

TEZĂ DE ABILITARE

POSSIBILITĂȚI DE SELECȚIE A MICROORGANISMELOR UTILE ȘI DE INHIBARE A MICROFLOREI DE ALTERARE A STRUGURILOR ȘI FRUCTELOR

REZUMAT

Teza de abilitare cu titlul: *Posibilități de selecție a microorganismelor utile și de inhibare a microflorei de alterare a strugurilor și fructelor* prezintă rezultatele activității științifice și academice în domeniul horticulturii, derulate din momentul susținerii tezei de doctorat, decembrie 2001, până în prezent. Capitolul final al tezei prezintă planul de dezvoltare a carierei didactice și direcțiile de cercetare științifică viitoare. Sunt descrise rezultate semnificative care au fost valorificate prin 10 lucrări ISI/ISI proceeding, 25 lucrări BDI și 1 cerere de brevet (în colaborare).

Teza este structurată în trei secțiuni, organizate astfel: prima secțiunea prezintă realizări științifice și profesionale, secțiunea a doua este focusată pe planul de dezvoltare a carierei iar în ultima secțiunea este prezentată bibliografia.

În capitolul introductiv sunt prezentate etapele activității didactice, participările la contracte de cercetare, activitatea publicistică precum și lucrările premiate.

Prima secțiune a tezei este structurată pe trei capitole și anume: (1) *Posibilități de selecție din microflora spontană a microorganismelor utile în procesele fermentative*; (2) *Inhibarea microflorei de alterare a strugurilor și fructelor cu ajutorul factorilor chimici convenționali*; (3) *Inhibarea microflorei de alterare a fructelor și strugurilor cu ajutorul extractelor din plante și a factorilor chimici neconvenționali*.

Capitolul (2.1) - *Posibilități de selecție din microflora spontană a microorganismelor utile în procesele fermentative* prezintă studii originale focusate pe izolarea, selecția și testarea în diferite condiții a microorganismelor utile în fermentația alcoolică și fermentația malolactică

a mustului și vinului. Sunt descrise din punct de vedere oenoclimatic arealele din Oltenia care au servit drept surse de izolare a microorganismelor utile precum și speciile de drojdii și bacterii lactice care au fost selectate din microflora strugurilor. De asemenea sunt prezentate rezultatele obținute cu ajutorul unei specii de bacterii lactice în condiții de microvinificare. Toate aceste rezultate au fost concretizate în activitatea publicistică în 4 lucrări ISI ca prim autor sau coautor și lucrări BDI. De asemenea, pe direcția acestei tematici au fost încheiate două contracte de cercetare, unul finanțat de CNCSIS și altul în colaborare cu un agent economic în domeniul vinificației. În continuare direcția de cercetare va fi dezvoltată pentru a selecta din microflora spontană și alte microorganisme utile, mai puțin convenționale dar care dispun de caracteristici oenologice superioare. De asemenea va fi dezvoltată tehnologia de liofilizare a microorganismelor selectate în vederea alcătuirii unei colecții care să poată fi eventual certificată.

Capitolul (2.2) - *Inhibarea microflorei de alterare a fructelor și strugurilor cu ajutorul factorilor chimici convenționali* prezintă efectul unor substanțe utilizate pentru reducerea numărului de microorganisme de alterare ceea ce va contribui la prelungirea perioadei de păstrare a fructelor și de stimulare a microflorei utile a strugurilor. Substanțele utilizate pentru tratarea fructelor au avut ca efect reducerea pH-ului care este definitoriu pentru activitatea microorganismelor. Astfel au fost efectuate experiențe cu acizi organici și apă acidă care s-au dovedit a avea efect microbiostatic, fără a fi afectată activitatea antioxidantă sau conținutul în compuși biologic activi ai fructelor luate în studiu. Experiențele au fost efectuate pe fructe cu grad mare de perisabilitate sau fructe tăiate care au susceptibilitatea mare la oxidare și alterare. O altă secțiune a acestui capitol este dedicată efectului exercitat de pesticidele utilizate în viticultură asupra microorganismelor responsabile de alterarea stării sanitare a strugurilor. Activitatea de cercetare din această direcție s-a concretizat prin 3 lucrări ISI din care una ca prim autor, 3 lucrări BDI precum și un contract de cercetare câștigat prin competiție internă la nivel de universitate.

