

# **A Guide to Access to Genetic Resources and Community Knowledge and Benefit Sharing in Ethiopia**

**Genetic Resources Transfer and Regulation Directorate**

**Institute of Biodiversity Conservation**

**Addis Ababa**

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## Use of terms

It is found necessary to define the following terms for anyone reading the *Guide*.

**Access** means collection, acquisition, transfer or use of genetic resources, and/or community knowledge.

**Access agreement** means an agreement, signed in accordance with Article 14 (2) of the Proclamation, on the access to, and sharing the benefits arising from the utilization of genetic resources and/or community knowledge.

**Access applicant** means a person who has lodged an access application to the Institute pursuant to Article 14 (1) of the Proclamation.

**Benefit** refers to the benefits the provider and/or the user of genetic resources obtain as a result of using those resources.

**Benefit sharing** means the sharing of whatever accrues from the utilization of genetic resources, community knowledge, technologies, innovations or practices.

**Biodiversity** means the variability among living organisms from all sources of ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

**Biological resource** includes genetic resources, organisms or parts thereof, populations or any other biotic component of ecosystem with actual or potential value for humanity.

**Community Knowledge** means knowledge, practices, innovations or technologies created or developed over generations by local communities on the conservation or use of genetic resources.

**Competent Authority** means a government organ of the country of the access applicant that is empowered to ensure the implementation of access agreements.

**Derivative** means product extracted or developed from biological resource and may include products such as plant varieties, oils, resins, gums, chemicals, proteins, etc.

**Exploration** means an activity to find out the existence or the status of given genetic resource.

***Ex situ*** means a condition in which a genetic resource is found outside its natural habitat.

**Genetic resource** means any genetic material of biological resource containing genetic information actual or potential value for humanity and it includes derivatives.

**Germplasm** means any genetic material of biological resource containing genetic information actual or potential value for humanity and it includes derivatives.

***In situ*** means a condition in which a genetic resource is found in its natural habitat or ecosystem.

**Institute** means the Institute of Biodiversity Conservation established by Proclamation No. 120/1998 (as amended).

**International Treaty** means the International Treaty on Plant Genetic Resources for Food and Agriculture which was adopted on the 3<sup>rd</sup> day of November 2001 at the 31<sup>st</sup> Conference of the Food and Agriculture Organization of the United Nations, and which Ethiopia ratified by Proclamation No. 330/2003.

**Local community** means a human population living in a distinct geographical area in Ethiopia as a custodian of a given genetic resource or creator of a given community knowledge.

**Multilateral system of access** means the system established in accordance with Article 10 of the International Treaty in order to facilitate the access to, and a fair and equitable sharing of the benefits arising from the utilization of plant genetic resources for food and agriculture.

**Mutually Agreed Terms (MAT)** refers to an agreement that must be conducted between the provider of the genetic resources and the user thereof to access to genetic resources and sharing of benefits arising from their use.

**Prior Informed Consent (PIC)** means the consent given by the Institute and the concerned local community based on an access application containing complete and accurate access information to a person seeking access to a specified genetic resource or community knowledge.

**Standard Material Transfer Agreement** means the material transfer agreement adopted under Article 12 of the International Treaty.

**User of genetic resources** means the entity (individual or organization) obtaining genetic resources from the country of origin of genetic resources or from the country providing genetic resources, and using them.

## 1. Introduction

Ethiopia has diverse agro-ecological zones with diverse biological wealth of plants, animals and microbial species. It is the 5<sup>th</sup> largest floral country in tropical Africa and one of the biodiversity-rich countries in the world. The country is also the home of amazing systems of indigenous community knowledge.

Ethiopia has issued a proclamation on access to genetic resources and community knowledge, and community rights (Proclamation No.482/2006) and Regulation 169/2009. For the effective implementation of the laws, it is necessary to raise awareness of users and providers of genetic resources and community.

Several stakeholders are unfamiliar with the Access and Benefit Sharing (ABS) procedures in Ethiopia. Country experiences indicate that poor understanding of ABS procedures results in abuse of access to genetic resources and sharing of benefit arising from their use. This guide thus seeks to provide a simple and concise summary of these procedures. It is hoped that the guide will be used by local and foreign stakeholders as a manual and reference.

