

A replacement of plant protein sources as an alternative of fish meal ingredient for African catfish, *Clarias gariepinus*: A review

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Abstract

Aquaculture is one of the fastest growing industries in the world. This industry supplies half of the fisheries products consumed annually, and future global demand can only be supplied by increasing aquaculture production, which, in turn, requires more aquafeed. Alternative ingredients must be increasingly used to supply significant proportions of protein and energy in aquafeeds, creating both challenges and opportunities for researchers and industry. Nowadays, there are too many researches on fish disease, growth and health but less in a fish feed especially a replacement of protein from plant sources in the fish feed. One of the alternative ways to optimise the growth and health condition of the fish is provide them a good protein from plant as a replacement in fish meal with the natural source protein instead of giving a good rearing condition and caring of the fish. The present article was constructed to highlight a replacement of plant protein sources as an alternative of fish meal for fish feed in African catfish, *Clarias gariepinus* that has been done by researchers. However, the application of replacement from plant protein sources in fish meal is now gradually gaining importance in commercial aquaculture practices and opened the door for the researchers to expend of this application, thus more detailed studies on molecular basis should be looked as to get the quality and enough nutrient fish feed for good production of aquaculture industry.

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1. INTRODUCTION

Recent years have seen a dramatic expansion of aquaculture feed industry, matched by an intense period of research into the biology of farmed species. The range of species cultured is large and growing. According to National Aquaculture Sector overview in 2008, African catfish (*Clarias gariepinus*) was first introduced in Malaysia in the early 1980's and it has been reported as the second largest contributor in terms of aquaculture production in Malaysia. The African catfish, is locally known as Ikan Keli belongs to *Clariidae* family, omnivores feeding nature and obligatory air-breathing freshwater fish. African catfish is a most attractive species for aquaculture because of its high degree of hardiness, the ability to feed on variety of feeds, and rapid growth, and survival level in poorly oxygenated water (Pillay, 1990). This species has

high economic importance in many countries of the world including Malaysia. Many aqua farming choose this species because the sale price at the market also giving a good promising in profit to the farmer as well as its consumer acceptance and good market in local and global. Nowadays, there are many products produced from African catfish such as fresh and frozen whole-dressed fish, fillets, shank fillets, fillet strips, nuggets, steaks, breaded fillets and nuggets, marinated fillets, and smoked fillets (Silva and Dean, 2001) and make this fish are very valuable and has a high potential to be commercial entrepreneurship development.

Aquaculture is rising because the quickest growing food-producing business within the world due to the increasing demands for fish and seafood. Worldwide, the aquaculture business has vast at a median rate of 8.9% per year since 1970 (FAO, 2016; Huang & Nitin, 2019).