

SPECIFICATION

TITLE OF INVENTION: METHOD FOR PRODUCING CULTURED ROOT OF PURPLE GINSENG

5 CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Korean Patent Application No.10-2011-0020355, filed on March 8, 2011 in the Korean Intellectual Property Office, Korean Patent Application No.10-2011-0030577, filed on April 4, 2011 in the Korean
10 Intellectual Property Office, Korean Patent Application No.10-2011-0085253, filed on August 25, 2011 in the Korean Intellectual Property Office and Korean Patent Application No.10-2011-0119040, filed on November 15, 2011 in the Korean Intellectual Property Office, the disclosure of which is
15 incorporated herein by reference.

TECHNICAL FIELD

[1] The present invention relates to a novel method for processing a cultured root of wild ginseng for increasing a
20 certain saponin content.

BACKGROUND

[2] A wild ginseng, called as a scientific name of *Panax schinseng* NESS, is similar to a ginseng, but it is formed with
25 a slightly different gene. The pharmacological effects of a

wild ginseng are significantly superior to those of a ginseng, but due to its rarity there is a great limitation in the study and utilization thereof. However, recently, due to a development of cell culture techniques, a wild ginseng cell
5 can be cultured to study or utilize the wild ginseng.

[3] An effective ingredient of a wild ginseng is known as a ginsenoside and its main pharmacological effects are known to have numerous physiological activities including an immunological enhancement action, an antidiabetic action, a
10 recovery from fatigue, an anti-stress action, a brain activity promotion effect, a nerve cell protection action, a blood circulation promotion action, a sexual dysfunction improvement action, a central nervous inhibitory action, a ditoxication effect, a platelet aggregation inhibitory action, particularly
15 anticancer and cancer treatment.

[4] On the other hand, when such a ginseng is processed, a ginsenoside content is mostly increased. A method for processing such a ginseng generally comprises repeatedly steaming and drying the ginseng several times under a high
20 condition of over 100°C. However, in such cases, since the steaming and drying must be repeated several times and they must continuously satisfy with a complicated condition of preparation, they may bring about reduction in the productivity and economic efficiency of the preparation
25 process. Further, there is a problem that a content of an

effective ginsenoside ingredient contained in the processed ginseng is not substantially increased.

DISCLOSURE OF THE INVENTION

5 TECHNICAL PROBLEM

[5] Thus, the present invention has been designed in order to resolve the problems encountered with prior arts as mentioned above. The purpose of the present invention is to provide a novel method for producing a cultured root of purple wild
10 ginseng which can process a cultured root of wild ginseng rather than a ginseng to obtain various kinds of ginsenoside ingredients in a high content.

TECHNICAL SOLUTION

15 [6] In order to accomplish the above mentioned purpose, the present invention provides a method for producing a cultured root of wild ginseng with an increased content of ginsenoside Rg3, Rh2, Rg2 and Rh1 which comprises a first step(i) of introducing a cultured root of dried wild ginseng or its
20 powder in a closed high pressure steamer, adding thereto a water within a range of about 1/50~1/100 of the volume of container equipped in the steamer and then conducting a first heating at a temperature of 80~100°C for 10~48 hours under a high pressure condition of 1.5~2 bar.

[7] The production method according to the present invention further comprises a second step (ii) of conducting the heating and drying at a temperature of 100~500°C for 10~48 hours in a state of maintaining the high pressure condition of the above
5 first step(i).

[8] The production method according to the present invention comprises, preferably, conducting the first step or the second step in a state of maintaining the condition of the step(i) and then 1~10 times repeatedly conducting the first step, the
10 second step, or both the first and second steps.

[9] Also, the present invention provides a method for producing a cultured root of wild ginseng with an increased content of ginsenoside Rg3, Rh2, Rg2 and Rh1 which comprises 1~10 times repeatedly conducting a second step (ii) of
15 introducing a cultured root of dried wild ginseng or its powder in a closed high pressure steamer, adding thereto a water within a range of about 1/50~1/100 of the volume of a container equipped in the steaming machine and then heating and drying them at a temperature of 100~500°C for 10~48 hours
20 under a high pressure condition.

[10] In the present invention, the high pressure steaming machine is preferably equipped with a safety pin of maintaining a pressure in order to prevent a damage of the container.

25 [11] The cultured root of dried wild ginseng preferably has

less than 5% of water content.

[12] In the above first and second steps, a range of temperature, a volume of water added, and a range of high voltage are not limited to the above mentioned range and they
5 can variously control depending on the desired use.

