

Preservation of flowers

This invention relates to the preservation of flowers and, in particular, to the preservation of flowers such as orchids that have fleshy petals and do not have a woody stem, in such a way that the natural shape, colour and texture of the petals are maintained.

Background of the invention

Natural flowers when cut and placed in water will fade and die after a short period of time. They start to turn soft and lose form after about 6 days from the time they are cut. Flowers that are packed and shipped overseas are squeezed together and lose their natural form and stiffness in the carton. Many petals are damaged.

Efforts have been made to preserve flowers so they retain their natural shape and colour for a prolonged period but such efforts have never been wholly successful and currently the only form of preserved flowers that are regularly available at reasonable price are dried flowers.

Flowers such as orchids have also been preserved by encapsulation in, for example, acrylic resin but it is not feasible to preserve the entire flower stock in this way or to produce a bunch of flowers that will have a natural appearance in a vase.

Advances in artificial flower making have produced artificial flowers that to a great extent simulate the shape and colours of the natural flowers but it is extremely difficult to form artificial flowers with the natural texture of the petals.

This invention provides a method of preserving flowers, particularly orchids, such that the shape, colour and texture of the petals and the natural form of the stalk of the flower on the growing plant are maintained.

Summary of the invention

According to the invention, non-woody stemmed flower stocks are preserved by the steps of

- 1) placing the fresh cut flower stocks in a dehydrating solution which penetrates the stem of the flower and replaces the water in the stem and flower head, for a period such that substantially all of the water is replaced, said solution, if necessary, containing a buffer to maintain the pH of the flower within the range of 5 to 7;
- 2) removing the flower stocks from the solution;
- 3) covering the flower stocks completely with powdered rehydrated plaster of Paris and the dehydrating solution of step 1);
- 4) placing the covered flower stocks from step 3) in an oven with a pressurized compartment at a temperature below the boiling point of water under a pressure of at least 8.2×10^5 Pa (about 120 psi)
- 5) periodically withdrawing the covered flower stocks from the oven and cooling them in a moisture-free compartment;
- 6) repeating the sequence of heating under pressure and cooling until all the water and the excess solution in the flower stocks has been withdrawn;

- 7) removing the flower stocks from the rehydrated plaster of Paris and dehydrating solution;
- 8) coating the flower stocks with transparent wax while they are still hot from the oven; and
- 9) covering the transparent wax layer with a protective coating of transparent matte lacquer.

The base for the dehydrating solution is preferably tertiary butyl alcohol but other organic solvents that can be used to dry out the water from the flower stock, such as acetone, maybe used. The solution may also contain an emollient such as glycerol or lanolin to maintain the petals in a non-brittle condition and a buffer which may, for example, comprise citric acid or sodium citrate.

The solution will normally contain other additives depending on the flower species and particularly orchid species to be preserved. Among such additives are, thiourea, cysteine hydrochloride, peracetic acid or polyvinyl alcohol in various combinations. The organic solvent, especially tertiary butyl alcohol, preferably comprises at least 90% of the solution. Polyvinyl alcohol, in particular acts as a nutrient supplement to maintain the freshness of the flowers. This may be necessary since dehydration is not instantaneous.

A typical treatment solution comprises glycerol 1.5% to 5% by weight, citric acid 0.05% to 0.3% by weight, thiourea 0.05% to 3% by weight and polyvinyl alcohol 2% to 5% by weight with the remainder being tertiary butyl alcohol. One specific solution that can be used for treating most orchid species comprises tertiary butyl alcohol 93.8%; glycerol 3%, citric acid 0.1%; thiourea 0.1%; and polyvinyl alcohol 3%.

The flower stocks will normally be placed in the dehydrating solution for a period of approximately 24 hours but the time is immaterial provided that a substantial part of the water is replaced by the solution.

In the oven treatment the flower stocks in the hydrated plaster of Paris/dehydrating solution will normally be subjected to a temperature within the range of 50°C to 80°C, preferably about 70°C for about 5 to 8 hours, preferably about 6 hours, and then removed and placed in the cooler moisture-free compartment at about 30°C to 50°C preferably 45°C to 50°C for about 20 to 40 minutes, preferably about 30 minutes. The treatment will normally be continue for approximately 60 hours. The actual treatment times and conditions are immaterial provided that, at the end of the treatment, the flower stocks are completely moisture free with their cell structure maintained.

The transparent wax that is used is preferably Chinese white wax. It may be applied by spraying from a solution, for example, in ethanol or by dipping the stocks in molten wax.

Any transparent moisture-resistant lacquer that is compatible with the wax may be applied. A preferred lacquer is a polyurethane lacquer.

When the process is complete the natural shape of the flower head and stem is retained and the natural colour and fresh look, including the texture of the flower head and stems is also retained.

The preserved flowers may be displayed, in the same way as natural flowers, in a vase or other container but in a preferred form of display are presented in a display case, for example, a glass or wood and glass cabinet or in a well designed box of cardboard, or stiff paper. A greeting card can be attached permanently or temporarily to the box. The customer can prescribe the wording and can send their greetings in a convenient and novel way. Mostly the product

will be packed in a well presented and decorative stiff paper box. This is more economical and practical for transport at lower cost. In the box the preserved flowers may be arranged in a fixed vase or other container that will display the flowers to advantage the customer can hang the decorative box as a décor on the wall. This concept has not previously been available in the world. Presently the fresh flowers are packed tightly in a box and in that form they cannot be used as décor. They have to taken out and put in a vase.

