The State of Eritrea

Ministry of Agriculture

Eritrean Experience in Seed Policy and Regulations

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2. Introduction

1.7 Country Background

Eritrea is located along the western coast of the Red Sea. The total area is around 124,320 square kilometer. The total population is about 4 million. Over 70% of the population live in the rural areas and directly depend on agriculture. The topography of the country comprises three major classifications, the central highlands, the eastern lowlands and the western lowlands. The agro-ecological zones of the country are; Sub-humid, moist highlands, moist lowlands, arid highlands, arid lowlands and semi-desert. The altitude ranges from 120 meters below sea level up to 3,600 meters above sea level.

Mean Annual Temperature

Highland	18^0 centigrade
Western lowland	24^0 centigrade
Eastern lowland	29^0 centigrade

Annual Rain-fall

Highland	224-574 mm
Western lowland	319-516 mm
Eastern lowland	<200mm

1.8 Agriculture

Although Eritrean agriculture is dominated by subsistence farming system, the agricultural sector has been always the base for the national economy, the source of livelihood for the vast majority of the population, the provider of raw materials for industries, and a major source of foreign exchange earnings. It is estimated that about 2.1 million hectare are arable land of which 1.5 million is for rainfed agriculture and 0.6 million hectare for irrigation.

Rainfall Pattern

Azmera Season Rain (March - May): - This season is mainly confined to the highlands and parts of adjoining eastern escarpments. This rain contributes to the start of land preparation and sowing of long period growing crops such as finger millet, highland sorghum, maize and taff.

Kremti Season Rain (June - September): - Mainly confined to the highlands, western lowlands and parts of adjoining eastern escarpments. It facilitates the start of sowing of short cycle crops such as wheat, Barley, Ground-nut, Sesame and other leguminous and cash crops.

Bahri Season Rain (October - March): - Mainly confined to the northern and southern Red Sea Coastal Areas. The major crops grown with the activities of this rain are maize, sorghum, and vegetables.

The Role of the Agriculture to the National economy

- The varied topography and weather of the country provide settings conducive to growing various staple and cash crops, assorted vegetables and fruits.
- Agriculture (crop and livestock production) is the backbone of the Eritrean economy and provides a livelihood for over 70% of the population.
- Accounts for more than 39% of the National GDP.
- Accounts for more than 29% of the foreign exchange earnings.
- Contributes raw materials for more than 22% to the industrial sector.

1.9 The Ministry of Agriculture (MoA)

In the year 2002, the MoA has redefined its structure and functions based on the Proclamation for the Establishment of Regional Administration (PERA). The strategic functions of the Ministry as stipulated in PERA are: policy formulation and strategic planning, regulation, research, human resource development and technical backup to the regions. Following a functional analysis, the MoA has developed its vision, mission and set its development objectives. The functional analysis has also clearly defined the role of the departments, divisions and units of the MoA. The Ministry of Agriculture has three departments namely: Agricultural Extension Department (AED), Regulatory Services Department (RSD) and National Agricultural Research Institute (NARI) and their mandates can be summarized as follows.

1. **Agricultural Extension Department**

Agricultural Extension department (AED) is mandated to enhance agricultural production through the dissemination of appropriate agricultural technologies and improved farming practices while promoting environmental restoration.

2. **Regulatory Services Department**

Regulatory Services Department (RSD) is mandated to develop and enhance standards and regulations within the agricultural sector.

3. **National Agricultural Research Institute**

National Agricultural Research Institute (NARI) is mandated to conduct demand driven, area based, commodity and farming system based research applying a multi-disciplinary approach.

The vision statement:

"The vision is a **modern, efficient, competitive and sustainable** agricultural sector, where the ministry promotes an enabling environment by providing policy and strategy frameworks, and efficient and effective regulatory, research and **decentralized** extension services and the **private sector undertakes** agricultural production, processing, marketing and other services."

The mission statement….

"The mission is to contribute to **economic growth and food security** through supporting increased and sustained agricultural development, while protecting the environment and the interests of consumers, farmers and the society in general."

Eritrea gives priority to develop agriculture as a major strategy to address food security and poverty eradication, and significant efforts have been made to develop the sector. In

line with this objective, the Ministry of Agriculture (MoA) has prepared the mid-term Agricultural Development Programme 2008 – 2013 which forms to achieve the sector objectives.

Agricultural Sector Development Objective
The development objective of the sector is to achieve food security and economic growth by transforming the traditional production system into modern commercial production system.

Immediate Objectives
- Promotion of import substitution products (mainly provision of raw materials to the processing plants) and premium quality produce for export through the applications of modern agricultural production technologies and effective research and extension services,
- Strengthening research outputs, particularly production and promotion of improved seed,
- Improvement of soil fertility and productivity through appropriate land management, application of best agronomic practices (alternating crops and pastures) promotion of efficient post-harvest handling measures, and development of agro-based processing plants.
- Development of career programs for the agricultural and technical college graduates that will enable them to establish modern production farms,
- Creation of employment opportunities and development of effective business management skills and work experiences at the acceptable standard level.
- Encourage investors, both nationals and foreigners to undertake investments in areas identified as having considerable agricultural development potentials.

Development Strategies
Food security and economic growth are foundation of the development objectives. In order to meet the goal, the following development strategies are identified.
- Enhancing production and productivity,
- Rehabilitating and development of physical infrastructure,
- Conserving natural resources for the protection and development of the environment,
- Promoting research and extension services for modernizing farming practices.
- Encouraging private sector investments for effective, competitive and sustainable agriculture sector development and
- Enhancing institutional and community capacities.

