ENHANCING POTENTIAL OF PAKISTAN FOREST TREE SEEDS

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by
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CONSULTANCY REPORT
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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The objectives were to plan and implement a National Tree Seed Conference (NTSC) for Pakistan in May 1992; and to evaluate existing tree seed facilities at the national and provincial levels.

An Implementation Manual has been prepared which gives a detailed structure for organizing NTSC. It is complete with lists of personnel, duties, agenda, speakers, and check-list of requisite tasks by date and persons of responsibility. A similar Implementation Manual has been prepared for an international seed symposium.

Evaluations of provincial tree seed capabilities were based in part by a questionnaire and personal interviews with the Chief Conservators of Forest in each province. The questionnaires are also attached as appendices.

Recommendations resulting from this report are:

1. convene NTSC in Peshawar 9-14 May 92
2. convene an International Symposium in Spring 1993.
3. formulate a National Tree Improvement Plan stressing the role of tree seeds.
4. supplement tree seed handling facilities, personnel, and training at the provincial level.
5. establish tree seed orchards as long range planning.
6. prepare a Pakistan Tree Seed Manual.
7. initiate proposed seed research program at PFRI.
8. encourage PFI response to provincial tree seed research needs.
9. supplement PFI courses in tree seed handling.

Implementing both internal and external programs as suggested will provide a firm base for Pakistan to assume regional leadership in arid tree seed handling.

INTRODUCTION

This consultancy was identified as a result of recommendations from the Winrock-International sponsored Tree Seed Workshop in October, 1991 at Pakistan Forestry Institute (PFI), Peshawar, Pakistan.

Participants and cadre of the Workshop realized the significance and potential of forest tree seeds to developing Pakistan forestry. As each province has its own authority and responsibility as directed by its Chief Conservator of Forests (CCF), there is a need for coordination at the province level as well as relating to the national forestry program. A national tree seed conference is an instrument to identify, discuss and approach tree seed programs as they fit into a nationally developed tree improvement plan.

Concurrently, a need exists to review tree seed facilities of each province, PFI, and Punjab Forestry Research Institute (PFRI) in order to evaluate current problems, training needs, and suggested research programs.

The following consultancy report addresses these two areas.

OBJECTIVES

Part I. To implement the plan for a National Tree Seed Conference.

Part II. To recommend operations at the provincial tree seed centers, PFI, and PFRI.

PROBLEMS ENCOUNTERED AND SOLUTIONS

Only minor problems were presented during the consultancy and each was met and solved using local sources.

RECOMMENDATIONS

Part I.

1. A National Tree Seed Conference (NTSC) is recommended in May, 1992. All details, objectives, goals, personnel and local arrangements are included in the Implementation Manual for planning the Pakistan National Tree Seed Symposium.

2. Following NTSC, a second symposium should be planned for Pakistan to host an international tree seed workers meeting. Its objective would be to initiate Pakistan as a recognized regional leader in arid, semi-arid forest tree seed technology. An international gathering of tree seed workers would be influenced to illustrate potential authority and commitment of Pakistan regarding forest tree seeds. Details are also given in the Implementation Manual for an International Tree Seeds Conference.

3. A national tree improvement plan should be adopted for guiding Pakistan forestry towards identified national objectives. Forest tree seed must be an integral part of the tree improvement plan. This plan should be formulated at the NTSC.

Part II.

1. Tree Seed facilities within each of the four provinces and Azad Kashmir should be supplemented. Training, equipment and personnel are necessary to implement a seed handling capability designated to meet the needs of each entity rather than a centralized facility for all Pakistan tree seed needs. Such provincial seed centers do

not necessarily need sophisticated equipment, but could use basic, practical tools in the hands of well qualified technicians (Appendices A - G).

2. Long range planning should include establishing tree seed orchards within each province which could supply the quality and quantity of projected tree seed needs. (Appendices A - G).

3. Preparation of a Pakistan Tree Seed Manual has been recognized by each CCF and the Director, PFRI as an essential requisite reference. There are some data currently available which should be reviewed with the intent to incorporate into a seed manual. However, much more information is available in the literature. All existing references should be identified, reviewed and formed into a format usable by those Pakistanis working with tree seeds. This recommendation is to concur with an original one from July, 1991 to prepare a Pakistan Tree Seed Manual. Refer to remarks by individual CCFs which support this recommendation as described in their attached NTSC Questionnaire (Appendices A - G). Two Pakistan scientists and one forestry administrator should be promptly detailed to the Mississippi State University tree seed center for implementing the plan to establish the Pakistan Tree Seed Manual (WI Consultancy Final Report; July, 1991 and November, 1991).

4. Research facilities at PFRI are adequate to conduct practical research needs of forest tree seeds. The seed laboratory has equipment and personnel capable of an independent program of investigations. There are two scientists trained at the Ph.D level in the USA who impress me as knowledgeable and resourceful. The obstacle to a practical research problem is motivation. Perhaps

the following suggested research problem could initiate research management:

Problem

Identifying tree seed technology related to successful germination.

Study

Maturation indices of primary tree seed species.

Study

Collection and transport of primary tree seed species.

Study

Extraction, cleaning and handling of primary tree seed species.

Study

Pretreatment of primary tree seed species.

Study

Germination capacity of primary tree seed species.

Study

Viability and testing of primary tree seed species.

Study

Storage requirements of primary tree seed species.

The identification of the primary tree seed species would be determined by CCF. Although some species are also important to other provinces, the emphasis here is of course with Punjab. Nevertheless, the research problem is one that could apply to any species in any province.

