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Assessment of Ornamental Nursery Wastewater Characteristics and Its Impact on Urban Drainage Water Quality in Nagpur Region

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Abstract –
The study evaluates the characteristics of wastewater generated from ornamental nurseries in the Nagpur region and its influence on adjacent urban drainage systems, particularly nalas. Ornamental nurseries employ extensive use of fertilizers, pesticides, and plant growth enhancers that enter the wastewater stream during routine horticultural operations. The research aims to characterize the physico-chemical and biological profile of the wastewater and determine its deviation from acceptable environmental standards. Sampling and analysis were conducted over a two-month period using APHA guidelines. The results revealed significant exceedance in BOD, COD, nutrients (NPK), and microbial contamination, suggesting high environmental risk. The impact on nala water quality was substantial, with measurable degradation in downstream sections. The study calls for immediate attention from civil and environmental engineers to implement decentralized, sustainable water treatment systems near nurseries. This investigation provides a unique contribution to the emerging field of horticultural wastewater management in urban environments.

Key Words: ornamental nursery, wastewater, nala, urban water quality, phytochemicals, pollutants.

1. INTRODUCTION

Urban ornamental nurseries are becoming a notable source of untreated wastewater due to the use of chemical fertilizers, pesticides, and growth enhancers. In Nagpur, many such nurseries discharge their wastewater directly into nalas without any treatment, contributing to urban water pollution. This wastewater often contains high nutrient loads, organic matter, and microbial contaminants. Despite this, nursery wastewater remains largely unregulated and under-researched. This paper investigates the wastewater quality of ornamental nurseries and its impact on nala water, aiming to identify pollution levels and suggest engineering-based control measures.

2. Body of Paper

2.1 Study Area and Sampling Methodology:

The study was conducted in the Nagpur region, Maharashtra, India, where several ornamental plant nurseries are located adjacent to or near urban nalas. Composite water samples were collected from nursery discharge outlets, nala entry points, and midstream sections. Sampling was carried out weekly for two months during peak nursery operation.

2.2 Analytical Procedure:

Water samples were analyzed for physico-chemical parameters (pH, EC, TDS, BOD, COD, N, P, K), biological parameters (total coliforms), and specific phytochemicals (auxins, gibberellins, synthetic fertilizers) using American Public Health Association (APHA) standard methods and spectrophotometry.

2.3 Results and Observations:

Fig. 1 and Table 1 illustrate key findings. Biological oxygen demand (BOD) and chemical oxygen demand (COD) levels exceeded Central Pollution Control Board (CPCB) limits in over 70% of samples. Nutrient loading was found to be 3–4 times higher than typical urban runoff. The presence of plant growth regulators suggests emerging contaminant risk.

2.4 Environmental and Civil Engineering Implications:

The findings emphasize the need for sustainable civil engineering designs such as buffer strips, constructed wetlands, and localized biofilters near nurseries. Incorporating these designs can mitigate point-source pollution and help maintain nala water quality.

Table -1: Waste Water Sample details
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Parameter	Nursery Wastewater	Nala Entry	CPCB Limit
BOD (mg/L)	85	72	30
COD (mg/L)	210	198	250
N (mg/L)	38	33	10
P (mg/L)	16	14	5
Total Coliform (MPN/100ml)	2400	2100	500

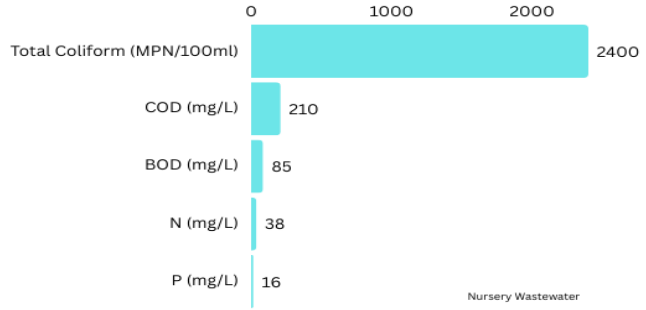

Fig -1: Water Quality Deviation Graph

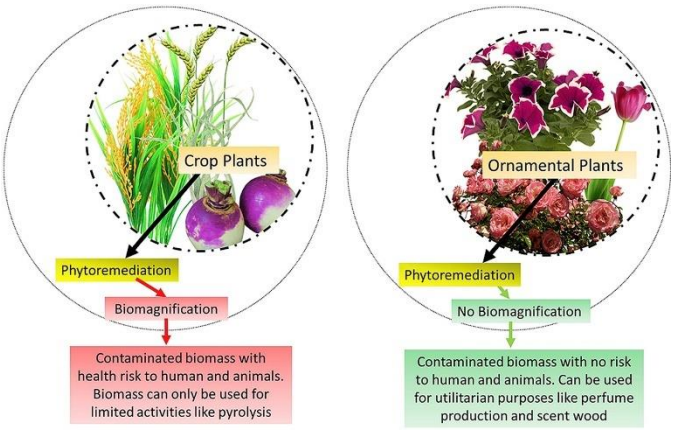

Fig -1: Comparative Phytoremediation Pathways and Biomass Utilization in Crop vs. Ornamental Plants

3. CONCLUSIONS:

The results demonstrate that ornamental nursery wastewater significantly impacts urban drainage water quality in Nagpur. High nutrient levels and phytochemical residues pose both environmental and ecological threats. This study identifies a novel pollution source, advocating the integration of environmental assessment with civil infrastructure solutions. Sustainable and cost-effective treatment methods need urgent attention from local authorities and urban planners.

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