1.10 Seed Policy
In May 2002, a Seed Policy has been developed. This Seed Policy document marks an important step in laying out a comprehensive framework for seed development strategy. It covers most of the relevant topics in considerable details. The document states that private sector involvement is considered as having the potential to play an important role in the development of commercial seed industry activities in the long-run. It indicates that for the medium term, the government must bear the responsibility of initiating and promoting the development of the seed industry. The document also foresees contracting with the private sector for seed multiplication, which signifies government

encouragement the private sector to participate actively in seed marketing, probably well before their involvement in production activities. This is because that private sector capacity for managing seeds needs to be developed.

The policy document highlights that government acknowledges that the outputs of research is fundamental to the seed industry. With this regard, the government encourages private sector involvement that supports national priorities. Owing to the high cost nature of basic research, the national agricultural research program will continue to encourage collaboration with relevant international, regional and private institutions.

Seed quality control is an important element of the policy. It states that seed quality control has to be harmonized with the existing regional and international system including COMESA seed harmonization regulation to ensure highest seed quality standards. The government recognizes that public policy development is a series of dynamic processes which is subject to review and modification.

1.11 National Seed Enterprise

In December 2008, the MoA has drafted the establishment of National Seed Enterprise. This enterprise was proposed to be established so as to act as a key entity (parastatal) for implementing the seed policy. The document argues that Eritrea needs a robust seed system to guarantee the sustainable development of its agriculture. It also justifies the essence of this body to be placed under the MoA by emphasizing that given the absence of an organized private seed industry, it becomes imperative that the MoA makes adequate interventions and establish an appropriate institution and fill up the gap.

The document clearly shows that the process of developing the legal instruments for regulating the various processes of the seed system – including variety improvement, variety listing, seed production, processing, storage, analysis, certification and marketing (import and export) – is still underway. The paper described the seed industry development strategy as follows:

- The Government (MoA) will ensure that the technical resources of the agricultural sector, especially the research, quality control regulatory and extension services, are fully mobilized in support of the seed industry. To meet the national demand for various types of improved variety of seeds, and at the same time to promote the benefits and potential of the seed industry, during the initial stages of development, Government's (MoA) role shall be as the promoter and regulator of production, processing and marketing activities.
- Both in the short and long term, Government will continue to bear responsibility for supportive and supplemental activities of economic importance, in areas which demand heavy investment, are risky, and of absolute necessity presumably show little prospect of commercial viability. Providing such support and incentives will enable the private sector to play their role. Concomitantly, the private sector, particularly local entrepreneurs, will be encouraged to establish ventures to carry out improved seed production, seed processing and marketing.

- In the short run, in view of the low demand, limited prospects of commercial profitability, the tradition of on-farm seed multiplication, limited access to credit and lower purchasing power of majority of the farmers, Government (MoA) recognizes that the private sector may not find it convenient to engage in the production, processing and marketing of improved variety of seeds. Nevertheless, it is recognized that improved variety of seeds are extremely important in the development of farming systems and household food security. To respond to the demand of improved variety of seeds, and to extend the benefits of modern crop improvement to farmers, Government through the Agricultural sector will endeavor to make adequate arrangements to cover the minimum seed production requirements for improved variety of seeds.

The document has also indicated the implantation arrangements by emphasizing the establishment of the National Seed Board and defining its members and responsibilities. It discusses the legality of the enterprise, the objective and modality of operation. It has also proposed the most efficient link with the public enterprises and farmers at large.

1.12 Current Seed Status

Seed of low-yielding varieties is usually attributing to low productivity. Therefore, seed of superior varieties must be developed or identified, demonstrated, produced and multiplied, and released to farmers. MoA has a role to play in the development and production of the basic seeds. Private farms and small scale farmers are involved in the multiplication of seeds and their distribution to end users.

In Eritrea, farmers' awareness of the relative importance of quality seed is highlighted in the recent years. Due to low supply and high price of this variety, however, its application is very limited, mainly to some commercial farmers. Most farmers prefer to retain seed from their own crops, because they lack confidence in what is available at the market. One of the main reasons of the direct involvement of the government is to build confidence on farmers by enhancing breeder and foundation seed on government research centers. The National Agricultural Research Institute in collaboration with Hamelmalo Agricultural College (HAC) is responsible for the development of the foundation seeds in Eritrea.

Seed distribution is equally important as producing it. Since producing improved seed demands high cost and long time, managing the improved seed requires skill, facilities and proper mechanism. Therefore, identifying model farmers (commercial and traditional farmers) is a very crucial step in the development cycle of improved seed chain. To coordinate the processes (improved seed chain), the MoA has established seed unit within the Agricultural Extension Department (AED).

Once the idea of producing a specific superior quality seed emanates, the need for supervision, inspection, quality control, standardization, coherence with international standards, phytosanitary and other related activities has to be considered as part of the whole package. The Regulatory Services Department is mandated to certify the seed and assure the quality of the seed before it is distributed to the ultimate users.

Seed distribution system in Eritrea

- Formal seed system
- Commercial seed system
- Informal seed system

Formal and Commercial Seed Systems: Seed is produced by specialized units, following a well described system and quality control regulations (certification and standardization). Under the formal and commercial seed systems often retain sufficiently good quality seeds for several generations. Nevertheless the experience for high quality seed is unaffordable for poor resource farmers. The Agricultural Extension Department under the Ministry of Agriculture is in charge for the formal seed system. However, this accounts for ± 10% and could not cover the need of seed for farmers in the country. For this reason, the seed system is currently dominated by the informal seed system.

Informal Seed System: Although there are many variations, the common approaches/ characteristics apply include good seed stocks which are used for several generations. Unlike the formal and commercial seed system, informal seed system are cheaper and most farmers can use their own seed do not need cash/credit to buy the seed. However, suppliers of the informal seed system often have credit facilities for the buyers of the seed. Seed suppliers provide seed at planting time and receive grain of the type at harvest time. In the Informal seed system, farmers (stockholders) supply and buy local/land race seeds or introduced or exchange seeds from farmer to farmer. Farmers prefer to use local varieties for certain reasons such as:

- To cope with variations in soil fertility and climate.
- To minimize the risk and to benefit from yield stability of the local seeds.
- Moreover, most of the farmers lack sufficient improved varieties from the MoA/NARI and are forced to use local varieties.

