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President's Allocution

*We have the special pleasure to let you know that the Review of our University, „**Bulletin of Scientific Information**", having ten years of consecutive issue, it achieved the recognition of the **National Council for Scientific Research in Higher Education (NURC)**, being comprised in the category „**National Reviews – C Category**".*

*So, the Bioterra University review „**Bulletin Of Scientific Information**" works as a real platform for the information and exhibition of the most recent and valuable research in the agricultual field and connected sciences (food industry, agro-tourism, ecology, agricultural economics etc.).*

This way I express my gratitude the contributors to our review, authoritative academic and univeritary names of whose studies are found in the selection done by the scientific board of the review, co-workers with whom we have strong relations of partnership and mutual support in the development and course of some conjointed research projects.

I wish to the review many and consistent issues.

Prof. Floarea Nicolae, PhD
President of Senat Bioterra University Bucharest

Editorial Board's Allocution

„Bulletin of Scientific Information" magazine was published at the initiative of several young researchers with the direct support of Bioterra University Board, having the first edition in 1998.

Years passed and this magazine has enriched continuously its scientific and didactic dowry, becoming slowly but surely a veritable platform for academic information.

In 2008 the magazine changed itself into a new more dynamic and attractive format, being published in special graphic conditions (full-color) and fully in English language. Also, since 2014 the magazine benefits of a modern website: www.bsi.bioterra.ro.

Every year the editorial team has increased the number of members; nowadays it brings together numerous personalities of the scientific and academic world from different foreign countries, thus being a guarantor of a high scientific level.

Thanks to all our readers and collaborators that through their suggestions, criticisms and feedback contribute to the improving of our magazine quality.

Prof. ATUDOSIEI Nicole Livia, PhD
Vice Rector of International Relations

Prof. GALAN Catalin, PhD
Vice Rector of the Educational Activity

Summary:

BULLETIN OF SCIENTIFIC INFORMATION

PHENOLIC COMPOUNDS OXIDATION IMPACT ON THE ODORANT VARIETY PROFILE OF WHITE WINES: SAUVIGNON BLANC VARIETY IN PARTICULAR CASE

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Abstract: *The paper addresses the incidence of the oxidation of phenolic compounds on white wines' aromatic profile; it treats the particular case of the Sauvignon Blanc variety, whose aromatic profile is dominated by the presence of the volatile thiols that are highly reactive; due to their high reactivity, the volatile thiols combine with the oxidized forms of (+) - catechin and (-) - epicatechin which are specific polyphenols (i. e., flavan-3-ols) for the white wines varieties. The strong oxidizing nature of these polyphenols affects the efficacy of the treatment with sulphur dioxide which is indented for the volatile thiols' protection. Comparative experiments have proved that Sauvignon Blanc wines elaborated only from free run juice have higher concentrations of volatile thiols than those wines produced from the pressed stum that comes from the same technological batch.*

The explanation is that in the pressed stum the concentrations of (+) - catechin and (-) - epicatechin are significantly higher, so the oxidation of volatile thiols is higher. The key to the development of Sauvignon Blanc wines with an expressive aromatic profile is the effective and sustainable protection of grapes in the technological stages for processing and obtaining the stum, when it is recommended the antioxidant protection of grapes, the destemming followed by an light crushing, the slow pressing in closed pneumatic presses under inert gas protection and the enzymatic treatment for the extraction of aroma's precursors from the peels and the separation of stum's fractions. Equally important is the contribution of both exogenous and endogenous glutathione (powerful natural antioxidant) by treatment with yeast derivatives which are rich in this compound.

Key words: *volatile thiols, flavan-3-ols, Sauvignon blanc, oxidation.*

Introduction

Contribution volatile thiols profile varietal wines odorant is known for over 20 years thanks to the results of preliminary investigations conducted by reputable authors ([2], [10]). These studies have contributed to the loss of typicality interpretation aromatic varietal of white varieties; these losses were observed in wines produced in oxidative technological conditions [3].

Among white varieties rich in volatile thiols fragrances that are key to their sensory expressiveness, most importantly Sauvignon blanc. These volatile thiols are compounds which have sulfhydryl groups in their chemical structure such that they are very sensitive to oxidation due to the enhanced reactivity of these groups; after certain chemical reactions with oxidized phenolic compounds oxidative degradation occurs

Figure no 01 - Sauvignon Blanc variety
(Source: http://winefolly.com/; https://s-media-cache-ak0.pinimg.com)

after these volatile thiols which changes its structure and lose their typical varietal character of Sauvignon blanc odorant [6].

Among the phenolic compounds susceptible to oxidation flag in white varieties (and especially the Sauvignon Blanc) most representative flavan-3-ols are of which were found in higher concentrations (+) - catechin and (-) - epicatechin; oxidized forms of these two compounds exhibit a different reactivity to the volatile thiols; the reactivity of the oxidized forms of (+) - catechin and (-) - epicatechin with volatile thiols 2-furanmetantiol decreases in the order (which is a primary thiol), 3-sulfanilhexanol (which is a secondary thiol) and 4-methyl-4- sulfanilpentan-2-one (which is a tertiary thiol); nucleophilic reactivity this ranking is attributed mainly to steric effect that diminishes the thiol primary to tertiary thiol; Furthermore, (-) - epicatechin is more reactive than the (+) - catechin to said volatile thiols in acid medium and oxidizing chemical conditions (in the presence of Fe3+ and oxygen); due to the higher oxidation capacity of these compounds has been reported to induce a loss of efficacy and sulfur dioxide in the protection of antioxidant provides stability volatile thiols [6]. The issue of oxidation compounds fragrances to Sauvignon Blanc variety (Figure no 01) was approached by many authors ([1], [4], [5], [7], [8]).

Materials and methods

The importance of managing nitrogen and glutathione. The experiments took into account the effective management of nitrogen deficiency, since Sauvignon blanc is very affected by the deficiency of nitrogen in the plant. Very recent studies have shown that eating nitrogen optimal vineyard Sauvignon Blanc, determined hubs vine to produce glutathione; this compound almost miraculously is a tripeptide which arrived in grapes play a protective antioxidant because they exhibit reactivity increased to oxygen (which he hangs disulfide) and to phenolic compounds such as flavan-3-ols mentioned above (which turns them into quinones). So, in the absence of nitrogen nutrition of the vine, glutathione content of the harvest will be very low (inconvenience) due to its strong reactivity of the above [4].

The importance of quality harvest. Another issue addressed in research methodology aimed at assessing the potential agrobiologic correct the Sauvignon Blanc varietal. A

poor harvest in precursors of flavor and rich in phenolic compounds can not ever get a Sauvignon Blanc with typical sensory profile and expressive. The stage was considered optimal harvest when the grapes had a crunchy taste character emphasizing a balance between concentration of sugars (sweetness) and the titratable acidity (sour taste). Typically, the sugar concentration is recommended situated around 220 g/l. An early harvest dictated by weather considerations, even if an alternative will cause to obtain a wine with a profile odorant pyrazine (predominantly plant) less agreeable taste and character loosely and without personality.

The research methodology. The novelty of the work methodology will be highlighted at every stage of technological development of the wine. The grapes were harvested raw material-the same plot, the same wine in the technological flow.

Results and discussions

They will be revealed still respecting the sequence of steps and technological development operations wines highlighting and commenting on the innovations applied in the comparative experiments.

Results and comments in step processing harvest

Oxidation protection. Is mandatory and can be effected only solution of SO2 at a dose of 30-50 mg/l, administered directly grapes (excluding tannin which is the enemy of glutathione and ascorbic acid which facilitates the formation of compounds with superior ability oxidation).

Destemming. Follow only peeling grains from the cob, so that they remain whole in order to facilitate the subsequent operation of separation is one.

Sorting harvest. It can be performed quickly and effectively with appropriate equipment (eg DELTA VISTALYS).

