

# E-BOOK OF EXTENDED ABSTRACT

## THE 14<sup>TH</sup> INTERNATIONAL INVENTION, INNOVATION & DESIGN COMPETITION 2025



14<sup>TH</sup> **INDES** 2025

ENVIRONMENTAL • SOCIAL • GOVERNANCE



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THE 14th INTERNATIONAL  
INVENTION, INNOVATION &  
DESIGN COMPETITION 2025

**Organized by:**

Office of Research, Industry,  
Community & Alumni Network  
UiTM Perak Branch

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Perpustakaan Negara Malaysia

Cataloguing in Publication Data

No e- ISBN: 978-967-2776-52-9

Cover Design: Dr. Mohd Khairulnizam Ramlie

Typesetting : Georgia

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# INNOVATIVE USE OF TRICHANTERA GIGANTEA LEAVES AND PINEAPPLE WASTE AS ECO-FRIENDLY FEED ADDITIVES FOR ENHANCED TILAPIA GROWTH

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## ABSTRACT

The rising demand for sustainable aquaculture practices has prompted the exploration of alternative, eco-friendly feed additives to support fish growth while reducing environmental impacts. This study investigates the effects of incorporating *Trichanthera gigantea* and pineapple waste as feed additives in the diets of juvenile tilapia (*Oreochromis niloticus*). To the best of our knowledge, this is the first study to examine the combined use of these two plant-based ingredients in tilapia nutrition. Four experimental diets were formulated, with varying inclusion levels of *T. gigantea* and pineapple waste, and their effects on weight gain, growth performance, and feed conversion ratio (FCR) were assessed for 28 days in controlled aquaculture tanks. Among the tested formulations, the diet containing 10% pineapple waste and 10% *T. gigantea* yielded the most favorable FCR of 1.25, indicating improved feed efficiency without compromising fish growth. To our knowledge, this is the first study to report on the effects of a combined diet of *Trichanthera gigantea* and pineapple waste as feed additives in tilapia juveniles (*Oreochromis niloticus*), demonstrating a novel and potential stage-specific nutritional approach in sustainable aquaculture. This synergistic use of agro-industrial and plant-based waste presents a cost-effective and environmentally sustainable strategy for aquaculture. The findings support the potential of utilising local, underused bioresources to promote circular economic practices in fish farming, aligning with global goals for sustainable food production.

**Keywords:** Tilapia, pineapple waste, *Trichanthera gigantea*, sustainable aquaculture

## 1. INTRODUCTION

Aquaculture has emerged as a significant source of protein for global consumption, particularly in developing nations such as Malaysia. However, the dependence on conventional aquafeed is costly and ecologically unsustainable. Efforts have been directed toward identifying alternative protein sources, such as plant-based ingredients, that can promote fish growth and are environmentally friendly. To ease the dependence on imported feed ingredients, alternatives such as local agro-industrial byproducts and multipurpose fodder plants were further explored. Locally known as Ketum Ayam, *Trichanthera gigantea* is known for its high crude protein content of 12-22% (Heuzé et al., 2016) and has the potential to become an alternative protein source in animal feed. In addition, pineapple waste which is a major byproduct of fruit processing industries, contains vitamin C, carotenoids, and flavonoids (Roda & Lambri, 2019). The combination of these ingredients in fish diets could potentially enhance nutrient availability, reduce feed costs, and support sustainable aquaculture practices. The Nile tilapia fish (*Oreochromis niloticus*) is the main choice of fish farming in the local region due to its market acceptability and ability to grow on a wide range of diets, apart from tolerance to a wide range of environmental conditions. Most tilapia fish farmers depend on locally available feed ingredients to supplement the diet of their cultured fish as this minimises their production costs (Mmanda et al., 2020). This study aims to investigate the appropriate diet formulated for Tilapia fish (*Oreochromis niloticus*), a common fish species for the aquaculture industry.

## 2. METHODOLOGY

The fish pellet was prepared by mixing all the ingredients. The main ingredients, *Trichanthera gigantea*, and pineapple waste, were mixed in a ratio of 0:5, 5:0, 5:5, and 10:10 g, respectively. The amount of 32 g of mealworms was used as the main protein source in making fish pellets. Drying and grinding procedures of pineapple waste and *Trichanthera gigantea* leaves were performed to produce fine powder, and mixed with other ingredients, forming the dough (Table 1). The dough was pelletised into 2mm according to the appropriate feeding stage.

**Table 1:** Formulation of Feed Additives in Fish Diets

Formulation Diet	<i>Trichanthera gigantea</i> (TG) leaves (g)	Pineapple waste (PW) (g)	Mealworms (g)	Palm oil (mL)	Water (mL)	Tapioca starch (g)
T1	5	0	32	10	23	30
T2	0	5	32	10	23	30
T3	5	5	32	10	23	25
T4	10	10	32	10	23	15

The study was conducted using four dietary treatments and three replicates of the respective dietary treatments. Tilapia juveniles weighing 8- 11g were arbitrarily selected and reared in controlled tanks with the appropriate temperature and pH level to provide the suitable water quality. The fish were acclimatised for 1 week to prevent stress and fed commercial pellets before being fed with formulated diets daily for 28 days.

