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Effect of Hygroscopic Solution (Glycerine, Sorbitol and Sodium chloride) on Drying and Preservation of Different Ornamental Foliage

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ABSTRACT: The aim of present study is to assess the "Effect of Hygroscopic Solution on Drying and Preservation of different ornamental foliage" was carried out at Postharvest laboratory of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and sciences, Prayagraj (U.P.). The two methods were applied in the experiment i.e. Uptake method and Full dip method. In Uptake Method, the leaves were harvested from the plants at matured stage and cut end of leaf or leaf was dipped in hygroscopic Solution and in full dip method. The leaves are fully dipped in Solutions. According to present finding the best results were obtained in Uptake method and the best concentration was 20% of glycerine for drying of ornamentals cut foliage. As the dried leaves and flowers are extensively used for decoration in marriages, pandals, temples. This study shows the importance of cut foliage in preparing various dry flower products such as dry flower arrangements, bouquets etc.

Keywords: Glycerine, sorbitol, sodium chloride, foliage, preservation.

INTRODUCTION

According to the present study we find out the appropriate time taken by the leaves of temperate zone in subtropical conditions of Prayagraj (U.P.) with different concentrations of hygroscopic solutions. Treating foliage with glycerine yield unique results, they remain flexible, pliable, indefinitely retain natural shapes and make the dried product last longer. Condor, (1979) expressed that dried materials (whole branches or single leaves) keep their natural shape and pliability in glycerine drying method.

In nature, the best plant materials tends to lose color due to oxidative reaction within the plant cell during desiccation of plant tissues (Dubois and Joyce 1989). Agnew and Linda (1992) revealed that this method proved that the best for foliage preservation. By mixing equal amount of glycerine and hot water the preservative solution should be prepared and 1-2 inches of leaf stems should be dipped in the solution. Datta, (1999) also found that preservation of foliage with glycerine will retain the shape and makes leaves soft, pliable and long lasting. Foliage should be collected at the top of its growing seasons and treat materials soon after picking (Dana and Lerner, 1983).

Fully developed leaves were best for glycerin drying but smaller and younger leaves can also be glycerinated. For younger leaves, it should fully be submerged in a 1:1 glycerin and water solution. It is one of the best dehydrating agents as it is an osmotic reagent. Foliage Preserved by glycerine can be wiped or cleaned and will last indefinitely (Peeran *et al.,* 2015). In India, dry flower industry development depends on the raw materials that are available from forests or other places and it preserves foliage by replacing the natural moisture present in the material with a substance that maintains the foliage form, texture and sometimes the color (Dhurve *et al.,* 2018).

MATERIALS AND METHODS

The study was carried out in the Post-Harvest Technology Laboratory and Science, Naini, Prayagraj (U.P.) during Rabi Season 2019-20. The experimental site is situated at 250°45′ North Latitude, 810°85′ East longitude and at an altitude of 98m above mean sea level. The climate of this area is typically subtropical. The experiment was conducted in completely Randomized Block Design (CRBD) having two methods in two three replications. *Deodar/cedar/Himalayan cedar or deodar/devdar, Eucalyptus, Ficus elastica (Rubber tree), Araucaria columnaris (Christmas tree), Fern (Pteris sp.), Maiden hair fern/(Himalayan fern (adiantum), Tea (Camellia sinensis) Rhododendron, Banoak (Himachal Pradesh)/Banjh oak (Uttrakhand), Bamboo leaves.* Methods of Hygroscopic chemicals are Uptake method and full dip method.

RESULTS AND DISCUSSION

The present studies revealed that the maximum change in leaf area (cm^2) was found in *Ficus elastica* ($68.12cm^2$) and max. EC (Sdm^{-1}), time taken for drying of foliage was found in 20% concentration of glycerine (with Uptake method) and the minimum leaf area was recorded in Deodar ($2.19cm^2$) and minimum EC (Sdm^{-1}), time taken for drying of foliage was recorded in 15% concentration of Sorbitol (with Dip method) as shown in Fig. 1, 2 and 3.

