

Study on potential aspect of an ornamental plant - *Syngonium podophyllum* (Schott) as a phytoremediator on environmental pollution: A Short Review

Leeba Balan* and Sriram Chandrasekaran

Bionyme Laboratories Pvt Ltd., No.16, 1st Floor, Bharathi Street, Radha Nagar, Chrompet, Chennai - 600 044, Tamil Nadu, India.

*Corresponding author

Leeba Balan, Bionyme Laboratories Pvt Ltd No.16, 1st Floor, Bharathi Street, Radha Nagar, Chrompet, Chennai - 6000 044, Tamil Nadu, India.

Submitted: 25 Apr 2022; **Accepted:** 02 May 2022; **Published:** 05 May 2022

Citation: Leeba Balan. (2022). Study on Potential Of Ornamental Plant – *Syngonium Podophyllum* (schott) As A Phytoremediator On Environmental Pollution: A Review; *China Int J Petro Chem Natur Gas*, 2(2):44-46.

Abstract

Environmental pollution is a globally faced problem by which the humans are facing various issues directly or indirectly. This is a long-term consequence which are created by both developed countries and developing countries. The stability of the ecosystem has been declined every year and it is evident by the loss of vegetation, quality of the air, ground level water contamination and extinct and dumping excessive amount of harmful chemicals without proper degradation. Due to these factors, serious threats have been evolved all over the world faced by all living organisms. Now, people are greatly focusing on green remediation, to remove or treat the hazardous materials using plants. Remediation with the usage of plants and phytoplanktons plays an important role as they are user friendly, cost effective and can be implemented at faster rate. Among the plants used for the study, ornamental plants plays a major role in the removal of pollutants and cleaning up of the environment.

Syngonium podophyllum (Schott), commonly called as arrowhead plant is an ornamental plant has the ability to remove benzene, toluene, formaldehyde and xylene gases and has been approved as air purifier by researchers at NASA. The whole plant is found to be poisonous to humans but have the capability to remove toxins from air by cleaning air. Hence, the review study is focused on the ability of plants to remove indoor pollutants harmful for mankind.

Keywords: Pollution, Environment, Green remediation, Ornamental plants, Cost-effective.

Introduction

Over a decade, environmental pollution is a major cause encountered by all living creatures. Human activities such as mining, urbanization, industrialization, exploration and excavation are all the major causes for the global environmental pollution. Increase in the environmental pollution in turn increases a serious threat for the living organisms. According to recent advances using CRISPR-CAS9 technique, genome of plants and micro-organisms are used to develop accumulation efficiency and degradation for controlling environmental pollutants. With the increase of acquisition of lands for human needs, various resources are being eliminated from the earth day by day. According to WHO in a report have stated that 91% of people are currently living in the place where airborne pollution have exceeded the WHO permissible limits [4].

Hence, more measures are yet to be taken to sustain the condition prevailing globally. At present, works on plant remediation in cleaning of the pollution are developing throughout the world as the technology is low at cost and environmental friendly. Recent reports on remediation of the pollutants using plants have been studied extensively and some of the ornamental plants also possess the ability to treat against the pollution [1-5].

Syngonium Podophyllum (Schott)

The plant belongs to the family Araceae, with common names as arrowhead plants originated from Latin America and also found growing naturally in Texas, West Indies, Hawaii and Florida. *Syngonium* has the ability to purify air pollutants indoor, humidifies and helps to breathe fresh air.



Figure 1: Syngonium Podophyllum

These plants are ever green, climbing and mostly the plants are grown for ornamental purpose as they possess attractive foliage and flowers. These plants have the potential to absorb volatile organic compounds such as benzene, toluene, xylene and formaldehyde from indoors. The plant is found to be toxic in nature as the sap's toxic elements leads to skin irritation and vomiting when consumed [6]. The plant leaves has a major compound – calcium oxalate, which causes severe pain in mouth.

Medicinal uses of Synovium: Crushed and boiled leaf decoction of the plant helps to treat stomachache. Milky-white sap of the stem is used to relive pain from tooth cavity problem. Roots and bark of the plant possess antimicrobial and anti-inflammatory activities. Some of the plants such as Aloe Vera, Spider plant, Snake plant, Bamboo palm and Warneck Dracaena are choosed for indoor units as a home remediation for purification of air, as according to WHO, 4.3 million people are estimated to be dead due to poor quality of air inside the house [6-7].

