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(54) METHOD FOR LONG-TERM STORAGE OR TRANSPORT OF ROSES OR CHRYSANTHEMUMS, PACKAGING ASSEMBLY, CONTAINER COMPRISING PACKAGING ASSEMBLIES, AND USE OF PACKAGING ASSEMBLY

VERFAHREN ZUR LANGZEITLAGERUNG ODER ZUM TRANSPORT VON ROSEN ODER CHRYSANTHEMEN, VERPACKUNGSANORDNUNG, DIE VERPACKUNGSANORDNUNGEN UMFASSENDER BEHÄLTER UND VERWENDUNG DER VERPACKUNGSANORDNUNG

PROCÉDÉ DE STOCKAGE À LONG TERME OU DE TRANSPORT DE ROSES OU DE CHRYSANTHÈMES, ENSEMBLE D'EMBALLAGE, CONTENANT COMPRENANT DESENSEMBLES D'EMBALLAGE, ET UTILISATION DE L'ENSEMBLE D'EMBALLAGE
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## Description

[0001] The present invention relates to a method for long-term storage or transport of roses or chrysanthemums. The invention further relates to a rose or chrysanthemum packaging assembly. The invention also relates to a container comprising a plurality of rose or chrysanthemum packaging assemblies. The invention still further relates to a use of a rose or chrysanthemum packaging assembly.
[0002] In the storage of roses or chrysanthemums, or in the storage of roses or chrysanthemums during transport thereof (briefly: in the transport of roses or chrysanthemums), a need exists to keep the roses or chrysanthemums in an excellent condition, thereby retaining a quality, appearance and vase life which is hardly, if at all, influenced by the storage or transport.
[0003] Known methods for storage of flowers, such as during transport thereof, differentiate between short-term storage, such as during air transport, and long-term storage, such as during sea transport. Here, a time period may be indicated as short-term when it takes at most a few, such as three, days, whereas a time period may be indicated as long-term when it takes at least one week, or more, such as two weeks or three weeks, up to about six weeks.
[0004] In short-term storage and transport of flowers, conventionally a simple box is used to keep the flowers in a lying condition (i.e. the stems of the flowers generally extend horizontally). Before the transport, a nutrient has been administered to the flowers, and there is no nutrient medium, such as a substrate or gel substrate, in the box. No particular measures are taken to control the temperature of the box. Usually, these flowers are transported as air freight, which keeps the transport time short. However, the costs are relatively high, and the available transport volume is limited.
[0005] NL-C-1021711 discloses a packaging method for ornamental cultivated plants, in particular cut flowers, enabling a long-term storage and transport. For this purpose, the plants are placed in a substantially upright position in a pack, a nutrient medium is placed in the pack, a leaf-yellowing inhibitor is administered to the plants, and the pack is placed in a cooled environment. Usually, these flowers are transported as sea freight in temperature controlled containers, making the transport time long, but providing a large transport volume, and keeping the costs at a reasonable level.
[0006] Although the known method is suitable to retain an acceptable quality, appearance and vase life of tulips and irises during long-term storage and transport, such as sea transport, it has appeared to be unsuitable for long-term storage and transport of roses or chrysanthemums. The roses or chrysanthemums appear to dry out, and fungus (in particular, Botrytus) develops on the roses or chrysanthemums. Both effects are highly undesirable, and in fact prevent roses or chrysanthemums to be stored and transported for long periods since they become un-
marketable after the storage and transport. Drying out of the roses or chrysanthemums appeared to be caused by the application of the nutrient medium, where the stems of the roses or chrysanthemums become clogged, pre-
5 venting the nutrient in the nutrient medium to be transported through the stem and reach the flower (bloom), as a result of which the upper part of the rose or chrysanthemum withers, and is susceptible to fungus.
[0007] It is desirable to transport large volumes of roses or chrysanthemums across large distances without loss of quality, appearance and vase life, and at reasonable costs.
[0008] According to an embodiment, the present invention provides a method for long-term storage or transport of roses or chrysanthemums according to claim 1.
[0009] Performing the above method provides roses or chrysanthemums which even after weeks of storage or transport have a good quality, appearance and vase life. In practice, it has been found possible to store or 20 transport roses or chrysanthemums during 5 weeks, and thereafter to enjoy a vase life of the roses or chrysanthemums with a good appearance well over one week.
[0010] Contrary to the common prejudice that the measure of feeding a nutrient to the roses or chrysanthemums prior to storage or transport, without providing a nutrient medium for the roses or chrysanthemums in the package during the storage or transport, can only be applied in short-term storage or transport, and would be unsuitable for long-term storage or transport, since it was 30 expected that the roses or chrysanthemums would dry out in that case, the present inventor has discovered that, with the above features of the invention, indeed the roses or chrysanthemums do not dry out and stay in excellent condition for long periods of time.
35 [0011] The nutrient is used to protect the roses or chrysanthemums against physiological disorders after being harvested and/or to optimize the water uptake and/or to improve vase life and/or to maintain the quality of the leaves and flowers. Examples of nutrients are Chrysal®
40 CVB or CVBN, Chrysal® Clear RVB, and Chrysal® Clear Professional T/Bag.
