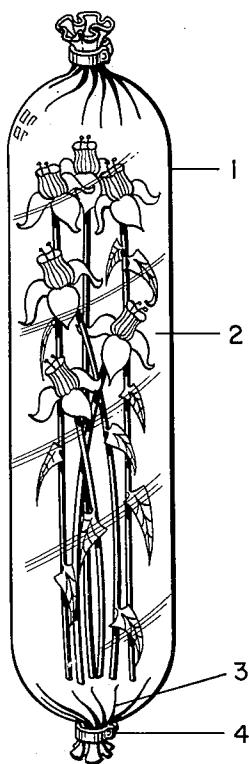


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PACKAGE

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2,994,424
PACKAGE

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This invention relates to an improved package for handling, shipping, and marketing fresh cut flowers, plants, and the like. Cut flowers are highly perishable, and refrigeration and moisture are absolutely essential to maintain their fresh appearance during marketing at production, wholesale, and retail levels. Present practice consists of keeping flowers under refrigeration in receptacles filled with water. With careful handling most types of cut flowers enjoy a marketable life of from 7 to 10 days. When purchased, flowers are removed from refrigeration, and if the customer does not place them in water within a few hours, they deteriorate rapidly.

A package which would extend the useful life of cut flowers without dependence upon refrigeration, water, or moisture would be of considerable economic importance and would increase the possible retail market outlets for this type of product. Occasional attempts have been made to package flowers by wrapping them in various types of paper and plastic film, but such a package has not been successful because the useful life of the flowers has not been extended sufficiently to allow proper merchandising. Various packages are available which include some means for holding or storing water or moisture in them. All of these have the disadvantage of additional cost for the moisture holding means plus the added complexity of the design of the package to encompass this moisture retaining means.

It is an object of the present invention to provide an improved package for preserving cut flowers, plants, and the like which will keep them fresh for a number of days without refrigeration or water.

This increased longevity and the absence of the need for personnel experienced in handling flowers will make it possible to market cut flowers not only through normal trade outlets but also in super markets, department or variety stores. Moreover, the consumer has the advantage of being able to purchase flowers at his convenience and is able to hold them in the package for several days without any special handling until he is ready to use them.

The improved package of the subject invention involves the use of a special, relatively thin, clear, flexible, and tough plastic film with a low moisture vapor transmission rate, an exceedingly low oxygen permeability, and relatively high carbon dioxide permeability. One example of such plastic film is composed of a copolymer of 70-77% vinylidene chloride, 30-23% vinylchloride, and necessary amounts of plasticizer and stabilizer to produce a stable film. The film is in the range of 1-2 mils thick, and possesses a moisture vapor transmission rate in the range of 0.3 to 1.0 gram per 24 hours per square meter at 1 atmosphere of differential pressure per mil thickness of film. The oxygen transmission rate is in the range of 50-300 cc. per 24 hours at 1 atmosphere of differential pressure per square meter of 1 mil thickness of film. The carbon dioxide transmission rate is in the range of 1000-1800 cc. per 24 hours at 1 atmosphere of differential pressure per square meter of 1-mil-thick film.

FIGURE 1 is a perspective view of the improved package according to this invention. The package as illustrated in FIGURE 1 comprises as its essential element an envelope or bag 1 of special plastic film of the type described above, which is filled with compressed air 2 and hermetically sealed. The package illustrated is

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fabricated from a length of thin, clear, flexible plastic tubing with each end portion 3 twisted and a metallic clip 4 applied to encompass the twisted portion to produce an hermetic seal.

