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Effect of Dry *Moringa Olifera* Leaf in Different Proportions as Feed Additives on the Growth of Clarias Gariepinus Fry in Semi Indoor Hatchery

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Abstract

This work was done by carrying out a comparative study on the effect of dry *moringa olifera* leaves as a feed (sketting feed) additive in different proportions on the growth of clarias gariepinus fry. The compacted feed (10g, 20g and 30g) and the control experiment all in three replicate were labeled treatment one, two three and four respectively, were experimentally used in feeding the fry for two weeks. And it was observed that the compacted sketting feed with *moringa olifera* at 30g gave the best results on average weight, average length, ammonia content, PH, mortality rate, average number of fishes and temperature. Therefore *moringa olifera* is an excellent additive to sketting feed in the production of clarias gariepinus fry.

Keywords

Moringa olifera, Clarias Gariepinus Fry, Ammonia (NH_3), Mortality Rate and Owerri

1. Introduction

Fish farming continues to make substantial contributions to Nigeria's animal protein requirements. Due to the over exploitation of the capture fisheries, the hope of the Nigerian fisheries is in aquaculture development. Production from aquaculture is increasing and supplied between 2.3 – 23% of total domestic fish production between the year 2000-2010. The African catfish (Clarias gariepinus) remains the most cultured species in Nigeria and is appreciated by consumers for the quality of its meat. Despite all this progress, the success story of aquaculture in Nigeria is still largely dependent on imported extruded feed using the limited foreign exchange of the state. Feed inputs thus constitute up to 40%-60% of the total farming cost [1]. Fish is an important source of food in many regions of the world. It is a good source of animal protein, which is in dispensable to a balanced diet, and it is valued in many cultural culinary traditions [13].

Aquaculture is the fastest growing sector and is mostly destined for human consumption and currently provides 50% of the total global food fish consumption. Most of the aqua feeds are largely based on fish meal which is a significant protein source for carnivorous fish. Several alternative protein sources are being investigated to replace fish meal in diets which include meals of soybean, canola, lupin, pigeon pea, green peas, yellow mungbean and other leaf meals. Numerous options have been advocated by researchers to direct their attention to utilize non-conventional feedstuff with emphasis on leaf meals as protein substitute for fish meal in fish feeds such as *Moringa oleifera, Pennisetum clandestinum, Leucaenaleucocephala, Ipomoea batatas*leaves, *Medicago sativa* and *Manihot esculenta* leaf meal [10].

Moringa oleifera which is commonly available in most rural communities of Africa [11] and it is native to India and widely grown in the tropics. It is also called horse radish or drumstick tree and known by many native names in Nigeria such as zogalle (in Hausa), okweoyibo (in Igbo), eweigbake (in Yoruba) and dogalla (in Taroh) [8]. In aquaculture systems the increasing price of feed is considered one of the most important factors that limit profitability, caused mainly by the cost of fishmeal used as a primary source of protein,

as a result, there is a need to search for alternative protein sources for aquaculture diets [16].

One of the problems facing fish culturists is the need to obtain a balance between rapid fish growth and optimum use of the supplied feed, Since the feed cost accounts approximately 40 - 60% of the operating costs in intensive culture systems, the economic viability of the culture operation depends on the feed and feeding frequency. It means that nutritionally well balanced diets and adequate feeding are the main requirements for successful culture operations [4].

Phytomedicines are believed to have benefits over conventional drugs and are regaining interest in current research. *Moringa oleifera* is a multi-purpose herbal plant used as human food and an alternative for medicinal purposes worldwide. It has been identified by researchers as a plant with numerous health benefits including nutritional and medicinal advantages [2].

However, the use of leaf meals is limited due to their high fiber content and presence of toxic factors. In order to reduce the need for fish meal ingredient in diet, *Moringa oleifera* is a great potential source of protein, an excellent source of vitamins, minerals and amino acids. It possess some medicinal properties that could combat against malnutrition, treatment for cardiovascular diseases, anti-ulcer, anti-inflammatory, food for human consumption, reproductive health, and for other industrial purposes [9, 10]. In recent feed researches, practical fish feed has been an area of focus in aquaculture nutrition research [7], Researchers are therefore looking for cheap, available, and safe alternative sources of protein and energy. In addition, scientists are also searching for natural antimicrobial ingredients [17]. *Moringa oleifera* is a highly valued food plant characterized by a multipurpose use [14] and since the leaves of the *Moringa oleifera* tree are very nutritious and dried *Moringa* leaves retain their nutrient content, it is possible to convert them into leaf powder [6].

The cost involved in achieving the desired level of treatment in water depends among other things, on the cost and availability of chemicals. Commonly used chemicals for the various treatment units are synthetic organic and inorganic substances. In many places, these are expensive and have to be imported in hard currency. Many of the chemicals are also associated with human health and environmental problems [3].

