Project Title: Domestication and Breeding of Indigenous Tilapiine Species for Food and Nutrition Security

Annual Report
Period Covered: October, 2020- September, 2021

KCSAP livestock
Applied Value chain: Aquaculture
Duration: 18 Months
Start Date: Oct 2020

Lead Institution: Kenya Marine and Fisheries Research Institute

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2. Dr Kevin Obiero
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Aquaculture plays a very crucial role in the world economy as a source of food and nutrition security, employment and foreign exchange and improved livelihoods (Obiero et al., 2019a). Global aquaculture production has shown an upward trend, increasing from 61.4 million tons in 2011 to 80 million tons in 2016 whereby finfish production stood at 54.1 million tons (FAO, 2018).

Demand for fish and fish products is increasing rapidly in Kenya and is driven by an ever-increasing population that has led to overexploitation of capture fisheries thus threatening the availability of fish supply to the public (Ogello et al., 2017). Another reason for the high demand for fish is increased awareness of the health benefits of fish consumption and changes in lifestyles and consumer preferences (Obiero et al., 2019a).

The only sustainable way to meet the increasing fish food demand is through aquaculture production (Munguti et al., 2014). It is reported that by 2014, aquaculture provided nearly half of all fish for human food and it is projected to increase to 62 percent by 2030 (FAO, 2014). The significant contribution of aquaculture may be attributed to the increase of aquaculture species among other factors. In Kenya, aquaculture is synonymous with the culture of Nile tilapia (Oreochromis niloticus) and African catfish (Clarias gariepinus). The scarcity of fish species under culture has impeded aquaculture development in the country, despite the existing huge potential. Therefore, there is a need to intensify efforts aimed at identifying and developing new aquaculture species. Such efforts include adoption and improvement of aquaculture technologies that include identification and development of new aquaculture species. Indigenous fish species are among the potential candidates that can be developed to contribute towards the increase of aquaculture production. This will enhance food production and ultimately contribute to poverty alleviation.

To address this, the Kenya Marine and Fisheries Research Institute (KMFRI) started domestication and breeding trials for indigenous fish species to diversify culture species. This project aims to sustainably increase productivity by increasing the number of culture species which will provide seed variety to the farmers who are always in dire need of quality seed for their cage and pond culture...
systems. Fish farming in Siaya and Busia County mainly depend on *O. niloticus* and *C. gariepinus*. Therefore, injecting two more culture species is expected to enhance the efforts of controlling pests and diseases, which become more resistant when fish farming relies on the culture of specific species for a long time. Additionally, given that *O. variabilis* and *O. esculentus* are highly endangered, the introduction of their seed into the aquaculture sector will not only contribute to increase in productivity but also act as a climate-smart way of conserving them.

### Objectives

1. To collect and domesticate *O. esculentus* and *O. variabilis*.

### Expected Outputs

1. At least 600 brooders of *O. esculentus* and *O. variabilis* collected and domesticated

## I ACHIEVEMENTS

### Objective 1: At least 600 brooders of *O. esculentus* and *O. variabilis* collected and domesticated

**Activity 1.1 Collection of *O. esculentus* and *O. variabilis***.

*Oreochromi esculentus* and *O. variabilis* brooders were collected from the wild as targeted. The two fish species were stocked into separate ponds. The numbers of brood stock collected surpassed the projected numbers.

**Activity 1.2: Domestication of *O. esculentus* and *O. variabilis* at KMFRI Sangoro Aquaculture Centre**

The broodstock of the two indigenous tilapiine species were placed under domestication in brood stock ponds set aside specifically for these fish species, at KMFRI Sangoro station. Clean water was replaced each time the liner ponds got dirty due to feed remnants, algae and faeces.

### Summary of achievements under objective 1

1. At least 820 *O. esculentus* and 690 *O. variabilis* broodstock collected from different water bodies and stocked in broodstock ponds by December, 2020 against the targeted 600 broodstock for each species.
2. Domestication *O. esculentus* and *O. variabilis* was successful as the fish were able to accept formulated diets by June 2021.

## II Other achievements (e.g. patents, publication such as journal papers, technical reports, presentation in workshops and conferences etc.). List them with proper citations

## III Constraints and how they were overcome

1. In order to comply with the Ministry of health guidelines of preventing the spread of COVID-19, additional items (face masks, sanitizers etc.) initially not budgeted for, were purchased. In addition, technical staff above 58 years were kept away from work.
2. The age-based exclusion of individuals, delayed the commencement of some activities such as preparation of fish holding units.
3. Due to the curfew imposed by the government, the research team was forced to stay longer in the days in the field than planned.
4. Sourcing of fish feed ingredients was difficult because of the low supply and thus higher prices however we had some stock of feeds from the previous which kept us moving.
IV Summary of funds received, accounted for and balance

<table>
<thead>
<tr>
<th>Project Amount (KES)</th>
<th>Amount Received (KES)</th>
<th>Amount accounted for (KES)</th>
<th>Balance (KES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,747,931</td>
<td>2,120,595</td>
<td>2,120,595</td>
<td>Nil</td>
</tr>
</tbody>
</table>

IV Way Forward

Activities Planned for the Period Oct 2021-June 2022

1. Mass production of seed for *O. esculentus* and *O. variabilis*
2. Development of propagation and nursing protocols for *O. esculentus* and *O. variabilis*
3. Development of optimum culture conditions for *O. esculentus* and *O. variabilis*
4. Growth trials for *O. esculentus* and *O. variabilis*
5. Selective breeding: Selection of *O. esculentus* and *O. variabilis* F2 brooders