The guide addresses:

- Access Request
- Access procedures for non-commercial use
- Permit procedures for non-commercial use
- Procedures for Multilateral System of Access
- Access Procedures for commercial use
- Access and Benefit Sharing Agreement
- Exploration of Genetic Resources
- Penalty for abusing genetic resources

## **2. Access request**

The Institute of Biodiversity Conservation (IBC) is mandated to give permit for Ethiopian and foreign researchers who need to access genetic resources and community knowledge for different purposes. Germplasm exchange involves import and export of genetic resources based upon specific request or interest.

To facilitate the process there are certain procedures that the access applicant needs to fulfill and follows.

### **2.1. Access procedures for non-commercial use**

Export permit is an official document authorizing export of genetic resources/ community knowledge accessed from a country.

To facilitate the export of any genetic resource/community knowledge accessed from Ethiopia, a permit applicant needs to fulfill the following requirements.

- The permit applicant must bring an official letter from his/her home organization.
- The applicant must submit a revised and authenticated copy of his/her research proposal (not more than 15 pages) - with brief introduction, objective/s, clear methodology, expected outcomes and the benefit of the research to Ethiopia.
- In the official letter, the name of a person responsible for the research, local and/or scientific name of the species that is required to be taken abroad, amount of sample in grams/kilograms/packs etc., the destination Institute/university and country, total number of accessions/samples and the purpose of the research needs to be mentioned.

- If the samples are collected by the researcher from field, the passport data of the samples needs to be attached and exact copies of the samples be brought to the Institute with the official request letter. Note that the passport data and copies of the newly collected samples will be deposited in the Institute for verification and follow-up purposes.
- Five (5) copies of the MTA signed by the researcher, and signed and stamped by the researcher's host institute need to be produced along with the official letter for faster facilitation process.
- The Material Transfer Agreement (MTA) will be made between the host organization, the researcher and IBC.
- Although the general structure of the MTA is similar, the specific contents vary depending on the research objective, expected outcome, amount required, destination country, etc. The MTA format can be downloaded from our website ([www.ibc.gov.et/gm-access-gm](http://www.ibc.gov.et/gm-access-gm)) and filled/edited depending on one's requirement.

## **2.2. Material Transfer Agreement**

A Material Transfer Agreement (MTA) is a written contract that governs the transfer of tangible research materials. MTA defines the rights, obligations and restrictions for both the provider and recipient with the material. These agreements should include language related to: rights to intellectual property (actual and potential), liability, confidentiality of provider information, publication of recipient research results, permitted use of the material and other associated legal issues that the provider and recipient may wish to specify in the transaction.

According to the MTA,

- The Researcher shall not transfer the material to any third party whosoever without first notifying to and securing explicit written agreement of the provider.
- Any third party that obtains the material from the researcher in the absence of permission from the provider shall not have any right whatsoever over the material and its components.
- The Researcher shall notify the provider the progress of its research through periodic research report.
- The Researcher shall at the end of the research present to the provider the hard and electronic copy of the research results.

### **2.3. Permit procedures for non-commercial local research**

#### **2.3.1 Collection from IBC gene bank**

In order to access genetic resources from IBC Gene bank for local research, users or researchers need to fulfill the following requirements:

- Official letter from his/her organization/institution.
- A copy of research proposal that clearly describes germplasm/genetic resource required (example: scientific and local name of the species; quantity of accession and number of seeds required, etc.).
- Users should complete seed request slips and seed delivery form in the IBC gene bank. One can collect the genetic resources within 48 hours (time taken for acclimatization).
- The researcher should put a clear statement on the letter that after completion of the research, he/she will submit the result of the research finding to IBC.



### **2.3.2. Access procedures from field**

#### **For Ethiopian researchers**

- Ethiopian higher learning and research institutions may not be required to obtain access permit from the IBC to collect genetic resource or community knowledge from field in the discharge of their duties; provided that they shall not transfer the genetic resource or community knowledge to third persons, or export out of Ethiopia unless they are given explicit permit by the Institute.
- To access genetic resources and community knowledge from field, employees of different institutes of Ethiopia must carry with them a letter from their institute to the responsible local government body.

