agricultures practice has imposed promotion of some strategies which through accepted principles to established alternatives to ecological agriculture.

4. CONCLUSIONS

Ecological agriculture is an ansamble of concepts, laws, principles, methodes, procceding and operations of soil till, raising domestic animals and of processing and commercing agriculture and feed products in agreement with laws and qualities of natural sistems, but excluding used the sinthetic chemicals products.

The ecological products has in origin raw materilas crops whose been obtained as part of ecological agriculture system, that hasn't used fertilizer, sinthetic pesticides, OMG (genetic modify organisms) and which are not processing with sinthetic aditivies.

At the present moment in Romania existed 4 million of household peasants. Could be passing in a ecological agriculture respective ecological animal husbandry through an transformation of one part from this farms and individual householdes of under being which yield, almost exclusive, just for themselves.

Some part of traditional agriculture could become ecological if it accomplish the established standards through laws.

Any farm, either agronomic or animal breeding for reach to be named ecologic must cross a period, longer or shorter, of conversion.

Animal breeding farm to became a ecological farm it is submit to testing, certifies totally – the fodder buse, the animals cover, spaces and production equipments but also the obtained products from animals.

From point of view the equilibrate integration of animal section we are interested to know the guide size of this section – useful area / animal in cover (useful load / hectare), nutrition with fodder and preparing the fodder's mixture but also the allowed sanitar – veterinary rules.

In ecological farms the animals must had space for move and rest, the cover had natural illumination and ventilation, to assure the easy access at water and fodders.

An outstanding importance is bestow alimentation with fodder and make rations for obtained very good results.

Are eliminated from rations that fodders obtained by fertilized grazing field with synthetic chemicals or arise from poluated areas.

Likewise are not administer secondary products results from oil fabrics – grind by chemical extract like soia, sun – flower or results from meat industry – flour by by animal origine.

Are not using in animals nutrition any production stimulation or synthetic antibiotics, hotmons and products for increase body weight, synthetic dye stuff, synthetic antioxidants.

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**THE EFFICACY OF SOME INSECTICIDE PRODUCTS IN THE CONTROL OF
APHELIA VIBURNIANA FABR. (TORTRICIDAE, LEPIDOPTERA) PEST AND THEIR
SELECTIVITY AGAINST THE USEFUL FAUNA IN DÂMBOVIȚA COUNTY -
ROMANIA**

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Abstract

Strawberry is one of the fruits with special economical and alimentary interest in Romania. Therefore, a suitable application of pest control methods is necessary to get rich and good quality crop productions. Observations were made between 2003-2006 in a cultivar of the Phytosanitary Unit of Dambovita county - Romania, where important populations of Aphelia viburniana Fabr. pest were found. The objectives were: to determine some insecticides efficacy in the control of Aphelia viburniana Fabr. in different stages of development, to identify the main parasites of the pest and to appreciate the selectivity of some insecticides against the useful fauna. From 9 tested products, very good results, with over 90% efficacy, had those based on Bacillus thuringiensis var. Kurstaki (Biobit XL - 0,1% and Dipel WP - 0,1%), diflubenzuron 25% (Dimilin 25 WP - 0,04%) and phosalone 25% (Zolone 25 WP - 0,25%). As regards the main limiters of the Aphelia viburniana Fabr. populations, the following were identified: Itopectis maculator F. (Ichneumonidae-Hymenoptera), Glypta genalis Möll. (Ichneumonidae-Hymenoptera) and Tachina larvarum L. (Tachinidae-Diptera). The highest degree of parasitation had Glypta genalis Möll. (26%). The selectivity of the insecticides against the useful fauna, according to our data, was high for the product with active ingredient - diflubenzuron 25% (Dimilin 25 WP - 0,04%), the average degree of parasitation being of 19%. The product with active ingredient - phosalone 25%, although being very efficacious, is not recommended to be used because of its reduced selectivity against the useful fauna.

Keywords: Aphelia viburniana Fabr., efficacy, insecticide, parasites, selectivity.

Rezumat

Capsunii reprezinta unele dintre fructele cu interes economic si alimentar din Romania. Obiectivul lucrari consta in determinarea eficacitatii unor insecticide in controlul Aphelia viburniana Fabr. in diferite stadii de dezvoltare, pentru a identifica principalii paraziti si a aprecia selectivitatea unor pesticide impotriva faunei usuale.

1. INTRODUCTION

Strawberry is one of the fruits with special economical and alimentary interest because of its alimental and organoleptic qualities, its ecological adaptability and processing possibilities - on a side, and because it covers the existent lack of fresh fruits on the market in May - June, in the temperate climate area - on the other side.

A. viburniana Fabr. (common name - the bilberry tortrix) is a pest which produce important damages to the strawberry crops in Romania, both on fruit production and quality.

The consequences of the attack on strawberry plants are: diminution of leaves surface with consequence on assimilation capacity, diminished number of flowers, improper development of the radicular system, 30- 50% losses in stolons production and reduction of their vigour (Bob, 1980). For these reasons, it is necessary a good knowledge and a suitable application of control methods, towards to get high, healthy and good quality productions.

2. MATERIAL AND METHODS

Research studies were undertaken between 2003 - 2006, in a strawberry plantation from the experimental field of the Phytosanitary Unit of Dâmbovița county, in Romania, where significant populations of *A. viburniana* Fabr. were found.

The plants were set in 2002, the varieties being Ro Real - late season variety, resistant to frost but sensible on *Mycosphaerella fragariae* and Premial - early season variety, resistant to frost, white frost and diseases (Teodorescu Georgeta et al., 2003).

The cultivated area is of about 2 ha. The distance between rows is 25 cm and between plants on a row, 30 cm.

9 products from different chemical groups were tested in control experiments: organophosphoric and carbamic insecticides, synthesis pyrethroids, inhibitors of arthropods metamorphosis, biological products.

The attack rate was calculated using the following formula:

$$F\% = \frac{n}{N} \times 100$$

where:

F = attack rate;

n = number of attacked plants or organs;

N = total number of analysed plants or organs.

Treatments application was done on warning. It was used the following formula to establish the efficacy of tested products:

$$E\% = [1 - a_2 / (N - M_2)] \times 100$$

where:

E = product efficacy;

a₂ = number of attacked leaves for the untreated control;

N = total number of analysed leaves;

M₂ = number of unattacked leaves for the untreated control.

The control efficacy was estimated by establishing the attacked organs percent, first at the end of each generation and then at the end of vegetation period. 100 attacked leaves were sampled and analysed in order to establish the natural parasitation.

The samples were isolated in separate test tubes and kept into laboratory until their flight to identify the parasites.

The 9 products were tested and compared with the untreated control to observe the selectivity of some insecticides on the useful fauna.

3. RESULTS AND DISCUSSIONS

In table 1, results about the efficacy of insecticides used, between 2004 - 2006, to control the bilberry tortrix *A. viburniana* Fabr. are presented.

As one can see, the best efficacy, of over 90%, during the 3 years of observations had:

- the biological insecticides based on *B. thuringiensis* var. *Kurstaki* (0,1%) - the "BIOBIT XL" product, with an efficacy between 93,04 and 96,00%, the "DIPEL WP" product, with an efficacy between 91,74 and 96,34%;

- the insecticide with diflubenzuron 25% as active ingredient - the "DIMILIN 25 WP" product, wicH applied on a concentration of 0,04%, had an efficacy between 90,12 and 96,00%;

- the insecticide with phosalone 25% as active ingredient - the "ZOLONE 25 WP" product, wicH applied on a concentration of 0,25%, had an efficacy between 92,00 and 98,73%.

The lowest efficacy, of 65,71% in 2004, 68,75% in 2005 and 80,16% in 2006, had the insecticide with cipermetrine 100g/l as active ingredient.

In table 2, results about the parasites identified on the larvae and pupa of *A. viburniana* Fabr. are presented. During the 4 years of observations, as one can see from the data, 26% of larvae were parasited by *G. genalis* Möll. - *Ichneumonidae*, *Hymenoptera* (rate of parasitation between 19% in 2006 and 37% in 2004), 5,5% of larvae by *Tachina larvarum* L. (*Tachinidae-Diptera*) and 4,4% of pupa by *Itopectis maculator* F. (*Ichneumonidae-Hymenoptera*).

The rate of parasitation varied according to the annual climatic conditions. Thus, the average parasitation rate was of 44% in 2004 and just of 28% in 2006, the difference being of 16%.

For a successful chemical control of the bilberry tortrix, without affecting the natural enemies, there were tested 9 insecticide products and the results were compared with those from the untreated control. Thus, from table 3, it results that the highest selectivity towards the entomophagous insects had the "BIOBIT XL" product, based on *B. thuringiensis* var. *Kurstaki*, with an average parasitation rate of 34,35%, with 2,1% less than on the untreated control. It was also distinguished the "DIPEL WP" product, based also on *B. thuringiensis* var. *Kurstaki*, with an average parasitation rate of 28,57%.

The inhibitors of arthropods metamorphosis presented also a quite good protection of useful fauna, as one can see for the "DIMILIN 25 WP" product, based on diflubenzuron 25 %. Thus, the average parasitation rate for this insecticide was of 19% (between 16,8% and 21,3%).

Among the other groups of insecticides, the "INSEGAR 25 WP" product (with fenoxycarb 25%

as active ingredient) had a quite good selectivity, the average parasitation rate being of 14,72%. All others insecticides had an average parasitation rate under 6%.

4. CONCLUSIONS

A. viburniana Fabr. is a pest which produce important damages to the strawberry crops in Romania, both on the fruit production and quality.

Biological products, based on *B. thuringiensis* var. *Kurstaki*, the inhibitors of arthropods metamorphosis based on diflubenzuron and organophosphoric products based on phosalone, had very good results in bilberry tortrix control, with an efficacy of over 90%.

The following products and concentrations were used: BIOBIT XL - 0,1%, DIPEL WP - 0,1%, DIMILIN 25 WP - 0,04% and ZOLONE 25 WP - 0,25%.

The rate of parasitation for the main limiters of *A. viburniana* Fabr. pest, the larvae and pupa

parasitoids, varied in different years between 2 and 37%. The highest rate of parasitation was recorded on *G. genalis* Möll.

Together with the biological products BIOBIT XL and DIPEL WP, the products DIMILIN 25 WP și INSEGAR 25 WP had a high average parasitation selectivity of 19% and 14,72%.

The ZOLONE 25 WP product, although being very efficacious in *A. viburniana* Fabr. control, was not recommended because it had a low selectivity, of only 3,70%.

