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5. SUMMARY AND RECOMENDATION

Nowadays with Egypt participation in general agreement tariffs trade (GATT), cut flowers and cut leaves are considered two of the most important products for export to foreign and local markets because of their importance as a source of national income *Solidago canadensis*, L. is an important floral crop used as a filler flowers in fresh and dried arrangement. Also, *Nephrolepis exaltata*, L. and *Melaleuca genistifolia*, L. are used as filler in fresh arrangement.

This study was carried out at post harvest laboratory of ornamental plants, Horticulture Department, Faculty of Agriculture, Mansoura University, Egypt, during 2005-2006 and 2006-2007 seasons.

The objective of this investigation aimed to study the effects of some preservative material treatments as holding solutions or spraying on flowers and green leaves. Besides, using pulsing solutions before storage periods for maintaining flowers and green leaves better during transportation. Also, using holding solutions at the end of storage periods may improve flowers and green leaves quality during shelf life.

In addition, studying the effect of packaging materials and cold storage periods as well as their interaction treatments on post harvest characters, water relations, some chemical constituents and bacterial counts of flowers and green leaves.

The obtained results could be summarized as follow:

Part I. *Solidago canadensis*, L:

I. 1. The effect of chemical preservative solutions on the keeping quality of solidago cut flowers:

1- Flowers treated with 5 ppm BA + 20 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS had significantly increased the vase life of solidago cut spikes as compared to other treatments under discussion. These treatments recorded the highest vase life 14 and 16 days in the first and second seasons, respectively.

2- The highest value of maximum increase of fresh weight % (14.9 and 14.7 %, in the two seasons, respectively) during shelf life periods recorded when flowers were treated by 5 ppm BA + 20 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS.

3- The fresh weight of flowers was increased significantly up to the 6^{th} day in most preservative solutions then gradually decreased after that day.

4- 5 ppm BA + 1 mL/L voporgard + 200 mg/L 8-HQS recorded significant increase in water uptake and increase in water loss of vase solution.

5- Treatment of 5 ppm BA + 20 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS recorded enhancement of water balance as compared with most other treatments.

6- Treatment of 5 ppm BA + 20 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS had the least average (360.6 and 332.1 colonis/ml) of bacterial count as compared with other treatments.

7- Treatment of 5 ppm BA + 20 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS recorded an increase in chlorophyll a, b and total chl. In leaves and carotenoids in floret of solidago cut spikes.

8- Treatment of 5 ppm BA + 20 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS recorded an increase in total sugars, reducing and non-reducing sugars as compared with other treatments.

9- The lowest values of proline content in flower leaves were obtained by using 5 ppm BA + 20 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS.

I. 2. The effect of packaging materials, cold storage periods and interaction between them on the keeping quality of solidago cut flowers:

1- The flowers were packaged in kraft paper reduced the fresh weight loss % during cold storage period as compared to packaging material i.e. polyethylene film, tissue paper and non-packaging, respectively.

2- Fresh weight loss % of solidago cut spikes were gradually increased by the extension of the dry storage periods (1, 2 or 3 weeks at 3°C in the two seasons).

3- Solidago cut spikes which packaged with kraft paper + stored at 3°C for one week reduced the fresh weight loss % during the storage periods.

4- The longest vase life (19.29 and 19.22 days in the both seasons, respectively) were when cut spikes were packaged in kraft paper as compared to non-packaging (12.48 and 12.67 days).

5- The vase life of cut spikes showed a highly significant decrease by the extension of dry storage at 3°C for one, two and three weeks.

6- Solidago cut spikes which packaged with kraft paper + stored at 3°C for one week recorded the maximum vase life (27.57 and 27.00 days) as compared with other treatments.

7- The advantageous effect of kraft paper packaging material recorded the highest value of maximum increase in fresh weight % up to the 6^{th} day and total water uptake, improved absorbed solution and enhancing water balance.

