

### **Azolla in Rice cultivation & production**

- *Azolla* is extensively grown in rice paddies to increase the rice production by more than 50% by utilizing the nitrogen fixation ability of *Azolla's* symbiont, *Anabaena azollae*.
- Rice is an important staple food crop of the world. The single most limiting factor in rice cultivation is nitrogen which strongly affects the crop yield. *Azolla* substantially increases the amount of nitrogen fertilizer available to growing rice and has been used as a 'green' nitrogen fertilizer to increase rice production. The rate of nitrogen fixed is about 25kg/ha.
- In India, Central Rice Research Institute, Cuttack made significant contribution on the methods of *Azolla* application in rice field.
  - (i) *Azolla* can be used as green manure by incorporating in field prior to rice planting &
  - (ii) By dual cropping with rice for some time.
- ***Azolla's* in rice paddy**- Less than 5% of the nitrogen sequestered by *Azolla* is available immediately to the growing rice plants. The remaining 95% remains in the *Azolla's* biomass until the plant dies. As the *Azolla* decomposes, its organic nitrogen is mineralized rapidly during the first two weeks and then at a more gradual rate.
- Nitrogen is then released mainly in the form of ammonium which then becomes available as a biofertilizer for the growing rice plants. *Azolla* has enormous potential to increase rice production worldwide and hence overcome the food shortages.
- **Other benefits of *Azolla* in rice cultivation:** Besides nitrogen fixation, *Azolla* provides many other benefits for rice cultivation and production.
  1. The thick *Azolla* mat in rice fields suppresses weeds.
  2. Since *Azolla* floats at the water surface, it does compete with rice for light and space.
  3. *Azolla* grows best under a partial shade which is provided by the rice canopy during early and intermediate stages of growth.
  4. During maturity of the rice crop, *Azolla* begins to die and decompose due to low light intensities under the canopy and a depletion of nutrients, thus releasing its nutrients into the water.
  5. As *Azolla* decomposes rapidly, its nitrogen, phosphorus and other nutrients are rapidly released into the water and made available for uptake by rice during grain development.
  6. *Azolla* has a greater ability than rice to accumulate potassium in its tissues in low-potassium environments, providing rice with potassium after *Azolla's* decomposition.
  7. *Azolla* has various benefits over chemical fertilizer as it improves soil fertility by addition of total nitrogen, organic carbon, phosphorus, potassium, other nutrients and organic matter.

### ***Azolla* production Technology:**

- This can be achieved by growing *Azolla* in pits lined with synthetic polythene sheet in courtyard/back yard preferably in open space or in tank where availability of sunlight is adequate. Production of *Azolla* requires cement concrete tanks of size 2 m long, 1 m wide and 0.5 m deep. Due care should be taken so that water can stand in the tank.

- Soil is distributed evenly across the bottom of the tank. The depth of soil layer should be about 10 cm. Cow dung is to be added at the rate of 1 to 1.5 kg per sq m of the tank area (2 to 3 kg of cow dung per tank).
- Single Super Phosphate (SSP) is to be added at the rate of 5 g per sq m of the tank area every week (10 g SSP per tank).
- Fill the tank with water till the water collects to a height of 10 to 15 cm above the soil. Allow the soil particle to settle down.
- Spread around 200 g of fresh *Azolla inoculum* over the surface of the water. It takes about 2 weeks for *Azolla* to form a mat over the water surface. Water level in the tank should be maintained especially during summer months.
- To reduce excessive ambient light, a shade made out of coconut leaves may be laid above the tank. This also prevents dew formation on the growing *Azolla* during winter.
- About 1.5 kg of mother culture of *Azolla* seed material brought from *Azolla* mother nursery is spread uniformly over the bed after stirring the water in the *Azolla* bed.
- Initially, *Azolla* will spread over the entire bed within seven days. During the initial seven days *Azolla* is not harvested. Water level is maintained by applying water every day. After the seventh day, 1.5 kg of *Azolla* can be harvested every day. *Azolla* should be harvested in plastic trays with sieve.
- After every 60 days, soil is removed from the bed and another 15 kg of fresh fertile soil is added into the bed to avoid nitrogen build up and also provide nutrient to the *Azolla*. Fresh inoculation of *Azolla* after removing soil and water should be made at least once in six months repeating the whole process afresh.



Suggested references for this topic:

Sathe, T.V. (2004). *Vermiculture and Organic Farming*. New Delhi, Delhi: Daya publishers, Chapter#2.

Subha Rao, N.S. (2000). *Soil Microbiology*. New Delhi, Delhi: Oxford & IBH Publishers, Chapter #7.