Table 1: Effect of different methods and hygroscopic chemicals concentration on leaf area (cm^2) of different ornamental foliage.

Treatment Notation	Foliage	Leaf area (cm^2)
T_1	Deodar/cedar/Himalayan cedar or deodar/devdar	2.19
T_2	Eucalyptus	40.10
T_3	*Ficus elastica* (Rubber tree)	68.12
T_4	Araucaria columnaris (Christmas tree)	50.39
T_5	Fern (Pteris sp.)	58.42
T_6	Maiden hair fern/(Himalayan fern (adiantum)	6.61
T_7	Tea (*Camellia sinensis* camellia sinensis)	21.22
T_8	Rhododendron	21.47
T_9	Ban oak (Himachal Pradesh)/ Banjh oak (Uttrakhand)	22.54
T_{10}	Bamboo leaves	15.18
	F-Test	**S**
	C.D. at 5%	0.228
	S.Ed. (±)	0.112

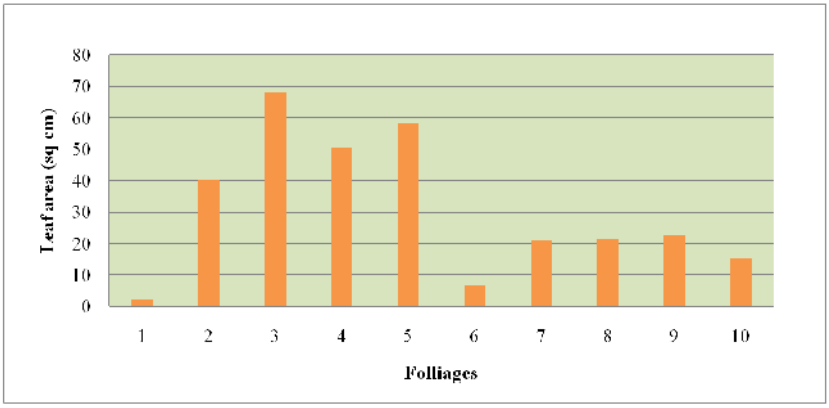

Fig. 1. Graphical representation of different treatments on leaf area of different cut foliage.

Similarly these results are obtained in concurrence with the Marak *et al.,* (2016); Megha *et al.,* (2019) in standardization of glycerinisation of Silveroak (*Grevillea robusta*), Kanchan (*Bauhinia purpurea*) and Pipal (*Ficus religiosa*) foliage.

Table 2: Effect of different methods and hygroscopic chemicals concentration on EC (Sdm^{-1}) of different ornamental foliage.

Treatments Notation	Treatments combinations	EC (Sdm^{-1})
T_1	Glycerine 20% + Uptake Method	6.45
T_2	Glycerine 40% + Uptake Method	6.17
T_3	Glycerine 60% + Uptake Method	5.80
T_4	Sorbitol 5% + Uptake Method	0.88
T_5	Sorbitol 10% + Uptake Method	0.75
T_6	Sorbitol 15% + Uptake Method	0.75
T_7	Sodium Chloride 5% + Uptake Method	2.47
T_8	Sodium Chloride 10%+ Uptake Method	3.38
T_9	Sodium Chloride 15%+ Uptake Method	3.56
T_{10}	Glycerine 20% + Dip Method	6.78
T_{11}	Glycerine 40%+ Dip Method	6.35
T_{12}	Glycerine 60%+ Dip Method	6.20
T_{13}	Sorbitol 5%+ Dip Method	0.76
T_{14}	Sorbitol 10%+ Dip Method	0.63
T_{15}	Sorbitol 15%+ Dip Method	0.69
T_{16}	Sodium Chloride 5% + Dip Method	2.34
T_{17}	Sodium Chloride 10%+ Dip Method	3.33
T_{18}	Sodium Chloride 15%+ Dip Method	3.28
	F-Test	**S**
	C.D. at 5%	4.289
	S.Ed. (±)	2.027