The enzymatic treatment. It is indispensable as it provides rapid and effective extraction of fragrances precursors variety cysteinyl (specific varietal Sauvignon Blanc) from grape husks. Only when it is closed pneumatic press under inert gas protection (experimental version) and without inert gas protection (version control), by administering an identical dose of 3 g / hl enzyme preparation extraction and rinsing; the enzymatic treatment is applied at the beginning of the pressing cycle of the pulp. The dose chosen must extract much of the flavor precursors and a low proportion as phenolic compounds. The treatment before fermentation maceration enzyme requires no cold pulp as it ensures the passage of the solid fraction (grapes husks) in the liquid fraction (stum) a sufficiently high bulk precursors of flavor that will further ensure varietal typicality of variety.

Pressing sorted grapes. Closed pneumatic press operation is performed (for example, the range XPERT); seeks only issue must of vacuoles beans through a mechanical action housekeeping that does not lead, not to increase the concentration in phenolic compounds (for the reason above mentioned), but no increase content in compounds with disagreeable herbaceous character.

Collection and protection must. It was provided with sulfur dioxide (at a dose of 20-30 mg / l), respectively to the control and yeasts rich in glutathione derivatives (for example, BATONNAGE plus 20 Kd) in a dose of 20 g / hl in the experimental variant.

Commenting on the results. Processing comparative experiments have demonstrated that wine grape stum produced only without pressing the grapes (experimental version)

had higher concentrations in the volatile thiols odoriferous than the developed mixed with stum press without pressing the grapes (version control); came from the same batch of the stum technological (version control); in comparative sensory examination of wines obtained without pressing the grapes only and stum only release results from the same batch of the stum technological notable differences were noted; wine without pressing the grapes being more expressive of sensory point of view than the derived only from wine press. The explanation is that the press stum to without pressing the grapes stum to concentrations in the (+) - catechin and (-) - epicatechin are significantly higher, so odoriferous volatile thiols oxidation is more intense.

Results and comments in the stum processing stage

Importance of assimilable nitrogen from stum. Very important is the fast assimilable nitrogen concentration in the stum which should be at least 190 mg / l. Otherwise, the content should be corrected by the addition of exogenous (as will be specified below) for yeast strain chosen to have sufficient resources to be able to produce nitrogen glutathione antioxidant protection needed to ensure efficient and sustainable. Of the transactions that make up this stage the most important technological settling and stalls are cold stum clarifying the same. However, recent research has shown that regardless of the size of the fermentation tank, the turbidity of the stum not interfere with the production of volatile thiols variety under the action of yeast strain during the AF [9].

Settling stum refrigeration. Aims to remove coarse and medium grape remains after showing a stum clarified that contain fine grape remains. In these circumstances, refrigerated stum will not fall below 8 to 10 ºC.

Cold stabulation of the clarifying stum. Stabulation is recommended cold (about 5 ° C) may be of varying duration from several days to several weeks. Already demonstrated the beneficial role in the production of this wine stabulations on cysteinyl flavor precursors is not yet fully understood, there are several hypotheses; the most plausible are played briefly below.

1. Loose housing hypothesis cold stum alter its composition, as a result of natural phenomena (under-researched and poorly understood) in such a way that the conversion efficiency of precursors in free flavors typical of the variety is stronger during subsequent AF.

Hypothesis 2. Loose housing to cool the stum facilitates the formation of a new olfactory precursor with a strong influence what remains to be identified. In support of the two hypotheses is placed diminishing content in C6 compounds disagreeable herbaceous character that has always been reported during these cold stabulations of stum [8].

Differentiation experiments. Operation of stabulation was applied only to the experimental variant.

Results and comments in fermentation stage

The most important role it has selected yeast strain choice and nutrient needed throughout its fermentation process and the fermentation temperature.

Choosing selected yeast strain. The strain chosen must contain viable cells in its proper enzymatic equipment that has high concentrations of the two essential enzymes, carbonsulfurlyase and alcoholacetiltransferase, which converts precursors in cysteinyl free varietal aromas typical of the variety; thus carbonsulfurlyase

transforms cysteine - 3 - MMP 4 - MMP (4 - methyl - 4 - mercaptopentan - 2 - one that identifies with the aroma of broom green and cranberry) and cysteine - 3 - MH 3 - MH (3 - mercaptohexanol that identifies with the aroma of passion fruit and grapefruit); in turn, alcoholacetiltransferase turns 3 - MH 3 - MHA (ethyl 3 - mercaptohexanol, is identified with like flavor derived from the alcohol). It recommends appropriate yeast strains selected (eg 53 or Fermol Fermol PMD mustards R) at doses of 25 g / hl ensures a viable population of at least 2 x 107 cells / ml guaranteeing a fermentative process regularly and fully.

Choosing nutrient. Is not suitable addition of diammonium phosphate (DAP) as nutrient in the AF stum because it generates a reduction in the production of volatile thiols [9]. Only the intake of the amino acid glutathione and directly assimilated exercises a favorable impact on cell multiplication and limit the adverse effects caused by the oxidation of proteins and amino acids within cells viable yeast; such a contribution is secured with a nutrient adequacy (as FERMOPLUS ENERGY GLU) at a dose of 30 g / hl run in two innings, stage debut fermentation process and then the final stage of it when the density of the stum decreased around value of 1040 g / l.

The thermal regime. Specialized foreign literature promotes the values of 18-20 ºC enabling enzymatic hydrolysis of strong varietal aroma precursors in free cysteinyl typical of the variety under the action of enzymatic equipment suitable yeast strain. Many practitioners are habit to ferment the stum at 13-14 °C, in the idea that at this level of temperature aromas released at this time are better protected. This approach lacks any scientific basis for the critical thermal limits, the question is uncertain protection of free flavors was set at 22 ºC.

Explanatory comments. All parameters of the fermentation were identical, except for the yeast strain and the fermentation temperature; the experimental variant strain was used Fermol PMD 53 and a fermentation temperature of 18-20 ° C, and the control variant strain Fermol mustards R fermented stum to 13-14 ° C.

Results and comments in post fermentation stage

This step aims technological heritage varietal wine odorant result.

Providing antioxidant protection. Not recommended small doses of SO2 or treatment with ascorbic acid because it favors formation of compounds with potential for oxidation of the smell of curry is the most important representative [5].

Primordial beneficial role of glutathione. The most effective protection it provides but the wine's intrinsic content of glutathione. Recent research has demonstrated the importance of its presence in the wine ensure sustainable and effective varietal aromas typical of the variety [3].

The prejudicial role of phenolic compounds. Of these compounds, flavan-3-ols such as (+) - catechin and (-) - epicatechin accelerates the reduction of the concentration of the volatile thiols even at low concentrations (a few tens of mg / l) as a result of their combination with glutathione do not it may provide antioxidant protection. Gradually the concentration of volatile thiols may be reduced by the disappearance of glutathione [7].

The addition of yeast rich in glutathione derivatives and peptides. Although foreign literature specialist very recent [5] recommends to preserve the typicality aromatic wines Sauvignon matured on sediment initial yeasts that generates progressively new quantities of glutathione

in an environment strongly reducing believe that antioxidant protection could be much safer, simpler and more effective by administration of an exogenous addition of yeast rich in glutathione derivatives and peptide at a dose of 30-40 g / hl.
The difference is variants. Only the experimental solution was treated with yeast derivatives rich in glutathione and peptides (e.g., GLU or BATONNAGE ENERGY FERMOPLUS plus 20 Kd) in a dose of 40 g / hl.

Conclusions

Sauvignon blanc wine obtained by applying the experimental variant was clearly superior in terms of expressiveness and typicality to the result of sensory control variant. In stage before fermentation, a decisive role it played using only the alcoholic fermentation of the stum without pressing the grapes protected derivatives of yeast rich in glutathione; during alcoholic fermentation was decisive fermentation temperature of 18-20 ° C; in turn, use the postfermentation stage treatment with derivatives of yeast rich in glutathione and peptide provided remarkable protection sensory profile "built" in previous technological steps.

