

Original Research Article

ASSESSMENT OF DIFFERENT GERMPLASM OF *AGLAONEMA* FOR POT AND 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 was designed 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 color was 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 cm²), 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 (298.09 cm²), 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* 'Emerald Bay' showed the maximum removal rate of PM₁ per 24 hours (92.16%) followed by *Aglaonema commutatum* (85.97%). Among all the germplasms, *Aglaonema* 'Emerald 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 PM₁.

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 plants and 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 (PM₁) level in air was recorded by using enclosed chamber using digital air quality index meter [13] before and after 24 hours and the PM₁ 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 analyzed as 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 (cm²), 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* 'Emerald 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* 'Emerald Bay'(311.66 cm²), closely followed by *Aglaonema commutatum*(298.09 cm²). In contrast, *Aglaonema siam aurora* (lipstick) displayed the smallest leaf area (111.55 cm²). *Aglaonema* 'Emerald Bay' showed the maximum leaf length (39.28 cm) followed by *Aglaonema commutatum*(34.28 cm) while it was minimum in *Aglaonema siam aurora* (lipstick) (15.25 cm). *Aglaonema* 'Emerald 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). Maximum internodal length was recorded in *Aglaonema* 'Emerald 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 number of leaves, 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 aurora*' (Lipstick) displayed the lowest branching frequency, with an average of 4.20 branches per plant. *Aglaonema* 'Emerald 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* 'Emerald 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* cutlass exhibited medium green, *Aglaonema* 'White Rain', *Aglaonema commutatum* (variegated) and *Aglaonema* white Chinese evergreen (Golden Bay) exhibited light green and *Aglaonema* Red Valentine exhibited light red pink colour.

Observations on removal rate of Particulate Matter₁ per 24 h (PM₁)(%) is represented in the table 3. *Aglaonema* 'Emerald 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* 'Emerald Bay' and *Aglaonema commutatum* contributed to higher PM removal rate.

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

Morphological characters					
Treatments Pooled data of two months					
	Plant Height(cm)	Leaf area (cm²)	Leaf length (cm)	Leaf width (cm)	Internodal length (cm)
G₁	30.68	111.55	15.25	6.28	1.92
G₂	73.18	311.66	39.28	15.26	3.43
G₃	69.58	298.09	34.28	11.10	3.34
G₄	40.24	212.43	21.71	10.53	2.91
G₅	54.74	212.26	23.22	11.69	3.08
G₆	45.07	113.70	27.82	4.83	2.23
G₇	62.75	236.36	33.94	13.30	2.06
G₈	56.48	271.19	29.14	12.57	3.00
G₉	56.15	269.81	25.40	7.57	1.52
G₁₀	66.49	154.72	26.09	8.30	2.25
G₁₁	35.42	252.93	25.58	12.21	2.80
G₁₂	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

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

Morphological characters					
Treatments 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
G₁	13.43	4.20	4.21	Dark purple red	46 A
G₂	14.16	4.89	4.88	Dark green	137 A
G₃	11.18	8.36	4.80	Dark green	139 A
G₄	25.08	9.35	4.79	Dark green	131B
G₅	19.78	6.58	4.34	Medium yellow green	151 D
G₆	43.90	12.24	4.61	Medium green	144 A
G₇	11.16	10.83	4.30	Light green	141D
G₈	13.63	13.56	4.71	Medium grey green	191 C
G₉	12.86	11.56	4.71	Medium yellow green	154 D
G₁₀	15.85	9.11	4.68	Light green	144 B
G₁₁	11.79	5.11	4.69	Light green	145 D
G₁₂	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. **G₁:** *Aglaonema siam aurora* (Lipstick), **G₂:** *Aglaonema* 'Emerald Bay', **G₃:** *Aglaonema commutatum*, **G₄:** *Aglaonema alumina*, **G₅:** *Aglaonema* 'Key Lime', **G₆:** *Aglaonema cutlass*, **G₇:** *Aglaonema* 'White Rain', **G₈:** *Aglaonema brevispathum*, **G₉:** *Aglaonema lime narrow*, **G₁₀:** *Aglaonema commutatum* (variegated), **G₁₁:** *Aglaonema white Chinese evergreen* (Golden Bay), **G₁₂:** *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)
G₁: <i>Aglaonema siam aurora</i> (Lipstick)	64.96
G₂: <i>Aglaonema</i> 'Emerald Bay'	92.16
G₃: <i>Aglaonema commutatum</i>	85.97
G₄: <i>Aglaonema alumina</i>	80.05
G₅: <i>Aglaonema</i> 'Key Lime'	81.09
G₆: <i>Aglaonema cutlass</i>	70.03
G₇: <i>Aglaonema</i> 'White Rain'	85.11
G₈: <i>Aglaonema brevispathum</i>	81.13
G₉: <i>Aglaonema lime narrow</i>	81.15
G₁₀: <i>Aglaonema commutatum</i> (variegated)	72.15
G₁₁: <i>Aglaonema white Chinese evergreen</i> (Golden Bay)	72.15
G₁₂: <i>Aglaonema Red Valentine</i>	63.06
	S.Em ±
	0.12
	CD at 5%
	0.36

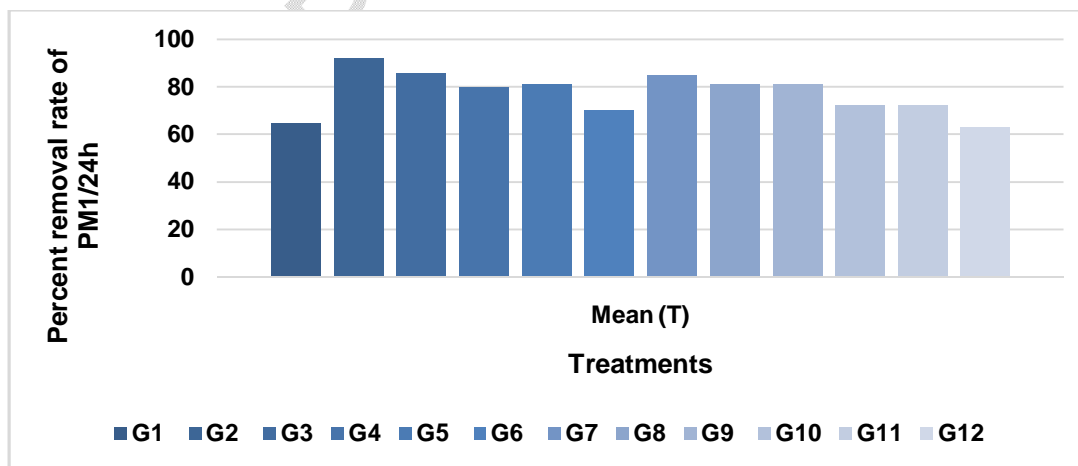


Fig. 1.Effect of different germplasms of *Aglaonema* on percent removal rate of PM₁(%)/24h

G₁: *Aglaonema siam aurora* (Lipstick), **G₂**: *Aglaonema* 'Emerald Bay', **G₃**: *Aglaonema commutatum*, **G₄**: *Aglaonema alumina*, **G₅**: *Aglaonema* 'Key Lime', **G₆**: *Aglaonema cutlass*, **G₇**: *Aglaonema* 'White Rain', **G₈**: *Aglaonema brevispathum*, **G₉**: *Aglaonema lime narrow*, **G₁₀**: *Aglaonema commutatum* (variegated), **G₁₁**: *Aglaonema white Chinese evergreen* (Golden Bay), **G₁₂**: *Aglaonema Red Valentine*

4. CONCLUSION

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

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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.

UNDER PEER REVIEW