Seed plays a critical role in increasing agricultural production and productivity. It also attributes to the upper limit of crop yields and the productivity of all other agricultural inputs to the farming system. In the year 1997 Ministry of Agriculture (MoA) in collaboration with different stakeholders recognized the critical role of quality seed in the transformation of the agriculture sector development.

In light of this, since the year 1995, Ministry of Agriculture (MoA) in collaboration with national and international development partners have been providing a substantial support to develop a small scale seed system. However, the efforts made achieved only limited success in few crops such as wheat, barley, sorghum, pearl millet, sesame and vegetables (hot pepper, potato).

As a result, the changes made in the farmer's livelihood and seed system were insignificant. Recently, the National Agricultural Research Institute (NARI) in collaboration with ICARDA is working under the challenge program for the improvement of the water productivity of cereals (wheat and barley) and legumes (chickpea, lentils and faba bean). Since the year 2004, under the program the two parties are working on:

- The introduction of improved exotic varieties and
- Improvement of the local varieties.

The efforts made by the 'Challenge Program' play a crucial role in raising the awareness of the Eritrean farmers on the uses of seed system and importance of improved and quality seeds.

After selection of different improved varieties, seed multiplication of barely, wheat and chickpea seeds were conducted among farmers in the year 2007, 2008 and 2009. Although the results from the seed multiplications are not as much as expected, farmers have obtained reasonable yields for using the improved seeds. Moreover, the farmers are highly motivated to take this opportunity to participate in the seed multiplication programs with full preparations.

Furthermore, the effort made is also playing a crucial role in raising the awareness of the Eritrean farmers on the introduction of improved seeds of sorghum, pearl millet and wheat. The initiatives of NARI in collaboration with Administration Regions in improved seed provision and multiplication is also playing a crucial role in solving the seed problems of the resource poor farmers and commercial farmers. Although the efforts made so far are considerable enough, more work is expected to fulfill and supply farmers with adapted, improved and high yielding varieties to secure food security at household and national levels.

G. Seed Regulations

G.1 Standards for Seed Certification

Seed is the primary input of the agricultural production and limits productivity tremendously. Culturally Eritrean farmers practice the use of quality seed; however this practice can't fulfill the needs at national level. To address the national seed requirements, the government of the State of Eritrea established plant breeding program in 1995 with the assistance of the international research institute such as Centro International de Mejoramiento de Maiz y Trogo (CIMMYT), Centro International de la Papa (CIP), International Center for Agricultural Research in the Dry Areas (ICARDA), as well as International Crops Research Institute for the Semi Arid Tropics (ICRISAT).

National Agricultural Research Institute (NARI) of the State of Eritrea, the former Department of Agricultural Research and Human Resource Development (DARHRD) is the leading public sector organization in the country that undertakes agricultural research. The plant breeding program mainly focused on the development of improved varieties of wheat, barley, maize, sorghum, pearl millet, chickpea, lentil, potato and locally adapted farmer varieties for specific agro-climatic zone of the country. Introduction of considerable amount of germplasm from ICARDA was done mostly on wheat, lentil and chickpea, and sorghum and pearl millet germplasm from ICRISAT while potato was introduced from CIP.

The existing seed classes in Eritrea are the:- Breeder Seed, Pre-Basic Seed, Basic Seed/Foundation Seed and Certified Seeds. The definition of the seed classes is presented as follows.

Breeder Seed: The small quantity of breeder seed produced is increased in an inbred increase nursery. Plants are either selfed or sibbed. Selfing maintains the line in its pure form but sibbing is usually preferred to prevent excessive loss of vigour.

Pre-Basic Seed: This is produced in an isolated block by natural random mating. The purity of seed harvested is verified by post control, although any out cross (off type) in an inbred line are detected and rouged out before flowering.

Basic Seed/Foundation Seed: This is produced from ore-basic seed. It may be either an inbred line or a cross between sister lines (modified single cross). Basic seed is produced in well isolated block.

Certified Seed: Certified seed is produced from basic seed in an isolated field.

Within the last 15 years, NARI managed to make available different crop varieties (5 wheat, 3 barley, 7 sorghum, 2 pearl millet and 1 chickpea varieties). Breeder and foundation seed of the already used varieties are produced every year and delivered to extension staffs of the MoA and development partners to be distributed to farmers. There are also promising varieties which are expected to be released in the near future. These include sorghum 1, pearl millet 2, barley 3, maize 3, wheat 5, and chickpea 4 varieties and lentil 1 variety.

The result of the research (Improved Seed Variety) are transferred through the Ministry of Agriculture, National and International Organizations and model farmers with technical assistance and training that NARI provides to the stockholders (farmers) with the aid of extension agents and zoba, sub zoba and village administrators.

Regulatory Service Department (RSD) of the Ministry of Agriculture was established at the beginning of 2003 in line with the Government policy to regulate agricultural sector. It has four divisions (namely: Plant Resources Regulatory, Animal Resources Regulatory, Natural Resources Regulatory and Forestry and Wild life Inspectorate division) and one central laboratory for plants and animals. The department is mandated to develop and enforce legislations and standards relating to agricultural regulatory activities. Specifically, the Plant Resources Regulatory Division is responsible to inspect and supervise plant and plant materials mainly on quarantine, surveillance plant pests, issuance of certification and issuance of import/export permits as well as developing legislative frameworks and standards related to seed development.

Seed is one of the basic agricultural inputs for achieving high agricultural production and productivity. However; the seed must be of high quality standards. Seed quality has various parameters, including genetic and physical quality as well as health aspects. In terms of genetic quality, for example, a true foundation seed must be produced by researchers and this must be certified by regulatory body before it enters to seed multiplication program.

