MYANMAR:

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CHAPTER 1
Introduction

The Union of Myanmar comprising seven states and seven division occupies and area of 261,000 square miles. Extending climatically from the subtropics to the tropics, it lies between 9' 58" and 28' 31" north latitude and 93' 10" and 101' 11" east longitude. It is bounded on the northeast by China, on the east by Lasc, and Thailand on the west by Bangaladesh and India and on the south by the bay of Bengal.

The climate of Myanmar is dominated by the south west monsoon nevertheless influenced by the height and direction of mountain ranges running north to south. Those mountain ranges act is moisture barriers for the monsoon in winner.

Myanmar has three well-defined seasons:

Wet/rainy season	(June to October)
Winner dry cooler season	(November to mid - February)
Summer/hot season	(Mid - February to March)

The mean annual rainfall varies considerably both seasonally and totally due to the influence of physiography.

An indication of the climate and rainfall conditions of the various agro-ecological zones are furnished below. (Table 1)

Zone		Annual rainfall	Temperature	
	No. of days	inches	Min.	Max.
Costal	115	200	16	37
Deltaic	116	150	16	37
Dry	54	36	12	40
Northern	104	84	10	34
Mountain	104	78	6	30

Myanmar can be divided into four physiographic region which form the basis for agricultural zones. These are:

- Mountains and hills occupying the north, west and east of the country, normally known as hilly region.
- Central area of rice plains and low hills and terraces
- Delta plains formed the alluvium of the Ayeyarwddy and silting rivers.
- Coastal strips comprising narrow alluvial plains rising to of mountainous terrain.

With an increase of 2.02 percent per year, Myanmar occupies a population about 46 million at present, where most of population (between 70 - 95 percent) lives in villages. The hilly and mountainous land along the borders are mainly occupied by the hill tribes. To support however increasing demand of the population planned agriculture is inevitably introduced.

Since Myanmar has a planned economy, coordinated national, divisional, township and village tract agricultural plans are made by the Myanmar Agriculture Service (MAS) on behalf of the government.

The economy, including agriculture, is organized into three categories of management; public cooperative and private. All land in Myanmar is publicly owned for as long as individual wishes to cultivate a particular plot. Farm holding size varies largely from 0.5 to 40 acres, but on the average nationwide to size is 5 acres approximately.

The government's stated objectives are:

1. To increase the production of selected non-rice crops grown in the drier regions of the country, particularly in upper Myanmar. Through increased multiple cropping and by diverting a part of the cropland currently in rice production to the cultivation of these other crops and
2. To intensify cropping in the wetter rice-producing areas of lower Myanmar with short duration rice followed by other crops including rice itself.

The main crop growth in Myanmar is rice which occupies over million acres each year, about 50 percent of the total sown area. Since rice yields have increased dramatically over the years, as a consequence, pulses are the main source of agricultural export revenue. Other such as sesame, groundnuts, cotton, jute, maize and wheat are also grown. In Upper Myanmar cotton, oilseeds, pulses, wheat and maize are grown in rotation with rice or in succession to each other, largely under rainfed condition.

Sesame and groundnuts, as a whole, meet much, but not all of the national edible oil requirement; wheat and maize are grown successfully in the central dry zone area. Cotton in also concentrated in the same area, but is unlikely to expand much further until and unless irrigation is achieved.

On the other hand, Central Agriculture Research Institute (CARI) at Yezin in Pyinmana township took the responsibility in undertaking crop research programmes such as agronomic practices, cropping patterns, variety resistance and yield trials for all of the important crops in Myanmar. The objectives of CARI are as follows:

1 To develop high yielding quality varieties (HYQV).

2 To investigate crop management systems.

3 To transfer the techniques to the agricultural workers.

4 To multiply and distribute HYQV and agrotechniques to farmers in collaboration with the extension and seed division.

Based on these objectives CARI undertakes experiments for the release of new varieties. Once a variety is about to be release it has to be submitted to the seed committee of MAS to take decision. If decided the seed to be released is again submitted to the National Seed Committee for the final decision for distribution. Rejected cultivars are however maintained and conserved at the Seed Bank for future use.

