



Evaluating the efficacy of *Tephrosia vogelii* (Fish Poison bean) leaf powder as an anesthesia on *Oreochromis niloticus* (Nile tilapia)

Pushpakanthan A.*, Herath S.S. and Sanuja R.G.

Department of Fisheries and Aquaculture, Faculty of Fisheries and Marine Sciences & Technology, University of Ruhuna, Matara

*Email: pushpakanthan97@gmail.com

Abstract

Anesthetic agents play a crucial role in aquaculture by mitigating stress and minimizing injuries among cultured fish, thereby maintaining their overall health. The efficacy of *Tephrosia vogelii* leaf powder as a potential anesthetic agent for Nile tilapia (*Oreochromis niloticus*) was investigated in this study. Fish poison bean is naturally more available and has shown sedative and anesthetic effects in terrestrial studies. The study involved preparing leaf powder solutions of four concentrations (5-20 mg/L) for two size categories such as small (0.7–1.6 g) and large size (3.5-6.5 g) of Nile tilapia. Through meticulous observation and video recording of the four stages of anesthesia based on behavior of fish As1 (fast swimming behavior), As2 (gaping behavior and some different positions of swimming), As3 (losing equilibrium), As4 (failure to respond to intense environmental stimuli), and two recovery stages RC1 (long-lasting balance restoration) and RC2 (Total recovery) were documented for each concentration. The findings revealed notable variations in anesthetic periods among different concentrations, with lower concentrations prolonging the induction of anesthesia. In concentration 5 mg/L, it took more longer time to reach (Response to visual stimuli and swimming avoidance), while 20 mg/L facilitated quicker induction for both small and large fish. Moreover, recovery time increased significantly with higher concentrations, suggesting a dose-dependent effect. Physicochemical parameters such as total dissolved solids (TDS), pH, salinity, and dissolved oxygen (DO) exhibited concentration-dependent variations, further highlighting the importance of dosage in achieving desired anesthetic effects. Behavioral responses to the anesthetic included distinctive changes such as slow and erratic swimming, increased opercular beat rate (18- before As1, 22- after RC2) and partial loss of equilibrium, providing valuable insights into the physiological impact of *Tephrosia vogelii* leaf powder on Nile tilapia. Small fish groups were more sensitive to the leaf powder solution compared to larger fish in all concentrations. Effective concentrations for anesthesia were determined, with 10 mg/L identified as optimal for both size group of fish. Overall, the results demonstrated the efficacy of *T. vogelii* leaf powder as an anesthetic agent for Nile tilapia, offering a promising alternative of stress-free manipulation in aquaculture practices by providing valuable insights into dosage-dependent effects and physiological responses. Further research could explore the broader applicability of *T. vogelii* leaf powder across different fish species and aquaculture settings, enhancing its utility in promoting animal welfare and productivity within the aquaculture industry.

Keywords

Fish poison bean, Tephrosia vogelii, Nile tilapia, anesthetic time, recovery time