The Regulatory Service Department (RSD), as one of its many regulatory activities, regulates the seed sector and tries to ensure that seed quality through conducting supervision and certification processes such as field inspection, laboratory seed testing, and supervision of seed processing plants as well as seed certification. Based on the standards seed crops should fulfill minimum requirements of moisture content, germination percentage and free from diseases (Annex I).

Seed certification process and documentation is carried out by plant resources regulatory division of the department (RSD). The purpose of seed certification is to preserve the genetic identity and purity of field crop seed varieties and ensure the provision of seed quality to the growers, which is handled by first the seed must be of a variety on one of national strategic crops. Second, the seed crop must be inspected by a qualified inspector and make sure that the crop has met the standards and then a sample is taken from seed lot by the inspector and tested in seed laboratory. Then, an official report is issued stating that whether the seed has met the prescribed standards or not. Furthermore, RSD is responsible to coordinate and monitor the multiplication activities of the seed, documentation and timely reporting of the performance on the ground.

Ministry of Agriculture has decided to establish a National Seed Enterprise (NSE), which will be responsible for seed multiplication, processing, storage, marketing and distribution systems. Thus, seed certification issue has come into a picture and designed a plan to develop standards on seed certification in relation to the NSE.

H. Variety Evaluation, Release and Registration

New varieties pass through a series of evaluations for registration and release before using them for production of seeds or grain. Registration test of a variety is used to evaluate, register and release a variety based on variety trials. Evaluation of variety consists of various trials and tests to determine its superiority over the best existing variety in yield, agronomic characteristics and its suitability for consumption. Variety description is therefore useful for implementing of variety maintenance (purification), seed multiplication, seed certification, and consumer and Plant Variety Protection (PVP) rights. An effective, flexible and participatory evaluation, registration and release system (involving all the stakeholders) assist in the development of a successful and efficient seed industry.

Generally, variety evaluation is carried out through registration tests (Distinctiveness, Uniformity and Stability, DUS) and performance tests (Value for Cultivation and Use, VCU). Identification of outstanding varieties is carried out for release as new varieties at workshops/meetings of the respective crops through proposals prepared by the respective breeder/s. Proposals consist of information on the results of the variety tests (pest and disease reactions, quality and other parameters) carried out at various centers for a minimum of 2-3 years.

After the completion of the identification processes, the variety is tested for atleast one year for disease and quality tests. The breeder/s submits a proposal for release as a new variety for approval by the National Variety Release Committee (NVRC) on Crop Standards and release of varieties.

National Agricultural Research Institute (NARI) and researchers in other institutions have primary responsibility for developing new varieties based on the strategic demand of the country and problems of farmers. Strategic demand of the country is focusing on field crops and mainly on strategic crops such as: Sorghum, Pearl millet, Sesame, Wheat, Barley and Chickpea to ensure food security programs of the country. Farmers in the different agro-ecological regions of the state of Eritrea also need early maturing, high yielding, disease-and pest-resistant crop varieties with acceptable processing quality. Researchers develop breeder, pre-basic, foundation and certified seeds and finally submit varietal seed for evaluation, release and registration.

Agronomic characteristics and other relevant data on crops are collected in multi-location trial programs (3-5 locations) that represent the agro-ecological conditions across the country for 2-3 years of evaluation period. The variety under evaluation usually passes through the Distinctiveness, Uniformity and Stability tests on station and on farm trials.

The variety is evaluated for yield, disease resistance and other relevant agronomic characteristics for a minimum of 2-3 years at 3-5 locations by the appointed subcommittee composed of members of NVRC and relevant subject matter specialists to report on varietal field performance after examining the performance data submitted by the breeder/s. The reports cover the performance field evaluation, general comments and recommendations.

The NVRC where RSD serves as the Variety Release Coordinator is responsible for variety release and registration. The NVRC is comprised of members from NARI, Agricultural Extension Department (AED), Regulatory Services Department (RSD), Hamelmalo Agricultural College (HAC) and other private sector stakeholders as deemed necessary.

Promising variety/varieties are promoted to farm verification trials. The breeder/s applies for his/her variety to be evaluated for release during the same season. The candidate variety is planted with established local or improved varieties in plots of at least 100 m^2 at 2-3 sites. During the anticipated year of release and registration, the variety is verified both on station and on farm by the NVRC and appointed sub-committee.

The Coordinator of the NVRC responsible for varietal release and registration is the Director General of the Regulatory Services Department (RSD) in the Ministry of Agriculture (MoA).
Crop types and varieties included in the variety evaluation, release and registration for Sorghum, Barley and Wheat, Pearl millet and Maize and legumes are presented in Annex III, Annex IV, Annex V and Annex VI respectively. N.B. Most of the registered varieties were released before the establishment of the NVRC between the year 2001 and 2003 without certification.

The future plan of the country in varieties evaluation, release and registration is to consolidate the established National Variety Release Committee (NVRC) and harmonize the overall seed activities in the country. Moreover, NVRC will develop a draft proposal

to collaborate in variety evaluation, release and registration among the Eastern and Southern African Countries (EAC) in particular and COMESA Member States in general.

Member States of COMESA has to develop a common proposal on harmonization of seed policy and regulations to create an environment conducive for fostering cooperation between governments and research institutions to make interventions needed in variety evaluation, release and registration in the COMESA Member States.

I. Phytosanitary Measures

Standards and technical regulations are now becoming the critical issue on the international trade agenda. Among these phytosanitary measures, special attention due to their crucial targets such that to secure common and effective action should be taken to prevent the introduction and spread of pests of plants and plant produces, and promote appropriate measures for their control and safeguard of the health and safety of human being in accordance with the World Health Organization (WHO).

