Retaining suppleness of dried flowers and foiliage with humectants

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Dried ornamental foliage requires some moisture content to prevent brittleness and associated shatter during handling. A relatively constant moisture content can be maintained in dried plant material by pulsing the freshly cut plant material with a solution containing a hygroscopic compound (humectant). Three plant lines of importance to the export dried flower industry were selected for experiments designed to optimise the use of humectants in the preservation of cut plant material. The species were Eucalyptus marginarta (jarrah regrowth) Anigozanthus rufus (red kangaroo paw), and Leucadendron salicifolium (female plant).

Methods

Jarrah regrowth and red kangaroo paw were placed into buckets of water immediately after picking. The leucadendron was dry packed in cardboard boxes and transported overnight to the laboratory, and then placed into water. All plant material was held in water for 48 hours at 5?C to ensure full turgor. The humectant uptake experiments were carried out under constant conditions of light, humidity (60-70% RH) and temperature (19-23?C). Stems were trimmed to a length of 30 cm and were recut under water before being placed into individual vases containing humectant solution. There were ten single stem replicates per treatment.

Three concentrations of glycerol solution (10, 20 and 30% v/v) were used in initial experiments with all species. Subsequent investigations with other humectants such as polyethylene glycol 400 and sorbitol involved concentrations up to 50 and 60% respectively. Only readily available "bulk grade" humectants (e.g. Sorbitol 700 g/l) were used. Branch and vase weight were recorded at regular intervals. Solution uptake was reported as mL of solution per g of fresh plant weight.

Results and discussion

The relationship between humectant concentration and solution uptake was similar for all three species. Uptake of the control (distilled water) was always constant for the the duration of the experiment (up to 16 days). The 10% glycerol solution generally resulted in an uptake pattern similar to the control for 3 to 4 days followed by a sharp reduction in uptake to a new value which then remained relatively constant.

Increasing the glycerol concentration to 20% hastened the point of divergence from the control uptake pattern to 2 days. A 30% concentration resulted in a decrease in solution uptake after only one day. Solution uptake at the various glycerol concentrations differed markedly among the three species. Leucadendron was the most sensitive, with the 30% glycerol solution causing virtual cessation of uptake. In contrast, kangaroo paw showed a reasonable degree of tolerance to the 30% concentration. The other humectants gave similar results. Unexpectedly, the leucadendron tolerated a 60% sorbitol solution.

Conversion of the solution uptake data into accumulation of humectant revealed that solution concentration is the most important factor governing the rate of humectant accumulation. For jarrah regrowth and kangaroo paw, the more concentrated solution was most suitable for the purpose of rapidly 'loading' the plant tissue with humectant. However, with leucadendron, the 20% glycerol solution produced the highest total leve1 of glycerol accumulation. It may be that further investigation will reveal the existence of a maximum 'threshold' value of humectant for every species. Ongoing research is investigating the influence of other variables (temperature, pH, plant water status) on the uptake of humectant solutions in these three and other plant species.