

## Different varieties of roses as natural dietary carotenoid sources for pigmentation and growth of Goldfish (*Carassius Auratus*)

\*Fernandes Danielle<sup>1</sup>, S. A. Saifuddin<sup>1</sup>, Lekshmi Manju<sup>2</sup>, Chaki Soma<sup>1</sup> and Singh Narendra Pratap Singh<sup>2</sup>

<sup>1</sup>Acharya Bangalore B-School, Bangalore University,  
dani@frnuds@gmail.com,

<sup>2</sup>ICAR-Central Coastal Agricultural Research Institute, Old Goa

**Abstract-** The attractive pigmentation of ornamental fishes, such as Goldfish (*Carassius auratus*), is mainly due to the carotenoids present in their tissues. To optimize the colour of aquarium fish, their feed is supplemented with carotenoid pigments in sufficient concentrations. With this objective, four different varieties of *Rosa hybrida* flower petals (Double delight, Jubileums, Brisbane blush and Restless) at three different concentrations (2, 4 and 6 gm/kg) were added to the formulated control feed, and fed at 3% of the body weight of the fishes, for 45 day period. The effect on pigmentation and growth parameters was studied. The effect of increasing the concentrations of the different Rose varieties on the length of the fishes was significant ( $P < 0.001$ ), with the highest concentration being the most effective. As regards the effect on weight gain, the effect of different concentrations of Rose flower were significantly different ( $P < 0.001$ ), and 4 gm/1000 gm of formulated control feed was seen to be most effective, with a decrease in weight at higher concentrations. The increase in carotenoid content of the fishes was clearly proportionate to the increase in concentration of the Rose petal, with 6 gm/1000 gm of formulated control feed being most effective.

### Introduction

Aquarium keeping is an immensely popular hobby, indulged by millions of enthusiasts all over the world (Ukaonu et al 2011). Goldfish (*Carassius auratus*), a freshwater fish of the Cyprinidae family, is the leading ornamental fish species due to their low maintenance, attractive aesthetics and easy availability (Jebaraja et al 2012). The attractive pigmentation of Goldfish is derived from the carotenoid pigments within their skin tissue (Ahilan et al 2008). Goodwin (1951) established that fish do not have the ability to biosynthesize carotenoids, instead they obtain these pigments from their diet (Gupta et al 2006). In natural conditions, fish feed on plants, phytoplankton, zooplankton and crustaceans which have carotenoids (Velasco-Santamaría et al 2011). However aquarium fish are deprived of these natural sources of food, and as a result often show degraded and faded skin colour (Pailan et al 2011). Synthetic carotenoid additives are expensive and have a deteriorating effect on the environment (García-Chavarría et al 2013). Hence, the use of natural compounds such as yeast, marine bacteria, green algae and plants extracts as pigment sources is preferred (Velasco-Santamaría et al 2011). With this background, *Rosa hybrida* flower was selected as a low cost and easily available natural carotenoid source in the diet of Goldfish. In this investigation, different