#### **For foreigners**

- The applicant must present a letter from the competent authority of his national state or that of his domicile to IBC.
- In the official letter, the person responsible for the access, local and scientific name of the species/subspecies to be collected, amount of sample in grams/kilograms/packs etc., the destination country, total number of accessions/samples and purpose of the collection need to be clearly indicated.
- The applicant must clearly state the specific locality where the access is to be undertaken.
- Before access to genetic resources, the applicant shall be subjected to the prior informed consent of the Institute and concerned local community.

- The collection of genetic resources and community knowledge shall be accompanied by the personnel of the Institute or the personnel of the relevant institution to be designated by the Institute.
- During collection, the collector should respect local customs, traditions and values of the local communities.
- When collecting cultivated or wild genetic resources, it is desirable that the local communities concerned be informed about the purpose of the collection.

N.B. During access, the users (whether Ethiopians or foreigners) should respect code of conduct to access genetic resources and community knowledge and benefit sharing in Ethiopia.

### **3. Multilateral system of access**

#### **3.1 Conditions for multilateral system of access.**

1. First the access applicant must be a citizen of a country that is party to the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).
2. The type of genetic resource requested must be listed in Annex-I of the International Treaty (ITPGRFA). This can be accessed at the link <http://www.planttreaty.org/content/texts-treaty-official-versions>  
<ftp://ftp.fao.org/docrep/fao/011/i0510e/i0510e.pdf>
3. The requested genetic resource should be under the *ex situ* or *in situ* management and control of the Ethiopian government organs or the possessor thereof consented to the conducting of the multilateral system of access.
4. The intended use of the genetic resource must be solely for the purpose of utilization and conservation for research, breeding and training for food and

agriculture. These uses do not include chemical, pharmaceutical and/ or other non-food or feed industrial uses.

### **3.2 Procedures of multilateral system of access**

The International Treaty on plant Genetic Resources for Food and Agriculture has created an innovative multilateral system of access and benefit-sharing (MLS) and adopted the Standard Material Transfer Agreement (SMTA) for the 64 crops and forages listed in Annex I of the Treaty.

In accordance with the terms and conditions of the SMTA: recipients pay an equitable share of financial benefits into the Treaty's Benefit-sharing Fund whenever a commercialized product resulting from material obtained from the Multilateral System is not freely available for further research and breeding. The funds that accumulate in the Benefit-sharing Fund flow primarily to farmers in developing countries who use and conserve crop diversity.

The Treaty also foresees the sharing of non-monetary benefits from the Multilateral System in the form of exchange of information, technology transfer and Capacity building:

In Ethiopia, Access to genetic Resources and Community knowledge, and Community Rights Regulation No. 169/2009 regulates the procedure for multilateral system of access. In order to access genetic resources according to the multilateral system of access, first the access applicant must be a citizen of a country that is party to the International Treaty. And the type of genetic resource requested must be listed in Annex-I of the International Treaty. The requested genetic resource should be under the *ex situ* or *in situ* management and control of the Ethiopian

government organs or the possessor thereof consented to the conducting of the multilateral system of access and the intended use of the genetic resource must be solely for the purpose of utilization and conservation for research, breeding and training for food and agriculture. These uses do not include chemical, pharmaceutical and/ or other non-food or feed industrial uses.

A person who wants to access genetic resources under this system shall present to the institute an access application that includes the following information.

- Name and address of the applicant, registered address of the organization.
- Details of the genetic resources to be accessed.
- Intended purpose of use.

The institute, after examining the application according to the conditions stipulated, either grants or denies the access. The applicant who is granted access according to this system shall pay for the costs for maintaining and for providing him/her the genetic resources. And these costs include the cost for maintaining the sample, multiplication, collection, packaging, postage, phyto-sanitary certification and the like.

Upon signing of the standard material transfer agreement and payment of the access fee, the Institute will provide the requested genetic resource together with the passport data and other non-confidential descriptive data to the applicant without any other requirement.

The institute will/shall follow up and monitor whether the utilization of the genetic resource provided is in accordance with the standard material transfer agreement and take the necessary measures in accordance with applicable laws. Finally, if any

claims arise in relation to the implementation of the standard material transfer agreements it may be presented to the Federal High Court.

#### **4. Access procedure for commercial use**

##### **4.1. Submission of application**

The application to access genetic resources and/or community knowledge shall have the following information.

