An apparatus for cultivating natural grain buds includes unit tray supports each having a grain-seed cultivating tray placed thereon and installed to be rotationally and reciprocally moved between a driving shaft and a driven shaft on a frame. Each unit tray support includes a supporting piece and a catching piece provided above the supporting piece. The supporting piece is provided on front side of each hollow boss fitted on a support-fixing shaft, which is secured to a chain connected between a driving sprocket wheel coupled to the driving shaft and a driven sprocket wheel coupled to the driven shaft. Sides of the hollow boss are coupled with brace members each having a placing portion such that the tray is placed thereon. The driving shaft, coupled with the driving sprocket wheel, is coupled to a driving motor connected to a control box. The frame is provided with a water supplying portion.
Description

NATURAL CEREALES GERM GROWING APPARATUS

Technical Field

[1] The present invention relates to an apparatus for cultivating natural grain buds, and more particularly, to an apparatus for cultivating natural grain buds, in which a tray with natural gain seeds sowed therein, such as black bean, buckwheat, rice, barley, or cereals, is placed on each of a plurality of unit tray supports, and then a predetermined amount of water is sprayed onto the tray through spraying nozzles of a pipe when the tray is being rotationally and reciprocally moved in a horizontal direction by a driving sprocket wheel, such that a large amount of the natural grain buds can be rapidly cultivated in a small space.

[2] Background Art

[3] In general, buckwheat buds, which are one type of natural grain buds, contain a large quantity of rutin of bio active materials, and therefore has excellent protective effect against diseases. Also, when normal buckwheat seeds as unhulled seeds are water-cultivated via showering in a dark room completely shielded from light, the contents of the rutin in the buckwheat buds can be increased by about thirty times.

[4] Such cultivation technique for cultivating buckwheat buds is proposed in Korean Patent Application Publication No. 1999-45699, in which mesh nets having many holes are disposed, respectively, above flat plates such that outside hulls of buckwheat buds can be released by the mesh nets during budding and growing procedures.

[5] However, the mesh nets in the form of a flat plate are stacked inside a box body as being spaced apart from each other, and then water is sprayed from above to below to feed to each of the mesh nets. Therefore, a cultivation amount of the buckwheat buds per unit area is limited, and thus the vertical height or the number of the box body has to be increased in order to increase the cultivation amount.


Technical Problem

[7] The present invention has been made to solve the foregoing problems with the prior art, and therefore the present invention is directed to an apparatus for cultivating natural grain buds, in which a tray with natural gain seeds sowed therein, such as black bean, buckwheat, rice, barley, or cereals, is placed on each of a plurality of unit tray supports, and then a predetermined amount of water is sprayed onto the tray through spraying nozzles of a pipe when the tray is being rotationally and reciprocally moved...
in a horizontal direction by a driving sprocket wheel, such that a large amount of the natural grain buds can be rapidly cultivated in a small space and the marketability thereof can be enhanced, and in which the number of the tray supports can be easily increased when the length of a chain connected to the unit tray supports is further increased.

[8] Technical Solution

[9] According to an aspect of the present invention, there is provided an apparatus for cultivating natural grain buds. The apparatus includes unit tray supports (10) each having a grain-seed cultivating tray (T) placed thereon, the unit tray supports (10) installed to be rotationally and reciprocally moved between a driving shaft (20) and a driven shaft (20a) installed on a frame (F). Each of the unit tray supports (10) includes a supporting piece (12) and a catching piece (13) provided above the supporting piece (12). The supporting piece (12) is provided on a front side of each of hollow bosses (11) fitted on a support-fixing shaft (25), which is secured to a chain (24) connected between a driving sprocket wheel (20) coupled to the driving shaft (20) and a driven sprocket wheel (23a) coupled to the driven shaft (20a). Both sides of the hollow boss (11) are respectively coupled with brace members (14) each having a placing portion (15) such that the grain-seed cultivating tray (T) is placed thereon. The driving shaft (20) coupled with the driving sprocket wheel (23) is coupled to a driving motor (22) connected to a control box (21). The frame (F) is provided with a water supplying portion (30).

