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Impact of Water Hyacinth- जलकुम्भी (Eichhornia Crassipes) on Life

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Abstract:

Water hyacinth (Eichhornia crassipes) is an aquatic plant recognized for its tendency to grow in bodies of water and its environmental effect, notably in terms of water quality and disturbance to ecosystems. This document provides a complete analysis of the ecological and socioeconomic effects of water hyacinth infestation, as well as alternative control solutions. It discusses the plant's ability to absorb pollutants, its potential as a biofuel source, and the issues it offers to many industries such as agriculture, navigation, and power generating. Despite its environmental relevance, there is a worrying lack of understanding, particularly among the younger population. To overcome this gap, a survey was undertaken among female students at Vanita Vishram Women's University in Surat, Gujarat, to assess their understanding of Water Hyacinth. The study used a descriptive research methodology and statistical approaches such as one-way ANOVA and post-hoc analysis to examine data acquired via a structured questionnaire. The results show a considerable disparity in

awareness levels across academic fields, with science students being more aware than those in Humanities and Social Sciences and Vocational Studies. These findings highlight the significance of focused educational activities to raise knowledge and foster informed decision-making on Water Hyacinth management and its effects on ecosystems and human well-being.

1. Introduction

Plants like water lilies, weeds, algae and Water Hyacinth have the ability to thrive in water and effectively absorb harmful substances presents in it. (Prasad et al., 2021) Water Hyacinth known as Eichhornia Crassipes is a type of plant that floats freely on water. It has green leaves that are spongy in texture and spherical to oval in shape. The leaves are attached to petioles and the plant has a dense network of fibrous branches with thick roots submerged in the water. This plants rapid and invasive growth poses a threat to continents due, to its aggressive nature. (Sulardjaka et al., 2022) (Abud & Silva, 2020) Eichhornia Crassipes is an aquatic plant belonging to the family Pontederiaceae found abundantly in the Amazon region of Tropical South America. (Damtie et al., 2022)(Prasad et al., 2021) According to Prasad (2021) Water hyacinth is a growing plant that spreads through runners and seeds resulting in a quick increase, in population. This plant, scientifically known as Eichhornia crassipes poses physical and economic challenges. It negatively affects water quality by limiting sunlight availability and causing disturbance to water based activities. (Sharma & Aggarwal, 2020). According to Abud and Silva (2020) they state that this substance is widely accessible and presents challenges that can impact socio economic factors and the environment. However it has the advantage of being biodegradable. It does not interfere with agricultural crops making it ideal for producing beneficial byproducts, like biofuels. (Abud & Silva, 2020)

Mujere (2016) demonstrated that there are few techniques which can be used to manage and to deal with water hyacinth such as mechanical, biological, manual, and chemical methods. (Mujere, 2016) Water hyacinth (Eichhornia crassipes) weed has been studied for its ability to remove pollutants from industrial wastewater through biosorption. (Sanmuga Priya & Senthamil Selvan, 2017)

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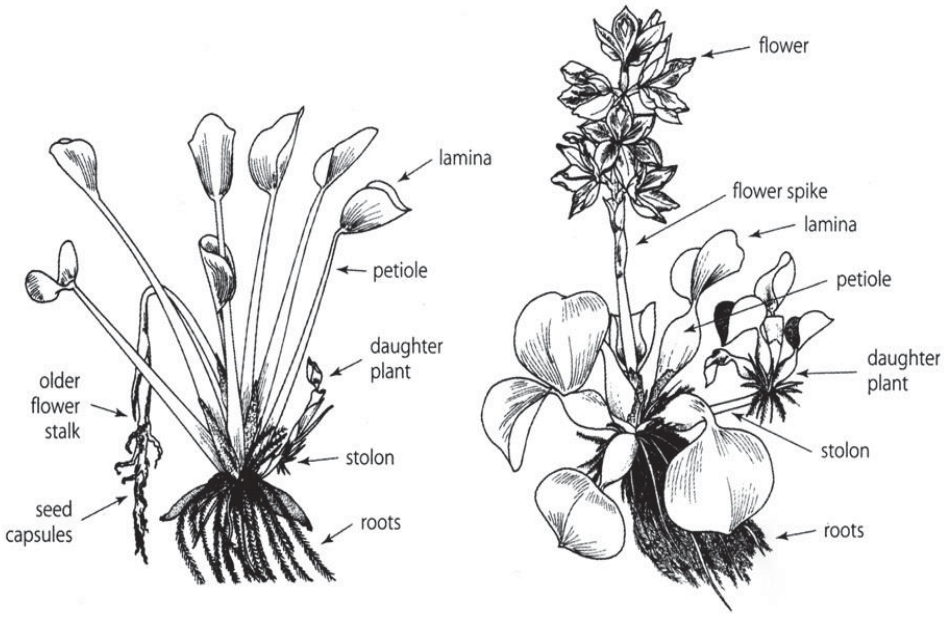

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It can also be managed using approaches that involve the use of insects, like weevils, chemical methods that utilize herbicides or manual/mechanical techniques. (Preethi & Umesh, 2015). Moreover, it has potential as a substrate for the production of value-added products like PHA (polyhydroxyalkanoates) using Pseudomonas aeruginosa as the fermenting organism (Moorthy, 2017). It can also be used for grey water treatment through phytoremediation, where water hyacinth effectively removes ammonium-nitrogen, phosphate-phosphorous, and chemical oxygen demand from grey water (Shubhangi & Sagar, 2017). Additionally, water hyacinth is a promising source for bio-fuel production due to its sustainability, wide abundance, and easy availability. (Sharma & Aggarwal, 2020)

