



PRINTABLE ABSTRACT



The project „*Performing technologies and equipments for convective drying of Romanian fruits and vegetables varieties, according to EU quality standards*”, was financed within the Programme „*Research of excellence*”, Module I and was carried on within the period 7.10.2005 – 30.08.2008.

The project was achieved in a consortia, as following:

1. **INSTITUTE OF FOOD BIORESOURCES – Project coordinator – Partner 1**
2. **POLYTECHNICS UNIVERSITY OF BUCHAREST – Partner 2**
3. **RESEARCH-DEVELOPMENT INSTITUTE FOR FRUIT GROWING – MĂRĂCINENI – Partner 3**
4. **UNIVERSITY OF AGRONOMICAL SCIENCES AND VETERINARY MEDICINE BUCHAREST - Partner 4**
5. **S.C. ECOPROIECT S.R.L. – Partner 5**
6. **S.C. MARVIOR EXPERT S.R.L. – Partner 6**
7. **S.C. CALORIS GROUP S.A. – Partner 7 (project cofinancer)**
8. **S.C. LEGUME FRUCTE BUZĂU S.A. – Partner 8 (project cofinancer)**
9. **S.C. MILENIUM COM S.R.L. – Partner 9 (project cofinancer)**

Main objectives of the project

- ✚ Achievement of performing technologies for convective dehydration, qualitative and economical optimised, which will lead to obtain dehydrated vegetables and fruits competitive with those achieved at the European level
- ✚ Achievement of models and simulation programs of dehydration processes and of dehydration equipments
- ✚ Development of performing algorithms for identification and automatically managing of dehydration processes
- ✚ Modernization of an existing tunnel drier in the endowment of a vegetables and fruits processing unit
- ✚ Achievement of a pilot convective drier, for vegetables and fruits, in modulated variant, for SMEs
- ✚ Homologation of dehydration technologies of vegetables and fruits achieved within the project
- ✚ Dissemination at national level of technologies and equipments, for development of this sector in Romania

Results obtained within project

Within the two stages of the project they were achieved simulation programs of dehydration processes and dehydration equipments and were developed performing algorithms for identification and automatically managing of dehydration processes.

Within the project they were achieved the following feasibility studies:

- ✚ Feasibility study for achieving of pilot convective drier for vegetables and fruits, in modulated variant, using as energy source classical combustibles

✚ Feasibility study for modernization of tunnel drier for dehydration of vegetables and fruits

Also, as a results of researches performed within consortia, it was achieved a pilot convective drier for vegetables and fruits, in modulated variant, and it was modernised a tunnel drier, for vegetables and fruits dehydration.

Based on experiments performed in the two equipments for convective dehydration of vegetables and fruits, they were drawn up the dehydration technologies, optimised from economical and qualitative point of view, for the following fruits and vegetables species:

- ✚ Dehydration technology of plums
- ✚ Dehydration technology of apples
- ✚ Dehydration technology of pears
- ✚ Dehydration technology of apricots
- ✚ Dehydration technology of bilberries
- ✚ Dehydration technology of *Hippophae Rhamnoides*
- ✚ Dehydration technology of spinach
- ✚ Dehydration technology of root crop vegetables
- ✚ Dehydration technology of onion
- ✚ Dehydration technology of peppers
- ✚ Dehydration technology of *Pleurotus* and *Agaricus Milena* mushrooms
- ✚ Dehydration technology of seasoning leaves
- ✚ Dehydration technology of garlic

They were elaborated the technical specifications of quality for dehydrated vegetables and fruits, according to existing quality standards at the European level, for these products. The technical specifications for achieving dehydrated fruits include the following elements:

- quality technical conditions of raw materials and packages
- organoleptic, physic-chemical and microbiological properties of dehydrated fruits and vegetables
- rules for quality verification, analysis methods of dehydrated fruits and vegetables
- conditions for packaging, marking, storage, transport of dehydrated fruits and vegetables
- minimum durability of dehydrated fruits and vegetables

They were elaborated H.A.C.C.P. studies (*Hazard Analysis and Critical Control Points*) in the process for obtaining dehydrated fruits and vegetables, through the following steps:

- establishment of the end product characteristics
- elaboration of the technological flow charts for to obtain dehydrated fruits and vegetables
- identification and analysis of physical, chemical and biological hazards, which can appear on the technological process for to obtain dehydrated fruits and vegetables
- determination of critical control points (CCP)
- establishment of control measures for each identified hazard, as well as for risks which can not be controlled by operator
- HACCP plan elaboration (establishment for each critical control point, of critical limits, of monitoring procedures, as well as for H.A.C.C.P. records).

It was elaborated a study concerning using of unconventional regenerative energies for supply with energy of the driers for vegetables and fruits.

The main bio-mass sources, which can be used for supply with energy of driers for vegetables and fruits (production of heat through thermo-chemical aerate of wastes of agricultural and wooden bio-mass), are the following:

- Residues and derivative products from forest industry, peels, sawdust and matchwood, scobs, flinders and other wood rests (i.e. rests which derive from scouring of fruit trees)
- Corn ears, oleaginous plants (rapeseed) and leguminous plants
- Rests from harvesting, coconut shells, rests of corn ear
- Wastes and derivative products in processing industry

For production of thermal energy from bio-mass it is recommended to use gazogens for thermal applications, which are simple constructive and easy to exploit.

They were analysed from technical and economical point of view two variants for using of bio-mass as energy source for driers, in comparison with diesel oil using, which can assure the energetical independence. Between the two variants for to use of bio-mass it conclude that it is not a world of difference; solution with gazogen which can use a combustible less pretentious and with higher moisture, could be considered as optimal solution for near future.

It was achieved the technological transfer, assuring consultancy and technical assistance in dehydration process of vegetables and fruits, to those two economical agents – beneficiaries of project results:

- S.C. Milenium Com S.R.L. (convective drier for vegetables and fruits dehydration)
- S.C. Legume Fructe S.A. Buzau (modernised tunnel drier, for vegetables and fruits)

Also, within the final step of the project, a Commission of the specialists in the field had homologated dehydration technologies of vegetables and fruits, achieved in the project.

Dissemination of obtained results within the project

- organization of seminars and round tables
- publication of five articles in specialty revues

1. Optimal technologies for conditioning of vegetables and fruits, in view of dehydration, *Revue CALITA*, 2007
2. Food value of fresh and dehydrated vegetables and fruits, *Revue CALITA*, 2007
3. Combined dehydration technology of apricots, *Revue CALITA*, 2007
4. Dehydration equipments, *Revue Mecanizarea agriculturii*, no. 8, 2007
5. Quality conditions of dehydrated fruits according to european and international standards, *Revue CALITA*, 2008

- elaboration of two technical paper works:

1. Good Hygiene Practices in dehydration process of vegetables and fruits/ISBN 978-973-718-747-5, Publishing house Printech, 2007
 2. Guide for achievement of a dehydration unit of vegetables and fruits/ISBN 978-606-521-019-6, Publishing house Printech, 2008
- Elaboration of web page of project (www.bioresurse.ro)

