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## Standardization of different drying techniques in aster flower

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### Abstract

The Investigation entitled “Standardization of different drying techniques in aster flower” was conducted at Dry Flower Laboratory, Department of Floriculture and Landscape Architecture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MH) during 2020 – 2021 to find out the suitable drying methods for Aster flower. The experiment was laid out in Completely Randomized Design (CRD) with seven treatments which were replicated four times. Treatments were Microwave oven drying for 1.0 minute, 1.5 minute and 2.0 minute (embedded in silica gel), Sand flour (rangoli) drying for 48 hours and 76 hours at room temperature, Borax drying for 48 hours and 76 hours at room temperature. The observation recorded were quantitative parameters, fresh flower weight (g), dry flower weight (g), moisture loss (%), initial diameter of flower (cm), diameter of dry flower (cm) reduction in flower diameter (mm), and storage study for 15 days interval for 3 months and visual quality parameters (appearance, colour, shape and texture) were statistically analysed. The result of present study revealed that, amongst all the treatments minimum dried weight, maximum moisture loss and minimum reduction in diameter of flowers were recorded in microwave oven drying for 2.0 minute with embedding in silica gel. The visual quality parameter like appearance, colour, shape and texture were found to be best in microwave oven drying for 2.0 minute embedded in silica gel. The results of the present study suggested that Microwave drying for 2.0 minute was found superior in better quality dried Aster flower var. “Phule Ganesh White” than rangoli drying and borax drying.

**Keywords:** Aster, microwave oven drying, sand flour (rangoli) drying, borax drying

### Introduction

Flowers are one of the pure and beautiful creations of nature. Flowers have a special place in everywhere, due to their purity and beauty. The fragrance of flowers makes the surrounding air pleasant to breathe. Their sight is a joy forever with expression of pure love and respect. Flowers are our companions in life as well as in death. They are symbol of love, respect, sacrifice, friendship, beauty and regard. Flowers are a most integral part of Indian culture. Flowers are being used for offering and decorative purposes all over the country since ancient times (Joshi and Jadhav, 2018) [5]. Besides their aesthetic value, flowers play important role in improving the environment in addition to their economical and medicinal properties. China aster (*Callistephus chinensis* L. Nees.) is an important annual crop belonging to family Asteraceae with the basic chromosome number of  $n=9$  but most of the species are diploid in nature *i.e.*,  $2n=18$  (Huziwara, 1954) [3]. The genus *Callistephus* derived its name from two Greek words ‘*Kalistos*’ and ‘*Stephos*’ meaning ‘most beautiful’ and ‘a crown’, respectively. Cassini described China aster as *Callistephus hortensis*. It was first named by Linnaeus as *Aster chinensis* and later Nees changed this name to *Callistephus chinensis* (Janakiram, 2006) [4]. Dried flowers are long lasting, can be used several times and also meet the decorative demand throughout the year. With growing eco-consciousness, the use of more and more nature friendly things like dry flowers comes as a natural choice for decoration. The life of dried flowers varies according to the species, texture of their petals and total consistency of flowers. Dried flowers can be effectively used for making decorative floral craft items for interior decoration and commercial exploitation (Bintory *et al.*, 2015) [2]. Flowers are used in many forms as loose flower, cut flower and dry flower from time immemorial for decorating homes due to their fragrance and welcome the guests at home. (Shailza *et al.*, 2018) [9]. The demand for ornamental flowers is ever increasing in the international and domestic market with the improvement in standard of living and quality of life. Flowers are delightful creation of nature considered as a symbol of love, beauty and a paradigm of life because of their

countless colours. Owing to steady increase in demand of flower floriculture has become one of the important Commercial trades in Agriculture (Kumar *et al.*, 2021) [6].

### Materials and Methods

The present study on “Standardization of different drying techniques in Aster flower” was carried out at “Dry Flower Laboratory, Department of Floriculture and Landscape Architecture, Dr. PDKV, Akola, (MS) during the year 2020-2021. The experiments was carried out by using drying methods *viz.* Microwave oven by desiccating the flowers in silica gel. For microwave oven drying, the flowers were kept in microwave oven at three different time levels (1.0 minute, 1.5 minute and 2.0 minute) with embedding in silica gel. In sand flour (rangoli) drying the flowers kept in plastic container at two different time levels (48 hrs and 76 hrs) embedding in rangoli at room temperature. In borax drying the flowers kept in plastic container at two different time levels (48 hrs and 76 hrs) embedding in borax at room temperature. The experiment was laid out in Completely Randomized Design (CRD) with seven treatments which were replicated four times.

