

Iron	1000-8600 ppm
Copper	30-210 ppm
Manganese	120-2700 ppm
Vitamin A	300-600 ppm
Minerals	10-15%

Feeding farm animals

When azolla is introduced as feed it can be mixed in 1:1 proportion with concentrates or other feeds. After some days, farm animals can feed on azolla directly without any requirement for admixture. Azolla can be fed to farm animals at the rate of 2-2.5 kg for milch cows, 1-1.5 kg for pigs, 300-500 grams for goats, 100 grams for rabbits and 25-30 grams for chicks.

Merits

- Approximately 10-15% increase in milk production in dairy cows, 8-10% increase in meat weight in goats and 10-15% increase in egg-laying capacity in poultry birds can be observed when these animals are fed with azolla.
- Azolla can be used as an alternate fodder when fodder resources are scarce or available at a very high cost.
- The protein-rich azolla, when used as an alternate feed can significantly reduce the production cost involved in maintaining the farm animals.
- Azolla can play a major role in providing a nutritionally balanced feed to all farm animals.

Economics

The cost of establishing two standard size beds which can provide a continuous supply of azolla is depicted in the table below.

Sl	Particulars	Quantity	Rate (₹)	Price (₹)
1	Cost of trench making (2.25 m x 1.5 m x 0.2 m)	2 trenches	250 (man-day)	250
2	Poly sheet (3 m x 2 m) 250 GSM	2 sheets	400	800
3	Soil	15 kg / trench	0.6	18
4	Cow dung	5 kg per trench	1.5	15
5	Fertilizer			
	SSP 5 kg each	10 kgs	8	80
	Mineral mixture 2 kg each	4 kgs	62	248
6	Azolla culture	2 kg	100	200
7	Poly net	(optional)		1000
8	Bamboo	(optional)		1000
	Total			3611

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AZOLLA - AN ALTERNATE FEED RESOURCE FOR FARM ANIMALS



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Azolla is a free-floating freshwater fern, belonging to the family *Salviniaceae* which grows rapidly on the surface of standing water forming a dense vegetative mass. It has a symbiotic relationship with the cyanobacterium (blue-green algae) *Anabaena azollae* which fixes atmospheric nitrogen. The fern reproduces vegetatively by slitting the fronds from the main axis or sexually by producing sporocarps in the fronds which release spores.

Production

A polythene sheet is spread in a way that 10 cm of standing water can be maintained. The width of the bed is maintained at 1.5 m to enable cultural operation from both sides. Length may be adjusted depending upon the fodder requirement of the unit.



Azolla grown in polythene sheet

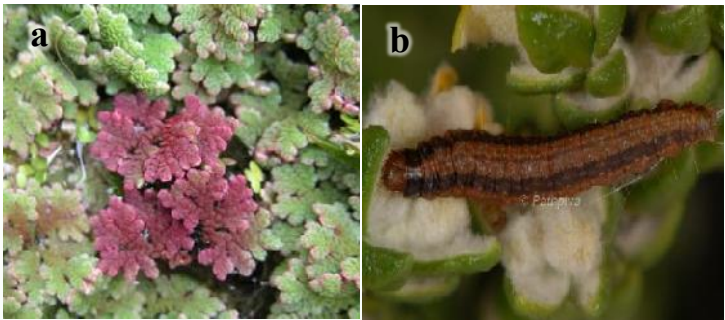
For a bed of size 2.5 m x 1.5 m, about 15 kg of fine sieved soil is spread over the bed. About 5 kg of pre-decomposed (2 days) cow dung is mixed with water, which provides carbon source for Azolla. About 40 g of nutrient mix (made by mixing 10 kg Rock phosphate, 1.5 kg Magnesium salt and 500 g of Muriate of Potash) is added to the azolla bed. The water is fortified with micronutrient of desired quantity.

This not only takes care of the micronutrient requirement of azolla but also the animals when azolla is fed to them. Sufficient water is added till the water level in the bed rise to 10 cm. The soil is stirred well and allowed to settle down over night. The next day, about 100 g of mother culture of azolla is spread uniformly over the bed over the clear water. After the seventh day, 1.5 kg of azolla can be harvested every day.

Precautions

The Azolla inoculum should be protected from contamination by adding Carbofuran (0.5 g/kg) to prevent pest infestation and Bavistin (1 gm/kg) to prevent disease incidence. Adequate sunlight (around 50K lux) and temperature (around 35°C) should be ensured. Azolla produces large amounts of deoxyanthocyanins in extreme temperatures turning its appearance to an intense red carpet. This will lower the proportion of polyunsaturated fatty acids thereby reducing the palatability and nutritive value.

In cold regions fodder plots should be covered with plastic sheet to reduce the impact of cold weather. pH of the medium should be between 5.5 to 7. Adequate nutrients (including micronutrients) should be supplied through cow dung slurry / micronutrient mixtures. Harvesting should be done regularly to avoid overcrowding.



a) Red colouration due to deoxy-anthocyanin formation b) *Cryptoblabes gnidiella* on Azolla

Nutritive value of Azolla

Azolla is rich in organic matter, crude protein and fiber content which are beneficial to animal growth. Apart from this they are also rich in vitamins, minerals and amino acids which are essential for various metabolic activity of the animals. Azolla also contains micro nutrients like iron, copper, manganese, etc. The proportion of various nutrients is given below.

Dry Matter (DM)	4.6%
Organic Matter (OM)	74.5-82.6%
Crude Protein (CP)	21-23%
Crude Fiber (CF)	10-13%
Dry weight crude fat	4.8-6.7%
Total Fat (omega 3 PUFA)	6.1-7.7%
Total Fat (omega 6 PUFA)	12.8-26.4%
Amino acids, bio-active substances and biopolymers	7-10%