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Tables

Table 1. Efficacy of some insecticides in the *Aphelia viburniana* Fabr. control, at the Phytosanitary Unit of Dâmbovița county - Romania

Crt. no.	Active ingredient	Product	Conc. (%)	Year	Number of analysed organs	Number of attacked organs	Number of unattacked organs on the untreated control	Frequency of attack (%)	Efficacy (%)
1.	<i>Bacillus thuringiensis subspecies kurstaki</i>	BIOBIT XL	0,1	2004	100	1	25	1	96,00
				2005	100	2	31	2	93,55
				2006	200	8	115	4	93,04
2.	<i>Bacillus thuringiensis subspecies kurstaki</i>	DIPEL WP	0,1	2004	200	10	121	5	91,74
				2005	450	5	236	1,11	96,34
				2006	450	12	274	2,67	95,62
3.	diflubenzuron 25%	DIMILIN 25 WP	0,04	2004	100	2	25	2	92,00
				2005	100	1	25	1	96,00
				2006	400	4	1	1,5	90,12
4.	phosalone 25%	ZOLONE 25 WP	0,25	2004	200	2	25	1	92,00
				2005	450	3	263	0,66	98,73
				2006	100	2	25	2	92,00
5.	fenoxycarb 25%	INSEGAR 25 WP	0,01	2004	200	5	31	2,5	83,87
				2005	200	8	36	4	77,78
				2006	200	12	41	6	70,73
6.	cipermetrine 100 g/l	FASTAC 10 EC-RV	0,015	2004	200	12	35	6	65,71
				2005	200	15	48	7,5	68,75
				2006	450	14	121	3,11	80,16
7.	triflumuron 25%	ALYSTIN 25 WP	0,05	2004	450	17	164	3,78	89,63
				2005	200	16	115	8	86,09
				2006	400	6	162	15	85,18
8.	deltametrine 25 g/l	DECIS 2,5 EC	0,03	2004	400	8	160	2	80,25
				2005	100	6	25	6	76,92
				2006	200	18	117	10	84,00
9.	esfenvalerate	SUMI-ALPHA 2,5 CE	0,015	2004	100	12	24	12	88,32
				2005	100	10	32	10	79,21
				2006	100	7	31	7	78,02

Table 2. The identified parasites on larvae and pupa of *Aphelia viburniana* Fabr., at the Phytosanitary Unit of Dâmbovița county – Romania

Year	Total parasited larvae (%)				Parasited pupa with <i>Itopectis maculator</i> F. (%)				Parasited larvae with <i>Glypta genalis</i> Möll. (%)				Parasited larvae with <i>Tachina larvarum</i> L. (%)			
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006
Average	33	44	39	28	6	4	2	6	25	37	23	19	2	3	14	3
	36				4,5				26				5,5			

Table 3. Observations with regard to some insecticide selectivity towards the useful fauna

Crt. no.	Comercial name of product	Active ingredient	Degree of parasitation [%] in the year:				Average
			2003	2004	2005	2006	
1.	BIOBIT XL	<i>Bacillus thuringiensis</i>	42,2	27,5	31,6	34,1	34,35
2.	DIPEL WP	<i>Bacillus thuringiensis</i>	30,3	27,1	34,4	22,5	28,57
3.	DIMILIN 25 WP	diflubenzuron 25 %	18,6	21,3	19,3	16,8	19,00
4.	ALYSTIN 25 WP	triflumuron 25 %	4,6	7,2	2,1	2,7	4,15
5.	INSEGAR 25 WP	fenoxycarb 25 %	17,2	6,0	24,3	11,4	14,72
6.	FASTAC 10 EC-RV	cipermetrine 100 g / l	5,6	2,3	11,7	4,1	5,92
7.	ZOLONE 25 WP	phosalone 25 %	2,6	3,1	2,8	6,3	3,70
8.	DECIS 2,5 EC	deltametrine 25 g / l	1,8	2,2	3,6	4,2	3,13
9.	SUMI-ALPHA 2,5 CE	esfenvalerate	2,8	10,6	7,3	4,4	5,65
10.	Untreated control	-	33,9	42,0	41,3	28,6	36,45

**THE ESTABLISHMENT OF THE SELECTION OBJECTIVE
IN A PIG POPULATION**

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Abstract

The goal of this paper is to optimization the selection objective in a paternal pig line. Therefore, we simulated six types of indexes, which differ among them on the number of traits. There were analysed the following traits: (1) body weight at 182 month age (BW), (2) meat percent in empty body (MPB); (3) average daily gain between 0-182 month age and (ADG); (4) average daily gain on empty body (ADGB). MPB trait was included in each objective (index). The six indexes were: (1) MPB+BW; (2) MPB+ADG; (3) MPB+ADGB; (4) MPB+BW+ADG; (5) MPB+BW+ASDGB, and (6) MPB+BW+ADG+ADGB .

The genetic parameters were computed using REML method. The biologic importance of the traits were estimated on linear multiple regression. For establishing of the best combination of the traits witch maximize the expected genetic progress, some parameters were used, that is: the accuracy of selection, overall genetic progress (ΔH) and the genetic progres for each trait (ΔG_i). The best index was the last, which included all traits. Its parameters were: 1,087 (r_{IH}); 2,144 (ΔH) and 3,35% (ΔG for MPB).

Keywords: pig population, selection

Rezumat

Obiectivul lucrării este de a optimiza selecția într-o linie paternă de suine. Parametrii genetici au fost monitorizați utilizând metoda REML. Importanța tratamentului biologic a fost estimat prin regresie liniară multiplă, pentru a stabili cele mai bune combinații ale tratamentelor au fost utilizați următorii parametri : acuritatea selecției, evoluția progresul genetic.

1. INTRODUCTION

The economic efficiency of the pigs breeding depends on the proliferation, output, consumption and the quality of the carcase, all of them being part of the improvement target. The achievement of hybrid pigs needs the crossbreeding of three or four populations, thus the objective of the populations selection is simplified: maternal populations are selected for their proficiency and the rate of growth (daily average gain or the living weight) , and the paternal populations are selected for the growing rythm and the quality of the carcase.

When the selection objective is established, the following principles must be taken into account : (a) The selection objective must be precisely expressed, meaning that the traits referred to have to be as much as possible objectively measured ; (b) The selection objective must be constant, for 3-4 generations, in order to assure the needed time for a new genetical structure of the population to come into being, following the direction the improver wants. The inconstancy of the selection objective can annihilate the previously got success. (c) The selection objective must be simple, meaning that, it has to include only essential traits, economically important. Each quantitative trait is an assembly of

simpler traits, until the traits controlled by a small number of genes, are obtained. For example, the production of meat provided by a womb sow is a very complex character, made of simpler characters : proliferation, the rate of growth and the carcase weight of the descent. At its turn, the proliferation depends on other simpler characters, such as the ovulation rate. The two simple characters do not have phenotypical expression anymore, they become methabological characters, that is why, in the selection objective, the medium characters are taken into account, some of them refer to the production quality (proliferation, growth rate, specific consumption), others to the production quantity (carcase quality).

Each new character included in the selection objective reduces the selection intensity for the other characters, implicitly the genetic progress, with a quantity equal to $\sqrt{n^{r_G-1}}$ of what would be obtained if the selection were done only on it (r_G , represents the genetic correlation between the considered characters).

2. MATERIAL AND METHOD

There were used the results obtained in a test according to the own performances of 3617 specimens from the Synthetic Line-345 Peris, belonging to 105 boars and 1040 sows. The average size of the boar family was 34,44 and that of the sow family 3,45. The traits referring to the rate of growth and the carcass quality were as follows: the living weight, the percentage of meat in carcass, the daily average rate and the average rate in carcass meat.

The selection objective is that of getting a maximum genetic progress per unit of time and expenses. As a result, it has to be optimized, by imagining more possible objectives that can compete against one another, those that can maximize the yearly genetic gain at low cost, being taken into account (though the optimization on economical criteria is not the point of the present paper).

Taken the considered characters into account, six possible objective were studied, elaborated according to the selection indexes techniques (L.N. Hazel, 1943, C.R. Henderson, 1963, Șt. Popescu-Vifor, 1990; Van Vleck, 1993, H.Grosu și col., 1997).

The six selection indexes built included the following characters : (a)meat percentage + living weight ; (b) meat percentage+ daily average rate ; (c) meat percentage + rate in the carcass ; (d) meat percentage + living weight + daily average rate ; (e) meat percentage + living weight + rate in the carcass and (f) meat percentage + living weight + daily average rate + rate in the carcass. Because the meat percentage is an important objective within a terminal line, there was a concern on keeping this character in every built index.

The selection indexes forming, implies the genetical and economical parameters cognition within the investigated population.

The REML method was used in order to estimate the genetic parameters (L.R. Schaeffer, 1999).

The economical importance of the characters has a central role in the improvement decision to make, the including of the characters in the improvement objective depending on it.

The economical value of a character is defined by the relativ effect on a global indicator (profit) given by its genetic growth with a genetic unit, the rest of the characters being constant. As the prices and the costs have a great variability in time and space, there were preoccupations on replacing the economical efficiency with the biological one. Within this context, the global indicator is

represented by the maximization of the daily average rate of the meat in the carcass.

In the present paper, the biological importance of each character was estimated by the multiple regression method, considering the daily average rate of carcass meat as the dependent variable (global indicator) and the characters such as living weight, carcass meat percentage, daily average rate and medium carcass rate, as independent variables. As the considered characters are expressed in different measure units, the partial regressions were standardized in order to obtain comparable results.

3. RESULTS AND DISCUSSION

3.1. The medium performances of the analyzed sample

The medium performances of the four considered characters and their statistical analysis are presented in Table 1.

Table 1. Average performance of the analysed sample

Character		X ±S _x	s	v%	t	t _α b
Living weight (kg)	F	100,65±0,356	14,25	14,159	2,67**	2,57
	M	101,99±0,354	15,91	15,603		
Meat percentage in the carcass (%)	F	54,61±0,099	3,98	7,30	10,22**	3,29
	M	55,99±0,091	4,09	7,31		
Daily average rate in the birth-oblation period (gr.)	F	0,507±0,002	0,071	14,142	1,63 ^{NS}	1,96
	M	0,511±0,001	0,076	14,95		
Daily average rate in the carcass (gr.)	F	0,397±0,001	0,067	16,77	2,18*	1,96
	M	0,402±0,001	0,070	17,565		

From the data presented in Table 1, it results that there are differences statistical assured between the two sexes, for three of the considered characters. The characters variability is in normal limits, too.

3.2 Genetical parameters

3.2.1. The phenotypical variance components. In order to make up the selection indexes, there were determined the phenotypical variance and covariance, genotypical and environmental, the values being presented in Table 2.

Table 2. The observational components of variance and covariance of the analysed traits.

Characters couple	S_F^2/cov_F	S_I^2/cov_I	S_i^2/cov_i
Living weight (A)	231,50	22,57	208,926
Meat percentage (B)	16,831	1,304	15,527
S.m.z. in life (C)	0,0055	0,00031	0,0052
S.m.z. in meat (D)	0,0047	0,00032	0,0044
AxB	-5,405	-3,179	-2,226
AxC	0,998	0,070	0,928
AxD	0,948	0,080	0,868
BxC	-0,0276	-0,008	-0,019
BxD	-0,0259	-0,009	-0,017
CxD	0,0045	0,0027	0,0042

Heritability. Based on the data presented in Table 2, the values of the four characters were computed and are presented in Table 3.