### Results and Discussion

#### Dry weight of flowers as influenced by different drying methods

It is apparent from the treatment T3 i.e. microwave oven drying for 2.0 minute with embedding in silica gel recorded minimum dry weight of flower (3.90 g). Drying of flowers in microwave oven with silica gel resulted in highest mean percentage of weight loss. The difference recorded in respect of dry weight of flowers in different drying methods was significant. In microwave oven drying for 2.0 minute with embedding in silica gel flowers placed for drying at constant temperature and different timing which leads to minimum dry weight of flower compared to borax drying and sand flour (rangoli) drying. In borax drying and sand flour (rangoli) drying the maximum dry weight of flower was observed because in this treatment the temperature and humidity changes every time to low to high resulting in dry weight of flower. This result was in accordance with Nirmala *et al.*, (2008) [7] in carnation.

#### Moisture loss of flowers as influenced by different drying methods

The treatment T3 i.e. microwave oven drying for 2.0 minute recorded maximum moisture loss of dry flower (48.66%). Maximum moisture loss of flower was observed in microwave oven dried for 2.0 minute embedded in silica gel. This method is followed by sand flour (rangoli) and borax drying at room temperature method. Moisture loss of microwave oven with silica gel resulted in plant part is kept at controlled temperature for a specified time typical of the plant species. Temperature plays an important role in drying of flowers and other ornamental plant parts by influencing both qualitative and quantitative parameters. At higher temperature, the rate of transpiration was comparatively much higher. This result were in accordance with Bintory *et al.*, (2015) [2] in dutch roses.

#### Diameter of dry flowers as influenced by different drying methods

The treatment T3 i.e. microwave oven drying for 2.0 minute with embedding in silica gel recorded minimum diameter of

dry flower (5.15 cm). However maximum diameter of dried flower was recorded in treatment T6 (5.24 cm) i.e. borax drying 48 hrs at room temperature. The microwave oven for 2.0 minute with embedding in silica gel drying method of flower drying recorded minimum dry diameter of flower. This might be due to microwave dried flowers showed less decrease in flower size due to presence of support provided by embedding medium and slow and uneven drying process that caused more shrinkage and petal wrinkling. This result were in accordance with Ugale *et al.*, (2016) [10] in rose.

#### Reduction in diameter of flowers as influenced by different drying methods

In this treatment minimum reduction of diameter of dry flower (0.60 mm) was recorded with the treatment T3 i.e. microwave oven drying for 2.0 minute embedded in silica gel. However maximum reduction in diameter of dry flower recorded in treatment T6 (0.70 mm) i.e. borax drying for 48 hrs at room temperature. There is reduction in diameter of flower was significant in different drying method. In borax drying maximum reduction in flower diameter was recorded, flower which leads to shrinkage of flower and reduction in diameter of flower. In microwave oven flowers were embedded in media and even distribution of heat both treatments might have helped to maintain proper shape of flower. Minimum reduction in diameter of flower was recorded in microwave drying. This result were in accordance with Nirmala *et al.*, (2008) [7] in Carnation.

#### Appearance of dry flowers as influenced by different drying methods

The treatment T3 i.e. microwave oven drying for 2.0 minute recorded excellent appearance of dry flower (3.67), which was significantly superior than rest of treatments. The maximum score in appearance of dried flower was recorded in flower dried in microwave oven. These treatments were followed by sand flour (rangoli) and borax drying method. The minimum score in appearance of flower was observed in 76 hrs borax drying treatment at room temperature. The difference recorded in respect of appearance of flowers in different drying method might be due in microwave oven the flowers exposure for minimum time and were embedded in silica gel. Silica gel by acting as drying agent could produce better quality of dry flowers in microwave oven. This result is in accordance with Safeena and Patil (2013) [8] in Dutch rose.

#### Colour of dry flowers as influenced by different drying methods

The treatment T3 i.e. microwave oven drying for 2.0 minute recorded excellent colour of dry flower (3.65) which was significantly superior than rest of treatments. However, medium colour of dry flower was found in the treatment T7 (2.12) i.e. borax drying for 76 hrs at room temperature. Colour retention of flower was observed good in microwave oven drying method because flowers were embedded in silica gel which helps to rapid drying and proper maintenance of colour and less drying time which helps to retain its colour. In sand flour (rangoli) and borax drying timing of flower drying is more in room temperature and flowers are leads to dullness of flower colour. The difference recorded in colour of flower after drying in different method might be due to different time levels in microwave oven. Silica gel is excellent drying agent for absorbing moisture from the flowers because it absorbs moisture from flowers rapidly, which helps preserve the

colour of flower. microwave prevents the direct removal of moisture from flowers by acting as an intermediate which prevents shrinkage of the flowers and degradation of colouring pigments that could take place when petal tissues are directly exposed to high temperatures and light. This result is accordance with Safeena and Patil (2013)<sup>[8]</sup> in Dutch rose.