[13] Furthermore, the present invention provides a cultured root of purple wild ginseng produced by the above mentioned method. The cultured root of wild ginseng prepared has as many as about 300 times more increased content of ginsenoside
10 Rg3 as compared with a wild ginseng as shown in the attached tables and also can produce various kinds of ginsenoside ingredients in a large quantities by controlling the temperature and pressure.

15 **ADVANTAGEOUS EFFECTS**

[14] The present invention can increase productivity and economic efficiency of a wild ginseng by simplifying the production process and provide a novel method for processing a cultured root of purple wild ginseng with a significantly
20 increased content of a certain ginsenoside ingredient.

[15] The cultured root of wild ginseng produced according to the present invention contains various kinds of saponin ingredients in a higher quantity, as compared with a cultured root of general wild ginseng or a cultured root of wild
25 ginseng processed by a conventional method. Accordingly, when

the above cultured root of wild ginseng or a supplementary health food containing the cultured root are taken, it is possible to show various pharmacological efficacies due to a high content of Rg2+Rh1(brain function activation), Rg3(cancer
5 cell metastasis inhibitor) and Rh2(cancer therapeutic agent) and the like.

BRIEF DECSRIPTION OF DRAWING

[16] Fig. 1 shows an analysis and test report of ginsenoside
10 ingredients of the cultured root of wild ginseng produced in Example 1.

[17] Fig. 2 shows an analysis and test report of ginsenoside ingredients of the cultured root of wild ginseng produced in Example 2.

15 [18] Fig. 3 shows an analysis and test report of ginsenoside ingredients of the cultured root of wild ginseng produced in Example 3.

[19] Fig. 4 shows an analysis and test report of ginsenoside ingredients of the cultured root of wild ginseng produced in
20 Example 4.

BEST MODE FOR CARRYING OUT THE INVENTION

[20] Hereinafter, the present invention is described in more detail.

[21] The method according to the present invention is characterized by processing a cultured root of wild ginseng with a water vapor under high pressure and high heat, instead of several times repeatedly steaming and processing a conventional ginseng under an atmospheric pressure condition.

[22] Through such processing, the present invention can significantly increase a content of a certain ginsenoside (e.g., Rh1, Rg3, Rh2, etc.) by hydrolyzing a conventional ginsenoside (e.g., Rg1) contained in the cultured root of wild ginseng and then newly synthesizing effective ingredients of other ginsenoside using the decomposed ginsenoside and the ingredients of cultured root itself (please refer to Table 1 and Figs. 1 through 4).

[23] In one embodiment of the novel method for producing the cultured root of wild ginseng according to the present invention, the cultured root of dried wild ginseng and water are introduced in a high pressure steaming machine, and then heated and dried while maintaining a high pressure state if possible. In a more preferred embodiment, the following three methods can be illustrated. However, the invention is not limited only to these methods.

[24]

[25] 1) First Embodiment

[26] The first embodiment of the method for producing the cultured root of wild ginseng according to the present

invention comprises introducing the cultured root of dried wild ginseng or its powder in a closed high pressure steaming machine, adding a water within a range of about 1/50~1/100 of the volume of a container equipped in the above steamer, and
5 then conducting a first heating at a temperature of 80~100°C for 10~48 hours under a high pressure of 1.5~2 bar.

[27] The cultured roots of wild ginseng used in the present invention refer to cultured roots of ginseng produced by tissue-culturing a wild ginseng under a certain condition, but
10 are not limited to these. The cultured roots of wild ginseng itself and the cultured roots of processed wild ginseng which are conventionally known in the art can be used, and these include a wild ginseng and a cultivated wild ginseng.

[28] The ginseng origin used in the tissue cultivation of the
15 cultured roots of wild ginseng is not particularly limited. As one example, the ginsengs which are originally from Korea, the United States, Japan, Himalaya, Vietnam and China can be used.

[29] Non-limiting examples of the cultured roots of wild ginseng which can be used herein include a living body of a
20 cultured root of wild ginseng, a powder of a cultured root of wild ginseng, a concentrate of a cultured root of wild ginseng and so on. In the present invention, the powder of the cultured root of wild ginseng is mainly used. In addition, any of a white ginseng, a fresh ginseng, a red ginseng and the

like which are commercially available in the art can be used in the practice of the present invention.

[30] When the cultured root of wild ginseng contains a large amount of moisture, it is difficult to pressurize the same
5 under the above mentioned high pressure condition. Therefore, the cultured root of dried wild ginseng is preferred. As one example, the cultured root of dried wild ginseng has preferably less than 5% of moisture content.

