

AVAILABILITY OF DIFFERENT DUCKWEED SPECIES (*LEMNA*) WITHIN IBADAN METROPOLIS

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ABSTRACT

Due to the exorbitant cost of conventional feed ingredients and competition between humans and animals for these ingredients, there is the need to seek alternative feed resources. One of the numerous alternative feed resources is the use of aquatic weeds in feeding ruminants. Duckweed is an effective aquatic plant with immense potentials, yet its utilization and production remain remarkably low in Nigeria. This is likely due to lack of knowledge about its potential, production expertise, and nutrient make-up. Therefore, it is necessary to investigate the availability of various duckweed species within Ibadan Metropolis. A well-structured questionnaire was administered to elicit information on the socio-economic characteristics of fish pond owners. Samples of duckweed (*lemna*) were collected and identified. Samples of water from the pond were also collected to evaluate the presence of heavy metals. The survey shows that there was no illiterate amongst the pond owners, 60% attended secondary school and 40% tertiary institution. 20% were full time farmers, traders, professionals and 40% Artisans. 40% of pond owners have 5-10years of farming experience while 60% have 15-20 years. It was observed that all the pond owners are aware *lemna* have different species and types. 60% of pond owners are aware of three *lemna* specie while 40% are aware of four different species. 40% of pond owners claimed that *lemna* is useful while 60% claim otherwise. Half of the respondents who claimed duckweed is useful use it to feed pigs while the remaining half uses it to feed tilapia. The water analysis revealed that significant differences ($P<0.05$) were observed for all heavy metals and nitrogen. *Spirodela polyrhiza* generally had higher values for most heavy metals, *Lemna paucicostata* had lower values for copper (0.06mg/l), and chromium (0.07mg/l) while *Lemna aequinoctialis* had higher values for chromium(1.32mg/l) and cadmium (3.11mg/l). The study concluded that *lemna* can be a sustainable and nutritious feed option for livestock, particularly in regions where traditional feed sources are scarce or expensive. Incorporating *lemna* into livestock diets can help improve animal nutrition, productivity, and overall health.

Keywords: Duckweed, Feed resources, Fish farmers, Production, Ibadan

INTRODUCTION

Duckweed is an innovative aquatic feed option that has not gotten enough attention. Duckweed are tiny free-floating vascular plants found throughout the world on fresh (or sometimes brackish) waters. The plants cluster in colonies and form green mats on the surface of the water. It is quite common for floating mats of duckweed to consist of more than one species, e.g. *Lemna* and *Wolffia*. Duckweed species are observable aquatic plants that often develop in poorly managed or abandoned earthen fish ponds in Southwest Nigeria, notably in Oyo State, where active fish farming has ceased. Considering its low land requirements and quick growth rate, duckweed has been viewed as a viable answer to the challenges relating to agriculture's use of land and the search for sustainable feed supplies. Duckweed applications have advanced significantly in recent years. Despite its popularity as ruminant feed, duckweed has not received as much research as water hyacinth (van der Spiegel *et al.*, 2013). Duckweed's low use and production in Nigeria, however, are likely due to a lack of knowledge about its potential, production expertise, and nutrient makeup. Therefore, it is necessary to investigate availability of various duckweed species within Ibadan Metropolis.

MATERIALS AND METHODS

This study was carried out at UishopweL, University of Ibadan. A well-structured questionnaire was administered to pond owners within Olodo (bank) to elicit information on the demographic status of the pond owners, *lemna* use, knowledge of duckweed species, among other things. The interviewing method was used to administer the questionnaire. Samples of different duckweed species were collected and identified. Pond water was also collected for heavy metal determination. Data were analysed using descriptive analysis.

RESULTS AND DISCUSSION

Presented in Table 1 are the socio-economic characteristics of pond owners. It was observed that 100% of the pond owners were males. 20% were within the age of 25-30 and 50-55years while 60% were within the age 40-45years. It was revealed that there was no illiterate amongst the pond owners, 60% attended secondary school and 40% tertiary institution. 20% were full time farmers, traders, professionals and 40% Artisans. 40% of pond owners have 5-10years of farming experience while 60% have 15-20 years. The result revealed that males are more involved in fish farming compared with females who do post-harvest activities more (Adeoye *et al.*,2020), most fish farmers are literate with farming experience.

Table 1: Socio-economic Characteristics of Pond Owners in Olodo (Bank)

Variables	Percentage (%)
Age group in years	
25-30	20
40-45	60
50-55	20
Total	100
Sex	
Male	100
Female	0
Total	100
Education	
Secondary	60
Tertiary	40
Primary	0
Total	100
Other Occupation	
None	20
Artisan	40
Trading	20
None	20
Total	100
Years of farming experience	
10-15	40
15-20	60
Total	100

Source: Field Survey, 2024

Presented in Table 2 is the awareness of different duckweed species by pond owners. It was observed that all the pond owners are aware *lemna* have different species and types. 60% of pond owners are aware of three *lemna* specie while 40% are aware of four different species of *lemna*. 80% claimed they have three species while 20% have two species on their farm. All the pond owners differentiate *lemna* species using physical appearance. Also, 40% of pond owners ascertain that the different species are on the same pond while 60% claims the different species are not on the same pond. All the respondents claimed there are different species on different ponds on different farmland. This result corroborates findings of Hassan *et al.* (2009) which records that duckweed has about 40 species and 5 genera.