The air pressure introduced is slightly above atmospheric pressure in order to accomplish two beneficial results. Compressed air causes the body wall of the plastic film package to be stretched taut so that the package becomes self-supporting. This offers physical protection to the product so packaged and makes it possible to handle the package in the normal manner without fear of damage. In addition, the compressed air supplies initially a large volume of oxygen. Even though the partial pressure of oxygen is reduced by the oxygen demand of the flowers, anaerobic conditions with their detrimental effects are prevented by the oxygen permeability of the film. An inhibitory effect upon the physiological process is exerted by increased carbon dioxide partial pressure, and the toxic effect of too high carbon dioxide concentration is prevented by sufficiently high carbon dioxide permeability of the film. The transpiration of the flowers, which, without a water supply, would quickly cause wilting, is reduced by a low moisture vapor transmission rate. The slight pressure in the package also assists in reducing the transpiration rate.

A package fabricated from film with the proper gas permeability and moisture vapor transmission rate, containing cut flowers and filled with compressed air, sets up a gaseous environment inside the package which is beneficial for the preservation of flowers and will maintain such an environment as a result of the balance between respiration of the flowers and permeability of the film. This beneficial environment consists of a supply of reduced oxygen pressure with an increase in carbon dioxide concentration and fairly high relative humidity.

Fresh cut carnations packaged according to the present invention were stored for two weeks at room temperature. At the end of the two weeks' storage period, the carnations were removed from the package, about 1.27 cm. of the lower stem portion was cut off, and the flowers placed in a receptacle of warm water. The carnations thus packaged appeared fresh and remained in good condition for more than three days at room temperature. Normal flowers stored during merchandising with water and controlled temperature and humidity will spoil in two or three days following exposure to room temperature. Similar tests on numerous other types of flowers packaged according to the subject invention have given similar results of extended useful life.

It has further been found that cut flowers packaged according to the subject invention remain fresh and in good condition for an extended period if stored alternately in a refrigerated atmosphere and room temperature. This fact is of considerable importance to retail outlets where it is necessary to keep cut flowers packaged according to the subject invention at room temperature on display during the day and stored under refrigeration at all other times. Similarly the subject invention would make it possible to greatly increase the useful life of cut flowers where semirefrigerated atmosphere is available, such as the open refrigerated display case used in super markets.

This invention provides an improved package for cut flowers, plants, and the like which will increase their useful life during handling and storage and will have a great economic advantage in the mass marketing of such perishable products.

We claim:

1. A package for storing cut flowers, plants and the like comprising an envelope of plastic film with low moisture vapor transmission rate, low oxygen permeability, and high carbon dioxide permeability, cut flowers,

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plants and the like enclosed within said envelope, said envelope filled with compressed air and hermetically sealed.

2. A package for storing cut flowers, plants and the like comprising a tubular length of plastic film, said film characterized by a low moisture vapor transmission rate, a low oxygen permeability, and a high carbon dioxide permeability, cut flowers, plants and the like enclosed within said tubular length of plastic film, each end of said tubular length having a clip applied around the twisted end portion thereof to produce an hermetic seal, and the envelope thus formed filled with compressed air.

3. A package for storing cut flowers, plants and the like comprising an envelope of plastic film of about 1 mil thickness with a moisture vapor transmission rate of not more than 1.0 gram per 24 hours per square meter at 1 atmosphere differential pressure per mil of film thickness, an oxygen permeability of not more than 300 cubic centimeters per 24 hours at 1 atmosphere differential pressure per square meter per 1 mil film thickness, and a carbon dioxide permeability of at least 1000 cubic centimeters per 24 hours at 1 atmosphere differential pressure per square meter per 1 mil film thickness, cut flowers, plants and the like enclosed within said envelope, said envelope filled with compressed air slightly above atmospheric pressure, and hermetically sealed.

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4. A package according to claim 3 wherein said film is composed of a copolymer of 70-77% vinylidene chloride and 30-23% vinyl chloride.

5. A hermetically sealed package comprising perishable cut flowers completely enclosed within an envelope of plastic film with a low moisture vapor transmission rate, low oxygen permeability and high carbon dioxide permeability, said envelope filled with compressed air prior to sealing.

6. A package according to claim 5 wherein said film is composed of a copolymer of 70-77% vinylidene chloride and 30-23% vinyl chloride.

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