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THE MANAGEMENT OF PROFESSIONAL TRAINING IN AGRICULTURE

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Abstract: *There is a real need of qualitative and quantitative development in the adults continuous vocational training in the Agricultural field. On the quantitative development background there still is the quality problem of the vocational training programs. It is considered that the Trainer's professionalization which means transition from an occupational status to professional one can solve a lot of problems.*

Key words: *learning concept, trainers, agricultural field.*

Introduction

The necessity of quantitative and qualitative development of the continuous training programs for adults, in the domain of agriculture is an objective reality, based on the following aspects:
- the rapidity of actual changes generally in economy and especially in agriculture, in compliance with the new lasting agricultural developing concept;
- reconsideration of the perpetual learning concept.

Romania occupies (with almost 2 %) one of the last positions in Europe, regarding the inclusion of adult population within training programs. As a result, with a declared target (in national official strategies) of minimum 8% of the active population included, until 2013, in continuous training programs, we presently witness a real explosion of professional formation needs, especially in the field of rural development.

In the context of quantitative development the problem of training program quality will be raised more urgently. The present legislation of professional training for adults will be permanently modified, to be suitable both for the formation need and request, but also for the new European initiatives (such as the European qualification frames - EQF). The improvement of the quality of training, regardless of the "quality model", cannot be conceived without ensuring the quality of fundamental resources for any training program - especially, the Trainer.

Materials and methods

» Who are the Trainers included in the performance of the professional training for adults?

The proliferation of the "Trainers' training" in all the activity domains and the lack of a well-defined status of the Trainer were the causes that led to the "Trainers" being extremely different. The differences refer to:
- theoretical bases for professional training;
- desired targets / objectives of formation / domain of formation;
- formation time (from three days to eight weeks or ten weeks);
- the method of assessment and certification;
- the manning and the ulterior use of the Trainers.

The Trainer's activity is mainly occupational - and Trainers become, out of passion, the best professionals of that domain, the activity of formation being usually regarded as a "supplement" of the basic attributions.
Within this context, the lack of trust and even the confusion of most formation suppliers is natural, as well as the lack of trust of the hiring institutions regarding the Trainers:
- Which Trainers are the best - The "theory" Trainers or the "practice" Trainers?
- What is the best program that needs to be graduated in order to become a "good" Trainer?
- How much formation does a Trainer need to become "competent"?
- What kind of experience needs to be required to the Trainers?
- How can the Trainer's activity be rated?
Apart from the problems of the Trainer, the possibility of acquiring professional competence throughout practicing the occupation at the working place leads to the appearance of a new set of questions:
- Can the theory Trainer and the practice Trainer be assimilated to the Trainer?
- If so, must he possess all the competence of the "universal" Trainer at the same level with this one?
- If not, what are the necessary competencies for the practice Trainer, so that he could carry out the attributions required by his working Contract?
It is considered that the professionalization of the Trainer, meaning the changing of the Trainer from an occupational to a professional status, can lead to the solving of many problems.
» Who are the professionalized Trainers ?
The Trainer "profession" is considered to be a class of undergoing activities, characterized by:
- possessing some knowledge highly specialized, their specific methodology of application in practice, the latter requesting initiatives and creativity;
- specialized formation with an important practical component;
- a well-defined social status, the social recognition of the monopoly in the respective domain;
- the autonomous practice, which implies the individual responsibility of the one who performs it;
- an intrinsic system of values, transmitted throughout the specialized formation and respecting a professional , specific moral code;
- the integration of practice within the training program, concomitant with the research, formation: the best practitioners become both researchers and Trainers - both at the level of initial formation and at the continuous training;
- the social insertion throughout the professional associations and organizations, which possess the right of advice over the training and accreditation, guarantees the status of the Trainer, impose the specific moral codes, imposing the control over practice in the domain, on professional bases (not administrative).

Results and discussions

In the professional training there is not a well-determined status for the Trainer. The Trainer's activity is controlled by groups and institutions, mainly on bureaucratic assessment criteria (number of students, number of groups, number of hours, pages of the manual, products and others).
The transition from the occupational status to the professional one would mean the mutually agreed adoption by the Trainers of a common

concept of "Trainer", characterized by:
- An extended concept of "Trainer" - which contains the recognized categories of Trainers;
- The competences common to all the categories of Trainers;
- Common terms of reference for training the Trainers in different domains;
- Common certifying procedures for different categories of Trainers.

» Main objectives within the continuous training:

a) the development of the training and advancing level of the agrarian producers, corresponding to the level of present demands;
b) diversification of continuous training programs destined to the agrarian producers in the agriculture, pisciculture, forestry and food industry domain, according to the European Framework of Qualifications;
c) the awareness of the rural population and training beneficiaries over the necessity of the investment growth in the human capital used in agriculture;
d) the quality increase of the continuous training programs (FPC);
e) the growth of the investments in training throughout the founding of new professional training centers, some extension centers and some competence assessment centers in their own network;
f) development of some training programs, adapted to the present requirements, in parallel with the elaboration of a system of assessment and impact indicators, for ensuring the quality of the FPC program;
g) the improvement of the professional training offer for developing the access to the continuous professional training of the under qualified and older persons, who presently occupy an important percent in agriculture;
h) the development of some innovative methods for learning and professional training.

The purpose of training in the field of agriculture:
- The stimulation of occupying the workforce in the rural environment;
- The rising of the professional competence level of the agricultural producers;
- The facilitation of working manning of the persons belonging to the rural environment, according with the tendencies of the workforce market at the regional level;
- The adjustment of the request and offer of qualified workforce in the rural environment, working in agriculture;
- The maintaining and development of the professional competence of the agricultural producers;
- The stimulation of workforce in the rural environment;
- The stimulation of the Contractor service in the rural environment, for the persons working in agriculture;
- The increase of the chances of professional (re)integration for the people in agriculture who belong to the rural environment;
- The reinsertion of a part of the workforce on the professional market in the rural environment;
- The growth of the preparation level for corresponding to the real demands for qualified personnel of the economic agents, in the field of agriculture, pisciculture and food industry in the rural and urban environment.

» The role of the professional training programs organized within the A.N.C.A. network

The organizing of some updated professional training programs in the field of agriculture contribute to the development and diversification of professional competence

of the producers and agricultural processors from small and middle farms, throughout the initiation, qualification, requalification and perfecting of the people in the rural environment, who are in search of a workplace.
The main features of the professional training programs ensured by the National Agency for Agricultural Consultancy are:
Specific activities:
1) identifying the needs for professional training in the field of agriculture, pisciculture and food industry;
2) planning the professional training activity;
3) assessing the professional training activity.

» The governing principles for the professional training in the domain:
- morality and legality;
- ethics and professionalism;
- efficiency;
- ensuring the equality of chances in the work market for the people belonging to disadvantaged or difficult areas;
- confidentiality;
- The personnel involved in the realization of the training activity for adults in the domains of agriculture, pisciculture and food industry;
- Consultants within OJCA and the Agriculturist's House from ANCA network involved in applying the professional training programs;
- The course responsible personnel;
- Trainers for theoretical and practical instruction hired from specific institutions: University and Specific High Schools professors, Specialists from other local institutions and organizations.

» The present situation of agricultural occupations in Romania:
- Reasons that justify the necessity of significant changes regarding the type and the content of agricultural occupations:
- new occupations have emerged (Agrotourism, Ecologic Agriculture and others);
- the content of many occupations is modified within 2-3 years and the COR has not been revised in agriculture for ten years;
- some occupations included in the COR are no longer required;
- demands for traditional crafts for exploiting natural resources, with the protection of the environment and of the value of the local traditions.
OJCA responsibilities as a supplier of continuous professional training.
- elaborates, coordinates and implements programs of professional training, to be in compliance with the needs of the FPC beneficiaries in the field;
- cooperates with the economic agents, public authorities at the local level, other professional training suppliers from the country and abroad, in order to achieve the realization and development of FPC programs.