8- The extended storage periods 3°C for one, twq and three weeks had negative effect in fresh weight %, water uptake and water balance.

9- All packaging materials + storage periods at 3°C for one and two weeks reduced the bacterial number in vase solution as compared to non-packaging and storage for three weeks, respectively.

10- Packaging with kraft paper + storage at 3°C for one week improved chlorophyll a, b and total in leaves and Carotenoids contents in florest of solidago cut spikes.

11- The gradual decreases in total sugars, reducing and non-reducing sugars in leaves were with extended storage periods at 3°C for deferent periods.

12- The lowest value of proline content recorded was when cut spikes were packaged with kraft paper + stored at 3°C for one week.

Part II. *Nephrolepis exaltata*, L:

II. 1. The effect of chemical preservative solutions on the keeping quality of nephrolepis cut leaves:

1- The highest vase life (25.67 and 27.00 in the both seasons) were obtained when cut leaves were treated with 5 ppm BA + 50 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS.

2- 5 ppm BA + 50 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS treatment had highly significant increase in maximum increase of fresh weight%.

3- The fresh weight% of cut leaves of nephrolepis recorded highest values at the 2nd days from the shelf life then decreased gradually after that day.

4- 5 ppm BA + 1 mL/L voporgard + 200 mg/L 8-HQS recorded significantly increase in total water uptake.

5- The high level of water uptake recorded in the 2nd day of shelf life then gradually declined after that day.

6- The cut leaves of nephrolepis were treated by 5 ppm BA + 50 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS caused enhancing water balance and reducing bacterial content.

7- The preservative solutions which contained 5 ppm BA + 50 g/L sucrose + 1 mL/L voporgard + 200 mg/L 8-HQS recorded the highest value of chl. a, b and total chl. in leaves. Also the treatment mentioned above recorded the highest value of total sugar, reducing and non reducing sugar. Moreover this treatment reduced proline content.

II. 2. The effect of packaging materials, cold storage periods and their interaction on the keeping quality of nephrolepis cut leaves:

1- The fresh weight loss % of nephrolepis cut leaves during the storage periods at 3°C for different time (one, two and three weeks) were reduced by used packaging materials treatments e.i. kraft paper, polyethylene film and tissue paper as compared to non-packaging treatments (control).

2- The fresh weight loss % of nephrolepis cut leaves were gradually increased by the extension of the dry storage period at 3°C.

3- The nephrolepis cut leaves were packaging in kraft paper then stored at 3°C for one week recorded significantly decrease in fresh weight loss % during and after end of storage periods.

4- The longest vase life (days) of nephrolepis cut leaves packaged in kraft paper in both seasons as compared with other packaging materials and non-packaging treatments.

5- The highest vase life of nephrolepis cut leaves were obtained with storage at 3°C for one week as compared to other storage periods (two and three weeks, respectively).

6- The nephrolepis cut leaves which packaged in kraft paper then stored at 3°C for one week recorded the longest vase life (36.5 and 36.0 days) as compared to control treatment (12.67 and 16.67 days).

7- The highest value of maximum increase of fresh weight % recorded was with packaging by kraft paper, storage at 3°C for one week and the interaction between them.

8- The fresh weight % increased until 8^{th} and 6^{th} day in two seasons then decreased slightly after that in most cases.

9- All packaging materials treatments significantly increase the total water uptake (g/leaf) as compared to non-packaging treatment (control).

10- The total water uptake of cut leaves decreased with extended storage periods at 3°C for different time (one, two and three weeks).

11- The nephrolepis cut leaves were treated with packaging in kraft paper then stored at 3°C for one week recorded the maximum amount of water uptake (5.09 and 5.13 g/leaf) as compared to stored at 3°C for three weeks without packaging treatment (1.73 and 3.03 g/leaf).

12- The extended storage period was affected on water uptake during the shelf life periods. The highest water uptake was observed when cut leaves were

stored at 3°C for one week as compared to store for two and three weeks, respectively in both seasons.

