

# Water Hyacinth (*Eichhornia crassipes*): A Source of Natural Fertilizer

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**Abstract:** Water Hyacinth (*Eichhornia crassipes*), is a free-floating aquatic plant easy available in the north-east region of India. In Assamese it is known as Meteka. It is considered as one of the world's dangerous aquatic weed. Assamese people are using water hyacinth as fertilizer without knowing its mineral contents. Chemical analysis shows that it contains almost all the macro and micro nutrients necessary for plant. Thus water hyacinth can be used as a source of natural fertilizer.

**Keywords:** Water Hyacinth, natural fertilizer, Meteka, chemical fertilizer, nutrients

## 1. Introduction

International prices for mineral fertilizer have significantly increased recently. The growing concern regarding the use of synthetic (chemical) fertilizers and pesticides and their effects on human and animal health and our environment needs to be taken into account with utmost seriousness. These harmful chemicals pollute our water sources. The chemical fertilizers contain mostly water soluble nitrogen (WSN) and are activated by water. Nutrients are released far faster than the plant can take them up or the microbes can break them down for storage in the soil. Therefore, there is leaching and run-off which is not only wasteful but, far worse, is harmful to the environment. The salts from the chemical fertilizers also adversely affect the organisms in the soil that provide a healthy environment the plant needs to grow.

Organic or natural fertilizer refers to materials used as fertilizer that occur regularly in nature, usually as a byproduct or end product of naturally occurring processes. Inorganic or synthetic fertilizers are produced artificially in a chemical industry. Organic fertilizers such as manure have been in use in agriculture for thousands of years. Ancient farmers did not understand the chemistry involved, but did recognize the benefit of providing their crops with organic material. Only within the past 100 years have fertilizers containing essential micro and macronutrients been synthesized in the laboratory. Mass production of synthetic fertilizers has greatly increased crop yields and made the green industry more cost efficient. However, within the last ten to twenty years have seen the negative effects of synthetic fertilizer runoff on the environment, and there has been a renewed interest in organic fertilizers as an environmentally friendly alternative to artificially synthesized chemicals

Like any other fertilizers, organic fertilizers typically provide the three major macronutrients required by plants: nitrogen, phosphorus, and potassium. As these are produced from naturally occurring sources, limited amounts of fossil fuels have to be used in the production, thus potentially lowering the amount of greenhouse gas released into the atmosphere. Organic fertilizer should be preferred for domestic use because of environmental concerns. Whatever the motivation, and whatever the fertilizer source, proper

fertilization procedures save money and benefit the environment.

## 2. Methodology

Water Hyacinth (*Eichhornia crassipes*), Meteka in Assamese is a free-floating aquatic plant native to tropical and subtropical south America and Asia with broad, thick glossy, oval leaves. It may rise above the surface of the water up to a height of about one meter. This abundantly growing plant has been utilized for many other purposes like cattle food and biogas production. Recently it is being used in wastewater treatment due to their fast growth and ability to tolerate high degree of pollution. In Bangladesh, farmers have started producing fertilizer using water hyacinth or korchuripana as it is known there.

The plant is collected from pond usually in the month of October and November and dried in sunshine for 15 days. When completely dried it is burnt in an earthen pot in presence of air.

## 3. Results and discussion

The pH of the aqueous suspension was recorded with the help of a digital pH meter (Eutech Instrument, pH 510, pH/mV/ 0C meter) and found to be 9.6 which indicate its basic nature. Chemical analysis of the ash derived from Water hyacinth showed the presence of the following acid radicals: Carbonate ( $\text{CO}_3^{2-}$ ), chloride ( $\text{Cl}^-$ ), phosphate ( $\text{PO}_4^{3-}$ ), nitrate ( $\text{NO}_3^-$ ), silicate ( $\text{SiO}_2$ ), and sulfate ( $\text{SO}_4^{2-}$ ). Bromide ( $\text{Br}^-$ ), Iodide ( $\text{I}^-$ ) and oxalate are found to be absent.

Qualitative estimation of metal is done by XRF study followed by AAS and flame photometry. Estimation done by Atomic Absorption spectroscopy showed the presence of Calcium(Ca), Magnesium(Mg), copper (Cu), Cobalt(Co), Iron(Fe), Manganese(Mn), Nickel(Ni) Chromium(Cr), Zinc (Zn). Cadmium (Cd), Lead (Pb) and Mercury (Hg) found in trace amount. Furthermore flame photometry analysis shows the presence of potassium (K) in significant quantity over sodium (Na).

## 4. Conclusion

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The analysis of the ash of water hyacinth thus reveals that almost all the macro and micro nutrients necessary for plant growth are present in it. In view of the fact that it contains both potassium and phosphate in appreciable amounts it has the potential to become a substitute for the normal commercial fertilizer. It offsets most of the the harmful effects of the chemical fertilizers. Abundance in availability of water hyacinth plant is an additional advantage. Considering the various aspects it can be strongly asserted that water hyacinth is a cost effective and environmental friendly substitute for chemical fertilizer.

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