

AQUATIC PLANTS WITH REFERENCE TO POLLUTION CONTROL

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ABSTRACT

The qualitative and quantitative analysis of water is the basic and most important step to reveal the nature of a specific environmental problem. The problem of water pollution has certainly been a great cause behind a number of diseases among rural and urban habitans. Innumerable diseases coming out of water pollution have ruined the health of rural people indeed. The present paper deals with the study of pollution tolerant aquatic plants growing in and around Jamtara district in the state of Jharkhand. The work is based on compilation and documentation of 32 aquatic and semi aquatic plants that belongs to 22 families. A field survey of the research site was carried out regularly to know the floristic features consisting of habitat, botanical name, vernacular name, family and their brief description. Some of the flora can be commonly used for removal of pollutants from the water bodies and can be cited as boon for the aquatic environment as well as human civilization.

Keywords: Aquatic plants, Pollution, Jamtara, Jharkhand, Heavy metals

1. INTRODUCTION

Knowledge of the qualitative and quantitative composition of water is the first step to reveal the nature of the particular environmental problem. One of the most important environmental areas is the quality of life giving water. The present paper deals with the selection of pollution tolerant aquatic plants growing in the water environment of Jamtara district in Jharkhand state. The systematic analysis was carried out which has revealed the presence of 32 aquatic and semi-aquatic plants comprising both monocots and dicots. The collected species have been documented and arranged alphabetically depicting the available local names, family, and mode of pollination, flowering periods, dominance and distributional pattern. The following species are found to grow abundantly in this locality, e.g. *Ceratophyllum demersum*, *Eichhorua crassipes*, *Hydrilla verticillata*, *Nymphaea mouchali*, *Nymphoides indicum*, *Pistia stratiotes*, *Utricularia flexuosa*, *Vallisneria spiralis* and different species of *Cyperus*. Plants like *Pistia stratiotes*, *Eichhornia crassipes* and *Hydrilla verticillata* have already proved to be as Hg (II) and Cr (VI) accumulators. These plants can be utilized for removal of the heavy metal pollutants from the polluted water bodies without endangering the lives of other flora and fauna. It may be concluded that these aquatic plants, which employ solar energy, can be utilized for the scavenging of heavy metals from waste water for water purification.

Water is one of our basic natural resources. It is essential for life in both the biochemical and biophysical senses and its influences are both internal and environmental. It is not only the most abundant single substance in the biosphere but probably is the most remarkable as well. The water environment can generally be characterized as a dilute, aqueous solution, containing a large variety of organic and inorganic chemical species, dissolved and in suspension, and including a variety of plant and animal life.

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2. MATERIALS AND METHODS

Jamtara district lies between 23°10' and 24°05' north latitudes and 86°30' and 87°15' east longitudes. It is located at a lower altitude of Chhotanagpur Plateau. The present work is a part of regular visit of the research sites, preferably at the interval of 15 – 20 days for collection and identification of plants for further study. During the survey, samples were collected, photographed and identified as per the rules and guidelines of Botanical Survey of India. They were dried and preserved by using standard herbarium techniques. Botanical names, common names, families, and floral characters were also recorded. Some stress was given on their ethno-medicinal and economic importance also.

3. RESULTS AND DISCUSSIONS

During the present work, total 32 aquatic plants with pollution tolerant properties were studied which were belonging to 22 families but these under mentioned 16 plants belonging to 15 families were most abundant in the studied areas which have been listed below:

S.No	Botanical Name (Family)	Local Name	Habitat	Plant description
1.	<i>Oxalis corniculata</i> (Oxalidaceae)	Amrul, Tinpatta	Marginal	Small , prostrate or sub - erect trailing herb ,rooting at the nodes, leaves trifoliolate petiolate , leaflets obovate , emarginated sparsely hairy , flowers solitary , yellow in simple umbel , stamens 10 , alternately long and short , connate at the base.
2.	<i>Oldenlandia corymbosa</i> (Rubiaceae)	Khetpapra	Marginal	Annual , glabrous and prostrate herb ; dichotomously branched , rooting at the nodes ; leaves linear , lanceolate ; flowers white , 1 or 2 at each node ; capsules didynamous , seeds angular.
3.	<i>Hygrophila auriculata</i> (Acanthaceae)	Kullikhara	Marginal	Erect marshy and annual undershrubs with axillary spines; stem angular in young stage; leaves sessile, oblong, lanceolate with long sharp spines at each node; flowers bright blue or bluish purple.
4.	<i>Alternanthera sessilis</i> (Amaranthaceae)	Gurundi	Marginal	Prostrate , glabrous herbs with roots at the nodes ; leaves elliptic , linear and oblong ; flowers white , shining in small axillary clusters ; tepals almost equal ; stamens 3 – 5,alternating with staminodes;utricle obcordate , compressed and one seeded.
5.	<i>Ranunculus scleratus</i> (Ranunculaceae)	Jaldhania	Marginal	Erect, annual herb, glabrous, stem succulent, hollow deeply furrowed. Leaves simple, sessile, radial, reniform, long, petiolate , tri-partite. Flowers small, white or yellowish white numerous and terminal. Calyx reflexed. Petals oblong with a basal pit or scale. Stamens indefinite.
6.	<i>Ammannia baccifera</i> (Lythraceae)	Dadmari	Marginal	Annual , erect , glabrous , marshy herb ; stem quadrangular and hard ; leaves opposite , decussate almost sessile , lamina narrow at the base ; flowers deep red in dense axillary cyme ; sepals 4 , petals minute or absent , stamens 4 ; fruits globose and irregularly dehiscent.

7.	<i>Spillanthes acmella</i> (Asteraceae)	Akarkara	Marginal	Herb with long weak stems creeping at the base. Sometimes erect or ascending; leaves simple, petiolate , opposite , ovate ; pretty yellow heads with very prominent centre.
8.	<i>Eclipta prostrate</i> (Asteraceae)	Bhingraj	Marginal	Prostrate or ascending annual herb ; often rooting at nodes ; stem hairy ; leaves opposite , sessile , oblong – lanceolate or linear – lanceolate , entire or serrate ; heads white , heterogamous ; pappus usually absent.
9.	<i>Rumex dentatus</i> (polygonaceae)	Jangli palak	Marginal	Erect , annual herbs , 20 to 25 cm high ; leaves oblong , obtuse, petiolate ; flowers green in leafy or leafless whorls ; perianths in 2 whorls (3 + 3) , toothed.
10.	<i>Ipomea aquatica</i> (Convolvulaceae)	Kalmisag	Immersed	Floating or trailing, amphibious herbs, rooting at the nodes stems fistula and soft. Leaves elliptic or ovate-oblong, flowers pale pink with a dark purple eye, solitary or 2-5 flowered peduncled cymes. Sepals unequal. Petals funnel shaped. Capsules globose.
11.	<i>Nymphoides indicum</i> (Menyanthaceae)	Kumudni	Immersed	Rooted, rhizomatous, floating herbs. Leaves leathery, orbicular-peltate; veins arising from the base of lamina, flowers dimorphic, white with yellow centre, in clusters at the base of the petiole. Sepals and petals both ovate lanceolate. Capsules subglobose. Seeds numerous.
12.	<i>Centella asiatica</i> (Apiaceae)	Thankuni Gotakola	Immersed	Creeping herbs with long roots at nodes; stems slender, creeping stolons, green in colour ; leaves long stalked , petioles long ; flowers minute , white or pinkish white in compound umbels ; fruits globose, seeds brown and oblong.
13.	<i>Ludwigia adscendens</i> (Onagraceae)	Labangi	Immersed	Long stem with obovate leaves, flowers whitish or pale creamy coloured , sepals lanceolate, seeds smooth.
14.	<i>Utricularia aurea</i> (Lentibulariaceae)	Jhangi	Submerged	Stolons much branched and submerged ; leaves simple , whorled at top and spiral along the stem, segments filiform , small sub-globose bladder at the base of each pinna ; flowers yellow , in 3 to 8 flowered serial racemes , petals 2 ; capsules globose seeds narrowly winged.
15.	<i>Eichhornia crassipes</i> (Pontederiaceae)	Jalkumbhi	Floating	Leaves smooth glossy bright green, broad and large, flowers violet blue, roots free and fibrous.
16.	<i>Marselia quadrifolia</i> (Marseliaceae)	Susni saag	Marginal	Rhizomes branched at leaf base, leaves showing circinate venation, petioles long and weak with 4 leaflets of equal size.

4. CONCLUSION

Aquatic plants play very significant role in removing pollution and making our environment green and clean. They should not be regarded only as weedy floras but they are also significant in the field of medicines and for so many purposes. The most invasive and troublesome weed *Eichhornia crassipes* has vast property to absorb heavy metals and they can be used in biogas production and for reducing pollution.

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