Original Research Article

ASSESSMENT OFDIFFERENT GERMPLASM OF *AGLAONEMA* FOR POTAND REMOVAL OF PARTICULATE MATTER IN AIR

ABSTRACT

The aim of the experiment is to screen twelve germplasm of *Aglaonema*for their suitability as pot plants and removal of particulate matter in air. The experiment wasdesigned using Completely Randomized Design (CRD) at the greenhouse complex of the Department of Floriculture and Landscape Architecture, ASPEE College of Horticulture, Navsari (Gujarat), during 2023-24. Morphological parameters were measured using various methods, including a measuring tape for plant height, a digital leaf area meter for leaf area, and manual counting for leaves and branches. Leaf colorwas evaluated on visual grading system and the RHS Colour Chart (2015), to assess visual appeal and characteristics and percent removal of particulate matter (PM)by the plant was measured using digital air quality index meter. *Aglaonema* 'Emerald Bay' exhibited maximum plant height (73.18 cm), leaf area (311.66 cm^2), leaf length (39.28 cm), leaf width (15.26 cm), internodal length (3.43 cm) and visual leaf colour grade (4.88) and dark green leaf colour (137A) as per RHS colour chart followed by *Aglaonema commutatum*with the plant height (69.58 cm), leaf area (298.09cm^2), leaf length (34.28 cm), leaf width (11.10 cm), internodal length (3.34 cm) and visual leaf colour grade (4.80) and dark green leaf colour(139 A) . Maximum number of leaves were recorded in *Aglaonema* 'Cutlass' (43.90), while maximum number of branches per plant were observed in *Aglaonema brevispathum* (13.56). *Aglaonema '*Emarald Bay'showed the maximum removal rate of PM1per 24 hours(92.16%) followed by *Aglaonema commutatum* (85.97%).Among all the germplasms, Aglaonema 'Emarald Bay' and *Aglaonema commutatum* have been highly suitable as pot plant owing to its good plant height, leaf area and their efficiency in removal of PM_1.

Keywords:Aglaonema, pot plant, morphological, visual leaf colour, particulate matter.

1. INTRODUCTION

Indoor gardening has been gaining high impetus with enhanced sense of emotional comfort, air quality and stress-free happy environment during the post COVID era[1].Further, pot plant trading is growing with rapid urbanization and hasty life style[2],[3]and[4].

Aglaonema, commonly known as Chinese evergreens, is a genus of 21 species within the Araceae family, native to Southeast Asia, Northeast India, and Southern China, with a distribution extending to Malaysia, New Guinea, and the Philippines [5],[6]. This genus has been extensively studied for its adaptability to indoor environments and its potential uses [7],[8].It is known for its striking foliage and adaptability, is a widely cultivated genus of ornamental plants, particularly valued as pot plants, it encompasses a diverse range of species and cultivars, each exhibiting unique morphological traits that influence their suitability for pot cultivation. Aglaonema is ideal for indoor environments due to its air-purifying capabilities, adaptability to low light, aesthetic diversity,low maintenance, making it both functional and visually appealing[9],[10]. It is essential to evaluate and screen various germplasms for desirable characteristics as pot plant and its ability to curb indoor pollution.

Aglaonema's contribution to indoor air quality is supported by its ability in removal of particulate matter and other pollutants, that makes it a valuable addition to indoor environments, promoting healthier and cleaner air [11].However, there are different species and varieties of Aglaonema that needs to be studied for air quality purification.

Hence this study focused on the screening of twelve Aglaonema germplasms, namely *Aglaonema siam aurora* (Lipstick), *Aglaonema* 'Emerald Bay', *Aglaonema commutatum*, *Aglaonema alumina*, *Aglaonema* 'Key Lime', *Aglaonema* cutlass, *Aglaonema* 'White Rain', *Aglaonema brevispathum*, *Aglaonema* lime narrow, *Aglaonema commutatum* (variegated), *Aglaonema* white Chinese evergreen (Golden Bay), and *Aglaonema* Red Valentine. The evaluation is based on key morphological parameters and its ability to curb indoor pollution.