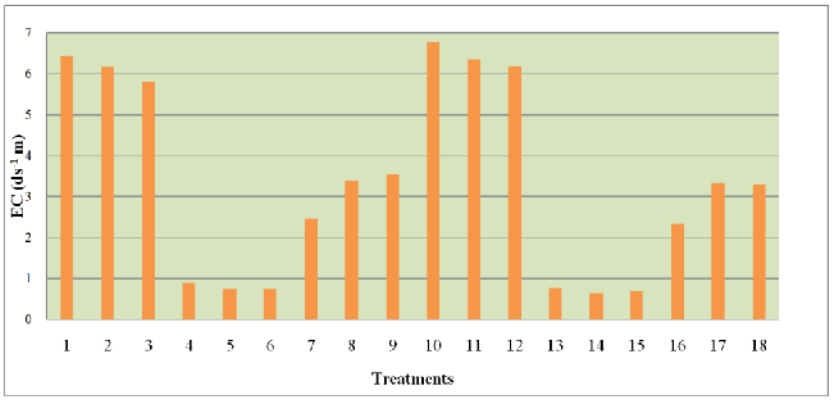

Fig. 2. Graphical Representation of different methods on EC (Sdm^{-1}) of different cut foliage.

Table 3: Effect of different methods and hygroscopic chemicals concentration on time taken for drying (days) of different ornamental foliage.

Treatments Notation	Treatment combination	Times taken for drying leaves (in Days)				
		Devdar	Eucalyptus	*Ficus elastica* (Rubber tree)	*Araucaria columnaris* (Christmas tree)	Fern (*Pteris* sp.)
T_1	Glycerine 20% + Uptake Method	16.67	16.16	18.87	19.87	14.39
T_2	Glycerine 40% + Uptake Method	15.00	15.21	17.92	18.74	13.85
T_3	Glycerine 60% + Uptake Method	14.67	14.87	16.31	17.60	13.14
T_4	Sorbitol 5% + Uptake Method	10.33	11.34	13.38	15.83	10.66
T_5	Sorbitol 10% + Uptake Method	6.33	13.15	13.01	16.20	10.48
T_6	Sorbitol 15% + Uptake Method	8.33	13.53	12.12	15.28	10.07
T_7	Sodium Chloride 5% + Uptake Method	12.67	14.66	17.54	17.45	12.58
T_8	Sodium Chloride 10% + Uptake Method	12.33	13.85	17.10	17.34	11.91
T_9	Sodium Chloride 15% + Uptake Method	11.00	13.49	15.71	17.28	11.41
T_{10}	Glycerine 20% + Dip Method	7.33	12.03	12.78	15.82	10.46
T_{11}	Glycerine 40%+ Dip Method	7.00	10.70	12.24	15.66	9.98
T_{12}	Glycerine 60% + Dip Method	6.67	10.11	11.82	14.65	9.94
T_{13}	Sorbitol 5% + Dip Method	4.81	8.48	9.86	11.37	6.40
T_{14}	Sorbitol 10% + Dip Method	6.59	7.57	9.06	10.30	5.81
T_{15}	Sorbitol 15% + Dip Method	5.33	6.43	8.03	9.16	4.96
T_{16}	Sodium Chloride 5% + Dip Method	7.00	9.61	11.56	12.74	8.42
T_{17}	Sodium Chloride 10%+ Dip Method	6.67	9.27	10.63	12.10	8.27
T_{18}	Sodium Chloride 15%+ Dip Method	6.80	9.19	10.08	11.75	8.07
	F-Test	**S**	**S**	**S**	**S**	**S**
	C.D. at 5%	**2.465**	**1.656**	**0.936**	**2.263**	**1.187**
	S.Ed (±)	**1.213**	**0.815**	**0.460**	**1.113**	**0.584**