Conclusions

The organization and the development of the assessment for the students who attend the professional training programs throughout the ANCA-OJCA network, is achieved according to the norms of organization and development established by the ANCA Decision No.1/2000.
The Rules for organization and development of the FPC programs from the ANCA-OJCA are revised on a periodical basis.

» Applying conditions for the courses organized for the FPC suppliers in the ANCA-OJCA network
Applying for courses is done by completing an application form which contains the

identification data, the domicile data, the training level acquired at the date of the application, with proving documents. It is recommended that the training beneficiaries apply to attend a training program, organized in the ANCA network, at a training supplier located as near to their residence as possible. The Admission for the classes is determined by the following conditions:
- the Applicant should possess a Secondary School Diploma;
- the Applicant must pay the admission tax of 20 RON/course (2008), according to the fees established every year by an Order issued by MADR (for example, the fees corresponding to the year 2008, apply according to the MADR Order 69/ 04.02.2008) AND 40 RON/ CNFPA authorized course;
- the Applicant must accept the starting date of the course, established by the training supplier, according to the Contract approved by the credit release authority;
- the Applicant must accept the compliance with the conditions of the development of the course program, both for the theoretic and the practical program. The graduation conditions of the training program and the obtaining of the Graduation Certificate;
For graduation of the courses the students have the following rights and obligations:
- the students must certify the presence at the practical and theoretical training program;
- the students must take part in the competence assessment program, which consists of a written exam sustained in front of an assessment committee and a practical exam sustained at the practical training place;
- the students must obtain at least grade 5 at the evaluation of the theoretical and practical knowledge;
- the students who do not obtain the minimum grade at the first assessment can require a new assessment;
- for the issuing of the Graduation Certificate, the students must pay the Certificate Tax (according to the MADR Order 69/04.02.2008 - in quantum of 50Ron/Certificate for the license to drive a tractor and 40 Ron/Certificate for other qualifications, and the tax for the authorized courses organized by CNFPA is 60 Ron/ Certificate);
- the students declared rejected have the right to forward an appeal.

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RESEARCHES CONCERNING CAPACITY OF FRUCTIFICATION OF SOME APPLE VARIETIES, GROWN IN SUPER-INTENSIVE SYSTEM

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Abstract: *Fruit production is depending on variety, technology applied and environmental conditions. Rubinola variety behaves like the when the autumn variety is grown in the warm climates of Bucharest. Topaz and Goldrush has ripening varieties and behaves like winter varieties later. Production potential is very high, Such as in the 5th year from planting trees between yield is 53.7 t/ha (Topaz) and 67.5 t/ha (Rubinola). Goldrush variety is highly productive, making many fruits on the tree but smaller compared to the first two varieties. The production of this variety exceeds to 63 t / ha. Research has shown that the high yield after year, like takes a decrease of 38.3% - 67.7 % with yield. That trees is making more fruits has more likely to occure alternating yield.*

Key words: *apple, productivity, variety*

Introduction

The researches related to the management of tree and obtain new varieties of trees have always been in attention of growers and breeders. The new apple crop systems have led to very high yields per hectare due to the use of rootstocks with small vigor and varieties with small fruit branches, all supported by a high-class culture technology. A variety created in certain geographical areas don t has the same fructification capacity when is grown in another environment.

Therefore researches concerning acclimatization and fructification varieties have an important role. In recent years they were created many varieties of apple and as a result of free trade was possible to grow them anywhere. It was found that some varieties produce more fruit when grown in areas other than those in which they were created, and others did not express their productive potential.

Thus, apple variety Generous, romanian variety, created at Voineşti, grown in warmer areas produce more fruit and better quality than when is grown in the area of origin. The researches effectuated in the experimental field at the Department of Horticulture Faculty of Horticulture in Bucharest on certain varieties of Fuji showed that are not for all varieties prerequisites for growth and development. Some varieties have formed small fruit, while others needed a longer growing season for developing. Romanian researchers drew the attention of growers in our country very often, must cultivate only varieties that have been tested and verified in field.

Materials and methods

The trials were effectuated in a modern plantation, established in 2010, on the reddish brown soil specific in Bucharest area. Were studied varieties, Rubinola Topaz and Goldrush. The three studied varieties were planted in rows oriented in the N-S to using efficiently the direct light and avoid mutual shading. Planting distances were determined according to rootstock vigor, vigor variety, land fertility and availability of technical application of technology. Based on these characteristics the distance between rows was 4 m, and the distance between plants in the row was 1 m. In these circumstances the number of trees per hectare was 2500.

The soil between trees was kept clean to weeds with the help of herbicides and mechanical mower. The land between rows was kept grassy, and grass was mowed repeatedly during the vegetation period to avoid competition between root system of trees and grass.

The orchard was provided with system for support the trees (espalier), anti hail net and drip irrigation system. During the research period were made observations regarding the start of phenophases generative and vegetative organs, the trunk circumference measured at a height of 20 and 150 cm using roulette.

The number of fruits formed was determined by counting the flowers in blossom period and after blossom when the fruits had 10 mm in diameter.

Fruit production was determined by harvesting the fruit from the 3 repetitions when the fruits have reached maturity. Determination of the evolution in dynamic of the fruits mass was effectuated in the field and laboratory, by measuring the height and diameter of the fruit.

Results and discussions

Immediately after shaking petals were made observations on the binding of the fruit. Compared to the old varieties , the varieties studied had binding percent to flowers bigger. This percent influences the fruit production on every tree. The Goldrush variety had the highest percentage of fruit formed .

Table 1 - Capacity to binding of fruits

Variety	% binding			Average (% binding)
	R1	R2	R3	
Rubinola	11	14	10	11,6
Topaz	12	8	12	10,6
Goldrush	14	12	13	12

The three varieties studied behaved very well at pollination and fertilization, and the researches period were not fruit losses due to binding the flowers. Observations on the length of vegetation period and the time required for growth and development fruit showed the following:

The fruits to Rubinola variety arrived to harvest maturity in late September, beeing consumed from October to December. At Topaz variety the fruit is harvested later and consummates their maturation during storage. In the environmental conditions in Bucharest and variety Topaz behave as autumn variety and is fit for consumption in September.

Goldrush cultivar is a variety of winter and needs several days to reach maturity. Fruit are harvested in late October.

During the growth of the fruit were observed marked differences from one variety to another in terms of the size of the fruit. At Rubinola variety the fruits increase fast being followed by Topaz and Goldrush.

The number of days needed growth and fruit development represents 56.2% from active vegetation period at Rubinola variety (130 days) and 63.8% at Topaz variety (141 days), the starting point being the end of flowering. At Goldrush variety the number of days needed growth and fruit development represents 83.2% from active vegetativ period. Given that the vegetation period is approximately the same length, variety Goldrush requires 184 days for fruit maturity, with 43 days more than the variety Topaz.

