

Biological Control of Freshwater Weed *Pistia stratoites* by Freshwater Fish

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Abstract: We all know that *Pistias stratoites* is a well-known freshwater weed and because of its rapid growth major freshwater resource i.e. rivers getting polluted. In other hand different animal species lives inside of water getting harm and struggling for surviving purpose. Goldfish was imported into laboratory as a potential biological control agent for the floating aquatic weed *Pistia stratoites*. Quarantine studies demonstrated that this fish was actually feeding on *P. stratoites*. On primary level fish was released into the culture of *P. stratoites* in laboratory for under observation. The fish was used for first time in India as a biological control on *P. stratoites*. It was observed that the goldfish actually feeding on freshwater floating weed *P. stratoites*. The result is discussed in relation to its effectiveness. I concluded that goldfish effectively controls the growth of *P. stratoites* by feeding on it in tropical region (22°C) but in cooler region its effectiveness may be fluctuate with seasonal conditions.

Key Words: *Pistia Stratoites*, Goldfish, Water Lettuce, Biological Control

Introduction:



Figure 1: *Pistia stratoites* spreading over the river

Systematic Position of Pistia:

Kingdom: Plantae

Phylum: Spermatophyta

Subphylum: Angiospermae

Class: Monocotyledonae

Order: Arales

Family: Araceae

Genus: *Pistia*

Species: *stratiotes*

Pistia is a genus of aquatic plant in the arum family Araceae. The single species it comprises, *Pistia stratiotes*, is often called water lettuce. Water Lettuce is an aquatic herb which floats on the surface of the water. Its roots hang inside water beneath floating leaves. The leaves can be up to 14 cm long and have no stem. They are light green, with parallel veins, wavy margins and are covered in short hairs which form basket-like structures which trap air bubbles, increasing the plant's buoyancy. Due to its growth habit, the plant spreads easily can be invasive. *Pistia stratiotes* is a free-floating, fast growing; obligate aquatic that can form vast, dense floating mats, covering the entire water surface of lakes and slow moving rivers. This species does not tolerate freezing temperatures, although its seeds can survive submerged in water that is 4°C for at least 2 months. It is the only reason for rapid growth of *P. stratoites* that its seeds can be survive under low temperature for 2 months. In rainy season in India this water lettuce has been drawn with water flow but seeds of this plants are still survive and it has been found that the seeds of water lettuce is buried inside of soil and it will re germinate in suitable environmental condition. Because of vast growing characteristic of Water Lettuce sunlight unable to penetrate deep inside of water and it results into decreasing of temperature of water. It affects on the animal biodiversity. Animals cannot be survived in presence of high growth of water lettuce.

Although water lettuce has some medicinal properties we cannot use it directly because of presence of crystals of calcium on the leaves of water lettuce. There are many medicinal uses of *P. stratoites* like it can be used against cough, piles, diabetes, skin diseases, etc. People of many regions are unknown about this that water lettuce can be used as a medicinal plant. But because of its uncontrolled growth its population is going to increased and it results into decreasing of number of animal and plant diversity. There should be some way to control on the growth of water lettuce is very important of today's situation.

Pistia stratiotes is a free-floating aquatic with feathery roots that can reach up to 50 cm in length. The fleshy leaves of this plant are arranged in a rosette and measure 2-15 cm in length. The leaves are green to greyish-green, and have dense white hairs and parallel veins on their

surface. As its common name indicates, the plant resembles a floating head of lettuce. *Pistia stratiotes* flowers in the late summer, but the flowers plant are small and inconspicuous. The male and female flowers are arranged in an inflorescence type known as a spadix, with 6-8 male flowers in a single whorl around the centre and one female flower below. The spathe, a bract-like leaf surrounding the spadix, is white to pale green, glabrous on the inside and pubescent on the outside. The fruits of this plant are light green berries that contain light brown seeds that are cylindrical in shape and measure 1 mm *Pistia stratiotes* has the ability to crowd out native aquatic plants, as well as to make infested water bodies inhospitable to different animals. For example, the coverage of plants on the water surface can reduce the oxygen available for fish in the water below. It also impedes recreational activities such as boating and swimming. Since this plant can spread vegetatively. It has the potential to spread via boats and water currents. It is sold in the aquarium and water garden trade, which could be a threat if the plants are not disposed of carefully. There is concern that with repeated introductions the plant could become less sensitive to frost, and eventually be able to sustain persistent populations in India.

Pistia stratiotes reproduces primarily vegetatively by means of daughter plants attached to stolons. The daughter plants have the potential to break off from the parent plant and be moved via water currents or boats to start new populations. It can also reproduce sexually via seeds. Water lettuce is often used in tropical aquariums to provide cover for fry and small fish. It is also helpful as it competes with algae for nutrients in the water, thereby preventing massive algal blooms. As we know *Pista* is very fast growing plant in summer and it compete with other aquatic plants for growth.

Materials and Method:

Pistia stratoites were collected from Pavana river chinchwad by simple hand picking method. Collected *Pistia* was green to greyish-green in colour and have dense white hairs and parallel veins on their surface. Collected all plants were cultured in transparent fish tank with freshwater fishes at room temperature. Whole plants were kept under observation for few days. I observed that fishes were feed on leaves and roots of *Pistia*. Though fishes never finish the whole plants but as my observation freshwater fishes can also feed on *Pistia*.

Result:

As my observation Freshwater fishes feed on leaves and roots of *Pistia straoites*. Freshwater fishes I used were actually feeding on the roots and the leaves of water lettuce.



Figure 2: Freshwater Fishes Actually Feeding on *Pistia stratoites*

Conclusion:

Freshwater fishes can also feed on *Pistias tratoites* and it will be resulting to decrease the number of *Pistia* in river. Because of fast growth of *Pistia* the sunlight cannot penetrate inside the river and it affects on the animal diversity present inside the river. But if we increase the number of freshwater fishes by controlling on fishing of herbivores fishes then it will be definitely helpful to control unwanted growth of *Pistia stratoites*.

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