Table 3. Heritability values of the analysed characters

Character	$h^2 \pm S_{h^2}$
Living weight	0,31±0,058
Meat percentage	0,39±0,070
S. m.z. in life	0,23±0,048
S. m. Z. In carcase	0,27±0,053

Out of the data presented in the table, we can notice that all the four studied characters are intermediate heritable, having heritability values of 0,23 for the daily average rate and 0,39 for the living weight.

Phenotypical, genotypical and environmental correlations. The phenotypical variances and covariances, inter- and intrafamilial (Table 2) were the base of the phenotypical, genotypical and environmental coefficient estimation (Table 4).

Table 4. The values of the phenotypical, genotypical and environmental correlation between the analysed characters

Characters couples	$r_F \pm Sr_F$	$r_G \pm Sr_G$	r_M
Living weight	-	-	0,08
x meat percentage	-	-	9
x daily average rate	0,087***±0,01	0,586***±0,06	0,91
x carcase rate	7	0	1
Meat percentage	0,884***±0,00	0,836***±0,03	0,90
x daily average rate	8	0	4
x carcase rate	0,908***±0,00	0,941***±0,01	-
Daily average rate	7	1	0,01
x carcase rate	-	-	5
	0,091***±0,01	0,397***±0,08	0,00
	6	1	5
	-	-	5
	0,092***±0,01	0,440***±0,07	0,89
	6	5	3
	0,885***±0,00	0,857***±0,02	
	8	7	

There are negative genotypical correlations between the meat percentage with living weight (-0,586), the daily average rate (-0,397) and the carcase rate (-0,440). In exchange, there are very tied genotypical correlations between the living weight and the two categories of rates and, between the latest ones.

The phenotypical correlations follow the same trends as the genotypical ones, the negative ones being weak in intensity. It can be noticed however, that all correlations are semnificative ($\alpha=0.001$).

3.3. The relative importance of the characters and the selection indexes

Out of the data presented in Table 5, it results that the best option proved to be index 6 (I_6), which includes all of the four characters. This index had the best efficiency ($r_{H,I} = 1,087$), and the best partial genetic gains (the genetic progress for each character expressed in terms of intensity unit of the selection), for the meat percentage (3,35%) and for the living weight (6,87 kg.).

The poorest results (even negative) were obtained for the alternatives of index two (I_2) and three (I_3), which include the daily average rate and the carcase rate.

It was observed that when the rate takes part in the two indexes making up, the genetic gain was -0,011 kg for the daily average rate (I_2) and -0,013 kg., respectively, for the carcase rate (I_3). For the two index alternatives, the lowest values of the

correlation between the aggregate genotype and the selection criterion: 0,57 and 0,58 respectively.

4. CONCLUSIONS

1) Following the Student test use, it resulted that there are differences statistically assured between the specimen of the two sexes, in case of three of the four characters (living weight, carcass meat percentage and average rate in the carcass);

2) The heritability values varied from 0,27 for the average rate in the carcass to 0,39 for the meat percentage, thus including the four characters in the category of the intermedial heritable ;

3) The phenotypical correlations varied from – 0,087 (living weight x meat percentage) to 0,908 (living weight x rate in the carcass) ;

4) The genotypical correlations varied from –0,397 (meat percentage x daily average rate) to 0,941 (living weight x rate in the carcass) ;

5) The environmental correlations varied from – 0,015 (meat percentage x daily average rate) to 0,911 (living weight x daily average rate) ;

6) The biological percentage in case of meat in the carcass was between 33-35%, the rest of it being distributed for the other characters ;

7) The best index option, that maximizes the selection effect, proved to be that one including all of the four characters.

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Table5. The selection indexes for several combinations of traits

Index	Characters	v_i	b_i	S_I^2	S_H^2	$R_{H,I}$	ΔH	ΔG_i per intensity unit of the selection
I₁	Meat percentage +living weight	0,35 0,65	0,692 0,289	25,22	44,57	0,75	5,02	1,45% 6,95 kg
I₂	Meat percentage + daily average rate	0,33 0,67	0,099 -1,27	0,181	0,554	0,57	0,42	1,31% -0,011 kg
I₃	Meat percentage + carcass rate	0,33 0,67	0,098 -1,81	0,186	0,552	0,58	0,43	1,33% -0,013 kg
I₄	Meat percentage + living weight + daily average rate	0,33 0,20 0,47	0,275 0,280 -41,158	5,550	5,900	0,97	2,35	2,68% 7,34 kg 0,0079 kg
I₅	Meat percentage + living weight + carcass rate	0,34 0,16 0,50	0,243 0,272 -45,23	4,290	4,33	0,99	2,07	3,07% 6,38 kg 0,0099kg
I₆	Meat percentage + living weight + daily average rate + carcass rate	0,33 0,15 0,17 0,35	0,227 0,320 -26,410 -30,280	4,550	3,895	1,087	2,144	3,35% 6,87 kg 0,0079kg 0,012kg

**STUDY ABOUT INFLUENCE OF CHEMICAL POLLUTANT FACTORS IN
BIOMARKERS HEALTH AND ENVIRONMENT**

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Abstract

Pollution is a complex phenomenon, involved more frequent because perturbed equilibrium of the environment compounds influencing the bio-enosis health. The herbivorous are in most situation contaminated at toxic agents from pollutant nature (fodder plants, water contaminated), and through the contaminated products (milk, meat) affect the human health, and one the other hand give a signal to alarm this to see the dangerous. The industry zone Targoviste (metallurgic industry), Fieni (cement industry), Doicești (industry thermoelectric) are for these specific pollutant sources of great diversity, with fertilisers and pesticides used in agriculture.

Key words: pollution, pesticides, health, animals, toxicology.

Rezumat

Poluarea este un fenomen complex implicat foarte frecvent în perturbarea echilibrului dintre componentele mediului ambiant influențând negativ sănătatea biocenozelor. Ierbivorele sunt contaminate adesea de agenți poluanți toxici prin consumul furajelor sau apei contaminate, iar produsele lor contaminate (laptele, carnea) afectează sănătatea oamenilor, putând fi și semnale de alarmă (biosenzori)

1. INTRODUCTION

Science progress and socio-economical development of humanity to provide higher life standards made possible the use of some chemical products destined to eliminate or destroy certain pests of agricultural ecosystem through artificial environment conditions. Another factor is the intensive development of industrialization – another polluting factor which leaves behind a large variety of residues lots of them are under degradable and easily transported by air or precipitations.

These factors may produce (can have) noxious effects characterized by environment degradation at soil, waters and air level, the exceeding of tolerant admissible limits have repercussions on some productive performances and bio-users health from environment (plants, animals, man); in the case of the two main categories of bio-users, the modifications suffered by these represent alarm signals for man health.

The knowledge of environment alterations may be very important because an early analysis about risky factors contributes at the prevent animals and man intoxications with are more or less acute.

Jean Boyer referring to pollution baneful actions concerning (about) man health, he specified that: "the water which runs through sewerage pipe (sewerage system) is not drinkable water, it's just good to drink and the air is only good to breathe (respire)."

2. METHODS

The analyses have makes through the gravimetric and electrochemical measures.

The samples from water, soil and air was analyzed with help of atomic absorption spectrometry (SAA) in fire, individual detection method which use in these sense a flame with role to generated stables atomics from energetic point of view. Another samples represented biomarkers (blood, muscles) from significantly bio indicators (ruminants). For these we used some method, atomic absorption spectrometry (SAA) in fire.

Whenever the light traversed the atomics cloud, these will be absorption at some wave length specifically for metal analyzed. The quantity of light absorption have direct proportionally with quantity of substance analyzed. The limit of specific detection method SAA in fire is at p.p.m. order.

It was analyzed:

- Substance of the mineral, organic or metal nature.
- Water hardness (Calcium and Magnesium).

The water samples drawing

In all was drawing 26 samples, 21 samples from water surface at Ialomița River, in north and south of Dâmbovița Department. At these add only 5 samples at water from wells.

The water volumes drawing on source and sector:

Table 1. Entire (thousand mc) drawing (population + industries + animals breeding + fish breeding):

Water beneficiary	Quantity (thousand mc)	Percents %
INDUSTRIES	70519	63,98
POPULATION	22329	20,26
ANIMALS BREEDING	561	0,51
Fish breeding	15893	14,42
IRRIGATION	788	0,72
ANOTHER ACTIVITIES	126	0,11

3. RESULT

The proposed theme brings a significant contribution knowledge development in this domain and can be argument in different ways as we intent to prove it further. As a result of the fact that we know very few aspects about some polluting factors impact on environment and their roll on some reference bioindicators. Beginning of progress improve in environment quality and quantity resources (water, air, soil) in Europe Union, it has been found that measures witch have object lessening of press ion exercise about these at pollutant elements generated from farm husbandry and industry give success, but some pollutant concentrations remain increases, this fact contributed at ecosystem degradation.

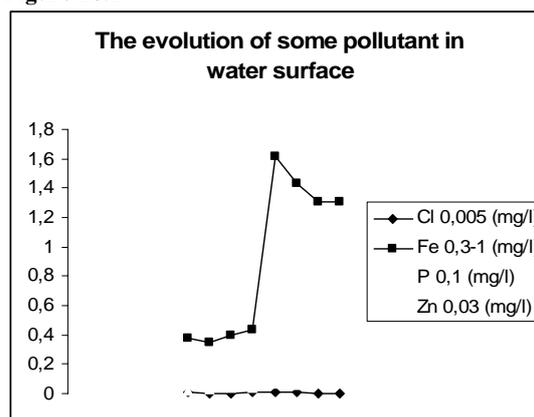
Chemical fertilizers have an important roll in researching activity and from these, tillable lands under crop which are on different chemical fertilizers action and has an influence on environment quality especially because of nitrous fertilizers containing nitrogen in small amounts: ammonia cal, amidial or oxygenated compounds (nitrates, nitrites) and his accumulation becomes excessive in some plants (oat, barley, green maize, clover, beat leaves and stem, rape). The accumulation is favorably drought periods followed by rich precipitation and the increase is between 10 – 30% under KNO₃ form.

In this case is necessary to know the quantitative tides from soil also the biotransformation on fodder plant level with a richer content. Even the water isn't exonerate from this contamination with nitrous substances (nitrates, nitrites) the presence of 50-100mg/l nitrates is a serious alarm motive and 1,1g/l level is touched and makes water to be toxic. In Romania were been reported miscarriage episodes at cows because of potable water source with a nitrates concentration between 80-200 mg/l.

The industry throw its innumerable branches is the main source for different pollution.

The exposes target of these human activities is atmosphere. Emanations, smoke, different gases, dust, vapors are dissemination methods in atmosphere of some element with raised toxic potential generic named heavy metals (lead, arsenium, mercury, cadmium). Polluting elements action on pollution source from a distance between 10-20 km and that's the reason why is forbidden that animal shelters to be placed in these kind of areas and the respective area must be monitored concerning polluting substance concentrations. It has been found that surface water is often unpurified with pollutant as a result of residual insufficient purified water overflowing, the exceed of maximum admissible concentration at every polluting makes the water flows quality to be decreased, the use of these is limited and rivers bio enosis suffers disorders.

