Innovative Farming
-An International Journal of Agriculture

AZOLLA: THE SUPER PLANT

Popular Article

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KEY WORDS
Symbiotic plants, Nitrogen fixation, Azolla, Fern, Biofuel

ARTICLE INFO

Received on: 12.01.2016
Revised on: 24.04.2016
Accepted on: 26.04.2016

ABSTRACT

***Azolla* is a free-floating water fern that floats in water and fixes atmospheric nitrogen in association with nitrogen fixing blue green alga *Anabaena azollae*. It has ability to both fix nitrogen, finding increasing use for sustainable production of livestock feed. *Azolla* is rich in proteins, essential amino acids, vitamins and minerals. Studies describe feeding *Azolla* to dairy cattle, pigs, ducks, and chickens, with reported increases in milk production, weight of broiler chickens and egg production of layers, as compared to conventional feed. One FAO study describes how *Azolla* integrates into a tropical biomass agricultural system, reducing the need for inputs.**

Introduction

Azolla is a symbiotic super organism that captures all the nitrogen fertilizer it needs to grow from the air around it. Asia's farmers have long known this, growing *Azolla* together with rice to provide a natural fertilizer to bolster rice productivity. *Azolla* floats on the surface of ponds and lakes. Tiny, but fierce, it can double its entire body mass in just less than two days, it is also a promising alternative for biofuel production and carbon-capture efforts. In a special leaf cavity, *Azolla* hosts a microbe called *Nostoc* that converts atmospheric nitrogen into food for its host. As when the green revolution resulted we have been using fertilizer responsive high yielding varieties and hybrids which practices intensive use of inorganic fertilizer, but this has resulted in poor soil health, at this juncture *Azolla* seems to be boon not only as bio fertilizer but as nutritious feed to live stock.

Azolla and its importance

Azolla is a free-floating water fern that floats in water and fixes atmospheric nitrogen in association with nitrogen fixing blue green alga *Anabaena Azollae*. *Azolla* fronds consist of sporophyte with a floating rhizome and small overlapping bi-lobed leaves and roots. It is also also called mosquito fern, duckweed fern, fairy moss, water fern and *Azolla* is a genus of seven species of aquatic ferns in the family Salviniaceae. Some of the selected species are *Azolla caroliniana* , *Azolla circinata* *Azolla filiculoides* *Azolla japonica* *Azolla mexicana* *Azolla Microphylla* *Azolla nilotica* *Azolla pinnata* *Azolla rubra*. They form a symbiotic relationship with the cyanobacterium *Anabaena Azollae*, which fixes atmospheric nitrogen, giving the plant access to the essential nutrient. This has led to the plant being dubbed a "super-plant", as it can readily colonise areas of freshwater, and grow at great speed - doubling its biomass every

two to three days. *Azolla* reproduces sexually and asexually by splitting.

Azolla has been used, for at least one thousand years. It has ability to both fix nitrogen, and known to contribute 40-60 kg N ha-1 per rice crop, also it block out light to prevent any competition from other plants. The twin potentials as biofertilizer and animal feed make the water fern *Azolla* as an effective input to both the vital components of integrated farming, agricultural and animal husbandry. *Azolla* contains 25 – 35 per cent protein on dry weight basis and rich in essential amino acids, minerals, vitamins and carotenoids including the antioxidant b carotene. Cholorophyll a, chlorophyll b and carotenoids are also present in *Azolla*. The rare combination of high nutritive value and rapid biomass production make *Azolla* a potential and effective feed substitute for live stocks. A study of Arctic climatology reported that *Azolla* may have had a significant role in reversing an increase in greenhouse effect that occurred 55 million years ago that caused the region around the North Pole to turn into a hot tropical environment. This research conducted by the Institute of Environmental Biology at Utrecht University claims that large dense patches of *Azolla* growing around freshwater lakes formed by the climate change eventually consumed enough carbon dioxide for the greenhouse effect to reverse.

Preparation/ cultivation

Azolla fronds, Polythene sheet, Super phosphate and Cow dung are inputs needed to cultivate *Azolla* The area selected for *Azolla* nursery should be partially shaded. The convenient size for *Azolla* is 10 feet length, 2 feet breadth and 1 feet depth (fig1). The nursery plot is spread with a polythene sheet at the bottom to prevent water loss. Soil is applied to a depth of 2 cm and a gram of super phosphate is applied along with 2 kg of vermicompost or cow dung in the nursery for quick growth. *Azolla* mother inoculum is introduced @ 5 kg/plot. The contents in the plot are stirred daily so that the nutrients in the soil dissolve in water for easy uptake by *Azolla*. *Azolla* is harvested fifteen days after inoculation at the rate of 50-80 kg / plot. One third of *Azolla* should be left in the plot for further multiplication. Five kg cow dung slurry should be sprinkled in the *Azolla* nursery at ten days intervals. Neem oil can be sprayed over the *Azolla* at 0.5 5 level to avoid pest incidence.

Uses/application

1.The *Azolla* biofertilizer may be applied in two ways for the wetland paddy.

- before transplanting incorporated as green manure
- after transplanting grown as dual culture with rice and incorporated subsequently

2.Animal feed at various dosages (table 1)

3.Improves and balances soil health.

Table 1. Dosage levels of *Azolla* for animal feed

Animal	Dosage / day
Adult cow , Buffalo, Bullock	1.5-2 kg
Layer, Broiler birds	20 – 30 grams
Goat	300 – 500 grams
Pig	1.5 – 2.0 kg
Rabbit	100 gram

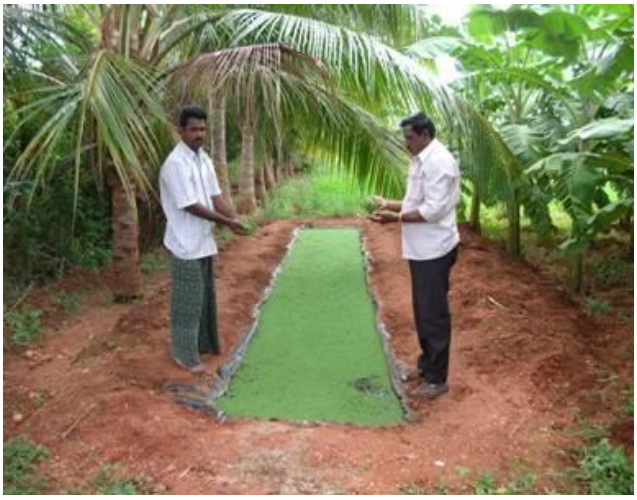

Fig. 1. *Azolla* cultivation pond

Conclusion

Azolla is an important low cost input, which plays a vital role in improving soil quantity in sustainable rice farming. In Indian conditions, agriculture is very much coupled with raising livestock. The high protein content of *Azolla* makes it ideal as animal feed. The application of *Azolla* in rice cultivation can be incorporated into carbon credit markets decreasing contributions to global warming. Decreasing use of agrochemicals will improve natural ecosystems, water quality, flourishing of natural biota, Soil texture, porosity and organic material content will increase, thus raising its economic value.

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How to cite this article?

Priyadarshini, S.K., T.N. Dhanalakshmi and G. Selva kumar. 2016. *Azolla:* the super plant. *Innovative Farming*, **1**(2): 42-44.