- Name & address of the applicant. If the applicant is legal person name & registered address of the organization; establishment document; details of the organization that includes individuals connected with the project; name & address of the contact person for the application & the position held in the organization;

##### **4.2. Submission of project proposal**

The Project proposal should include the following details

- Objectives of the project proposal
- Financial details for the project & if it is sponsored, the details of the institution or individual that sponsored the project;
- Specific taxa (taxonomic categories) of the genetic resource
- The actual or potential uses of the genetic resource & its derivatives;
- The specific locality where the collection is intended to be undertaken and other possible locations of the genetic resource;
- The parts of the genetic resource to be accessed (tissues, seeds, leaves.....,etc)

**Quantity to be collected;**

- Any community knowledge associated with the genetic resource;
- In case the genetic resource is held in *ex situ*, details of the institution holding it.

The details of the proposed use of the genetic resource should also be mentioned including the following information:

- The type of use for which the genetic resource is required.
- The type & extent of the research as well as the expertise & the equipment to be used;
- The expected research result & the estimated time of competition;
- The places where each element of the research and development will take place.
- The manner & extent of participation of Ethiopian nationals in the research, if any;
- National institutions which will participate in the research.
- The primary & the probable subsequent destinations of the genetic resource; and
- When the access applicant is a foreigner, confirm that he can present a letter from competent authority of his national state or that of his domestic assuring that it shall uphold & enforce the access obligation if the applicant is granted access.
- Most importantly, the application should include details to the proposed mechanism & arrangements for benefit sharing; the economic social, technical, bio-technological scientific, environmental or any other benefits that are intended, or may be likely, to accrue to the country or the concerned local communities; and any other information which the access

applicant think might be useful to make an informed decision on the access application.

### **Prior informed consent (PIC)**

Prior informed consent (PIC) is an important precondition of access and benefit sharing (ABS) agreement. The Institute of Biodiversity Conservation and the concerned local community shall give their consent based on an access application.

The concerned local community shall give their consent through their representatives. Where the community giving consent resides only in one Woreda, by the Woreda Council, where the community giving consent resides in different Woredas or zones of one region by the Provisional Committee of the Regional Council consisting members represented from such Woredas or zones, where the community giving consent resided in an area which falls in different regions, by the Provisional Committee of the House of Peoples Representatives consisting of members represented from such area where the community resides.

## **5. Access and Benefit Sharing Agreement**

The Convention on Biological Diversity (CBD) as well as the Nagoya Protocol on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization stipulates that any benefits arising from the utilization of genetic resources and community knowledge shall be shared between the people or country using the genetic resources and/or community knowledge (user) and the people or country providing them (provider).

- **Announcement of Access request for public**

After examining the access application, the Institute of Biodiversity Conservation announces the access request in a national newspaper having wider distribution and, as appropriate, in the local newspaper where the access is intended to take place. The public notice shall contain the necessary particulars in relation to the applicant and the proposed genetic resources except certain confidential information so that any person may lodge objection against, or give comment on, the access application within 30 days from the date of publication.

### **Mutually agreed term (MAT)**

The provider and user establish and negotiate mutually agreed terms (MAT). Any issues in relation to access and benefit sharing shall be established and agreed through mutual discussion and they become part of the final access and benefit sharing agreement.

The benefits to be shared from an access to genetic resources and community knowledge may be monetary such as license fee, upfront payment, milestone payment, royalty and research funding and/or non-monetary such as joint ownership of intellectual property, employment opportunity, and support of infrastructure and technologies. Hence, access and benefit sharing agreement is one of the important requirements to access genetic resources and community knowledge in Ethiopia.

## **6. Import permit procedures**

Import permit is an official document authorizing import of genetic resources/ community knowledge from foreign countries.

To facilitate the import (introduction) of any genetic resource/community knowledge, an applicant must have/fulfill the following requirements.



