



## Eritrea's National Agricultural Research Institute: A Journey and History of 100+ Years in Brief

The National Agricultural Research Institute (NARI) is one of the major bodies of the Ministry of Agriculture (MoA) of the State of Eritrea. The establishment and operation of a strong agricultural research services were given high priority since Eritrea's independence in 1991. Subsequently, a lot of investments were put in place to establish research stations operating in all agro-ecological zones. The Public Relations Division has conducted a brief interview with the Head of NARI, Mr. Tsegay Berhane focusing on the history, achievements and challenges of the institute ever since its establishment.

**Question (Q): Let's start with a brief history of agricultural research activities in Eritrea.**

**Answer (A):** Records reveal that agricultural research in Eritrea began during the Italian period. In 1910, research stations of coffee, citrus, palm and eucalyptus trees were established in Filfil, Fagena, Keren and Adi-wegri. Later, in 1920s, cotton, in the western lowlands; and wheat germplasm, in the highlands, were introduced.

During the federation period with Ethiopia (1952-1962), new research centers were established in Sembel, Daero-pawlos, Paradizo and Adi-wegri. Then, wheat and barley were selected as high priority crops for the highlands. Moreover, documents indicate that some linkages started with Kenya and International Maize and Wheat Improvement Center (CIMMYT) mainly with the objective of material exchange. Research activities declined during the forced annexation by Ethiopia. Later, cotton germplasm was introduced from US and Israel in 1976 in Alighider, and a variety "Acala 17c" was developed. Green houses and other research facilities were also established in Sembel and Paradizo. Asmara University also established research centers which focused on cowpea, chickpea and beans (Embatkala); horticultural crops and cereals (Halhale); and animal feed (Abardae)



*Mr. Tsegay Berhane*

**Q: What about the activities, during the war for independence?**

**A:** In the mid-1980s the Eritrean People's Liberation Front (EPLF) started to implement research programs on soil fertility, agronomic practices, crop protection, forestry, rangeland management, livestock and farm machinery across the liberated areas. The front was conducting research and training activities along with farmers. At that time soil and water laboratory was one of the major pillars in the research undertaking.

**Q: Let's continue to the new era after independence**

**A:** As a continuation to the earlier researches, undertaking the new government of Eritrea gave special focus to the importance human capacity development. Subsequently, agricultural research organs of the MoA went through a number of structural transformations to come to its current status. For instance, agricultural research and extension was its first structure after independence (1993-1997) followed by Agricultural Research and Human Resources Development in 1997. This structure was operational until 2003. Then after, it acquired its current name and structure – namely the National Agricultural Research Institute (NARI).

**Q: Why do you think that agricultural research is important for a nation?**

**A:** Agricultural research is important to any country because it carries out applied and basic researches to generate viable technologies to solve farmers' problems. For instance, NARI is working to achieve these objectives through identification and promotion of high value crop and livestock commodities in different production systems. This is done either on demand and/or institutional analysis of the small-scale farmers and small and medium commercial farmers to improve relevance, sustainability, efficiency, effectiveness and impact of the research which is normally conducted in a participatory manner.

**Q: How about the current structure and major pillars of NARI.**

**A:** Currently, NARI is composed of five technical divisions, namely; Crop Improvement; Natural Resources; Livestock Improvement; Agricultural Engineering as well as Genetic Resources Research. In addition support units like Administration and Finance; Bio-technology; Planning and Statistics; Food technology play a significant role.

**Q: Mr. Tsegai. Let's see individual achievements of these bodies. Could we start with the Genetic Resources Division for it is the backbone of all kinds of researches?**

**A:** Yes. Conserving and developing a country's genetic resources is not only technical work but also holds strategic and security importance. Hence, NARI gives special attention to conserving genetic resources of crops, trees and animals. So far, 6182 accessions of 158 crop types, out of which 4557 from within Eritrea, are collected. The remaining crops were supplied by external research institutions. In addition, agro-morphological researches on 1664 crops; and molecular characterization on 256 crops were carried out. Maintenance and multiplication of collected and conserved samples are also among the most important activities. On this basis, 1274 samples of cereals and pulses were maintained; and 686 newly collected samples were multiplied for conservation purposes.

