

# Dry green leaves of Indian almond (*Terminalia catappa*) to prevent streptococcal infection in juveniles of the Nile tilapia (*Oreochromis niloticus*)

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## Abstract

Two concentrations of dry leaves in powder (5 and 10 % in feed) of *Terminalia catappa* (Combretaceae) were embedded in a fish feed to prevent and limit the impact of *Streptococcus agalactiae* in juveniles of *Oreochromis niloticus*. Fish were fed with this enriched feed for 15 days before challenge disease and until 21 days after challenge. The cumulative incidence of disease and mortality were significantly reduced in treated fish compared to the controls. The relative percent survival (RPS) were 78% and 62%, respectively for 10 and 5% of leaves powder added in the feed. No negative impact on condition factor, weight gain and specific growth rate were observed in fish fed with dry green leaves of *T. catappa*.

## Introduction

Different species of streptococcus are responsible of disease in tilapia in Asian countries, however, epidemiological studies have shown that *Streptococcus agalactiae* is the dominant bacteria involved in streptococcal disease (Amal et al., 2008; Zhang et al., 2013; Jantrakajorn et al., 2014). This is also the case in Indonesia (Lusiastuti et al., 2014), even if *S. iniae* and *Lactococcus garviae* were also found (Anshary et al., 2014) in tilapia floating cages. Antibiotics are commonly used against streptococcal disease (Shoemaker and Klesius, 1997) but antimicrobial resistance is already observed in *S. agalactiae* (Faria et al., 2014; Lukkana et al., 2016). Furthermore,

small scale fish farmers often do not master the use of antibiotics. This may contribute to the promotion of antibiotic resistance within bacterial communities and increase the presence of residual antibiotic within the flesh of the fish. Both are serious concerns for public health, and misuse (and abuse) of antibiotics is considered a dangerous and unsustainable practice in aquaculture. Disease prevention using vaccines is a key approach to fighting diseases; however, a commercial vaccine for both biotype 1 and 2 of *S. agalactiae* is still not available and vaccine costs may not be affordable for small-scale fish farmers. For all of these considerations, alterna-

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