- An official letter from his/her organization.
- A revised and authenticated copy of a research proposal (not more than 15 pages) with brief introduction, objectives, expected outcomes and the benefit of the research to Ethiopia.
- In the official letter, the name of the person/Institute responsible for the research, local and scientific name of the species that needs to be imported, amount of sample in grams/kilograms/packs etc., the country from where the material is imported, total number of accessions/samples required and purpose of the research need to be mentioned.
- The passport data and/or pedigree information of the samples needs to be attached with the official request letter.
- If the material to be imported is plant genetic resource, a phyto-sanitary certificate from the exporting country is required.
- Five (5) copies of signed and stamped Material Transfer Agreement (MTA) by the importing organization and the researcher need to be produced along with the official letter for faster facilitation process.
- The Material Transfer Agreement (MTA) will be made between the importing organization and IBC.
- The process for import permit takes a minimum of 2 days.

## **7. Exploration of Genetic Resources**

Those who want to research and use genetic resources or community knowledge are obliged to follow certain procedures and uphold standards in collaboration with the appropriate governments and communities. While actual experiences vary widely, Access and Benefit Sharing (ABS) that concerns communities generally begins with a researcher interested in exploring the potential applications of a genetic

resource that has traditionally been cultivated, harvested, or used otherwise for cultural purposes.

## **7.1. Granting Exploration Permit**

### **Prohibition**

1. No person may conduct exploration of genetic resources unless he/she possesses exploration permit from the Institute.
2. Organs of the state which are empowered by law to conserve genetic resources are not required to obtain exploration permit to conduct exploration of genetic resources in discharge of their duties.

### **Application**

1. Any person who wants to obtain exploration permit shall present written application to the Institute.
2. The application shall specify
  - the purpose of the exploration,
  - the types of genetic resources to be explored
  - the locality where the exploration shall be conducted &
  - the time schedule for the exploration

The institute shall in consultation with the relevant institution grant an exploration permit to the applicant given that there is a complete exploration application.

The Institute shall assign its scientific personnel or designate other relevant institution to accompany the exploration mission.

## **7.2. Obligations of the Explorers**

Any holder of an exploration permit shall have the following obligations:

1. Deposit a copy of the exploration permit with the relevant institution in the district of the locality where exploration will be conducted.
2. Strictly observe the terms and conditions specified in the permit
3. Present to the Institute a detailed and complete report of the exploration mission upon its completion.
4. Show the exploration permit issued to him upon request.
5. Respect local customs, traditions, values, property rights in the locality (where the exploration shall be conducted) and the laws of the country.

## **8. Penalty**

Any applicant who did not fulfill the above requirements will not be able to access genetic resources and/or community knowledge as s/he requested. And if any person violates the ABS Laws, will be subject to punishments. Any person who:

- Accesses genetic resources or community knowledge without obtaining an access permit from the Institute;
- Provides false information in the access application or in the course of subsequent monitoring of access agreement;
- Subsequently changes the purpose of access specified in the access agreement without obtaining permit from the Institute to the effect.

- Explores genetic resources without obtaining exploration permit from the Institute of provides false information in the application for exploration permit

Shall, without prejudice to the confiscation of the genetic resource accessed, the cancellation of the access permit granted, and the civil liability arising thereof, be punished, depending on the gravity of the circumstance, with rigorous imprisonment of not less than three years and a fine of not less than ten-thousand and not exceeding thirty-thousand birr.

Where the offence committed is in relation to genetic resources endemic to Ethiopia, the punishment shall be, depending on the circumstance, rigorous imprisonment of not less than five years and not exceeding twelve-years and a fine ranging from fifty thousand birr to hundred-thousand birr. And where the offences stated above are committed in negligence, the penalty shall be a fine of not less than five thousand birr or, depending on the circumstance and the gravity of the offence, simple imprisonment of not less than three months.

## **Material Transfer Agreement**

### **1. Formation**

This material transfer agreement is made between the Institute of Biodiversity Conservation hereinafter referred to as the "Provider" of the one part and -----  
----- (your host institution) hereinafter referred to as the "Sponsor" and Mr. -----(specify your name and title) hereinafter referred to as the "Researcher".

### **2. Purpose of Agreement**

Whereas the Researcher, Mr X is undertaking a PhD/MSc research that intends to ----- (purpose of the research) and wants to take ----- (amount of sample) samples to ----- (specify the university/Institute and country of destination) for purpose of the said research;

Whereas the Researcher has confirmed that the research cannot be carried out here in Ethiopia due to ----- (specific reason for not carrying out the research in Ethiopia);

Whereas the Provider convinced that the intended research is useful for the ----- (specify the benefit of the research to Ethiopia) approved the exporting of the said ----- samples.

