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Professional paper

RELATION OF THE EXTRACTION PROCESS OF SAMBUCUS NIGER WITH THE SIZE OF GRANULES OF THE RAW MATERIAL

Mahi LATIFI[1], Ejup LATIFI[2]

[1] *Max Zeller Sohne AG Pflanzliche Heilmittel Romanshorn*
[2]*Rruget shteterore te Maqedonise Veriore*
**Corresponding author: email: mahi.ljatifi@zallerag.ch*

Abstract

The extraction process of plant-based pharmaceutic raw material Sambucus Niger, is related to many factors such as the size of grind raw material, extraction temperature, number of spinning of the mixer, maceration time, concentration of the solvent, as well as the amount of the solvent in relation with the raw material. Each of these factors has a direct relation with the type of pharmaceutic plant which undergoes extraction. The content of the raw material which may be grounded flowers, stalk mixed with flowers, roots of raw material, or fruit of raw material indicated the method that should be used for extraction, such as extraction with various solvents-Maceration, extraction with CO2, and percolation extraction. In this case, when the raw material is a fruit of a pharmaceutics plant, the extraction is made by maceration, a method that also has its complexity in the technological process for such raw material. The grinding degree of raw material indicates optimization of the technological process, on the other side presents maintaining e high value of the extraction coefficient as well as reaching maximum values of basic substances that are present in the raw material.

Keywords: Extraction, maceration, extraction coefficient

1. Introduction

Sambucus nigra is known as pharmaceutical raw material, which in its composition contains substances that are very important for the human body, in particular: essential oils, glycosides, and flavonoids. It grows mainly in the Balkan countries, Asia, and North Africa. It grows to a height of 3 to 7 meters. and the blooming time is May-June, when the fruits start to be created, first they have a greenish and yellowish color, and later they are black and perfectly shine. The tree of Sambucus is characterized by its stem, which is woody on the outside and inside there is an empty part with a white, non-woody mass. Sambucus has been used as a medicinal plant since ancient times to increase the body's immunity and for cold, there was no exact preparation of the extract, but its fruits were dissolved in water and were used in the form of tea. The main ingredients are essential oils, and high amounts of flavonoids, including the antioxidant rutin. (Abuja, PM, Murkovic, M., Pfannhausser). Nowadays, Sambucus fruits are a special study object in pharmacy due to the content of very useful ingredients such as organic acids, sugars, cyanogenic glycosides, and other components such as vitamins, tannins, amino acids (Atkinson, M.D.Atkinson). Anthocyanins have a high antioxidant effect, therefore it can be used for cardiovascular diseases, tumors, as well as metabolic disorders. Even though sambucus niger, together with its fruits in the shape of grape vines has a high healing potential due to its ingredients, therefore choosing the most suitable extraction method is still a problem. (Kaack, K., Austed, T). Due to the complexity of the extraction, all the extraction factors must be carefully treated, first of all, the size of the grains, so we must have a clear

granulometric analysis. The extraction will be difficult due to the substances that are created after the maceration process, during the extraction a binding phase is created which completely blocks the extraction, therefore it is not preferred for the raw material to be ground so much - fraction 1 -scum, as this contributes more to the creation of sticky phase. (M. Wichtl) Even though it is added Maltodextrin during maceration, to reduce the stickiness of the extract, the stickiness also increases or decreases depending on the fineness of the raw material.

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The extraction was performed by maceration for the three ground samples with different grinding fractions starting from 2 mm to the finest fraction of 0.125 or even the cum. The purpose of the extraction in different fractions is to find the adequate size of the grains that come into contact with the solvent to extract all the main components of Sambucus Niger, to have a higher extraction coefficient and on the other hand, further technological process to be without any obstacles. From the three prepared samples, it is preferable to a higher or perhaps ungrounded fraction of Sambucus Niger Diag.1 a) Tab1.

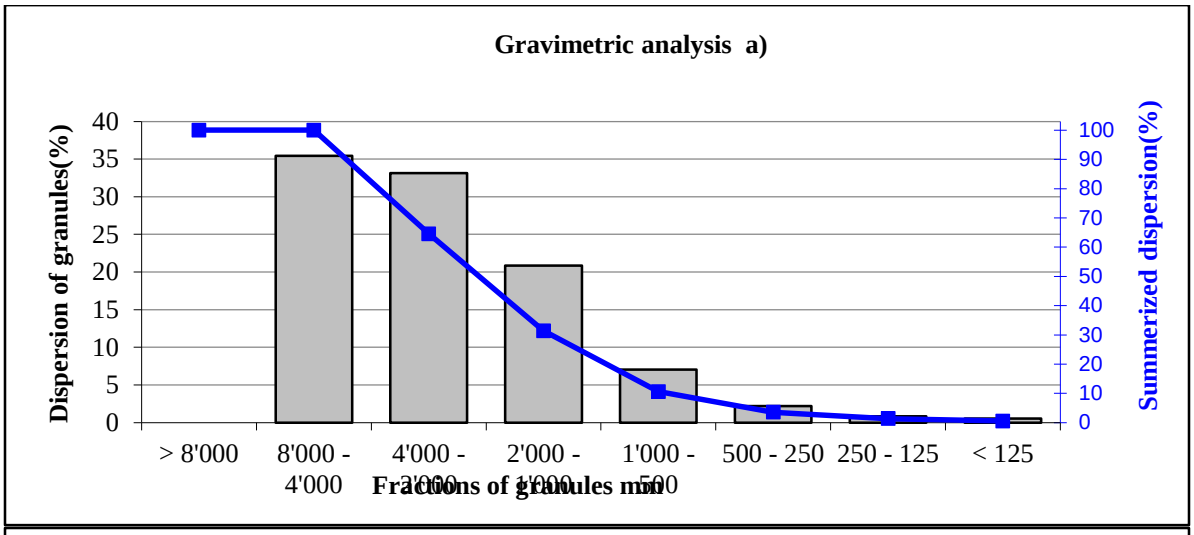
All this is because of the elimination of conditions to create a sticky substance that blocks the filtration process. From the results in Tab no. 4 where is seen the relation of the dry mass per time unit for the three samples, it is found that the sample with smaller fractions has a higher extraction coefficient but is not suitable for further technological process.

