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# LOCAL SURVEY OF *HYDRILLA VERTICILLATA* (L.F.) ROYLE : AN INVASIVE AND VALUABLE AQUATIC WEED

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The highly invasive aquatic plant *Hydrilla verticillata* ( l.f.) Royle , commonly known as "Water thyme" is a unique aggressive submerged water weed. It is polymorphic and perennial in nature. Its scientific name is made up of the Greek word "hydro" meaning "water" and the Latin Word "verticillus" that means "the whorl of a spindle". A highly specialised and impressive growth, physiological features and high rate of infestation make this plant native of submerged aquatic habitat. Once it invades an aquatic habitat it drives out all the native aquatic flora creating a pure stand. The local survey work at some of the important ponds of Jamtara district of Jharkhand state shows this water weed to be an economic drain. It is an angiospermic submerged invisible menace that grows throughout Indian sub-continent. The present work compiles botanical descriptions of *Hydrilla verticillata* and its economic impact.

*Hydrilla* is a herbaceous and invasive aquatic flora which is a native plant of India. However there are some contradictions with regard to its origin.*Hydrilla* is probably native to the warmer regions of Asia (Cook and Luond 1982). With remarkable and significant appearance, it grows at the surface forming dense mats. It is extremely hardy and can grow in any condition including low light levels (1% of sunlight or less) and poor nutrient areas. It grows mostly in paddy fields, at the shallow water ditches, springs, lakes and unused or less used ponds. It grows mostly in few inches of water but its growth is also reported in deep water. It can grow both in oligotrophic and eutrophic conditions. It can grow in 7 % salinity of seawater (Haller 1974 ) and can withstand in a wide range of pH value ( Steward 1991).

*Hydrilla verticillata* ( l.f.) Royle is a monocot angiosperm belonging to family Hydrocharitaceae and is commonly known as "Jhangi" by the resident of research area. It is a submerged, leafy and diocious herb with long fibrous root and slender and branched stem. The leaves are small, green, translucent, whorled, oblong to linear, lanceolate, acute and serrate in nature. The flowers are tiny white and unisexual. It also produces turions (" buds") in some of the leaf axils and potato like tubers (subterranean turions) attached to the root tips in the mud. It reproduces primarily vegetatively by fragmentation and by turions or rhizomes but sexual reproduction has also been reported producing oblong seeds.

## MATERIALS AND METHODS

Jamtara district lying between 23°10′ and 24°05′ north latitudes and 86°30′ and 87°15′ east longitudes is located at a lower altitude of Chhotanagpur Plateau.The present study is a part of regular survey of some of the major ponds of this locality.The sites were visited fortnightly and plants were collected for further detailed study including economical aspects. Biochemical analysis of water of research area was also done.

The informations collected for *Hydrilla verticillata* ( l.f.) Royle Commonly known as "Jhangi" had been documented with botanical name,family name,common name,taxonomic descriptions and economic impacts in various fields.

### Physico-chemical Analysis

Water was collected from the ponds of sampling sites and was analysed on the basis of some physical and chemical parameters. The analysis was done mostly at Water Sample Testing Laboratory , Water and Sanitation ( PHED ) Department , Jamtara with the help of chemist Mr. Rajesh Kumar Singh. Some of the parameters like colour , temperature and odour were analysed at the collection points while most of the work was done in the laboratory

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Massive growth of *Hydrilla* in the pond

within 24 hours of collection. Physical parameters include colour, odour and temperature while chemical parameters include pH, Total Suspended Solids (TSS), Total Hardness, Dissolved oxygen, Iron, Nitrates and fluorides.

Colour of sample water was recorded by visual observation while odour was recorded by physiological sense. The temperature of water was measured by taking 1 litre of water sample and immersing the thermometer into it untill the reading stablizes. pH of the sample was tested by adding 1 drop of water on pH paper and visual observation of change in colour.

TSS was estimated by filtering 100 ml. of water with the help of filter paper. The residual solids found present on the filter paper were dried in oven and increase in weight was measured which shows the amound of TSS present in water. Total Hardness was analysed by titrating 50 ml of water sample with EDTA (Ethylene-diamine tetra acetic acid) 0.01M solution.

DO was analysed by idiometric method of Winkler (Welch 1952), and the analysis of nitrate, fluoride and Iron was done using Spectroquant Pharo 300 and field water testing kits.

In total, 5 ponds were selected for the present work as Mansa Pond (S1), Bewa Pond (S2), Kishori talab (S3), Vaishnavi Pond (S4) and Mejia Pond (S5). The estimated record of Physico-chemical analysis done in the month of August & December, 2014 at various sampling sites (Tables 1&2).