CHAPTER 2
Indigenous Plant Genetic Resources

Myanmar is rich in natural resources and no doubt plant genetic are one of it. It is well known as the primary center of PGR diversity for rice and secondary for other crops.

Myanmar has long been involved in the introduction of crop varieties, the last three decades in particular. Obviously, plant genetic resources were ignored by the authorities but together with the developments in agriculture they soon realize that these invaluable materials are of paramount importance in developing and protecting for human welfare. Thus the collection and conservation of plant genetic resources play a vital role as it has drawn greater attention these days.

Centers of diversity for plant genetic resource in Myanmar are of great antiquity and are famous of its richness. Some species of higher plans exit in its different pytogeographic regions; out of which 49% of the flora is unique. Rice itself together with us wild relatives' numbers around 2,00 and others that provide food and medicine around 300 in the wild. There are also some other corps like mango, bananas, jack fruit, citrus, turmeric, ginger, vegetables and bamboo's which occur in different regions of the country. The richness of diversity is more in the tribal dominated tracts in Myanmar, particularly in the northeast and northwest. Fortunately, something, these ethnic communities are custodians of crop resources and other potentially useful wild materials. The tribal societies in those areas still gather useful wild materials. The Ministry of Agriculture has a variety improvement program incorporating branches in its organization such as the CARI with its system of experiment stations and the Agriculture Extension with its crop series. In most of the breeding programmes, the local plant genetic resources have not received as much attention as they deserve. While the local genetic resources are not effectively used in the country for developing new varieties leads to the problem that the local varieties are being replaced by severed direct introductions from abroad thus became a threat to the existing plant genetic diversity. Besides construction of roads bridges, dams etc., also enhance genetic erosion. Fortunately, some of the earlier plant introductions became adaptive and successful in Myanmar. Bearing in mind the richness of genetic resources a coordinated collection and consecution of genetic wealth is urgently needed not only in national level, but equally so in regional and international contexts, future programmer should implement possible ways and means of assessing the current status of plant genetic resources.
Myanmar has diversity for crops such as rice maize, sorghum, millets, pigeon

pea, coupe. sesame, groundnut, niger, banana, mango, custard apple, citrus, okra, tomato, chilies, place pepper, ginger, cambric bamboo's. Water melon and many medicinal plants. Myanmar, realized the importance of international cooperation for plant germplasm exchange long ago, but since there has been none of the germplasm collected then it failed to do so, instead prioritizing on introduction from abroad. Iranian plant breeders were also rate in the past, yet, few agriculturists took interest in breeding cotton. During 1970's a plant breeder from the International Rice Research Institute (Philippines) made a national collection on rice germplasm emphasizing only on cultivars primitive materials. The collected genetic resource were stored at the Rice Division of CARI and systematically arrayed. These germplasm were mostly indigenous sources of plant products and had been continuously utilized in the breeding program.

Myanmar Agriculture Service (MAS) and the International Rice Research Institute (IRRI) undertook a three-year collection program of the wild relatives of rice of Myanmar. During these missions six divisions (Mandalay, Sagaing, Ayeyarwaddy, Yangon, Bago, Magway) and three states (Shan, Chin,,Mon) was made resulting in the collection of 161 sample of 5 wild rice and 116 sample of cultivated rice.

Dr. Duncan A. Vaughan an IRRI scientist was the person who led the mission during 1990 and 1992. Collection on other crops of economic importance such as groundnut, pearl millet, sorghum were also made by scientists from ICRISAT. Still there are more of these species in the build that have not been developed or collected and those that are important sources of breeding (e.g. cereals, oilseeds, legumes, rioters, vegetables and fruits) some of the areas as in the hilly regions as well as in the delta, farmers rely on unimproved cultivors which are adapted to specific ecological nature and that could never be replaced with modern varieties. On the country undomesticated wild species are also available for human consumption and other uses (e.g. forestry species and medicinal plants) in these regions of diversity.