Description of preferred embodiment

Suitable dehydrating solutions for specific orchid species are as follows:

<u>Solution</u>	<u>Orchid Species</u>
1. Tertiary butyl alcohol 98% Citric acid 2%	a. Tricocentrum volcar b. Cataselum delightful c. Bulb flaridum d. Catilia delightful e. Xylobium elongatrum f. Den. platgastrum g. Caeletin taylori h. Arachnis
2. Tertiary butyl alcohol 94% Thiourea 2% Citric acid 2% Sodium citrate 2%	a. Bulb stramineum
3. Tertiary butyl alcohol 98% Thiourea 1%	a. Rynchooglossum noloneanum b. Renantanda tropicanun

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|---|---|
| Cysteine HCL 1% | c. Arunda graminifolia
d. Epiphysodes
e. Restrepia
f. De. platygastrum |
| 4. Tertiary butyl alcohol 99%
Peracetic acid 1% | a. Rynchooglossum tropicanun
b. Epiphysodes |
| 5. Tertiary butyl alcohol 97%
Citric acid 2%
Cysteines HCL 1% | a. Epiphysodes
b. Phloroglosun
c. Spendicula pendula |
| 6. Tertiary butyl alcohol 92%
Citric acid 2%
Thiourea 1%
Formaldehyde (40%) 5% | a. Epiphysodes
b. Restrepia |
| 7. Tertiary butyl alcohol 99%
Peracetic acid 1% | a. Epiphysodes |

The following example illustrates the invention:-

EXAMPLE

A solution of the following composition was prepared:

Tertiary butyl alcohol	-	93.8%
Glycerol	-	3.0%
Citric acid	-	0.1%
Thiourea	-	0.1%
Polyvinyl alcohol	-	3.0%

Fresh cut flower stocks were stood with their stems in the solution for 24 hours during which time the water content of the stocks was gradually reduced and replaced by the solution and the pH was maintained at 5 to 7.

Plaster of Paris was fully hydrated and allowed to set and was then ground to powder.

The substantially dehydrated flower stocks were laid in a container and covered with the powder to a depth of 5cm above the stocks.

The tertiary butyl alcohol solution was then added to cover the powder.

The container was placed in an oven in a compartment pressurised to $10.3 \times 10^5 \text{ N}$ (about 150 psi) at 20°C for 6 hours. At the end of that period the container was removed and placed in a moisture free chamber at atmosphere pressure at 50°C for 30 minutes. This cycle was repeated 8 times and the container was then placed in the oven in the oven for a final 6 hour treatment.

After removal from the oven the hot flower stocks were separated from the powder/solution mixture and coated with Chinese white wax by spraying them with a solution of wax in ethanol.

To complete the preservation process the wax coating was covered with a layer of polyurethane lacquer.

Claims

1. A method for the preservation of flower stocks comprising the steps of
 - 1) placing the fresh cut flower stocks in a dehydrating solution which penetrates the stem of the flower and replaces the water in the stem and flower head, for a period such that substantially all of the water is replaced, said solution, if necessary, containing a buffer to maintain the pH within the range of 5 to 7;
 - 2) removing the flower stocks from the solution;
 - 3) covering the flower stocks completely with powdered rehydrated plaster of Paris and the dehydrating solution of step 1);
 - 4) placing the covered flower stocks from step 3) in an oven with a pressurized compartment at a temperature below the boiling point of water under a pressure of at least 120 psi;
 - 5) periodically withdrawing the covered flower stocks from the oven and cooling them in a moisture-free compartment;
 - 6) repeating the sequence of heating under pressure and cooling until all the water and the excess solution in the flower stocks has been withdrawn;
 - 7) removing the flower stocks from the rehydrated plaster of Paris and dehydrating solution;
 - 8) coating the flower stocks with transparent wax while they are still hot from the oven; and



- 9) covering the transparent wax layer with a protective coating of transparent matte lacquer.
2. A method according to claim 1, wherein the base for the dehydrating solution is tertiary butyl alcohol.
3. A method according to claim 1 or claim 2, wherein the solution also contains an emollient to maintain the petals in a non-brittle condition.
4. A method according to claim 3, wherein the emollient is glycerol or lanolin.
5. A method according to anyone of claims 1 to 4, wherein the solution also contains a buffer.
6. A method according to anyone of claims 1 to 5, wherein the solution contains thiourea, cysteine hydrochloride, peracetic acid or polyvinyl alcohol in various combinations.
7. A method according to anyone of claims 1 to 6, wherein the organic solvent comprises at least 90% of the solution.
8. A method according to claim 2, wherein the solution comprises glycerol 1.5% to 5% by weight, citric acid 0.05% to 0.3% by weight, thiourea 0.05% to 3% by weight and polyvinyl alcohol 2% to 5% by weight with the remainder being tertiary butyl alcohol.
9. A method according to claim 8, wherein the solution comprises tertiary butyl alcohol 93.8%; glycerol 3%, citric acid 0.1%; thiourea 0.1%; and polyvinyl alcohol 3%.



- 10 A method according to anyone of claims 1 to 9, wherein during the oven treatment the flower stocks in the hydrated plaster of Paris/dehydrating solution are subjected to a temperature within the range of 50°C to 80°C a period of 5 to 8 hours and then removed and placed in the cooler moisture-free compartment at about 30°C to 50°C for about 20-40 minutes.
- 11 A method according to claim 10, wherein the oven treatment comprise placing the flower stocks in the oven at about 70°C for about 6 hours removing to the moisture free-compartment at about 50°C for about 30 minutes and continuing the cycle for about 60 hours.
- 12 A method according to any one of claims 1 to 11, wherein the transparent wax is Chinese white wax.
- 13 A method according to any one of claims 1 to 12, wherein the wax is applied by spraying from a solution or by dipping the stocks in molten wax.
- 14 A method according to any one of claims 1 to 13, wherein the lacquer is a polyurethane lacquer.
- 15 Preserved flowers stocks produced by the method of any one of claims 1 to 14.