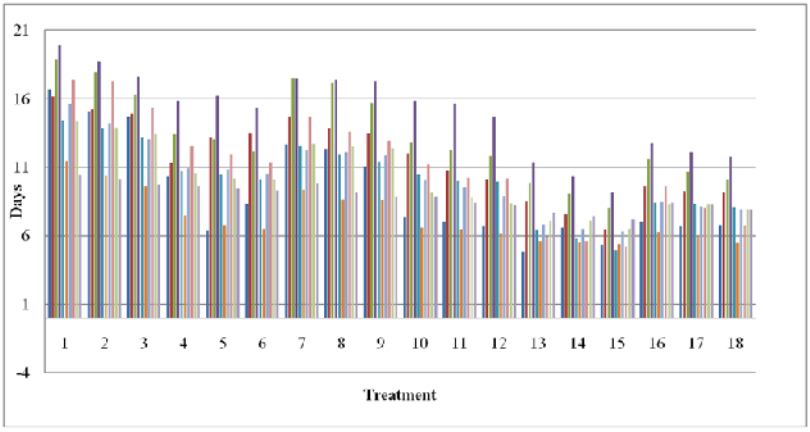

Fig. 3. Graphical Representation of different treatments on time taken for drying (days) of different leaves.

Table 4: Effect of different methods and hygroscopic chemicals concentration on time taken for drying (days) of different ornamental foliage.

Treatment notation	Treatment combination	Times taken for drying leaves (Days)				
		Maiden hair fern/ (Himalayan fern (adiantum)	Tea (*Camellia sinensis*)	*Rhododendron*	Banjh oak (Uttarakhand)	Bamboo
T_1	Glycerine 20% + Uptake Method	11.43	15.62	17.36	14.33	10.40
T_2	Glycerine 40%+ Uptake Method	10.35	14.21	17.28	13.87	10.14
T_3	Glycerine 60%+ Uptake Method	9.64	13.02	15.33	13.37	9.69
T_4	Sorbitol 5% + Uptake Method	7.46	10.90	12.56	10.54	9.63
T_5	Sorbitol 10%+ Uptake Method	6.77	10.82	11.88	10.21	9.43
T_6	Sorbitol 15%+ Uptake Method	6.49	10.50	11.37	10.10	9.31
T_7	Sodium Chloride 5% + Uptake Method	9.36	12.22	14.65	12.69	9.81
T_8	Sodium Chloride 10%+ Uptake Method	8.66	12.08	13.58	12.49	9.12
T_9	Sodium Chloride 15%+ Uptake Method	8.60	11.85	12.96	12.37	8.83
T_{10}	Glycerine 20% + Dip Method	6.59	10.03	11.22	9.14	8.80
T_{11}	Glycerine 40% + Dip Method	6.44	9.50	10.24	8.76	8.42
T_{12}	Glycerine 60% + Dip Method	6.18	8.88	10.20	8.37	8.21
T_{13}	Sorbitol 5% + Dip Method	5.62	6.84	5.95	7.13	7.67
T_{14}	Sorbitol 10% + Dip Method	5.55	6.49	5.63	7.10	7.43
T_{15}	Sorbitol 15% + Dip Method	5.37	6.31	5.17	6.51	7.18
T_{16}	Sodium Chloride 5% + Dip Method	6.25	8.43	9.64	8.26	8.42
T_{17}	Sodium Chloride 10% + Dip Method	5.98	8.12	8.03	8.24	8.23
T_{18}	Sodium Chloride 15% + Dip Method	5.44	7.89	6.76	7.87	7.87
	F-Test	**S**	**S**	**S**	**S**	**S**
	C.D. at 5%	**1.408**	**0.573**	**1.346**	**0.622**	**0.385**
	S.Ed (±)	**0.693**	**0.282**	**0.662**	**0.306**	**0.190**

As similar finding were noticed by Yadav *et al*., (2018); Megha *et al.*, (2019) who work on the effect of glycerine on drying of cut foliage of *Polystichum squarrosum* and *Peltophorum pterocarpum*.

CONCLUSION

Based on the present finding it is concluded that uptake method is better as compared to full dip method and 20% is the optimum concentration of glycerine for drying of different ornamental cut foliage. Hence we can make more amendments in this experiment.

Conflict of Interest. None.

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