Landraces of rice in the delta, Taninthayi Division, Kachin States, Shan States, Chin States, groundnut in the delta. Magway Division, Mandalay Division, Sagaing Division, Shan States and Bago Division; Sesame in Magway and Sagaing Division; Sorghum in Mandalay, Sagaing and Magway Division; Cotton in Mandalay Division; Wheat in Sagaing Division; Pigeon pea in Mandalay, Bago, Magway and Sagaing Divisions play a prominent role in those areas and are still maintained and used by Myanmar farmers because of their adaptability, and endemic characters preferred by the farmers. Regarding the Landraces in specific regions of the country, farmers protect them and maintained them systematically and as a matter of fact even if they were forced to replace these Landraces with improved varieties they would refused to do so. Thus the government, releasing the current situation, never did use

its pressure to eliminate the materials neither did encourage the farmers to concentrate the materials, neither did encourage the farmers to concentrate on landraces.

Assessments on these landraces were made by the MAS staff and as a result 21 of these are already conserved at the seed Bank (Table 2) and collection of genetic resources under short and medium long term storage at CART, Yezin, Pyinmana is show in Table 3.

CHAPTER 3
National Conservation Activities

3.1 *IN SITU* CONSERVATION

Seed conservation is by far the most efficient and safest means of genetic conservation and this is entirely the responsibility of MAS though, the forest department has been conserving many forest species including social and economic through natural regeneration. Comprehensive genetic conservation programs composed of exploration and collection rejuvenation evaluation, and maintenance. These activities are directly managed by the government and technical experts. In doing so, genetic materials such as teak, hardwood and some medicinal plants are conserved in natural communities, following landraces in their areas of cultivation. Besides., new plantations are formed particularity with the intention of targeting to save plant materials of yet unknown genetic potential of wild relatives. To sustain the potential for improvement genetic resources, conservation programs are directed towards long term preservation either in-situ or *ex situ*.

3.2 *EX SITU* CONSERVATION

As indicated above, in-situ preservation are carried out sporadically by the forest department dealing specially with forest species. While effect are being put in the ex-situ preservation by the MAS endeavouring as much as possible mainly in evaluation, characterization, preservation and documentation of plant genetic resources.

3.3 STORAGE FACILITIES

To support the activities relating to plant genetic resources, a seed bank has been established in 1990, in Yezin, Pyimana on CARI campus provided with modern equipment and laboratory. Conservation of seeds plants, plant-parts, cells, tissues and meristem cultures are involved. Cold storage facilities are also provided; short-term (for active collections) and medium long-term (for the collections) storage rooms. The approximate capacity of the short-term storage being 13,000 and the medium long-term being 20,000.

The main objective of the Seed Bank are:

1 To categorise and evaluate collected indigenous and exotic genetic naturals.

2 To explore, and evaluate primitive and wild forms of various crop germplasm.

3 To act as a center for international exchange of genetic resource in order to manipulate crop varieties adaptable to Myanmar's agro-ecological nature.

4 To find our suitable conservation methods for seed, tissue, pollen without damaging the embryo.

5 To promote effective utilization of genetic resources through systematic
data processing and recording.

6 To preserve crop genetic materials safely for short and medium terms.

7 To provide genetic materials in the crop improvement programs.

To cope with the objectives staff numbers of the Seed Bank recruited from crop divisions of CARI are subjected to the following activities whatsoever samples in the form seeds received through collection on donor are primarily checked for the passport data and duplication following amount of seed. Those with incomplete information as regards to characters are lined up in the pipeline under cool condition for further rejuvenation in a sequence. Depending on the availability of time and climate, rejuvenation of the materials is done simultaneously with evaluation and characterization using descriptors prescribed by the IBPGR (now ICPPGR). Harvested seeds passed a sequential process such-as moisture reduction (a minimum of 3-7 percent), detection of disease and insects, laboratory assessments etc., eventually documented and stored in the cold rooms. Those genetic materials will however without losing its viability, be maintained under -5' C in the medium long-term cold storage for 25 to 30 years and under 15' C with a relative humidity of 35 percent for 3 to 5 years in the short term storage. Genetic materials in the medium long-term storage will be remained undisturbed where as the same materials stored in the short-term storage presumably have to go on a series of works, for instance like, viability testing and germination testing, every year. If the viability percent is found to be low and the germination fall under 85 percent these materials are again rejuvenated to obtain fresh samples. Seeds in the short-term storages, as it is known as active of distribution and exchanges among breeders and other international. In some cases, the genetic materials could perhaps arrived at the seed bank in the form meristems, tissues or pollens, in-vitro techniques are used to conserve them. To facilitate true-to-type

