Ann. Agric. Res. New Series Vol. 46 (4) : 412-414 (2025)

Flower quality parameter as affected by moisture content during value addition through flower drying

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Received: May 2025; Revised Accepted: August 2025

Abstract

Moisture content studies were carried out among sixteen flowers including selection of quality floral raw material for dehydrated value addition and product preparation. The results revealed that optimum floral moisture content directly influenced the quality, natural colour retention and shelf life of dry flowers. Moisture content varied 6.81% (helichrysum) to 15.23% (dahlia) based on flower texture, size and utility. In dry flowers, high moisture content (12 to 15%) than optimum levels lead to more shrinkage and microbial infestation with lesser shelf life, whereas very low levels of moisture (less than 5%) causes flower brittleness and shattering. Hence an optimum moisture content on dry weight basis (7-9 percent) was found optimum for quality dry flowers selection with higher shelf life of more than four years.

Keywords: Dry flowers, moisture content, shelf lfe, shrinkage, value addition

In India, dry flower and its value addition occupies the major segment in floriculture trade with a very high export potential to temperate countries. Due to central position and varied climate, India is endued with diverse flora and vast trading opportunities to all the surrounding countries. Moreover, creative and hardworking Indian intellectuals are the asset for dry flower industry management (Datta, 1997). In India, despite of these strong heritage, is lacking in research and extension activities of dry flowers, though in some institutes the related research is limited to drying methodologies of major flowers only. Hence, tapping of the hidden potential of research on quality dry flowers is still the need of hour. Since the delicacy of fresh flowers depends on its moisture and if it is optimized during drying, it would help in enhancing the shelf life of the flowers without the application of artificial colour or aerosol (Oulalk, 2012). Hence in this study, optimum moisture content is analysed for the selection of appropriate dry flowers for quality and durable value addition.

Materials and Methods

The present study was conducted at Value Addition Laboratory of Bihar Agricultural University, Sabour, Bhagalpur, Bihar, since July 2020. The experiment was laid out in Completely Randomized Design (CRD) with three replications. Under this study, sixteen flowers (ixora, rose, zinnia, cassia, annual chrysanthemum, dog flower, ice plant, brachychome, phlox, sweet william, carnation, gladiolus, larkspur, dahlia, helichrysum and aparajita) were studied. The flowers for value addition were plucked from field and immediately weighed on digital weighing balance for initial weight calculation. After this, floral material was dried in hot air oven at constant temperature of 48°C until it reached a constant mass as final weight. The moisture content was calculated as per the given formulae.

M.C. on dry weight basis = (Initial weight - dry weight)/dry weight

Similarly, flower shrinkage percentage was calculated as per the given formulae

Flower shrinkage (%) = (fresh flower area- dry flower area)/ fresh flower area x 100

Fresh and dry flower pigments were calculated as per the method given by Roy, 1973 (with modification) and Ranganna (1977) method. Total carotenoids were estimated by crushing sample in cold acetone till it become colourless and taking hexane as blank. The extract was mixed with hexane and a pinch of Na_2SO_4 in a funnel and shaken vigrously to separate layers. The extract volume was made with hexane and with spetophotometer at 452 nm wavelength the pigment in mg/100g) was estimated as follows:

Total carotenoids = 3.857 x Vol. X O.D. x 100 x Dilution factor/sample weight x 100

Total anthocyanin by Ranganna method was widely used to determine the total anthocyanin content in a sample by using 85% methanolic acid. One gram sample was mixed with 10 ml of 85% methanolic acid was and kept in cool conditions for three days. as blank and using 535 nm wavelength of spectrophotometer. The sample after mixing with the formulae for calculating total anthocyanin was calculated by computing the formula as follows:

Total anthocyanin (mg/100g) = O.D. per 100g/ 98.2,

whereas O.D. /100 g = O.D. x vol. x 100/sample weight (g)

Colour deterioration was calculated by the formula as follows:

Colour deterioration (%) = (Fresh - Dry flower pigment)/Fresh flower pigment *100

Colour retension (%) = 100 - Colour deterioration (%)

Shelf life of the dry flowers was assessed by checking its presenatability on the basis of flower shrinkage and natural colour retention including physical deterioration.

