The State of Eritrea
Ministry of Agriculture Newsletter
A Monthly Newsletter prepared by the Public Relations Division, Issue No 51, September, 2022

# Eritrea's Marine Resources Contribute to Boost Agricultural Productivity by Producing Liquid Fertilizer

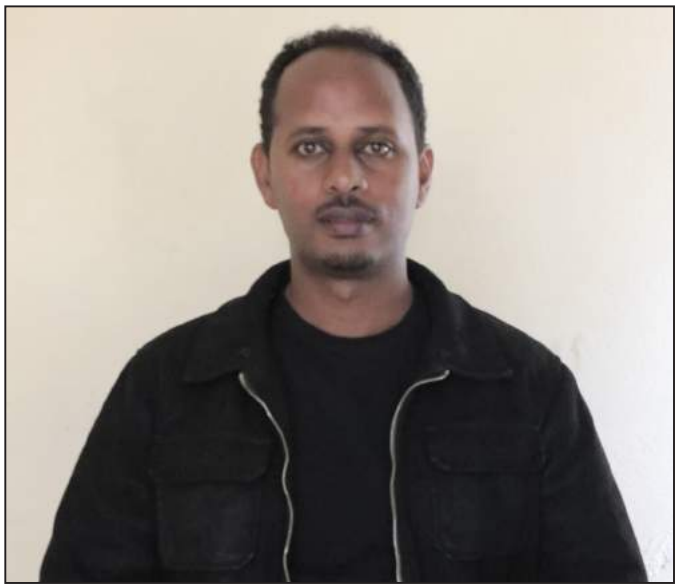
## 'The Sea - Once Victim of Agro-chemicals becomes a Friend of Agriculture'

Even though, the major challenge of Eritrea's agriculture is shortage of water; its degraded land also negatively affects the agricultural productivity. The country's soil which, generally, is known to be calcareous alkaline with very low organic matter and agricultural nutrient content needs continuous amendment to sustain agriculture. For this reason, Eritrean farmers have been heavily dependent on the supplemental use of chemical fertilizers mainly DAP and Urea.

Although the use of chemical fertilizers is known to boost agricultural production, its continuous use results in serious environmental problems; including ground water contamination. Chemicals leaching and running off from farm lands also make their way in to water bodies; including the sea to cause death of terrestrial and aquatic organisms.

A technical committee composed of senior experts from the Ministries of Agriculture, Marine Resources and the private sector has been working to solve the above stated interrelated problems. Mr. Temesgen Gebremeskel, from Mainefhi College of Science; and representing the Marine resources sector has briefed this newsletter with regard to producing liquid fertilizers from the available marine resources.

***Question: The marine resources have started contributing to agricultural productivity. Where is the connection of these two sectors?***



*Mr. Temesgen Gebremeskel*

Answer: The Ministry of Marine resources has been conducting a number of trials if marine by-products can be used in aquaculture. Fish waste was used as a source of nutrients in hydroponic farming. Moreover, studies were being conducted to use fish discards and seaweeds as fertilizers. Concurrently, the Ministry of Agriculture launched a revolutionary campaign to produce bio-fertilizers and bio-pesticides. It was during this time (early 2021) that both ministries started to merge their initiatives for a better outcome.

***Q: It is known that the saline water bodies are usually victims of agricultural chemicals; and now you are trying to reverse this scenario.***

A: Even though, the sea has been one of the victims, fortunately it has also got a promising solution to this problem through its living resources. Foliar spray liquid fertilizers prepared from underutilized and discarded fish resources; and coastal seaweeds have been found to boost plant growth and yield in a number of studies.

***Q: Does the Red Sea have adequate resources to produce liquid fertlilizers?***

A: A study conducted along the Eritrean Red Sea coast has documented that there are more than 100 macro-algal species along the coast comprising members from the three major taxas; Chlorophyta, Phaeophyta, and Rhodophyta. These seaweeds are often regarded as waste littering coastal beaches. Parallel to that, an unpublished data of the Ministry of Marine Resources show that by-catch of fish from bottom trawl vessels reaches about 30-50% of the total catch with pony fishes covering 24% of the total value. Thus, it is imperative that there are undoubtedly enough underutilized resource which could be used to produce fish amino acid (FAA) and seaweed liquid fertilizer (SLF). These fertilizers could be distributed throughout the country, and gradually for export. Furthermore, it is important to note that this kind of production is also creating job opportunity to the coastal people to improve their livelihood.