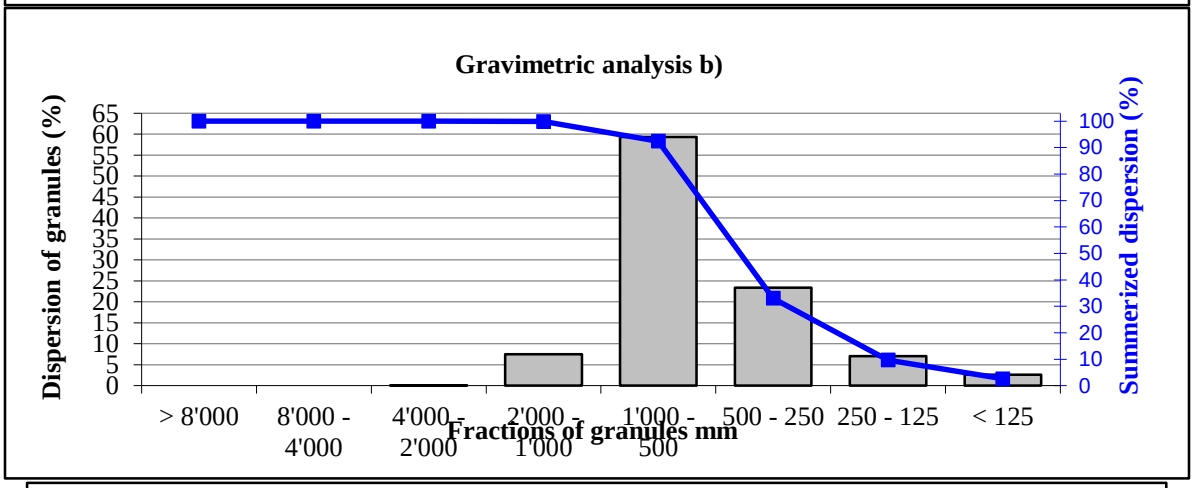
Maceration was made in a 2000 ml laboratory vessel, there were weighed 1520 g of ethanol with a concentration of 70% and 190 g of raw material - Sambucus fruits, which were subjected to the same mixing at 400 rpm in a time interval of 60 min. , due to the analysis, the maceration was extended up to 150 min to have the complete extraction of the main components in Sambucus Nigra.

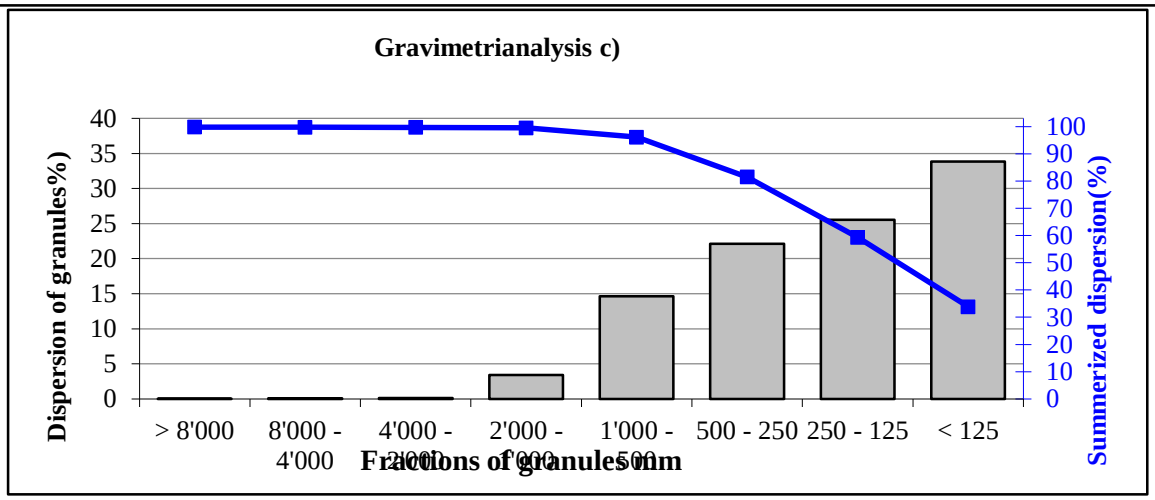
The maceration is performed in two phases, in the first phase it is an intensive extraction that lasts 30 to 40 min, and in the second phase, it is a slow extraction to an equilibrium. (diag.) Maceration is made at a temperature of 35 °C. The temperatures shouldn't be higher because this affects the creation of a sticky viscous mass which makes the filtration process impossible. During the maceration time, 30% of the amount of dry extract Maltodextrin is added to the extract to make the joining of the sticky component with maltodextrin, so the extract remains pure.