seeds such activities like isolation in glass houses, in pots are determined. Documentation for all types of information regarding monitoring activities of accessions are adopted at the Information Center of the seed bank where a modernized computerizing system is practiced.

The seed bank establishment was conducted by a bilateral cooperation between the Japan International Cooperation Agency (JICA) and the Government of Myanmar (GOM). The construction was initiated in 1988 and handed over to the MAS in 1990, after completion the total cost of the establishment being 113.42 million kyats (US$). The seed bank is intended for run as a projects ever since, and a Technical Cooperation Program., (TCP) be set up nevertheless due to unexpected circumstance the TCP was abandoned. The Government of the Union of Myanmar believes that the development of the seed bank is a worthwhile investment. In fact, the on-going costs for the bank is funded by the government (MAS), that one could say it is not financially sound for the long term, what needs to be done is a prompt TCP to focus on.

By far majority of the collections made and otherwise rejuvenated are of' indigenous materials and those that are taken into account as major crop. As Myanmar, rice is the so important that these germplasms are non-replaceable and must safeguarded.

The basic in constructing a seed bank is to explore and collect genetic materials which must be protected. These materials should be kept in cold storage to be ready for the plant breeders to utilize them, while exchanging materials and the information concerned with international institutions. Although seed bank is well equipped with high-tech facilities, because of the lack of experienced leader, trained person and technical know-how, the staff member of the seed bank have little experience in handling the genetic materials.

3.4 DOCUMENTATION

The Seed Bank in Myanmar generally maintained the genetic samples with all its associated information. This information is classified into main categories.

1	Passport data	1. includes information on the locality and side where a sample has been collection with its ecological and habitat data, altitude, climate. etc.
2	Management & conservation	Includes details of each sample stored in the seed bank, quantity, its placement in the storage room germination percent, where stored, distribution date of rejuvenation next probable date for replenishment of seeds etc.
3	Characterisation& Evaluation data	includes morphological and evaluation data on various collections, agro- botanical characters, quality traits, reaction to various diseases and pests etc. (this type of data recording is based on crop descriptors prescribed by the IBPGR, instead making a slight modification which will meet the suitability of Myanmar's condition.)

To make the information system generally applicable and recognising the need for an internationally accepted system to record, correct use of update information about accessions, data processing is by done a complete computer-based system. As present, the seed bank holds over 8000 accession of various crops which are stored in the cold repository for short medium and modicum long-term conservation. The data base is being developed and the information is monitored periodically. Documentation, therefore, is one of the critical functions relating to genetic resources.

3.5 EVALUATION AND CHARACTERIZATION

Since there is not clear distinction between the processes of characterization and evaluation of germplasm sample in the National Program, the seed bank staff members are the persons invalid in this actuality.

Various crop germplasms are regularly evaluated and characterized every year with the help of crop descriptors prescribed by the IBPGR. To match with the suitable conditions of Myanmar, a minor modification has been made. Rice germplasm collected represent as wild, primitive and improved types and its number exceed 4000, it is given priority in evaluating and characterizing. Attempts during the initial period of the emergence of the bank had different views on the technology in handling seeds in a seed bank. Nevertheless, to ensure becoming a routine achievement, rice was selected for the crop to be

evaluated and characterised. The primary evaluation of rice came first in line due to its insufficient amount. International communications and with the aid of other international institutions and IBPGR itself, made the evaluation and characterization more schematic and systematic effect. At present, out of over 8000 accessions have already gone under evaluation and characterization.