***Q: Could you elaborate about how these liquid fertilizers are made?***

A: FAA is a liquid fertilizer with high nitrogen content made by chopping fish discards and leftovers; and then mixing it with sugar or molasses for proper fermentation. Similarly, the SLF is made by collecting sea weed, washing it with fresh water, and finally mixing it with sugar or molasses to get fermented.

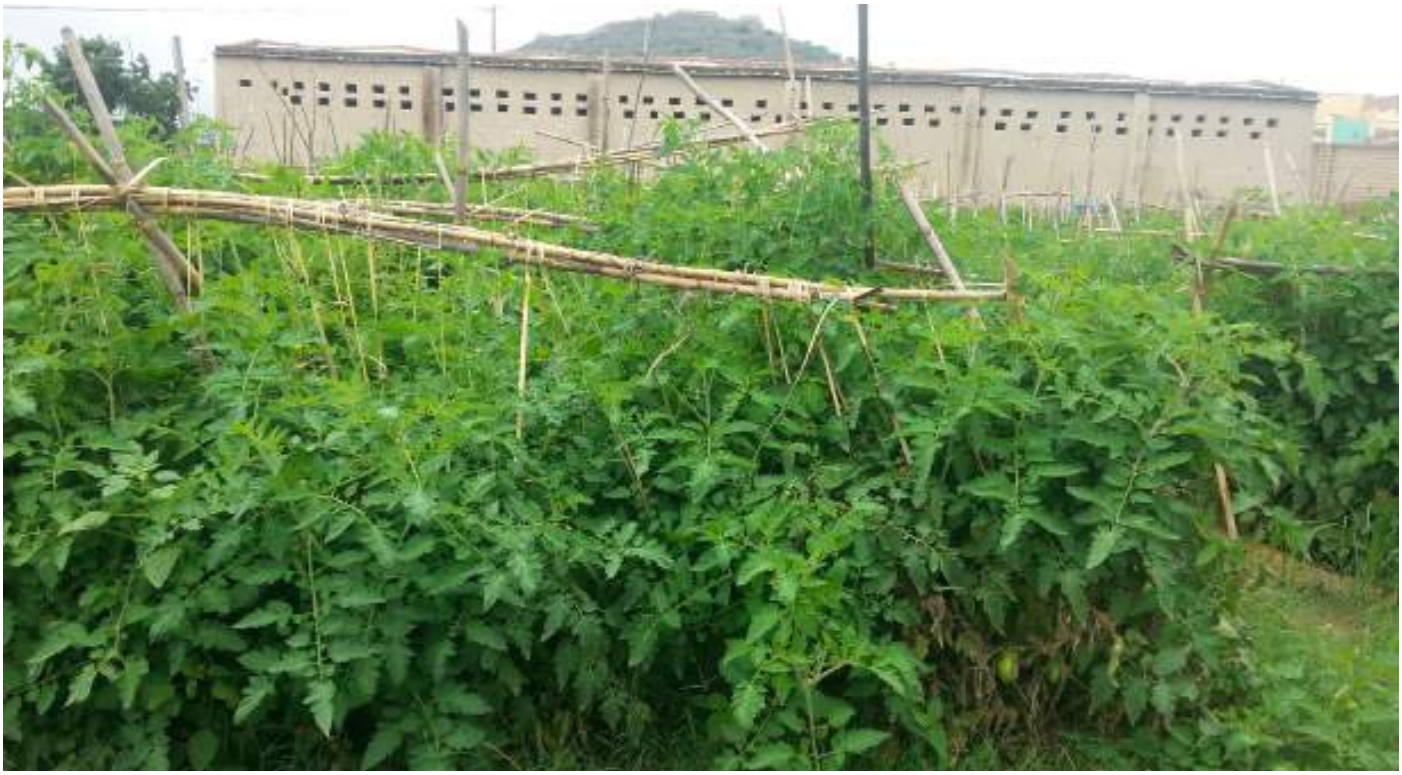
We have now prepared a consortia of Indigenous Effective Microorganisms (IEM) and lactic acid bacteria to speed up the fermentation process.

