PREZENT TENDINCIES IN OBTAINING AND USING OF NATURAL FLAVOURS

Steluța Radu
"Ion Ionescu de la Brad" University of Iași, Faculty of Agriculture

Abstract

The aim of this essay was to emphasize the methods and the process of obtaining natural flavours, to establish the concentration of some flavours from food products, cooked food, drinks and finally standing out the necessary amount for using natural flavours in order to obtain ecological food products. Using of flavours have been made to obtain new products and a lage scale of food product. These have been improved with a superior level of qualityat the taste and small.
***Keywords**: naturale flavours and actual utilities in food products making by modern methods-a healthy nutrition for consumer.*

Introduction

Vegetal raw material used to obtain aromatizations is devided, taking in account the morphological characteristics in the following groups: juicy fruits (from fruit trees with seeds, stone fruits.cedrate fruits), withered fruits (monospermes, polispermes) herbs (with or without flavour) roots (with or without flavour), flowers, bark .

Among fruits and fruit trees it can be used: rowan tree, blueberries, strawberries, raspberries, gooseberries,bilberries,white underbrushes. All of them are fruits full of sugars, acids, tannins and colourants. Strawberries and raspberries also contain a small amount of essential oils.

Used stone fruits: apricots, wax cherries, morello cherries ,cherries, plums, sloe fruits and bird cherries. The pulp from these fruits contains sugars, acids, tannins and colourants. In the middle of the kernel there is an important flavour glycoside.

Seeds fruits (apples, pears, quinces, fowler's pears) are full in sugar and low in colourants substances .The flavour substances can be found only in the peel of the fruits.The quinces contain a large amount of tannins and flavour substances.

Among cedrate fruits we use oranges, tangerines, lemons and grapefruits. The most important substances contained by these fruits are essential oils from the peel .

Among dried fruits we use the anise, coriander ,almonds, caraway, pepper, vanilla and they are full of essential oils .

The herbs group is composed by plants and shrubberries and for the raw material we use the leaves, flowers and sometimes the stems .The aromatic herbs are the melilot, hardhay, hyssop, marjoram, melissa, mint, wormwood, shepherd's thyme, savory, tarragon which are full of essential oils and some in tannins, bitter and coloured substances.

The plants group from which we can use the flowers it is composed of the arnica acacia, clove, lime, rose, lilac etc. all of them with a large amount of essential oils. At some of the plants we can use the bark: the cinnamon or quinine .

Experimental

The chemical composition of the vegetal raw material is different not only from one species to another but also inside of the same species due to the pedoclimateric conditions and the harvest period .

Specially important for the fruits taste are the glycosides more often founded in the peel of the fruits and their seeds. They can be easily soluble in water and alcohols. The glycosides are hydrolysed and splitted in sugars and aglycones influenced of the enzym from plants or of the organic and mineral acids. A*migdalina* being in large amounts in the seeds of the almond in (2,5 - 3% from the procent of dry substance), apples (0,6%), morello cheries (0,82%), plums (0,96%)and in the seeds of the appricot ,quinces all of them being hidrolised due to the action of the emulsion or the acids formed by the glucose,benzaldehyde and prussic acid. Some glycosides have a bitter taste and as an example it is the gentiopicrine which can be found in the roots of gentian or absinth oil found in the leaves of wormwood; there are some other glycosides as coloured or tannated substances. Some series of glycosides using the splitting process release essentials oils.

Pectine substances contained by fruits, can be situated in the cellular juice, and in the cellular cover in the shape of protopectine, insoluble in water. The pectine splits due to the action of alkali and the enzyme. Under the action of the pectase, an enzym found in fruits, the pectin passes through the pectic acid and then it is coagulated and the protopectina is split in pectin and it continues to split in galaturonic acid and others soluble compounds. The presence of the pectin in the strained fruit juice makes it difficult to filter and rinse .In the watery substances of ethylic alcohol the pectin is unstable. A small amount of pectin found in alcohol drinks can improve the taste,

confering a special and smooth touch. Juicy fruits are the ones rich in pectin: plums, appricots and the fruits bushes (blueberries, gooseberries).