[10] Furthermore, the hollow bosses (11) and the support-fixing shaft (25) are formed in a polygonal shape. The placing portion (15) has a placing guide piece (152) of a vertical shape integrally formed with a placing piece (151) of a horizontal shape. The brace members (14) are respectively coupled with each end of an enforcing member (15). A threaded shaft (251), formed on the support-fixing shaft (25), extends through a through-groove (241) formed in the chain (24) and a nut (252) is tightening to the threaded shaft (251), such that the support-fixing shaft (25) is coupled with the chain (25). Furthermore, a plurality of angled protrusions formed between the threaded shaft (251) and the support-fixing shaft (25) are engaged in a plurality of matching angled recesses (242) formed in the chain (24).

[11] In addition, the water supplying portion (30) has a pipe (32) connected to a supplying pump (31) and branched into spaces between the unit tray supports (10), and spraying nozzles (33) are coupled to portions of the pipe (10) disposed between the unit tray supports (10).
Advantageous Effects

According to the present invention as set forth above, the tray with buckwheat seeds sowed therein is placed on each of the unit tray supports, and then, a predetermined amount of water is continuously supplied onto the tray through the spraying nozzles when the tray is rotationally and reciprocally moved in a horizontal direction by a driving sprocket wheel, such that a large amount of the natural grains buds can be rapidly cultivated in a small space and the marketability thereof can be enhanced.

In addition, the number of the tray supports can be easily increased when the length of the chain connected to the unit tray supports is further increased, and therefore, the productivity of the buckwheat buds can be enhanced.

Brief Description of the Drawings

FIG. 1 is a front view of an apparatus for cultivating natural grain buds according to the invention;
FIG. 2 is a plan view of the apparatus for cultivating natural grain buds according to the invention;
FIG. 3 is an exploded perspective view of an assembled state of a driving shaft and unit tray supports of the apparatus for cultivating natural grain buds according to the invention;
FIG. 4 is an exploded perspective view of the unit tray supports installed in the apparatus for cultivating natural grain buds according to the invention;
FIG. 5 is a perspective view of trays on the unit tray supports according to the invention; and
FIG. 6 is a perspective view showing trays placed on the unit tray supports according to the invention.

Best Mode for Carrying Out the Invention

Hereinafter, an exemplary embodiment of the present invention will be described in detail with reference to the accompanying drawings.
FIG. 1 is a front view of an apparatus for cultivating natural grain buds according to the invention, FIG. 2 is a plan view of the apparatus for cultivating natural grain buds according to the invention, FIG. 3 is an exploded perspective view of an assembled state of a driving shaft and unit tray supports of the apparatus for cultivating natural grain buds according to the invention, FIG. 4 is an exploded perspective view of the unit tray supports installed in the apparatus for cultivating natural grain buds according to the invention, FIG. 5 is a perspective view of trays on the unit tray supports according to the invention, and FIG. 6 is a perspective view showing trays placed on
the unit tray supports according to the invention.

[25] In the apparatus for cultivating natural grain buds according to the invention, a driving shaft 20 and a driven shaft 20a are installed on both sides of a frame F in parallel to each other in a vertical direction. A pair of driving sprocket wheels 23 having the same shape is coupled, respectively, to upper and lower portions of the driving shaft 20, and a pair of driven sprocket wheels 23a having the same shape as those of the driving sprocket wheels 23 is coupled, respectively, to upper and lower portions of the driven shaft 20a. Each of the driving sprocket wheels 23 and each of the driven sprocket wheels 23a are connected with a pair of chains 24, respectively. A plurality of support fixing shafts 25, evenly spaced from each other, is coupled between the chains 24. A plurality of unit tray supports 10 as described below are coupled by each of the supporting fixing shafts 25 in a vertically stacked state, such that the unit tray supports 10 can be installed to be rotationally and reciprocally moved by the chains 24.

[26] Furthermore, the frame F is equipped with a water supplying portion 30 so as to supply a predetermined amount of water to a grain-seed cultivating tray T placed on each of the unit tray supports 10.

[27] Also, the frame F has a peripheral portion closed to block light entering from outside thereof. In other words, the unit tray supports 10, on each of which the grain-seed cultivating tray T is placed, can be moved into a darkroom.

[28] The driving shaft 20 is coupled to a driving motor 22 connected to a control box 21.

[29] Although the driving motor 22 is directly coupled to the driving shaft 20 in the invention, it is desirable that the driving motor 22 may be coupled to the driving shaft 20 through a conventional coupler for coupling any shafts to facilitate maintenance thereof, and also maintained at a predetermined speed by a transmission system. In addition, a geared motor may be used as the driving motor 22 such that forward and backward rotation thereof can be easily accomplished.

