

## DEVELOPMENT OF A TECHNOLOGY FOR VALUATING THE GRAPE POMACE BY OBTAINING ALIMENTARY FINISHED PRODUCTS

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### **Abstract**

*Grapes and their products have always a pleasure to eat. Now, research is showing that grape ingredients also have healthful properties. Phenolic compounds from grape seeds and other parts of the grape are powerful antioxidants that augment heart health. Developing a technology to recapture the phenols from pomace is considered an advantage and the phenolic extract has a large utilization from food industry, to pharmaceutical and cosmetics.*

**Key words:** grape pomace, phenols, natural antioxidants, food natural additives, alimentary supplement.

### **INTRODUCTION**

Antioxidants are compounds that have the capacity to neutralize reactive oxygen species. Oxygen free radicals generated by oxidative and other biochemical pathways are the main cause for a number of degenerative diseases. Antioxidants act as radical scavengers, and convert the radicals to less reactive species. The imbalance due to the presence of excess free radicals and lower antioxidants causes *oxidative stress* and many chronic health problems such as cancer, atherosclerosis, myocardial infarction, senile cataracts, and rheumatoid arthritis(4).

Natural alternatives to commonly used food preservatives in processed foods are growing in demand as consumers shy away from synthetic food additives in favour of a natural equivalent. An anti-microbial agent sourced from grapes will target this growing market(6).

The waste to recover from the grapes and wine by products is estimated at 25% from the value of grapes harvest(1). In wine industry, at any technological stage results a series of by products which have a chemical and mechanical composition that varies on large scale, depending on some biological factors like breed, maturation stage and other ecological and technological factors.

Analyzing the death rate relation in cases of cardio-vascular disease and wine consumption in figure 1 and 2 below we can observe a very

significant reverse relation which suggests that the wine consumption ensure a great protection in France, Portugal, Italy, Spain in comparison with the countries with a low wine consumption like Finland, Ireland, Denmark. This effect is well know world wide as „the french paradox”. The phenols from the wine are responsible for this remarkable health promoting action(5). The concept of „the french paradox” is a moderate consumption of red wine which decrease the risk of CVD due to high consumption of fat.

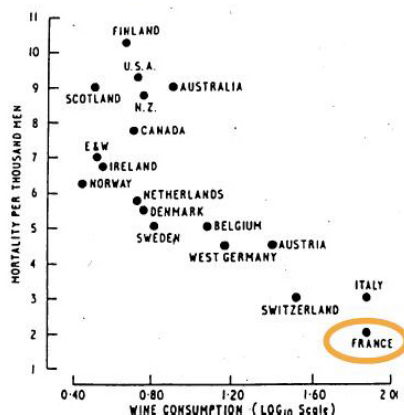


Fig.1. Relation between wine consumption and mortality per thousand men.

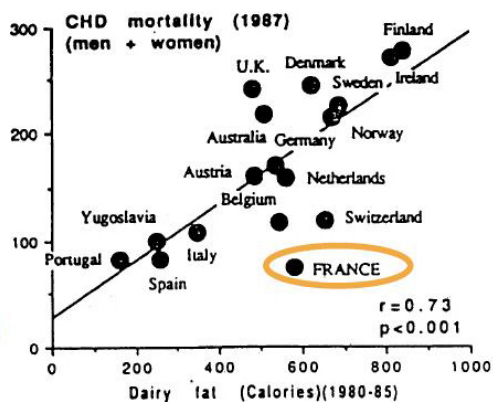


Fig.2. Relation between dairy fat consumption And CHD mortality of men and women.

After the wine making or other processing of grapes is left a considerable quantity of waste – grape pomace which normally is throwaway. To recover the polyphenolics from that waste and use them in food industry as nutraceuticals is a great benefit for humans.

## MATERIALS AND METHODS

A lab scale technology was developed to obtain finish products from a grape pomace extract. All analysis were made in the chemistry lab from the University of Agriculture Cluj-Napoca.

1) Prepare freeze grape pomace by removing the rough parts and graining the material to facilitate extraction.

