

## Production of Paper Pulp by Water Hyacinth (*Eicchornia Crassipes*) in Rajasthan State in India

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**Abstract :** *Excessive use of trees in paper production is very dangerous for environment and human life. The LODHA Pond, city Banswara and PICHOLA Lake Udaipur are the major wetland in the Rajasthan state in INDIA, with the potential for production of large quantities of biomass of aquatic floating species, especially water hyacinth (*Eicchornia crassipes* and *E. azurea*), during the aquatic phase of the flood-pulse characteristic for this ecosystem. We mean to change over water hyacinth into paper. The Paper mash from the non-oceanic plant like water hyacinth will be utilized for the various uses and this won't produce and unfriendly impact to the any environment of regular assets. Water has a longest fiber chain yet most lower runkel number. Assessment of the mash quality show that the proportion of crude material to mash creation is over .4. which is moderate worth. The physical property of water hyacinth paper mash is acceptable as portrayed by tearing and collapsing obstruction and so forth. Preparing of this plant is fairly troublesome on account of character of fiber suspension. The extraction of Paper mash from water hyacinth is an affordable procedure in view of the lesser expense of crude material and its simple accessibility. Paper mash is delivered from water hyacinth, a sea-going weed plant, including great amount of cellulose, hemi cellulose, lignin which expands the extraction pace of Paper mash from it. All in all the three oceanic weed species can deliver a moderate nature of the paper mash, in spite of the fact that the monetary angles despite everything must be additionally examined.*

**Keywords :** *Aquatic biomass, Water treatment, climate changes, Second-Generation Paper Pulp, Renewability.*

### Introduction

The Water Hyacinth Plant which is accessible in immense Quantity on practically all Continents from 100 of years. As we probably am aware it is a water squander and can't be halted from developing in long haul premise. For it humble strategy has been set in the mood for creating hand-made paper by utilizing Water Hyacinth. We know as Water Hyacinth comprise of 96% of water and with many Impurity's, which are hard to expel, however we can use it for creation of Paper. As wood comprises of good measure of Cellulose, Hemicellulose and lignin, where at another side water hyacinth (*Eicchornia crassipes*) which comprises of Lingo-cellulose, which will be additionally changed over into Pulp to deliver it as a Paper.

The Worlds three Largest Paper Producing Countries are China, the United States and Japan. Which requires enormous measure of crude material (Pulp) which originates from trees and prompts Deforestation, to stop that we can take utilization of water hyacinth, A plant which develops at the highest point of the water knows as water squander on the grounds that it lessens the oxygen content from the water.

The Paper is framed from wood mash of plant or plant fiber. At most punctual paper was papyrus, produced using reeds by the antiquated Egyptians. The strategy for making paper is basically a basic one—stir up vegetable strands, and cooks them in high temp water until the filaments are delicate yet not broke down. The high temp water additionally contains a base synthetic, for example, lye,

which mellow the strands as they are cooking. At that point, pass a screen-like material through the blend, let the water trickle off or potentially dissipate, and afterward crush or rub out extra water. A layer of paper is abandoned. Fundamental to the procedure are the filaments, which are rarely completely crushed, and, when blended and relaxed, structure a joined example inside the paper itself. Current papermaking techniques, albeit fundamentally more confounded than the more established ways, are formative upgrades instead of altogether new strategies for making paper.

Problems arising in the use of water hyacinth need to be addressed, however. When used as fresh, the material is very bulky that a 200-L drum usually used for cooking can accommodate only a fraction of the usual load of dry fibers. Thus, air-drying prior to cooking would be advantageous; but this would require large space an additional time for drying. Moreover, water hyacinth material, even when dried, cannot be stored for a long time because it is easily attacked by fungi. Incidentally, in a previous study aimed at taking advantage of the mucilaginous property of water hyacinth (Mari et al. 2010), water content of the plant's stems was mechanically extracted and successfully used as formation aid in making hand sheets from equal proportions of abaca and wastepaper pulp. The extract significantly increased the tensile strength of the resulting hand sheets while residual mass after extraction can be used for other purposes.

## **ii. Literature Review :**

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**Valuable Product from Water Hyacinth – Review Paper**

**Mukesh Dwivedi,et.al.:** Work summarised following points:

1. Removing water hyacinth promotes cleaning of river.
2. It reduces harms to ecosystem.

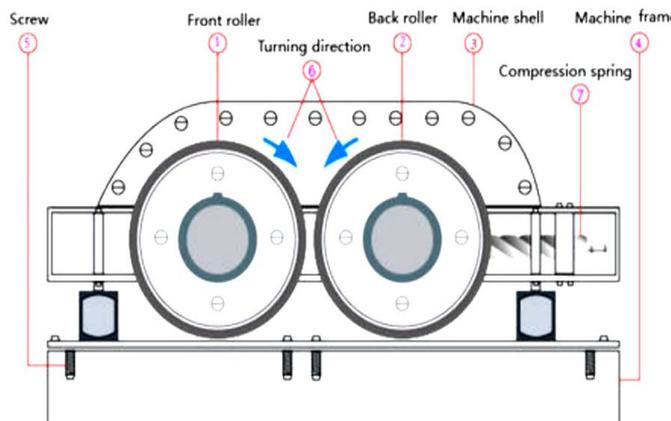
3. It is also used in producing bio product as discussed.
- 4.