Samples received from donors or collected are primarily and physically checked and out of these which are insufficient for storage are given priority for evaluation. Evaluation is more or less done by the seed bank staff members without the participation of frames. To prevent from loss of the materials, they are specifically evaluated in research farms and at CARI to have close supervision. For instance, almost all of the rice expect improved cultures have already evaluated. Mostly evaluated are of wild cultivar. Wild rice collected by Dr. Duncan Vaughan is separately grown in pots in the glass house, and evaluated. As relation with other crops, such as maize, cotton, sorghum, sesame, groundnut and niger have been invalid in the evaluation program unlike the institutions, the seed bank, as it is under the administration of CARI has to pass certain formalities. Only recently, efforts were begun to catalogue and update these data and for the publication, the prepared catalogues are submitted to the General Manager of CARI for approval. The General Manager will make the decision whether or not to distribute among the breeders as well as to any genetic research centres. So far, following evaluation, the samples are dedicated to run on a series of procedure, the involves, drying, letting, germination, moisture reduction, purity analysis, weighing or counting of seed, finally placed in the cold rooms. Apart from this type of storing, all samples that are conserved will however have a duplicate in the specimen room kept in small vials. This has been so, to compare the differences between the regenerated or otherwise evaluated or characterized accessions and the ordinals in case accessions and the originals in case a certain change might occur.

Active collections, which have undergone a chain of tasks and conserved in the cold rooms are specifically meant for international exchange of germplasm. Unfortunately, no modern agricultural or those trained in this field did not cared very much in exchanging species between the various genetic resources centers. Nevertheless, it is hoped that in the years Myanmar will benefit mutually from the plant genetic resources works looking forward to collaborate with the neighboring country. Engeneration of genetic related to evaluation need characterization to have a more accurate approach. Sequential or not is unknown due to lack of experienced personnels. Therefore international assistance, emphasizing not only on evaluation but also with other procedures and technology in handling seeds in gene banks is needed.

CHAPTER 4
In - Country Uses of Plant Genetic Resources Use of Pgr Collection

After the emergence of the seed bank, Myanmar with a view to ensure the capability of operating tactfully, started its fundamental activity by exploring and collection the plant genetic resources. Priority is given to wild, landraces improved as a sequence. The exploration and collection is made nationwide with the help of the extension workers of Ministry of Agriculture, naturally, because Myanmar is one of the rice producing countries in the world most of the resources of diversity, explored and collected are, of course, no other than rice. This achievement has been fulfilled by the Myanmar Agriculture Service (MAS) itself and quite often in collaboration with scientist from the International Rice Research Institute of the Philippines. Other crop resources are also being collected and held in the seed bank. At present, the collection of rice alone has research 1355 species. A catalogue of this has already been produced and is used and the seed bank processes a possibility to provide these materials for the breeding purposes. Apparently, these plant genetic resources are left undisturbed in the seed bank since its arrival. Perhaps, depending on the breeders' interest and the government`s encouragement, it is hoped that these species will however be more frequently utilised in the breeding programmes in the next few years.

4.1 CROP IMPROVEMENT PROGRAMMES AND SEED DISTRLBUTION

Because of the complexity and magnitude of problems involved in increasing production through the selection of improved varieties in the past, a network has evolved to facilitate a systematic technique, thus, general of the crop species are being utilized in the breeding programmes, but to be frank is very limited. The main functions of the national breeding programmes was once used to be an approach just to fill the gap for local needs. Marking the imported germplasm to get acquainted and adaptive to certain conditions, however, during the early 1980, dramatic changes took place in the breeding programmes, targeted to improve local varieties for higher yields. Collaborative activities to introduce specific characters, e.g., pest resistance, cold tolerance, drought tolerance, saline tolerance etc. with international nurseries, are also involved depending on different agroecological environments.

In fact, the ultimate objective and goal of the plant breeding programme is

typically in an integrated form, basically, to meet the national requirement and to export the surplus. On one side endeavors to increase yield on a per unit basis and to obtain superior quality seeds are inevitably included in the task. In the context, continues advancement in the development and dissemination of quality seeds of more reductive crop varieties is of utmost emergency.