Tannates substances have a big influence on the fruits, having an astringent and harsh taste. These substances have an positive role in forming the taste of the products giving to them a pleasant and harmonious freshness. The limit in discerning the tannin taste is 0,0012%. There is a tight relation between the tannin concetration and sour taste and after we add an amount of tannin, the limit of discerning sour taste is dropping. The tannates substances contribute at the juice rinsing and they are forming with the albuminous substances insoluble substances, that can be easily separated through decantation or percolation. The negative part in the process of raw material processing it is the capacity of these substances to form dark coloured products, due to the oxidation in the air or having a direct contact with iron. Tannates substances can be found in a large amount in the sloe fruits or gooseberries. Their vegetal raw material content stops the developing of micro-organisms and this is very important for the fruits preservation 5.

Nitrous substances are in the raw material in the shape of albumine, alkaloids, aminoacids ,amide mineral salts. The albuminoide substances in the heating process will coagulate and in the strain process a large amount will remain in the pomace .

From the lab research the following data (table 1) concluded:

Table 1: Chemical composition of medium fresh quality fruits

Fruits name	Water	Soluble substances	Sugar content expressed in saccharose	Acid content expressed in cedrate acid	Pectin	Tannates substances	Kernel content
Bush Fruits							
Rowans	83,4	9,8	5,03	1,86	0,2	0,25	
Bilberry	88,2	7,0	4,80	1,40	0,5	0,15	
Blueberry	88,1	8,0	4,0	0,56	0,4-1,0	0,29	
Strawberry	90,5	6,5	4,18	0,83	0,7-1,6	0,20	
Mossberry	88,0	8,0	3,42	2,75	0,73		
Gooseberry	78,7	9,0	5,18	2,55	0,8-2,2	0,39	
Raspbery	84,6	8,0	5,05	0,79	0,7-1,1	0,26	
Stone Fruits							
Apricots	86,3	11,0	6,00	1,17	0,7-1,1	0,07	7,0
Wax cherry	87,4	11,0	4,42	2,10	0,3-0,6		7,0
Morello cherry	84,6	13,0	7,28	1,35	0,3	0,18	8,0
COARNE	85,7	12,0	5,76	1,81	0,75	0,61	19,0
White underbrush	82,4	8,0	3,60	2,20	0,46	0,12	16,0
Plums	84,9	12,0	7,09	1,06	0,6-1,2	0,13	5,0
Sloes		13,0	7,80	2,34	0,8	1,7	11,4
Seeds Fruits							
Quinces	81,9	12,4	6,80	0,90		0,4-0,6	8,0
Fowler's pear	72,9	17,0	5,50	2,50	0,5-1,5	0,27	core
APPLES	82,4	10,5	7,61	0,95	0,4-1,2	0,1	

Naturals flavoura can be classified in:

- Proper spices and seasoned plants (leaves, flower buds ,fruits, seeds, bulbs, peel, roots). In this category it is the pepper, paprika, rosemary, tarragon, savory, anise, dill, lovage, mint, sweet basil, cinnamon, coriander,foeniculum, juniper, white and black mustard;
- extracts from flavoured fruits ,meat and secondary products, fish and shellfish that are obtained with different technological processes;
- oils substances that are obtained from spices and seasoned plants using the percolation with an organic solvent, and the organic residue which is the residue left after the the retrieve of the solvent and finally getting the oil ;
- essentials oils that are obtained from spices and seasoned plants mainly through drawing out with an organic solvent, and then it follows the solvent retreive and then taking back the residue with ethilyc alcohol in cold, through the alcohol passing only the essential oils ;
- fermented aromatisations that are producted by micro-organisms grown on different stratum (cheese, bread ,mushrooms, flowers, fruits, butter flavoured aromatisations).