## RESULT AND DISCUSSION

The infestation of *Hydrilla* increases most rapidly by the production of "turions" and "tubers" and seeds play a very small role in its spread. It has excellent survival and dispersal strategies. The tubers and turions can survive for a long time which creates major challenge in the eradication of plant. Vegetative growth of this taxon is very rapid during monsoon and it creates maximum trouble to the fish farmers. *Hydrilla* is one of the worl. *Hydrilla*

**Table 1** : Physico-Chemical Analysis in August, 2014.

| Sl.No. | Parameters | $S_1$ | $S_2$ | $S_3$ | $S_4$ | $S_5$ |
|---|---|---|---|---|---|---|
| 1 | Air Temperature in $^oC$ | 30 | 27.5 | 31 | 30.5 | 29 |
| 2 | Water Temperature in $^oC$ | 28.5 | 26.5 | 30 | 29 | 27 |
| 3 | pH | 8.5 | 7.9 | 9.1 | 8.9 | 7.6 |
| 4 | Total Hardness in mg/l | 350 | 629 | 458 | 425 | 378 |
| 5 | DO in mg/l | 3.2 | 2.3 | 4.1 | 3.8 | 2.9 |
| 6 | TSS in mg/l | 318 | 596 | 398 | 465 | 380 |
| 7 | Nitrate in mg/l | 20 | 50 | 30 | 34 | 45 |
| 8 | Fluoride in mg/l | 0.5 | 0.8 | 0.6 | 0.3 | 0.2 |
| 9 | Iron in mg/l | 0.4 | 0.7 | 0.9 | 0.8 | 0.3 |

**Table2 :** Physico-Chemical Analysis in December, 2014.

| Sl.No. | Parameters | $S_1$ | $S_2$ | $S_3$ | $S_4$ | $S_5$ |
|---|---|---|---|---|---|---|
| 1 | Air Temperature in $^oC$ | 14 | 12.5 | 11 | 15.5 | 17 |
| 2 | Water Temperature in $^oC$ | 12.5 | 11 | 10 | 14.5 | 15.5 |
| 3 | pH | 8.9 | 8.3 | 9.6 | 9.5 | 7.8 |
| 4 | Total Hardness in mg/l | 370 | 642 | 463 | 441 | 354 |
| 5 | DO in mg/l | 3.5 | 2.6 | 4.0 | 4.2 | 4.1 |
| 6 | TSS in mg/l | 308 | 559 | 402 | 412 | 354 |
| 7 | Nitrate in mg/l | 20 | 45 | 32 | 31 | 40 |
| 8 | Fluoride in mg/l | 0.3 | 0.7 | 0.7 | 0.4 | 0.3 |
| 9 | Iron in mg/l | 0.5 | 0.6 | 1.0 | 0.7 | 0.4 |

*infestations* may reduce the seed production of native plant species, which would result in a reduction in the number of native plants in the community (de Winton and Clayton 1996). It may also shift the phytoplankton composition of its habitat (Canfield *et al*. 1984). It is the most troublesome weed which forms thick dense mats that prevent sunlight to enter inside. This forms the monoculture which reduces biodiversity and alter the ecosystem. *Hydrilla* appears to provide habitats for a number of mosquito species (Hearnden and Kay 1997). It slows down water flow and clogs irrigation and flood control canals. It also blocks intake at water treatment power generation and industrial facilities. Dense infestation can alter water chemistry by raising pH fluctuating oxygen level ( Pesacreta 1988 ) and increasing water temperature. These pernicious effects on water use can negatively impact real estate values.

Inspite of so many negative role this weed plant has some positive impacts also. They are used to display both in outdoor and indoor fish aquarium, release abundant amount of free oxygen and favour pisciculture and also used in the process of sugar refining factories (Naskar1990). The leaves of *Hydrilla* are highly proteinaceous containg at least 17 types of amino acid (Naskar1990). So it is an ideal and rich fodder for fish. In ethnobotanical study it was found to be used as poultice over summerboils (Naskar1990). The leaves of hydrilla plant are dried, powdered and applied on cuts and wound to accelerate healing (Lal Harishankar and Mishra 2012).

## CONCLUSION

Inspite of having so many nuisance, troublesome and pernicious nature, this aquatic flora has a number of significant role both for mankind and other aquatic fauna like fish. The fish farmers and tribal comminities should be encouraged to use this weedy flora for betterment of their life. In other way, the water bodies of the sampling sites have remarkable amount of Iron and flouride, which is not good for living world.

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