Moringa oleifera is an organic material that has proven effectiveness in treating water, and successfully adopted for use in developing countries [15].

Among all the large numbers of plant materials that have been used over the years, *moringa oleifera* have been shown to be one of the most effective primary coagulant for water treatment especially in rural communities [15].

The main objectives of this study are:

a. To determine the effectiveness of *moringa olifera* as a feed additive. This is due to the fact that hatchers in Owerri complain that sketting feed (0.3-0.5mm) is not efficient to the growth of their fry.
b. To know the different effects of *moringa olifera* in different proportions in feed on the growth and survival of fry.
c. To establish the purification function of *moringa oleifera* as the farmers also complain that sketting feed pollutes their water.

2. Materials and Experimental Design

2.1. Material Collection

Fresh *moringa oleifera* leaves were harvested from the environs of National institute for Freshwater Fisheries Research, Owerri, Nigeria and as stipulated by [1], the leaves were air dried, grinded into powdery form with a hammer mill and stored in well sealed plastic containers, on till they were ready for application. Other materials were obtained in the order listed below:

Four Clarias gariepinus brood stocks weighing 4.6g, 3.0g, 2.5g, and 3.5g respectively

four buckets measuring 120 litters each

twelve bowls measuring 10 litters each

Surgical blades, Sensitive scale elastic band and 1.8mm mesh

PH meter, ammonia meter, measuring rule and a pine

Accessories for the plumbing fittings, which include pipes, adapter, back nuts, elastic bonds gauge valve, and elbow, were all bought in the market.

2.2. Experimental Design

The four Clarias gariepinus brood stocks (two males and two females) weighing 4.6g, 3.0g, 2.5g, and 3.5g each were injected and spawned through artificial breeding. Feeding of the Clarias gariepinus fry later commenced four days after hatching with artemia. The artemia feeding lasted for nine days. We used three treatments and one control. Each treatment and the control had three replicates. Each of the buckets was perforated in three locations and the pipes passed through each to supply water to all the replicates. Gauge valve was fixed together to control the water flow. Shorter pipes were fixed and dropped down with the use of elbow to avoid water splash. Twelve bowls measuring 10 litters were perforated at the upper side, using heated 12mm iron rod. This perforations served as spill way or outlet (to control water level). Fine sieve was placed inside the bowls, and elastics bonds were used to bind them on the bowls to prevent the fry from escaping from the holes. Three bowls which served as replicates were placed under each bucket, which were raised with paint buckets filled with sand. Mesh of 1.8mm mesh was used to cover each of the replicates to protect them from predators. Four grams (4g) of sodium bicarbonate was introduced into the 120 litters of water to boost the pH overnight. One hundred fry weighing eight grams were introduced in each of the bowls (replicates). They were left for three hours to recover from stress. Then a flow-through system was introduced. Later, feeding was commenced accordingly. Sketting feed of 0.3mm was used

for the feeding with grinded dried leaves of *moringa olifera* as feed additive.

a. Treatment one comprised of 10g of *moringa olifera* in 120g of feed
b. Treatment two comprised of 20g of *moringa olifera* in 120g of feed
c. Treatment three comprised of 30g of *moringa olifera* in 120g of feed
d. Treatment four was the control which was ordinary sketting feed without any additive.

2.3. Data Collection

The following parameters were monitored daily; temperature, NH_3 (ammonia) and pH, Siphoning of debris was done every day, the weight and standard length of the fry were measured weekly, mortality recorded at the conclusion of the experiment and the experiment lasted for two weeks. The potential of a feedstuff such as leaf meal in fish diets can be evaluated on the basis of its proximate chemical composition, which comprises the moisture content, crude protein, crude fiber, crude fat, total ash and nitrogen free extract. [5, 12]. For this research work, the proximate analysis of the *moringa olifera* leaf used is shown below:

Table 1. *Shows the Proximate Analysis of the moringa olifera leaf used in this experiment.*

Nutritional Analysis	Proximate Composition (g/100g)
Crude protein	25.0
Crude lipid	2.9
Fiber	7.9
Ash	8.3
Energy value (Kcal/100kg)	2650.5
NFE	57.8
Moisture	4.5

3. Result and Discussion

3.1. Data Analysis

Table 2. *Overall average values.*

Treatments	T1	T2	T3	T4
Average no of fish	56.4	74.7	61.9	66.0
Average standard length (cm)	2.5	2.4	2.8	2.5
Average weight (g)	29.4	32.5	40	27.2
Mortality	3	2.5	0.5	5.5
Temperature (°C)	26.5	26.5	26.5	26.5
Ph	7.2	7.2	7.2	7.2
NH_3	19.4	17.4	15.9	20.6