[30] Each of the unit tray supports 10, on which the grain-seed cultivating tray T will be placed, includes a supporting piece 12 provided on the front side of each of hollow bosses 11 and a catching piece 13 provided above the supporting piece 12. The bosses 11 are fitted on each of the support-fixing shafts 25, which are secured to the chains 24.

[31] The hollow boss 11 is coupled, at both sides thereof, with brace members 14, respectively, in a flaring tube shape or a diverging shape. The brace members 14 are coupled with both ends of an enforcing member 15 as shown in FIGS. 3 and 4. Each of the brace members 14 is provided with a placing portion 15 in an end thereof, such that both sides of the grain-seed cultivating tray T can be safely placed thereon.

[32] The placing portions 15 have a function of bearing both side edges and a bottom of
the gain-seed cultivating tray T, and include a placing guide piece 152 of a vertical shape integrally formed with a placing piece 151 of a horizontal shape.

The hollow boss 11 is formed in a quadrangle shape, and the support-fixing shaft 25 to be inserted into the hollow bosses 11 is formed in the same quadrangle shape as that of the hollow boss 11, such that the unit tray supports 10 can be prevented from being twisted while the unit tray supports 10 are moved by the chains 24. Although the hollow boss 11 and the support-fixing shaft 25 have the quadrangle shape, the hollow boss 11 and the support-fixing shaft 25 may have any other polygonal shapes other than the quadrangle shape.

A threaded shaft 251, formed on the support-fixing shaft 25, extends through a through-groove 241 formed in each of the chains 24, and a nut 252 is tightened to the threaded shaft 251, such that the support-fixing shaft 25 is coupled with the chains 24. Further, a plurality of angled protrusions 235, formed between the threaded shafts 251 and the support-fixing shafts 25, are engaged in a plurality of matching angled recesses 242 in the chains 24 to prevent the support-fixing shafts 25 from idling.

The water supplying portion 30 has a pipe 32 connected to a supplying pump 31 and branched into spaces between the unit tray supports 10, and spraying nozzles 33 are coupled to portions of the pipe 10 disposed between the unit tray supports 10.

In the apparatus for cultivating natural grain buds constituted as mentioned above, firstly, the driving shaft 20 coupled with the driving sprocket wheels 23 and the driven shaft 20a coupled with the driven sprocket wheels 23a are installed, respectively, on both sides of the frame F, and then the chains 24 are connected, respectively, between the driving sprocket wheels 23 and the driven sprocket wheels 23a.

Next, the threaded shaft 251 formed on one side of the support-fixing shaft 25 is extended through the through-groove 241 formed on one of the chains 24, and then is tightened and fixed with the nut 24. The hollow bosses 11 of the unit tray supports 10 are successively fitted and stacked onto the support-fixing shaft 25, which is tightened and fixed with the nut 24. Then, a threaded shaft with the same shape as that of the threaded shaft 251, which is formed on the other side of each of the support-fixing shafts 25, is coupled to the other one of the chains 24 according to the same procedures as mentioned above. As a result, the assembling of the unit tray supports 10 is completed.

In such state, the grain-seed cultivating tray T is placed on the supporting pieces 12 of one of the unit tray supports 10. Then, the grain-seed cultivating tray T is placed on the brace members 14, and both side bottoms of the grain-seed cultivating tray T are placed on the placing pieces 151 respectively formed on distal ends of the brace members 14. Therefore, both side surfaces of the grain-seed cultivating tray T are respectively supported by the placing guide pieces 152.
By repeating the procedure as mentioned above, the grain-seed cultivating tray T is placed on every one of the unit tray supports 10. At this time, a predetermined amount of buckwheat seeds has been already sowed on the grain-seed cultivating tray T.

Next, when a power switch (not shown) provided on the control box 21 is turned on, the driving motor 22 rotates to drive the driving shaft 20 and in turn the driving sprocket wheels 23 coupled to the driving shaft 20.

Then, the rotation of the driving sprocket wheels 23 causes the chains 24 to move, such that the support-fixing shafts 25 coupled between the chains 24 and in turn the unit tray supports 10 coupled onto the support-fixing shafts 25 are moved in a predetermined speed. During this procedure, a predetermined amount of water, supplied through the pipe 32 from the water supplying portion 33, is sprayed by the spay nozzles 33 to thereby feed to the grain-seed cultivating tray T placed on each of the unit tray supports 10. As a result, the buckwheat seeds can bud and grow. In this case, the peripheral portion of the frame F is closed to maintain its function as a darkroom, and such conditions are kept during approximately four to ten days such that buckwheat buds can be harvested.

