

Genetic Resources of Togo

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Physical and climatic features

Togo lies near the Tropic of Cancer in West Africa and is bounded by the Atlantic Ocean to the south, Ghana to the west, Burkina Faso to the north and Benin to the east.

Togo is divided into 5 administrative divisions, viz.: Maritime, Plateaux, Centrale, Kara and Savannes. Of these, Maritime and Plateaux have a bimodal rainy season while the others are monomodal. The Togo Mountains divide the country into 2 regions. To the east and south of the mountains the land descends across a sloping plateau to a sandy coastal plain, which is characterized by very low rainfall, a unique feature on the coast of tropical Africa.

This results in a Sudanian micro-climate in the area of Lomé which is distinguished by 900 mm annual rainfall and by a savannah with baobab vegetation. To the west and north of the mountains the land also descends across a sloping plateau to the Burkina and Nigerese plain. The climate is Guinean near the mountains and becomes progressively Sudanian towards Burkina Faso. The Togo Mountains are characterized by a transition forest savannah climate with 1300 mm average annual rainfall and 2 areas with more than 1400 mm annual rainfall (Fig. 1).

During the dry season, the Harmattan (a wind coming from the Sahara) blows on the whole surface of the country with decreasing intensity and duration from the north to the south. These physical and

climatic factors determine the main areas of genetic variability for all crops. The Centrale and Plateaux regions have the greatest abundance and diversity in pulses, especially cowpea. Although millet is not found south of the Kara region, sorghum is present throughout the country but displays greatest variability in the north. Maize is found virtually only in the south and shows a rather poor variability.

Agriculture and organization of research

Togo's land area is 56,000 km², of which 5700 is devoted to agriculture, 14,100 lies fallow, 7200 is forest and 2000 is perennial pasture. The principal crops occupy 80% of the agricultural land. These are sorghum, millets, maize, rice, beans, groundnut, cassava, yam and cotton (Fig. 2). Minor crops include coconut, coffee, cocoa, oil palm, fruits, vegetables and cocoyam. Togo has begun to set up its agricultural research, with 7 main research centres, almost all of which are located in the south with approximately 30 experimental plots or secondary stations distributed throughout the country (Fig. 3). Those stations belong to 7 research institutions under separate Ministries; an attempt is being made to restructure the entire research system with assistance from FAO and the World Bank. This attempt will soon be under the direction of a newly organized national committee of agronomic research.