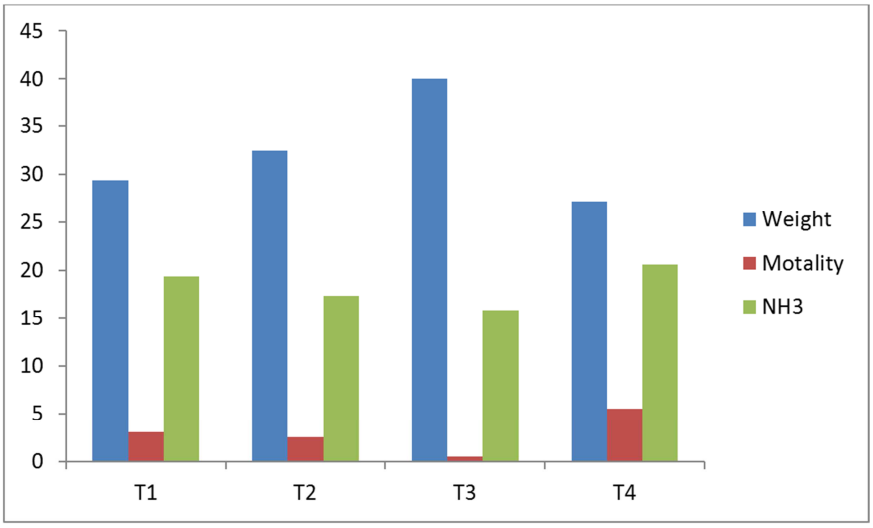

Figure 1. *Histogram of the effect of moringa olifera in the various treatments.*

3.2. Discussions

From the histogram above, shows that the results of the application of sketting feed compounded with *moringa olifera* as an additive on treatment one, two and three, in the composition of 10g, 20, and 30g respectively. With treatment four which had no *moringa olifera added* to the sketting feed serving as the control experiment. And, from the histogram above it was noticed that 30g *moringa olifera* which is treatment three attained the highest mean weight, followed by treatment two and treatment one while treatment four, the control (0g *moringa olifera*) had the lowest mean weight. Also, it was observed from the histogram that treatment three recorded the lowest mortality rate of 0.5% followed by treatment two, one and four with 2.5%, 3% and 5.5% respectively. These shows that treatment three recorded the lowest mortality rate with 30g of *moringa olifera* and treatment four with no *moringa olifera* recorded the highest mortality rate.

Finally, it was observed that the *moringa olifera* has a very good effect on coagulation of water, as a result of the wastes generated from feeding and other sources were coagulated with the help of the *moringa olifera* and the resultant debris were easily Siphoned out with the aid of a flexible pipe. These greatly influenced the ammonia content of the various treatments, the ammonia (NH_3) content of the water also had a similar pattern with that of the weight and mortality rate, in the sense that with higher content of *moringa olifera* there was lower ammonia content in the water when compared to lower *moringa olifera* content and at 30g of *moringa olifera*

gave the best result with the lowest ammonia content. Therefore from the analysis results it can be deduced that *moringa olifera* has a very good effect as a feed additive in the growth and production of clarias gariepinus fry and its usage should be encouraged.

4. Conclusions, Challenges and Recommendations

4.1. Conclusion

From the experiment, the following observations were made:

a. The fry fed with the experimental feed were highly responsive to the feed. The fry fed with 30g *moringa olifera* (treatment 3) were found to have the maximum growth, both in weight and standard length.
b. The *moringa olifera* served as a coagulating agent, making it easy for siphoning of debris in the water and helps prevents water pollution.
c. The *moringa olifera* leaf powder helps maintain a clear view in the water. The water was observed to be clearer and light green.
d. *Moringa olifera* leaf powder also served as anti stress, very low mortality was recorded in the treatments, especially in treatment three when compared with the highest mortality that was recorded from the control.

In conclusion, *moringa olifera* is an effective feed additive for fry. 30g of *moringa olifera* in 120g of sketting feed gave the best result.

4.2. Challenges

a. The weather was observed to be too cold for the eggs to have a successful hatching, as both the external and internal walls of the hatchery building are just around four feet from ground level. And this has made the hatchery not to be properly heated for a hatching and development of fry.
b. Dragon flies were a major challenge as they deposited their larvae which kills the fry.

4.3. Recommendations

a. The external and internal walls of the hatchery building should be raised up to lintel levels also a door and windows should also be installed in the hatchery building.
b. An over head tank should also be installed for the hatchery building for easy circulation of water.
c. Based on the result obtained from the above experiment, it is therefore recommended that farmers should start planting *moringa olifera* in their farms and especially around their ponds.
d. *Moringa olifera* leaf powder should be used as feed additive for fish fry and fingerlings.