Figure no.1



The obtained results have shown the toxic lead absence with grave implications on living organisms and microelements with toxic potential like cadmium, zinc and copper were identified. Also, was signaled iron and manganese presence in bigger concentrations proving an intense metallurgic activity and its emanated smoke pollutes animal environment containing especially the soil and the air.

Table nr.2 The investigation results of tissue

µg/ml	Pb	Cd	Cu	Fe	Zn	Mn
Muscle	-	0,008	0,02	2,5	-	0,077
Organs	-	0,017	0,17	14,1	-	0,13
Milk	-	0,007	0,005	2,6	0,11	0,072
Serum	-	0,022	0,01	3,5	0,03	0,073

The increasing of the copper (0.02 – 0.17mg/ml) and zinc concentrations in organs (liver, kidneys, and muscular tissue) produce irritating effects on digestive mucous membrane characterized by congestive hemorrhagical lesions, some deposits in certain organs and muscles, the clinical evolution isn't noticed, the symptoms have untypical aspect and that can have noxious effect on the consumers of the products obtained from these animals.

The cadmium presence (0.007 – 0.022 mg/ml) is obvious and is well known its pathological action blocking some enzymes with thiolic groups (ATP – ase, aldolase) or zinc dependents (carbonic anhydrase, carboxypeptidase). The reproduction is the most affected function, cadmium affects sperm qualities. In the same time, calcium intestinal absorption is lowered, the value of hematocrite and hemoglobin increases cadmium has also a cancerous effect.

Sanguineous serum and organs are contaminated in a bigger proportion than muscles or milk, the liver and kidneys are organs located on this element have direct metabolized.

Some microelements presence as cadmium, copper or zinc used in metallurgic industry in bigger concentration than the admissible ones even if the results didn't pointed out a spectacular increasing of these elements with polluting character it may be considered an alarm signal for the affected area and an impulse for the investigation domain to be continued and enlarged.

The fall-out are soil pollution sources also sediment able and in suspension (unregistered lead values were between 60-120 PPM and maximum admissible concentration is 100ppm; cadmium values were between 4-11 PPM and maximum admissible concentration is 5ppm – Klonke).

The ruminants are often affected, the impact on them is multiple represented by water, air and contaminated fodder. It's considered that lead intoxication at bovines is ten times bigger than lead intoxication at other species because this species is more sensible at chemical polluting activity than the others. (after Ghergariu).

The etiological investigation and metabolic profile studies at cattle pointed out in the polluted areas from Romania (Dâmbovița area) and those from Europe that were the polluting factors action from heavy metals group is present was observed especially on herbivores pathological states with sub clinical character and a bigger incidence of medical diseases (pulmonary, digestive, hepatic, renal) in comparison with other unpolluting witness areas and the unregistered mortality at wild animals from affected ecological area is evidently big.

Hematological and biochemical tests at these species pointed out some transformations as leucocytes (leukocytes no. > 10 thousands/ dc³), blood protein (total proteins > 7.9 g/dl), hyperhemoglobinaemia (hemoglobin > 9.5 g/dl) and increased of glutamate-oxalacetate transaminase activity (GOT > 36 U/l) and gammaglobulines activity (2.3g/dl).

The drawer hair from bovines is an important bio indicator for polluted area especially for cadmium because its values are 5-300 times bigger than maximum admissible concentration and this aspect proves the cumulative effect of the chronic intoxication and the environment pollution level.

These observations made on the vegetation from the polluting sources action area pointed out the increasing production at field crops (wheat, maize etc.), a hayfields and pastures floristically composition of low quality and also an increasing of diseases with a folios action at leguminous plants (manna).

In present, the environment protection is a humanity complex preoccupation because human intervention on nature from multiple directions affected environment regenerating power what led to pollution by irreversible degradation of the environment and various baneful actions (toxic, climatic, ecological).

4. CONCLUSIONS

The proposed theme brings a significant contribution knowledge development in this domain and can be argumentum in different ways as we intent to prove it further. As a result of the fact that we know very few aspects about some polluting factors impact on environment and their roll on some reference bio indicators (plants or animals) in Dambovita and Ialomita basins, industrial areas of Targoviste, Fieni and Doicești is a good reason for approaching some researches that implicates specialists from different fields (veterinary, medicine, chemistry, physics, agriculture, environment) together we can resolve this complex problems created by the phenomena called *pollution*.

Other areas from our country have been studied more so in this way step by step we will obtain in the future a map with potential areas with polluting risk and these will be monitored better and the noxious effect will increase evidently.

The specificity of the proposed contributions is referring to creation of some connections between risking polluting factors from soil, water and

atmosphere and bio-users of these environment components.

Chemical or organic fertilizers can influence the contamination of fodder and water consumed by ruminants and that is a new aspect in the approaching of this type of pollution effects.

Animal humors, tissues and organs identification of some components with direct pathogenic risk on animals and indirectly through animal products on human health are elements what offers the specificity to this project. Another part of this project is to find the connections between different pathological manifestations and the presence of some polluting factors with toxic potential. The main original hinted elements are represented by: hill and sub mountain areas with mixed exploitations of fruit trees and animals to find the influence of chemical and natural stimulators practiced for obtaining bigger crops, the analysis of nitrous substances concentration from soil, water and fodder (hay, aftermath, green fodder); the selection of viable analysis methods to make the measurement of these polluting factors with toxic potential (heavy metals), the introduction of new methods (atomic methods of micro elementary analysis

The canalization and animals residuum have sources of contamination with pathogen agents and others microorganisms from soil, and especially from potable and recreation waters. Excessive concentrations of nutrients at water sources can makes adverse effects of eutrophication, appear microscopic algae in excessive quantities, after these death make deposit in deep water, subtitle the

heterogenic composition of bacteria population with the white sulphur bacteria stratum.

The potable waters quality is regulated from STAS 1342-84, specifics the potable of water (chemic, physics, bacteriological) witch elimination risk of illness. The quality of surfaces waters is regulated from STAS 4706-74. The STAS 9450-98 regulated the quality of water from agricultures irrigations.

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BIOTECHNOLOGIES USED IN SOILS' DECONTAMINATION

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Abstract

The problem of soil contamination and heavy metals, fuels and toxically substances decontamination is a reality over the world. U.S. Geological Survey studies demonstrate that microorganisms, naturally, consume toxically compound of oil and put them into harmless carbon dioxide. For heavy metals stabilization it must be used low level accumulation plants to reduce the dispersion of metals by grazing or after plants death. The researches demonstrate that many species of mushrooms accumulate elements like cadmium, mercury and lead at high levels, according the species, nutritional strategy and soil compounds. The content of these elements is much more low in cultivated mushrooms than in wild growing mushrooms.

Keywords: biotechnologies, heavy metals, living organisms, biorecuperation, macro fungus

Rezumat

Problema contaminării solurilor și a depoluării de metale grele, combustibili și alte substanțe toxice este o realitate la nivel mondial. Studiile U.S. Geological Survey (USGS) au arătat că microorganismele, în mod natural, consumă componentele toxice derivate din petrol și le transformă în dioxid de carbon inofensiv. La stabilizarea metalelor grele și a arsenului trebuie folosite plante cu capacitate scăzută de acumulare pentru a reduce dispersia metalelor prin pășunat, sau după moartea plantei. Cercetările au demonstrat că multe specii de ciuperci acumulează elemente precum cadmiu, mercur și plumb la niveluri ridicate, în funcție de specie, de modul de hrănire și compoziția substratului. Conținutul în aceste elemente este considerabil mai scăzut în ciupercile cultivate decât în ciupercile din flora spontană.

1. INTRODUCTION

In order of sustainable development, the occidental model of economical increase is based on the present serious environment problems, which affect the quality of habitant's life.

The environment protection politics in European Union is coordinated by Environment European Agency who supervises environment parameters and identifies the global evolution. In the same time, each European state has the duty of environmental inspections based on minimal fixed standards and results publication. [28]

An important component of environment politics is represented by the prevention of air, water and soil pollution [28], and this process is carrying on a strict management of natural resources and of wastes. The major objectives which characterize the environment politics are based on the restricted usage of regenerable resources at the level of them regeneration, efficiency increase of non-regenerable resources and decrease of wastes produce [28]

According of these, the metallurgic industry suppose, moreover the sustainable organization of resources, to find out solutions of metals recovery

from wastes and that one which contaminate the soils, in order to recover the soils for agriculture.

The problem of heavy metals, fuels and other toxically substances soil contamination in nowadays reality. After soil accidentally contamination with toxically materials, the affected area increase because of the infiltration of these substances in underground waters, and them transportation to the residential area create a risk for habitants health. [29]

Using the classic remediation methods, the soils are more destroyed, and them reconstruction needs a long period of time and suppose a new toxins production from machines. This is the reason of looking for a ecological remediation solution to minimize the risk of accidentally disasters.

**2. METHODS OF POLLUTED SOILS
BIOREMEDIATION**

Like a result of many research years, in United States of America, have been found methods for toxically substances biodegradation using microorganisms and macrofungus.

U.S. Geological Survey (USGS) studies prove that microorganisms, naturally, consume toxically

compound of oil and put them into harmless carbon dioxide.[29] moreover, the studies prove that the level of these biotransformation can be increased successfully by adding nutrients, which stimulate microorganisms growing.[29]

Besides the fact that soils remediation with microorganisms is an ecological method, but it's a financial efficient methods. The classic technologies of cleaning the contaminated fields involve the disorder of soil, which means higher costs, while bioremediation involve only nutrients supply for wild growing plants on these contaminated fields.

The toxic compounds concentration, like heavy metals and arsenic, is bigger in mining exploitation areas, which is noxious for animals and plants. Many deposits reach in metals consist in pyrites (FeS_2) and other sulfide minerals. Sulfides oxidation produce metals protons and arsenic.[16,20] Oxidation agents are the atmospheric oxygen or Fe^{3+} which is produce by Fe^{2+} oxidation, resulted from pyrite oxidation. [22]

From among the mining areas bioremediation, fitoremediation is a method with good results in preventing acid mining drain and in metals mobilization.[25] Fitoremediation is the process which uses green plants to degrade, transfer and mobilize the pollutants from soil, sediments, other solids, surface and underground water.[4]

Fitoremediation of heavy metals involve the processes [21]:

1. fitoextraction – use the plants to absorb, assign and depose toxically contaminants from soil to roots and shoots tissues ;
2. root filtration – use the plants with high root absorption which depose the contaminants;
3. fitostabilization – use the plants with soil pollutants mobilization capacity to decrease contaminations dispersion level.

