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Distribution and Prevalence of Fungi Species across Selected Fish Pond Waters in Yenagoa Metropolis, Bayelsa State, Nigeria

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ABSTRACT

This study investigated the distribution and prevalence of fungal species in selected fish pond waters across Yenagoa Metropolis, Bayelsa State, Nigeria. Fish pond water samples were collected from five fish ponds located in five communities within Yenagoa Metropolis, and analyzed for their physicochemical parameters using standard analytical procedures. Isolation, enumeration and tentative identification of fungi species from the fish pond water samples were performed following standard microbiological methods. Results revealed that across the fish pond waters pH were quite acidic, with values ranging from 5.79 to 6.57, while biochemical oxygen demand (2.88 to 4.02 mg/L), dissolved oxygen (2.54 to 3.51 mg/L) and turbidity (27.33 to 106 NTU), were below WHO permissible limits of 10 mg/L, 8-10 mg/L and 5-25 NTU, respectively. Fungal counts in all samples were too few to count (<30 colonies). Twenty (20) fungal isolates belonging to seven genera were identified; *Penicillium*, *Mucor*, *Aspergillus*, *Rhizopus*, *Fusarium*, *Candida*, and *Rhodotorula*. *Penicillium* species were the most prevalent (100%) across the sampled fish pond waters. This study demonstrated that the sampled fish pond waters across Yenagoa Metropolis harboured diverse fungal species despite low fungal counts. The prevalence of *Penicillium* species suggests their adaptability to pond environmental conditions and available organic substrates. Although most *Penicillium* species are not primary fish pathogens, some species may produce mycotoxins and act as opportunistic pathogens under favourable conditions, posing potential risks to fish health and indirectly to public health through contaminated fish products. These findings provide baseline information on fungal prevalence in the sampled fish pond waters and highlight the need for routine monitoring of water quality and microbial communities to promote sustainable aquaculture practices and reduced risk of fungi-related diseases.

Keywords: Fish pond water, Fungi, Physicochemical parameters, Prevalence, *Penicillium*, Bayelsa State.

Introduction

Fish farming has become one of the fastest-growing agricultural sectors worldwide and plays an important role in global food security and poverty reduction. In Nigeria, aquaculture has developed rapidly, making the country the second largest aquaculture producer in Africa and the leading producer of African catfish (*Clarias gariepinus*) and African bonytongue (*Heterotis niloticus*) (Ogunji & Wuterz, 2023). Fish farming contributes significantly to household nutrition, employment, and economic development, as fish provides a major and affordable source of animal protein for many Nigerians (Ogunji & wuterz, 2023). Aquaculture can be practiced using concrete ponds, earthen ponds, fibre glass tanks and plastic tanks. These range from small scale for home use subsistence to large scale commercial system (Olajuyigbe *et al.,* 2020). Fish ponds are artificial ecosystems that host diverse microorganisms—including bacteria, fungi, protozoa, algae, and viruses which help maintain ecological balance, support fish health, and improve water quality (Onianwah, 2018).

Microorganisms enter ponds through water, decomposing feed, sediments, and fish wastes colonizing water, sediments, and fish surfaces (Zhang *et al.,* 2021). Their diversity is influenced by these, and other environmental factors such as temperature, pH, dissolved oxygen, and nutrient levels.

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Additionally, some microorganisms serve as live food for fish larvae and zooplankton, providing essential nutrients and forming a key part of the pond's food web (Onianwah, 2018). Several researchers have reported the occurrence of different fungal species in fish ponds and aquaculture environments. Commonly isolated genera include *Aspergillus*, *Penicillium*, *Fusarium*, *Alternaria*, and *Rhizopus*. A study investigating fungal contamination in fish farm water identified species such as *Aspergillus fumigatus, Penicillium citrinum*, and *Fusarium oxysporum*, with higher fungal abundance recorded during the rainy season and in poorly managed ponds (Terada-Nascimento *et al.,* 2023).

These fungi species are widely recognized as opportunistic pathogens capable of causing infections in humans under favorable conditions. In Nigeria, studies have also demonstrated the presence of fungal species in fish ponds and aquaculture environments. Olajuyigbe *et al.* (2019) isolated *Aspergillus*, *Mucor*, *Rhizopus*, *Penicillium*, and *Fusarium*, from fish ponds, indicating that fish ponds can serve as reservoirs for various fungal microorganisms, some of which may be pathogenic or of public health importance.