Table 2: Awareness of Different Duckweed Species

Parameters	Percentage (%)
Do you know <i>lemna</i> have different species	
Yes	100
No	0
Total	100
How many species do you know?	
3	60
4	40
Total	100
How many do you have on your pond currently?	
3	80
2	20
Total	100
How do you differentiate the species of <i>lemna</i> on your pond?	
Physical appearance	100
Others	0
Total	100
Is there different species on the same pond?	
Yes	40
No	60
Total	100
Is there different species on different pond on different farmland?	
Yes	100
No	0
Total	100

Source: Field survey, 2024

Presented in Table 3 are the uses and harvesting of duckweed from ponds. The result of the study shows that 80% of Ponds have duckweed while 20% does not. 40% of pond owners claimed that lemna is useful while 60% claim otherwise. Half of respondent who claimed duckweed is useful uses it to feed pigs while the remaining half uses it to feed tilapia. Also, 60% of pond owners who claimed duckweed is not useful harvests it with the use of fishing net, 20% uses mosquito nets, while 20% do not harvest the plant. These findings corroborate the study of Flores-Mirinda et al, (2015) which reveals that duckweed has been successfully used as a complete feed for shrimps and fish.

Table 3: Uses and Harvesting of Lemna plant

Parameters	Responses (%)		
	Yes	No	Unsure
Is lemna present in all ponds	80	20	0
Is lemna useful	40	60	0
Lemna can be fed to Tilapia	50	50	0
Lemna can be fed to Pigs	50	50	0

Source: Field survey, 2024

Revealed in Table 4 is the heavy metals of the different duckweed species. There were significant differences ($P < 0.05$) observed for all the metals, Manganese ranging from 0.25-1.31mg/l with the highest value in treatment two (1.13mg/l) and lowest in treatment three (0.25mg/l) with treatment one having (1.11mg/l). The value of Zinc ranges from 0.07-1.35mg/l with lowest in treatment one having 0.07mg/l followed by 0.09mg/l in T3 and 1.35mg/l in T2. Copper ranges from 0.06-1.20mg/l with the highest value in T2 (1.20mg/l) and lowest in T1(0.06mg/l), Lead was present with values ranging from T2 (0.08mg/l) followed by T1(1.19mg/l) and T3(1.21mg/l). Chromium has its lowest value in T1 (0.07mg/l) followed by T2 (1.16mg/l) then T3 (1.32mg/l). Nitrogen was highest in T2 (3.50mg/l) and lowest in T3(1.13mg/l) followed by T1(1.28mg/l). The value for Iron ranges from 0.08mg/l-1.02mg/l with T3 having 0.08mg/l, T2 (0.09mg/l) and highest in T1(1.02mg/l). Cadmium has values ranging from 0.09-3.11mg/l with highest in T3(3.11mg/l) and lowest in T2 (0.09mg/l) and T1(1.76mg/l). This result reveals that almost all duckweed species can absorb and accumulate heavy metals such as Cd, Cr, Pb and so forth as reported by (Piotrowska *et al.*, 2010), These metals act as cofactors for enzymes involved in protein synthesis and energy metabolism, promoting efficient nutrient utilization.

Table 4: Heavy Metal of Different Duckweed Species

Metals	T1	T2	T3	SEM
Mn	1.11 ^b	1.31 ^a	0.25 ^c	0.00
Zn	0.07 ^c	1.35 ^a	0.09 ^b	0.00
Cu	0.06 ^c	1.20 ^a	1.04 ^b	0.00
Pb	1.19 ^b	0.08 ^c	1.21 ^a	0.00
Cr	0.07 ^c	1.16 ^b	1.32 ^a	0.00
N	1.28 ^b	3.50 ^a	1.13 ^c	0.00
Fe	1.02 ^a	0.09 ^b	0.08 ^b	0.00
Cd	1.76 ^b	0.09 ^c	3.11 ^a	0.00

^{a,b,c} Means having different superscript in a row differ significantly ($p < 0.05$);

T1= (*Lemna paucicostata*), T2= (*Spirodela polyrhiza*), T3= (*Lemna aequinoctialis*), Mn=Manganese, Cd=Cadmium, Zn=Zinc, Pb= Lead Cu=Copper, Cr=Chromium, N=Nitrogen, Fe= Iron

CONCLUSION

From the findings of this study, lemna species are available in different species as feed supplement for ruminants. The results suggest that lemna can be a sustainable and nutritious feed option for livestock, particularly in regions where traditional feed sources are scarce or expensive.

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