Eritrea became a contracting party (April 6, 2001) to the International Plant Protection Convention (IPPC), which is considered to be one of the paves to enhance international trade and to prevent Eritrean plant resources from introduction of exotic pests. Moreover, Eritrea follows strictly the International Standards for Phytosanitary Measures (ISPMs) which was developed by Food and Agriculture Organization (FAO) in 2006 and it has been exercising the right to utilize the phytosanitary measures to regulate the entry of plants and plant produces and other materials potential for harboring plant pests. Because all phytosanitary measures are based on international standards, guidelines and recommendations developed within the framework of the IPPC, which works under the auspices of FAO considers the following points.

1. To prevent the introduction of foreign pests into Eritrea along with agricultural input or plant materials such as seeds, importation of any agricultural input is subject to strict specified conditions. The predetermined procedures ensure that enough information on the plant material is going to be collected to evaluate the level of the pest risk. Plant quarantine restrictions are based on Pest Risk Analysis (PRA) supported by scientific knowledge on the distribution, biology and pests of the plant.
2. Suitable regulations are enforced to facilitate the import/export of plant materials through the issuance of import permits and a phytosanitary certificate, which indicates the consignments of plants, plant products or other regulated articles meet specified phytosanitary import requirements and are in conformity with the certifying statement of the appropriate model certificate.
3. Inspections are carried out at the entry points: international air port, sea ports (Massawa and Assab) and land border in South Western part of Eritrea (Tesseney).
4. RSD of the Ministry of Agriculture is responsible to allow the plant material to enter; for treatment or destruction of infested or infected through appropriate steps such as eradication, containment and control to mitigate adverse effects.
5. Since Eritrea is the member country in the IPPC, there is a bilateral agreement when there are differences between the views of the importing and exporting country regarding the justification for requiring a phytosanitary certificate. Changes regarding the requirement for a phytosanitary certificate should respect the principles of transparency and non-discrimination.

Pest surveillance conducted in Eritrea during the cropping season of 2003 (still draft document) aiming with to categorize pests into quarantine and regulatory non-quarantine pests, identify pests associated with import and export commodities that could be used in the development of phytosanitary system in Eritrea. The surveillance was to give a clue on the type and distribution of the pests, their aggressiveness and economic importance in terms of yield reduction or affect the quality of the crops or transmission of diseases as vectors (Annex II).

RSD of the ministry has a program to build up the capacity of the staff with the assistance of regional and international organization on awareness of contemporary phytosanitary issues and ensure that the staff is implementing phytosanitary measures; specific phytosanitary issues such as PRA and identification of pests of quarantine importance.

Furthermore, there is a plan (a) to strengthening border control by establishing more inspection points at entry points to prevent introduction of exotic pests (b) setting up laboratory facilities at the major entry points to ensure quick identification of intercepted species or pests etc.

J. Plant Variety Protection (PVP), Intellectual Property Right (IPR) and Farmer's Right

The development of new certified seed variety is an extremely expensive, laborious and time consuming activity which also requires great research efforts and dedications. On the other hand, new released varieties can be sold or advertised for seed purposes without the permission of the breeder. Therefore, Plant Variety Protection and Intellectual Property Right Act have to come into effect with rules and regulations to ensure the protection of the newly developed variety and plant breeders' right. Moreover, the Plant Variety Protection PVP Act ensures the plant breeders to benefit and be able to recover research cost as well as encourage the development of new varieties.

The Plant Variety Protection and Intellectual Property Right provide the breeders of new varieties exclusive rights that protect the reproduction and distribution of the varieties without the permission of the breeder. Therefore, at the times of seed release and registration, the variety has to be accompanied with rules and policies concerning Plant Variety Protection or Intellectual Property Rights on the released variety.

Although Ministry of Agriculture of the State of Eritrea enacted the Seed Policy in May 2002, the Plant Variety Protection (PVP) Act and supportive seed legislation issue was left to be drafted in the appropriate time. For this reason, the Plant Variety Protection and Intellectual Property Right Act were not enacted until recent times.

East African Countries are the center of origin or genetic sources for a number of crop species and a number of crops are specific to the African continent. Moreover, African farmers save, use, multiply and sell seeds that contribute to the development of new varieties by breeders that are distinct, uniform and stable in nature.

Recently, with development of new varieties of different crops by breeders and the contribution of farmers to this development, the Ministry of Agriculture of the State of

Eritrea acknowledges the relevance of the Plant Variety Protection, Intellectual Property Right (IPR) and Farmers right Act and decided project proposal to be drafted as soon as possible. The Plant Variety Protection (PVP), Intellectual Property Right and Farmers Right Act is now on plan level to be drafted and will be ready for review by seed stakeholders to harmonize the proposal draft with the seed policy and seed activities in the country.

The Plant Variety Protection, Intellectual Property Right and Farmers Right Act will ensure the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders. Moreover, the Act will encourage the development of new varieties of plants and is considered necessary to recognize and protect the rights of the farmers in respect of their contribution in conserving, improving and making available plant genetic resources for the development of the new plant varieties.

According to the proposed plan on the draft of the Plant Variety Protection, Intellectual Property Right and Farmers Right Act, the NVRC and the breeder or the institution of the breeder, NARI are responsible to give protection for Plant Variety Protection, Intellectual Property Right and Farmers Right to use the variety.

The future plan of the country in the Plant Variety Protection, Intellectual Property Right and Farmers Right is to take immediate initiatives on the finalization of the draft and to enact the seed legislation in to effect as soon as possible. Moreover, the NVRC will develop a draft proposal on Plant Variety Protection, Intellectual Property Right and Farmers Right to collaborate and harmonize the seed legislation among the EAC and COMESA Member States, whenever necessary.
EAC and COMESA Member States has to develop a common proposal on seed legislation policy and harmonization to create an environment conducive for fostering cooperation between governments and research institutions to make interventions needed in Plant Variety Protection, Intellectual Property Right and Farmers Right Act.

According to the proposed plan on the draft, the NVRC, where RSD serves as the Variety Release Coordinator and the Director General of NARI are responsible to give protection for Plant Variety Protection, Intellectual Property Right and Farmers Right to use the variety.