4.2 USE OF FOREST GENETIC RESOURCES

On the forest sector, the forest department has its own genebank where seeds are held, and most of the seeds maintained are of prime importance to the country. These seeds are produced ex-situ and supplied with in the department forest products belong to the government and there is no private or foreign companing organization, responsible for either new cultivation or maintenance. Neither the farmers are responsible for this purpose. Research activities for better forest seed production and all of the forest products are government property.

Forests gradually deteriorated during the last two decades due to use of trees as firewood by the village people. Hence to reestablish forest trees the government has fully paid attention and as a result national programmes to grow trees as much as possible has been announced by the department, similarly, slogans, advertisements, are performed, at points where people could easily take notice. This is done in order to prevent forests and trees from misusing them. On the country, trees only meant for firewood have been grown in isolation in areas where firewood scarce.

CHAPTER 5
National Goals, Policies and Legislation

Efforts are being made to maintain the speed of workforce in the scientific plant breeding currently undertaken can be considered as adequate to meet the national needs and goals. CARI has released crop varieties through breeding and the volume of released varieties have continued to grow rapidly due to increase demand by the farmers around the country. Nevertheless more literature and more advanced technology on actual systems of plant breeding should be encouraged as means by which experience in this area may be shared. Breeding activities are primarily conducted by government funded programmes and to be precise all of the activities related to plant breeding are being carried out at CARI, no private companies or foreign commercial firms are involved . Besides, produce of in-country crop improvement are made available to farmers easily and quickly by mean of conducting simultaneously in the farmers' field where by conformatory tests are finally done by the volunteer farmers in specific areas on behalf of CARI. These result are them submitted to CARI and the seed distributed among other farmers who took been interest in the product. Improved varieties are available to farmers to save extent. Since, seed obtained from plant breeding are slow, this has found to be insufficient in meeting the farmers' needs in a short period of time, the flow of multiplication of improved varieties and distribution should be made more easier and quicker.

5.1 TRAINING

The PGR activities in Myanmar are to be speeded up in view of the already were established gene bank facility. To catch up fast the technical and scientific staff of the seed bank needs to be trained. It is suggested that a short training on plant exploration and germplasm collecting should be organized. The cooperating scientists for such activities in the seed bank collaborated programme should be given an orientation, particularly with emphasis on practical guideline. IBPRG office should assist in this programme and provide scientific and technical expertise.

The training comprising of several lectures and practical demonstration conducted by scientist from the Genetics Research Unit, ICRISAT and Genetical for IRRI, IBPGR Regional Office for South and South East Asia were held in Myanmar during 1900- 1992. These included detailed between on ex situ - in situ and in vitro conservation and documentation of data and practical to

demonstrate various techniques used for monitoring germplasm. Lecture were also given on how to layout and experiment and collect, compile and interpret the results. These trainings were attended by Seed Bank staff and staff from CARI.

Moreover, a national workshop may be organised by CARI Seed Bank. The dialogues and discussion with concerned staff from other research centres/ farms will help crystallize better functioning, monitoring management and coordination of PGR activities in Myanmar. IBPGR should provide its technical/scientific expertise during the preparation and the actual meeting.

CHAPTER 6
International Collaboration

The Seed Bank in Myanmar was established with the bilateral cooperation between the Japan International Cooperation Agency and the Government of Myanmar. The construction was commenced on 2nd February 1988 and completed in 1990.

Collection of local landraces for different crop growing regions of Myanmar and training of Seed Bank staff in Plant Genetic Resources activities to strengthen their capabilities in germplasm conservations and utilization was carried out in collaboration of International Organization such as FAO, IBGR. IRRI, ICRISAT. Several scientists from these organizations visited Myanmar during 1990-92 to interest further with seed bank project staff and to explore for to the compete of germplasm collection, conservation and management of plants genetic resources.

CHAPTER 7
NATIONAL NEEDS AND OPPORTUNITIES

In operating Myanmar's seed bank smoothly and efficiently there needs to be staff members who are experienced in this specific field. Since the emergence of the bank, staff members recruited from crop divisions of CARI. The opportunity running the bank by means of studying. The literature provided by the IBCPGR (formerly IBPGR). Certain activities have been accomplished to some extent not particularly covering the whole complex. Similarly, lack of trained personnel and also the interest of higher official is made it more less successful. In focusing the view of the genetic laboratories and facilities are provided, a know-how to utilize these is essential majority of the staff members in the seed bank comes from different fields and therefore, the concentration of works leans only on the field and not no other laboratory assessment.