**Q: What about initiatives taken to conserve animal genetic resources?**

**A:** Conserving and improving indigenous animal genetic resource remain important pillars of the Genetic Resource Research Division. However, this research area is at its infant stage, phenotypic characterization was conducted on a total of 158 cattle that are believed to share genetic attributes of the indigenous Barka breed which were collected from Goluj and Tessenay Sub-zones. The process involved adherence to 40 genetic parameters.

**Q: What is, then, the future plan to reinforce this research area?**





**A:** Strengthening genetic resources conservation on crops and trees (in-situ and ex-situ); holistic research on characteristics of the already collected crop samples; establishment of domestic animal gene bank; and extensive public awareness raising activities are among the major short and long term plans of the division.

**Q: Let's move to crop improvement activities. What are the major achievements of this research area?**

**A:** The Institute has registered commendable progress in crop improvement. The main focus of the research has been on sorghum, pearl millet, barley, wheat and maize in field crops; and in pea, lentils, cow pea and beans in pulses. Moreover, limited crop improvement programs were carried out in oil-crops such as sesame; rapeseed, sunflower and cotton.

**Q:- Could you tell us, in figures, the released crop varieties?**

**A:** Starting from 1997, 45 varieties of improved crop varieties namely; wheat (16), barley (6), sorghum (11), pearl millet (6), maize (3), sun flower (1) and two varieties of pulses have been realeased from Halhale, Gahtelay, Sheeb, Akurdet, Shambiko, Hagaz and Guluj research stations. Moreover, from 2000-2021, more than 15 quintals of improved foundation seed were multiplied. The improved crop varieties are distributed to farmers through the Agricultural Extension Department (AED) and play important roles in increasing production and productivity. They are also known to be disease and pest resistant.

**Q:- Reports from the Institute also reveal that you carry out focused adaptability trials in horticultural crops. What was the outcome of this trials?**

**A:** With regards to horticultural research, the Institute focuses on potato, onions, tomatoes, pepper, garlic and fruits. As of now, 34 vegetable and 36 fruit varieties were identified as promising crops to a number of agro-ecological zones of the country. In line with this, research is conducted on important crop pests and diseases. As a result, 26 plant diseases, three new pests, and two types of weeds have been identified; and a number of effective pesticides were selected thereof.

**Q: Natural Resource Management (NRM) Research is also an important component of NARI, what are the main achievements in this division?**

**A:** Conducting research on soil, water and fertilizers are the major mandates of the Natural Resources Management Division (NRMD). Therefore, until 2021 the NRMD conducted laboratory analyses on more than 15 thousand soil samples; over 400 water samples; around 80 fertilizers samples; and on more than 1300 plant samples. Moreover, two guidelines for fertilizer application on sorghum and wheat were made available for users. Furthermore, a soil profile research was conducted on more than 50 thousand hectares of land; and partial soil suitability map was drafted. However, rigorous efforts need to be made with regards to the drafting of National Soil Suitability Map.





**Q: In addition to soil, water and fertilizers, what kind of research does the NRMD conduct?**

**A:** The Forestry and Wild Life Research Unit of the NRMD on its part, managed to collect a total of 1819 Kgs of seeds from 39 tree species (22 indigenous and 17 exotic) varieties. Meanwhile, assessment and selection processes were done on 52 tree species and 59 seed provenances, i.e. in the context of proper forestry management. It is also to be noted that various trees and shrubs were planted for research purposes in the Central (Merhano), Southern (Debarwa Sub-Zone) and Gash-Barka (Shambuko, Akurdet and Goluj) regions; and further studies are being carried out on them. Likewise, similar initiatives were taken in some areas of Anseba and Northern Red Sea regions.

Reports from the watershed management unit of this division also indicate that several researches were carried out on the impact of different types of physical soil and water conservation measures.