The studies, made since 1977 by the American biologist dr. Robert Brooks, prove that metals, like Ni, Zn, Pb and Au, can be extracted from the green plants, but depends on the density and solubility of elements. From the first experiments it was obtained 0,01 g Ni from few kilograms of vegetal mass and, recently, 10 g Au from two hectares of a rape crop, cultivated nearby an abandoned mine from California.[32]

So as the results of fitoremediation will be efficient, in this process are use plants with a high capacity of

metals accumulation. The number of high accumulating plants is showed in the next table:

Table 1: The number of plants with high accumulation capacity for heavy metals [17]

Metal	Leaves concentration	Taxonomical number	Family number
Cadmium	>0,001	1	1
Cobalt	>0,1	26	12
Copper	>0,1	24	11
Lead	>0,1	5	3
Nickel	>0,1	>300	35
Magnesium	>1	8	5
Zinc	>1	18	5

For heavy metals and arsenic stabilization are used plants with low capacity of accumulation to reduce the metal dispersion by grazing or after plant death. When the plants are tilled in the mine tailings cover water, will be formed and organic layer. [22]

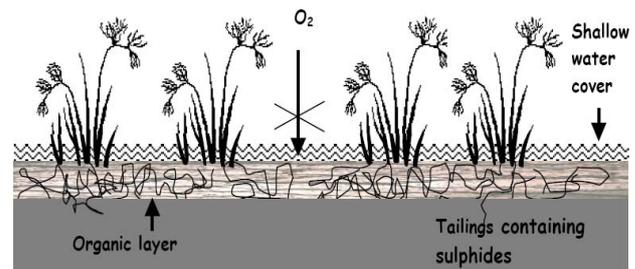


Figure 1: Plant establishment on water covered tailings might stop the oxygen penetration [22]

This layer will consumes oxygen (because of chemical and biochemical processes) and together with the plants , will contribute to waves and erosion decrease. If the mine tailing is poor in nutrients for plants, will need a nutrients supply to improve the growing conditions.[11] For low costs, organic matters wastes will be use like amendments.

For the establishment of water-covered mine tailings are used wetland plants who remove oxygen by root. This mechanism can produce an oxidation of tailings and increase te risk of forming mine acids.[1] Moreover, the roots of plants produce organic acids, protons and carbon dioxide, which accelerate the degeneration process for some minerals.[15]

Between the plants that can be used in fitoremediation of mine tailings, the studies prove that *Eriophorum angustifolium*, is a plant who

resists on layers with wide rate of pH, from 10.9 to 2.7. [22] Other species that can be crop in a low pH environment are *Carex rostrata*, *Eriophorum scheuchzeri*, *Phragmites australis*, *Typha angustifolia*, *Typha latifolia*, which resist in a pH of 2.1; 4.4; 2.1; 3.0, respectively 2.5. [19]

Many species, which can grow up on mine tailings, have a high level of the concentration of heavy metals and arsenic in the roots. This is possible because of a mechanism which protect the photosynthetic parts of plants from toxically concentration in metals and arsenic.[3] The plants species with low transfer rate for metals to shoots and leaves are proper for the crops on mine tailings, because they reduce the metals dispersion after next destruction of plant.

Metals concentration in the shoots of *Eriophorum angustifolium*, growing on mine tailings, is of 2.6 (As), 2.5 (Cd), 3.6 (Cu), 7.3 (Pb) și 5.0 (Zn)times bigger comparing with the plants grow on a normal layer.[22]

3. MYCOREMEDIATION OF SOILS POLLUTED WITH METALS

Researches of the last three decades prove that many species of mushrooms accumulate elements like cadmium, mercury and lead, in a rate that excel the content from other foods. Moreover, many species accumulate radioactive isotopes of cesium. [13]

The content in metals depends, in the first line, on species, and on nutritional strategy – mycorrhizal, parasitic or saprophytic. Also, an important factor is represented by the layer content, existing some meaningful differences in individual metals assimilation. Mercury and cadmium are well accumulated by mushrooms while the lead has a lower level in fungus body than in the layer. [8]

The percent of metal contained in deposits of atmospheric powder doesn't have importance because of the short period of vegetation (10-14 days). The most important factors which affect the metals accumulation are represented by the age of mycelium and by the interval between fructification. The maximum content in metals was observed in the initial crop of white mushrooms (*Agaricus bisporus*).[23]

The level of metals estimated in wild growing mushrooms *A. bisporus* is higher than in the cultivated mushrooms. [13] Explanation doesn't consist only in the difference between the two layers and the contamination level, but in the difference between the age of mycelium in nature,

which is about few years comparing with few months for the one in culture.

Content of metals is distributed unbalanced in the fruiting body. The bigger level was observed in spore-forming part, but not in spores, and a low content in the rest of cap and the lower content in the stipe.[13]

A high content of metals was observed in the mushrooms that are cultivated in much polluted areas, like nearby of highways and in the landfills of sewage sludge, while nearby the smelters the metals contents is extremely high.[24]

The ability of mushrooms to accumulate heavy metals and the factors which influence this trait represent an important aspect in the bioremediation of contaminated soils.

Content of metals in fruiting bodies of mushrooms

The content of metals are express usually in mg/kg dry matter. To recalculate the fresh matter is considered for mushrooms that the dry matter represents 10%.

Some countries establish limits of the metals level contained in the edible mushrooms and this content is 5.0 mg/kg dry matter for mercury, 2.0 mg/kg dry matter for cadmium and 10.0 mg/kg dry matter for lead, according with the weekly intakes quantities accepted of 0,005; 0,007 and 0,025 mg per kg body weight for mercury, cadmium and lead, respectively. [13]

Hg – the high accumulating species for this element (up to 20 mg/kg dry matter) are represented by *Calocybe gambosa*, *Lepista nuda* și *Agaricus arvensis*; a high content, up to 10 mg/kg dry matter is characteristic for *Agaricaceae* și *Macrolepiotae*; and a level up to 5 mg/kg dry matter for genus *Boletus*. [13]



Fig. 2: Agaricus bisporus [33]

In the table 2 are presented data from recently researches about the content of mercury in several species less studied in Poland. Moreover, are given information about bioaccumulation factor value

between mercury content in cap and stipe and in the content of 1-10 cm depth layer.[6,7] The content of mercury and bioaccumulation factor value varied widely according the species, *Calvatia excipuliformis* is the only one with a high mercury content.

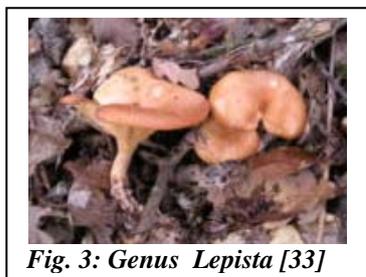


Fig. 3: Genus *Lepista* [33]

Cd - the content of cadmium in many species of mushrooms from unpolluted areas is under 2 mg/kg dry matter , but in the species *Boletus aestivalis*, *Leccinum scabrum*, *Calocybe gambosa*, *Armillaria mellea* and *Russula cyanoxantha* cadmium can be up to 5 mg/kg dry matter , and the species from genus *Agaricus* up to 50 mg/kg dry matter. [14]

In table 3 are given data about 17 species of edible mushrooms with a content of cadmium over 2 mg/kg dry matter. This represents only 10% from species collected in rural area of Turkey.[5,27] The values for *Armillaria mellea* and *Russula cyanoxantha* are very similar with the one observed

at the species from central Europe. [14]



Fig. 4: *Armillaria mellea*[33]

<i>Calvatia excipuliformis</i>	4.4	1.9	960	310
<i>Clitocybe odora</i>	0.94	-	-	-
<i>Leccinum griseum</i>	0.86	0.82	54	52
<i>Leccinum rufum</i> (syn. <i>L. aurantiacum</i>)	0.6 – 1.8	0.45 – 0.93	22 - 73	14 – 46
<i>Leccinum versipellis</i>	0.46 – 0.72	0.25 – 0.42	10 - 24	5.4 – 14
<i>Marasmius oreades</i>	0.73 – 0.93	0.48	19	13
<i>Rozites caperata</i>	1.2	0.47	36	14
<i>Russula vesca</i>	0.05	0.03	18	12
<i>Russula xerampelina</i>	0.06	0.04	2.7	1.8
<i>Sarcodon imbricatus</i>	2.3	1.1	73	30
<i>Suillus bovinus</i>	0.32	0.16	53	26
<i>Suillus flavus</i>	0.60	0.15	17	4.1
<i>Tricholoma flavovirens</i>	0.12 – 0.24	0.07 – 0.17	7.5 - 37	5 – 7
<i>Tricholoma portentosum</i>	0.10 – 0.18	0.03 – 0.09	3.5 – 9.6	1.1 – 4.4
<i>Tricholoma terreum</i>	0.03 – 0.25	0.02 – 0.12	0.6 – 3.8	0.4

Pb – In general, the content of lead in many species of edible mushrooms from unpolluted areas is lower than 2 mg/kg dry matter , but were determined also contents up to 5 mg/kg dry matter for numerous species. A content up to 10 mg/kg dry matter was found in specimen of genus *Agaricus*, *Macrolepiota* and *Lepista nuda*, and more higher in *Lycoperdon perlatum*. [14]

A higher level of lead was found in specimens growing nearby the highways, but an extremely high content, over 100 mg/kg dry matter was observed nearby the lead smelters.[12]

Table 2: Contents of total mercury in caps and stipes of several edible mushroom species collected from Poland and mean values of bioaccumulation factors [13]

Species	Mercury content (mg kg ⁻¹ dry matter)		Bioaccumulation factor	
	Cap	Stipe	Cap	Stipe
<i>Boletus pinophilus</i>	2.0	0.85	110	44

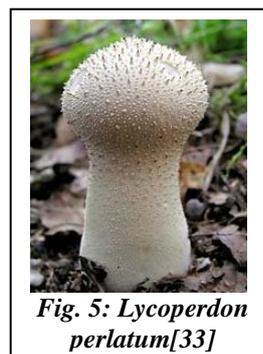


Fig. 5: *Lycoperdon perlatum*[33]

Table 3: Edible mushroom species with cadmium content above 2 mg/kg dry matter collected from unpolluted sites of Turkey[13]

Species	Cadmium content (mg kg ⁻¹ dry matter)
<i>Agaricus bisporus</i>	3.5
<i>Agaricus bitorquis</i>	3.1
<i>Agaricus silvicolla</i>	4.2 – 4.9
<i>Armillaria mellea</i>	2.5 – 5.5
<i>Boletus luridus</i>	2.2
<i>Cantharellus subalbidus</i>	2.3
<i>Cantharellus tubaeformis</i>	2.1
<i>Cystoderma amianthinum</i>	2.2
<i>Hydnum repandum</i>	3.1 – 3.6
<i>Hypholoma capnoides</i>	3.2
<i>Kuehneromyces mutabilis</i>	2.1
<i>Laccaria amethystina</i>	2.7
<i>Laccaria laccata</i>	2.1
<i>Lactarius deliciosus</i>	2.8
<i>Lactarius sanguifluus</i>	3.2
<i>Russula cyanoxantha</i>	3.2
<i>Russula delica</i>	2.3 – 4.3

4. CONCLUSION

Remediation of soils from contaminated areas using living organisms is a appreciatively new methods, which demonstrated it's efficiency in the case of an accident which affect the environment. Researchers from United States of America realize the vastest research in this domain, applying successfully the results.