2. MATERIAL AND METHODS

The experiment was conducted during 2023-24 at the greenhouse complex of Department of Floriculture and Landscape Architecture, ASPEE College of Horticulture, Navsari (Gujarat), using a Completely Randomized Design (CRD) to screen twelve Aglaonema germplasms for their suitability as pot plantsand removal of particulate matter in air.The plants were maintained under uniform growing conditions to ensure consistency in environmental factors such as light, water, and nutrients. Morphological parameters were recorded both at the start of the experiment and after two months. plant height was measured from the soil level to the growing tip using a measuring tape. Leaf area was determined using a digital leaf area meter, while leaf length and width were measured using a meter scale. The number of leaves and branches per plant were counted manually. The visual colour grade of Aglaonema plants was assessed using a standardized grading system [12].This system evaluates leaf colour grade based on greenness with freshness and luster, assigning scores 1= poor colour,3= good, light green and 5= excellent dark green & silver contrast, and visual leaf color was evaluated using the RHS Colour Chart (2015). Internodal length was measured between nodes using a meter scale. Particulate matter (PM_1)level in air was recorded by using enclosed chamber using digital air quality index meter [13] before and after 24 hours and the PM_1 removal rate by the plant was calculated on per cent basis.The data on all the parameters was collected twice at an interval of two months were pooled and statistically analyzedas per the method given by Panse and Sukhatme[14] and the results were evaluated at 5%level of significance.

3. RESULTS AND DISCUSSION

Observations on morphological parameters viz., plant height (cm), leaf area (cm^2), leaf length (cm),leaf width(cm) and internodal length(cm)of twelve germplasm of *Aglaonema*are represented in the table 1. Maximum plant height exhibited by *Aglaonema* 'Emarald Bay'(73.18 cm), closely followed by *Aglaonema commutatum* (69.58 cm). In contrast, *Aglaonema siam aurora* (lipstick) displayed the minimum plant height (30.68 cm). Maximum leaf area exhibited by *Aglaonema* 'Emarald Bay'(311.66 cm²),closely followed by *Aglaonemacommutatum*(298.09 cm²). Incontrast, *Aglaonema siam aurora* (lipstick) displayed the smallest leaf area (111.55 cm²). *Aglaonema* 'Emarald Bay'showed the maximum leaf length (39.28cm) followed by *Aglaonema commutatum* (34.28 cm)while it was minimum in*Aglaonema siam aurora (*lipstick) (15.25cm).*Aglaonema* 'Emarald Bay' exhibited maximum leaf width (15.26 cm), closely followed by *Aglaonema* 'white Rain' (13.30 cm), whereas *Aglaonema* 'cutlass' displayed the narrowest leaves (4.83 cm). Maximuminternodal length was recorded in *Aglaonema* 'Emarald Bay' (3.43 cm), closely followed by *Aglaonema commutatum* (3.34 cm). In contrast, *Aglaonema* 'lime narrow' exhibited the shortest internodal length (1.52 cm).

Observations on numberofleaves, number of branches per plant,visual leaf color grade of twelve germplasm of *Aglaonema* are represented in the table 2.Maximum leaf count was observed in *Aglaonema* 'Cutlass' (43.90), followed by *Aglaonema* 'Alumina' (25.08), while *Aglaonema* 'White Rain' had the minimum (11.16). *Aglaonema brevispathum* exhibited maximum number of branches per plant, with an average of 13.56, closely followed by *Aglaonema* 'Cutlass' (12.24 branches per plant). In contrast, *Aglaonema siam auror'* (Lipstick) displayed the lowest branching frequency, with an average of 4.20 branches per plant. *Aglaonema* 'Emarald Bay' exhibited the highest visual leaf color grade (4.88), closely followed by *Aglaonema* 'Alumina' (4.80) on the basis of 5 point visual grade for freshness, greenness and luster.Variation with regard to colour as per RHS chart among different germplasms was observed, wherein *Aglaonema* 'Emarald Bay',*Aglaonema commutatum*and*Aglaonema alumina*exhibited dark green colour, *Aglaonema siam aurora (Lipstick)* exhibited dark purple red, *Aglaonema* 'Key Lime'and *Aglaonema* lime narrow exhibited medium yellow green,*Aglaonema* cutlassexhibited medium green,*Aglaonema* 'White Rain',*Aglaonema commutatum* (variegated)and*Aglaonema* white Chinese evergreen(Golden Bay)exhibited light green and *Aglaonema* Red Valentineexhibited light red pink colour.