Genetic resources potential

Among the crops grown in Togo quite a few are native or are early introductions

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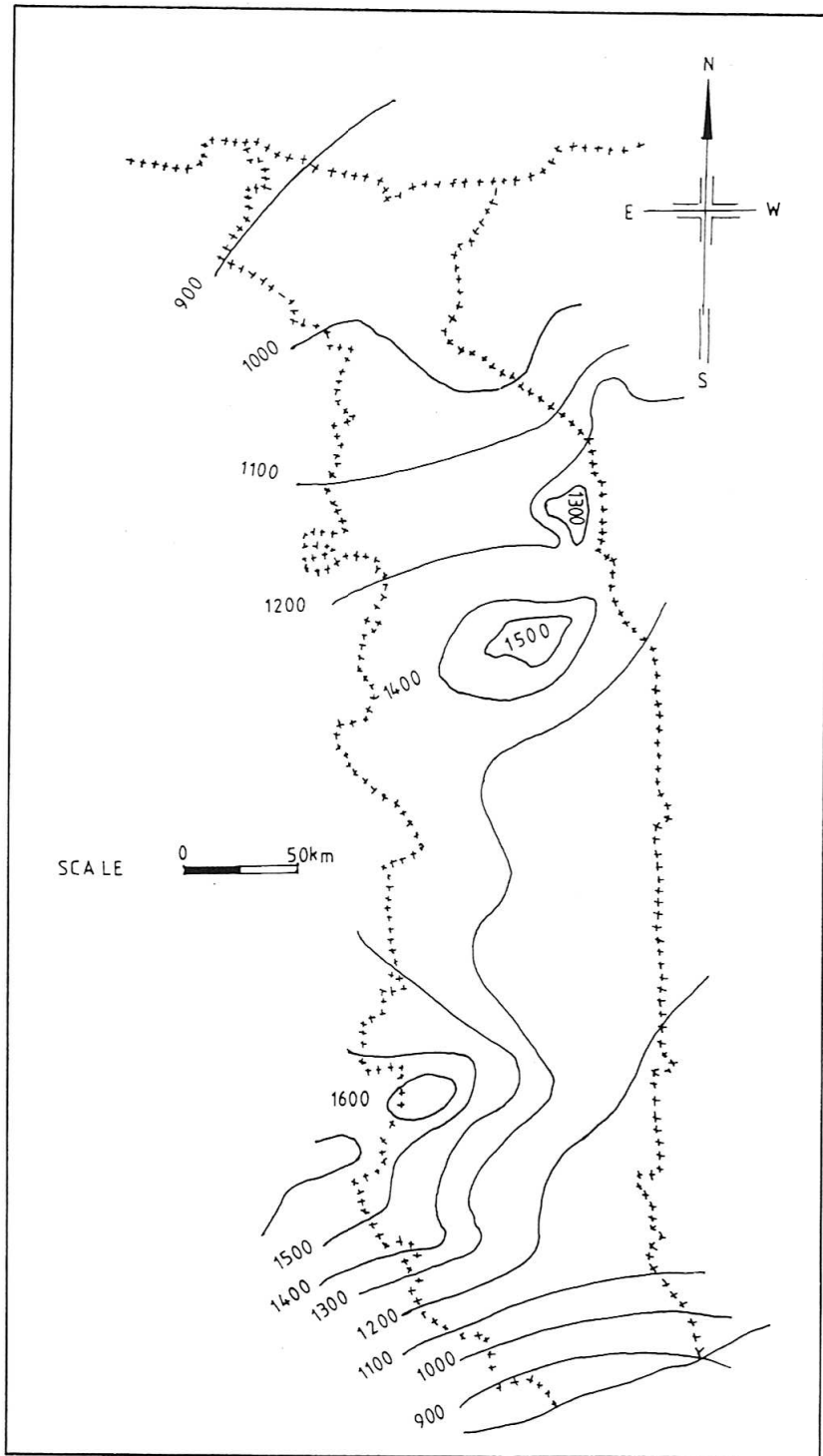


Fig. 1. Annual rainfall distribution in Togo (in mm)

