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**Reyes Alvin T**

College of Fisheries-Freshwater  
Aquaculture Center, Central  
Luzon State University, Science  
City of Muñoz, Nueva Ecija,  
Philippines

**Cando Elmer N**

College of Fisheries-Freshwater  
Aquaculture Center, Central  
Luzon State University, Science  
City of Muñoz, Nueva Ecija,  
Philippines

## Prevalence and intensity of ectoparasites in juvenile Nile tilapia (*Oreochromis niloticus* L.) Grown in earthen ponds in Minalin, Pampanga, Philippines

**Reyes Alvin T and Cando Elmer N**

### Abstract

This study aimed to determine the prevalence and intensity of ectoparasites in the gills and skin of juvenile Nile tilapia (*Oreochromis niloticus* L.) grown in earthen ponds in Minalin, Pampanga, Philippines. Five ectoparasites namely, *Trichodina* spp., monogenean, *Ambiphyra* spp., *Coleps* spp. and *Euplotes* spp. were recorded in both gills and skin of the collected tilapia samples. *Trichodina* spp. recorded the highest prevalence and intensity of all the parasites identified and this could be attributed to its direct life cycle. Intensification of aquaculture practices creates parasitic problems that originate from overcrowding or deteriorating water quality.

**Keywords:** Aquaculture, Nile tilapia, ectoparasites

### 1. Introduction

Nile tilapia (*Oreochromis niloticus* L.) is considered as the second trendiest cultured fish in the Philippines after milkfish<sup>1</sup>. It provides Filipinos with animal protein of low price and of excellent flesh quality. It is believed that in the future, Nile tilapia may become the most important finfish in the world<sup>[1]</sup>. Asia as the main tilapia producer in the region is also responsible for the spectacular growth experienced during the past decade<sup>[2]</sup>.

Tilapia culture occurs in a wide range of environments including freshwater, seawater and brackishwater<sup>[3, 4]</sup>. Tilapia was initially described as more disease resistant than other species of cultured fish<sup>[5]</sup>. However, the intensification of fish culture practices creates disease problems that originate from overcrowding or deteriorating water quality such as unsuitable water temperature, pH, carbon dioxide and free ammonia concentrations<sup>[6, 7, 8]</sup>. The reality in commercial tilapia production is that multiple disease agents are present<sup>[9, 10]</sup>. Because of this, fish health and production efficiency are affected. According to Pozio and Rosa<sup>[11]</sup>, the high risk of disease transmission among species has increased the level of insecurity which farm managers have to contend with to develop the industry.

Parasites exert profound and pervasive costs on their hosts through mounting immunity based defense, causing reduced growth and reproduction, and immunopathology<sup>[12, 13]</sup>. It also deteriorates the normal health condition of fish and cause mortality, thus results in great economic loss<sup>[14]</sup>. Ectoparasites are the most dangerous group causing severe mortalities in farmed fishes<sup>[15]</sup>. These parasites are commonly found in the skin, fins and gills of fishes<sup>[16]</sup>.

### 2. Materials and Methods

#### 2.1. Collection of tilapia samples

One hundred (100) pieces of juvenile Nile tilapia, with individual length of 5 to 15 cm were collected from grow-out farms in 13 barangays of Minalin, Pampanga, Philippines. The collected samples were placed in aerated plastic bags with pond water.

#### 2.2. Preparation of smear and identification of the ectoparasites

Smears of gills and skin were separately made and examined under the photomicroscope for the presence of ectoparasite. The parasite specimens were identified to genus level using the reference keys of Kabata<sup>[17]</sup>. The prevalence and intensity of the parasite were computed following the formulae proposed by Margolis *et al.*<sup>[18]</sup>.

**Corresponding Author:**

**Reyes Alvin T**

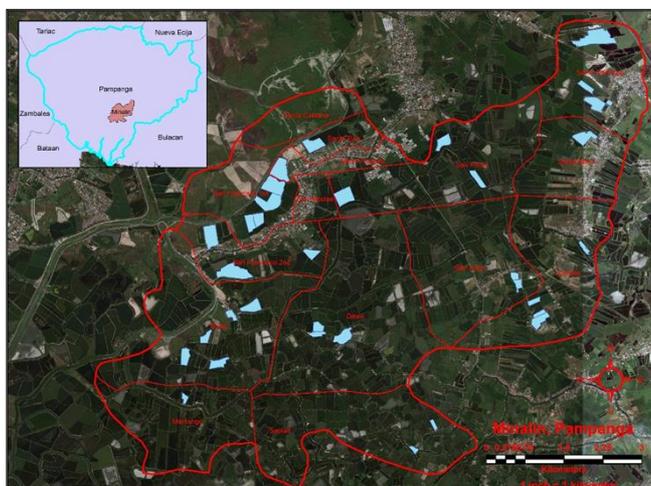
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City of Muñoz, Nueva Ecija,  
Philippines