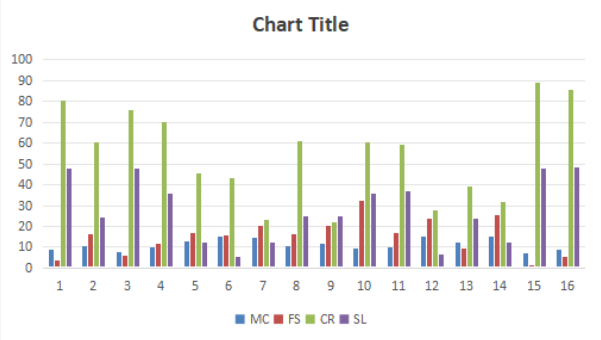
Results and Discussion

The data depicted in Table 1 revealed that the fresh and dry weight of flower ranged from 0.10 to 13.43 g and 0.010 to 1.500 g in Aparajita and Zinnia, respectively. On the basis of fresh and dry weight of flowers, moisture content in dry flowers ranged from 6.81 to 15.23 in Helichrysum and Dahlia flowers, respectively. Simiarly, on the basis of fresh and dry flower area the flower shrinkage was found maximum in dianthus (32.26%), followed by dahlia (25.15%) and gladiolus (23.67%), whereas minimum floral shrinkage was

Table 1. Effect of moisture content on flower shrinkage, natural colour retention and shelf life of dried flowers

Flower	Fresh weight (g)	Dry weight (g)	Moisture content (dwb)	Fresh flower area (cm^2)	Dry flower area (cm^2)	Flower shrinkage (%)	Fresh flower pigment (mg/100g)	Dry flower pigment (mg/100g)	Colour retention (%)	Shelf life (month)
Ixora	0.12	0.014	7.57	2.33	2.24	3.86	50.66	40.70	80.34	47.67
Rose	12.13	1.060	10.44	11.99	10.06	17.10	66.02	39.91	60.46	24.33
Zinnia	13.43	1.500	7.95	12.57	11.79	6.21	40.98	31.00	75.64	47.67
Cassia	0.33	0.031	9.65	2.35	2.08	11.48	86.91	60.96	70.13	36.00
Annual Chrysanthemum	1.48	0.105	13.10	4.49	3.74	16.70	2.49	1.13	45.59	12.33
Dog flower	1.21	0.078	14.51	9.31	7.86	15.57	15.66	6.73	43.00	5.67
Ice Plant	0.51	0.034	14.00	17.65	14.04	20.45	1.89	0.44	23.10	12.33
Brachychome	0.80	0.071	10.27	22.84	19.15	16.16	12.66	7.74	61.10	24.67
Phlox	0.30	0.024	11.50	4.97	3.96	20.32	1.87	0.413	22.14	25.00
Dianthus	0.53	0.049	9.82	1.55	1.05	32.26	12.90	7.81	60.58	36.00
Carnation	6.28	0.581	9.81	6.50	5.42	16.62	41.71	24.77	59.39	36.67
Gladiolus	9.46	0.588	15.09	12.97	9.90	23.67	27.64	7.73	27.97	6.33
Larkspur	0.40	0.030	12.33	4.61	4.18	9.33	8.80	3.47	39.40	23.67
Dahlia	6.67	0.411	15.23	23.94	17.92	25.15	35.55	11.38	32.01	12.33
Helichysum	1.25	0.160	6.81	6.56	6.49	1.07	72.61	64.62	89.00	48.33
Aparajita	0.10	0.010	9.00	5.57	5.26	5.57	228.67	195.76	85.61	47.67
C.D.	0.08	0.034	0.21	0.15	0.09	2.13	0.15	0.08	0.43	1.53
COV (%)	1.38	5.60	1.10	0.96	0.66	8.47	0.20	0.14	0.46	3.27

reported in helichrysum (1.07%) followed by ixora (3.86%). Similiarly, the natural pigments in form of total carotenoids and anthocyanins retained maximum value in helichrysum (89%), aparajita (85.61%) and ixora (80.34%), however the decreasing trend of natural colors was observed with increasing moisture content and was found minimum in phlox (22.14 at 11:50 moisture content) followed by 23.10 in ice plant at 14.00 moisture content, 27.97 in gladiolus at 15.09 moisture content and 32.01 in dahlia at 15.23 moisture content. Shelf life of the flowers recorded maximum value in helichrysum (48.33 months) followed by 47.67 months in ixora, zinnia and aparajita flowers having moisture content in range of 7-9%. Similiarly with increasing moisture content the shelf life showed a decreasing trend and was found minimum in dog flower (5.67 months) followed by 6.33 months in (gladiolus) having moisture content in between 14 to 15 %. The results are in line of confirmity with the findings of Rengasamy *et al.* (1999), Singh (2018), Singh (2019) and Singh and Kumari (2023). This may be due to the reason of optimum level of moisture checked the entry of micro-organism which may lead to fading of natural flower colour and presentability of flowers along with physical damage, shattering and deformation of dry flowers.



Graph 1. Graphical representation of moisture content effect on dry flowers quality

Conclusion

Optimum moisture levels in dried flowers have a beneficial role against flower shrinkage, natural pigment fading, flower deformation and shattering. All these quality parameters directly affect the shelf life of dry flowers and its further utilization for value addition. Hence an optimum moisture of 7-9 percent was found effective in controlling the microbial and pest infestation and to maintain the physical integrity and aesthetic appeal of dry flowers.

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