***Q: So far, how much FAA and SLF have been produced?***

A: As of now, around 9,375 litres of FAA and SLF have been distributed to all regions except the Southern Red Sea region; and were applied on different vegetable plants like potatoes, green pepper, okra, tomato, onion, and cabbage. Moreover, there are 2,200 litres of these liquid fertilizers ready for distribution.

***Q: How is, then, the result of the application evaluated?***

A: The study was conducted on different vegetables by applying FAA alone, SLF alone, a combined application and a control. The performance and growth of the crops were reported by the regional



*Potato farm supplied with FAA and SLF, Anseba Region*

agricultural experts; and were generally satisfactory. The yield gained in all applications was higher when compared to the control. When it comes to the details, FAA increased yield by 38%; SLF by 25%; and their combination resulted in yield increment of 29% in Zoba Maekel at potato farm trials. Trials in Zoba Debub also showed, on average, a 50% increment in potato tuber number after application with these fertilizers. These liquid fertilizers were tested in Gash-barka region on green pepper plots; and resulted in 20% increment in foliar growth as well as considerable fruit growth that led to high demand in the market. The liquid fertilizers made from FAA also contributed in increasing the number of flowers and improving foliar growth after applied in flower plants at the Maisurwa Flower Production Plant. Azieb Agro-industry is also one of the farms which benefited from the liquid fertilizers to boost its forage production.

***Q: What about the dose of application?***

A: For the right dose of application of the liquid fertilizers, a number of trials are being carried out in Halhale, the National Agricultural Research Institute (NARI). The trials are conducted on wheat, potato and green pepper at different dilution levels.

Preliminary dose trials were also conducted in the MoMR Premises. After proper data analysis, the following preliminary results came out from the study. Maximum results have been achieved at 1:20 and 1:30 ratios for SLF and FAA respectively (dilution levels). Moreover, both the liquid fertilizers have proven to be effective although FAA has been found to enhance root growth extraordinarily.

***Q: How do you communicate these results with other experts and the farming community?***

A: We have prepared and distributed a brochure concerning the application of these liquid fertilizers. Besides, a number of trainings have been conducted to the regional experts and farmers. However, since the research conducted is at its early stage, it needs to be replicated with other ratios in other crops; and at the same time in different parts of the country to provide a more reliable picture.

***Q: What is the future plan of the MoMR and MoA towards mass production of these kinds of fertilizers?***

A: The trials conducted so far have revealed that both FAA and SLF have great potential in boosting the growth and yield of the commonly grown horticultural crops. Both pot culture and field trials have given promising results in improving all aspects of the plants. These positive results of the trials were also proven in farmers' fields. All these positive feedbacks and high demand for these organic fertilizers are now pushing the MoMR and MoA towards up scaling the current potential. The MoMR is witnessing that this pilot project is also setting a milestone in job creation and subsequently improving the livelihood of the coastal rural

community. Besides, mitigating the risk of coastal and inland water contamination from excessive use and misuse of chemical fertilizers are also becoming other benefits of the project. Hence, the Engineering and Technical Works Division of the MoMR has developed a machine that can chop 10 quintals of fish per hour. Furthermore, all the needed materials for fermentation process are now ready. At present, the facility which has been established in Grar, Massawa, has the capacity to produce 10,000 litres of FAA and SLW per month.