The prevalence of fungal species in aquaculture systems refers to the frequency of occurrence and proportion of fungal isolates recovered from aquatic environments such as fishpond water, sediments, and associated organic matter (Zhang *et al*., 2021). In the Niger Delta region, studies have shown that fungal prevalence is generally high due to favorable environmental conditions such as warm temperatures, high humidity, and organic pollution from aquaculture activities (Izah *et al*., 2021; Mbong *et al.,* 2023).

Investigations in fishpond and aquaculture systems in southern Nigeria have shown that fungal prevalence is strongly linked to poor water quality, high organic load, and inadequate pond management practices (Olajuyigbe *et al*., 2020; Bassey *et al*., 2025). For instance, fungal loads in fishpond water have been reported to range from moderate to high levels, with *Aspergillus niger* and related species often accounting for the highest proportion of isolates (Ike *et al.,* 2020; Otene *et al.,* 2022). These organisms are frequently associated with decomposing organic matter, making aquaculture systems particularly conducive for their proliferation.

Water quality is one of the most important factors influencing fungal distribution in aquatic environments. Recent studies in southern Nigeria have shown that physicochemical parameters such as turbidity, temperature, dissolved oxygen, and nutrient concentrations strongly affect the occurrence and diversity of aquatic fungi. These parameters determine the suitability of aquatic habitats for microbial growth and survival (Bassey *et al.,* 2025).

The Al-safi (2025) study highlighted that degraded water quality enhances fungal growth, thereby increasing the concentration of fungal propagules in aquaculture environments and elevating exposure risks for humans interacting with such waters.

Also, it is noteworthy that, fish farmers are continuously exposed to pond water and sediments, increasing their risk of direct contact with fungal spores. Prolonged exposure may lead to sensitization, skin infections, and allergic reactions.

Mbong *et al*. (2023) noted that individuals working in contaminated pond environments are at higher risk of fungal-related health effects due to repeated occupational exposure.

Despite the increasing importance of aquaculture in Nigeria, information on the distribution and prevalence of fungal species in fish pond water remains limited in many regions, particularly in the Niger Delta area. Most available studies have focused on surface water in rivers, ponds in other regions of Nigeria, or on fungal pathogens in fish tissues, leaving a gap in knowledge about the fungal prevalence in fishpond waters specifically in Yenagoa Metropolis.

Therefore, there is a need to investigate the distribution and prevalence of fungal species in fish pond waters within Yenagoa Metropolis. This will provide valuable baseline data for improving aquaculture management, preventing fish diseases, and ensuring food safety and environmental sustainability.

This study was conducted to isolate and enumerate fungal species from selected fish pond waters across five communities within Yenagoa Metropolis, in order to explore the distribution and prevalence of these fungal species across fish ponds within Yenagoa Metropolis, Bayelsa State, Nigeria

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Materials and Methods

Study Area

The study areas were Agudama, Ekeki, Biogbolo, Etegwe, and Onopa communities, Yenagoa Bayelsa State, situated at coordinates latitude 4°58′38.5″N longitude 6°22′26.6″E, latitude 4°55′22.5″N longitude 6°18′46.1″E, latitude 4°56′33.9″N longitude 6°19′57.3″E, latitude 4°56′15.1″N longitude 6°21′02.7″E, and latitude 4°56′23.9″N longitude 6°16′57.2″E, respectively.

Collection of Fish Pond Water Samples

Water samples were collected in March, 2026, from each designated fish pond using sterile sampling bottles with screw caps. Prior to collection, each bottle was rinsed with the pond water at the point of sampling. Samples were collected below the surface water at a depth of 15–20 cm, away from the pond walls and at a distance of not less than 50 cm from the pond embankment, to avoid sediment disturbance. Bottles were filled completely, capped without air space, labelled accordingly, and placed in an ice chest for transport to the laboratory (APHA, 2017).