Natural flavoured and aromatisations substances used in perfumery and food industry can be classified in:volatile oils, concrete and absolute oils, resinoids, oilsinoids, animal origin extraction, fruits juice flavours, isolated substances from volatile oils through fractioned distillation or other methods.

Essentials oils or volatile oils which represent the smell and taste quintessence with animal origin, are fundamentally different taking in account the composition and properties too, from the fatty oils which are mainly composed of fat acids esters with the glycerine and also from the mineral oils mainly composed of hidro carbons and derived silicium. Essential oils are specific for the vegetal kingdom ,defined by a lower or bigger volatilility, isolated from aromatic plants or parts of them using a phisycal process raw material, and having a nice smell specific from the vegetal raw material. Ether oils are natural organic products with an agreeable smell and they are composed by colourless or yellowish, flavoured,volatile, easily weathered oil compounds made of aliphatic hydrocarbons mixture ,aromatic and hydroaromatic ones, aldehyde, alcohols, ketone, esters and acids .

Natural ether oils can be found in flowers, fruits, fruits peel, in seeds, leaves, stem, root or the root stalk of some plants as well as in the vegetal or animal secretion products or in balsam and oil resin. There are known more

than 3000 essential oils, taking in account the phisycal and chemical characteristics and from all these only 150 are produced at an industrial scale. National production of essential oils without the spirit of turpentine, outruns 20.000 a year.

The most known oils are: anise oil (extracted from the anise seeds), fir tree (from the fir tree sprouts and young cones) eucalyptus (separated from the eucalyptus leaves) clove, jasmine, juniper, lemon, lavender (from the lavender flowers or seeds) mandarine, mint (from the mint leaves), bittered almounds (separated from the almounds kermel), pelargonium, oranges (separated from the flowers or peels of the oranges), rosemary, white sandal, cinnamon, iris, rose, valerian.

Most of the ether oils are colourless, oilly and yellowish compounds, volatile and flavoured. Some can congeal tottaly or partly at low temperatures. Therefore the rose oil or the anise one, when the temperature drops, they become a solid structure, paraffinish or crystallize. They have different smells, characteristicaly for the predominant component. Their consistency varies between 800 and 1200kg/m^3, he oils which are richer in hydrocarbons have a lower consistency and the ones richer in phenolshave a bigger consistency. The boiling point can vary after the components between 150°C and 300°C. The oils are soluble in absolut ethilic alcohol and in attenuate ethilic alcohol their solubility drops while the water content is raising. In the water they are insoluble or they have a lower solubility due to the hydrophilic component. Also they are soluble in fats or vegetal oils, their solubility being determined by the chemical composition.

The composition of essential oils varies taking in acount not only the the botanical species but also the enviroment where the plant grows.

Table 2: Fruits juice quality from the medium raw material

RAW MATERIAL NAME	First pouring fruit juice			Second pouring fruit juice		
	G content for 100ml fruit juice					
	Total extract	Sugars in saccharose	Acids in cedrate acid	Total extract	Sugars in saccharose	Acids in cedrate acid
1	2	3	4	5	6	7
Apricot	6,00	3,27	0,64	2,77	1,51	0,30
Quinces	6,50	3,58	0,47	3,50	1,90	0,25
Wax cherry	5,04	2,02	0,96	2,16	0,86	0,11
Rowan tree	4,45	2,28	0,85	3,50	1,80	0,66
Morello cherrires	6,50	3,65	0,67	2,85	1,60	0,30
Billberries	3,80	2,60	0,76	1,67	1,15	0,33
Blueberries	4,36	2,17	0,30	2,47	1,24	0,17
Strawberries	3,52	2,26	0,45	1,54	1,00	0,20
Cornc	4,45	2,14	0,67	2,89	1,46	0,46
Mossberries	3,40	1,84	1,48	1,63	0,70	0,56
Raspberries	4,40	2,77	0,45	2,45	1,55	0,24