[31] Further, the amount of the cultured root of wild ginseng
10 used is not particularly limited. As one example, it is preferable to use it within a range of less than 1/10 of the volume of the container.

[32] In the present invention, the high pressure steaming machine refers to an equipment of adding a certain pressure
15 condition and steaming a cultured root of wild ginseng. The high pressure steaming machine includes a container capable of receiving the cultured root of wild ginseng under a certain high pressure condition. Non-limiting examples of the container which can be used herein include a silver container,
20 earthenware, a glass container, a ceramic container, a harmless metal container and the like. Using earthenware with high germanium content together is preferred.

[33] Water used together with the cultured root of wild ginseng prevents from excessively increasing a water vapor
25 pressure in a high pressure steaming machine, and the cultured

root of wild ginseng dried in the container absorbs moisture.
In view of these, water can be used within a range of 1/50 to
1/100 of the volume of the container in which the cultured
root of wild ginseng is introduced. By controlling the heating
5 temperature in a closed container, a pressure resulting from
the water vapor pressure in the container can be controlled.

[34] Further, in the first step, the pressurized condition in
a high pressure steaming machine is not particularly limited.
It is effective to use the maximum water vapor pressure which
10 can be obtained by conducting the heating at the temperature of
less than 100°C, preferably 80~95°C. Herein, it is necessary
to equip a safety pin for preventing a damage of the high
pressure steaming machine.

[35] In the above first step, the heating and drying can be
15 conducted at a temperature of less than 100°C, preferably
80~100°C, for 10~48 hours. In order to sufficiently obtain
ginsenoside ingredients, it is preferable to conduct the
heating for a possible long time and thus, these are not
limited only to the above range. The heating at a temperature
20 of less than 100°C is for the purpose of sufficiently
obtaining ginsenoside ingredients produced at a temperature of
less than 100°C.

[36]

[37] 2) Second Embodiment

[38] The second embodiment of the method for producing the cultured roots of wild ginseng according to the present invention comprises heating the cultured roots of wild ginseng under higher pressure and temperature condition as compared
5 with the above mentioned first embodiment. A preferred example thereof comprises introducing the cultured root of dried wild ginseng or its powder in a closed high pressure steaming machine, adding a water within a range of about 1/50~1/100 of the volume of container equipped in the above steaming machine,
10 and then conducting the heating at a temperature of more than 100°C for 10~48 hours in a state of maintaining a high pressure condition (the second step).

[39] The heating of the second embodiment can be conducted, for example, at a temperature of more 100°C, preferably
15 100~500°C, for 10~48 hours. In order to sufficiently obtain ginsenoside ingredients in the same manner as the first step, it is preferable to conduct the heating for a possible long time and thus, these are not limited only to the above range.

[40] When the temperature in the closed high pressure steaming
20 machine is raised to more than 100°C, the internal pressure of the steaming machine resulting from the water vapor pressure will also be significantly increased. As such, the decomposition of a conventional ginsenoside and the synthesis of new ginsenoside can be significantly increased due to such
25 the high pressure water vapor. Since a pressure is increased

in proportion to a temperature, the above mentioned high pressure range is not particularly limited. As one example, the high pressure range of the second embodiment is preferable that the pressure of the steam is increased as much as possible within a range capable of standing the container. Additionally, the production condition can be applied identically to the above mentioned first embodiment or it can be properly changed.

[41] When the second embodiment is either first practiced or alone practiced, it may further comprise a third step (iii) of conducting the heating at a lower temperature range than the second embodiment, in a state of maintaining the high temperature/high pressure condition of the second embodiment (ii) As one example, the heating in the above third step can be conducted at a temperature of 90~110°C for 10~48 hours.

[42]

[43] 3) Third Embodiment

[44] The third embodiment of the method for producing the cultured roots of wild ginseng according to the present invention comprises sequentially conducting the first embodiment(first step) and the second embodiment (second step). As one example, after completion of the first step, the cultured roots of wild ginseng can be produced by conducting a second heating and drying in a state of maintaining a high pressure condition of the first step. Alternatively, after the

first step or the second step has been conducted in a state of maintaining the condition of the first step (i), the cultured roots of wild ginseng can be produced by several times repeatedly conducting and drying the first step, the second
5 step or both the first and the second steps .

[45] As the repeating time is increased, the kinds of effective ginsenoside ingredients in the cultured root of wild ginseng and the content thereof are increased. Therefore, the repeating times or order of the above mentioned first and
10 second steps may not be particularly limited. As one example, the repeating times may be 1 to 10 times.