United State Geological Survey (USGS) demonstrated that bioremediation has many benefits comparing with the classical methods of soil restoration. In bioremediation doesn't need the mechanical action against field, but only a supply of amendmets which improve the soil and, also is prevented a new contamination with fuels from machines.

The plants with a wide resistance for variation of layer's pH, like *Eriophorum angustifolium*, were used successfully to stabilize the water-covered mine tailings, mobilizing heavy metals in them roots, and after deaths in the organic layer that cover the tailing.

Recently research on macro fungus and on them capacity for metals accumulation prove that the mushrooms, established on a high level of concentration in metals layer, will have a higher content of that metals. The level of metals accumulation in fruiting bodies of mushrooms depends on species, nutrition strategy and age of mycelium.

The content of mercury, cadmium and lead is sensible lower in the cultivated mushrooms than in the wild growing one from the same species. *Agaricus bisporus* is the only species which increase the mercury content, and a bit the cadmium content, comparing with the layer composition, and accumulate the bought metals in fruiting body.

Also, bioremediation, being a natural process, needs a minimal supervise which make it a fair method, and the field is back in agriculture in a shorter time.

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**RESEARCHES CONCERNING THE PHYSICO-CHEMICAL QUALITIES OF THE
HYDRIC SOILS FROM THE TITU PLAIN WITH A VIEW TO THEIR
IMPROVEMENT**

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Abstract

In Titu Plain, which is a division of the Romanian Plain and is situated in the central part of the latter, because of the relief which is sometimes microdepressionary and because of the parental material has formed soils, which present in the structure an excess of phreatic humidity (gleysols) or pluvial humidity (stagnic luvisols), soils which require improvement works with a view to the growth of the productive potential. Both gleysols and stagnic luvisols present, as a restrictive factor of the productive potential, the excess of humidity in the structure of the soil, excess which can be removed through a series of hydroimprovement methods. Through the removal of the excess of humidity and by the application of a correct fertilisation the physico-chemical qualities of these soils will improve fact which lead to the growth of the productive potential.

Keywords : soil, water, plain, horizon

Rezumat

In campia Titu, care reprezinta o parte a Campiei Romane si este situata in partea centrala din cauza reliefului care este uneori microdepressionar si a rocii parentale care a format solul si care prezinta un exces de umiditate (freatic sau pluvial), solurile cer o imbunatatire a lucrarilor in vederea cresterii potentialului productiv.

1. INTRODUCTION

Titu Plain is situated on the central part of the Romanian Plain, on the inferior courses of the Argeş and Dâmboviţa rivers. This plain is considered to be a plain of digression, of subsidence presenting an aspect of an alluvial plain which merges with the rivers meadow.

The variety and the interaction of the pedogenetic factors (the relief, the parental material, the climate, the hidrology, the vegetation) led to the formation of a varied soil cover characterized by 12 types of soils framed in 6 classes.

The presence of water in excess in the soil profile both from the ground-water layer which level pendulates between 1,5 and 5 m depth, and from the rainfall which stagnates over some horizons slightly permeable, determine the appearance into the soil of an anaerobic medium, fact which favour the unfolding of the reduction processes.

Thus after the processes of gleization and pseudogleization which took place the gleic horizon is formed G (G_r and G_o) and the stagnogleic diagnosis horizons for the soil types from the hydri soils class (gleysol and stagnic luvisol) but which characterized the gleic and stagnic subtypes of the other types of soils framed in other classes.

The G_r and W horizons are characterized by the greenish, blue-navy, bluish colours, resulted after the reducing process and for the G_o and w horizons these colours alternate with the oxidation colours (yellowish-reddish).

From the total surface of the Titu Plain, the hydri soils have 7,5 %.

2. MATERIAL AND METHODS

With the view to the performance of the soil profile, tests and pedological and agrochemical examinations, was used the topopedological base formed by maps and plans made at the following scale 1: 10 000 and 1 : 5 000. Thirty principal profile of soil had been made and fifty five tests. The examinations have been analysed chemically (from the point of view of the pH, CaCO₃, of the humus content, N, P and K mobile) and physically being kept in mind in essence the granulometric composition.

3. RESULTS AND DISCUSSIONS

Because of the excess of humidity from the ground-water layer situated at near depth (1-2 m) the gleysols have formed, characterized by intense

process of gleization fact which determined the formation of the gleic horizon(G) typically horizon for this type of soil.

In Titu Plain the gleysols are encountered near Titu, Potlogi, Poiana but on the small places at the north of Florești. These soils were formed on the parental materials represented by clayey fluvial storage but even on the fluvial gravels.

The morphological characters and the physico-chemical qualities of the gleysols are presented as part of a profile which presents the horizontal succession $A_0 - A / G_0 - G_0 - G_r$.

- $A_0 = 0 - 22$ cm; clayey; grey(10YR 4/2) yellowish-rusty(10YR 6/6); granular structure; middle porosity; thin and bushy roots; presenting $CaCO_3$ (which makes effervescence); step by step passing.
- $A / G_0 = 22 - 40$ cm; clayey; grey-brown(10YR 4,5/2) rusty-purplish; polyhedral structured, temperate developed; middle porosity; temperate densely; moist; presenting $CaCO_3$ (which makes effervescence); step by step passing.
- $G_0 = 40 - 88$ cm; clayey; bluish-rusty; polyhedral structured; middle porosity; moderate densely; moist; presenting $CaCO_3$; clear passing.
- $G_r = 88 - 107$ cm; clayey; bluish-bluish; damp; presenting $CaCO_3$ as powder.

The analytical data from the table no. 1 shows a weak levigation the texture being undifferentiated on the profile(remaining middle clayey).

In the granulometric composition the fine sand which in the A_0 horizon, passes 43% followed by the clay(29,9%), silt(24,4%) and rough sand 1,8%.

The humus content reduced from the superior part to the base of the horizon A / G_0 where it has the value of 1,8%. The reaction of the soil is weak alkaline(pH = 8,15) at the level of A_0 horizon maintaining itself constantly on the whole profile(100%).

The $CaCO_3$ content registers a reduction from 5,1% at the level of A_0 horizon to 2,9% in A / G_0 horizon, and is going to be 11,8% at the base of the profile, without forming the C_{ca} horizon.

The cationic exchange capacity has the value of 23,3 me/100 mg soil in the superior horizon and the supplying with nutritive elements is medium regarding nitrogen and potassium and it is pretty low in case of mobile phosphorus(10,1ppm).

The value of nitrogen index(IN) is 3,7 at the level of the first horizon after wards decreasing to 1,8 at the base of the A / G_0 horizon.

In the lowest areas close to Titu, Potlogi and Brezoaia, because of the freatic level situated at ~50 cm, which during the periods with abundant precipitations is raising to the surface of the soil favorising the growth of hydrofile vegetation represented trough reed and mace reed. These soils have a profile represented from a 15 –20 cm A / G_0 horizon, followed by G_r horizon which has aerohidric qualities in totality unfavourable.

In some areas these are mollic and cambic subtypes that presents Amollic (A_m) horizon respectively B cambic(B_v) formed thanks to pedogenetic processes development.

Owing to the rised content in clay and to the poor external draining the precipitations water stagnates in the superior part of the soil profile, a big time of year, resulting pseudo gleization processes and trough these stagnic luvisols.

Because of the pseudogleization process it constitutes W stagnogleic horizon which is a diagnosis horizon for stagnic luvisols.

Succeeding field research, except typical stagnic luvisols, have been identified stagni-vertic luvisols that presents ByW horizon with an clay content of 50% and stagni-albic luvisols that presents E_aW and BW horizons accompanied by an accentuated increase of the clay content on less than 15 cm.

Stagnic luvisols are situated in Titu Plain in Dâmbovița-Ciorogârla interstream, depression area clogged with thin parental materials.

Swampy stagnic luvisols presents a profile with the horizon succession $Aw - A/BW - B_1W - B_2W - B_3W - C$ having as morphological characteristics:

- $Aw = 0 - 23$ cm; dark brown, rusty-purple; clayey; lumpy; swampy; settled; cracked ; little, thin roots; gradual passing
- $A/BW = 23 - 36$ cm; purple, brown-rusty; clayey; lumpy;dry-hard; gradual passing; moderate pseudogleyed
- $B_1W = 36-59$ cm; brown -purple-rusty; clayey; lumpy; ferromanganic neoformations(concretion spots and points); moist; gradual passing
- $B_2W = 59-83$ cm; prismatic structure; clayey; ; ferromanganic neoformations(concretion spots and points); gradual passing

- $B_3W = 83-102$ cm; purple 70%; anstructured; moist ; gradual passing

The clay content of stagnic luvisols is higher on the superior part of the profile(38% at the Aw horizon level) and it decreases to the base of the profile(32,5%). So, a big time of year there are registered processes of swamping soils.

Soil reaction is moderate alkaline, the humus content is at the middle and decreases with depth, but water presence in excess determine a low microbiological activity.

These soils are well supplied with nitrogen and potassium, nitrogen index reaching at the value of 3,8 at the level of the first horizon, and a low supply with phosphorus(2,6 mg/100 g soil).

The degree of the saturation in bases faithful follows the pH values.

4. CONCLUSIONS

The main problem about Titu Plain' s hydric soils it is represented by humidity excess present in the soil profile, no matter his source. Because of this it is necessary to apply hydroameliorative measures to eliminate humidity excess or to eliminate the causes that determined it . For this it imposes the apply of agrotechnical, agrochemical and biological measures, as it followes:

- for gleysols and stagnic luvisols it is necessary the nivelation of the field
- the execution of drainage canals or drains for the descent and maintainance of freatic waters under the depth of the critic level in gleysols case

- carryng out drains combined with draining network for elimination of humidity excess on stagnic luvisols
- carryng out deep ploughing and deep breakings up following the draing on gleysols and ploughing in ridges after draining, on stagnic luvisols
- the apply of gypsum improvement, on gleysols when soil reaction presents values higher than 8,5 and calcic improvement for stagni-albic luvisols with pH less than 5,4
- the apply of an organic fertilisation(20-40 t/ha) for “ worming up” these soils and to improve the biological activity
- the apply of chemical fertilizer specially with phosphorus because of the low supply of the soil in this element
- the cultivation of plants with phitoimprovement action(*Medicago sativa*, *Trifolium pratense*, *Melilothus officinalis*) and practice of crop rotation specific to the soils with humidity excess.