Now, therefore, it is agreed as follows:

### **3. Descriptions and Quantity**

Under this material transfer agreement the Researcher is allowed to export to ----  
----- (destination university/Institute and country) ----- (amount of samples).

### **4. Utilization of Material**

1. The Researcher shall utilize the material for said research program only.
2. The Researcher cannot use the material for commercial purpose nor can it obtain any intellectual property right on the material.
3. The Researcher retains the material for the period of the research in ----- (destination country) whereupon it shall return any remaining unused material to the Provider.

## 5. Other Obligations

1. The Researcher shall not transfer the material to any third party whatsoever without first notifying to and securing explicit written agreement of the Provider.
2. Any third party that obtains the material from the Researcher in the absence of permission from the Provider shall not have any right whatsoever over the material and its components.
3. The Researcher shall notify the Provider the progress of its research through periodic research report.
4. The Researcher shall at the end of the research present to the Provider the hard and electronic copy of the research results.
5. Any benefit that accrues from the use of this material shall be subject to the relevant existing and future national and international laws.

### Signature

On behalf of the Sponsor

On behalf of the Researcher

Name \_\_\_\_\_ Name \_\_\_\_\_

Signature \_\_\_\_\_ Signature \_\_\_\_\_

Date \_\_\_\_\_ Date \_\_\_\_\_

On behalf of the Provider

Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

## **Material Importation Agreement**

### **1. Formation**

This material importation/introduction agreement is signed between the Institute of Biodiversity Conservation hereinafter referred to as the "Institute" and the (Name of the importing institute) hereinafter referred to as the "Importer".

### **2. Purpose of Agreement**

Whereas the Importer, for the purpose of (purpose of the research), wants to import ----- (type and amount of sample) samples (list attached) from -----  
---- (specify the country and the organization);

Whereas the Institute, convinced that ----- (specify the benefit of the research to Ethiopia), has consented to the importation of said materials on condition that the Importer fulfils the biosafety obligations mentioned here below.

In witness thereof it is agreed as follows:

### **3. Material to be imported**

1. Under this material importation agreement the Importer is allowed to import different (type and amount of samples) (list attached) only.
2. The Importer cannot import materials outside of the above-mentioned one.

### **4. Obligations of the importer**

1. The Importer shall use the material for the said research purpose only.
2. The importer shall not transfer the material to any other party without first having the consent of the Institute
3. The Importer shall not release the material outside of its research centres before the material goes under evaluations for biosafety by the Institute or other appropriate institution and approved for release
4. The Importer shall observe the conditions specified by the donor of the material.
5. The importer shall notify the Institute the result of its research on the material

6. The importer shall be responsible for the damage that may arise from violating the terms and obligations mentioned in this agreement.

**Signature**

**On Behalf of the Institute**

**On Behalf of the Importer**

-----

Name

-----

Name

-----

Signature

-----

Signature

-----

Date

-----

Date



## Crops and Forages of Annex 1

### Annex I. List of crops covered under the Multilateral System Food crops

#### Food crops

Crop	Genus	Observations
Breadfruit	<i>Artocarpus</i>	Breadfruit only.
Asparagus	<i>Asparagus</i>	
Oat	<i>Avena</i>	
Beet	<i>Beta</i>	
Brassica complex	<i>Brassica et al.</i>	Genera included are: <i>Brassica</i> , <i>Armoracia</i> , <i>Barbarea</i> , <i>Camelina</i> , <i>Crambe</i> , <i>Diplotaxis</i> , <i>Eruca</i> , <i>Isatis</i> , <i>Lepidium</i> , <i>Raphanobrassica</i> , <i>Raphanus</i> , <i>Rorippa</i> , and <i>Sinapis</i> . This comprises oilseed and vegetable crops such as cabbage, rapeseed, mustard, cress, rocket, radish, and turnip. The species <i>Lepidium meyenii</i> (maca) is excluded.
Pigeon Pea	<i>Cajanus</i>	
Chickpea	<i>Cicer</i>	
Citrus	<i>Citrus</i>	Genera <i>Poncirus</i> and <i>Fortunella</i> are included as root stock.
Coconut	<i>Cocos</i>	
Major aroids	<i>Colocasia</i> , <i>Xanthosoma</i>	Major aroids include taro, cocoyam, dasheen and tannia.
Carrot	<i>Daucus</i>	
Yams	<i>Dioscorea</i>	
Finger Millet	<i>Eleusine</i>	
Strawberry	<i>Fragaria</i>	