**Q: Would you give us a brief explanation on the overall bio-technological activities of NARI, along with their impact and the challenges faced, if any?**



**A:** The Bio-technology unit focuses on tissue culture and molecular biology. Although it is not a long-established unit, it has, so far, registered remarkable achievements in terms of producing virus-free potato seeds and banana seedlings. For instance, in the course of the years 2016-2021, around 150 quintals of virus-free potato seeds were produced and distributed to farmers, and thus raising the average national potato yield to over 160 per-hectare. This figure depicts only the average national harvest of that time. Otherwise,



NARI's reports indicate that farmers who made good care of their farmland were able to secure up to 450 quintals per-hectare. There are also reports that farmers who managed to achieve good and continuous harvest up to nine generations. Likewise, more than 2,000 banana seedlings produced through tissue culture were distributed to farmers during the years 2018-2021. Currently, greater emphasis is being made on date palm tissue culture propagation. This undertaking is at its preliminary state but it is equally worth-mentioning that, in the course of the period 2018-2021, more than 7,800 imported date palm seedlings were distributed to several farmers and institutions in the Northern and Southern Red Sea regions after the seedlings were properly hardened MoA nurseries.

**Q: What can you tell us about NARI's initiatives on livestock research?**

**A:** Livestock production and productivity can be addressed effectively on the basis of maintaining standardized nutrition, good health and selected breeds. That is why all possible research efforts have been exerted to ensure comprehensive achievement in these three areas starting immediately after independence. Pursuant to the endeavours put up towards improving livestock feed quality, especially concerning diversification of feed options for dairy cattle, trials were made on a total of 261 forage seed varieties, out of which 30 types of grass and 50 types of legumes; were selected. Meanwhile, six varieties of sweet potato were planted on trial basis with the intent of studying their effectiveness as forage; and, out of them, 4 were selected.

With regards to feed block trials, 4 types were selected to serve as standard options in the highlands, while the numbers of suitable options for the eastern and western lowlands stand at 2 and 3 respectively. Moreover, a machine that mixes and packs these



feed blocks was designed and produced locally. The livestock research division has further managed to formulate preparation of silage using maize and alfalfa. Besides, trial on one kind of calf starter is underway.

**Q: You have mentioned the research conducted on animal feed, what about the results of research in breeding?**

**A:** Even though research activities on livestock breeding is at its infant stage, promising outcome has been recorded with regard to our initiative in breeding and multiplication of high performing sheep varieties both at our site, Halhale, and private farms. Following close follow up and identification of some breeds with high tolerance to external parasites and promising genetic characteristics. We can also say that the establishment of research centre for local cattle breeds at the Goluj station has given encouraging signals to focus on this subject. In addition, preliminary research was conducted on various types of diseases and pests in collaboration with the National Animal and Plant Health Laboratory (NAPHL). Subsequently, necessary drug proposals were recommended. According to research outcome from this division, the number of identified prevalent internal parasites stands at 5, while that of external parasites is 6.

**Q: Could you also brief our readers concerning research activities on agricultural engineering?**

**A:** Agricultural Engineering Research Division is an essential part of NARI as it serves all the other areas of research. Some of the major accomplishments with

the view of strengthening the agricultural research since 1997 are establishment of seed cleaning facility and meteorological sites; installation of irrigation infrastructure and solar energy; construction of various diversion schemes and dams of limited water-holding capacity, as well as water wells, among others. Since 1991, this division has been playing a leading role in terms of identification of proper tillage alternatives, constructing of ordinary crop seed stores, cold stores, livestock shelters etc.

**Q: NARI has also conducted some research on food technology. What kind of achievement has, so far, been registered in this field?**

**A:** Although research activities on food technology are at their initial stage, value addition trials were conducted focusing on various recipes of sweet potato, instant yogurt, pumpkin, flaxseed and various legumes. However, we shouldn't forget that this area is vast and more needs to be done in collaboration with other relevant institutions and actors.

**Thank you Mr. Tsegai**



**Editor-In-Chief:** Ermias Solomon, Director of Public Relations Division: Email:- ersohab@gmail.com, Tel: +291-1-182225/ +2917143877

**Assistant Editor-In-Chief:** Filmawit Measho; **Translator:** Medhanie Tsegai

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