

The Effects of *Eichhornia crassipes* on the water resources

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-----ABSTRACT-----

Eichhornia crassipes transferred to Iraq from Egypt in order to use as garnish plants in plantation in military channel region in Baghdad, and transferred to Tigris River, then spread in rivers, streams and irrigation stations in Karbala city and Dhi Qar city. *Eichhornia crassipes* is the most serious aquatic plants affecting the water resources in most countries, which is one of the most dangerous jungles of the world, widespread and endemic in a region is a disaster of those regional water and cause devastating case and cause significant economic losses due to the quickly spread of this plant. There are three generally methods used to control *Eichhornia crassipes* invasion (mechanical method, chemical method, biological method). The mechanical method is the oldest method used in treatment this herb, chemical method used in very high spread of herb, while biological method is very effective without any environmental effects.

Keywords - *Eichhornia crassipes*, Tigris River, mechanical method, chemical method, biological method.

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I. INTRODUCTION

Biological invaders are spread and can change inhabitation dynamics and community constructing of local ecosystems. Fundamental homeland variation by non-native species can affect the surrounding society [1]. Aquatic plants are especially invasive, mostly in regions that are change by humans. *Eichhornia crassipes* is a floating aquatic plant that is non-native.

The *Eichhornia crassipes* is type of the Amazon basin plants belonging to the Pontederiaceae family includes seven species and thirty kinds prevalent mostly in the tropics and semi-tropical, or temperate zones. This family is aquatic plants grow in ponds, lakes, swamps, rivers and marshes, in regions extends between 45 degrees north and 45 degrees south latitude in water bodies which is not exposed to the extreme cold [2].

II. CLASSIFICATION

The classification of this plant is ; Plantae Kingdom, Commelinales Order, Pontederiaceae Family, *Eichhornia* Genus, and *E. crassipes* Species, commonly, native to the Amazon basin[3].

III. DESCRIPTION

Eichhornia crassipes is an free floating aquatic plant (Fig 1), known as water hyacinth and is often reflected a highly doubtful outside its municipal range.



Figure .1 *Eichhornia crassipes*

It is thick, glossy, oval leaves, may rising over the surface of the aqueous about 1 meter in high [4]. The leaves are "10–20 cm" across, and float over the water surface. They have long, porous and bulbous stems. The fluffy, there roots are freely hanging with a purple-black color. An erected shank underpins a single high of "8-15" attractive flowers, especially pink to lavender in color with six petals. Each plant can produce thousands of sowings every year, and these sowings can stay fertile for more than 28 years. The mutual Eichhornia crassipes are farmers known to double their inhabitation in two weeks. In their municipal zone these flowers are vaccinated by bees and they can increase [5].

IV. ECOLOGY AND HABITAT

Eichhornia crassipes is a floating aquatic plant which is non-indigenous, have become spread widely on a global field. Though overall policy to control the widespread of invasive these species is becoming more popular, the environmental impacts of certain creature are less well known. Strange species can change the population dynamics and society structure of regional ecosystems. They resort to be most successful in confused homeland, proportionate with the average-confused hypothesis [6].

Its Ecology ambit from equatorial wild land to semitropical desert to rainforest regions. The growth temperature toleration of the water Eichhornia is from 12 °C to 35 °C. Its pH tolerance is from 5.0 to 7.5. Leaves are killed by freeze water and salty water (greater 15% than that of sea water), which are used to get rid of some of it by floating boats of the cut off grass to the sea [7].

V. ECOLOGY AND HABITAT

When the plant not controlled, water hyacinth will cover aquatic surface completely; this impacts water flux, prohibit sunlight from arriving regional aquatic plants, and forbade the oxygen from the water, oftentimes killing fish and aquatic [8].

The plants also make a primary homeland for mosquitos, the vectors of disease. Water hyacinth is oftentimes make problems in water resources if uncontrolled Ecological worry through non-domestic type.

An aquatic plant infestation is a inconvenience worldwide, mostly in environments that have been widely convert by humans. In addition of that to the effects of formation a heavy vegetal cover, the natural construction of the roots pending in the water column and the leaves over the water supply habitant for other types. Moreover, organic collapse from the sunshade can affect the benthic region [9].