13- All treatments recorded the maximum amount of absorbed preservative solution up to the 2nd day of shelf life periods, then gradually decreased after that day.

14- The treatment of interaction between packaging with tissue paper + stored at 3°C for one 3weeks recorded the highest value of water loss after 4th day in two seasons.

15- Packaging with kraft paper, stored at 3°C for one week and interaction between them enhanced water balance of nephrolepis cut leaves in both seasons.

16- All packaging materials treatments then stored at 3°C for one week had decreased number of bacterial in vase solution as compared to storage periods for two or three weeks, respectively.

17- Chlorophyll a and b decreased with extending cold storage periods.

18- The treatment of kraft paper + stored for one week maintained the value of chlorophyll a and b and total chlorophyll in leaves of nephrolepis during shelf life periods.

19- All packaging materials then stored at 3°C for one week conserved the level of total sugars, reducing sugars as compared to other storage periods (two and three weeks).

Moreover, there were gradual decreases in total and reducing sugar with extended storage periods.

20- All packaging treatments with storage at 3°C for one week due to a decrease in Proline content as compared to other different storage periods.

21- The lowest value of proline were obtained when nephrolepis cut leaves were packaged with kraft paper then stored at 3°C for one week.

Part III. *Melaleuca genistifolia*, L:

Effect of chemical preservative solutions on the keeping quality of melaleuca cut branches:

1- Using 5 ppm BA + 50 g/L sucrose + 1 ml/L voporgard + 200 mg/L 8-HQS had significantly increased vase life (12.33 and 13.00 days) of melaleuca cut branches as compared to other treatments.

2- The maximum increase in branches fresh weight % was recorded with treated by 5 ppm BA + 50 g/L sucrose + 1 ml/L voporgard + 200 mg/L 8-HQS.

3- The fresh weight % of branches was significantly increased up to the 6^{th} day then gradually decreased after that day.

4- The highest total water uptake was by using preservative solution containing 5 ppm BA + 1 ml/L voporgard + 200 mg/L 8-HQS in both seasons.

5- The treatment of 5 ppm BA + 1 ml/L voporgard + 200 mg/L 8-HQS increased water uptake until the 4th day then gradually a decreased at the end of the shelf life periods.

6- The lowest value of water loss were obtained with treatment of 5 ppm BA + 50 g/L sucrose + 200 mg/L 8-HQS.

7- The vase solution containing 5 ppm BA + 50 g/L sucrose + 1 ml/L voporgard + 200 mg/L 8-HQS enhanced the water balance of melaleuca cut branches during the shelf life periods.

8- All preservative solutions under study reduced bacterial counts of melaleuca cut branches as compared to control (distilled water).

9- The treatment of 5 ppm BA + 50 g/L sucrose + 1 ml/L voporgard + 200 mg/L 8-HQS had the lowest average of bacterial count nearly about half, as compared to control treatment.

10- The treatment of 5 ppm BA + 50 g/L sucrose + 1 ml/L voporgard + 200 mg/L 8-HQS maintained the level of chlorophyll b and total chl in melaleuca cut branches, increase in total, reducing and non-reducing sugars and decrease in proline content in leaves.

RECOMENDTION

1- The highest keeping quality and longest vase life of *Solidago canadensis* as cut flowers, L., *Nephrolepis exaltata*, L. and *Melaleuca genistifolia*, L. as cut leaves were obtained by using the preservative solution containing 5 ppm BA + 1 ml/L voporgard + 200 mg/L 8-HQS + 20 g/L sucrose for solidago and 50 g/L for (nephrolepis and melaleuca).

2- To improve the keeping quality of both *Solidago canadensis*, L. and *Nephrolepis exaltata*, L. during transit periods, It may be achieved to be packaged by kraft paper then stored or shipped at 3°C for one week.