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Title: Characterization of the nutritional quality of amaranth leaf protein concentrates and suitability of fish meal replacement in Nile tilapia feeds

Author(s): Charles C. Ngugi¹, Elijah Oyoo-Okoth², Julius O. Manyala³, Kevin Fitzsimmons⁴, Ann Kimotho⁵

1. Mwea AquaFish Farm, Kenya

2. Department of Natural Resources, Karatina University, PO Box 1957, Karatina, Kenya

3. Department of Fisheries and Aquatic Sciences, University of Eldoret, PO Box 11125, Eldoret, Kenya

4. University of Arizona, USA

5. Ministry of Agriculture, Livestock and Fisheries, Kirinyaga County, Kenya

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Abstract: A number of leafy vegetables, their protein concentrates and hydrolasates are under evaluation as alternative protein ingredients to fish meal (FM) in aquafeeds. This study evaluated the nutritional characteristics and suitability of replacing FM with the amaranth (*Amaranthus hybridus*) leaf protein concentrates (ALPC) as a protein ingredient in the diet of Nile tilapia (*Oreochromis niloticus*). Experimental diets were formulated, where 100%, 75%, 50%, 40%, 20% and 0% FM protein was substituted by protein from ALPC. The six dietary treatments were tested in triplicate in static flow-through tanks. The substitution effects were compared in terms of fish growth performance, nutrient utilization, whole body composition and apparent nutrient digestibility. After 160 days of feeding, the growth, nutrient utilization and Feed Conversion Ratio (FCR) in fish fed diets containing 100%, 75%, 50%, 40% and 20% FM were better ($P < 0.05$) than those fed diet with 0% FM. The apparent nutrient digestibility was high for protein, lipid and energy and differed significantly among the dietary treatments ($P < 0.05$). Protein digestibility in fish was highest in feed formulated with 100%, 75%, 50% and 40% FM, which were significantly ($P < 0.05$) higher than at 25% and 0% FM. Lipid digestibility was comparable for all the diets except fish fed 0% FM. Digestible carbohydrates and dry matter were similar for all dietary treatments ($P < 0.05$). We demonstrate that it is possible to replace up to 80% of fish meal with ALPC without compromising the performance *O. niloticus*. These results demonstrate that although it is possible to replace large part of fish

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meal with ALPC, it is not possible to eliminate it in Nile tilapia diet as alternative protein ingredient.

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