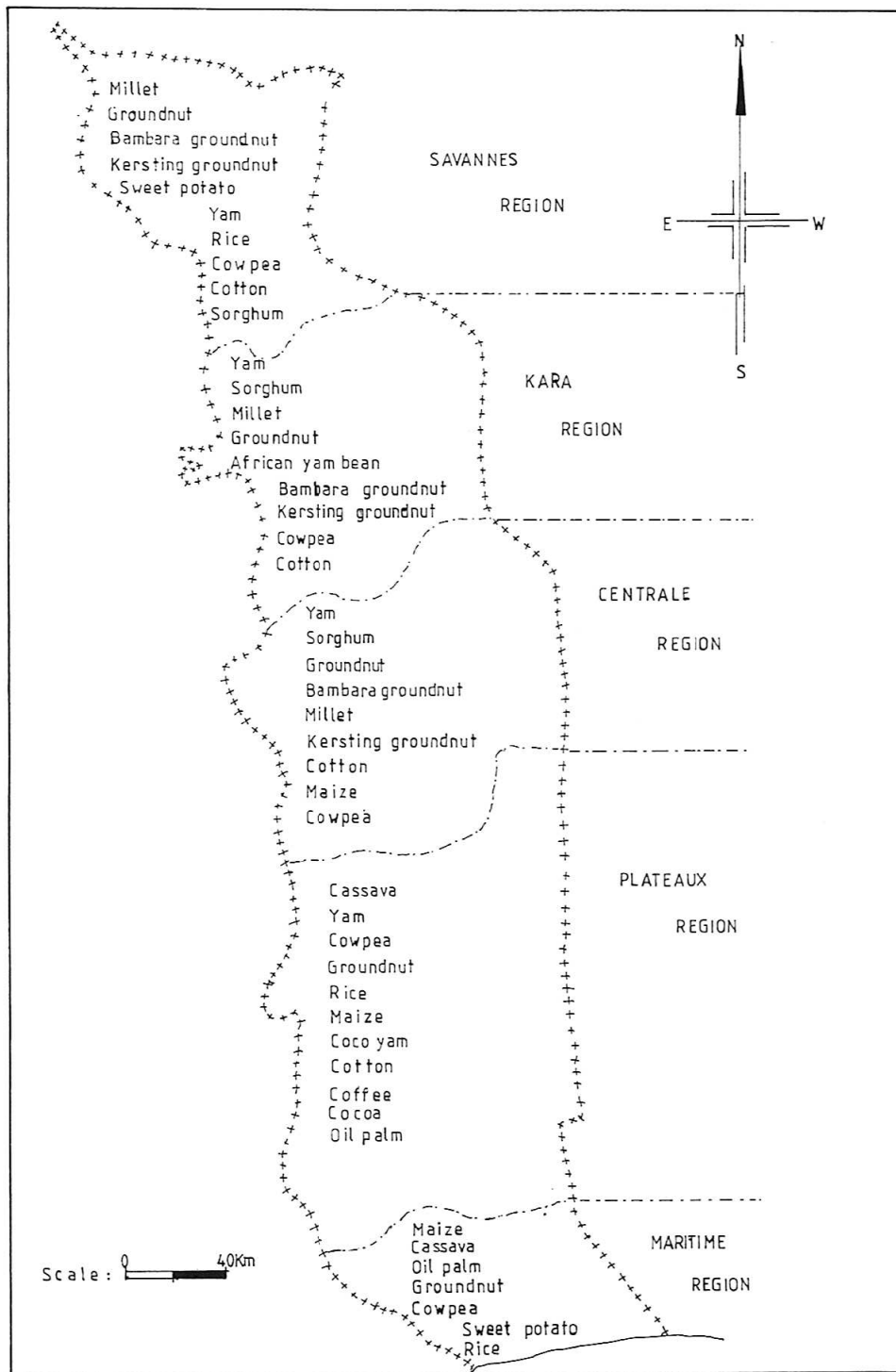


Fig. 2. Distribution of principal crops in Togo

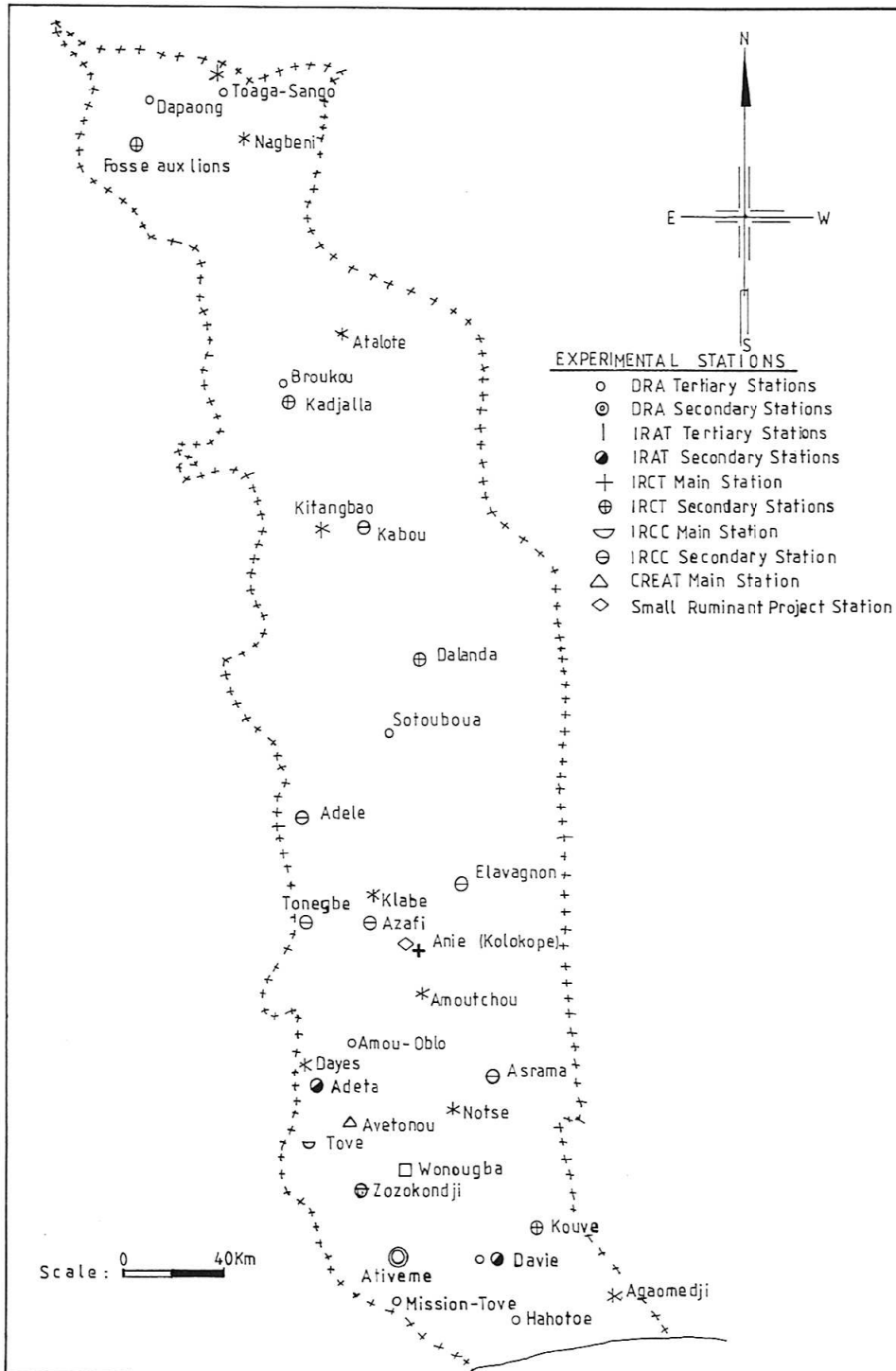


Fig. 3. Agronomic research stations in Togo

Table 1. Accessions collected by crop and by collecting mission

Crop	ORSTOM	IITA	IITA	Lester	Holloway	Charrier	Chesquiere	SOTOCO	DRA	Total
	1977	Aug. 1978	Oct. 1978	1981	1981	1982	1983	1983	1985	
Maize	-	-	20	-	-	-	89	-	-	109
Millet	131	-	4	-	-	-	36	-	-	171
Sorghum	375	-	20	-	-	-	143	126	-	664
Hungry rice	62	-	-	-	-	-	19	-	-	81
Rice	31	5	116	-	-	-	74	-	-	226
Cowpea	-	69	154	-	-	-	100	-	-	323
Bambara groundnut	-	31	62	-	-	-	64	-	326	483
Lima bean	-	1	36	-	-	-	37	-	-	74
Pigeonpea	-	2	14	-	-	-	19	-	-	35
Kersting's groundnut	-	-	8	-	-	-	8	-	-	16
Yam bean	-	-	5	-	-	-	4	-	-	9
Wild <i>Vigna</i> spp.	-	-	18	-	-	-	-	-	-	18
Woody <i>Vigna</i> spp.	-	-	1	-	-	-	-	-	-	1
Groundnut	-	-	47	-	-	-	29	-	-	76
Canavalia	-	-	-	-	-	-	1	-	-	1
Yam	-	2	-	-	-	-	-	-	-	2
Cassava	-	-	12	-	-	-	-	-	-	12
Sweet potato	-	20	-	-	-	-	-	-	-	20
Eggplant	-	-	-	149	12	-	4	-	-	165