Physicochemical Analysis of the Water Samples

The physicochemical analysis of the fishpond water samples were conducted following standard analytical methods described thus; pH and conductivity, dissolved oxygen, nitrates, phosphates, hardness, and heavy metals were analyzed adopting APHA (2017), while, turbidity, chemical oxygen demand and biochemical oxygen demand were analyzed adopting the method of APHA, AWWA,WEF (2017).

Fungi Isolation and Enumeration

Under aseptic conditions, each pond water sample was subjected to tenfold serial dilutions using peptone water as diluent. This was done by transferring 1 mL of each water sample into 9 mL of sterile peptone water (10^{-1}). Further dilutions of 10^{-2}, 10^{-3}, and 10^{-4}, were prepared for each sample. From the prepared serial dilutions for each sample, 0.1 mL aliquots from 10^{-2} to 10^{-3} dilutions were inoculated onto sterile Rose-Bengal Chloramphenicol agar plates using the spread plate technique. Inoculated plates were incubated aerobically at 25 - 28°C for 3 - 7 days, with daily inspection for colony development. After the incubation period, the total fungal counts (TFC) for each water sample was determined by counting all distinct colony types on each replicate plate, and expressed as colony-forming units per millilitre (CFU/mL) using the formula: CFU/mL = (Number of colonies × Dilution factor) / Volume plated (mL) (Cheesbrough, 2006). Distinct fungal colonies observed on primary isolation plates were selected for subculture onto fresh Sabouraud Dextrose Agar (SDA) plates to obtain pure cultures. Each isolate was subcultured by picking a small portion of the colony using a sterile inoculation loop and streaking onto a fresh medium plate. Purified cultures were incubated at 28°C for 3–7 days until adequate growth was achieved for identification purposes. The isolated fungi were identified based on their macroscopic and microscopic characteristics following standard identification procedures described by (Cheesbrough, 2006).

Tentative Identification of the Fungal Isolates

Macroscopic Identification

Each purified fungal isolate was characterized macroscopically by observing the following colony characteristics on SDA plates; pigmentation of the colony surface, colony texture (i.e. cottony, powdery, velvety, granular or waxy), reverse color (i.e. pigmentation visible on the underside of the plate) and colony margin (regular, irregular, filamentous or lobate) (Cheesbrough, 2006).

Microscopic Identification

Microscopic examination of each isolate was performed using the lactophenol cotton blue (LPCB) wet mount preparation and the slide culture technique (Cheesbrough, 2006). A small portion of colony material was transferred to a drop of LPCB staining solution on a clean glass slide. A drop of Lactophenol Cotton Blue (LPCB) stain was added to the preparation, teased apart with sterile dissecting needles, covered with a cover slip, and examined under a a light microscope using ×10 and ×40 magnifications. The fungi were identified based on morphological features such as the shape and size of hyphae, the presence and arrangement of spores, conidia, conidiophores, and sporangia. The observed characteristics were compared with standard identification keys and descriptions provided by Cheesbrough (2017).

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Evaluation of Frequency of Occurrence of Fungal Isolates

This was done following the method described by Mungadi et al. (2026). Frequency of occurrence was evaluated by expressing the number of isolates of each fungal species as a percentage of isolates recovered. The frequency of occurrence was expressed as a percentage using the formula:

$$\frac{\text{Total count of specific microbe}}{\text{Total number of sampling locations}} \times 100$$

Evaluation of the prevalence of the fungal isolates across the sample locations

The prevalence of fungal isolates across the sample locations was determined by calculating the proportion of each fungal species among the total fungal isolates recovered from all sampling locations. The prevalence was expressed as a percentage using the following equation:

$$\text{Prevalence} = \frac{\text{Number of samples positive}}{\text{Total number of water samples tested}} \times 100$$

The calculated prevalence values were used to compare the relative abundance and distribution of fungal species among the different fish pond locations (Edegbene *et al*., 2024).

Ethics and Consent to Participate

Verbal consent was first obtained from all the owners/managers of the selected fish ponds before water samples were collected. The purpose of study was clearly explained to the fish pond owners and their right to withdraw from the study at any time without consequence. As this study involved only the collection of environmental water samples and did not include human subjects, clinical specimens, or Experimental animals, formal institutional ethical committee approval beyond standard departmental research clearance was not required. Water samples were collected using standard Microbiological procedures in a manner that did not disrupt the normal activities of the fish ponds or cause harm to the aquatic environment. No chemical disinfectant or antifungal agents capable of contaminating the ponds were introduced during the sample collection and during the conduct of this study.