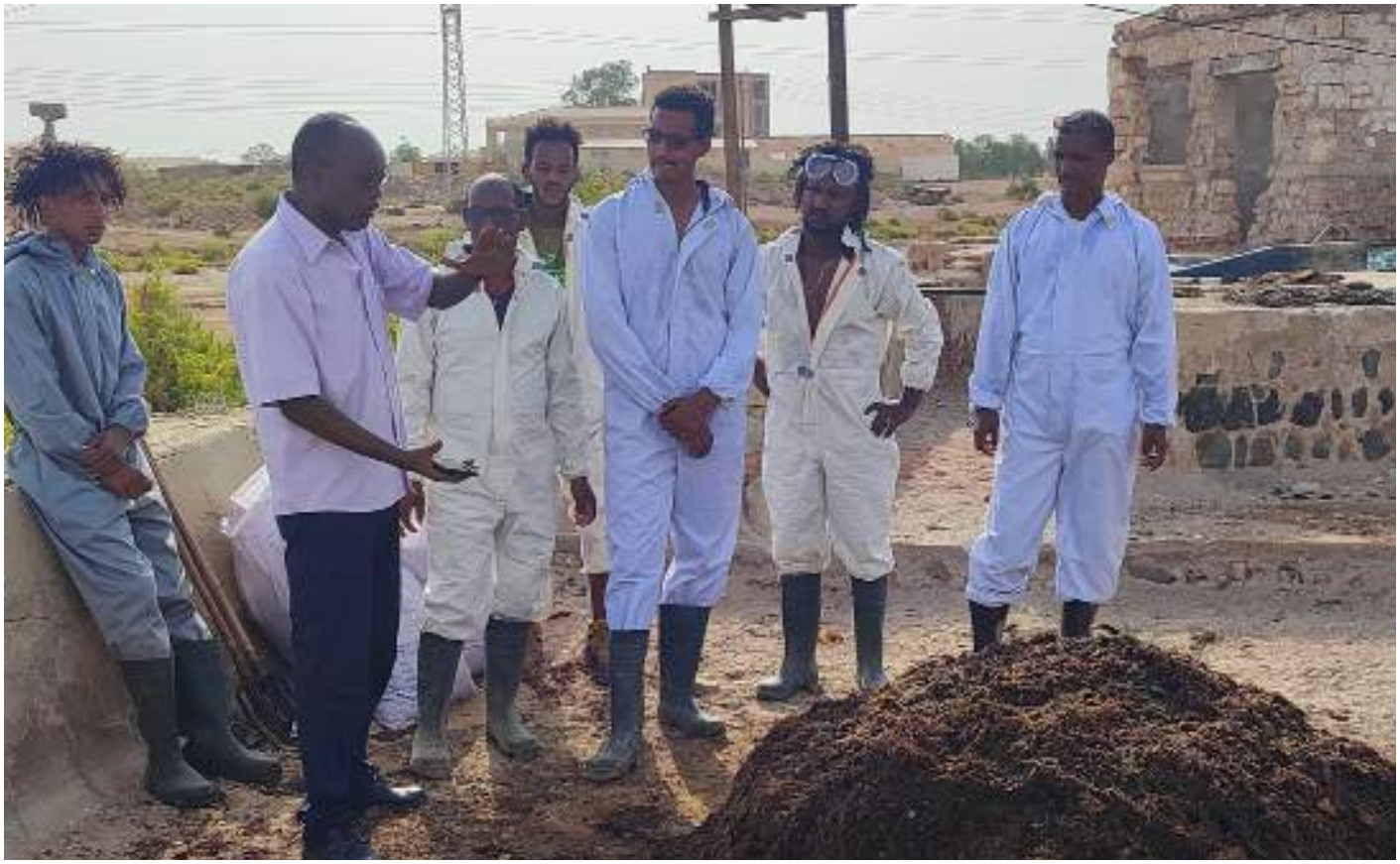
***Q: What do you do to scientifically test and standardize your products?***

A: All the requirements for the production of the liquid fertilizers such as hiring permenant staff, establishing a standard production line, renovation activities, electrical installations, provision of personal protective equipment (PPE), and preparation of safety guidelines have now been completed in collaboration with the Regulatory Services Department of the MoA. Proper packaging and labelling of the products are also underway. Samples are regularly sent to NARI for nutrient content and chemical analyses. Moreover, the National Animal and Plant Health Laborataoty (NAPHL) of the MoA conducts microbial analysis of the products. It should also be noted that we have started sending samples to the Khartum University

for nutrient analysis in collaboration with the Sawaina Organic Compost Manufacturing Plant.

