INTRODUCTION

Eichhornia crassipes Solms., Commonly known as water-hyacinth is a free floating fresh water aquatic weed. It is with beautiful lilac violet flowers. For mankind 'weeds' are the unwanted plants which grow in wanted area. Water hyacinth [E .crassipes] is considered to be one of the most damaging of all aquatic plants (Sculthorpe, 1967). The severeity of the problems caused by water-hyacinth and the magnitude of the area under its cover can be judged by the fact that remote sensing techniques are employed to survey and monitor this weed (Scott, 1968).

Eichhornia crassipes, the water hyacinth is also known by other terms as 'Demon' (Mclean, 1922), 'Blue devil' (Vietmeyer, 1975), 'Bengal terror', 'Curse of Bengal' (Bose, 1933, 1945), 'Million doller weed' (Mathews 1971) and a 'Cindrella of the plant world' (Dymond, 1948).

Water hyacinth creates mosquito breeding sites and prevents small fish from feeding on mosquito larvae (Del Fosse, 1977). Water hyacinth is classified as an aquatic pest (Gupta, 1980).

Eichhorina crassipes Solms. belongs to the family pontederiaceae placed under the order liliales (Hutchinson, 1959). Pontederiaceae is an entirely aquatic family found only in

freshwater in the warmer parts of the world. In word of Hutschinson (1959) "the pontederiaceae are a difficult family to place. They appear to be aquatic liliaceae, tending towards the Aroid type. The spiciform inflorescence having a spathe like reduced leaf sheath. The habit recalls that of Hydrocharitaceae. The zygomorphy, variability and reduction in stamens differentiate it from liliaceae".

The genus Eichhornia was named by Kunth in 1842 in the honour of J.A.F. Eichhorn, a Prussian Minister of Education at that time. Kunth (1842) described the plant as Eicchornia speciosa and nomenclature was latter corrected by Solms-Laubach (1843) as Eichhorina crassipes. Besides E. crassipes there are five different species of the genus Eicchornia. They are - E. azurea (Swartz) Kunth.; E. diversifolia (Vahl) Urb; E. heterosperma Alexander, E. paniculata (K. Spreng.) Solms. and E. paradoxa.

The water hyacinth is known by different local names in different countries and regions. Brij Gopal and Sharma (1981) has compiled the list of local names of E. crassipes. It is as -

Argentina	Aquapey; Camalote
Bangladesh	Kachuripana
Brazil	Agupes
Burma	Beda-bin; Ye-padauk

Cambodia		Kamplauk
Colombia		Buchon; Lirio de aqua; Tarulla
Fiji		Bekabekairaga; Babedabeniga; Jalkhumbe
France		Jacinthe de l'eau
Germany		Wasserhyazinthe
India	Hindi:	Jalkumbhi; Falkumbhi; Shokh-samundar
	Telugu :	Pisachi Thanana
	Tamil :	Akasa thamaraj; Neithamarai
	Malayalam :	Kolavazha
	Oriya :	Kajor pati
	Bengali :	Kachuripana
	Kannada :	Kulavali
Indonesia		Bengkok; Eceng Gondok; Eceng Padi; Gendet
Japan		Weinchan
Mauritius		Hoteiaoi
Malaysia		Kemelingtelur; Keladi Bunting; Bunga Jamban
Puerto Rico		Flor de agua
Siam		Paktopchava
Thailand		Pak tob java; top-chawa; Sawah
Venezulea		Laguna
Vietnam		Luc-binth

FIG·1

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(a)

(b)

(c)

FIG. 2

(a)

(b)

FIG.3

(a)

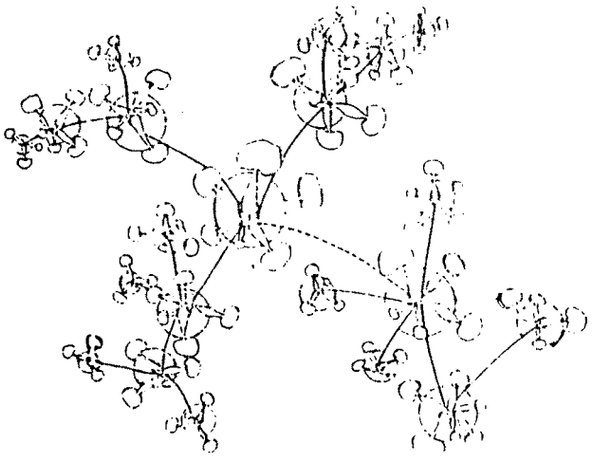
(b)

FIG. 4

Water hyacinth is distributed today throughout the world in the tropics and subtropics. It occurs in fresh water ponds, pools, tanks, lakes, reservoirs, streams and rivers and in irrigation chanals and paddy fields.