Data analysis

Data obtained from this study were presented in tables, figures and analyzed using descriptive statistics.

Results

Information on the characteristics and management practices of the selected fish ponds was obtained through interviews with the pond owners using a structured questionnaire. The information collected included the type of pond, source of water, frequency of water changes, use of antibiotics, and other relevant management practices. These data provide background information on the study sites and help to explain factors that may influence the distribution and prevalence of fungal isolates in the fish pond water. The details are presented in Table 1.

Physicochemical characteristics of the fish pond water samples revealed that, the pH values of the pond water samples ranged from 5.76 to 6.57, across the sampled fish ponds. Water temperature showed little variation across the sample locations, ranging from 25.70°C to 25.90°C. Other parameters analyzed, including nutrients such as nitrite and phosphates, as well as heavy metals such as arsenic, are also presented in Table 2.

Table 1: Characteristics of fish ponds and management practices across the study area

Sample Location	Type of Pond	Source of Water	Frequency of Water Change	Frequency of Antibiotics Use	Frequency of Growth Promoter Use
Agudama	Concrete	Bore hole	3-4 days	None	None
Biogbolo	Earthen	Bore hole	None	None	None
Ekeki	Concrete	Bore hole	Weekly	None	Once in a while
Etegwe	Earthen	Bore hole	Once in a while	Once in a while	None
Onopa	Earthen	Bore hole	Twice yearly, but once a year during flood periods	None	Once daily

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Table 2: Physicochemical characteristics of fish pond water samples

Parameters (Unit)	Location of Fish Ponds					Permissible standard limits	
	Agudama	Ekeki	Biogbolo	Etegwe	Onopa	WHO (2009)	FEPA (1993)
pH	6.57	6.43	6.39	5.79	6.38	6.5 - 8.5	
Temperature (°C)	25.90	25.70	25.70	25.70	25.80		≤ 30°C
Turbidity (NTU)	27.33	38.65	75.09	106	52.40	5 - 25	
E. C (*µS/cm*)	250	345	439	536	234		200
Total dissolved solid (mg/L)	125	172	220	268	117	< 80	
DO (mg/L)	2.82	3.46	3.51	2.54	3.18		8 - 10
BOD (mg/L)	4.02	3.52	3.20	3.92	2.88	10	
Total hardness (mg/L)	96	108	84	102	90	50- 150	
COD (mg/L)	50.45	50.40	54.00	78.35	57.60	10	
Nitrate (mg/L)	0.10	0.30	0.30	0.40	1.00	45	
Phosphate (mg/L)	0.20	0.30	0.80	0.50	0.90	0.03 - 2	
Iron (mg/L)	0.03	0.14	0.22	1.32	0.26	0.30	
Lead (mg/L)	0.06	0.22	0.14	0.32	0.38	≤ 10	
Chromium (mg/L)	0.08	0.06	0.09	0.10	0.07		50
Cadmium (mg/L)	0.01	0.01	<0.01	0.01	0.01	≤ 10	
Arsenic (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	

*WHO: World Health Organization; FEPA: Federal Environmental Protection Agency, Nigeria; mg/L: Milligrams per litre; E.C: Electrical conductivity; *µS/cm*: Microsiemens per centimetre; DO: Dissolved Oxygen; BOD: Biological Oxygen Demand; COD: Chemical Oxygen Demand; NTU: Nephelometric Turbidity Units.

The fungal counts across the fish pond water samples from the study locations were too few to count (< 30 colonies), indicating a very low fungal population in the fish pond waters examined. The macroscopic and microscopic characteristics of the fungal isolates recovered from fish pond waters across the sampled Locations are presented in Tables 3. These characteristics tentatively categorized the fungal isolates under the genera; *Penicillium*, *Mucor*, *Aspergillus*, *Rhizopus*, *Fusarium*, *Candida*, and *Rhodotorula*.