Capitolul (2.3) - *Inhibarea microflorei de alterare a fructelor și strugurilor cu ajutorul extractelor din plante și a factorilor chimici neconvenționali* prezintă efectul exercitat de extracte apoase din plante (frunze de nuc, codițe de cireșe), uleiuri esențiale din plante (mărar, busuioc) sau a unor compuși ai borului asupra microorganismelor fitopatogene care se regăsesc pe fructe și struguri. Rezultatele obținute au demonstrat că extractele apoase din plante nu au efect microbicid în timp ce uleiurile, prin concentrarea compușilor cu rol antimicrobian, sunt mult mai eficiente. De asemenea s-a dovedit că anumiți compuși ai borului pot avea efect asupra

unor microorganisme patogene, rezistente la antibioticele convenționale. Această direcție de cercetare s-a concretizat publicistic printr-o lucrare ISI de prim autor și o lucrare BDI, dar direcția va fi intensificată în scopul găsirii unor extracte naturale cu proprietăți antimicrobiene foarte bune.

În partea a doua a tezei este prezentat planul de dezvoltare a carierei didactice și științifice. Acest plan are ca obiectiv creșterea vizibilității rezultatelor obținute prin activitatea de cercetare și atragerea unui număr cât mai mare de studenți către activitățile de laborator și de integrare în echipe de cercetare alături de cadre didactice, masteranzi și doctoranzi.

TUȚULESCU I. FELICIA

HABILITATION THESIS

OPPORTUNE METHODS ABLE TO SELECT USEFUL MICRO-ORGANISMS AND TO INHIBIT THE MICRO-FLORA WHICH COULD ALTERATE GRAPES AND FRUITS

ABSTRACT

The present habilitation thesis entitled *Opportune methods able to select useful micro-organisms and to inhibit the micro-flora which could alterate grapes and fruits* does present the author's obtained results throughout her scientific and academic activities within the domain of horticulture which have been carried on since the moment when her doctoral thesis has been sustained (December 2001) until the present day. The final chapter of the habilitation thesis does present the development plan of the author's didactic career and the future directions she does intend to approach throughout her scientific investigations. Some significant results are as well described which the author has reevaluated through 10 ISI/ISI proceedings, 25 BDI works and 1 patent letter requests (in collaboration).

The present habilitation thesis is structured throughout three sections which are organized as it follows: the first section does present the author's professional and scientific achievements; the second section is focused upon the author's career development plan; within the last section the present habilitation thesis'bibliography is presented.

The introductive chapter of the habilitation thesis does enumerate the various stages of the author's didactic activity, her successful participations in many scientific research contracts, her activity which involved the publishing of a considerable number of papers as well as her meritoriously awarded works.

The above mentioned first section of the present habilitation thesis is judiciously divided in three chapters which are respectively denominated: (1) *Selection opportunities throughout*

the spontaneous micro-flora of micro-organisms which are useful for fermentative processes; (2) Inhibition processes concerning the micro-flora which could alterate grapes and fruits carried on through the action of chemical conventional elements; (3) Inhibition processes concerning the micro-flora which could alterate grapes and fruits carried on through the action of extracts drawn out of plants as well as through the one of non-conventional chemical elements.

Chapter (2.1) - *Selection opportunities throughout the spontaneous micro-flora of micro-organisms which are useful for fermentative processes* does present some among the author's original studies which are respectively focused upon the isolation, selection and testing procedures (under various circumstances) which could involve the micro-organisms that might be useful for the respective processes of alcoholic and malolactic fermentation which should concern the must as well as further on the wine. The Oltenian vineyard plots which have served as isolation sources for the respectively concerned useful micro-organisms are described through an oeno-climate perspective survey as well as the precisely designated species of lactic yeast strains and of bacteria which have been selected by the author throughout the grape's specific micro-flora. A species of lactic bacteria has then been situated under the specific circumstances of a micro-dimensionally shaped wine-making process and its consequently obtained results are also presented. The author's publishing activity through which all of these obtained results have been illustrated has assumed the embodied respective forms of 4 ISI works presented under the respective qualities of first author or co-author as well as the ones BDI works.