2) From 6 g of dry substance meaning 20 g of freeze pomace make the extraction with ethanol 1:1(v/v): water, successively 3x40 ml using a blender (UltraTurax).

3) Concentrate the extract. The ethanol is removed from the extract with a rotary evaporator (Büchi, CH).

4) Bring at sign with distilled water the concentrate extract – at a volume of 100ml and a pH =4.

The technological flow chart for obtaining a **liquid extract of polyphenols** that can be used in food industry is presented below in Fig.3:

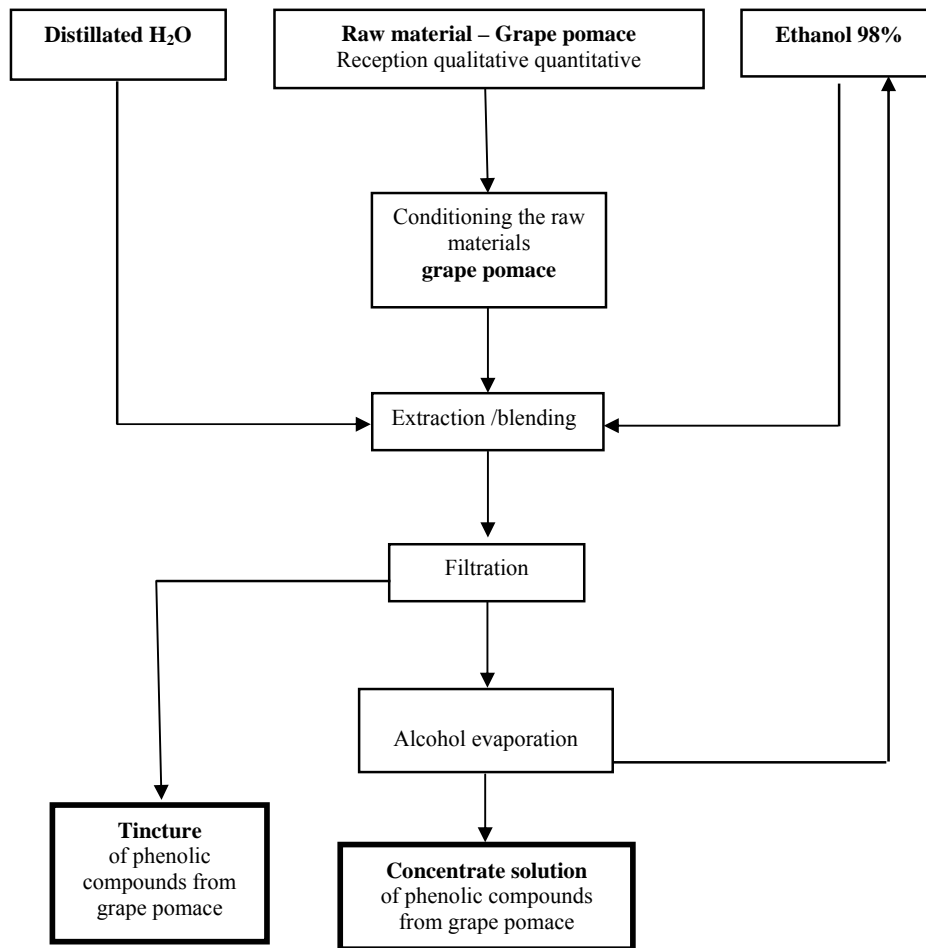


Fig.3. Technological flow chart for obtaining Phenolic solution and Phenolic tincture.

Concentrate solution of polyphenols is used in food industry as antioxidant, natural colorant, taste enhancer and has a bacteriostatic activity.

From the concentrate solution of polyphenolic extract can be obtained a water soluble granulated product that can be used as alimentary supplement, natural antioxidant in food industry as well as a colorant, taste enhancer. To obtain the granulated product, the phenolic solution is fixed on a substratum and then dried, grinded and in the end the granulated.