## 3. FINDINGS

The feed conversion ratio (FCR: feed per unit of body weight gain) is an important indicator of the quality of fish (Boyd & Nevin, 2022). From the study, juvenile tilapias were fed diets containing varying combinations of pineapple waste (PW) and *Trichanthera gigantea* (TG) leaves to assess their impact on growth performance and FCR. All experimental groups supplemented with PW and/or TG demonstrated lower FCR values, suggesting improved feed utilisation in contrast with the control group (commercial pellets) (Table 2). Both T3 (5% PW + 5% TG) and T4 (10% PW + 10% TG) groups performed well, with FCRs of 1.33 and 1.25, respectively. These findings confirm the potential of moderate-level supplementation to enhance feed efficiency compared to conventional feed. Meanwhile, both Groups T1 and T2, with only one additive at 5%, showed moderate FCR improvements (7.70 and 6.30), reinforcing the conclusion that a combination of both additives is more effective than using either alone.

**Table 2:** Weight Gain, Specific Growth Rate and Feed Conversion Rate of Tilapia Fish from Diet Groups

Group	Weight Gain (%)	Specific Growth Rate (%)	Feed Conversion Rate (FCR)
Control	10.53	0.36	13.30
T1	18.18	0.57	7.70
T2	22.22	0.71	6.30
T3	105.45	2.57	1.33
T4	111.64	2.67	1.25

The results also indicate that the efficacy of the feed formulation is dose-dependent, as different levels of PW and TG yielded varied FCR values. This responsiveness should be considered alongside the developmental stages of tilapia, from fingerlings to growers, since feed intake and nutrient requirements vary by life stage (Anis et al., 2022). These findings support the use of agricultural by-products as eco-friendly feed additives (Paguia et al., 2024).

Incorporating pineapple waste and *Trichanthera gigantea* leaves into the tilapia diet lead to improved efficiency, growth performance, and promote environmental sustainability and potential circular economy practices in aquaculture. Further research into digestibility, long-term effects, and nutrient bioavailability is recommended to optimise formulations for commercial application.

#### 4. CONCLUSION

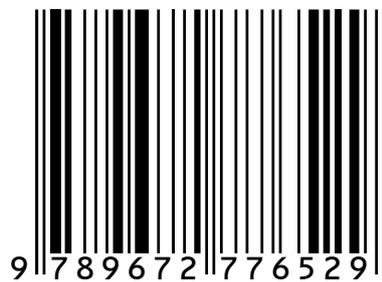
To the best of our knowledge, this study is the first to evaluate the combined use of *Trichanthera gigantea* and pineapple waste as dietary additives in juvenile tilapia (*Oreochromis niloticus*). The formulation containing 10% pineapple waste and 10% *T. gigantea* yielded the most efficient feed conversion ratio (FCR) of 1.25, indicating its potential as a stage-specific nutritional strategy in sustainable aquaculture. Hence, utilising these locally available agricultural byproducts and tropical plants not only enhances feed efficiency but also promotes potential circular economy practices. Further research on long-term effects and nutrient bioavailability is recommended to validate its applicability at a commercial scale.

#### REFERENCES

- Mmanda, F. P., Mulokozi, D. P., Lindberg, J. E., Norman Haldén, A., Mtolera, M., Kitula, R., & Lundh, T. (2020). Fish farming in Tanzania: the availability and nutritive value of local feed ingredients. *Journal of Applied Aquaculture*, 32(4), 341-360.
- Heuzé, V., Tran, G., Boudon, A., & Bastianelli, D. (2016). *Nacedero (Trichanthera gigantea)*. Feedipedia, a program by INRA, CIRAD, AFZ and FAO. <http://www.feedipedia.org/node/7270>
- Roda A, Lambri M. (2019). Food uses of pineapple waste and by-products: A review. *Int J Food Sci Technol.*, 54, 1009-1017.
- Boyd, C. E., & McNevin, A. A. (2022). Overview of aquaculture feeds: Global impacts of ingredient production, manufacturing, and use. In D. A. Davis (Ed.), *Feed and feeding practices in aquaculture* (2nd ed., pp. 3–28). Woodhead Publishing. <https://doi.org/10.1016/B978-0-12-821598-2.00003-5>
- Anis Mohamad Sukri, S., Andu, Y., Tuan Harith, Z., Sarijan, S., Naim Firdaus Pauzi, M., Seong Wei, L., Dawood, M. A. O., & Abdul Kari, Z. (2022). Effect of feeding pineapple waste on growth performance, texture quality and flesh colour of Nile tilapia (*Oreochromis niloticus*) fingerlings. *Saudi journal of biological sciences*, 29(4), 2514–2519. <https://doi.org/10.1016/j.sjbs.2021.12.027>
- Paguia, H.M., Paguia, R.Q., Peralta, R.A., Esaga, T., Balba, C.M. & Corpuz, M.N.C. (2024). Effect of fermented Madre de Agua leaf meal (*Trichanthera gigantea*) on growth performance of heritage free-range chicken (*Gallus domesticus* Linn.) *GPH J. Agric. & Res.* 7(2), 43-50.

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e ISBN 978-967-2776-52-9



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