### III. Method of Making Paper Pulp:

The paper wouldn't dry, was very weak and not a pleasant colour. First and foremost, there is the high water content of a water hyacinth 90 to 95%. The plant can lose or absorb a great deal of water in a short space of time, depending on changes to the temperature. Not for nothing is the Hindi name for water hyacinth samudra sokh which means they who can absorb an ocean.

#### DRYING

As the name recommend we will expel water from water hyacinth. Leaves will be set under the daylight dor drying process for 2 days then we dry it by utilizing tourist oven and afterward cut it into little pieces for legitimate handling however the main weaknesses of the procedure subsequent to squeezing the fiber gets stringy, at that point it make hard to isolate the fiber pack. At that point the arrangement of fiber group is currently feed into twofold moving plant for pounding process.



**Fig 1 Double roller mill used for crushing**

Right now of the caught water in the plant will likewise expel out from the plant and our answer will transform into non filaments material. An option in contrast to this is to encourage the plant mass into an edge sprinter factory or kollergang. These factories separate the filaments from the substance substantially more effectively, bringing about a homogenous

plant mass. Right now, with the middle person stages, we can decrease the water content radically. By utilizing sprinter plant we will take out all the fiber structure it.

#### COOKING

As we probably am aware water hyacinth ingest a great deal of water, it implies we required increasingly synthetic for cooking, yet we realize synthetic substances are very broad. The capacity, taking care of and adherence to the wellbeing guidelines to the extent the synthetic concoctions utilized on the task are concerned additionally leaves a ton to be wanted. This typically happens in light of obliviousness. For cooking of fibre we required a correct chemical, although the cooking time of water hyacinth is very short so this saves expansive chemicals.



**Fig 2 Sealed vat pressure cooker**

As well as can be expected be utilized for cooking the water hyacinth is sodium sulfide ( $\text{Na}_2\text{S}_3$ ). Right now can accomplish the most noteworthy fiber yield with the most ideal nature of paper. It will be the best to do cooking in a fixed tank pressure cooker, in which we can accomplish high temperature with low cooking time. In view of the weight made during the cooking, the tank should obviously have the option to meet certain particular prerequisites. Obviously this involves critical expenses. As anyone might expect, it isn't constantly conceivable to buy such a costly high-pressure heater. Once in a while it's conceivable to arrive at higher

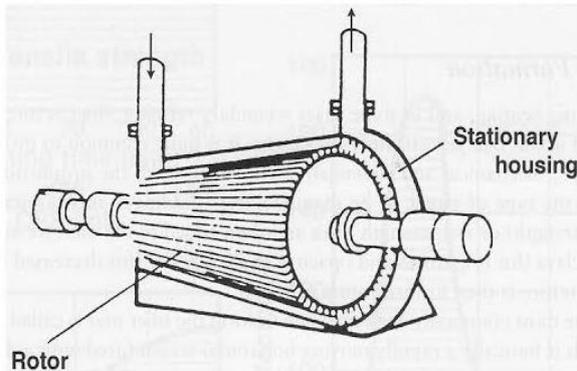
temperatures by changing the sort of fuel: each kind of fuel has its own net warming worth.

### Beating

The fiber of water hyacinth is comparatively long, when compared with straw, sugarcane and jute. But water hyacinth cannot be utilized for creating solid paper.

The powerless and inflexible cell divider implies that the fiber is greatly delicate and breaks effortlessly. This implies that beating with the Hollander would cause an incredible bargain of harm. Hence, we cannot chop and blend the strand within the regular way.

Beating is essential in arrange to break down the fiber bundles into person strands so that they are suspended within the water and shape a layer when scooped onto the mould.



**Fig 3 Pulp beater**

A massive part of the characteristic of the Hollander has already been taken over via the part runnermill, and additionally through the initial segmentation of the plant and of route the crushing process. However, the Hollander additionally provides a good homogeneous mass. Therefore, simply a few minutes in the Hollander is recommended, however then with the clearance between the roll and bedplate set as huge as viable to stop the fibres being crushed or chopped any further.

In this fermentation system the water hyacinth powder changed into taken and it will

be below long gone through the several steps and the samples have been one at a time analysed by way of the usage of the NREL analytical chemical analysis method. it will take the solutions and separate the sugar content material material from the acid hydrolysis solution.