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Table 1. Analytical data concerning the physico-chemicals qualities of gleysols

Horizon	Depth (cm)	Granulometric composition (%)				Humus (%)	pH	CaCO ₃	T mg/100 g soil	V (%)	P mobil	K mobil
		2-0,2 (mm)	0,2-0,02 (mm)	0,02-0,002 (mm)	<0,002 (mm)							
A ₀	0-22	1,8	43,9	24,4	29,9	3,7	8,15	5,1	23,3	100	10,1	80,5
A/G ₀	22-40	1,5	43,6	22,5	32,4	2,35	8,40	3,6	22,9	100	3,8	71,4
G ₀	40-88	1,1	43,9	24,9	30,1	1,80	8,35	4,3	25,1	100	2,0	58,1
G _r	88-107	2,8	38,8	26,9	31,5		8,40	11,8	24,6	100		

Table 2. Analytical data concerning the physico-chemicals qualities of stagnic luvisols

Horizon	Depth (cm)	Granulometric composition (%)				Humus (%)	pH	SB	T	V (%)	IN (%)	P mobil	K mobil
		2-0,2 (mm)	0,2-0,02 (mm)	0,02-0,002 (mm)	<0,002 (mm)								
Aw	0-23	16,2	21,9	23,9	38,0	4,01	7,55	35,0	36,4	96,2	3,86	2,6	103,8
A/BW	23-36	16,8	20,3	24,3	38,6	2,23	7,35	31,2	32,8	95,1	2,12	1,4	66,4
B ₁ W	36-59	19,5	20,3	29,0	31,8	1,14	7,40	25,4	26,9	94,4	1,14	8,1	97,1
B ₂ W	59-83	19,8	22,4	27,1	30,7		7,30	26,0	27,4	94,9			
B ₃ W	83-120	23,5	25,2	18,3	32,5		7,40	21,8	23,2	94,0			

Table 3. Analytical data concerning the physico-chemicals qualities of stagni-albic luvisols

Horizon	Depth (cm)	Granulometric composition (%)				Humus (%)	pH	SB	T	V (%)	P mobil	K mobil
		2-0,2 (mm)	0,2-0,02 (mm)	0,02-0,002 (mm)	<0,002 (mm)							
A ₀	0-35	9,6	35,2	29,1	25,5	1,57	6,58	11,2	19,0	84,5	16,2	234,2
E _{av}	35-45	8,1	32,9	29,6	29,3	1,18	6,60	15,4	20,3	85,4	15,4	183,5
E/BW	45-62	8,7	32,6	29,6	33,9		6,62	16,0	21,5	87,3		
B ₁ W	62-90	7,5	17,4	25,5	49,8		6,70		26,5	88,7		
B ₂ W	90-125	4,9	29,4	24,3	41,3		6,88	18,8	28,4	91,3		

**INFLUENCE OF FERTILIZERS ON FEEDING RED CLOVER
CROP PRODUCTION (DRY MATTER)**

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Abstract

From the researches made so far we know that the fertilizers could contribute at the crop production increase. From this point of view, in our research program we make also a fertilizers experience. So, for to establish the best fertilizer system we studied the influence of some organic, mineral and mixt organical-mineral fertilizers dose on red clover production in luvic-brown soil in Targoviste Plane.

Key words: Red clover, the plant height, experimental alternatives

Rezumat

Din cercetarile efectuate pana acum se stie ca fertilizarea poate contribui la cresterea productiei. Din acest punct de vedere, in acest program de cercetare am efectuat o experienta cu fertilizarea.

1. INTRODUCTION

The red clover export big quantities of nutritive elements . From this point of view red clover want needs big quantities of the fertilizers. This fenomen result from the researches made by many specialists in Roumania and other country and from my researches, too.

2. MATERIAL AND METHODES

We study the effieience of seven fertilizers dose (organic, mineral and organical - mineral) comparatively with the control alternative experimentation (anfertilized).

In this experience was used different dose of manure (10 to 40 to/ha), but in the same time was used also some mineral and mixt organical – mineral alternatives of fertilization, with a view to see the effieience of the different typs of fertilizers on feeding red clover in the luvic brown soil (table 1).

The experience had eight alternatives put in the range in tiers block method, with eight repetitions. The preliminary plant was soybean.

Table 1

Nr. var.	Variant			
	GG (to/ha)	N (kg/ha)	P (kg/ha)	K (kg/ha)
1	-	-	-	-
2	10	-	-	-
3	20	-	-	-
4	30	-	-	-
5	40	-	-	-
6	-	50	50	50
7	-	-	50	50
8	10	-	50	50

3. RESULTS AND DISCUSSION

The fertilizers influence on dry matter production (to/ha) for three years of experimentation and the production average values are presented in the next table:

Table 2. THE FERTILIZERS INFLUENCE ON DRY MATTER PRODUCTION (TO/HA) – YEARS 2003-2005

Nr. var.	Year			Intercede 2003-2005	%	d	Significance
	2003	2004	2005				
1	11.07	10.43	16.78	12.76	100	-	-
2	11.96	15.15	19.49	15.53	122	2.77	**
3	13.12	15.08	20.06	16.08	126	5.32	**
4	13.64	16.42	21.57	17.21	135	4.45	**
5	14.10	16.90	22.17	17.72	139	4.96	**
6	12.12	16.10	20.41	16.21	127	3.45	**
7	11.66	15.44	19.50	15.53	122	2.77	**
8	12.37	15.52	20.01	15.96	125	3.20	**
Intercede	12.50	15.13	19.99	15.87			

D.L.5% =0.98

D.L.1% =2.28

D.L.0,1% =7.26

From the table dates it comes that:

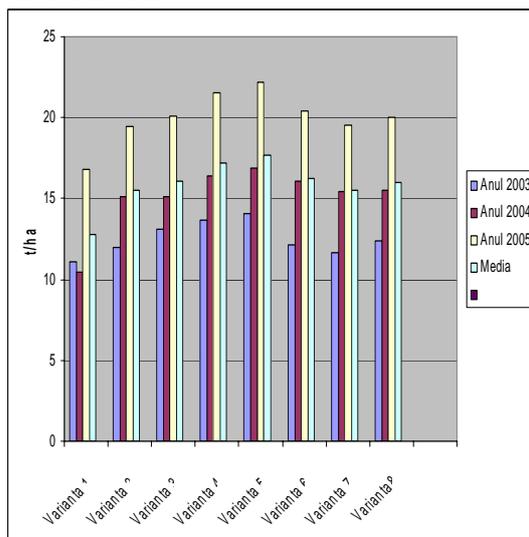
- In 2003 we obtained low dry matter production, the average was 12, 5 to/ha;
- In 2004 we obtained a high average dry matter production (15,13 to/ha) then 2003, but less then 2005 (19,99 to/ha). Thus, the average dry matter production for all three years of experimentation is very good (15,87 to/ha);
- The average dry matter production for all three years of the control alternative

experimentation (unfertilized) – V_1 it was high, because the climatic conditions it was favourable, as well as a good shoot of red clover plants;

- The highest dry matter production for this three years of experimentation it was at the alternative experience which was fertilized with 40 t/ha manure (V_5) giving a high average dry matter production for three years (17,22 t/ha). This high production on the manure fertilized field it is because the red clover had a strongly striking root and the percent of the lossed plants from the “uprooting fenomen” it was reduced;
- The mineral fertilizers (V_6 - V_7) had a small influence on dry matter production then organic fertilizers, the average value for three years of experimentation being 16,21 t/ha at fertilization with $N_{50}P_{50}K_{50}$ and 15,53 t/ha at fertilization with $P_{50}K_{50}$;
- When we applied organical – mineral fertilizers we registered an increase dry matter production with 25% then control alternative (unfertilized – V_1), the average dry matter production for three years of experimentation being 15,96 t/ha;

A general view about influence of organic, mineral and organical – mineral fertilizers on dry matter production of red clover at Dacia – Tetra variety it is presentate in the next picture:

Fig. 1. The fertilizers influence on dry matter production (to/ha) – Years 2003-2005



As you can see the dry matter production of red clover at Dacia – Tetra variety, for all the experimentation years, it was influenced by the fertilization system.

The production variations, from the year to year in the same experimentation alternative, was because the climatic conditions it was favourable in special the rainfall.

4. CONCLUSIONS

- The organic fertilizers has a good influence on soil fertility;
- This experience is framing in a large context of organic, sustainable and efficiently agriculture;
- The experimental dates demonstrate that the Dacia Tetra red clover variety gives high production on luvical – brown soil in a good climatic conditions and could be maintained on the same field, with good results, for three years.

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**MORFOGENETIC REACTIVITY OF PEAR EXPLANTS
FUNCTION OF NUTRITIVE MEDIUM
FOR INITIALIZING STAGE OF *IN VITRO* CULTURES**

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Abstract

The goal of this experience is to determine the nutritive mediums specific to pear tree cultivars (Monica, Republica, Argessis). I studied the growing capacity of pear tree explants function of the nutritive medium structure and genotype. The way the nutritive medium acts is generally similar in the case of each of the 3 pear tree cultivars we studied. The 4 culture media (basic) we studied are Murashige-Skoog (MS), Fossard (F), Lepoivre (L), Woody Plant Medium (WPM). Nutritive media used to initiate the culture: basic media were supplemented with dextrose (40g/l), IBA (0.1ml/l), AG3 (1ml/l), Na Fe EDTA (3.2ml/l). In nutritive medium Murashige-Skoog we obtained the best results in pear tree cultivars taken for research, the determining part being of the vitamin complex we used and of the hormonal balance achieved by gibberelic acid 1mg/l and IBA 0.1mg/l. The pear tree cultivar called Monica is far from the other two cultivars on the nutritive medium average by 55% grown explants.

Keywords: pear, in vitro, reactivity, nutritive medium

Rezumat

Scopul experientei consta in determinarea mediilor nutritive specifice pentru soiurile de par: Monica, Republica, Argessis. A fost studiata capacitatea de crestere a explantelor de par in functie de structura mediului nutritiv si genotip. Modul in care mediul nutritiv reactioneaza este in general similar pentru toate cele 3 soiuri de par studiate. Cele 4 medii de baza studiate sunt: Murashige-Skoog (MS), Fossard (F), Lepoivre (L), Woody Plant Medium (WPM). Mediul nutritiv utilizat pentru initierea culturii consta in mediul de baza suplimentat cu dextroza (40g/l), IBA (0.1ml/l), AG3 (1ml/l), Na Fe EDTA (3.2ml/l). Pentru cele 3 soiuri de par luate in studiu mediul MS a determinat cele mai bune rezultate, rolul determinant revenind complexului vitaminic si balantei hormonale. Soiul de par Monica s-a situat pe primul loc cu un procent de 55% explante crescute.

1. INTRODUCTION

The necessity to modernize the planting material production technologies for pear to satisfy the actual standards is also determined by many other considerations such as:

- increasing the tree density within plantations and adopting intensive culture systems in which the selections of new father plants (predominantly vegetative), creating and introducing new cultivars together with the modernization of tree conduct and carving, let us see a new "era" in cultivating these two species, of course conditioned by the quick providing with bigger and bigger quantities of planting material.

- contributions to a quick replacement of non-economical sorts from old plantations by way of introduction of a fast pace of new middle-little vigour pear cultivars with fast fruit-bearing that are compatible with the quince and have tolerance towards fire blight.

2. MATERIAL AND METHODS

The cultivars and father plants we used are from the experimental fields of I.C.D.P.P. Pitesti-Maracineni (mother plantations); the tree ages varied from 5 to 15 years old.