VI. EFFECTS

A conclusion section must be included and should indicate clearly the advantages, limitations, and possible applications of the paper. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

VII. EICHHORNIA CRASSIPES IN IRAQ

Eichhornia crassipes first time appeared in Iraq in the mid-eighties of the last century, which was admitted for decoration taken by some private nurseries in Baghdad, in Tigris River south of Baghdad, and gradually moved into Diyala river and then it found suitable environment for spreading[10].

VIII. GROWTH SEASON

The growth season between April and November and the maximum growth in warm months, (from June to September) [11].

IX. NEGATIVE IMPACTS

- The most negative impacts of its presence in waters that prevent run off the water in the canals and small streams.
- Cause depletion of oxygen and block sunlight from access to the water stream, which so effectively impacts on the organisms in the water.
- Work as Incubator for diseases where it is suitable environment for many insects and snails.
- Cause the loss of large amounts of water through transpiration, it losses 3.5 times more than the water evaporated directly from the surface of the water, (each plant transpire 0.7 to 1 liter of water per day).
- Direct effects on the pumping stations [12].
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X. TREATMENT

There are three generally methods used to control Eichhornia crassipes invasion, they are:

- 1- Mechanical method,
- 2- Chemical method,
- 3- Biological method.

Each of these methods has its benefits and blemishes. The best observation depends on the given states of each affected position such as the range of water Eichhornia invasion, rational climate, and vicinity to human being and other ecological system [13].

1- Mechanical method:

Physical method is accomplished by ground founded instruments such as pail cranes, or by water founded mechanization such as water herb reaper, dredges, or plant segmentation [14].

Physical method (Fig 2) is seen as the better treatment to the reproduction of the herbs. this method is used different types of tools to impress, collect, and deduct of "1500 hectares" of the plant in a "12-month" period of time.



Figure .2 Mechanical methods

However, it is expensive and requests the use of two type's ground and water chariots, but it took plentiful years for the mere to be in needy state and repair will be a persistent process. It may have a yearly cost "from 6 to 20 million dollar" and is only believed a short-lived treatment to a long-lived affair.

A disadvantage of physical gathering is that it may lead to more shatter of plants when they are dissociation up by cutters of the reaper machine. The shatters of the plant that are leave beyond in the water may readily reproduce and raise another invasion. Thus, transmission and elimination of the harvested plant is a very big challenge because of the heavy weight of vegetation.

The harvested plant may confuse a health danger to humans because of it's tendency for absorbing pollutants, and it be believed hazardous to humans [15].

Therefore, the fulfill of the machinists harvesting is not efficient in all cases invasions of the water hyacinth, that is because of the invasive of this aquatic types are grows more quickly than it can be removed. Moreover, every day only one or two acres can mechanically harvest, that is because of the large saucepans of plant in the aqueous environment [16].

2- Chemical method:

Chemical method is the minimum used out of the three methods that is because of its long-range effects on the human health and the environmental elements. The usage of chemicals needs severe agreement from environmental protection agency of practiced technician to use and treat the affected regions, and this method may be used only in the severe cases of the spread of the plant. Therefore, the most successful utilize of chemicals is when it is used for minimal areas of invasion of the plant. Because in large areas, some mats of the plant are probable to survive the chemicals and can sliver to another reproduce. Moreover, it is extra cost-effective and low hard than mechanical method. In addition, it can produce to environmental negative monuments as it can reach into the ground water and can harm the water rotation in an environment also impact the local water cycle and human body health [17].

The common chemicals used for this purpose is 2,4-D, glyphosate (Fig 3). When the chemicals are sprayed on the Eichhornia crassipes leaves and causes to immediate alterations to the physiology of the transplant. The

utilize of the chemicals known as 2,4-D cause to the eliminate of Eichhornia crassipes through repression of cell development of new tissue. It may take about two-weeks before mats of Eichhornia crassipes are demolished with 2,4-D. The chemical known as a liquid bromide salt which can immediately permeate the leaves of the Eichhornia crassipes and lead to direct breakdown of crop cells. The glyphosate has a less poisoning than the other chemicals; thus, it takes longer time for the Eichhornia crassipes mats to be demolished, about "3 weeks"[18].

