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# Partial replacement of meal by *Trichanthera gigantea* leaf powder on growth performance of bronze featherback (*Notopterus notopterus*)

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Bronze featherback (*Notopterusnotopterus*) is highly appreciated by its elastic meat. *Trichantheragigantea* leaf is a rich source of protein. This research evaluated the replacement of commercial pellet by *Trichantheragigantea* leaf powder (0÷25 %) on the physical, chemical and biological properties of bronze featherback. Results showed that 20 % or 25 % *Trichantheragigantea* leaf powder greatly improved specific growth rate (%/day), feed conversion ratio, survial rate (%), carcass yield (%), protein content (%), fat content (%). *Trichantheragigantea* leaf powder would be a promising alternative in fish feeding.

**Keywords: Carcass yield, fat content, feed conversion ratio, Notopterusnotopterus, protein content, specific growth rate, survial rate, Trichantheragigantea**

## INTRODUCTION

Bronze featherback (*Notopterusnotopterus*) is an important fish with a good source of protein (Chompunutch et al. 2019). It's commonly localized in standing or sluggish water of river, pond and cage (Nguyen et al. 2019). It has more spines in their flesh than any other Mekong fish species. It is widely consumed as scraped meat by its excellent gelling property (Khawaja et al. 2017; Minh and Nga, 2018). *Trichantheragigantea*is a non-legume species of fodder tree widely distributed in Vietnam. It can thrive under unfavorable environmental condition. It can be rejuvenated repeatedly by cuttings with rapid growth rate to produce high yield (Elena, 2017). It had a rich source of crude protein (12-22 %) with substantial weight gain and carcass weight effect (Ly et al. 2001; Sarwatt et al. 2003; Martens et al. 2012). The leaves and twigs of *Trichantheragigantea*can be utilized in livestock and aquaculture (Wanapat, 2009; Avril et al. 2012). Objective of our study was to examine the influence of replacement of fish meal by *Trichantheragigantea* leaf powder during fish culture.

## MATERIALS AND METHODS

### 2.1 Material

*Trichantheragigantea*leaves were collected in SocTrang province, Vietnam. They were dehydrated to 14 % moisture content by convective dryer at 45 $^{o}$C, air velocity 2 m/s for 18 hours. These dried leaves were finely ground into powder. Chemical reagents such as $K_2SO_4$, $CuSO_4$, $H_2SO_4$, NaOH, HCl, $H_3BO_3$, methyl red, ethanol, bromocresol green, petroleum ether were all analytical grade.

### 2.2 Researching method

Diet was formulated with meal replaced by 0÷25 % of *Trichantheragigantea* leaf powder. Fishes with initial weight about 200±5 g were stocked with a density of 4 fishes per cubic meter.

Feeding twice a day (at 8 AM in the morning and 8 PM in the evening) was applied. Experimental fishes were fed by commercial pellet with3 % of total body weight per day. All fishes were cultured in cage for 90 days. The experimental fishes were taken to examine specific growth rate (%/day), feed conversion ratio, survial rate (%), carcass yield (%), protein content (%), fat content (%).

### 2.3 Physical, chemical and biological evaluation

Specific growthrate (SGR, %/day) = 100*(natural logarithm of final weight-natural logarithm of initial weight)/ time (days) from stocking to harvesting.

Feed conversion ratio (FCR) = feed given (g)/body weight gain (g)

Survival rate (SR, %) = 100*(number of fish harvested/number of fish stocked)

Carcass yield (CY, %) = 100*(weight of muscle/ weight of fish)

Proteincontent (%) was determined by Kjedahl method (AOAC, 2000). Fatcontent (%) was evaluated by Soxhlet method (AOAC, 2000).

### 2.4 Statistical analysis

The experiments were run in triplicate with different groups of samples. The data were presented as mean±standard deviation. Statistical analysis was performed by the Statgraphics Centurion version XVI.