Eichhorina crassipesis a free floating stoloniferons herb. It consists of a rhizomatous stem, a rosette of leaves, numerous roots and an inflorescence [Fig. 1]. The stem or the rhizome consists of an axis with several short internodes. The nodes bear leaves roots offsets and inflorescence. The leaves are radical, spirally arranged on the rhizome and form a rosette. A typical leaf is green with high glossy texture and consists of a membranous ligule, a float, an isthmus (the thin portion between the float and the blade) and a blade. The roots are adventitious, fibrous, unbranched and have a conspicuous root cap. The roots produce a large number of laterals (up to 70 per cm.) of limited growth giving a fine feathry appearance. The inflorescence is "an attractive lavender spike subtended by two bracts and surmounted on an elongated peduncle". Each spike has 4 to 26 flowers (seed and obeid, 1975). The plant reproduces rapidly by vegetative means. Vietmeyer (1975) have reported that ten plants can multiply to six lakh individuals in only eight months. Once established water hyacinth rapidly forms dense mat of vegetation which can quickly cover a sluggishly flowing body of water.

Water hyacinths multiplies vegetatively with its horizontal sympodial branching pattern. Center (1980) has picturally shown the brnaching pattern as



A stolon which has broken or decayed is represented by the dashed line. As each stolon on the plant is a product of vegetative growth and it is genetically identical to the parent plant. Harper (1977) classifies these as ramets and distinguishes them from genetically unique genets. Thus each ramet is a component of genet. Thus in the figure there are two separate groups of ramets which are genetically identical but appears to be two separate plants.

The plant size of E. crassipes may vary from 50 to 300 cms with an average weight of about 1 kg of which about 95% is the water. Freezing water temperature increased salinity and lack of dissolved oxygen can kill these plants. The plant has its own mechanism for survival when the waterway dries up.

In earlier studies it was believed that the plant does not produce seeds and if the seeds are produced these do not play any significant role in the propagation of the weed. However Bruhl and Sengupta (1927) obtained seeds by artificial pollination in Eichhornia. Thus the production of seeds and their role in propagation of the plant appears to be of minor importance.

The water hyacinth produce large standing crops and utilize large amounts of nutrients. The explosive growth rate and voracious appetite for nutrites of Eichhorina crassipes is now being used in cleaning up of municipal and agricultural waste waters. Water hyacinth is effective in removing algae, fecal coliform bacteria, suspended particles, trace toxic metals, organic and many other dissolved impurities from waste waters. A number of useful applications of water hyacianth has been investigated (Bates and Hentges, 1976). Included are the schemes-for harvesting to make compost and soil additives.

- to extract chlorophyll and carotene
- to produce high protein cattle food
- to produce pulp, paper and fibre
- to provide biogas as an energy source.

Considering the role of Eichhorina crassipes in form of firend and foe to the mankind it was thought to study some eco-physiological aspects of the plant. Attempt has been made to survey the shade effect on plant growth, effect of degree of pollution by measuring dissolved oxygen in the surrounding water from different habitats. In light of the recent view of nutrient removal with water hyacinth it was thought interesting to study some aspects of nitrogen metabolism. Nitrogen metabolism study in Eichhorina crassipes includes total nitrogen contents, nitrate reductase and study of enzyme nitrate reductase. Enzyme study is continued with respect to substrate, temperature, pH effect to understand the flexibility of enzyme activity. A brief resume of the research on different eco-physiological aspects of Eichhornia is covered in the first chapter 'Review of the literautre'. The methodology followed for this investigation is presented in the second chapter of the dissertation. The outcomings of the present investigation are presented and discussed in the light of available literature, in the third chapter of 'Results and Discussion'.

It must be mentioned here that, the present study is an attempt in continuation of the available research concepts. In light of the report that water hyacinth in a sewage lagoon system reduces BOD up to 95% TSS up to 90%, nitrogen, phosphorous and other heavy metals. Making much of the library and laboratory facilities at our institution we have tried to probe into some eco-physiological aspects, with more importance to the nitrogen metabolism study in the Eichhorina crassipes. An attempt is made to have the preliminary idea about the behaviour of nitrate reductase, a key enzyme of nitrogen assimilation. It is hoped that further probe will help in understanding the nitrogen metabolism of an aquatic pest the Eichhorina crassipes .