Table 2 - The length of vegetation period (2013 - 2014)

Variety	Start blooming	Leafs fall	Vegetation period (nr. days)	
			Active vegetation	Dormant
Rubinola	5 april	25 november	224	141
Topaz	8 april	25 november	221	144
Goldrush	8 april	25 november	221	144

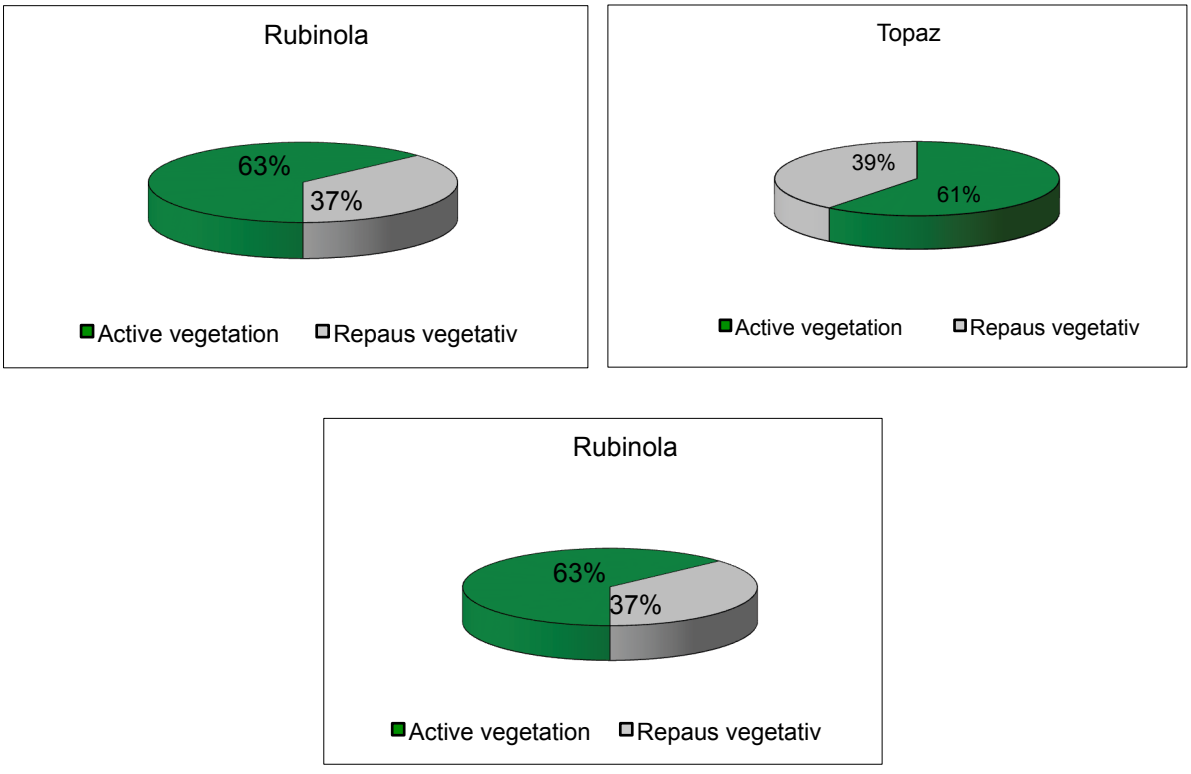

Fig. 1 - Percentual duration of vegetation period to Topaz and Rubinola varieties

Table 3 - The number of days needed growth and fruit developement (2014)

Variety	End of blooming	Fruits maturity	Days from blooming to maturity
Rubinola	14 april	28 aut	130
Topaz	20 april	8 september	141
Goldrush	17 april	17 octomber	184

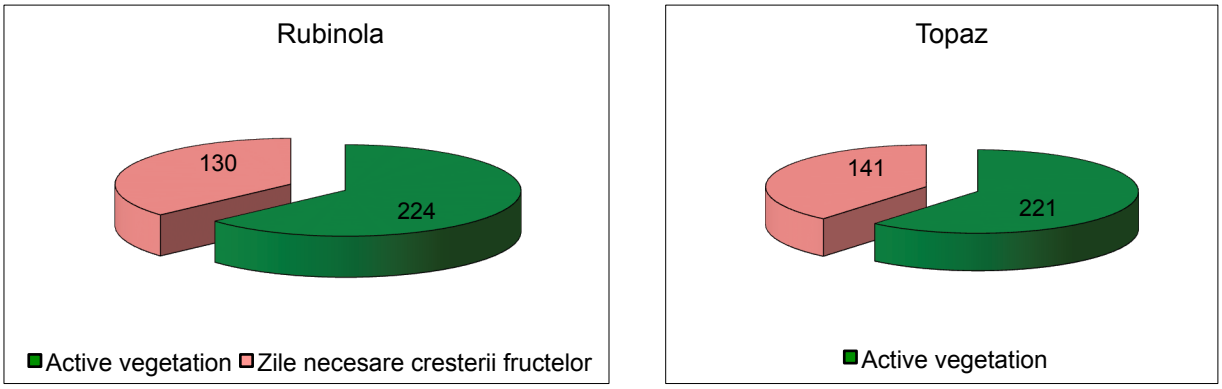

Fig. 2 The number of days needed growth and fruit development at Rubinola and Topaz varieties

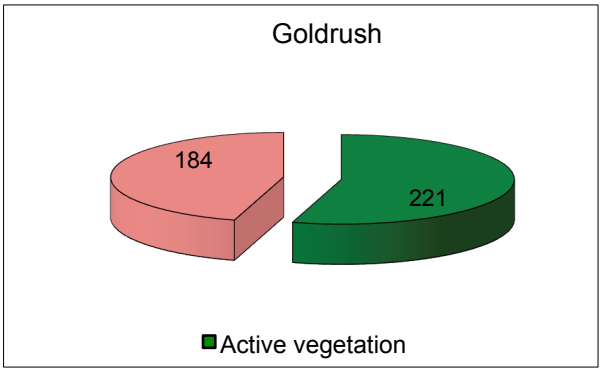

Fig. 3 The number of days needed growth and fruit development at Goldrush variety

To determine the production of each variety, the fruits were harvested from the trees, studied, weighed, counted and was determinated average weight of fruit. Based on measurements made the average weight of a fruit at Rubinola variety was 230 g weight range of fruit being between 190 and 245 g. The Topaz variety, formed fruit with an average weight of 215 g, minimum and maximum weight of the fruit beeing between 190 and 225 g. Goldrush variety had in 2014 fruit with average weight of 190 g. The minimum weight of fruit obtained at Goldrush variety was 160g and maximum of 205 g.

Fruit production obtained in 2013 was on average 27 kg / tree at variety Rubinola, 21.5 kg at Topaz variety, and 25.2 kg at Goldrush variety.

At the end of 2014 was obtained a lower production compared to 2013, while the technology was the same. The significant decrease in production is explained by alternation of fructification, which is frequent at this species.

Following the alternant fructification, production decreased in 2014 compared to 2013 by 38.3 % at Rubinola variety with 57.2% at Topaz variety and 67.5 % at Goldrush variety. The results obtained in terms of production capacity of the varieties studied confirm the results obtained from producers in countries with a tradition in pomiculture. Big productions obtained demonstrates the ability of these varieties to adapt to our conditions and to express their productive potential to maximum.

These high yields are obtained even in the 4th year of the establishment of the plantation. These results obtained allow as with some reservations to conclude that we can expand in production these apple varieties (Figure no. 4, 5 nd 6).

Figure no. 4 - Topaz apple varieties
(Source: http://www.sagesapples.com/apple/topaz4.jpg)

Figure no. 5 Rubinola apple varieties
(Source: https://www.i-chef.biz/wp-content/uploads/2014/12/RedDevil-apple.jpg)

Figure no. 6 Goldrush apple varieties
(Source: https://s-media-cache-ak0.pinimg.com/736x/aa/d8/c7/aad8c78502364b07a2606dbb5ec52954.jpg)

Conclusions

» The varieties studied behaved very well in intensive conditions and planting distances established provides the necessary space to development.

» Vertical axis crown is well suited for the varieties studied and its maintenance is very easy.

» The yield obtained at the 3 varieties were very high, similar to those obtained in other countries. In favorable years apple production per hectare exceeds the amount of 65 t.

» The alternation in fructification manifests itself in the three varieties, which makes production to fluctuate from year to year .