Water hyacinth (Eichhornia crassipes) has a threatening effect on the environment, aquatic biodiversity, and various sectors such as power generation, navigation, and irrigation (Agri et al., 2019). It is considered one of the world's worst invasive weeds, causing significant challenges for water utilization and management (Segbefia et al., 2019). The rapid growth and colonization of water hyacinth pose a serious threat to aquatic ecosystems and freshwater

services (Kriticos & Brunel, 2016). It decreases water quality by reducing sunlight availability, leading to reduced photosynthesis rates and dissolved oxygen levels. The infestation of water hyacinth also disrupts activities such as boating and fishing. Controlling water hyacinth can be done through biological methods using insects, chemical methods using herbicides, or manual/mechanical removal. However, these methods have their limitations and associated costs. Efforts to manage and prevent the spread of water hyacinth are crucial to protect aquatic ecosystems and ensure the sustainable use of water resources. (Moorthy, 2017) The above review shows that water hyacinth plants have some positive and negative impact on human life and yet there is lack of awareness amongst young generation. Hence, the survey research was undertaken to study the awareness of effect of Water Hyacinth amongst the young population of Vanita Vishram Women's University.

Objective

1.To measure the awareness regarding the effect of Water Hyacinth on living being.

Delimitation of the study

The present study is limited to female students of Vanita Vishram Women's University, Surat, Gujarat.

Hypothesis

There will be statistically significant difference in awareness about Water Hyacinth Plant among the students of Science, Humanities and Social Sciences, and Vocational Studies.

2. Methodology

The presented study adopts descriptive research design aims to measure the awareness of effect of Water Hyacinth plant on life. The study will be conducted in urban area of Surat, Gujarat specifically the adult female students of Vanita Vishram Women's University aged between 25 to 30 years from varied socio-economic backgrounds. The data will be collected through a structured questionnaire from the post graduate students of various departments of Vanita Vishram Women's University. Random sampling method will be employed to collect

the data through online survey to ensure that the sample is representative of population of adult female students of Vanita Vishram Women's University. The researcher will approach Head of each Department and with the informed consent of respective heads and student the online questionnaire will be shared to collect the data. With the help of SPSS software, the acquired data will be examined using descriptive statistics such as mean, median, and percentage in addition to an ANOVA test. The pilot test of questionnaire will be carried out to check the clarity and reliability of the questions with experts. The researcher will strictly adhere to the ethical guidelines, obtain consent from the participants, and ensure the confidentiality of their responses. The data collection and analysis will be done within a month. Thus, the researcher will consider all the aspects of scientific research for the present study and further information.

3. Results and Discussion

The primary data was gathered from female students at Vanita Vishram Women's University from several departments. and the findings have been divided into three sections. The first subhead shows the awareness of female respondents enrolled in various courses science, while the second subhead describes the awareness of female respondents enrolled in various courses of Humanities and social sciences. The third subhead is discussed about the awareness of female respondents enrolled in various courses of Vocational courses.

Table 1 Statistical analysis of the data with One-way ANOVA test

	Sum of Square	df	Mean Square	F	Significant
Between Groups	606.741	2	303.370	12.344	.000
Within Groups	8453.928	344	24.575		
Total	9060.669	346			

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To analyze the data, one-way ANOVA was conducted. As per the table 1, from the statistical analysis it was found to be significant at 0.05 as $p < 0.05$. The F value was found to be 12.344 which is statistically significant implying that there is a significant difference in awareness about Water Hyacinth plant among students of Science, Humanities and Social Sciences, and Vocational Studies.

Table 2 Post Hoc Analysis

Course I	Course J	Mean Difference (IJ)	Std. Error	Sig.	95% Lower Bound
Science	Vocational Studies	6.074*	1.244	.000	2.89
	Humanities and Social Sciences	5.082*	1.202	.001	1.98
Vocational Studies	Science	-6.074*	1.244	.000	-9.25
	Humanities and Social Sciences	-.992	.572	.233	-2.37
Humanities and Social Sciences	Science	-5.082*	1.202	.001	-8.18
	Vocational Studies	.992	.572	.233	-.39

According to table 2, post hoc analysis was conducted to further compare groups which revealed that students of science were more aware than Humanities and Social Sciences, and Vocational Studies. There was no difference in awareness found between students of Humanities and Social Sciences as well as Vocational Studies. This suggests a varying level of awareness across academic disciplines, with science students showing a notable advantage.

4. Conclusion

In conclusion, the study sheds light on the awareness levels among female students at Vanita Vishram Women's University regarding the effects of Water Hyacinth. The findings indicate a significant disparity in awareness across academic disciplines. Specifically, science students demonstrate higher awareness compared to their counterparts in Humanities and Social Sciences, as well as Vocational Studies. However, no notable difference in awareness emerged between students of Humanities and Social Sciences and those in Vocational Studies. These results underscore the need for targeted educational initiatives to enhance awareness among students, particularly in disciplines where awareness appears to be lacking. Additionally, the study emphasizes the importance of addressing the environmental and socio-economic challenges posed by Water Hyacinth through effective management strategies and interdisciplinary collaboration.

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