Table 3: Macroscopic and microscopic characteristics of the fungal isolates recovered from fish pond waters

S/N	Macroscopic characteristics	Reverse	Microscopic characteristics	Tentative Identity of fungi
1	Blue-grey, velvety to powdery colony with lighter margin or Blue-green, velvety colony with white margin and pinkish tones, radially sulcate	Black or Creamy white, Dark cream, Light pink.	Brush like structure or dense oval hyaline with septate hyphae or Brush like conidiophores, globose conidia, hyaline, septate hyphae	*Penicillium* sp.
2	White cottony colony, forming concentric rings, with grey border, or white cottony, fluffy colony	Creamy white	Broad, non-septate hyphae, with large, globose sporangia that are dermataceous	*Mucor* sp.
3	Velvety, radial colony with pale outer margin and dark brownish centre	Creamy white with brown centre	Septate and hyaline hyphae, globose conidia with short and hyaline conidiophores	*Aspergillus* sp.

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4	White, cottony to woolly colony	Creamy white	Non-septate, hyaline root like hyphae with long sporangiophores	*Rhizopus* sp.
5	White cottony colony with pale fringe, or Pink to salmon pigmented cottony colony, radially sulcate	Creamy white with dark yellow centre, or yellow with white border	Septate hyphae bearing oval shaped macroconidia	*Fusarium* sp.
6	Creamy, pasty, smooth colony with white to pale-pink pigmentation	Cream	Oval budding yeast like cells	*Candida* sp.
7	Smooth, glossy pink-orange pigmented colony	Pink	Spherical to elongate budding yeast like cells or blastoconidia	*Rhodotorula* sp.

The distribution, frequency of occurrence, and prevalence of fungal isolates recovered from the fish pond water samples across the five sampling locations are presented in Table 4, and Figure 1. The results revealed variations in the distribution, frequency of occurrence, and prevalence of the fungal isolates across the study area, with *Penicillium* species being the most widely distributed and prevalent fungal isolate.

Table 4: Distribution and Prevalence of the fungi isolates across the fish pond water samples

S/N	Fungi species	Location of Fish Pond					Prevalence (%)
		Agudama	Biogbolo	Ekeki	Etegwe	Onopa	
1.	*Penicillium* sp.	2	1	2	3	2	100
2.	*Mucor* sp.	1	1	0	0	1	60
3.	*Aspergillus* sp.	0	0	1	0	0	20
4.	*Rhizopus* sp.	0	1	1	0	0	40
5.	*Fusarium* sp.	1	1	0	0	0	40
6.	*Candida* sp.	1	0	0	0	0	20
7.	*Rhodotorula* sp.	0	1	0	0	0	20
	Total	5	5	4	3	3	

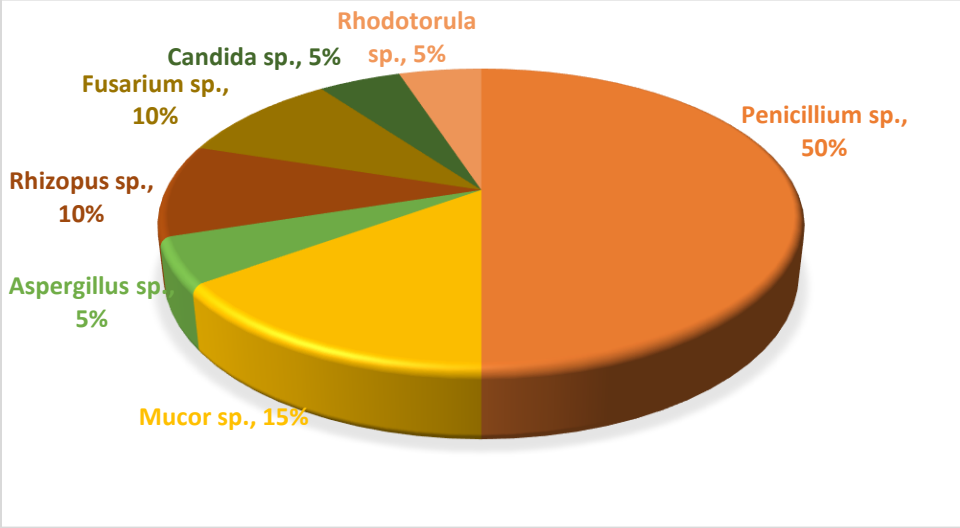


Fig. 1: Frequency of occurrence of the fungal isolates recovered from the fishpond water samples