K. Seed Import/Export Documentation and Procedures

Seed import/export is the delivery of different seeds into and out of the country for the purpose of production and research activities. Seed import/export from and to other countries with similar agro-ecological zones is necessary and desirable on some occasions, especially if farmers in the country failed to harvest any seed and at times of bad season/s. Seed import/export follows several procedures prior to mass seed importation. The seed import/export procedures reduce the risk of introduction and dissemination of diseases into/out of the country.

In Eritrea, the seed import/export activities pass through several Agricultural departments to comply and harmonize with the enacted seed policy of the country. There is no seed

export activities except that of seed exchange with regional and international research institutions. As far as the seed import is concerned, seed for planting material and seed for research purposes is requested from the Agricultural Extension Department (AED) and National Agricultural Research Institute (NARI) respectively.

Requested seed lots for planting material and for research purposes is directly delivered to Regulatory Services Department (RSD) for quarantine and phytosanitary purposes. The imported seed lots are checked in laboratory for economically important pests and disease to minimize the risk of introduction and dissemination of pests and diseases into the country. After the imported seed lots pass the phytosanitary control, the seed lots for planting material and for research purposes will be sent to the Agricultural Extension Department (AED) and National Agricultural Research Institute (NARI) respectively.

National Agricultural Research Institute (NARI) then continues to conduct different research activities with the imported seed lots for research purposes. Agricultural Extension Department (AED) submits the seed lots for planting material to the National Agricultural Research Institute (NARI) to carry out adaptation trials on station, different specific farms to identify and verify the variety/varieties under specific environmental conditions in collaboration with regional AED experts to avoid/reduce risk of failures of direct and mass planting.

When recommendations are made on the seed lots for planting material by NARI, the AED requests the RSD for import permit of the mass seed. The import permit and seed specification (variety, label, amount, chemical treatment, seed containers, purity, germination and others) is then submitted to MoA Administration and Finance Division, Procurement Unit to follow and to be guided by the rules and procedures of the Ministry of Finance. The Administration and Finance Division, Procurement Unit of the MoA also make all the clearing and forwarding of the imported seeds during arrivals.

The future plan of the country on Seed Import/Export Documentation and Procedures is to comply with rules and regulations of the enacted Seed Policy of the country. Moreover, the Ministry of Agriculture of the State of Eritrea will take initiatives to share the Seed Import/Export Documentation and Procedures with EAC. The Ministry of Agriculture of the State of Eritrea will also work together on seed exchange and seed import/export Procedures among the EAC.
Variety seed export has not been practiced so far in Eritrea for the last Twenty (20) years. However, Open Pollinated Varieties (OPV) and Hybrid varieties of different seeds crops are imported into Eritrea from different countries to provide farmers with quality and adapted seeds to increase the production and productivity of crops.

In the year 2009/10 for example, the amount and type of seed imported into Eritrea and country of origin of crops are presented in the following table.

Crop type	Unit	Quantity	Country of Origin	Remark
Hybrid Maize	Ton	500	China	
Hybrid Maize	Ton	8.5	Zambia	
Hybrid Maize	Ton	200	India	

Sorghum	Ton	150	Sudan	
Pearl Millet	Ton	200	India	
Potato	Ton	220	Netherlands	
Hybrid Tomato	Ton	1	China	

L. Membership to International Organization

Eritrea is membership of several regional and international organizations.

Regional:

- Inter African Phytosanitary Council (IAPSC): Eritrea is signatory with the council and working with it to secure a common and effective action to prevent the spread and introduction of pests and plant products as well as the need to promote appropriate measures for their control.
- Codex: Eritrea has a National Codex Committee (NCC) established in 2004. The NCC formed by Government institutions: Ministry of Agriculture (chair), Ministry of Health, Ministry of Marine Resources and Ministry of Trade and Industry aiming at promoting coordination of national, regional and international food standards and information exchange on regulatory aspects. However, the membership of the NCC would be revised to include other institutions such as Eritrean Standard Institution, National Chamber of Commerce, Ministry of Water Land and Environment and other relevant Ministries as well as Higher Education Institutions.

International:

- International Plant Protection Convention (IPPC): As it is mentioned in the above, Eritrea is member of IPPC and is obliged to be obeyed by the rules and regulations of the convention. Based on this, Eritrea has a responsibility to ensure certificates relating to the phytosanitary regulations; conducting of surveillance on growing plants; inspection of consignments; storage conditions and transportations; disinfestations or disinfection of consignments of plants and plant materials as well as conducting Pest Risk Analysis (PRA).

FAO:- Eritrea is one country in the United Nations and as a nation; it has a right to take advantage from FAO on technical and professional development of the seed sector that is one of the driving forces of improving the food security situation in the country. FAO is used as a means of regional and international collaborations as well as national capacity required on developing standards and guidelines for variety improvement, production, multiplication and supplying system for good quality of seeds of varieties adapted to the agro-ecological conditions of the nation. FAO has also great contribution on strengthening linkages to the global frameworks for seed policy and program strategies.

Annex I

Guidelines for the Operation of Seed Inspection Activities

(A) Field Inspection

A seed inspector will undertake first field inspection activities during the first month of the crop to verify that the land under seed multiplication complies with necessary requirements. Necessary seed inspection standards of some crop species are indicated below.

1. A seed inspector will undertake frequent field inspection activities, at least during the following period:
   i. During field preparation and planting
   ii. Before and after flowering of the crop,
   iii. During seed setting,
   iv. Maturity stage of the crop, and
   v. Before harvesting of the crop, for making the necessary observations and also to take samples of field plot tests for verify whether the seed lots fulfill the requirements of seed multiplication

2. Field inspection activities may result in:
   (a) Approval of the seed plots of the field for further sampling and laboratory analysis.
   (b) Rejection of seed plots of the field.