***Q: If you are extracting liquid fertilizers from the fish discards and sea weeds, it is obvious that you have got some by-product or waste. How do you manage this byproduct?***

A: Although organic, like any processing plant, the production of the FAA and SLF has some waste which will normally increase with more production. Thus, a training on how to convert and reuse the waste as a compost was given to the relevant MoMR staff by Mr. Fikadu Tesfamichael, a senior compost expert from the Sawaina Organic Compost Manufacturing Plant, Sudan. After completion of the training, all the available waste have been proporley piled up to form a 5 $m^3$ compost pile. The compost produced



from this waste was sent to NARI for analysis. Besides, converting the waste into compost has proven to be the best cure for the smell arising from the fish waste.

***Q: If you have some thing to forward?***

The project is now being implemented by a team of experts from both Ministries, Mai-Nefhi College of Science, and other institutions. However, for its sustainability, I urge private entrepreneurs to closely work with these Ministries, and ultimately take over this important business. Moreover, in terms of research and refining the application rates, I believe we have a long way to go. Hence, the committee invites experts from the academia and other institutions to take part in these revolutionary initiative.

## *Witnesses from FAA and SLF Beneficiaries*

### *Azieb Agro-industry PLC*

*Mr. Abraham Michael*

Azieb Agro-industry is a private limited company located in the Sub-zone of Debarwa, the Southern Zone. The Company was selected to be one of the demonstration sites to test the efficiency of FAA and SLF.

According to Mr. Abraham Michael, General Manager of the company, these liquid fertilizers were applied in three hectares of forage land cultivated with

*Azieb Agro-industry PLC*

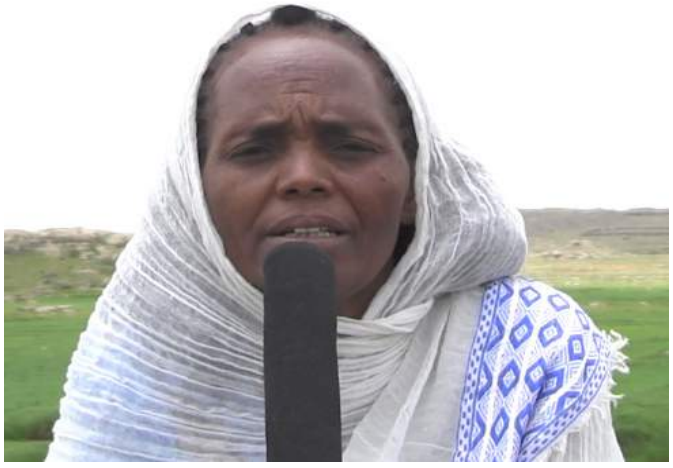
alfalfa. “Thanks to these liquid fertilizers, we have witnessed a 40% increase in alfalfa yield. Moreover, after application of the fertilizers, the nitrogen content of the alfalfa plant dramatically improved and contributed to almost double the milk yield.” He concluded.

### *Tseazega Village*

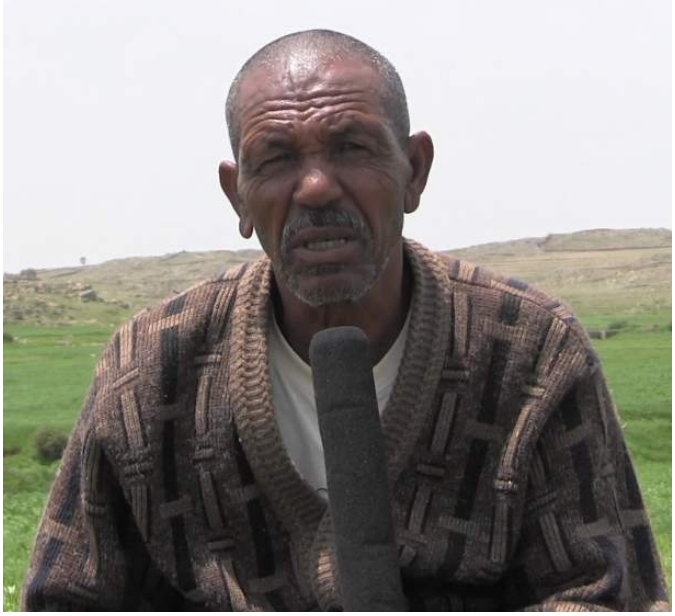
After proper orientation, Tseazega village was chosen as a pilot ground for liquid fertilizer trial in around 7 hectares of land cultivated with improved wheat variety on the 24th August 2022.