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Discussion

The physicochemical characteristics of the fish pond waters showed slight variations across the sampled locations (Table 2). The pH values ranged from 5.79 to 6.57, indicating acidic to slightly acidic conditions. While, pH of the fish pond water at Agudama (6.57) met the WHO (2009) permissible standard, the remaining pond waters recorded slightly lower values, suggesting slightly acidic conditions. Such conditions have been reported to support the survival and growth of many aquatic fungi, particularly species of *Aspergillus*, *Penicillium*, and *Mucor*, which are capable of tolerating a broad pH range (Gulis *et al*., 2017; Pérez *et al*., 2018). This finding agrees with the reports of Tian *et al*. (2018), who observed that fungal communities are influenced by water pH, with slightly acidic environments favouring the establishment of several filamentous fungi. Dissolved oxygen (DO) values ranged from 2.54 to 3.51 mg/L, which are considerably lower than the FEPA (1993) recommended range of 8–10 mg/L. Low dissolved oxygen concentrations are commonly associated with the microbial decomposition of organic matter, resulting in increased oxygen consumption (Fabian *et al*., 2017; Grossart *et al*., 2019). Similar low DO values in aquaculture systems was reported by Bassey *et al*. (2025), who associated it with elevated microbial activity and organic pollution. Biological oxygen demand (BOD) values ranged from 2.88 to 4.02 mg/L, remaining below the WHO (2009) permissible limit of 10 mg/L, indicating relatively low levels of biodegradable organic pollution. This suggests that although organic matter was present, its levels were not capable of causing severe deterioration of water quality (Tian *et al*., 2018). Chemical oxygen demand (COD) values ranged from 50.40 to 78.35 mg/L, exceeding the WHO (2009) limit (10 mg/L). Elevated COD indicates substantial quantities of oxidizable organic and inorganic substances in the ponds, reflecting increased organic loading from fish wastes and uneaten feed (Fabian *et al*., 2017). This observation agrees with Mbong *et al*. (2023), who reported elevated COD values in intensively managed fish ponds due to the accumulation of decomposable organic matter. Nitrate concentrations ranged from 0.10 to 1.00 mg/L, remaining below the WHO (2009) permissible limit of 45 mg/L, indicating that nitrate contamination was minimal and unlikely to pose a risk to aquatic organisms.

In contrast, phosphate concentrations ranged from 0.20 to 0.90 mg/L, exceeding the recommended level of 0.03–0.20 mg/L. Elevated phosphate concentrations may stimulate microbial productivity by supplying essential nutrients for growth (Gulis *et al*., 2017). Similar observations were made by Pérez *et al*. (2018), who reported that increased nutrient availability enhances fungal colonization and diversity in aquatic habitats. All the heavy metals analyzed remained within the permissible limits recommended by WHO (2009) and FEPA (1993) (Table 2), indicating minimal contamination by these toxic metals.

The fungal counts obtained from all pond water samples were recorded as too few to count (TFTC), indicating a generally low fungal load in the sampled ponds. This finding contrasts the reports of Njoku et al. (2015) and Al-Safi (2025), who recorded increased fungal counts across the fish pond waters investigated in their studies. The comparatively lower fungal counts obtained in the present study may be attributed to lower organic contamination and better pond management practices revealed from the data in Tables 1 and 2. Marijani *et al*. (2019) and Nyamwaka *et al*. (2020) reported that poor pond management practices, including the accumulation of organic wastes, favour fungal contamination and proliferation in aquaculture systems. Seven fungal genera were identified in the fish pond water samples: *Penicillium*, *Mucor*, *Aspergillus*, *Rhizopus*, *Fusarium*, *Candida* and *Rhodotorula* (Table 3). These fungi have previously been reported in aquatic environments and aquaculture systems. The occurrence of these genera agrees with findings by Olajuyigbe *et al*. (2019), Amadi *et al*. (2020), Izah *et al*. (2021) and Al-Safi (2025), who reported similar fungal species in surface waters and fish pond environments in Iran and Nigeria. The presence of these fungi may be linked to the accumulation of organic matter, fish feed residues, fish wastes, and environmental inputs into the pond (Marijani *et al.*, 2019).