References

[1] Adewumi. A. A., 2014, *Moringa oleifera* as a Protein Supplement in Clarias gariepinus Diet, Advances in Research Journal, Vol. 2 (11): 580-589.

[2] Ahmad Faizal Abdull Razis, Muhammad Din Ibrahim and Saie Brindha Kntayya, 2014, health benefits of *Moringa oleifera*, Asian Pacific journal of cancer prevention, Vol. 15 (20): 8571-8576.

[3] Aho, I. M. and Lagasi, J. E, 2012, A new water treatment system using *Moringa oleifera* seed, American Journal Of Scientific and Industrial Research, Vol. 3 (6): 487-492.

[4] Bamidele N. A, Obasa S. O, Ikeiwenwe N. B, Abdulraheem I, Adeoye A. A, Odebiyi O. C., 2015, Effect of dried *moringa (Moringa Oleifera*) seed meal based diets on the growth, hematological, biochemical parameters and histopathology of the African Catfish, *Clarias gariepinus* fingerlings, International Journal of Fisheries and Aquatic Studies, Vol. 2 (4S): 27-34.

[5] Bello, Nuhu Ozovehe and G. C. Nzeh, 2013, Effects of varying levels of *Moringa oleifera* leaf meal diet on growth performance, hematological indices and biochemical enzymes of African catfish Clarias gariepinus, Elixir International Journal, (57A): 14459-14466.

[6] Beth Doerr and Lindsay Cameron, 2005, *moringa* leaf powder, echo technical note, North Fort Myers, United States of America, Pg1.

[7] Bundit Yuangsoi and Toshiro Masumoto, 2012, Replacing *moringa* leaf (*Moringa oleifera*) partially by protein replacement in soybean meal of fancy carp (*Cyprinus carpio*), Songklanakarin Journal of Science and Technology, Vol. 34 (5): 479-485.

[8] Dalen, M. B., Pam, J. S., Izang, A. And Ekele, R., 2009, Synergy between *Moringa oleifera* seed powder and Alum in the purification of domestic water, Science World Journal, Vol. 4 (4): 6-11.

[9] Egwui Peter Chuks, Mgbenka Bernard O and Ezeonyejiaku, Chigozie D., 2013, *moringa* plant and it use as feed in aquaculture development, Animal Research International, Vol. 10 (1): 1672-1680.

[10] Erlinda S. Ganzon-Naret, 2014, Utilization of *Moringa oleifera* leaf meals as plant protein sources at different inclusion levels in fish meal based diets fed to Latescalcarifer, International Journal of the Bioflux Society, Vol. 6 (2): 158-167.

[11] Francis Kweku Amagloh and Amos Benang, 2009, Effectiveness of *Moringa oleifera* seed as coagulant for water purification, African Journal of Agricultural Research Vol. 4 (1): 119-123.

[12] H. E. Dienye and O. K. Olumuji, 2014, Growth performance and haematological responses of African mud catfish *Clarias gariepinus* fed dietary levels of *Moringa oleifera* leaf meal, *Net Journal of Agricultural Science,* Vol. 2 (2): 79-88.

[13] Kazeem Dauda Adeyemi, Aminat Mustapha Ahmed El-Imam, Ayotunde Oluwatunbo Olorunsanya, Foluke Eunice Sola-Ojo, Olaife Salome Olatunji, Kehinde MathiasOkukpe, Olusegun Oyeshina Dosunmu, Rafiat Morolayo Shittu, Olayinka Ramota Karim, Ismail Adewale Fatai, 2014, lipid peroxidation in smoke-dried african catfish treated with *moringa oleifera* marinade, salt or butylated hydroxyl anisole, Croatian Journal of Fisheries, (72): 36-40.

[14] Ochi, E. B., Elbushra, M. E., Fatur, M. Abubakr O. Ismail and Hafiz Abdalla, 2015, Effect of *Moringa (Moringa oleifera Lam*) Seeds on the Performance and Carcass Characteristics of Broiler Chickens, Journal of Natural Sciences Research, Vol. 5 (8): 66-73.

[15] Sowmeyan. R, Santhosh. J and Latha. R, 2011, Effectiveness of herbs in community water treatment, International Research Journal of Biochemistry and Bioinformatics, Vol. 1 (11): 297-303.

[16] Tagwireyi. T., Mupangwa. J. F., Jepsen J. And Mwera P, (2007), effect of feeding *moringa oleifera* leaf meal on the growth performance of oreochromisniloticus fry, Lake Harvest International, Kariba, Zimbabwe, Pg 1-2.

[17] Talha. E. Abbas, 2013, The use of *Moringa oleifera* in poultry diets, Turkish Journal of Veterinary and Animal Sciences, 37: 492-496.