In the invention, although buckwheat seeds are sowed on the grain-seed cultivating tray T, such that buckwheat buds put forth and grow, natural grain seeds other than buckwheat, such as black beans, rice, barley, or cereals, may be sowed in order to cultivate buds thereof.
Claims

[1] An apparatus for cultivating natural grain buds, comprising unit tray supports (10) each having a grain-seed cultivating tray (T) placed thereon, the unit tray supports (10) installed to be rotationally and reciprocally moved between a driving shaft (20) and a driven shaft (20a) installed on a frame (F), wherein each of the unit tray support (10) includes a supporting piece (12) and a catching piece (13) provided above the supporting piece (12), the supporting piece (12) provided on a front side of each of hollow bosses (11) fitted on a support-fixing shaft (25), which is secured to a chain (24) connected between a driving sprocket wheel (20) connected to the driving shaft (20) and a driven sprocket wheel (23a) coupled to the driven shaft (20a), wherein both sides of the hollow boss (11) are respectively coupled with brace members (14) each having a placing portion (15), such that the grain-seed cultivating tray 4 is placed thereon, and wherein the driving shaft (20) coupled with the driving sprocket wheel (23) is coupled to a driving motor (22) connected to a control box (21), and the frame (F) is provided with a water supplying portion (30).

[2] The apparatus according to claim 1, wherein the hollow bosses (11) and the support-fixing shaft (25) are formed in a polygonal shape, the placing portion (15) has a placing guide piece (152) of a vertical shape integrally formed with a placing piece (151) of a horizontal shape, and the brace members (14) are respectively coupled with both ends of an enforcing member (15), wherein a threaded shaft (251), formed on the support-fixing shaft (25), extends through a through-groove (241) formed in each of the chains (24), and a nut (252) is tightened to the threaded shaft (251), such that the support-fixing shaft (25) is coupled with the chains (24), and wherein a plurality of angled protrusions formed between the threaded shaft (251) and the support-fixing shaft (25) are engaged in a plurality of matching angled recesses (242) formed in the chain (24).

[3] The apparatus according to claim 1, wherein the water supplying portion (30) has a pipe (32) connected to a supplying pump (31) and branched into spaces between the unit tray supports (10), and a spraying nozzles (33) is coupled to portions of the pipe (10) disposed between the unit tray supports (10).
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 AOIG 31/00, 9/00, 27/00, 31/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPASS, Delphion, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>JP 2003-164229 A (KYUSHU ELECTRIC POWER CO INC ASAHI KOGYOSHA Co , Ltd) 10 June 2003 see the abstract, figures 1-3</td>
<td>1-3</td>
</tr>
<tr>
<td>A</td>
<td>KR 10-2002-001 1225 A (GREENLAND Co , Ltd) 08 February 2002 see the abstract, figures 1-4</td>
<td>1-3</td>
</tr>
<tr>
<td>A</td>
<td>JP 10-150855 A (KAGAKU GIJUTSU SHINKO JIGYODAN ISHIGURO IMOONO SEISAKUSHO KK) 09 June 1998 see the abstract</td>
<td>1-3</td>
</tr>
<tr>
<td>A</td>
<td>KR 10-1996-0033245 A (KIM YANG GYU ) 22 October 1996 see the abstract, figures 1-3a</td>
<td>1-3</td>
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Further documents are listed in the continuation of Box C

See patent family annex

*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

*X* document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

*Y* document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

&* document member of the same patent family

Date of the actual completion of the international search

23 JANUARY 2008 (23 01 2008)

Date of mailing of the international search report

24 JANUARY 2008 (24.01.2008)

Name and mailing address of the ISA/KR

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<tr>
<td>KR 10-2002-001 1225 A</td>
<td>08.02.2002</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>JP 10-150855 A</td>
<td>09.06.1998</td>
<td>JP 10-150855 A2</td>
<td>09.06.1998</td>
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<tr>
<td></td>
<td></td>
<td>JP 2845321 B2</td>
<td>13.01.1999</td>
</tr>
<tr>
<td>KR 10-1996-003245 A</td>
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<td>None</td>
<td></td>
</tr>
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Form PCT/ISA/210 (patent family annex) (April 2007)