As regards to exploration and collection, of plant genetic resources, short training courses are conducted at the seed bank and trainees being the extension workers, who in turn would take the responsibility of collection on behalf of the seed bank staff. As a matter of fact, these extension workers, generally to act as a media between the diverse areas and the seed bank though, no achievements have been made due to their load of work assigned for extension works, therefore, neither feed back of information nor the collection of genetic resources are reported back foreign training to the extension workers has its own objectives.

The main objectives is that, in comparison with research workers, extension people are free to travel around areas when rich genetic diversity exist, even to remote areas. However, this does not work, because each and every activity related to agriculture is normally under the governments control and thus government servants involved in this field would do their own specialised jobs and most of the other works indirectly concerned are ignored, especially with the extension people. One point that leads to this type of situation is the negligence of the authorities and their encouragement on this subject. To overcome these problems, an urgent international support is immediately required, in terms of introduction systematic procedures in handling seeds in a seed bank as well as reorganizing a team of technicians by means of training personnel locally and abroad.

CHAPTER 8
Proposals for a Global Plan of Action

Myanmar seed bank is at present in the initial stage and people also are non-experienced as mentioned above. Ironically, it requires an international support and guidance in ways and means of carrying out the activities successfully and systematically.

At the moment, the most important task to be given priority is the exploration and collection of genetic resources since well-equipped cold storage facilities are being provided.

The very basic concept is to make authorities to understand the importance and usefulness of the seed bank and to convince them the needs to train persons who really care about the genetic resources.

Plant Genetic Resources have been gradually diminishing due to natural disasters, building and construction of loads, bridges, housings. -- etc., and even in the remote areas.

Actually, these PGRC, if be utilised effectively, would become the most important weapon in producing food for mankind, keeping in mind importance of the material nations of the world should however cooperate in exploring and collecting these precious materials in and abroad before it vanishes and this in a way be carried out as prompt as possible. Not only in convenient areas but also in remote areas.

APPENDIX 1

Table 2 Genetic Resources Collected at Introduction Lab;CARI, Yezin, Pyinmana

Sr.No.	Crop	Number of collections
1	Rice	4798
2	Maize	343
3	Sorgum	294
4	Wheat	1573
5	Millet	80
6	Barley	10
7	Wild Rice	118
8	Black-gram	91
9	Cowpea	92
10	Pigeon pea	175
11	Chick pea	331
12	Mung bean	133
13	Soybean	2
14	Butten bean	12
15	Groundnut	650
16	The Lentil	3
17	Chicking vetch	1
18	Yellow flower pea	2
19	Lab bean	10
20	Oion	1
21	Chili	1
	Total	**8720**

Table 3 Collection of Genetic Resources under Short & Medium Long Term storage of CARI, Yezin, Pyinmana

Sr. No.	Crop	Short-term storage	Medium-long term storage
1	Rice	2185	1173
2	Wild Rice	-	92
3	Millet	14	-
4	Maize	32	32
5	Wheat	1250	1250
6	Sorghum	140	25
7	Sesame	5	-
8	Chickpa	192	191
9	Pigeon pea	4	4
10	Soybean	2	2
11	Lima bean	2	-
12	Black gram	72	72
13	Mung bean	52	52
	Total	**3950**	**2893**