Properties Of Ornamental Plants As Phytoremediation

The surface area of the leaf increases with the reduction of air pollutants as they absorb the volatile components. Mostly, twenty-eight ornamental plants are commonly used for interior places to remove the volatile indoor pollutants. It has been estimates that 1400 deaths of people are due to the pollution caused by the environment and breathing volatile gases as most of the time people are spending 90% of their time indoors [8-10]. One of the added advantage in the usage of plants inside or in the outdoor units is to decrease the CO₂ content and oxygen level increases which in turn reduces 60–80 % less than the conventional method to remove the pollutants [11-12]. According to Mung et al, 2006 they have reported that Syngonium podophyllum along with other ornamental plants have been tested for the absorption of volatile gases in the indoor unit. It has been found that Syngonium has the ability to absorb the gases by purifying the atmospheric oxygen to a greater extent [13-14].

Conclusion

The use of plants to clean the environment is found to be more nourishing all over the world and step-by-step actions are taken to eradicate the pollutants causing harmful effects for humans and enhance the quality of air that the humans breathe. Hence planting of trees, shrubs outside helps to decrease the volatile gases content and increases the oxygen level for better living as the plans of planting are less cost and are eco-friendly as both are equally benefitted rather than going for conventional methods to remediation of the pollution. Growing of ornamental plants inside and outside are found to be an alternative source to cleanse the air and improve the quality of the air to give a better tomorrow for the future generations. More research works are yet to be carried out to prove the mechanism of how plants have the ability to intake the toxic substances and purify the air.

References

1. Ukaogo, P. O., Ewuzie, U., & Onwuka, C. V. (2020). Environmental pollution: causes, effects, and the remedies. In *Microorganisms for sustainable environment and health* (pp. 419-429). Elsevier.
2. Iyyanki V.Muralikrishna and Valli Manickam. Chapter One – Introduction. *Environmental Management Science and Engineering for Industry*. 2017, 1-4p.
3. Patel, H., Shakhreliya, S., Maurya, R., Pandey, V. C., Gohil, N., Bhattacharjee, G., ... & Singh, V. (2022). CRISPR-assisted strategies for futuristic phytoremediation. In *Assisted Phytoremediation* (pp. 203-220). Elsevier.
4. Health Effects Institute. (2019). State of global air 2019. Special Report.
5. Zhang, B., Cao, D., & Zhu, S. (2020). Use of plants to clean polluted air: a potentially effective and low-cost phytoremediation technology. *BioResources*, 15(3), 4650-4654.
6. Liamas K A. Tropical flowering plants. A guide to identification and cultivation. Publication: Timber Press, Oregon, ISBN: 0-88192-585-3. 2003.
7. Aashtha Ahuja. Combating Indoor Air Pollution: 5 Plants To Make Your Home Clean And Green. 2018.
8. Brown, S. K. (1994). Volatile organic compounds in indoor air: sources and control..
9. World Health Organization. (2000). The right to healthy indoor air: report on a WHO meeting, Bilthoven, The Netherlands 15-17 May 2000 (No. EUR/00 (5020494). Copenhagen: WHO Regional Office for Europe.
10. Schnoor, J.L., *Phytoremediation: Technology Evaluation Report*, GWRTAC Series TE-98-01, 1997.
11. USEPA, United States Environmental Protection Agency. *Electrokinetic and phytoremediation in situtreatment of metal-contaminated soil: State-of-the-Practice*. EPA/542/R-00/XXX. US EnvironmentalProtection Agency, Office of Solid Waste and Emergency Response Technology Innovation Office, Washington, DC. 2000.
12. Cunningham, S.D., Shann, J.R., Crowley, D. and Anderson,

-
- T.A., Phytoremediation of Soil and Water Contaminants. American Chemical Society, Washington, DC, 1997.
13. Yoo, M. H., Kwon, Y. J., Son, K. C., & Kays, S. J. (2006). Efficacy of indoor plants for the removal of single and mixed volatile organic pollutants and physiological effects of the volatiles on the plants. *Journal of the American Society for Horticultural Science*, 131(4), 452-458.
 14. Vandana, S. (2013). Role of medicinal Plant in controlling environmental (Air) pollution. *International Ayurvedic Medical Journal*, 1(5).

Copyright: ©2022 Leeba Balan. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.