

Role of immunomodulatory plants in pisciculture

SEEMA GUPTA AND PREETI MISHRA

Department of Zoology and Biotechnology, Government N.P.G. Science College, RAIPUR (C.G.) INDIA

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The basic function of immune system is to protect individuals against pathogens which put the immune system in a vital position between a healthy and diseased state of a host. Thus, it plays a crucial role in the defense against infections. Its integrity and effectiveness is important for the treatment of diseases. Therefore, modulation of immune system is to overcome disease that has been attention of many researchers. Immunomodulators are the substance of biological or synthetic in origin that can stimulate, suppress or modulate any of the components of the immune system. Immunostimulants, immunosuppressant and immunoadjuvants are the three groups of immunomodulators. Immunostimulants are likely to serve as promoting agent by enhancing the basic levels of immune responses, immunosuppressant could be used to control the pathological immune response and are active in autoimmune disease where as immunoadjuvants are to increase the effectiveness of vaccine. In traditional medicine, different plant parts and their products are believed to have specific medicinal properties including the ability to stimulate the body's immune mechanism (Craig, 1999). That's why Ayurveda termed "Rasayan" is devoted to enhancement of body resistance (Thatte and Dahanukar, 1997). Sharma (1981) identified list of thirty four plants as 'Rasaynas' in the Ayurvedic system of medicine. Agrawal and Singh (1999) reviewed fourteen indigenous medicinal plants investigated in laboratory on mammalian models for immunomodulatory effect. *Eclipta alba* (Lal *et al.*, 2010) and *Cynodon dactylon* (Santhi and Annapoorani, 2010) were also reported for immunomodulation. A survey of literature shows that people knew about the medicinal importance of plant few centuries back. However, it is only during the past few decades that re-emphasis has been given to their uses on health and treatment of diseases. There is not much information available on the immunomodulatory effect of

medicinal plants on the fishes which forms valuable source of food for mankind.

Fish culture is an age-old practice in India, which is the second largest fish culture producer in the world. Healthy or disease resistant culturable fishes are essential requirement for profitable aquaculture, which is achieved by providing nutritious diet or some natural or chemical substances that improve the general health of the fish or strengthen their immune system. Various synthetic chemicals and antibiotics have been used to prevent or treat fish diseases with partial success. However, the emergence of antibiotic resistant microorganisms is an important obstacle to their extensive uses. Subsequently, the use of botanicals as immunostimulant substances was introduced as a prophylactic measure. Since such uses have so far not shown any of the negative side effects that antibiotics and live vaccines may have on the fish and on the environment, they are attractive way of controlling fish infections (Mulero *et al.*, 1998) and development of resistance against pathogens. Direkbusarakom (2004) reported the major role of herbs and herbal products in aquaculture.

Botanicals have broad spectrum activities and can be extracted in commercial qualities. They are biodegradable and easily reversed in fish subjected to chronic concentrations (Fafioye, 2005). That's why in many parts of our country, plants are used in the traditional fishing system (Kadamban and Balachandram, 2005). Some plants have insecticidal, piscicidal and molluscicidal properties (Singh *et al.*, 2010). Piscicidal plants may be useful in developing eco-friendly methods to eradicate fishes from the aquaculture ponds without using any hazards chemicals. Several plants have toxic effect on weed fishes (Olafayo, 2009). That's why they are used to eradicate the unwanted fishes from the aquaculture ponds. One of the important plant *Azadirachta indica* exhibit strong insecticidal activity used to control predators