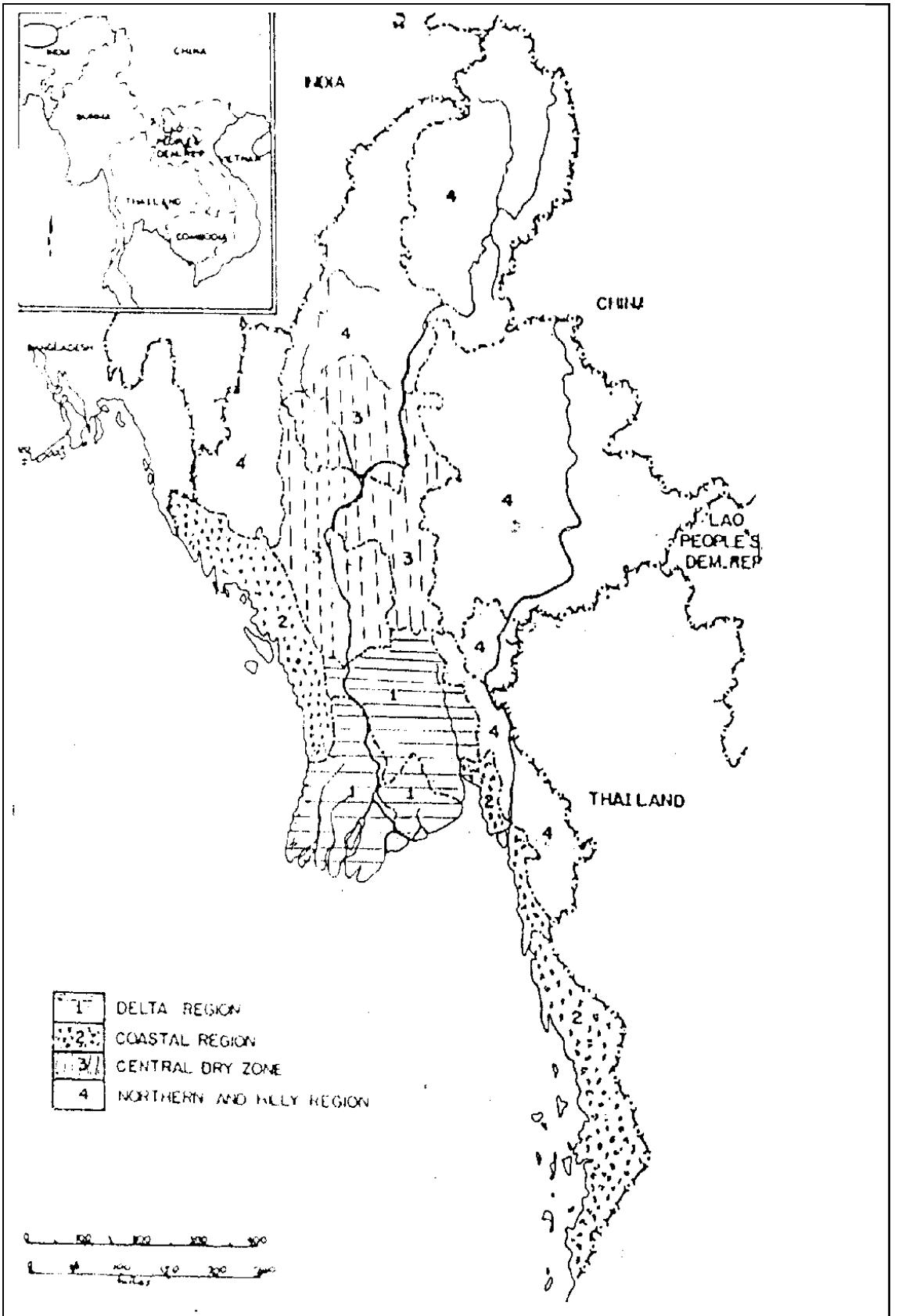
References

ARORA, R. K. 1991. Report on an assessment of plant genetic resources activities in Myanmar - present status and future perspective.

TinAung 1994. Paper presented at Action Plan Meeting of Safeguarding and Preservation the Biodiversity of the Rice Genepool, IRRI, Philippines.

Vaughan, D. A. Than Sein, Khin Mg Nyunt and Tin Mg Tun, 1993. Collection and Conservation of traditional and wild rice in Myanmar. J. Agric. Sci. (5) 1: 7-14.

MAP. 1 PHYSIOGRAPHIC REGION BASIS FOR AGRICULTURAL ZONES.



Map. 1 Physiographic regions basis for agricultural zones.