Sunflower	<i>Helianthus</i>	
Barley	<i>Hordeum</i>	
Sweet Potato	<i>Ipomoea</i>	
Grass pea	<i>Lathyrus</i>	
Lentil	<i>Lens</i>	
Apple	<i>Malus</i>	
Cassava	<i>Manihot</i>	<i>Manihot esculenta</i> only.
Banana / Plantain	<i>Musa</i>	Except <i>Musa textilis</i> .
Rice	<i>Oryza</i>	
Pearl Millet	<i>Pennisetum</i>	
Beans	<i>Phaseolus</i>	Except <i>Phaseolus polyanthus</i> .
Pea	<i>Pisum</i>	
Rye	<i>Secale</i>	
Potato	<i>Solanum</i>	Section <i>tuberosa</i> included, except <i>Solanum phureja</i> .
Eggplant	<i>Solanum</i>	Section <i>melongena</i> included.
Sorghum	<i>Sorghum</i>	
Triticale	<i>Triticosecale</i>	
Wheat	<i>Triticum</i> et al.	Including <i>Agropyron</i> , <i>Elymus</i> , and <i>Secale</i> .
Faba Bean / Vetch	<i>Vicia</i>	
Cowpea et al.	<i>Vigna</i>	
Maize	<i>Zea</i>	Excluding <i>Zea perennis</i> , <i>Zea diploperennis</i> , and <i>Zea luxurians</i> .

## Forages

Genera	Species
<b>Legume forages</b>	
<i>Astragalus</i>	<i>chinensis, cicer, arenarius</i>
<i>Canavalia</i>	<i>Ensiformis</i>
<i>Coronilla</i>	<i>Varia</i>
<i>Hedysarum</i>	<i>coronarium</i>
<i>Lathyrus</i>	<i>cicera, ciliolatus, hirsutus, ochrus, odoratus, sativus</i>
<i>Lespedeza</i>	<i>cuneata, striata, stipulacea</i>
<i>Lotus</i>	<i>corniculatus, subbiflorus, uliginosus</i>
<i>Lupinus</i>	<i>albus, angustifolius, luteus</i>
<i>Medicago</i>	<i>arborea, falcata, sativa, scutellata, rigidula, truncatula</i>
<i>Melilotus</i>	<i>albus, officinalis</i>
<i>Onobrychis</i>	<i>Viciiifolia</i>
<i>Ornithopus</i>	<i>Sativus</i>
<i>Prosopis</i>	<i>affinis, alba, chilensis, nigra, pallida</i>
<i>Pueraria</i>	<i>phaseoloides</i>
<i>Trifolium</i>	<i>alexandrinum, alpestre, ambiguum, angustifolium, arvense, agrocicerum, hybridum, incarnatum, pratense, repens, resupinatum, rueppellianum, semipilosum, subterraneum, vesiculosum</i>
<b>Grass forages</b>	
<i>Andropogon</i>	<i>Gayanus</i>
<i>Agropyron</i>	<i>cristatum, desertorum</i>
<i>Agrostis</i>	<i>stolonifera, tenuis</i>
<i>Alopecurus</i>	<i>Pratensis</i>

<i>Arrhenatherum</i>	<i>Elatius</i>
<i>Dactylis</i>	<i>Glomerata</i>
<i>Festuca</i>	<i>arundinacea, gigantea, heterophylla, ovina, pratensis, rubra</i>
<i>Lolium</i>	<i>hybridum, multiflorum, perenne, rigidum, temulentum</i>
<i>Phalaris</i>	<i>aquatica, arundinacea</i>
<i>Phleum</i>	<i>pratense</i>
<i>Poa</i>	<i>alpina, annua, pratensis</i>
<i>Tripsacum</i>	<i>laxum</i>
<b>Other forages</b>	
<i>Atriplex</i>	<i>halimus, nummularia</i>
<i>Salsola</i>	<i>vermiculata</i>