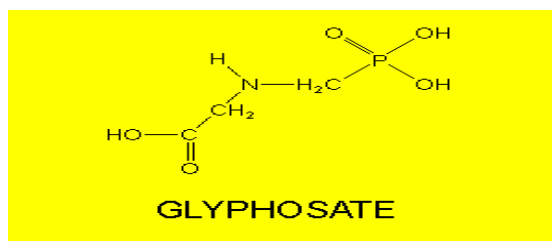


Figure .3 2,4-D, glyphosate

3- Biological method:

Researchers interested in agriculture used the insect *Megamelus scutellaris* as a biological method for *Eichhornia crassipes*. Since the chemical methods and the mechanical methods are relatively too expensive and ineffectual, therefore the researchers have used the [biological method](#) to cooperation with this environmental problem. The researchers released three kinds of insects known to nourish on *Eichhornia crassipes*, *Neochetina bruchi*, *N.eichhorniae*, and the *Eichhornia crassipes* borer *Sameodes albiguttalis* (Figure 4). Therefore, because the life period of these insects is only three months, so it puts restrictions on the use of biological fertility to worthily repress *Eichhornia crassipes* development. These organisms regulate *Eichhornia crassipes* by limiting their extent, its vegetative promulgation, and grain production. In addition they endure microorganisms that may be pathological to the *Eichhornia crassipes*[19]. These insects eat shank tissue of the plant, which effects in wastage of floating herbs, which will finally drown. Although the limited success, the most effective method remains to prevent of the disseminate of this species.

Researchers consideration the impacts of the biological method in inclusive host-domain studies and results that the insects is highly host-certain and will not confuse a impendence to any other plants other than *Eichhornia crassipes*. Researchers expect that the biological method will be more flexible than present biological methods to the chemicals that are perhaps in place to conflict the *Eichhornia crassipes*[19].



Figure (4) Sameodes albiguttalis

XI. USES OF EICHHORNIA CRASSIPES

Eichhornia crassipes can be used in several uses, such as:

1. Bioenergy

Due to its very high amended of evolution, *Eichhornia crassipes* is an superior provenance of biomass. Every "1 hectare" of that plant consequently produce about "70,000 m³" of biogas. Every "1 kg" of dry matter can produce "370 liters" of biogas, presenting a heating value of "580 Btu/ft³" contrasted to methane which produces "895Btu/ft³" [20].

2. Phytoremediation

The roots of *Eichhornia crassipes* can absorb contaminations, including heavy metals such as lead, mercury, and strontium-90; in addition of some organic composite confirm to be carcinogenic. Therefore *Eichhornia crassipes* may be cultivated for the treatment of waste water.

Eichhornia crassipes is notified for its efficiency to strip about 60–80 % nitrogen and also about 69% of potassium from water. The roots of the plant were remove particulate matter as well as nitrogen in a normal shallow wetland [21].

3. Another uses

Eichhornia crassipes from "Lake Victoria" in East Africa are used to make some furnitures, bags and ropes. The plant is also used for animal feed and also as agricultural fertilizer though there is debate from the high pH value of the fertilizer. The researchers found limited utilization of Eichhornia crassipes for paper manufacture [21].

XII. CONCLUSION

Eichhornia crassipes is a free floating aquatic herb, known as water hyacinth and is predominately reflected an immensely doubtful out of its municipal ambit. It effects negatively on the water resources and aquatics.

Different ways may be used to treated this herb and control it. So to prevent the propagation, strict instructions must use against cultivation and propagation of Eichhornia crassipes, and encourage farmers and citizens and fishermen to collect this herbs and control it.

The mechanical method is the oldest method used in treatment this herb, manually remove of the herb then drying and burning it.

The use of effective and successful mechanical way, especially in the early stages of the problem, but in the late stages or completely incurable, the chemical method used.

The insecticide must be (easy decomposition in aqueous phase, its impact on the plants not-existent, and relative cheap in price). The use of biological adversary who feed on this herb and there are a number of organisms has been used this way in many countries, and has given a very good results without any environmental effects.

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