After the filtration process, the obtained extract is again not pure and accompanied by impurities that are created during the maceration process as a result of the maceration temperature. From the results of the laboratory work, it can be seen that even though the raw material is the same but pre-prepared in different fractions, we also have different degrees of extraction (Tab.3).

3. Table Figures and Equations







Diag.1 Gravimetric analyze of raw material:a)Fraction 2-0.25mm b)Fracsion 1-0.25 mm c) Fracsion 1-0.125mm

Table 1 (a,b,c) Size granules distribution according to the size of the strainer

Probe 1			
Size of strainer	**Measuring vessel gr**	**Vessel + raw material gr**	**Netto**
8.00 mm	448.13	448.13	0
4.00 mm	430.32	430.32	0
2.00 mm	400.3	416.92	16.62
1.00 mm	362	372.45	10.45
0.50 mm	322.69	326.23	3.54
0.25 mm	290.12	291.22	1.1
0.125 mm	279.7	280.11	0.41
Sludge	400.76	401.02	0.26

a)

Probe 2			
Size of strainer	**Measuring vessel gr**	**Vessel + raw material gr**	**Netto**
8.00 mm	448.1	448.1	0
4.00 mm	430.9	430.6	0.3
2.00 mm	400.09	399.9	0.19
1.00 mm	361.94	365.4	3.46
0.50 mm	322.68	339.82	17.14
0.25 mm	290.07	303.14	13.03
0.125 mm	279.48	292.55	13.07
Sludge	400.88	404.25	3.37

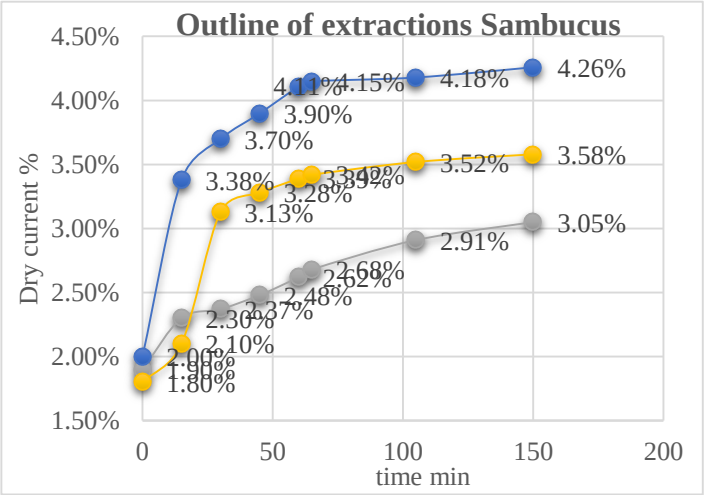
b)

Probe.3			
Size of strainer	**Measuring vessel gr**	**Vessel + raw material gr**	**Netto**
8.00 mm	448.5	448.52	0.02
4.00 mm	426.83	426.88	0.05
2.00 mm	399.75	399.82	0.07
1.00 mm	358.79	365.7	6.91
0.50 mm	318.86	326.18	13.8
0.25 mm	289.86	300.93	11.07
0.125 mm	246.44	259.21	12.77
Sludge	400.8	417.72	16.92

c)

Table.2 Dry mass in relation to the extraction time

Time	Probe1	Probe2	Probe3
0	1.90%	1.80%	2.00%
15	2.30%	2.10%	3.38%
30	2.37%	3.13%	3.70%
45	2.48%	3.28%	3.90%
60	2.62%	3.39%	4.11%
65	2.68%	3.42%	4.15%
105	2.91%	3.52%	4.18%
150	3.05%	3.58%	4.26%



Diag .2 Curves from the extraction in three analysis

4. Conclusions

- Before the extraction process, it is preferable to make an adequate selection of the degree of grinding, first of all, the grinding should not be high and is also preferable to an average fraction.
-Although the extraction coefficient for smaller fractions of the strainer is not preferable for extraction due to the creation of a sticky substance that completely blocks the filtration process and the technological process becomes difficult to realize.
-After the extraction, it is preferable to do filtration of the extract which is obtained due to the dirt of the extract.
-High temperatures for maceration are not preferable, because the creation of a sticky phase is higher in high temperatures and the same lowers the extraction coefficient.
-It is also not preferable the increase the solvent concentration due to the extraction of unnecessary substances which makes the extraction process as a disadvantage.

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