[46] In the first embodiment through the third embodiment according to the present invention, a temperature range, an amount of water added, and a pressure range are not limited to
15 the above mentioned ranges. Even applying to the higher temperature and pressure than the above mentioned range during a condition of not damaging the container equipped in the high pressure steaming machine is included within the range of the present invention.

20 [47] On the other hand, the present invention discloses about once practicing the first and the second steps. If necessary, the first and the second steps can be repeatedly conducted more than once, for example 1~10 times. Also, properly changing the order of the first and the second steps depending

on the desired use is included within a range of the present invention.

[48] After taking the production step as mentioned above, the cultured roots of wild ginseng show a deep purple color.

5 [49] According to the present invention, when the content of saponin which is the main ingredient of the cultured root of wild ginseng, is raised to a maximum content, it is possible include much more kinds of saponin ingredients as compared with a conventional wild ginseng. The term "saponin" used in
10 the present invention refers to ginsenoside, i.e., ginseng saponin, unless indicated otherwise. Saponin of the other plant can variably increase in the same manner.

[50] Particularly, the cultured roots of wild ginseng produced according to the present invention show ginsenoside
15 ingredients and content behaviors which are different from the cultured roots of conventional wild ginseng.

[51] As one example, it can be identified that the cultured roots of conventional wild ginseng has a high content of ginsenoside Rg1, whereas the content of ginsenoside Rg3 and
20 Rh2 is extremely low. In contrast, the cultured roots of wild ginseng processed according to the present invention do not substantially present the content of ginsenoside Rg1, and the contents of ginsenoside Rg3 and Rh2 are increased to hundreds of times, respectively (please refer to Table 1). These
25 results show that ingredients contained in the cultured roots

of wild ginseng and a conventional ginseng saponin can be hydrolyzed or synthesized through the novel production method according to the present invention to thereby increase a better quality of saponin such as new ginsenoside Rh1, Rg3,
5 Rg2 and Rh2.

[52] Accordingly, the cultured roots of wild ginseng produced according to the present invention are anticipated to be effectively used in the field of a platelet aggregation inhibitory action, a cancer cell growth inhibition, a cancer
10 metastasis inhibitory action, an anticancer activity expansion of anticancer agent, an anti-allergic effect, an anti-inflammatory and cancer therapy, which show the efficacies of ginsenoside Rg3 and Rh2. The reason thereof is that mass production of Rg3 and Rh2 is possible.

15 [53] The cultured roots of wild ginseng produced according to the present invention is condensed, decomposed, freeze-dried or vacuum-dried to make a powder, or can be taken in the form of a solution formed by precipitating them in a spirit. Or it can be used as an injection or in several other forms. Or the
20 powder or solution may be added to medicine, food, health supplemental and so on.

[54] The cultured roots of wild ginseng produced according to the present invention can be used as a medicine for anti-cancer, anti-inflammatory, or anti-allergic therapies.

[55] When the cultured roots of wild ginseng produced according to the present invention are used as a medicine for anti-cancer, anti-inflammatory, or anti-allergic therapies, they may optionally further comprise conventional carriers, excipients or diluents known in the art.

[56] Further, the cultured roots of wild ginseng produced according to the present invention can be used as a supplemental health food.

10 **Best Mode for Carrying out Invention**

[57] Hereinafter, the present invention is described in more detail with reference to examples. However, the following examples are intended to illustrate the invention, and the scope of the invention is not limited to these examples. The examples can be properly corrected and modified by a person skilled in the art within the scope of the present invention.

[58]

[59] **Example 1**

[60] 1-1. Drying of the cultured roots of wild ginseng

[61] The cultured roots of wild ginseng were harvested and three times cleanly washed with water. They were laid with a thickness of 3~5cm on a dry wicker tray. The wicker tray was placed on an automatic dryer. They are dried at a temperature of 80°C for 9 hours and processed as a fine powder so that the moisture content is less than 5%.

[62] 1-2. Preparation of the cultured roots of wild ginseng

[63] 500g of the cultured roots of wild ginseng dried in Example 1-1 were introduced in a pure silver container (10l) equipped in a high pressure steaming machine to which water of
5 about 1/100 of the container volume was added. A safety pin was equipped therein so that the hydrostatic pressure was not increased more than 2 bar. The first heating was then conducted at a temperature of 95°C for 24 hours.