Okra	-	29	15	5	-	406	5	-	-	460
Total	599	159	532	154	12	406	652	126	326	2946

to the country and are co-existing with related landraces and wild relatives. They are:

Cowpea (*Vigna unguiculata*), bambara groundnut (*V. subterranea*), Kersting's groundnut (*Macrostyloma geocarpum*), African yam bean (*Sphenostylis stenocarpa*), yam (*Dioscorea cayenensis*; *D. dumetorum*; *D. rotundata*), Eleusine (*Eleusine coracana*; *E. indica*), African rice (*Oryza glaberrima*), African wild rice (*O. longistaminata*), Napier grass (*Pennisetum purpureum*), pearl millet (*P. tiphoides*), sorghum (*Sorghum bicolor*), Kamerun grass (*S. arundinaceum*), hungry rice (*Digitaria exilis*; *D. iburua*), Guinea grass (*Panicum maximum*), okra (*Abelmoschus esculentus*), Guinea sorrel (*Hibiscus sabdariffa*), oil palm tree (*Elaeis guineensis*), sesame (*Sesamum indicum*), coffee (*Coffea canephora*), karite (*Butyrospermum parkii*), cola (*Cola nitida*; *C. togoensis*), eggplant (*Solanum*

macrocarpon; *S. melongena*) and Guinea pepper (*Aframomum melegueta*).