The biological material we used was made up of branches aged 1 year, 30-50 cm long; we drew explants out of them. We drew 10 buds from each of them 3 repetitive times to initiate in vitro multiplication.

The 4 culture media (basic) we studied are Murashige-Skoog (MS), Fossard (F), Lepoivre (L), Woody Medium (WPM) supplemented with: dextrose (40 g/l); IBA (0,1 ml/l); AG₃ (1 ml/l); Na Fe EDTA (3,2 ml/l). Statistic interpretation was made by Duncan test.

3. RESULTS AND DISCUSSIONS

The best results were obtained on Murashige-Skoog medium (68%) for grown explants (%) function of nutritive mediums (Duncan test for $P \leq 0,05$).

Smoler percentages were obtained on Fossard (62 %) and Lepoivre (52 %). The smolest percentage of grown explants was obtained on Woody Plant Medium (20 %) (Fig. 1).

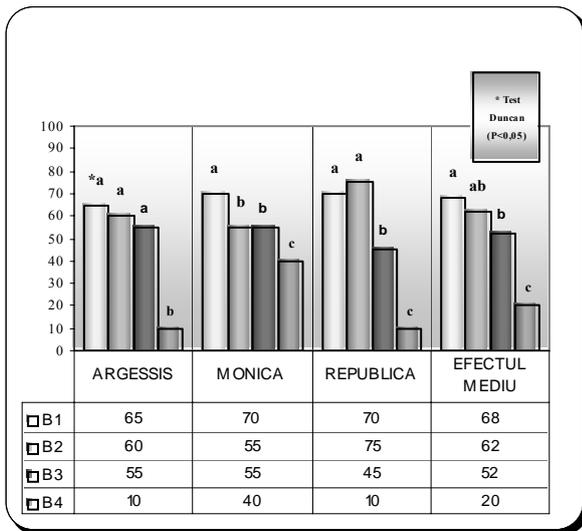


Fig. 1 Grown explants (%) function of nutritive mediums for pear cultivars

From the interaction of factors genotyp x nutritive medium results a similar action way of genotyp, in the case of each of the 3 pear tree cultivars we studied; the interaction was reduced.

For *Argessis* cultivar, in MS nutritive medium we obtained 65% grown explants and the differences from Lepoivre and Woody Plant Medium were statistically secure. Lower results were obtained on Fossard and Lepoivre (60% and 55%) nutritive mediums; on Woody Plant Medium was obtained the smolest percentage 10%.

For *Republica* cultivar, the influence of nutritive medium is maintain between 75% and 10 % grown explants. Fossard medium determine 75% grown explants and the differences from Lepoivre and Woody Plant Medium were statistically secure. The differences between Murashige-Skoog (70% grown explants) and Lepoivre (45% grown explants) nutritive mediums are significantly distinct. Woody Plant Medium determine 10% grown explants.

For *Monica* cultivar, in MS nutritive medium we obtained 70% grown explants and the differences from Lepoivre, Fossard and Woody Plant Medium were statistically secure. On Fossard și Lepoivre mediums were obtained 55% grown explants. The smolest results were obtained on Woody Plant Medium (40%).

4. CONCLUSIONS

The way the nutritive medium acts is generally similar in the case of each of the 3 pear tree cultivars we studied.

- In nutritive medium B.1 (MS) we obtained the best results in pear tree cultivars taken for research, the determining part being of the vitamin complex we used and of the hormonal balance achieved by giberelic acid 1mg/l and IBA 0.1mg/l.
- The pear tree cultivar called Monica is far from the other two cultivars on the nutritive medium average by 55% grown explants.

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**STUDIES ABOUT THE BEHAVIOUR OF SOME APPLE TREES CULTIVARS ON THE
LEAF MINER - *PHYLLONORYCTER CORYLIFOLIELLA* HB. (*GRACILLARIIDAE*,
LEPIDOPTERA) ATTACK IN THE CLIMATIC CONDITIONS OF MĂRĂCINENI -
ARGEȘ FRUIT-GROWING AREA**

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Abstract

Jonathan and Idared apple trees cultivars had resistance on the leaf miner attack, the degree of attack being of 8.55%, and 10.15% (average values). Prima and Pioneer apple trees cultivars were the most affected, with a degree of attack of 6.15% and 51.95%, with 53.60% and 43.30% more than for Jonathan apple trees cultivar. The average density of mines on a leaf is different in terms of cultivar. The lowest measured value was for Jonathan apple trees cultivar, with an average density of mines on a leaf of 0.79 in 2003 and 0.42 in 2004.

Keywords: *Phyllonorycter corylifoliella* Hb., degree of attack, cultivars.

Rezumat

Soiurile de mar Jonathan si Idared sunt rezistente la atacul minierului placat, gradul de atac fiind cuprins intre 8.55%, si 10.15% (valori medii). Soiurile de mar Prima si Pioneer au fost cele mai afectate, cu un grad de atac cuprins intre 6.15% si 51.95%, si 53.60% - 43.30% mai mult decat la soiul de mar Jonathan.

1. INTRODUCTION

The leaf miner - *Phyllonorycter corylifoliella* Hb. is spread all over the european continent, whitout the palearctic area, in North America and Asia. In Romania we find this pest almost all over the country, the areas with highest densities of populations, where damages are significantly larger, being concentrated mainly in the center of the country (Frăsin Loredana, 2005).

$$F\% = \frac{n}{N} \times 100$$

where:

F	=	frequency of attack;
n	=	number of attacked plants or organs;
N	=	number of analysed plants or organs.

2. MATERIAL AND METHODS

Research studies were accomplished in the years 2003 and 2004 within the orchards from an experimental field of the Research Institute for Fruit Growing - I.C.D.P. Mărăcineni, Argeș, Romania where important populations of leaf miner - *Phyllonorycter corylifoliella* Hb were found.

The frequency of attack and the intensity of attack were the indicators calculated to evaluate the attack, for 10 different apple trees cultivars.

The frequency of attack was calculated using the formula:

A marking scale with 6 classes was used to estimate the intensity of attack, as follows:

- 0 - 0 degree of attack;
- 1 - 1 to 3% degree of attack;
- 2 - 4 to 10% degree of attack;
- 3 - 11 to 25% degree of attack;
- 4 - 26 to 50% degree of attack;
- 5 - 51 to 75% degree of attack;
- 6 - 76 to 100% degree of attack.

The intensity of attack was calculated using the following formula:

$$I\% = \frac{\sum(i \times f)}{n}$$

where:

- I = intensity of attack;
 i = mark or percent of attack;
 f = number of attack situations at each mark;
 n = total number of attack situations.

The degree of attack was calculated using the following formula:

$$GA \% = \frac{F \times I}{100}$$

where:

- F = frequency of attack;
 I = intensity of attack;

These indicators were calculated for 10 apple trees cultivars in the year 2003.

3. RESULTS AND DISCUSSIONS

In foreign literature there are vague references about the behaviour of some apple trees cultivars on pests attack (Graf et al., 1992; Gagne și Baret, 1994) and only one reference about the behaviour of the spotted tentiform leafminer (Nyrop et al., 1990). These last researchers showed that although mines distribution on leaves varies by cultivars, the first generation mines distribution on leaves follow in parallel the eggs distribution for all cultivars.

A larger number of mines were present at cultivars with more leaves on a sprout (Idared cultivar, for example), on leaves 2-4. Eggs were layed on the first three leaves for cultivars with less leaves (Cortland cultivar, for example), as a consequence, the mines followed this distribution.

From the 10 apple trees cultivars within the orchards of the Research Institute for Fruit Growing - I.C.D.P. Mărăcineni, the most resistant on leaf miner - *Phyllonorycter corylifoliella* Hb. attack was Jonathan cultivar with an average degree of attack of 8.55%, as one can see in table 1.

Table 1. Some apple cultivars' behaviour on leaf miner's (*Phyllonorycter corylifoliella* Hb.) attack at I.C.D.P. Mărăcineni - Argeș, in the year 2003

No.	Apple tree cultivar	Frequency of attack [%]	Intensity of attack [%]	Degree of attack [%]	
				Limits	Average
1.	Generos	43.00	39.18	12 - 21	16.85
2.	Idared	28.00	36.25	8 - 12	10.15
3.	Florina	56.00	33.04	15 - 24	18.50
4.	Pionier	90.00	57.61	43 - 61	51.85
5.	Starkrimson	96.00	46.35	39 - 50	44.50
6.	James Grieves	84.00	50.35	38 - 49	42.30
7.	Prima	98.00	63.41	54 - 69	62.15
8.	Golden Delicious	58.00	47.58	23 - 32	27.60
9.	Romus	81.00	42.47	28 - 42	34.40
10.	Jonathan	38.00	22.50	6 - 11	8.55

Table 2. Average density of mines per leaf for different apple cultivars at I.C.D.P. Mărăcineni - Argeș, in the years 2003 and 2004

Apple trees cultivar	Year					
	Mines per leaves (average density)	2003		2004		
		Difference		Mines per leaves (average density)	Difference	
		to Golden Delicious cultivar	to Jonathan cultivar		to Golden Delicious cultivar	to Jonathan cultivar
Golden Delicious	2.25	-	-1.46	1.77	-	-1.35
Jonathan	0.79	+1.46	-	0.42	+1.35	-
Florina	1.07	+1.18	-0.28	0.70	+1.07	-0.28
Generos	1.61	+0.64	-0.82	1.29	+0.48	-0.87

A close degree of attack was noticed to Idared cultivar, the average value being 10.15%. The highest degree of attack was observed to Prima and Pionier cultivars (62.15 and 51.95%), 53.60 and 43.30% more than for Jonathan cultivar.

There are also differences among cultivars as for the average density of mines per leaf. The lowest values were observed to Jonathan apple trees (0.79

mines per leaf in the year 2003 and 0.42 in the year 2004). The highest values were observed to Golden Delicious apple trees in the year 2003 (2.25 mines per leaf) and to Generos apple trees in the year 2004 (1.29 mines per leaf), as one can see in table 2.

4. CONCLUSIONS

The leaf miner - *Phyllonorycter corylifoliella* Hb. is one of the pests which produce important damages in apple trees orchards, the areas with the highest densities of populations, where damages are significantly larger, being concentrated mainly in the center of the country (Frăsin Loredana, 2005). Jonathan and Idared apple trees cultivars have resistance on leaf miner attack, the degree of attack having average values of 8.55%, and 10.15%. Prima and Pioneer apple trees cultivars were the most affected, with a degree of attack of 62.15% and 51.95%, which is 53.60% and 43.30% more than for Jonathan apple trees cultivar. The average density of mines on a leaf was different in terms of cultivar. The lowest measured value was for Jonathan apple trees cultivar, with an

average density of mines on a leaf of 0.79 in 2003 and 0.42 in 2004.

Golden Delicious in the year 2003 and Generos in the year 2004 presented the highest density – the average value being 2.25 for the first and 1.29 for the second one.

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