1	2	3	4	5	6	7
White underbruses	3,36	1,51	0.95	2,40	1,08	0,66
Service fruits	5.80	1,88	0,80	2,18	0,70	0,32
Plums	5.61	3,31	0,49	2,40	1,43	0,21
Gooseberry	4.90	2,80	1,39	2,70	1,58	0,78
Sloe fruts	6.80	4,10	1.22	3,16	1,90	0.57
Apples	5.50	4.00	0.50	2.60	1.80	0,23

The substances with odoriferous and aromatizated characteristics are found in a large amount in nature especially in the vegetal kingdom .They are distributed in the whole plant, or often they can be preferentialy gather up in one organ of the plant. These aromatic plants parts or organs become raw material in obtaining naturals odoriferouses. They can be: flowers (roses, jasmines, tuberoses), flowers and leaves (minta, geranium, violets), fruits (coriander, anise, foeniculum), seeds (nutmed, AMBRET, TONCA), fruits peel (oranges, lemons), roots (angelica, vetiver, ginger),wood or bark (santal wood , cedar, cinnamon), flower and leaf buds (clove, blak poplar, gooseberry), the whole plant (garden sage, savory, sweet basil), acicular leaves and branches (pine, cypress, fir tree).

In some cases the odoriferouses substances can be found in the natural or pathological extrusions of some plants. These kind of raw materials are the resinates, balms, oleogumirezines and gumirezines. The process used in obtaining these "essences" depends on the way they are found in the vegetal raw material, on their chemical composition and their properties.

Most of the applied industry processes are supported on two of their physical properties as: trained property with water steam and their solubile in some solvents (hydrocarbons, alcohols, organic compounds, fats, carbon dioxide etc.).

The main processes practically applied are the following: steam water training, the extraction with animal fats, organic solvents extraction, the extraction with liquified gases, extraction through pressing, the absorbtion on an absorbant material, or specific processes for obtaining the flavours from the fruits juice.

The separation of a flavour from its natural enviroment is a difficult problem because it has to be isolated or concentrated with minimal loss, from contents modifications and without the introduction of some foreign substances. Any inadequate process leads to the degradation of the natural composition.

Fruits juice is characterised with a high water content (till 95%) adding sugars, too and proteine, lipide, mineral salts, organic acids, vitamins,

and a small amount of aromatic flavours principles some parts figures on a million. In their nature, these partially fat-soluble flavours, hydro soluble, can not be obtain through the general method of extraction with the help of fats or solvents, and neither through the water drawing.

Their stability outside their natural enviroment given the temperature and oxidizing agent is low. Their volatility and though boiling points of different compounds varies in a large domain. Some intermolecular associations between the components can influence powerfully their individual volatility, dameging the volatile composition in the steam process.

Industrial applied technics in obtaining the flavours from fruit juice (apples, pears, grapes, strawberries, pineapple, banana), are based as a principle on their concentration on different ways, through the elimination of the biggest part of water content and the extraction of the flavour from that concentrate. More of the time there is a preference for the obtaining of only the aromatic concentrates, easily to keep and use.

The juice concentration through distilation named concentration with flavours recovering. it is the process most often used at the industrial scale. To protect the flavour, a distilation mechanism should satisfy the following requirings: to decrease the heating temperature, to decrease the juice stationed time in the distilation system, the best condensation of the flavour volatile components. In this sense it is usual the distilation in ascendent or descendent film which allows an immmediate evaporation of a big quantity of water. The distilation takes place in an inert atmosphere, to prevent the oxidant processes.

Cryoconcentration is the juice freezing and the mechanical separation of the ice chrystals. The application of this process is limited because of the partial flavours lost, restrained by the ice chrystals.

