Aquaculture is developing, expanding and intensifying throughout the world, especially in Asian countries, however, the frequent outbreaks of various kinds of fish diseases have constituted the most important threat to the sustainable development of aquaculture. The usefulness of antibiotics for infectious disease control has been challenged by its potential harm to the public health due to antibiotic resistance and residue problem, therefore there is an urgent need to search for alternatives. In the recent years, there has been growing interest in the use of Chinese Medicinal Herbs (CMHs) to prevent and control both infectious and non-infectious fish diseases because of their well documented immunostimulating and hepatoprotective effects in human beings and terrestrial animals.

The studies presented in this dissertation aimed to evaluate the effects and clarify the possible mechanisms of immunostimulation and hepatoprotection of several CMHs in fish. Two herbal polysaccharides (Astragalus polysaccharide and lentinan) were chosen for the in vitro tests for immunostimulation in the Common Carp (Cyprinus carpio). Results showed that both herbal polysaccharides enhanced the production of reactive oxygen species and nitric oxide by macrophage and stimulated the proliferation of peripheral blood leukocytes (PBLs) in a dose-dependent way. Up-regulation of cytokine gene expression was seen in lentinan stimulated macrophages (IL-1β) and Astragalus polysaccharide stimulated PBLs (IL-1β, TNF-α, iNOS and IL-10). Four CMHs (Astragalus radix, Ganoderma lucidum, Scutellaria radix, Lonicera japonica) were tested for their in vivo effects of non-specific immunostimulation in the common carp (Cyprinus carpio) and/or the tilapia (Oreochromis niloticus). Results showed that all the herbs, used alone or in combination or with vaccine, can stimulate the non-specific immune responses of fish, as shown by enhancing some components of the innate immune system such as the respiratory burst activity and phagocytosis of phagocytic blood cells, lysozyme activity and circulatory antibody titres in plasma during certain periods of feeding experiments. Disease resistance of fish can be increased by the inclusion of Astragalus radix, Ganoderma lucidum and Lonicera japonica in the diets as shown...
by the increased survival after challenge with *Aeromonas hydrophila*. *Glycyrrhiza glabra* extract was chosen and tested for its hepatoprotective and antioxidant effect in the Common Carp (*Cyprinus carpio*) using an *in vitro* model of carbon tetrachloride (*CCl₄*) induced hepatocyte injury. Results showed that pre-treatment and pre & post-treatment of the hepatocytes with *Glycyrrhiza glabra* extract significantly reduced the elevated levels of lactate dehydrogenase, glutamate oxalate transaminase, glutamate pyruvate transaminase and malondialdehyde and increased the reduced levels of superoxide dismutase and glutathione peroxidase by *CCl₄*, suggesting its protective effects against *CCl₄* induced hepatocyte injury.

The results presented in this dissertation demonstrated the non-specific immunostimulating and hepatoprotective activities of CMHs in fish, suggesting that CMHs can be potentially used as immunostimulants and hepatoprotective agents for the prevention and control of infectious and non-infectious diseases in aquaculture.