The main exotic plants cultivated in Togo are:

Groundnut (*Arachis hypogaea*), pigeonpea (*Cajanus cajan*), maize (*Zea mays*), coffee (*Coffea arabica*), cocoa (*Theobroma cacao*), lima bean, (*Phaseolus lunatus*), Asian rice (*Oryza sativa*), cassava (*Manihot esculenta*), sweet potato (*Ipomoea batatas*), eggplant (*Solanum aethiopicum*) and cotton (*Gossypium hirsutum*).

Crops threatened by genetic erosion are:

Yam (*Dioscorea cayenensis*; *D. dumetorum*), groundnut (*Arachis hypogaea*), pigeonpea (*Cajanus cajan*), African yam bean (*Sphenostylis stenocarpa*), Kersting's groundnut (*Macrostyloma geocarpum*),

African rice (*Oryza glaberrima*), African wild rice (*O. longistaminata*) and hungry rice (*Digitaria iburua*).

Germplasm collection

The first scientific collecting mission is reported to have taken place in 1977 by Clement and Leblanc of Institut Francais de Recherche Scientifique pour le Développement en Cooperation (ORSTOM) who collected 599 samples of sorghum, millet and hungry rice. Since then, there have been 8 additional missions (Table 1). More emphasis has been given to collecting food grain legumes (cowpea, groundnut and Kersting's groundnut), cereals (sorghum, millets and maize) and traditional vegetable (okra and eggplant). Of those missions, only the collected material of the last 5 are being maintained in Togo.

They consist of 406 accessions of okra from a 1982 collecting mission by Charrier, 57 accessions of eggplant from a 1981 collecting mission by Lester, 93 accessions of sorghum from a 1983 mission by Societé Togolaise du Coton (SOTOCO), 533 accessions of cereals, grain legume and traditional vegetables gathered during the last IBPGR multi-crop collecting mission and 326 accessions of bambara groundnut from the last 2 DRA missions in December 1984 and December 1985. During the 1983 collecting period the drought at the time did not allow the collection of samples of sufficient size as suggested by IBPGR.

Besides those samples derived from collecting missions the Direction de la Recherche Agronomique (DRA) of Togo is maintaining about 120 traditional and improved cultivars of soyabean, mungbean and groundnut sent by International Institute of Tropical Agriculture (IITA), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT), in addition to 172 accessions of traditional eggplant sent from Côte d'Ivoire and 114 other eggplant accessions originating from Benin, Ghana and Togo which were collected by Lester in 1981.

The remainder of the samples left in Togo by previous collecting missions have not been maintained in the country.

Original samples from all the collecting mission are being conserved in the base collections at Royal Botanic Gardens, Kew, UK, at IITA and at Institut National de la Recherche Agronomique (INRA), France. 231 accessions of cassava, yam and sweet potato are maintained in a field genebank by Institut National des Plantes a Tubercules (INPT), Lomé.

All the accessions collected by Institut Francais du Cafe, du Cacao et autres Plantes Stimulantes (IFCC), France (several wild coffee accessions) were sent to Côte d'Ivoire. The only material of this kind now held at DRA is a collection of about 15 foreign accessions used for the improvement of coffee and cocoa trees (the main aim is to increase resistance against phytopathological diseases).

The research station of Institut de Recherches du Coton et des Textiles Exotiques (IRCT) at Koloko receives each year from France a certain number of cotton cultivars for regeneration, after which they are returned to IRCT at Montpellier, France.

IRAT preserves the local cultivars of the crops tested in its multi-location trials only as a check.

Storage, maintenance and multiplication

The collections made of various crops, introductions and clones of vegetatively propagated plants are maintained in about 10 agricultural research centres. One of them (DRA) has been provided by IBPGR with cold storage facilities although it is not yet completely operational (90% R.H., 9°C average temperature). A 600-litre deepfreeze at DRA has also been installed. Both the cold storage room and the deepfreeze have been provided with shelving. Other than at DRA, there are no long-term storage facilities and seeds must be frequently rejuvenated.

DRA and INPT are the only institutes that are actively involved in germplasm conservation. At DRA, multiplication is carried out according to the ecological origin of the accessions in the new research station of Ativeme (southern Togo) and in the secondary station of Broukou (northern Togo) in collaboration

with the Semi-Arid Food Grain Research and Development (SAFGRAD) project at Kara. The station at Ativeme is equipped with an irrigation system that allows continued rejuvenation of the collections independent of rainfall conditions. At INPT, the collections are located at Agoenyve, Adangbe and Sotouboua.