Observations onremomal rate of Particulate Matter1per 24 h(PM1)(%) is represented in the table 3. *Aglaonema* 'Emarald Bay'showed the maximum removal rate of PM1 (%) in 24 hours(92.16%) followed by *Aglaonema commutatum* (85.97%)while it was minimum in*Aglaonema* Red Valentine(63.06%). The results suggest that the morphological characteristics of plants play a crucial role in reducing PM concentration. Leaf traits, including shape, arrangement, and the leaf area and hair structure on the surface, are particularly important for PM accumulation. Plants remove PM through stomatal uptake and deposition on the leaf surface. PM particles can penetrate the stomata and accumulate beneath the epidermis or in the palisade layer of leaves [15],[16],[17],[18],[19] and [20]. Higher leaf area in *Aglaonema* 'Emarald Bay' and *Aglaonema commutatum*contributed to higher PM removal rate.

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Table 1: Morphological characters of twelve germplasm of *Aglaonema*

Treatments	Morphological characters – Pooled data of two months				
	Plant Height(cm)	Leaf area (cm^2)	Leaf length (cm)	Leaf width (cm)	Internodal length (cm)
G_1	30.68	111.55	15.25	6.28	1.92
G_2	73.18	311.66	39.28	15.26	3.43
G_3	69.58	298.09	34.28	11.10	3.34
G_4	40.24	212.43	21.71	10.53	2.91
G_5	54.74	212.26	23.22	11.69	3.08
G_6	45.07	113.70	27.82	4.83	2.23
G_7	62.75	236.36	33.94	13.30	2.06
G_8	56.48	271.19	29.14	12.57	3.00
G_9	56.15	269.81	25.40	7.57	1.52
G_{10}	66.49	154.72	26.09	8.30	2.25
G_{11}	35.42	252.93	25.58	12.21	2.80
G_{12}	37.05	119.65	20.61	6.35	1.81
S.Em ±	**0.39**	**1.76**	**0.45**	**0.15**	**0.04**
CD at 5%	**1.13**	**5.03**	**1.30**	**0.38**	**0.10**

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Table 2: Morphological characters of twelve germplasm of *Aglaonema*

Treatments	Morphological characters – Pooled data of two months				
	Number of leaves	Number of branches per plant	visual leaf colour grade (5-point scale)	RHS Colour group	colour code
G_1	13.43	4.20	4.21	Dark purple red	46 A
G_2	14.16	4.89	4.88	Dark green	137 A
G_3	11.18	8.36	4.80	Dark green	139 A
G_4	25.08	9.35	4.79	Dark green	131B
G_5	19.78	6.58	4.34	Medium yellow green	151 D
G_6	43.90	12.24	4.61	Medium green	144 A
G_7	11.16	10.83	4.30	Light green	141D
G_8	13.63	13.56	4.71	Medium grey green	191 C
G_9	12.86	11.56	4.71	Medium yellow green	154 D
G_{10}	15.85	9.11	4.68	Light green	144 B
G_{11}	11.79	5.11	4.69	Light green	145 D
G_{12}	12.93	5.00	4.06	Light red pink	49 D

S.Em ±	**0.34**	**0.13**	**0.03**
CD at 5%	**0.98**	**0.36**	**0.10**

Table .1 and 2. G$_1$: *Aglaonema siam aurora (Lipstick),* ***G$_2$:*** *Aglaonema 'Emarald Bay',* ***G$_3$:*** *Aglaonema commutatum,* ***G$_4$:*** *Aglaonema alumina,* ***G$_5$:*** *Aglaonema 'Key Lime',* ***G$_6$:*** *Aglaonema cutlass,* ***G$_7$:*** *Aglaonema 'White Rain',* ***G$_8$:*** *Aglaonema brevispathum,* ***G$_9$:*** *Aglaonema lime narrow,* ***G$_{10}$:*** *Aglaonema commutatum (variegated),* ***G$_{11}$:*** *Aglaonema white Chinese evergreen (Golden Bay),* ***G$_{12}$:*** *Aglaonema Red Valentine*