## RESULTS AND DISCUSSION

Growth performance of bronze featherback fed by *Trichantheragigantea* leaf powder was presented in figure 1-6. After 90 days of feeding trial, the specific growth rate (SGR) of bronze featherback fed by *Trichantheragigantea* leaf powder (5÷25 % replacement) was significantly higher than control (100 % commercial pellet). No significant difference was noticed in SGR (1.08 %/day and 1.1 %/day, respectively) between feeding 20 % and 25 % of *Trichantheragigantea* leaf powder (figure 1). The lowest of feed conversion ratio (FCR) was observed (1.05 or 1.04, respectively) in bronze featherback fed by 20 % or 25 % *Trichantheragigantea* leaf powder (figure 2). This implied that fish used commercial pellet with *Trichantheragigantea* leaf powder replacement had better feed efficiency. With 20 % or 25 % of *Trichantheragigantea* leaf powder replacement on commercial pellet, the survival rate was highest (96.26 % or 97.01 %, respectively). Meanwhile, fish fed by pure commercial pellet had the lowest survival rate (78.12 %) (Figure 3). This indicated that by replacement of *Trichantheragigantea* leaf powder by commercial pellet, fish had better strength to resist against negative factors in living environments. Carcass yield (%) on fish fed by meal replaced with *Trichantheragigantea*leaf powder (5÷25 %) was significantly higher than control (pure commercial pellet). The highest carcass yield (81.05 %) was observed on fish fed by 25 % *Trichantheragigantea* leaf powder. Meanwhile, the lowest carcass yiled (67.51 %) was recorded on fish fed by pure fish meal (figure 4). The more replacement of *Trichantheragigantea* leaf powder (5÷25 %) to commercial pellet, the higher protein content and lower fat content in fish muscle were observed (figure 5 and 6). Fish fed by pure commercial pellet had much more fat (2.16 %) and less protein (17.08 %). Meanwhiel fish fed by meal with 25 % *Trichantheragigantea* leaf powder, the fat content (1.98 %) and protein content (19.75 %) were clearly presented. This meaned that bronze featherback had better carcass quality because consumer prefer to lean fish instead of fat fish. Generally, the bronze featheback should be fed by commercial pellet replaced by 20 % or 25 % *Trichantheragigantea* leaf powder.

Several literatures mentioned to application of *Trichantheragigantea*as feed utilization. The diet of rabbits could be replaced by 27 % *Trichantheragigantea* to encourage feed intake and growth efficiency (Sarwatt et al., 2003). One investigation of the inclusion of 50% *Trichantheragigantea* leaf meal in diet on rectal digestibility of nutrients and N balance of pigs was conducted (Ly et al., 2014). *Trichanthera* foliage could completely replace water spinach as a fresh fibrous vegetable for young growing ostrich (Nguyen and Le, 2015). Nile tilapia fed with *Trichantheragigantea* leaf meal greatly affected to the ovarian development of the juvenile tilapia stocked in aquaponics system based on the relative fecundity and the oocyte maturation (Gliza et al., 2016). Quails fed 15 % *Trichantheragigantea* leaf meal had a higher profit on investment than those fed 25 % *Trichantheragigantea* leaf meal (Feleciano, 2017). *Trichantera* leaf meal in 20% fermented diet can be utilized efficiently to grow pig (Elena, 2017). The influence of semi replacement of commercial sheep ration with *Trichantheragigantea* leaves was verified. This replacement contributed to a significant improvement in weight gain, protein concentration, dressing yield, carcass weight in lamb (Balraj et al., 2018). Numerous levels of

*Trichantheragigantea* leaf meal affected the growth efficiency, hematological profile, and sensory characteristics of pekin ducklings. The pekin ducks fed with 15 % *Trichantheragigantea* leaf meal resulted better weight gain and lower feed intake (Freddie, 2020).

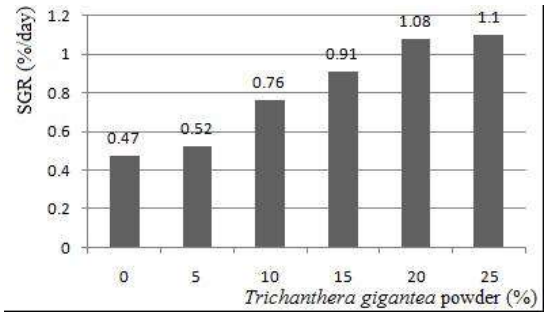


**Figure 1: Feed meal replaced by *Trichantheragigantea* leaf powder (%) on specific growth rate (%) of bronze featherback**

