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A Case Study

Azolla cultivation: A supplementary cattle feed production through natural resource management

SOMA BISWAS AND SURAJIT SARKAR

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Author for correspondence :
SOMA BISWAS
Krishi Vigyan Kendra, Uttar Banga Krishi Viswavidyalaya, Pundibari, COOCH BEHAR (W.B.) INDIA
Email: somakvk123@yahoo.com

See end of the article for authors' affiliations

Evolution of high yielding variety especially in paddy has increased the grain yield, but the straw: grain ratio have been decreased. Short straw with nutritionally low straw is growing threat for the grazing lands a result of urbanization. In quality has invited an insecured cattle feed availability for the rural people. With this situation Azolla, the aquatic fern, host of blue green algae, can be a leading solution to solve the scarcity problem of cattle feed.Azolla is a floating fern which resembles algae. Normally Azolla is grown in paddy field or in shallow water bodies, multiplies very rapidly. It belongs to the family Azollaceae. The fern Azolla, a host of symbiotic blue green algae *Anabaena azolle* which is responsible for the fixation and assimilation of atmospheric nitrogen. Use of Azolla is now multifaced. Azolla can be cultivated not only as bio-fertilizer but also as cattle feed.In addition to it's traditional cultivation as a bio-fertilizer for wet land paddy, Azolla is finding increasing use for sustainable production of lives stock feed (Pillai, 2008).Azolla technology if once introduced, get integrated with farmyard and homestead activities through sustained results.

Azolla as cattle feed :

Azolla is very rich in proteins, essential amino acids, vitamins, potassium, ferrous, copper, magnesium, zinc etc. On a dry weight basis, Azolla consists of 25-35 per cent protein, 10-15 per cent mineral and 7-10 per cent amino acids, bio-active substances and bio-polymers. Carbohydrate and oil content in Azolla is very low (Source: NDDB study at Anand). All these bio-chemical constitutions along with rapid multiplication rate make Azolla ideal organic feed substitutes for livestock. Livestock can easily digest Azolla due to high protein content and low lignin content.Trials on dairy animals showed an overall increase of milk yield by 15-20 per cent when 2-3 kg of Azolla was combined with regular feed and 15-20 per cent of commercial feed can be replaced with the same quantity of Azolla on dry weight basis, without affecting milk production (Source: VK-NARDEP, Tamil Nadu). Azolla feeding also improved the health and milk quality.

Low cost technique of Azolla cultivation :

–The soil in the area is first cleared of weeds and leveled.
–Bricks are lined horizontally in a rectangular fashion.
–A UV stabilized silpauline sheet of 2m x 2m size is uniformly spread over the bricks in such a way as to cover the margin of the rectangle made by the bricks.
–10-15 kg of sieved soil is uniformly spread over the silpauline pit.
–Slurry made of 2 kg cow dung and 30 g of super phosphate mixed in 10 litres of water,

Table 1: Nutritive value of Azolla as fodder-a comparison

	Crude protein	Fibre	Digestive nutrient content
Roughages	-	More than 18%	Less than 60%
Concentrates	-	Less than 18%	More than60%
Fodder legumes	16-20%	30%	Less than 60%
Azolla	25%	10%	60-65%

Source: NDDB study at Anand

is poured onto the sheet. More water is poured on to raise the water level to about 10 cm.

–About 0.5-1kg of pure mother Azolla culture seed material is spread uniformly over the water, after mild stirring of soil and water in the Azolla bed. Fresh water should be sprinkled over the Azolla immediately after inoculation to make the Azolla plants upright.

–In a week's time, the Azolla spreads all over the bed and develops a thick mat like appearance.

–A mixture of 20 g of super phosphate and about 1 kg of cow dung should be added once in 5 days in order to maintain rapid multiplication of the Azolla and to maintain the daily yield of 500 g.

–A micronutrient mix containing magnesium, iron, copper, sulphur etc., can also be added at weekly intervals to enhance the mineral content of Azolla.

–About 5 kg of bed soil should be replaced with fresh soil, once in 30 days, to avoid nitrogen build up and prevent micro-nutrient deficiency.

–25 to 30 per cent of the water also needs to be replaced with fresh water, once every 10 days, to prevent nitrogen build up in the bed.

–The bed should be cleaned, the water and soil replaced and new Azolla inoculated once every six months.

–A fresh bed has to be prepared and inoculated with pure culture of Azolla, when contaminated by pest and diseases.

Harvesting :

–Will grow rapidly and fill the pit within 10-15 days. From then on, 500 - 600 g of Azolla can be harvested daily.

–Can be done every day from the 15th day onwards with the help of a plastic sieve or tray with holes at the bottom.

–The harvested Azolla should be washed in fresh water to get rid of the cow dung smell.

Environmental factors for the growth :

–Temperature 20°C - 28°C.

–Light 50 per cent full sunlight.

–Relative humidity 65 - 80 per cent.

–Water (standing in the tank) 5 - 12 cm.

–pH 4-7.5.

Precaution :

–Plant should not be allowed to enter maturity stage or

Fig. 1: Inoculation of azolla mother culture into new pit

Fig. 2: Azolla-ready for cattle feed

Fig. 3: Azolla- a supplementary cattle feed

sporulation stage by periodic application of cow dung slurry, super phosphate and other macro and micronutrients except nitrogen.

–Temperature should be retained below 30 degree centigrade incase the temperature goes up, the light intensity should be maintained by providing shade net or other devices.

–Bio-mass should be removed every day or alternative days to avoid over crowding. pH should be tested periodically to see that it never goes below 5.5.above 7.

–Seed stock is maintained separately treated with pesticides and fungicides.

–Azolla should be well washed with water before feeding to livestock to get rid of smell of cow dung.

–Biomass collected from the field applied with the pesticide should not be used as a feed for livestock.

Conclusion :

The supplementary feed like Azolla improves the health of milch animals. Extra milk can be obtained from the milch animals by feeding them with Azolla. The cost of feeding can be decreased by the production of Azolla. So, it is necessary to promote the cultivation of Azolla as cattle feed among the Indian villagers.

Authors' affiliations :

SURAJIT SARKAR, Krishi Vigyan Kendra, Uttar Banga Krishi Viswavidyalaya, Pundibari, COOCH BEHAR (W.B.) INDIA, Email: drsurajitskr@gmail.com

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