Table 3:Effect of different germplasms of *Aglaonema* on Removal rate of PM1 (%) in 24 h

Removal rate of PM_1(%)/ 24 h	
Treatments	**Mean (T)**
G$_1$:*Aglaonema siam aurora* (Lipstick)	**64.96**
G$_2$:*Aglaonema* 'Emarald Bay'	**92.16**
G$_3$: *Aglaonema commutatum*	**85.97**
G$_4$:*Aglaonema alumina*	**80.05**
G$_5$:*Aglaonema* 'Key Lime'	**81.09**
G$_6$: *Aglaonema* cutlass	**70.03**
G$_7$:*Aglaonema* 'White Rain'	**85.11**
G$_8$: *Aglaonema brevispathum*	**81.13**
G$_9$:*Aglaonema* lime narrow	**81.15**
G$_{10}$:*Aglaonema commutatum* (variegated)	**72.15**
G$_{11}$:*Aglaonema* white Chinese evergreen(Golden Bay)	**72.15**
G$_{12}$:*Aglaonema* Red Valentine	**63.06**
S.Em ±	**0.12**
CD at 5%	**0.36**

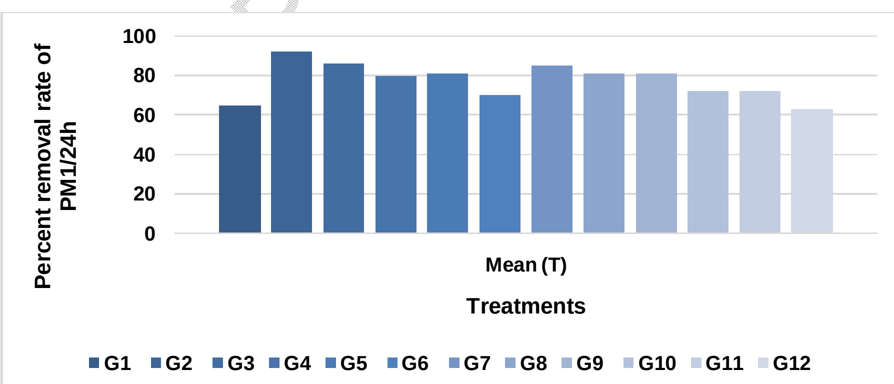

Fig. 1.Effect of different germplasms of *Aglaonema* on percent removal rate of PM_1(%)/24h

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***G$_1$:** Aglaonema siam aurora (Lipstick), **G$_2$:** Aglaonema 'Emarald Bay', **G$_3$:** Aglaonema commutatum, **G$_4$:** Aglaonema alumina, **G$_5$:** Aglaonema 'Key Lime', **G$_6$:** Aglaonema cutlass, **G$_7$:** Aglaonema 'White Rain', **G$_8$:** Aglaonema brevispathum, **G$_9$:** Aglaonema lime narrow, **G$_{10}$:** Aglaonema commutatum (variegated), **G$_{11}$:** Aglaonema white Chinese evergreen (Golden Bay), **G$_{12}$:** Aglaonema Red Valentine*

4. CONCLUSION

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Based on the findings of the present investigation, *Aglaonema* 'Emarald Bay' and *Aglaonema commutatum* exhibited superior morphological characteristics with maximum values for plant height, leaf area, leaf length, leaf ~~width,visual~~width, visual leaf colour grade with dark green and lustrous leaf colourand along with efficient removal rate of particulate matter and thus,making them the more suitable germplasms for pot plants. Overall, *Aglaonema* 'Emarald Bay' and *Aglaonema commutatum*arepromising germplasms for pot plant production and indoor air purification.

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Comment [ay5]: Reference should be written accordingly to author guideline.

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DEFINITIONS, ACRONYMS, ABBREVIATIONS

Particulate matter 1 (PM1): A type of air pollution that refers to particles that are less than 1 micron in diameter.