#### Shape of dry flowers as influenced by different drying methods

The treatment T3 i.e. microwave oven drying for 2.0 minute, observed excellent shape of dry flower (3.42). However, medium shape of dry flower was recorded in the treatment T7 (2.05) i.e. borax drying for 76 hrs at room temperature. In microwave oven drying method the flowers were embedded in media i.e. silica gel which provides support and rapid drying and equal heat generated in microwave oven and its less drying duration helps to maintain the shape of flower like original. This might be due to flowers were embedding in silica gel and it removes moisture in faster rate without affecting the structural integrity of flowers. This result is accordance with Acharyya *et al.* (2013)<sup>[1]</sup> in Rose. Flowers embedded in silica gel remained intact throughout the drying

process and also maintained the original shape, similar findings were reported by Nirmala *et al.* (2008)<sup>[7]</sup> in carnation flowers.

#### Texture of dry flowers as influenced by different drying methods

The treatment T3 i.e. microwave oven drying for 2.0 minute, recorded excellent texture of dry flower (3.47). The microwave method of flower drying scored maximum points in respect of texture because flower was embedded in silica gel which acts as a quick drying agent and quick action of flower drying helps to maintain the texture of flower without damaging the petals. In sand flour (rangoli) drying and borax drying flowers were kept in plastic containers at room temperature, in this drying process the shrinkage and cracking of flower is occurs it affects the flower texture. Similar trend was observed by Safeena and Patil (2013)<sup>[8]</sup> smooth petal texture was observed in 'Lambada' cultivar of rose when embedded in silica gel, because silica gel is composed of a vast network of interconnecting microscopic pores which attracts and hold moisture by the phenomenon known as physical adsorption and capillary condensation.

**Table 1:** Treatments

Treatments	Fresh weight of the flower (cm)	Dry weight of flower (cm)	Moisture loss of flowers (%)	Initial diameter of flower (cm)	Diameter of dry flower (cm)	Reduction in diameter of flower (cm)	Appearance of flower	Colour of flowers	Shape of flowers	Texture of flowers
T1	7.14	4.07	44.95	5.90	5.21	0.69	2.72	2.57	2.80	2.92
T2	7.16	3.94	47.38	5.78	5.16	0.62	2.90	2.77	3.02	3.12
T3	7.15	3.90	48.66	5.75	5.15	0.60	3.67	3.65	3.42	3.47
T4	7.13	4.06	41.87	5.78	5.18	0.63	2.62	2.52	2.67	2.65
T5	7.12	4.00	43.70	5.90	5.17	0.61	2.15	2.22	2.30	2.25
T6	7.14	4.10	41.63	5.82	5.24	0.70	2.42	2.27	2.50	2.47
T7	7.16	3.97	42.38	5.87	5.19	0.68	2.10	2.12	2.05	2.17
F Test	NS	Sig	Sig	NS	Sig	Sig	Sig	Sig	Sig	Sig
SE (m)	0.12	0.01	0.75	0.13	0.02	0.01	0.16	0.14	0.19	0.18
CD at 1%	0.53	0.06	3.19	1.31	0.08	0.07	0.67	0.59	0.79	0.7

T1 - Microwave oven for 1.0 minute (silica gel),

T2 - Microwave oven for 1.5 minute (silica gel)

T3 - Microwave oven for 2.0 minute (silica gel),

T4- Sand flour (rangoli drying) 48 hrs at room temperature

T5 - Sand flour (rangoli drying) 76 hrs at room temperature

T6 - Borax drying 48 hrs at room temperature

T7 - Borax drying 76 hrs at room temperature

#### Conclusion

Form the present investigation Silica gel was found to be best desiccants to maintain the appearance, colour, shape and texture of flower. Among different drying techniques, microwave oven drying with silica gel as embedding media at full bloom flower produced good quality dried flowers. The efforts made to standardize drying time in microwave oven for aster revealed that for drying 2.0 minutes maintained the quality of flower.

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