Only alimentary plastic or steel utensils were used to prevent material degradation or oxidation. 50 ml from the phenolic solution were fixed on 50g dextrose layer. The dextrose can be replaced with other powders like starch, lactose, glucose, etc, among other substances like vitamins C, A, E or other natural colorants. These substances will modify the taste and color of the phenolic granules. After homogenizing the mix, it was stretched in a thin layer then dried in a ventilated atmosphere for 72 hours. The dried composition was grinded to a rough powder. The granulation can be done by adding starch or gelatin (10-20%). The powder was measured in order to calculate the necessity of gelatin and distilled water. 20 g of gelatin were soluble by boiling on bain marine with 100 ml distilled water. After the gelatin was melted, the powder was added and mixed to obtain a homogeny mixture with water sandy consistency. The mixture was passed on a bolt with a 0.5 cm diameter of the holes to granulate. The granulation for large quantities can also be obtained with a granulator. The granules were dried for another 48 hours. It is necessary to dry very well the granules to prevent mould during the packaging and storing. Store at dark, dry, ventilated space.

The technological flow chart is presented as below in Fig.4:

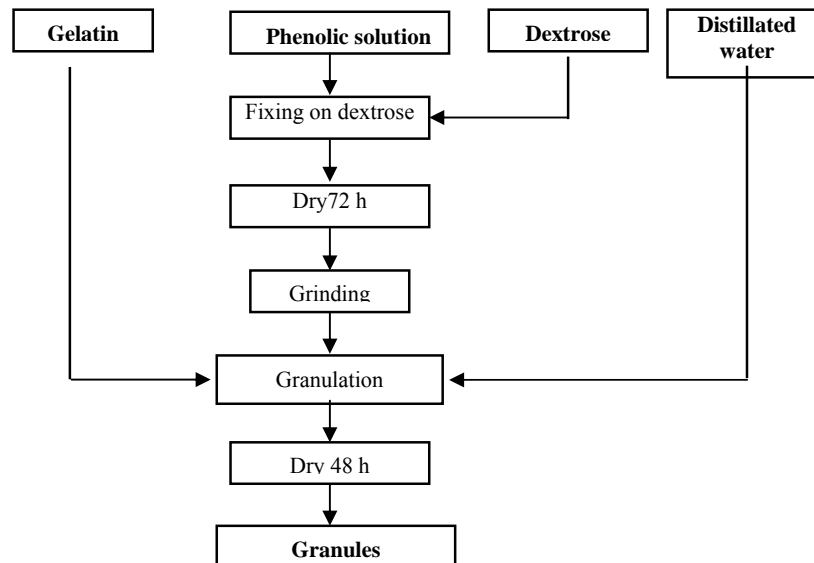


Fig.4. Technological flow chart for obtaining granules with phenolic compounds.

## RESULTS AND DISCUSSION

The phenolic extract solution obtained in Fig.3 according to the flow chart has the following properties:

1. sensory(organoleptic) – is a pale-orange liquid, with white-orange opacity, pleasant flavoured scent of Muscat breed, and astringent taste.
2. physico-chemical - contains 2,8 % alcohol, 1,033 density, 0,5% dry substance and  $DO_{330} = 0,350$  at a dilution of 1:100.
3. microbiological - total amount of germs is less than 1000/ml, moulds and yeasts less than 500/ml.

The granules obtained according to the flow chart have the following properties:

1. sensory(organoleptic) – have cream-beige color, a sweet flavoured taste and are not hygroscopic.
2. physico-chemical - contains 0 % alcohol, 88.5 % dry substance.
3. microbiological - total amount of germs is less than 800/ml, moulds and yeasts less than 450/ml.

All microbiological data were provided by Microbiology Department of the Faculty of Veterinary Medicine Cluj-Napoca.

## CONCLUSIONS

These two products value the phenolic bioactive compounds from grape pomace. Both technological flow charts can be adapted from lab scale to large scale. The granules involve higher costs in the flow chart but have a higher stability and a longer validity term.

This preliminary study can be further developed with the purpose of producing natural food supplements, natural preservatives – antioxidants for food industry recovering the phenolic compounds from grape pomace.

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