Table 4 - The productive potential (fruit number / pom)

Variety	Repetition	Vertical Axis			
		Fruits number/pom		Yield /tree (kg)	
		2013	2014	2013	2014
Rubinola	R1	135	98	31,0	22,5
	R2	130	47	29,9	10,8
	R3	125	74	28,7	17,0
Average		**130**	**73**	**27,0**	**16,7**
Topaz	R1	119	62	25,5	13,3
	R2	144	29	33,1	6,2
	R3	133	38	30,7	8,1
Average		**132**	**43**	**21,5**	**9,2**
Goldrush	R1	147	58	27,9	11,0
	R2	156	31	29,6	5,8
	R3	140	42	26,6	7,9
Average		**147**	**43**	**25,2**	**20,5**

Table 5 - Productive potential (Average yield t/ha)

Type of crown	Rubinola		Topaz		Goldrush	
	2013	2014	2013	2014	2013	2014
Vertical Axis	67,5	41,7	53,7	23	63	20,5

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YERSINIA ENTEROCOLITICA - RESEARCH REGARDING THE INCIDENCE IN FRESH PORK MEAT

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Abstract: *Yersinia enterocolitica occurs in the ground and fresh water ecosystem, especially in the cold climate areas. It can occur in meat, fresh milk and milk and meat products, fish, shells, crabs, wild birds and rodent. It was discovered in the excrement flora of the bovines, suina, caprinae, dogs and cats. Even after 90 days of the disapearance of the clinical signs at the healthy pigs condition, this yersinia was found in the excrements.*

Key words: *Yersinia enterocolitica, incidence, pork meat, slaughter house.*

Introduction

Yersinia sp. can multiply at 2-8 degrees Celsius. It is estimated that of the total number of the diseases with diarrhoea infections syndrome at human beings 4 per cent are caused by Y. enterocolitica. In the 92/117 EEC direction the Yersinia diseases is considered to be a zoonosis and stipulates the obligation of the competent authority.
We are going to speak about the Yersinia enterocolitica (Figure no. 1) incidence in pork. The research developed over a year, every season (winter, spring, summer, autumn).

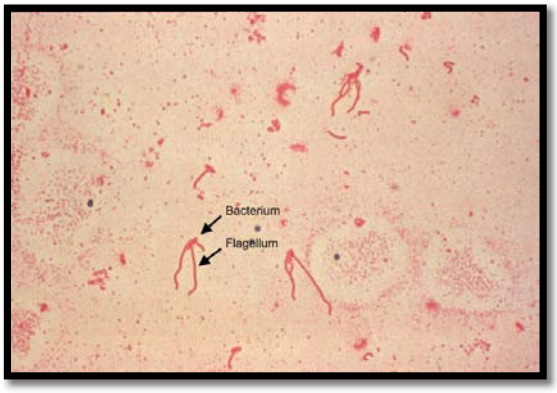

Fig. no. 1 - A photomicrograph of Yersinia enterocolitica
(Source: www.ppdictionary.com)

Materials and methods

According to a plan there were taken samples for the microbiological exam from the slaughter house, frigorific storehouse and supermarket. From the butchery there were taken 720 semple from the tonsisl, belly manual incision and semi-carcass surface.
In the frigorific storehouse there were taken 360 semples from the carcasses surfaces in three points (submandibular, chest and joint) after a deposit of 5-6 days at a 2 to 9 degree Celsius temperature.
From the supermarket there were taken 240 semples monthly of carved pre-packed bulk and of minced pre-packed bulk meat.
The meat test was done according to SR EN ISO 1073/2003. The research results were presented in three tables and pointed ont the following facts: the incidence of Yersinia

enterocolitica in the slaughter house was revealed at 39 per cent ont of the analysed samples at the belly incision in cold season and 8 per cent of the samples of the same leavel incision in summer.

Results and discussions

Table no. 1 - Incidence Y. enterocolitica in pork meat on slaughter house

Season	Anatomical area	Number of samples analyzed	Incidence	Rate
Winter XII-I-II 5x3x3	Almond Abdominal incision Posterior incision Surface meat	45 45 45 45	12 18 9 11	27% 39% 21% 24%
Total Winter		**180**	**50**	**28**
Spring III-IV-V	Almond Abdominal incision Posterior incision Surface meat	45 45 45 45	8 12 7 9	18% 27% 15% 21%
Total Spring		**180**	**36**	**20**
Summer **VI-VII-VIII**	Almond Abdominal incision Posterior incision Surface meat	45 45 45 45	5 8 4 5	12% 7% 9% 11%
Total Summer		**180**	**22**	**12**
Autumn **IX-X-XI**	Almond Abdominal incision Posterior incision Surface meat	45 45 45 45	9 15 8 9	20% 33% 17% 21%
Total Autumn		**180**	**41**	**18**
Total year		**720**	**149**	**23**

Table no. 2 - Incidence Y. enterocolitica on porc meat at 3-5 days of storage at 2-9□C

Season	Anatomical area	Number of samples analyzed	Incidence	Rate
Winter XII-I-II 5x3x2	Submandibular area Chest area Haunch area	30 30 30	8 6 7	28 19 22
Total Winter		**90**	**21**	**23**
Spring III-IV-V	Submandibular area Chest area Haunch area	30 30 30	6 3 6	19 10 19
Total Spring		**90**	**15**	**17**
Summer **VI-VII-VIII**	Submandibular area Chest area Haunch area	30 30 30	3 2 2	10 7 7
Total Summer		**90**	**7**	**8**
Autumn **IX-X-XI**	Submandibular area Chest area Haunch area	30 30 30	6 7 5	19 22 16
Total Autumn		**90**	**18**	**20**
Total year		**360**	**61**	**17%**

Table no. 3 - Incidence Y. enterocolitica on porc meat from supermarket

Season	Anatomical area	Number of samples analyzed	Incidence	Rate
Winter XII-I-II 5x3x2	Cut meat loose Prepackaged meat Mince loose Prepackaged ground meat	15 15 15 15	3 2 5 2	20 13 33 13
Total Winter		**60**	**12**	**20%**
Spring III-IV-V	Cut meat loose Prepackaged meat Mince loose Prepackaged ground meat	15 15 15 15	3 2 3 1	20 13 20 6
Total Spring		**60**	**9**	**15%**
Summer VI-VII-VIII	Cut meat loose Prepackaged meat Mince loose Prepackaged ground meat	15 15 15 15	2 1 3 0	13 6 20 0
Total Summer		**60**	**6**	**10%**
Autumn IX-X-XI	Cut meat loose Prepackaged meat Mince loose Prepackaged ground meat	15 15 15 15	4 2 5 2	26 13 33 13
Total Autumn		**60**	**13**	**26**
Total year		**240**	**40**	**16**

Conclusions

Out of 12 months of the total examined samples in the butchery (720) at 149 (23 per cent) the presence of Y. enterocolitica was revealed. The results in the frigorific storehouse at 5 days deposit, at 2-9 degrres Celsius revealed the presence of Y. enterocolitica at the surface of the bulks betwen 28 per cent in winter in the submandibular area and 7 per cent in summer in the joint. At a year level ont of the total examined samples in the butchery of 360 samples to 61 samples (17 per cent) it was revealed the presence of Yersinia enterocolitica. At the samples in the supermarket on of 240 ones, it was revealed its presence at 40 samples (16 per cent).

From the for kinds of pork examined (carved pre-packed bulk and minced pre-packed bulk meat) the incidence at the bulk minced meat was of 33 per cent.

It was noticed a significant variation of the incidence of Y. enterocolitica according to the calendar seasons.

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INVESTING IN EDUCATION - DETERMINANT IN THE REPRODUCTION OF HUMAN CAPITAL IN INNOVATIVE ECONOMY

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Abstract: *Innovative science and information can be developed through education, by highest qualifications and by accumulating experience. The human being, through the strengthening of human capital, contribute to the implementation of the results pursued by innovative science.*

Key words: *education, human capital, investment in education, innovation economics*

Introduction

Recognizing the central role of knowledge in economic development involves giving absolute priority to education. Progress can be achieved only through performance, human capital is key and education is the main way by which people gain greater powers.