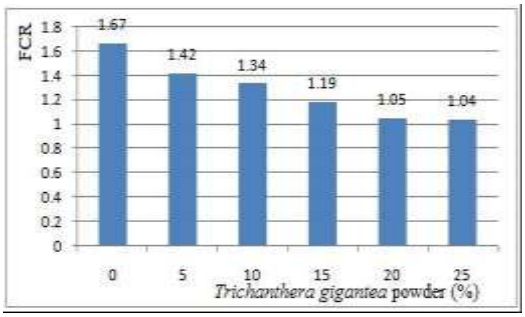


**Figure 2: Feed meal replaced by *Trichantheragigantea* leaf powder (%) on feed conversion ratio of bronze featherback**

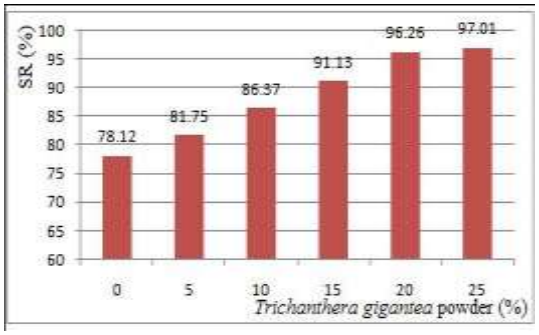


**Figure 3: Feed meal replaced by *Trichantheragigantea* leaf powder (%) on survival rate (%) of bronze featherback**

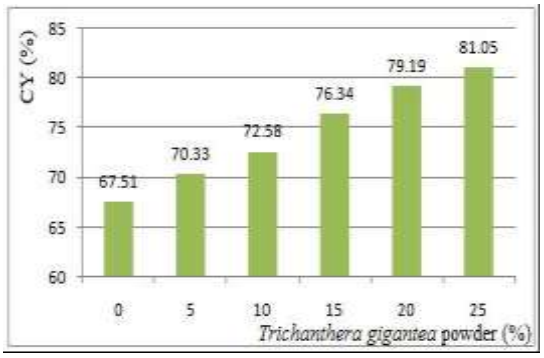


**Figure 4: Feed meal replaced by *Trichantheragigantea* leaf powder (%) on specific carcass yield (%) of bronze featherback**

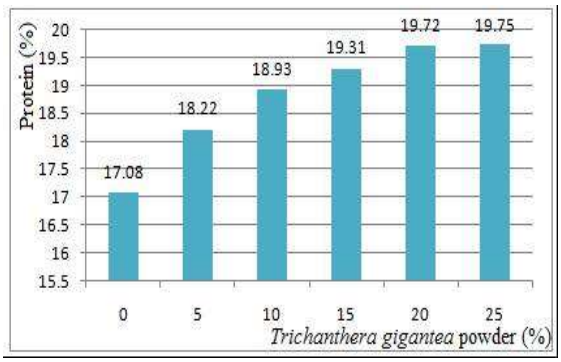


**Figure 5 Feed meal replaced by *Trichantheragigantea* leaf powder (%) on protein content (%) of bronze featherback**

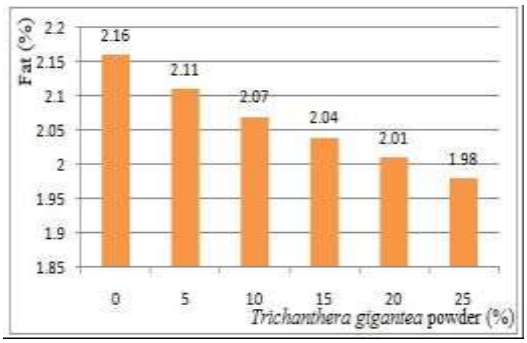


**Figure 6: Feed meal replaced by *Trichantheragigantea* leaf powder (%) on fat content (%) of bronze featherback**

## CONCLUSION

*Trichantheragigantea* leaf is one of the protein-rich foliage popularly distributed in Vietnam. It contained abundance of nutrients essential for bronze featherback. This research successfully demonstrated the impact of *Trichantheragigantea* leaf powder in fish meal in respect of growth performance of bronze

featherback. As a good source of protein, *Trichantheragigantea* leaf powder greatly enhanced specific growth rate, feed conversion ratio, survial rate, carcass yield, protein and fat content inbronze featherback muscle.

## CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

## ACKNOWLEGEMENT

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## AUTHOR CONTRIBUTIONS

Nguyen Phuoc Minh arranged the experiments and also wrote the manuscript.



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