

ABSTRACT

The current study was designed to evaluate the effects of Licorice (*Glycyrrhiza glabra*) root powder (LRP) on innate immunity and growth performance of grass carp (*Ctenopharyngodon idella*). Grass carp were randomly distributed into 8 tanks in replicates (n= 10/ per tank) and fed with experimental diets twice a day supplemented with 0 LRP (control), 5% (5g LRP), 10% (10g LRP) and 20% (20g LRP) for 60 days. At the end of the experiment, growth performance and expression of various immune related genes was assessed. The growth statistics of Grass Carp fed LRP supplemented diets at various amounts considerably improved throughout the course of the experiment ($P < 0.05$), with the most significant growth ($P < 0.05$) reported in group fed with 10 and 20 grams of LRP/kg of food. The optimal inclusion of LRP in Grass Carp diets was discovered to be 20g/kg diet. Furthermore, using LRP in fish diets enhanced feed intake considerably ($P < 0.05$); however, FCR results indicated non-significant change between groups ($P > 0.05$). The fish given a 20 LRP/kg feed showed highest feed consumption, while fish on a control feed showed lowest feed intake. Maximum protease activity was observed in group treated with 20% LRP inclusion and minimum activity was observed in group fed with 5% Licorice root powder. Results also suggested that fish in every treatment group showed good health during the feeding trial, with no reported mortality. In conclusion, these findings suggest that dietary LRP supplementation has significantly improved health status, growth performance, mucus related immune parameters and expression of immune related genes in grass carp and thus upregulated its innate immune immunity. LRP supplemented diet can be recommended for grass carp at an optimal inclusion level of 20% per kg of diet to boost its immune status and growth performance. Altogether, Licorice root powder has immunostimulatory effects on grass carp and can be used to improve overall health status of grass carp (*Ctenopharyngodon idella*).