[0012] A further advantage of not using a nutrient medium in the package is that the corresponding costs and the logistics of providing such nutrient medium in the 45 package may be omitted. Another advantage is that the roses or chrysanthemums may be stored and transported either in a lying position (with the stems extending essentially horizontally), or in an upright position (with the stems extending essentially vertically), or any other position or combination of positions.
[0013] In the method according to the invention, a particular sequence of feeding the nutrient to the roses or chrysanthemums, and applying an anti-fungal agent to the roses or chrysanthemums is not essential, before 55 placing the roses or chrysanthemums in the package. As an example, in the feeding of the nutrient by means of a liquid, also the anti-fungal agent may be contained in said liquid. The anti-fungal agent may also e.g. be applied by
immersing at least a part of each rose or chrysanthemum in an anti-fungal agent, and/or by spraying an anti-fungal agent on at least part of each rose or chrysanthemum and/or by smoking tablets releasing an anti-fungal smoke which is brought into contact with at least part of each rose or chrysanthemum. Examples of anti-fungal agents are Switch®, Fungaflor $®$, Collis®, Frupica®, Meltatox®, Nimrod $®$, Teldor $®$, Tocsin $®$, Baycor $®$, Eupareen $®$, Rovral®, Ronilan®, Signum® TMTD, and Sumislex®. The anti-fungal agent may further be placed in the package, e.g. contained in a bag or sticker. For an optimum protection of the roses or chrysanthemums against fungus, the roses or chrysanthemums are placed essentially dry (i.e. essentially without liquid on their exterior surface) in the package.
[0014] Optionally, insecticides may be applied to the roses or chrysanthemums.
[0015] In an embodiment, the package comprises a first package and a second package enclosing the first package. The first or the second package may comprise a bag made of a suitable flexible material, such as a plastic or paper bag, or may comprise a box, such as a plastic or paper or cardboard box. The box may be provided with a strengthening and/or watertight insert, e.g. a plastic tray at the bottom thereof, to prevent loss of shape of the box by liquid possibly originating from the roses or chrysanthemums or originating from the environment weakening the box material. If the box or the part thereof containing the insert is used in the sale of the roses or chrysanthemums as a display means, the tray may be filled with a liquid to feed the roses or chrysanthemums. In combination, the first package may be made from a flexible material, and the second package may be made from an inflexible material providing resistance to impact, and providing sufficient strength to allow stacking of packages. Alternatively, the first package may be made from an inflexible material, and the second package may be made from a flexible material. Any of the package, the first package and the second package may be reusable.
[0016] In an embodiment, the package is oxygentransmitting. In particular, the first package may be oxy-gen-transmitting. This means, on the one hand, that the roses or chrysanthemums, when placed in the package, are protected against harmful substances, while, on the other hand, the necessary oxygen can pass into the package or first package to reach the roses or chrysanthemums.
[0017] The person skilled in the art will understand that the package or first package must be capable of allowing through an amount of oxygen that the roses or chrysanthemums do not suffer any shortage of oxygen during the entire duration of packaging. To this end, the package or first package can be made of various materials. The package or first package may have OTR (Oxygen Transmission) values of $9,800-11,000 \mathrm{ml} / \mathrm{m}^{2} /$ day at $23 \mathrm{de}-$ grees Celsius; $5,400-6,000 \mathrm{ml} / \mathrm{m}^{2} /$ day at 12.5 degrees Celsius; $975-1,100 \mathrm{ml} / \mathrm{m}^{2} /$ day at 2.5 degrees Celsius; $15-135 \mathrm{ml} / \mathrm{m}^{2} /$ day at 0 degrees Celsius; and approxi-
mately 0 at -2 degrees Celsius. The person skilled in the art will quickly be able to select, for example, a suitable (possibly multi-ply, possibly sealable) plastic film for this purpose.
5 [0018] In an embodiment, the package is ethylene-regulating. In particular, the first package may be ethyleneregulating. By means of the ethylene-regulating package or first package, the ethylene content in the package or first package is kept low, which keeps the roses or chry10 santhemums fresh for long time periods. It has also been found that such package or first package aids in preventing the roses or chrysanthemums from drying out, which improves their keeping quality. It has proved advantageous for the package or first package to have an ethyl15 ene absorption value in the region of $0.7-14 \mathrm{ml} / \mathrm{m}^{2} /$ day. [0019] An example of a suitable ethylene-regulating package or first package is an LDPE film with a kaolin additive. An ethylene-absorbing agent may be applied on or in the material of the ethylene-regulating package. ly, ly, a sea container, comprising a plurality of rose or chrysanthemum packaging assemblies, and an air conditioning device configured to maintain the temperature of the
packages. The air conditioning device may be provided internally or externally of the container, and cools the interior of the container to the desired temperature range. [0027] In still another embodiment, the present invention provides a use of the rose or chrysanthemum packaging assembly for long-term storage or transport of roses or chrysanthemums.
[0028] The above and further objects, features, and advantages of the present invention will be readily apparent upon consideration of the following detailed description in conjunction with the accompanying drawings, in which:

Fig. 1 schematically illustrates, in perspective view, a packing of roses or chrysanthemums in a package; and
Fig. 2 schematically illustrates a side view, partially in cross-section, of a container according to an embodiment of the present invention.
[0029] In the different drawings, like reference symbols indicate like parts, or parts with a similar function.
[0030] Fig. 1 schematically illustrates a package comprising a first package 10 embodied as a bag, and a second package embodied as a box, comprising a lower box part 11 and an upper box part 12. The first package 10 may be made essentially from a flexible plastic material. The first package 10 may have oxygen-transmitting and ethylene-regulating c.q. ethylene-absorbing properties. The second package, comprising the lower box part 11 and the upper box part 12 may be made from cardboard. In an embodiment, the cardboard is moisture-resistant to aid the cardboard to retain its shape in moist conditions.
[0031] The lower box part 11 has an essentially rectangular shape, the top side thereof being open, a front side thereof being partly open, and lateral sides thereof having triangular cut-outs matching an upper edge of the front side. The upper box part 12 has an essentially rectangular shape, the bottom side thereof being open. The interior dimensions of the upper box part are slightly larger than exterior dimensions of the lower box part 11, so that the upper box part 12 may fit over the lower box part 11.
[0032] The lower box part 11 comprises an optional tray-like insert 13 of a rigid material, such as a plastic material, to retain the shape of the lower box part 11, and to prevent any liquid emanating from the first package 10 to reach the lower box part 11 and undesiredly soften the material of the lower box part 11. The insert 13 may also be used as a liquid container when the lower box part 11 is used as a display means at a point of sale, to aid in keeping the roses or chrysanthemums fresh.
[0033] A plurality of roses or chrysanthemums 14, which have been fed with a nutrient, and to which an antifungal agent has been applied, has been placed in the first package 10, after which the first package 10 has been closed with a clip 15, or a rubber band or string or
the like. In the first package 10, bouquets of roses or chrysanthemums may have been formed by suitably assembling pluralities of flowers with a rubber band or in a wrapper, for example. A pad 16 comprising an ethylene may have been inserted into the first package 10 . Such agent may also be contained in a bag, a sticker, and the like. The first package 10 as such may alternatively or additionally contain an ethylene absorbing agent.
0 [0034] The first package 10 containing the roses or chrysanthemums 14 is placed in the (insert 13 of the) lower box part 11, as indicated by arrow 17. Next, the upper box part 12, being open at its lower side (not shown) is placed over the lower box part 11, thus forming the second package, as indicated by arrow 18. The first package 10 and the second package in combination form the package of the roses or chrysanthemums 14 , and where the first package 10, the second package, and the roses or chrysanthemums 14 (and possible pads 16, bags, stickers, and the like) in combination form a rose or chrysanthemum packaging assembly. The upper box part 12 may contain holes 19 to allow oxygen to reach the first package 10, where oxygen is transmitted into the first package 10 by virtue of its oxygen-transmitting properties to reach the roses or chrysanthemums 14.
[0035] The roses or chrysanthemums are placed upright in the package, so that a mechanical load on the roses or chrysanthemums is kept at a minimum.
[0036] The second package may also be designed as a simple box, i.e. as depicted at reference numeral 12, but being closed at its lower side. In that case, the first package 10 is placed in the second package designed as a box, and the lower box part 11 is omitted.
[0037] Further, the first package and the second package may be connected to each other (such as by gluing part of a first package manufactured as a bag made from a flexible material at the inside of a second package manufactured from a rigid material). The first package and the second package may also be integrated, i.e. form a 40 unit (such as by covering the inside of a second package manufactured from a rigid, perforated material by a lining having the desired properties as explained above.
[0038] The package may further be formed as a Procona ${ }^{8}$ package as known in the art, i.e. a bucket made from a plastic material, having a box, such as a cardboard box, placed on top, where the box is open at its upper and lower side, and having a cover made from a plastic material placed on top of the box. In this case, the first package may be formed from a flexible material, to be placed into the assembly of the bucket, the box and the cover forming the second package.
[0039] Fig. 2 shows a container 20, comprising a plurality of stacked rose or chrysanthemum packaging assemblies 21 as explained in relation to Fig. 1, and an air conditioning device 22 provided at the outside of the container 20. Alternatively or additionally, an air conditioning device can be provided at the inside of the container 20. The air conditioning device 22 is adapted to condition the
temperature of the air inside the container such that the temperature of the rose or chrysanthemum packaging assemblies is maintained between 0 and 3 degrees Celsius, in particular between 0 and 1 degree Celsius. The container may be suitable for sea transport and/or land transport.
[0040] While the invention has been described and illustrated in its preferred embodiments, it should be understood that departures may be made therefrom within the scope of the invention, which is not limited to the details disclosed herein.
[0041] The terms "a" or "an", as used herein, are defined as one or more than one. The term plurality, as used herein, is defined as two or more than two. The term another, as used herein, is defined as at least a second or more. The terms including and/or having, as used herein, are defined as comprising (i.e., open language).