3. A seed inspector will assure that equipment used for harvesting or threshing of seed produced from an approved field is clean.

(B) Storage, Laboratory Analysis and Certification

4. A seed approved in the field by an inspector should be separately and properly stored to protect it from excessive humidity and high temperatures as well as from any pests.

5. The Inspector will take seed samples from seed approved in the field for laboratory analysis. Laboratory analysis required for certification are:
   (i) Moisture content the variety,
   (ii) Physical purity and the presence of undesirable wild seeds,
   (iii) Varietal purity,
   (iv) Any other parameter that RSD may request,
   (V) Germination percentage

6. If the laboratory analysis is satisfactory, RSD will initiate the registration process of the seed as certified seed, with a specific code number.

(C) Labeling

7. Certified seed will be properly packaged in 5/10/25/50 kg new bags previously not used depending on the crop type.

25/50 kg – Barley, Wheat
5/10/25 kg – Sorghum, maize and millet
25/50 kg potato

8. The packaging material
For cereals water proof bag
For potato jute bag
For vegetables aluminum foil or cans

9. Labels should be clearly shown in Tigrinya, Arabic and English on the bag and should contain the following information.

(i) Name of organization producing the seed.
(ii) Name of the variety and its registration code number.
(iii) Date of production and expiry date.
(iv) Seed amount (Kg)
(v) Moisture (%) during storage
(vi) Germination (%)
(vii) Treatment
Treated with a chemical name

10. The material used for labeling should be strong enough to prevent damage during ordinary usage.

Annex II
Seed Inspection Standards

Inspection parameter	wheat	Barely	Sorghum	F. millet	P. millet	Maize	Chickpea	Field bean	Faba bean	Lentils
Isolation distance (m)	2-5	2-5	200-400	2-5	4 -5	400-500	10-50	2-5	50	2-5
Off type and other varieties	0.10% (1:1000)	0.10% (1:1000)	0.3%	0.10%	0.3%	0.3%	-	-	-	-
Other crops	0.10%	0.10%	3%	-	3%	3%	-	-	-	-
Noxious weeds	0	0	0 [1]	0	0	0	0	0	0	0
Wild oats	1:100m2	1:100m2	-	-	-	-	-	-	-	-
Convolvulus	1:100m2	1:100m2	-	-	-	-	-	-	-	-
Striga	-	-	0.5 %	0.5 %	0.5%	-	-	-	-	-
Disease										
Smut	0.04%	0.04%	-	0.04%	-	-	-	-	-	-
Head smut	-	-	-	-	-	-	-	-	-	-
Bunt	-	-	-	-	-	-	-	-	-	-
Ascochyta blight	-									
Wilt	-	-	-	-	-	-	-	-	-	-
Laboratory inspection										
Moisture content (%)	12.5	11	12.5	11	11	11	8 -10	8 -10	8 -10	8 -10
Germination capacity (%)	85	75	80	80	75	90	80	80	-	-
Physical purity (%)	98	97.5	98	98	97.5	99	98	98	-	-
Varietals purity (%)	98	98	99.5	98	99.5	99	-	-	-	-
Weed seeds &other crops	5-10%	5-10%	10 seed/kg	0	0	-	-	2 seeds/kg	-	-

[1] Distance (isolation) from varieties of the crop and related species

Inspection parameter	Potato	Tomato	pepper	Onion	Sesame	Rape seeds	Cotton	Ground nut
Isolation distance(m)[2]	50	25 (pure) 100 (hybrid)	200	500	50	50	30	3
Off type and other varieties	0.10%	0.10%	0.50%	0.50%	25 plants/ha	-	10 plants/ha	-
Other crops	0.10%	0.10%	-	-	-	-	-	-
Noxious weeds	0	0	0	0	0	0	0	0
Disease								
Mild mosaic	5%	-	-	-	-	-	-	-
Rig rot	1%	-	-	-	-	-	-	-
Early blight	1%	1%	-	-	-	-	-	-
Late blight	1%	1%	-	-	-	-	-	-
Fusarium wilt	-	-	-	-	-	-	-	-
Bacterial spot	-	-	-	-	-	-	-	-
Total all viruses	2%	2%	2%	-	-	-	-	-
Laboratory inspection								
Moisture content (%)	-	5 -8%	5 -8%	5 -8%	6 - 8	6 - 8	-	-
Germination capacity (%)	-	80	-	80	80	-	70	80
Physical purity (%)	98	98	98	98	98	-	99	98
Varietals purity (%)	-	-	-	-	98	-	-	-
Weed seeds &other crops	-	0.2%	-	0.2%	-	-	1seed/kg	-
Net necrosis	0.5%	-	-	-	-	-	-	-
Nematode* (root-knot)	1%	-	-	-	-	-	-	-
Late blight	1%	-	-	-	-	-	-	-

* 1% of tubers by weight showing nematode infection

[2] Distance (isolation) from varieties of the crop and related species

Annex III

s. no	Crop Type	Variety Name	Source of seed and year of introduction	breeder seed	foundation seed	released	Remark
1	Sorghum	wedi arbaa	Local	✓	✓	2009	Local purified
		IESV92029	ICRISAT, 1998	✓	✓	2005/6	
		Laba(MW5003)	ICRISAT, 1996	✓		2000	
		Shieb(MW5056)	ICRISAT, 1996	✓		2000	
		Shiketi(IS29415)	ICRISAT, 1996	✓		2000	
		P9401	INTSORMIL,1998	✓	✓	2005/6	
		ICSV 111 IN	ICRISAT, 1998	✓	✓	2005/6	
		ICSV 210(bushikua	ICRISAT, 1996	✓	✓	2000	
		PP290(shambiko	ICRISAT, 1996	✓	✓	2000	
		Macia	ICRISAT, 1998	✓		2001/02	
		Gedam Hamam	ICRISAT, 1998	✓		2001/02	
		PP9407	INTSORMIL,1998	✓	✓	2005/6	
		IESV91011	ICRISAT, 1998	✓			
		IESV91065	ICRISAT, 1998	✓			
		IESV91081	ICRISAT, 1998	✓			
		IESV94049	ICRISAT, 1998	✓			
		Kari Matama	ICRISAT, 2008	✓			
		S-35-1	ICRISAT, 2008	✓			
		S-35-2	ICRISAT, 2008	✓			