The distribution of fungal isolates across the five fish ponds appeared to be influenced by variations in the physicochemical characteristics of the pond water (Table 4). Although all sampled pond waters exhibited similar temperature values (25.70–25.90°C), differences were observed in other physicochemical properties (Table 2).

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Penicillium species occurred in pond waters from all five sampled locations, suggesting a broad ecological tolerance to the slightly acidic pH (5.79–6.57) and the varying nutrient conditions recorded in the ponds. This finding agrees with Izah *et al*. (2021) and Richard & Aseibai (2021), who reported that *Penicillium* species are widely distributed in aquatic ecosystems because of their adaptability to diverse environmental conditions. In contrast, *Aspergillus* was isolated only from Ekeki pond, indicating that its distribution may have been influenced by local physicochemical conditions that favoured its growth. Similarly, *Candida* and *Rhodotorula* were each recovered from only one sample location, suggesting that these yeasts require more specific environmental conditions than the more widely distributed filamentous fungi (Yurkov, 2018).

Penicillium species were the most frequently occurring fungal isolates, accounting for 50% of the total isolates recovered (Figure 1). The high frequency of occurrence and widespread distribution of *Penicillium* species agree with the findings of Izah *et al*. (2021), and Richard & Aseibai (2021), who reported *Penicillium* among the dominant fungal genera in aquatic environments in the Niger Delta. Similarly, Amadi *et al*. (2020) identified *Penicillium* as one of the prevalent fungal genera in surface waters of Rivers State.

Aspergillus species were isolated only from Ekeki pond and accounted for 5% of the total isolates. Although their frequency of occurrence was low, the presence of *Aspergillus* is noteworthy because some species are recognized as opportunistic pathogens and producers of mycotoxins (Marijani *et al*., 2019; Al-Safi (2025); Mahmud *et al*., 2025). Similarly, *Candida* and *Rhodotorula* each accounted for 5% of the total isolates and were recovered from Agudama and Biogbolo ponds, respectively. The isolation of these yeast genera demonstrates the diversity of fungal communities present in fish pond waters and is consistent with the reports of Naranjo-Ortiz & Gabaldón (2019), Al-Safi (2025), and Aleruchi et al. (2025) who noted that aquatic ecosystems support diverse communities of both filamentous fungi and yeasts.

Although fungal counts were low, the isolation of potentially pathogenic genera such as *Aspergillus*, *Fusarium*, *Candida*, and *Mucor* has important implications for aquaculture and public health. Some species within these genera are recognized as opportunistic pathogens capable of causing fungal infections in fish, leading to disease outbreaks, reduced productivity, particularly when fish are exposed to environmental stress or poor water quality (Faheem *et al*., 2021; Mahmud *et al*., 2025). From a public health perspective, these fungi may contaminate fish and the surrounding environment, posing health risks to consumers and individuals handling fish, particularly immunocompromised persons (Grossart *et al*., 2019; Mbong *et al*., 2023). Consequently, continuous monitoring of pond water quality and fungal communities is essential to ensure sustainable aquaculture production and protect public health (Marijani *et al*., 2019).

Conclusion

This study investigated the distribution and prevalence of fungal species in fish pond water from selected locations within Yenagoa Metropolis, Bayelsa State. The physicochemical properties of the pond waters revealed acidic to slightly acidic conditions, while other properties such as DO, BOD, COD, and phosphate levels did not meet regulatory standard permissible limits. Although fungal counts in all samples were recorded as too few to count (< 30 colonies), seven fungal genera comprising *Penicillium*, *Mucor*, *Aspergillus*, *Rhizopus*, *Fusarium*, *Candida*, and *Rhodotorula* were recovered from the fish pond water samples. *Penicillium* species were the most prevalent (100%) and widely distributed fungi, accounting for 50% of all isolates.

The study therefore confirms that fish pond waters in Yenagoa Metropolis, serve as a reservoir for diverse fungal species despite the relatively low fungal population observed. The findings provide baseline information on the fungal ecology of fish pond water in the study area and emphasize the importance of regular monitoring of pond water quality and microbial communities to ensure sustainable aquaculture production and minimize the risk of fungal contamination and disease occurrence.

Conflicts of Interest

The authors declare no conflicts of interest.

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