Many economies in transition, as they open to international competition, stronger, based on market forces, should increase their efficiency and competitiveness by raising employment training by investing in education. Unfortunately, the difficulties of the transition process make a mark, more or less, on education systems, affecting the present and future training of human resources.

Materials and methods

Education and teaching, using new methods of development of individuals, develop individual human capital directly. Thus, we conclude that science and education serve to resolve differences between consumption and production capacity, having a decisive role in the organizational-economic mechanism of the reproductive cycle of human capital.

The economics of education generally developed based on the idea of human capital reproductive cycle. Science and education are essential elements, each of these produces effects, but ultimately act as a whole contributes to the economic development of society, based on generator "benefits", human capital respectively.

In the innovative company, the quality of human capital is the core that contributes to economic and social development, economic structure reform. This reform of economic structure is possible by satisfying the following conditions:

1. immediate improvement of capacities, over the initial investments in human capital, first of all in the fundamental science that generates major new scientific and technical principles that underpin innovation;

2. doing of spending on education and training, raising culture and knowledge level, thus creating a qualified workforce that has the ability to implement innovation;
3. raising quality and improving the physical structure of capital through investment;
4. existence of a correlation between improvement of the economic mechanism (incentive and control) and socio-economic and institutional exchanges.

Education, seen as a fundamental category of study of social and human sciences, was defined in different ways, but two alternative approaches are distinguished, namely the individual and society, namely anthropocentric and sociocentric approach[1].

If anthropocentric approach assumes a universal and invariable human nature, education having the role to develop the individual's innate qualities, sociocentric approach interprets education through the preparation of the individual in the pursuit of social roles.

Thus, if we combine the two approaches, we conclude that the individual, through education, improves his quality and skills to use in society. In this respect, E. Durkheim argues: "the man that education must create in ourself is not the man created by nature, but the man that society wants and it wants him as his interior structure asked. In summary, education is, above all, means by which society continually renews its own conditions of existence"[2].

The importance of investment in education is linked to learning ability of each individual and on institutional rules (broadly educational device), in other words, the conditions of production and accumulation of human capital. It depends on the amount of time and other production factors that determine the investment cost. Finally, investment size is also related to the perception profits separated from human life finititude.

By linking life cycle earnings, with profile of the investment in human capital, you can predict can predict how are structured the remuneration flows during the working life of individuals.

Economic history education is linked by the perception on education as a good investment, but knowing as a product of education becomes „the number one component of economic development" according to H. Simon, a Nobel laureate.

In 2005, in a study conducted in England, was discussed the role of qualification acquired through browsing various school subjects [3].

Thus has been found the existence of differences in the income for those who go through academic courses, respectively vocational courses or even for those who have followed the same school subject but have acquired detailed qualification certificates of the discipline.

In developed countries, in the current conditions, was formed a structure for training, where humanitarian profile professions, natural, social and economic, have considerable precedence over technical ones (fig. 1).

In the U.S. percentage for technical specialists in 2007, or of engineers when graduated the higher education institutions is very small, namely 7,0%, in EU countries is 12,6 %, in Romania 14,5% and the highest percentage is found in Lithuania 31,5%, respectively.

A study by IMF in 2004, "Human capital and economic development"[4] recommended that countries invest in public education to ensure a rapid and sustainable development, „A country that does not invest in education, cannot develop".

The educational level in society is an element that directly affects economic development, both in terms of the science and innovation, but this is not done independently but only in conjunction with other factors of different nature: technical or economical and political. The new educational methods consider an educational gain from spending for research and development, training in management and administration.

» Hypothesis of the research

Our research intends to demonstrate the need for investments in human capital and that the process of human capital accumulation during education and skills acquired at work, is itself represents a value for future revenue growth, as J. Mincer specifies in his book "Studies of human capital":"educated employees have at least two advantages over those less educated, including higher pay and greater stability in the workplace".

» Means and tools of research

The methodological basis of research knowledge is dialectical method, device and philosophical categorical general systems theory, comparative analysis method.

In the 2010 report on education of the OECD, on the relative earnings of the adult population in 2006-2008 (Table 1), the educational levels for the age range 25-64 years, there is a clear distinction for those who have a secondary education, the upper and post secondary non-tertiary, Hungary showing the largest discrepancy of 2,94 times higher relative earnings for people with tertiary level education, compared to those with upper secondary sublevel.

The investment doesn't produce the same benefits at all levels of education and training.

Rates of benefit both for individuals (private benefit) and for society (social benefit) varies by country and gender of person.

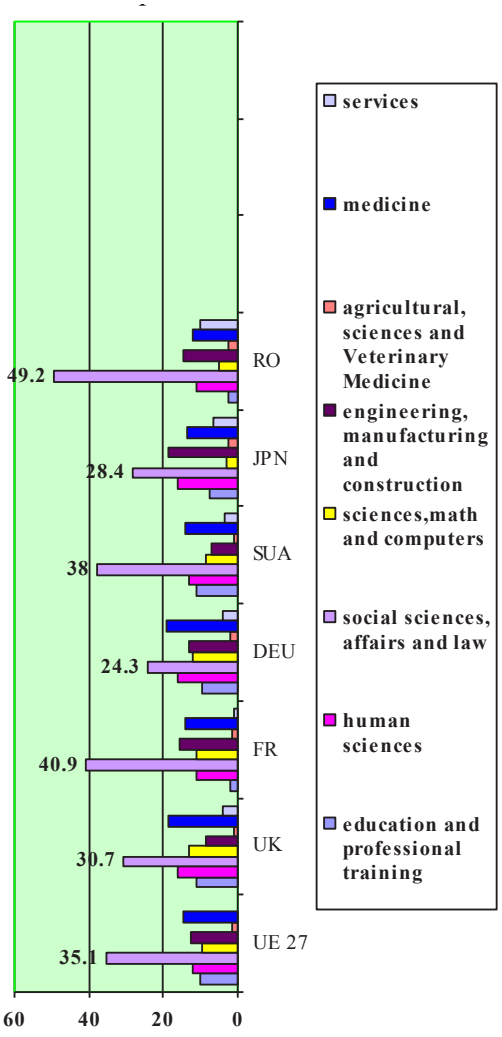

Fig 1 - Graduates of higher education on specializations in developed countries in 2007
Source: processing author after Eurostat, Data in focus, no. 37/2009, Education in Europe, Key statistics 2007, pg. 6

Different benefit rates may reflect deficiencies in the labor market (unemployment among low skilled or immigrants, rigidities in wage bargaining, low female staffing etc.) and different levels of investments (high investments reduce the marginal benefits and pull down the average benefits).

The total benefit (private and public) for a man who has completed secondary education with higher education exceeds 500.000 dollars in Italy, Portugal, United Kingdom.

Table 1:
Trends in relative earnings: Total population (1998-2008) By educational attainment, for 25-64 year-olds (upper secondary and post-secondary non-tertiary education = 100)

Country	Educațional level	2006	2007	2008
Austria	Below upper secondary	66	67	68
	Tertiary	167	155	160
Czech Republic	Below upper secondary	74	73	72
	Tertiary	183	183	183
Denmark	Below upper secondary	83	82	83
	Tertiary	126	125	125
Finland	Below upper secondary	94	94	-
	Tertiary	149	148	-
France	Below upper secondary	85	84	-
	Tertiary	149	150	-
Germany	Below upper secondary	90	91	90
	Tertiary	164	162	167
Hungary	Below upper secondary	73	72	73
	Tertiary	219	211	210
Italy	Below upper secondary	76	-	-
	Tertiary	155	-	-
Netherlands	Below upper secondary	85	-	-
	Tertiary	154	-	-
Poland	Below upper secondary	84	-	83
	Tertiary	173	-	167
Portugal	Below upper secondary	68	-	-
	Tertiary	177	-	-
Spania	Below upper secondary	-	81	-
	Tertiary	-	138	-
Sweden	Below upper secondary	85	84	83
	Tertiary	126	126	126
UK	Below upper secondary	71	70	71
	Tertiary	160	157	154
SUA	Below upper secondary	66	65	66
	Tertiary	176	172	177

Source: OECD indicators, Education at a Glance , www.oecd.org./dataoecd/17/322010, tabel A7.2a, p.128
** missing data*

On average, according to data presented in "Education at a Glance OECD INDICATORS 2010, in OECD countries, total benefit exceeds 335.000 USD.