Ms. Askalu Zerubabiel, Tseazega Community administrator, said, “We were told by the MoA branch that we would be given sidra - an improved wheat variety- before some months. Subsequently, the villagers have been preparing their land starting from May. Then, the MoA provided us with the improved seed; and now with compost and liquid fertilizers. As you can see, today we are spraying the liquid fertilizers made from our marine resources in our integrated farmlands of selected communities.”

Ms. Askalu, finally, urged the government to continue such initiative; and if possible educate them how to make the liquid fertilizers by themselves for its extensive application throughout the village and their surroundings.



Ms. Askalu Zerubabiel



Mr. Ghirmay Kiflay

Mr. Ghirmay Kiflay, a resident of the village, told this newsletter that they are privileged for being chosen to pilot FAA and SLF. He said that treating the land with organic liquid fertilizer is a great surprize for them; and told that they are eager to see its results and become model to the whole country.

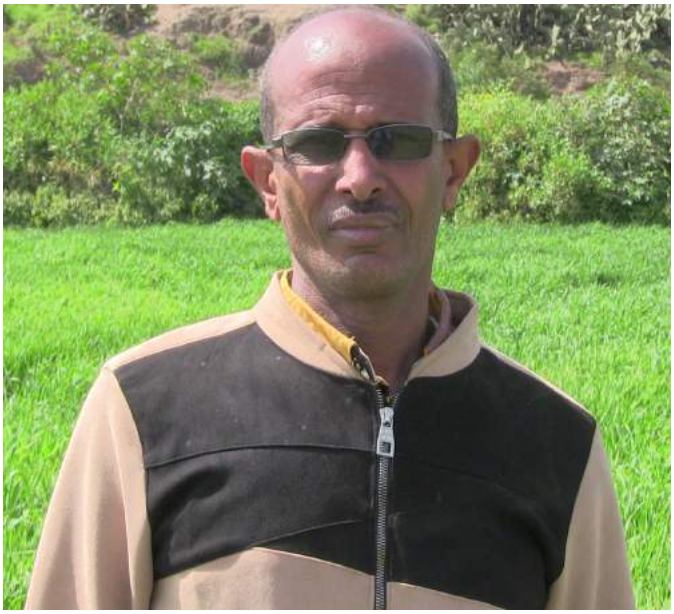
"Since, we took adequate training and practical observation on the results of these fertilizers; we are sure that we will have a bumper harvest with a combination of the good rain and these fertilizers" He said.

"If the government continues such trainings and production of organic fertilizers, we are ready to get rid-off the chemical fertilizers which are hazardous for us and our land." Mr. Ghirmay concluded.

***FAA and SLF in Potato farm***

Biemnet Negassi is a farmer in Menaharya, Asmara Sub-zone of the Central Region. He was supplied with FAA and SLF to test them on his potato farm, and witnessed that he found them very effective. He said, "I allocated two plots of land to try these liquid fertilizers. Finally, I harvested 14 quintals of potato from a quintal of potato seed in the plot not supplied with FAA and SLF. On the contrary I got 17 quintals from similar plot of land supplied with these fertilizers."

He further noted that these fertilizers resulted in extraordinary foliar growth and, the potato plants reached at flowering stage early when compared with the control. Finally, I really thank the government bodies who are distributing these kinds of harmless as well as in-country produced fertilizers and urge other farmers to adopt these liquid fertilizers.



Mr. Biemnet Negassi

*Coastal communities benefiting from see-weed collection*

**Editor-In-Chief**: Ermias Solomon, Director of Public Relations Division: Email:- ersohab@gmail.com, Tel: 182225/ 07143877
**Editorial Board:** Filmawit Measho, Hara Weldetnsae, Andemeskel Berhe
**Photo Credit**: Aradom Bereket, Habteab Andemariam, Thomas Mehari, Temesgen Gebrezgabhier, MoMR Archives