Within this topics'orientation the author has as well agreed to participate in two scientific research contracts of which one has been financed by the CNCSIS while the other has been funded through the author's cooperation with an economical operator which does act within the wine-making domain. The author's manifested intention is the one to keep on developing the above mentioned orientation of her scientific research interests in order to further carry on throughout the spontaneous micro-flora the selection process which should concern many other useful micro-organisms the distinctive asset of which should be the one that in spite of the fact that they might figure among the less conventional ones they would however own some intrinsic features which should indicate for each of them the effective presence of a high quality oenological vocation. The author does as well intend to develop as an auxiliary tool the lyophyle-shaped conservation technology so that she could then apply it to

the previously selected micro-organisms in view of gathering a full collection which in due time could eventually be certified.

Chapter (2.2) - *Inhibition processes concerning the micro-flora which could alterate grapes and fruits carried on through the action of chemical conventional elements* does present the respective effects generated by some substances the author has made use of in order to physically reduce the respective amounts of the existing pernicious micro-organisms; this taken action should obviously contribute to the prolongation of the time interval during which the fruits could be able to preserve their most adequate sanitary condition as well as to the stimulation process which should concern the grapes' useful micro-flora. The respective substances with which the fruits have been treated had thus as their main effect the decrease of their respective *pH* levels – an essential index through which the activity of micro-organisms could be evaluated. Upon the studied fruit samples experiments have been thus performed into which acid water as well as organic acids have been involved: their effectively proven results have therefore demonstrated the consequent appearance of a microbial inhibition process carried on until their stasis; however the anti-oxidizing activities as well as the existing respective amounts of biologically active compounds within the fruit samples have in no way at all been affected. The above mentioned experiments have been on purpose performed upon some types of fruits which do usually present a high natural alteration ratio while still being under their natural condition that is to say upon the plant itself as well as upon some cutten fruit samples which could therefore become highly susceptible insofar the oxidizing and alteration processes could be concerned. In this chapter another section has been dedicated by the author to the respective effects which could eventually be exerted by the pesticide substances made use of throughout the vine cultivation process upon the micro-organisms which might cause the alteration of the grapes' good sanitary condition. Insofar this scientific orientation could be concerned the author's research activity has assumed the respective material forms of 3 ISI works among which one as a prime author and of 3 BDI works as well as of a research contract obtained through an internal competition at the University level.

Chapter (2.3) – *Inhibition processes concerning the micro-flora which could alterate grapes and fruits carried on through the action of extracts drawn out of plants as well as through the one of non-conventional chemical elements* does present the respective effects exerted by some aqueous extracts drawn out of plants (like for example from the walnut tree leaves or the cherry tree short tails) by some essential oils extracted out of plants (like for example from dill seeds or from sweet basil) or by some boron compounds on the phyto-

pathogenic micro-organisms which could usually be found upon fruits and grapes. The results obtained by the author have demonstrated and effectively pointed out the respective facts that the aqueous extracts drawn out of plants do present no microbicide effect at all while the oils are much more effective in this respect due to their highly concentrated ratios of some existing compounds the assumed roles of which are anti-microbial ones. The author has also scientifically proven the respective facts that certain among the boron compounds could exert a lethal effect upon some pathogenic micro-organisms which are usually resisting when confronted with the conventional antibiotic treatments. Insofar this scientific orientation could be concerned the author's research activity has assumed the respective material forms of an ISI work as a prime author and of a BDI work; yet the expressed intention of the author is the one to intensify her investigations within this line of interest for the aimed purpose of finding out some more new natural extracts which should exhibit some highly effective anti-microbial taken actions.

In the second part of the present habilitation thesis the author does present her own assumed development plan insofar her scientific and didactic careers could be concerned. The main objective pursued through this plan is the one of mostly increasing the possible to be realized impact potential of the results she has obtained through her scientific research activity; this objective is as well accompanied by another one which is to attract the largest possible number of students towards the practice of the laboratory scientific investigation procedures; they should be further integrated to various research collectives into the activities of which they could fruitfully join the academic staff, the mastership cycle students and the doctoral students.