



## Evaluation of nutritional value of prickly chaff flower (*Achyranthes aspera*) as fish feed ingredient

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Received: 26 June 2021; Accepted: 12 July 2021

### ABSTRACT

The nutritional value of seeds and leaves of *Achyranthes aspera* as fish feed ingredients was evaluated. The protein and lipid contents were higher in seeds and ash content was higher in leaves. In seeds, total 18 essential and non-essential amino acids were present; total 17 amino acids were found in leaves, cysteine was absent. The essential and non-essential amino acid contents were higher in seeds compared to leaves except, leucine, tryptophan, valine, alanine and tyrosine. Taurine content was higher in leaves. Higher saturated, monounsaturated and *n*-6 polyunsaturated fatty acids (*n*-6 PUFA) contents were observed in seeds, whereas, *n*-3 PUFA level was higher in leaves. In seeds, oleic and linoleic acid levels were 1863.34±9.25 and 3342.05±8.05 mg/100 g, respectively;  $\alpha$ -linolenic acids level in leaves was 1058.07±3.71 mg/100 g. Vitamins A, D<sub>2</sub>, E, B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, B<sub>12</sub> and C were present in seeds; vitamins A, D<sub>2</sub>, E, B<sub>2</sub> and B<sub>12</sub> were found in leaves. In seeds and leaves, four macro, nine trace and four ultra-trace minerals were found and contents were higher in leaves, except zinc. In seeds and leaves, iron contents were 76.82±4.15 and 293.73±11.40  $\mu$ g/g, respectively. Thus, seeds and leaves are rich sources of nutrients.

**Keywords:**  $\alpha$ -linolenic acid, *Achyranthes aspera*, Amino acids, Linoleic acid, Minerals, Vitamins

*Achyranthes aspera*, the prickly chaff flower (Amaranthaceae), occupies a significant position in Ayurveda, Unani and folk medicines of India. The herb grows profusely in the tropical climate of Asia, South America and Africa. In India, the plant grows throughout the year. The plant has several medicinal applications, viz. for the treatment of diabetes, dysentery, fever, hypertension, asthma (Girach-Aminuddin and Khan 1992, Tang 1992, Liersch 1992). The roots are applied for the treatment of diarrhoea and cold in children; leaves are effective to treat asthma and seeds have emetic and hydrophobic properties (Bishit and Sandhu 1990, Borthakur and Goswami 1995, Singh 1995). The aqueous extract of the plant stimulates immune system of mice (Vasudeva *et al.* 2002). Even the roots, leaves and seeds of the plant improve the immune system of fishes and provide protection against bacterial pathogens (Rao *et al.* 2004, Rao *et al.* 2006, Rao and Chakrabarti 2005, Chakrabarti and Rao 2006, Chakrabarti and Rao 2012, Chakrabarti *et al.* 2012, Kumar *et al.* 2019, Sharma *et al.* 2019, Singh *et al.* 2019). The seeds protect fishes from harmful UV-B irradiation (Singh *et al.* 2013a, Singh *et al.* 2013b). Feeding of fish with *A. aspera* seeds

and leaves enriched feeds always enhances the growth of fishes.

The scattered information are available on the composition of various parts of the plant. In seeds of *A. aspera*, two glycosides of oleanolic acid and two homogeneous saponins, saponin A and B are found (Hariharan and Rangaswami 1970). The seeds contain amino acids, fatty acids, different oleonic acid, saponins and ecdysterone (Varuna *et al.* 2010). The calorific value of seeds is 3.92/g (Goyal *et al.* 2007). In petroleum ether fraction of seeds, linolenic, oleic, palmitic and stearic acids are found; ecdysterone has been reported in the alcohol and aqueous alcohol extracts of the seeds (Chakrabarti *et al.* 2012). In root, stem and leaves extracts alkaloids, saponin, tannin, steroid reducing sugars, glycosides, phenolic compounds and protein are present (Dhale and Bhoi 2013). In leaves, 13 chemical compounds are isolated through HPLC and alkaloids are the dominant one (Meles *et al.* 2017). The proximate and mineral compositions of roots and leaves are documented (Joy *et al.* 2017, Rana *et al.* 2019). Review of literature shows the pharmacological importance of the plant and most of these studies are conducted in isolation. The present investigation has been designed to evaluate the nutritional value of seeds and leaves of *Achyranthes aspera* as fish feed ingredient. A holistic approach has been taken for their proper nutraceutical applications.

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