A modern process of concetration is the one in an electromagnetic field of high frequence. With this kind of process the water evaporation can be realized at a medium temperature with a very simple equipment. The elecromagnetic field operates on the polar molecule, the energy of the waves being taken by them, transformed in thermic energy which induce the evaporation. The main characteristics of the concentrates obtained through his method are: the flavours do not lose their properties and do not suffer changes, the caramelisation of sugars because of the contact with the heaten surfaces is not produced, and they are less viscid than the ones obtained through heating .

The separation of the flavour from the flavoured concentrated is done through the extraction with organic solvents, liquefied gases, the adsorbsion

and disorbsion on a absorbant support. In the case of the extraction with solvents we prefer the saturation of the common salt or sodium sulphate concentrate and the using of a minimal solvent quantity. The selective extraction of the easily volatile components can be practiced in solvents with high boiling points and in solvents with low boiling points, for the harder volatile components to facilitate the separation of the distilations.

Results and Discussion

1. The using of flavoured substances is permitted with the condition: to have no risk for the customer 's health, not to decieve the customer.
2. To know the nocive effects of the flavoured substances used as flavours, it has to be done a periodical toxicological evaluation.
3. All the flavoured substances are the reason of a continuous survail and as many times it is necessary, their revaluation will be done in order to see the health effects or/ and the enviroment effects.
4. Food flavours must not contain more than: 3mg As/kg, 10mg Pb/kg,1mg Cd/kg, 1mg Hg/kg.

Any added substance intentionately in a food product in order to make it tastier, nicer or more appetizing can be a hidden enemy for our health. The producer is directly responsible for the product quality and also the customer health. The used flavoured dose is the one recommended by the Ministery of health and family. It is not allowed the using of the flavours at the raw products, flour, farina, sugar ,,sterilised cans of fruits and vegetables, dried fruits, coffee, tea and wine.

Table 3: The determination of the flavour concentration from different food/cooked products types

Nr. Crt.	Food products /cooked products	Used flavour	the determined quantity in the product mg/kg	Maximum addmited dose mg/kg
1	Tinned fruit coctail	Bittrer almound essence	40	40
2	Tropical fruit mixture	Cherry essence	40	30
3	Cherries jam	Cherry essence	20	20
4	Cereal food for kids <1year and between1-3 years	Etil-vanilină	68,5	70
5	Cocoa powder	Etil-vanilină	55	60
6	Cream	Etil-vanilină	5	10
7	Jelly	Mint flavour	55	60
8	Green beans	Mint flavour	1	-
9	Citric fruit jam	Natural flavour of citric fruits	25	30
10	Chocolate	vanilină	75	70

The research was on a number of 14 samples and the result of the determination the tabel 4 resulted.

Table 4: Concentration of flavours from 14 gastronomy products/food products/bevarages

Nr. crt.	Served products /food products	Maximun addmited dose mg/kg	Agaric acid mg/kg	Alpin mg/kg	Beta asarone mg/kg	Berberina mg/kg	Cumarina mg/kg	Hidroci Namic acid mg/kg	Hype-ricine mg/kg	Pulegone mg/kg	Safrol and isosafrol mg/kg
1	**Mushrooms saute**	20	26	-	-	-	-	-	-	-	-
2	**Cabernet Sauvignon**	0,1	-	0,1	-	-	-	-	-	-	-
3	**Sauvgnon**	1,0	-	-	0,9	-	-	-	-	-	-
4	**Chips**	1,0	-	-	-	15	-	-	-	-	-
5	**Refreshing drinks**	10	-	-	-	-	10	-	-	-	-
6	**Caramel cake**	2	-	-	-	-	50	-	-	-	-
7	**Chewing gum**	2	-	-	-	-	-	-	-	-	-
8	**Martipan**	0,1	-	-	-	-	-	-	-	-	-
9	**Nougat**	1	-	-	-	-	-	50	-	-	-
10	**Tinned fruits**	1	-	-	-	-	-	5	-	-	-
11	**Meat products**	0.1	-	-	-	-	-	-	10	-	-
12	**Mint brandy**	25	-	-	-	-	-	-	-	250	-
13	**Alcoholic drinks with the alcohol concentratin lowerthan25%vol.**	1	-	-	-	-	-	-	-	-	2
14	**Alcoholic drinks with the alcohol concetration biggerthan25%vol**	0.1	-	-	-	-	-	-	-	-	1