Prevalence = (number of host parasitized/number of host examined) x 100

Intensity = number of parasite/number of host parasitized

### 3. Results and Discussion

The 13 barangays of Minalin, Pampanga, Philippines that served as collection sites for juvenile Nile tilapia were Bulac, Dawe, Lourdes, Maniango, Saplad, San Isidro, San Francisco 1<sup>st</sup>, San Francisco 2<sup>nd</sup>, San Pedro, Sta. Maria, Sta. Rita, Sto. Domingo and Sta. Rosario (Figure 1). Parasitological analysis of both gills and skin resulted to the identification of five ectoparasites namely, *Trichodina* spp., mononegenean (*Dactylogyrus* spp. and *Gyrodactylus* spp.), *Ambiphyra* spp., *Coleps* spp. and *Euplotes* spp. *Trichodina* is a genus of ciliate alveolates that is ectocommensal or parasitic on aquatic animals, particularly fish. This parasite is characterized by the presence of a ring of interlocking cytoskeletal denticles, which provide support for the cell and allow for adhesion to surfaces including fish tissue<sup>[19]</sup>. Monogeneans are a group of ectoparasitic flatworms commonly found on the skin, gills, or fins of fish. They have series of hooks which are used to attach onto fish, and as a result, could lead to infections<sup>20</sup>. *Ambiphyra* is a sedentary ciliate that is found on the skin, fins or gills of host fish. This parasite is identifiable by having cylindrical shape, row of oral cilia and middle bank of cilia<sup>21</sup>. The parasite *Coleps* is a genus of ciliates in the class Prostomatea with barrel-shaped body and a test made of biomineralized plates<sup>[22]</sup>. *Euplotes* is an interesting ciliate with a transparent body. It has large cilia that is tufted together to form cirri and a band-like macronucleus<sup>[23]</sup>.



**Fig 1:** The blue polygons are tilapia grow-out ponds that served as collection sites of juvenile Nile tilapia.

The most prevalent parasite in juvenile Nile tilapia grown in ponds in Minalin, Pampanga was *Trichodina* spp. wherein 80% and 70% of the collected samples were being parasitized in the gills and skin, respectively. Next to *Trichodina* spp. was *Coleps* spp. with prevalence of 29.83% in the gills and 24.60% in the skin. The monogenean parasites ranked third (gills = 22.67%; skin = 16.45%), followed by the *Ambiphyra* (gills = 10.36%; skin = 8.10%) and least the parasite *Euplotes* spp. (gills = 4.38%; skin = 6.38%) (Table 1).

The gills of tilapia (67 *Trichodina*/fish, 16 monogenean/fish, 13 *Ambiphyra*/fish, 37 *Coleps*/fish and 14 *Euplotes*/fish) harbor more ectoparasites than its skin (43 *Trichodina*/fish, 5 monogenean/fish, 24 *Ambiphyra*/fish, 25 *Coleps*/fish and 5 *Euplotes*/fish) based upon computed parasite intensity. In both

gills and skin, the highest parasite intensity was in *Trichodina* spp. and this could be attributed to its direct life cycle and ability to reproduce in a wide range of temperatures (Table 1).

**Table 1:** Prevalence and intensity of ectoparasites in the gills and skin of juvenile Nile tilapia grown in earthen ponds in Minalin, Pampanga, Philippines

Ectoparasites	Prevalence (%)		Intensity (parasite/fish)	
	Gills	Skin	Gills	Skin
<i>Trichodina</i> spp.	80.00	70.00	67	43
Monogenean	22.67	16.45	16	5
<i>Ambiphyra</i> spp.	10.36	8.10	13	24
<i>Coleps</i> spp.	29.83	24.60	37	25
<i>Euplotes</i> spp.	4.38	6.38	14	5

Occurrence of pathogenic diseases in fishes might be due to intensification of production and lack of health management measures<sup>[24]</sup>. About 80% of fish diseases are parasitic especially in warm water fishes<sup>[24]</sup>. Their presence on farmed fishes indicates poor husbandry practices and environmental conditions<sup>[25, 26, 27, 28]</sup>. According to Reyes<sup>29</sup>, parasites of farmed tilapia in Pampanga, Philippines have originated from infected hatcheries where fry and fingerlings used to stock ponds have been raised. Poor hatchery conditions provide excellent breeding environments for parasites as intra-population transmission rates becomes high in such facilities<sup>[30, 31]</sup>.

Parasites, to a large extent, are detrimental for a fish population and consequently, impose high losses in production. Parasitic invasion on fishes may cause high mortality, weight losses and reduced fecundity<sup>32</sup>. Besides direct losses caused by mortality, parasites may have considerable impact on growth and behavior of fish, their resistance to other stressing factors and susceptibility to predation<sup>[33]</sup>.

### 4. Conclusion

Five ectoparasites namely, *Trichodina* spp., monogenean, *Ambiphyra* spp., *Coleps* spp. and *Euplotes* spp. were recorded in both gills and skin of juvenile Nile tilapia grown in Minalin, Pampanga, Philippines. The parasite *Trichodina* spp. was the most prevalent and had the highest intensity.

### 5. Acknowledgement

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