Annex IV

Barley							
Variety Name	**Source of seed**	**Year of introduction**	**Year of release**	**Breeder seed**	**Foundation**	**Released**	**Remark**
PROCTOR	ETHIOPIA	1998	2002			√	**Malting barley**
HOLKER	ETHIOPIA	1998	2002			√	>>
BEKA	ETHIOPIA	1998	2002			√	>>
TSAEDA	ER-Gene bank	Local				√	**Food barely**
SHISHAY	ER-Gene bank	Local			√		>>
TEKONDAE	ER-Gene bank	Local			√		>>

RAHWA	ER-Gene bank	Local			√		>>
ABAT	ER-Gene bank	Local		√			>>
TSAEDA	ER-Gene bank	Local		√			>>
KULIH	ER-Gene bank	Local		√			>>
YEHA	ER-Gene bank	Local		√			>>
QUNTO	ER-Gene bank	Local		√			>>
TSELIMO	ER-Gene bank	Local		√			>>
SIGEM	ER-Gene bank	Local		√			>>
TSALTA	ER-Gene bank	Local		√			>>
AYE	ER-Gene bank	Local		√			>>
KULIH BA-1924	ER-Gene bank	Local		√			>>
KULIH BA-343	ER-Gene bank	Local		√			>>
ACC BA-1272	ER-Gene bank	Local		√			>>
EGC 2004-020B	ICARDA	2006		√			>>
SIGEM BA-1291	ER-Gene bank	Local		√			>>
ACC BA-1272	ER-Gene bank	Local		√			>>
TSAEDA BA-227	ER-Gene bank	Local		√			>>
Wheat							
BUHIE	ETHIOPIA	1994	1998			√	**Durum wheat**
KUCUK	CYMMIT	2003			√		>>
HI 8498	INDIA	2006			√		>>
AUSTRALIA	ETHIOPIA	1994	1998			√	**Bread wheat**
HALHALE	ETHIOPIA	1994	1998			√	
PAVON-76	ETHIOPIA	1994				√	

ALMAZ21	ICARDA	2006			√		
ATILA/VEE	ICARDA	2006			√		>>
BOOMA2	ICARDA	2006			√		>>
GOUMRIA15	ICARDA	2006			√		>>
GOUMRIA17	ICARDA	2006			√		>>
KATILA11	ICARDA	2006			√		>>
QUAFZA18	ICARDA	2006			√		>>
SW89.3064ST*	ICARDA	2003			√		>>
HAR3768	ECAWIN	2003		√			>>
KAMBARA2	CYMMIT	2003		√			>>
KAUZ//PRL/VEE#6/3/BAV92	CYMMIT	2003		√			>>
17THSAWSN	CYMMIT	2003		√			>>
TUIL/PYN//RAYON	CYMMIT	2003		√			>>
BABAX/KS93U76//BABAX	CYMMIT	2003		√			>>
FRET2	CYMMIT	2003		√			>>
SHA4/3/22*CHUM…	CYMMIT	2003		√			>>
TURACO/2*BORL95…	CYMMIT	2003		√			>>
IRAP#1/YACO//BA…	CYMMIT	2003		√			>>
VEE/LIRA//BOW/3/..	CYMMIT	2003		√			>>
SENSAS	ICARDA	2008		√			>>
PBW373	India	2006		√			>>

SIDC4	ICARDA	2008		√			>>

Annex V

Pearl millet							
Variety Name	**Source of seed**	**Year of Introduction**	**Year of release**	**Breeder seed**	**Foundation**	**Released**	**Remark**
Kona	ICRISAT	1995	2000	√	√	√	
Hagaz	NARI	2000	2004	√	√	√	Population developed from Local and introduced
ICMV 95490	ICRISAT	2000	2009	√	√	√	
White kona	ICRISAT	2008	-	√	-	Pipe line	
Bristle Kona	ICRISAT	2008	-	√	√	Pipe line	
Maize							
Earl local	NARI	2004	-	√	√	Pipe line	Population developed from local cultivars
04SADEV	CIMMYT	2007	-	√	√	Pipe line	

Annex VI

Crop type	Name	Source	Year Introduced	Status			Year Released
				Breeder Seed	Foundation Seed	Certified Seed	
Lentil	1. ILL 7978(Check)	ICARDA	2005		√		
	2. ILL 10017	ICARDA	2006	√			
	3. ILL 9850	ICARDA	2006	√			
	4. ILL 10063	ICARDA	2006	√			
	5. ILL 9935	ICARDA	2006	√			
Chickpea	1. Chickpea Short D,	ICARDA	2004	√			
	2. ICCV 94920-3	ICARDA	2006	√			
	3. ICCV 97024	ICARDA	2006	√			
	4. ICCV 92944	ICARDA	2006	√			
	5. Desi	CRS			√		
	6. ICCV107	CRS			√		
	7. ICCV9732	CRS			√		
Faba bean	1. Landrace Ent1/09	INDIGENOUS	2005		√		
	2. Landrace Ent2/09	INDIGENOUS	2005		√		
	3. Landrace Ent3/09	INDIGENOUS	2005		√		
	4.Landrace Ent4/09	INDIGENOUS	2005		√		
	6.Lndrace Ent1/10	INDIGENOUS	2006	√			
	5. Landrace Ent2/10	INDIGENOUS	2006	√			
	6. Landrace Ent1/10	INDIGENOUS	2006	√			
	7. HBP/S1D/2001-F6	ICARDA	2006	√			

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