[64] Subsequently, the temperature was raised to 130°C in a
10 state of maintaining the pressure and then the second heating was conducted for 24 hours. The cultured roots of heated wild ginseng were laid with a thickness of 1~2cm on a wicker tray and then dried at a temperature of 90~100°C for 10 hours so that a moisture content is less than 5%. The cultured roots of
15 wild ginseng produced from the above procedure could be analyzed to obtain the results as shown in Table 1 below.

[65]

[66] **Examples 2 and 3**

[67] The cultured roots of wild ginseng shown in the test
20 reports of Figs. 2 and 3 were produced by conducting the same procedures as Example 1.

[68]

[69] **Example 4**

[70] The cultured roots of wild ginseng were produced in the
25 same manner as Example 1 except that they were produced

through the first heating and drying steps without the second heating step.

[71]

[72] **Experimental Example 1.** Comparison of saponin ingredients
5 of the cultured roots of wild ginseng and saponin ingredients
of the cultured roots of steamed wild ginseng

[73] The ingredient analysis of the cultured roots of wild
ginseng prepared in Examples 1 to 4 was conducted by the Life
Science Research Center in Industry-University Collaboration
10 Foundation, JOONGBU University (Food Sanitation Test
Organization Designation No. 38 by the Korea Ministry of Food
and Drug Safety). The analysis results of the cultured roots
of wild ginseng prepared are shown in Tale 1 below.

[74] In Examples 1 to 3, the cultured roots of wild ginseng
15 were heated and steamed under high temperature and high
pressure conditions of the first and second steps. In Example
4, the cultured roots of wild ginseng were heated and steamed
under a high temperature and high pressure of the first step
by changing the conditions.

20 [75] As shown in Table 1 below, the cultured roots of wild
ginseng prepared in Examples 1 to 4 have various kinds of
saponin ingredients in a high content as compared with the
cultured roots of non-treated wild ginseng. Particularly, the
cultured roots of wild ginseng prepared in Examples 1 to 3
25 under the high temperature and high pressure significantly

increase the content of certain ginsenoside Rh1, Rg3, Rh2 and so on.

[76] Accordingly, the novel method for producing the cultured roots of wild ginseng according to the present invention can be usefully applied to several fields which require various pharmacological effects.

[77] Table 1

	Test items and results (mg/g)							Condition	
	Rg1	Rf	Rg2	Rh1	Rg3	Rh2	Crude saponin	1st step	2nd step
Example 1 cultured roots of wild ginseng	0	0.205	0.046	0.251	6.42	1.787	50.10	○	○
Example 2 cultured roots of wild ginseng	0	0.119	0.192	0.262	4.07	1.233	65.1	○	○
Example 3 cultured roots of wild ginseng	0.045	0.047	0.104	0.134	4.77	3.466	96.5	○	○
Example 4 cultured	0.155	0.012	0.047	0.00	2.28	0.658	78.7	○	x

roots of wild ginseng									
Non-treated cultured roots of wild ginseng	0.82	0.27	0.28	0.02	0.02	7.37	x	X	

WHAT IS CLAIMED IS:

1. A method for producing a cultured root of wild ginseng with an increased content of ginsenoside Rg3, Rh2, Rg2 and Rh1
5 which comprises a first step(i) of introducing a cultured root of dried wild ginseng or its powder in a closed high pressure steaming machine, adding thereto a water within a range of about 1/50~1/100 of the volume of a container equipped in the steaming machine and then conducting a first heating at a
10 temperature of 80~100°C for 10~48 hours under a high pressure condition of 1.5~2 bar.

2. The method for producing a cultured root of wild ginseng as claimed in claim 1 which further comprises a second step
15 (ii) of conducting the heating and drying at a temperature of 100~500°C for 10~48 hours in a state of maintaining the high pressure condition of the above first step(i).

3. The method for producing a cultured root of wild
20 ginseng as claimed in claim 2 which comprises conducting the first step or the second step in a state of maintaining the condition of the above step(i) and then 1~10 times repeatedly conducting the first step, the second step, or both the first and second steps.

25

4. A method for producing a cultured root of wild ginseng with an increased content of ginsenoside Rg3, Rh2, Rg2 and Rh1 which comprises 1~10 times repeatedly conducting the steps of introducing a cultured root of dried wild ginseng or its powder in a closed high pressure steaming machine, adding thereto a water within a range of about 1/50~1/100 of the volume of a container equipped in the steaming machine and then conducting the heating and drying at a temperature of 100~500°C for 10~48 hours under a high pressure condition.

10

5. A cultured root of purple wild ginseng prepared by the methods defined in any of claims 1 to 4.