### Dehydration

The pure fibre content material is really worth mentioning, around 50%. However, water hyacinth additionally consists of good sized portions of other materials, such as lignin, pectin, fats and resin. Almost all of them are the constructing materials, which cement the cells together; they are known jointly as hemi cellulose. It is specifically the inherent traits of the hemi cellulose, which confound us when making paper from the water hyacinth. There are sure factors in the plant that we can in no way remove at some stage in the cooking process. This prevents the fibre from being completely dissolved and property distributed in the water in the forming vat, which means the pulp has an extraordinarily low freeness. When it has been prepared in the right way, water hyacinth pulp has, in accordance to Canadian Standard Freeness standards, a freeness of 40 - 80 ml whereas wooden pulp, for example, has a freeness of 700 - 750 ml. Therefore, if we are no longer careful it will take an exceptionally long time before the newly formed sheet of paper certainly dries. This is one of the motives why we mustn't beat the pulp in the Hollander for too long. This would make the pulp mass even finer and consequently extra hard to dehydrate. Unfortunately, this hassle has now not yet been completely resolved. Although shortly we expect, with exterior help, to be capable to produce an applicable kind of paper from the water hyacinth.

#### IV Suitability of Water Hyacinth In Rajasthan State Area:

Rajasthan is India's largest state by area (132,139 sq. mile) or 10.4% of India's total area). It is situated on the North Western side of India. Total water resources available for fisheries in the State are 15838 no. of water bodies covering an area of 4,23,765 hectare excluding rivers and canals (30,000 ha.) and water logged area (80,000 ha.) at Full Tank Level (FTL). In addition to it 1,80,000 hectare salt affected area is also available.

Banswara is a city in Banswara District in south Rajasthan in India. Banswara district is located between 23° 11' and 23° 56' latitude and 73° 58' and 74° 49' longitude. Banswara District has an area of 5,037 km<sup>2</sup>, 1.47% of Rajasthan state, India It is also known as 'City of Hundred Islands', due to presence of numerous islands on the Mahi River named "Chachakota" where the islands located, which flows through Banswara. The district has a climate which is milder than that in the desert regions in further north and north-west, Maximum temperature is 45 degrees Celsius to 46 degrees Celsius, Minimum temperature is 10 degrees Celsius to 20 degrees Celsius and Normal annual rainfall is 922.4 mm.



**Fig. 1: Lodha Pond, Banswara with Huge potential of Water Hyacinth**



**Fig 2: Workers cleaning the Lodha Pond at Banswara**



**Fig3: Pichola Lake at Udaipur**

#### V Chemical Composition:

The ethanol yield of a biomass is subject to its sugar content, hydrolysis proficiency, and fermentation proficiency. The hypothetical potential ethanol yields were determined utilizing the accompanying Conditions.

**Table 1 chemical availability in water hyacinth**

	Lower Limit	Upper Limit	Center value
<b>Water content (%)</b>			
W	85	95	90
<b>Dry Matter (%)</b>			
Cellulose	18	31	24
	18	43	30
Hemicellulose	7	26	16
Lignin	15	26	20
Ashes			

Element Composition (%)			
C	33	43.3	38.4
H	5.3	6.4	5.85
O	27.5	28.8	28.1
N	1.5	4.3	2.9
S	0.35	0.59	0.47
P	0.7	0.84	0.77
K	2.75	2.8	2.78
Ca	0.95	1.68	1.32
Na	0.88	2	1.44

## VI Challenges And Barriers In Production Of Paper Pulp By Water Hyacinth In Banswara Rajasthan India:

As Production of Water Hyacinth is very quick but retrieval of same is very cumbersome which require high man power. Some good techniques should be adopted for collection of huge amount of water hyacinth. In Banswara District most population are from Tribal belt and getting labors for this work is very difficult. Many Research work concluded that the Water hyacinth paper pulp production was still too expensive to be commercialized in the near future. This is the renewable form of any pulp extraction.

### Conclusion

In the LODHA Pond, city Banswara and PICHOLA Lake Udaipur, of Rajasthan state in INDIA, the usage of naturally exported water hyacinth biomass for paper pulp relies on the annual flood dynamics. The ecosystem surplus of water hyacinth biomass exported by the LODHA Pond, city Banswara and PICHOLA Lake Udaipur, wetland of Rajasthan state in INDIA is sustainable and renewable, and can be a good source of biomass for paper pulp production, regarding climatic change scenarios.

The plant that considered as a weeds can be processed into useful materials, any natural source contained at least 60% of some chemical compound has meet minimum requirement to be processed into a raw materials, the water hyacinth has 64% cellulose fiber, so it has reached to be used as raw material. The lignin may bind to cellulose to alter the pulp color. Therefore, the digester process with NaOH is required to separate the lignin from cellulose fibers, so the color of the

pulp becomes lighter after lignin (chromophore,) has separated.

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