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## Azolla: Nutritional importance in animal feed and its composition

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### Abstract

Azolla is a good source of protein and it contains almost all essential amino acids, minerals such as iron, calcium, magnesium, potassium, phosphorus, manganese etc, apart from appreciable quantities of vitamin A precursor beta-carotene and vitamin B12. Due to the above facts, the nutritive value of Azolla as a feed supplement was explored. It is also a rich source of phytochemicals and is responsible for antioxidant activity. Inclusion of agricultural leftovers with Azolla increases the digestibility of feedstuff and the productivity of animals improves. The study was conducted to evaluate the nutritional composition of *Azolla pinnata* and its nutritional importance in animal feed. After its full growth, *Azolla pinnata* was harvested, washed properly to remove smell and dried in shade. The in shade dried Azolla was further used for analysis.

**Keywords:** Nutritional facts, Azolla feed, importance in animal

### Introduction

Aquatic plant, free floating fern Azolla which belongs to the family Azollaceae is a good source of protein and it contains almost all essential amino acids, minerals such as iron, calcium, magnesium, potassium, phosphorus, manganese etc, apart from appreciable quantities of vitamin A precursor beta-carotene and vitamin B12. *Azolla pinnata* being used as unconventional feed and protein supplement for animals like ruminants, pigs, poultry and fish. It is also found to contain probiotics and biopolymers. It has been also known as “green gold mine” because of its high nutritive value. Thus, Azolla appears to be a potential source of nutrients especially protein and has a considerably high feeding value (Hossiny *et al.*, 2008) [9]. Azolla can act as a valuable green feed supplement for dairy cattle to improve productivity (Chatterjee *et al.*, 2013) [7]. Due to easy cultivation, good nutritive value and high productivity it can be used as a beneficial fodder supplement as revealed by various researchers (Singh and Subhudhi 1978, Prabina and Kumar 2010) [14, 12]. Thus, the present study was conducted to analyse the nutritive value of *Azolla pinnata*.

### Materials and Methods

The Azolla had been cultivated at KVK Jalna II. Azolla beds placed in shady area, preferably under a tin shade, with sufficient sunlight should be chosen for the Azolla production unit. The present research analysis work has been carried out at soil science department, college of agriculture Dhule. Direct sunlight should be avoided. All three Azolla beds are having the dimensions 4 X 2 ft<sup>2</sup> with 0.5ft depth. About 20-25 kg fertile soil with cow dung was spread uniformly in bed. All mixture was well dissolved in water. Azolla bed with thorough mixing such that the mixture was spread evenly throughout the area. Water is filled in bed up to the level of 10-15 cm. All corners of the pit should be of the same level so that the water level can be kept uniformly. Each bed was inoculated with 2.5 kg of fresh and pure culture of Azolla and water was sprinkled over it. After 20-25 days, everyday 1 kg of Azolla can be harvested from each bed. About 40 per cent water was replaced with fresh water once every 15 days to prevent excess nitrogen accumulation. Replacement of water and soil should be followed by fresh inoculation of Azolla, once in six months.

### Collections and storage of azolla

Azolla multiplied rapidly and covered the complete pits within 7 days. Fully grown azolla was harvested every week from the water trough. Harvesting azolla was cleaned and thoroughly washed and shade dried for 2-3 days and dried till crispy and stored in air tight bags.

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**Table 1:** Proximate composition of *Azolla pinnata*

| Sr. No. | Nutrient                    | % DM  |
|---------|-----------------------------|-------|
| 1       | Organic matter (OM)         | 76.19 |
| 2       | Dry matter (DM)             | 86.72 |
| 3       | Crude fiber (CF)            | 13.67 |
| 4       | Crude protein (CP)          | 26.46 |
| 5       | Nitrogen free extract (NFE) | 41.97 |
| 6       | Ether extract (EE)          | 3.92  |
| 7       | Total ash (TA)              | 24.49 |

### Results and Discussion

The chemical composition of shade dried *Azolla pinnata* sample as presented in Table 1. revealed that the organic matter (OM) content of shade dried azolla was 76.19 percent. Azolla contained 86.72 percent dry matter (DM), 13.67 percent crude fibre (CF), 26.46 percent crude protein (CP), 41.97 percent nitrogen free extract (NFE), 3.92 percent ether extract (EE), 24.49 percent total ash (TA). The chemical composition of shade dried *Azolla pinnata* sample as presented in (Table 1) revealed that the dry matter content was 86.72 percent which was in close agreement with the results of Basak *et al.* (2002) [6], Balaji *et al.* (2009) [5] and slightly lower than the value obtained by Kumar *et al.* (2012) [11]. The less dry matter content of azolla may act as an impediment to use it on fresh basis as the bulk required to satisfy the DM requirements of livestock is very high. The value of crude fibre content 13.67 was close agreement with the values obtained by Balaji *et al.* (2009) [5], respectively. On the contrary Singh & Subudhi (1978) [14] reported less value and it ranged between 9.1 to 13.07 percent while Alalade & Iyayi (2006) [3] was reported 12.7 per cent CF. Further the higher range of CF values from 15.17 to 19.85 was recorded by Bolka (2011). The crude protein (CP) content of *Azolla pinnata* ranges from 24.65 to 28.96 with an average value of 26.46 percent. Similar or slightly higher value of CP were obtained by various researchers 26.7%, (Becerra *et al.*, 1995), 28.59% (Ahirwar and Leela 2012) and 28.24% (Indira *et al.*, 2009). In this study the Nitrogen free extract content of *Azolla pinnata* (% DM basis) was found as 41.97 percent Similar records were obtained by Chatterjee *et al.*, (2013) [7], Roy *et al.*, (2016) [13]. The result is comparable with the observation of Balaji *et al.* (2009) [5]. The result is lower than the observation of Tamang and Samanta (1993) [15] and Alalade and Iyayi, (2006) [3]. The present study was revealed that the ether extract was 3.92 percent, which was in agreement with Singh and Subudhi (1978) [14], Basak *et al.* (2002) [6], Balaji *et al.* (2009) [5]. The present study was also inline with Anitha *et al.*, (2016) [4] in *A. pinnata* and lower values recorded by Roy *et al.*, (2016) [13], Akhud *et al.*, (2017). The total ash content of *Azolla pinnata* obtained in this study was 24.49 percent, higher than the findings of Singh and Subudhi (1978) [14], Basak *et al.* (2002) [6], Alalade and Iyayi (2006) [3], Balaji *et al.* (2009) [5].

### Conclusion

Shade dried *Azolla pinnata* on chemical analysis showed that high in crude protein, hence it can be used as livestock feed as an unconventional feed.

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