

Appendix

Azolla

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(Editor)

Extract from FAO Tropical Feeds Database

6 tropical and warm species (*A. filiculoides*, *A. pinnata*, etc.). The aquatic fern *Azolla* contains a symbiotic, heterocystous, blue-green alga, *Anabaena azollae* within cavities in its leaves. By the process of nitrogen-fixation the alga is capable of fulfilling the N requirements of the association.

An *Azolla* plant consists of a short, branched, floating stem bearing roots which hang down in the water. Each leaf is bi-lobed, the upper lobe containing green chlorophyll while the lower lobe is colourless. Under certain conditions, an anthocyanin pigment, also occurs giving the fern a reddish-brown colour. This is particularly associated with over-fertilization of ponds, pollution and excess sunlight. Shaded conditions are preferred to full exposure to tropical sunlight.

The plant is highly productive with the ability to double its weight in 7 days. It can produce 9 tonnes of protein per hectare of pond per year. It is used as green manure (in rice paddies), stock feed and for controlling mosquitoes by blocking water-surface. Because the fern can form dense mats on water surfaces, it is classified as a water weed in many areas.

Azolla has reportedly been used as a feed for pigs and ducks in SE Asia; for cattle, fish and poultry in Vietnam; and for pigs in Singapore and Taiwan. It is described as an excellent substitute for green forage for cattle in Vietnam and may replace up to 50% of the rice bran used as feed for pigs in that country.

Although very low in DM, it contains a high level of protein (24% CP). The amino acid composition of *Azolla* compared well with reference protein sources. Methionine is low, as with many leaf proteins, but the value for lysine is more than twice that of corn.

As a supplement for growing pigs, performance was reduced compared to controls in the growing phase but the animals compensated and grew faster in the period from 24-89 kg. It has been used as a sole feed for lactating sows which have a higher intake to deal with the low DM content.

Ducks (650-1800g LW) consumed 350g Azolla when given free-choice with sugarcane juice and soya (about 5% of the diet). It is also used for grazing ducks and geese in paddy fields where the Azolla is used as a fertilizer.

As % of dry matter

	DM	CP	ADF	NDF	Ash	EE	Ca	P	Ref
Azolla	23.4	26.6	39.2	15.5	5.1	0.10	0.05		634

Amino acid composition as % of crude protein

<i>Azolla filiculoides</i>											Ref: 634	
Arg	Cys	Gly	His	Ile	Leu	Lys	Met	Phe	Thr	Try	Tyr	Val
6.62	2.26	5.72	2.31	5.38	9.05	6.45	1.88	5.64	4.70	2.01	4.10	6.75