## Claims

1. Method for storage or transport of roses or chrysanthemums (14), comprising:

- feeding a nutrient to the roses or chrysanthemums;
- placing the roses or chrysanthemums (14) in a package;
wherein feeding the nutrient to the roses or chrysanthemums is before placing the roses or chrysanthemums in the package,
characterized in that the storage or transport is long-term, and the method further comprises: - placing the package containing the roses or chrysanthemums in a cooled environment being at a temperature between 0 and 3 degrees Celsius, and
- applying an anti-fungal agent to the roses or chrysanthemums before placing the roses or chrysanthemums essentially dry in the package.

2. Method according to claim 1 , wherein the cooled environment is at a temperature between 0 and 1 degree Celsius.
3. Method according to claim 1 or 2 , wherein the package comprises a first package (10) and a second package $(11,12)$ enclosing the first package (10).
4. Method according to any of the preceding claims, wherein the package is oxygen-transmitting.
5. Method according to any of the preceding claims, wherein the package is ethylene-regulating.
6. Method according to any of the preceding claims, wherein an ethylene-absorbing agent is placed in the package.
7. Method according to any of the preceding claims, wherein the package is placed in a container (20) constituting the cooled environment.
8. Method according to any of the preceding claims, wherein the roses or chrysanthemums (14) are placed in a substantially upright position in the package.
9. Method according to any of the preceding claims, wherein the roses or chrysanthemums (14) remain in the package for at least one week.
10. Flower-packaging assembly (21) for roses or chrysanthemums, the assembly comprising:

- a package containing at least one rose or chrysanthemum (14) having been fed with a nutrient before placing the rose or chrysanthemum in the package,


## characterized in that:

- the package has a temperature between 0 and 3 degrees Celsius, and
- the rose or chrysanthemum has an anti-fungal agent been applied thereto before placing it essentially dry in the package.

11. Container (20), comprising a plurality of rose or chrysanthemum packaging assemblies (21) according to claim 10, and an air-conditioning device (22) configured to maintain the temperature of the packages.
12. Use of the rose or chrysanthemum packaging assembly (21) according to claim 10 for long-term storage or transport of roses or chrysanthemums (14).

## Patentansprüche

den Rosen oder Chrysanthemen, bevor die Rosen oder Chrysanthemen im Wesentlichen trokken in der Pakkung untergebracht werden.
2. Verfahren nach Anspruch 1, wobei die gekühlte Umgebung eine Temperatur zwischen 0 und $1^{\circ} \mathrm{C}$ aufweist.
3. Verfahren nach Anspruch 1 oder 2, wobei die Pakkung eine erste Packung (10) und eine zweite Pakkung (11, 12), welche die erste Packung (10) einschließt, umfasst.
4. Verfahren nach einem der vorangehenden Ansprüche, wobei die Packung sauerstoffdurchlässig ist.
5. Verfahren nach einem der vorangehenden Ansprüche, wobei die Packung Ethylenregulierend ist.
6. Verfahren nach einem der vorangehenden Ansprüche, wobei ein Ethylen-absorbierendes Mittel in der Packung untergebracht ist.
7. Verfahren nach einem der vorangehenden Ansprüche, wobei die Packung in einem Behälter (20) untergebracht ist, der die gekühlte Umgebung bildet.
8. Verfahren nach einem der vorangehenden Ansprüche, wobei die Rosen oder Chrysanthemen (14) in einer im Wesentlichen aufrechten Position in der Packung untergebracht werden.
9. Verfahren nach einem der vorangehenden Ansprüche, wobei die Rosen oder Chrysanthemen (14) wenigstens eine Woche lang in der Packung bleiben.
10. Blumenverpackungsanordnung (21) für Rosen oder Chrysanthemen, wobei die Anordnung umfasst:

- eine Packung, enthaltend wenigstens eine Rose oder Chrysantheme (14), der ein Nährstoff zugeführt worden ist, bevor die Rose oder Chrysantheme in der Packung untergebracht wurde,
dadurch gekennzeichnet, dass:
- die Packung eine Temperatur zwischen 0 und $3^{\circ} \mathrm{C}$ aufweist, und
- ein Fungizid auf die Rose oder Chrysantheme angewandt bzw. ihr zugeführt wurde, bevor sie im Wesentlichen trocken in der Packung untergebracht wurde.

11. Behälter (20), umfassend eine Mehrzahl von Rosenoder Chrysanthemenverpackungsanordnungen (21) nach Anspruch 10, und eine Klimatisierungsvorrichtung (22), die so konfiguriert ist, dass sie die Temperatur der Packungen aufrechterhält.
12. Verwendung der Rosen- oder Chrysanthemenverpackungsanordnung (21) nach Anspruch 10 für eine langzeitige Aufbewahrung oder einen langzeitigen Transport von Rosen oder Chrysanthemen (14).

## Revendications

1. Procédé pour stocker ou transporter des roses ou des chrysanthèmes (14), comprenant les étapes consistant à :
> donner une substance nutritive aux roses ou aux chrysanthèmes;
> placer les roses ou les chrysanthèmes (14) dans un emballage ;
> dans lequel, l'étape consistantà donner la substance nutritive aux roses ou aux chrysanthèmes est réalisée avant de placer les roses ou les chrysanthèmes dans l'emballage,
> caractérisé en ce que le stockage ou le transport est à long terme, et le procédé comprend en outre les étapes consistant à :
> placer l'emballage contenant les roses ou les chrysanthèmes dans un environnement refroidi qui est à une température comprise entre 0 et 3 degrés Celsius, et
> appliquer un fongicide aux roses ou chrysanthèmes avant de placer les roses ou les chrysanthèmes essentiellement secs dans l'emballage.
2. Procédé selon la revendication 1, dans lequel l'environnement refroidi està une température comprise entre 0 et 1 degré Celsius.
3. Procédé selon la revendication 1 ou 2 , dans lequel l'emballage comprend un premier emballage (10) et un deuxième emballage $(11,12)$ enfermant le premier emballage (10).
4. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'emballage est à transmission d'oxygène.
5. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'emballage régule l'éthylène.
6. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'agent d'absorption d'éthylène est placé dans l'emballage.
7. Procédé selon l'une quelconque des revendications précédentes, dans lequell'emballage est placé dans un contenant (20) constituant l'environnement refroidi.
8. Procédé selon l'une quelconque des revendications précédentes, dans lequel les roses ou les chrysanthèmes (14) sont placé(e)s dans une position sensiblement droite dans l'emballage.
9. Procédé selon l'une quelconque des revendications précédentes, dans lequel les roses ou les chrysanthèmes (14) restent dans l'emballage pendant au moins une semaine.
10. Ensemble d'emballage de fleur (21) pour des roses ou des chrysanthèmes, l'ensemble comprenant:
un emballage contenant au moins une rose ou un chrysanthème (14) ayant été alimenté(e) avec une substance nutritive avant de placer la rose ou le chrysanthème dans l'emballage,

## caractérisé en ce que :

l'emballage a une température comprise entre 0 et 3 degrés Celsius, et la rose ou le chrysanthème a un fongicide appliqué à cette dernière ou ce dernier avant de la (le) placer essentiellement sèche ( sec ) dans l'emballage.
11. Contenant (20) comprenant une pluralité d'ensembles d'emballage de roses ou chrysanthèmes (21) selon la revendication 10, et un dispositif de conditionnement d'air (22) configuré pour maintenir la température des emballages.
12. Utilisation de l'ensemble d'emballage de roses ou chrysanthèmes (21) selon la revendication 10 pour le stockage ou le transport à long terme des roses ou des chrysanthèmes (14).

EP 2238036 B1


Fig. 1


Fig. 2

## REFERENCES CITED IN THE DESCRIPTION

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