Current estimates for the European Union show that the benefits of investments tend to be low in the Nordic countries and higher in the United Kingdom and Ireland, and the benefits are higher for women than for men. Comparing the estimated rates of benefit for various stages of the education system (68.000 for secondary education and 145.000 for higher education) result that secondary education is the basic level of education for the knowledge society. It's obvious that the duration (and thus the costs) of periods of unemployment decrease substantially with increasing enrollment growth from secondary education to the secondary.

Results and discussions

In the innovation economy, the development and evolution of human capital take place under the principles of sustainable economic

development. Educational capital, as the central pillar in the development of innovative society, is found in the human development index. Thus, the annual reports of the UNDP regarding the human development, include also the index that quantifies the level of development of the educational system EDI (adult literacy rate and combined tuition rate between primary, secondary and tertiary levels).

The level of these indicators, according to UNDP 2009 - 2010, for Member States shows considerable differences between 2005 and 2007, respectively. If in 2005 the top positions were occupied by Britain (0,995), Slovenia and Sweden, each with a score of 0,994, in 2007 the situation changed radically, with top positions occupied by Denmark and Finland with 0,993 and the Netherlands with 0,985. We can observe a difference between maximum and minimum for the two years analyzed. If in 2005 the maximum was 0,995, in 2007 it is only 0,993, and minimum values recorded in 2005 are 0,997 and 0,887 in 2007, both achieved by Malta. Depending on the stage of human development, respectively HDI (human development index) of the various countries of the world, the priorities are set within the government budgets regarding the public expenditure for human capital formation, for education and health, respectively.

It highlights the direct association between the level of development and the share of GDP spending on health and human capital formation, resulting that the nations who considered education and health as priorities in their development strategies (Ireland, Sweden, Holland, France etc.), with Romania being on the last positions, spending on both health and education by 3,4% of GDP), are in the group of benchmark countries with high human development. Specifically, countries with high level of education have some fundamental advantages, namely they can adapt effectively to the challenges and opportunities of globalization because companies in these countries are more flexible and dynamic in adapting and adopting new technologies. In Romania, the negative effects of the transition period, which were more obvious in the economic system, but no less important in the social one, are manifested in terms of education.

Chronic shortage of financial resources, population poverty, disorder and indiscipline in the economy and society, moral crisis and confusion in the face of changes whose direction is not always discernible and clear, have affected the conditions for the educational process - state of infrastructure, provision of facilities, teaching provision and motivation - and the quality of education, putting obstacles in the way of education reform. The paradox arises where economic theory has demonstrated that, in periods of economic crisis, people are going to study, to raising educational and in 2011 in Romania, this is absolutely untenable considering the state policies and economic situation. Because of inequalities, social and economic (income and education), individuals without sufficient income, cannot aspire to higher education and to higher incomes during working life. According to Cosmin Marinescu "it is a phenomenon similar to "snowball" because the state of poverty and "maleducation" increases from one generation to another[3].

In Romania, inclusion education degree (the ratio between the number of students in a particular age group, regardless of education level and the total population of the same age group) was strongly influenced by the negative effects of transition, the result is reduction of participation in education.

Negative demographic trends recorded since early 90's (embodied in reducing the birth

rate, increasing mortality rate and, thus, reducing the natural increase and average annual population growth), though they began to improve in 2000, have generated reduction in the school-age population (population 3-23 years) in Romania, during 2000-2006 the reduction was 1006,6 thousand people (from 6625,5 thousand to 5618,9 thousand), but during school year 2007-2008 the school age population grew by nearly 48.000 than in 2006-2007, thereby reaching 5666,9 thousand and for the year 2009-2010 has reached 4564,8 thousand that reflects a decrease from the period 2006-2007.

Along with the decline in tuition of school age population reduction has occurred the population included 206,8 thousand people in the education system: from 4459,8 thousand in the 2004-2005 school year to 4343,0 thousand in the 2006-2007 school year, after that is recorded an increase in the year 2007- 2008 to 4405 thousand, following a downward trend for the coming years and bringing to 4177,0 thousand in 2009-2010.

The depopulation of schools and universities comes in the context in which Romania is on the last places in Europe, regarding the report between the number of pupils and students enrolled in the education system and the total number of people aged 3 to 29 years.

Specifically, the rate of participation at all levels of education recorded by Romania is only 56%, while the EU average is 63% for 2010. Reducing the school classes relative to primary and secondary education, which will continue into next years (but with a lower rate), according to demographic forecasts, involved and will involve consequences for human resources, quantitatively, and even regarding the design of school network, particularly in rural areas.

The correlation established between the level of education of the population and overall revenues in Romania is well-linked, due to factors such as age (usually at the same level of education, most young people earn less than older ones), inherited wealth, existing skills beyond formal education (for example, the top football players, or those of some contractors), distributional inequities, theft etc.) (fig.1).

The link between economic development and education can be obtained and analyzed by the association and comparative analysis of the factors related to regional development policy and the participation of population at education by regions. In Romania poorer counties have generally less educated population. The richer regions are usually those that attract a more skilled workforce, thus becoming more likely to increase and tends to become richer.

In Romania the richest counties in human capital are located in Transylvania and north of Wallachia - Timis, Arad, Cluj, Sibiu, Brasov, Prahova, Arges and Bucharest, while in Moldova, only the city of Galati is placed slightly above the national

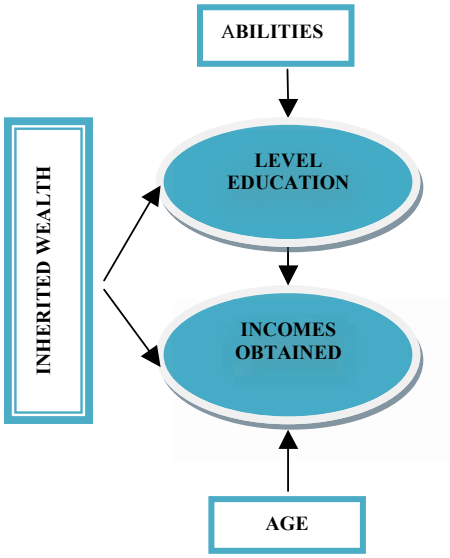

Fig. 1 - Factors influencing the link between education and income level (Source: authors)

average, the remaining counties of Suceava, Botosani, Vaslui showing a high degree of human capital deficiency. The educational capital is concentrated mainly in the same counties, more urbanized, non-agricultural, and major universities, as Iasi and Constanta - as traditional universities.

Conclusions

The investments in human capital are the support of sustainable economic development. The empirical studies on investments in human capital, applied in some countries, shows that these generate additional incomes on both long-term, social and private. The most important feature is, however, that investment in education is a long term investment and, at present, given the priorities emerging in the economic and social plan, the changes in attitudes, preferences and attitudes – we can say that all these factors make education much less attractive investment. In Romania there are major differences compared with the situation existing in developed countries and thus appears the need for early investment in education

This includes major involvement of the state in order to build strategies of modernizing education, to provide additional funding for training programs for teachers, but also by finding new ways for families to realize the role of education in building the children's future welfare.

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