The accessions collected during the last 3 collecting missions have been multiplied at Ativeme and Broukou in 1984 and 1985. 2 successive steps of multiplication were necessary for certain accessions that did not reach sufficient size as prescribed by IBPGR after the first regeneration for sending to the Gene Bank at Kew.

Sun drying followed by stove drying was used until seed moisture reached the 6 to 8% level recommended by IBPGR. Seeds are being maintained in thick vapour-proof polythene bags or in the aluminium foil bags provided by IBPGR. Fumigation of seeds at Ativeme and Broukou is done under canvas sheets furnished by IBPGR. Because electricity is not available occasionally during the day in northern Togo, the establishment of a secondary short-term conservation unit having a deepfreezer in this region is not feasible at present.

The working space at Ativeme and Broukou and the conservation facilities at DRA at Cacavelli are quite sufficient and are not used to full capacity. There is a lack of space, however, in the cold room at Cacavelli because there is no other storage area for short-term conservation. The capacity of the deep-freeze has also almost been reached.

Evaluation

All the accessions from the last 5 collecting missions that are maintained at the DRA have been preliminarily evaluated according to IBPGR descriptors, where a descriptor list for the crop is available. At INPT accessions maintained in living collection have been described following local descriptors. In the other centres the work with regard to evaluation is not comprehensive; breeders choose the material in their area of interest and use it in breeding programmes.

Documentation

At the DRA, documentation (collection

data) concerning the material gathered during the first 3 collecting missions has not been maintained. For the last 5 collecting missions, the documentation (collection data, passport data and plant data) is available and registered on Apple IIe computerized files. Apart from these, the collections of other crops have not been scientifically characterized.

Utilization

All the research institutions use introductions from foreign organizations to improve some of the crops with which they deal, i.e. rice, maize (DRA); coffee, cocoa (IFCC); cotton (IRCT); and cassava, sweet potato, yam (INPT).

Portions of the material collected during the previous missions have been used with success in the DRA rice and maize improvement programmes.

Manpower

The total number of scientists working in the agronomical research in Togo is 106: 80 Togolese research workers and the remainder expatriates. Among them are 10 involved in genetic resources work and genetic improvement of crops. They are assisted by about 30 technical and support staff. A staff member has taken IBPGR short training courses. There is no work being done at present on the genetic resources of industrial crops.

DRA appears to be adequately staffed, while other institutes suffer an acute shortage of professional and technical manpower.

Conclusions

Achievements in terms of collecting, documentation and evaluation may be considered good for a small country although the germplasm has not yet been effectively utilized. 9 collecting missions have been completed in Togo and it can be assumed that for cereals, grain legume and traditional vegetables most of the variability has been collected. Tuber crops have not been collected.

The country has about 2500 accessions in collections, including those which have been acquired by expeditions (1451) and introduced (about 1000) and about 1250 others that originate from Togo are

conserved in base collections outside the country (at Kew, IITA and INRA).

Systematic documentation and evaluation of the accessions are carried out only by DRA. Utilization of germplasm remains at a low level for crops other than maize, rice, coffee, cocoa and

cotton. There are only 2 cold storage units for short-term and medium-term conservation of seeds both of which are located at the DRA at Cacavelli. The facilities available at Cacavelli and Ativeme are nearly full because of the lack of a climatized store for short-term conservation.

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RESUME

Parmi les plantes cultivées au Togo, plusieurs sont indigènes et coexistent avec des espèces sauvages, comme c'est le cas par exemple pour le niébé ainsi que d'autres légumineuses, l'igname, le riz, le gombo, les aubergines et plusieurs cultures industrielles. Neuf missions de récolte ont été effectuées depuis 1977, et le matériel récolté, qui consiste en environ 2,500 spécimens, est conservé dans 10 centres de recherche. Les installations de stockage ont été améliorées et, à l'un de ces centres, on a entrepris d'établir une documentation relative au matériel génétique.

RESUMEN

Entre las plantas cultivadas en Togo, hay varias autóctonas que coexisten con especies silvestres, como por ejemplo el caupí y otras leguminosas de grano, el ñame, el arroz, el gombo, la berenjena y varios cultivos industriales. A partir de 1977 se han llevado a cabo nueve misiones de recogida, y el material, consistente en unas 2,500 procedencias, se mantiene en 10 centros de investigación. Se han mejorado las instalaciones de almacenamiento y se está preparando documentación de germoplasma en un centro.