Conclusions

The using of natural flavours has demonstrate its utility for many food products as: pastery products, refreshing drinks, alcoholic drinks, cooked products.

Improving the taste of the food products and cooked products with the help of the flavours which generated the rising of the sortiments products but it did not determinated the maintaining or rising the quality of the products on the process of aromatisation.

The existence on the market of the improved food products with natural flavours and identically naturals makes a confusion on the aromatistion techique.

Through the experiments we obtain the following results:

- The using of the flavours is necessary esspecialy for the food products which are from the raw material that loses its proper flavour

- It is better to use natural flavours which are extracted with modern processes that destroies less the nutritive value of the food products.

- The using in the products aromatisation techique of only the natural flavours determines a process where the result are ecological products. This technological process means the protection of the natural flavours at the fresh raw material.

- The using of naturals flavours has some advantages: in some case it does not need an advanced proces, so it contains substances with an antioxidant action, has a power of aromatisation which is stable for a long time;

- During the conservation the flavours do not change their taste, smell, colour, or the chemical-physical structure of the product

- The using of the spices and aromatic plants have a terapeutical effect on the people health natural flavours can be singular or mixtures the using of natural flavours offers a healthy nutrity.

The disadvantages of using the natural flavours:

- can be distributed in the whole part of the product by using complex technological equipment with big energy consumption.

- the flavour of the product is not felt with the same intensity in the product parts because the difusion of the taste and smell components is slower, as a fact of that the product needs a longer time for the technological maturity (which means the rising of the depositation time, conservation and technological maturity, a bigger attention in transportation).

- in some cases, like the aromatic plants, they can print a particular colour to the flavoured product, which it is not always compatible with the required technological needs and the ones of the customers'

- during their conservation for a longer time they lose their initial power of flavouring due to the quantitative lost of the essential oils.

References

Banu C. (coordonator), (1985)-*Folosirea aditivilor în industria alimentară*, Editura Tehnică, Bucureşti.

Carabulea B., (2002)-*Tehnologia păstrării şi industrializării produselor horticole*, Editura Cartea Moldovei, Chişinău.

Cotea V. (1995)-*Tratat de oenologie*, volumul I, Editura Tehnică, Bucureşti,.

Eliu Ceauşescu V., Rădoiaş Gh.,(1988)-*Odorante si aromatizante*, Editura Tehnică Bucureşti.

Horoba E., Cristian Gh., Horoba L.(2001)-*Tehnologii de valorificare a produselor naturale*, Editura Corson, Iaşi.

Hura C.(2004)-Institutul de Sănătate Publică Iaşi, *Aditivi alimentari*, Editura Cermi, Iaşi,.

Merică E.(2003)-*Tehnologia produselor cosmetice*, ediția a II-a, volum I, *Substanțe active și aditivi*, Editura Kolos, Iași.
Niac Gh. (2004)-*Alimentație, nutriție și alimente* (Știința alimentației, tehnologii culinare), Editura Emia, București.
Păun E., Mihaela A., Dumitrescu A., Verzea M., Coșocariu O. (1986)-*Tratat de plante medicinale și aromatice cultivate*, volumul I, Editura Academiei Române, București.
Păun E., Mihaela A., Dumitrescu A., Verzea M., Coșocariu O. (1988)-*Tratat de plante medicinale și aromatice cultivate*, volumul II, Editura Academiei Române, București,.