5. PFI is predominantly a research-oriented institution whose resources can also be directed to problems of tree seed handling much as those suggested for PFRI. The advantage of PFI research is that it can meet the needs of the national tree seed program rather than only provincial interests. Those provinces which do not currently have a research capability must be liaisoned with PFI as a resource to solve their problems. This must have some incentives to PFI in order for them to accept and conduct research needs of provinces. There should be an intermediate responsible party between PFI and CCFs to represent both interests, i.e., practical research needs and available research capabilities. This intermediate could also establish the research priorities.

6. PFI should be encouraged to supplement its forestry curriculum by adding course work specifically for tree seed training. Several short courses directed to province foresters should be presently added. At least one full term course, Tree Seed Handling, should be offered at undergraduate and graduate levels. The recent Tree Seed Workshop in October, 1991 serves as a model for both the short course concept and also a full term offering.

CONCLUSIONS

Pakistan should assume the leadership role as the regional authority regarding arid, semi-arid tree seeds. An internal program including NTSC, an integrated tree seed emphasis within the National Tree Improvement Plan, active research studies, supplemental course work at undergraduate and graduate levels, and preparing a Pakistan Tree Seed Manual will give confidence to Pakistan foresters, scientists, educators and administrators to assume this leadership role. An external forum such as an international seed symposium hosted by Pakistan would complement its internal program by drawing attention to Pakistani assets while hosting an

international quorum of participants.

No country is now recognized as a leader in arid zone tree seed handling. It should be Pakistan.

February , 1992

Province: Punjab

CCF : Anwar Masrur, Central Zone, Lahore

Representative to PTSC:

Name: Sahibzada Muhammad Hafeez
Title : Director
Address: Punjab Forestry Research Institute, Faisalabad

Important Species of Tree Seeds:

Dalbergia sissoo, E.camaldulensis, Acacia nilotica, Morus alba, Bombex ceiba, Acacia modesta, Albizzia procera, Prosopis cineraria, Pinus wallichiana, Pinus roxburghi, Cedrus deodara, Aesculus indica, Quercus incana, Populus ciliata, Populus euphratica.

Most important problems currently in Tree Seeds:

Lack of collection, processing, storage and distribution facilities.

Research needed in Tree Seeds:

1. Seed sources development, (seed production areas/seed orchards)
2. Seed testing
3. Seed processing and storage.

Equipment currently available for handling Tree Seeds:

1. Macevator 2. Aspirator 3. Seed Blower
4. Seed Screener 5. Cleaning fan 6. Germinator
7. Moisture meter 8. Seed counter 9. Seed divider
10. Oven

Equipment needed for handling Tree Seeds:

1. Vehicles fitted with ladders
2. Tree shakers (Mechanical)
3. Trucks for seed carriage
4. Seed dryers
5. Seed mixers
6. Air conditioners and cold storage
7. Seed containers

Training needed for handling Tree Seeds:

Three months training needed in USA for a tree seed cell composed of the following,

1. S.R.O.	1 No.
2. R.O.	2 No.
3. A.R.O.	3 No.

Strength of our Tree Seed Program:

1. Partially fitted seed labs
2. Partially trained staff

Weaknesses of our Tree Seed Program:

1. Lack of equipment for seed handling
2. Non availability of trained staff for seed handling
3. Non availability of funds for this programme
4. Lack of concept of proper tree seed programme

Comments regarding cooperation among all provinces as well as support at the national level to improve tree seed handling in Pakistan:

A little cooperation exists but needs strengthening at proper level.

Any additional comments regarding tree seeds:

1. Establishment of a well-conceived and scientifically developed tree seed programme for the Punjab is needed
2. Need for international tree seed exchange programme
3. Development of a tree seed manual for the country

Aside from Tree Seed needs, please comment on your use of asexual reproduction:

Cuttings ✓
Coppice ✓
Grafting
Other

February , 1992

Province: Punjab

CCF : Ishtiaq Ahmad Qazi, Rawalpindi

Representative to PTSC:

Name: Ishtiaq Ahmad Qazi
Title : Chief Conservator of Forests
Address: 102-A, Satellite Town, Rawalpindi

Important Species of Tree Seeds:

Shisham, Eucalyptus, Simal, Mulberry,
Kikar, Phulai, Deodar, Chir pine,
Blue pine, Fir, Spruce

Most important problems currently in Tree Seeds:

Non availability of quality seed,
its storage facilities

Research needed in Tree Seeds:

Identification of seed source, viability, preservation and storage

Equipment currently available for handling Tree Seeds:

N I L

Equipment needed for handling Tree Seeds:

Collection equipment, testing facilities, treatment for improvement and preservation, storage and distribution

Training needed for handling Tree Seeds:

Required for all at all levels. May be through a system of refresher courses

Strength of our Tree Seed Program:

N I L

Weaknesses of our Tree Seed Program:

This is no seed program at present. It needs to formulated and established on sound footing

Comments regarding cooperation among all provinces as well as support at the national level to improve tree seed handling in Pakistan:

P.F.I. may handle the research aspect and provinces may develop the seed collection, storage and distribution system. They may may have mutual cooperation through inter-personal committees already existing.

Any additional comments regarding tree seeds:

A seed manual would be a very helpful document for the field staff and researchers

Aside from Tree Seed needs, please comment on your use of asexual reproduction:

Cuttings ✓
Coppice ✓
Grafting
Other

February , 1992

Province: Punjab

CCF : Akhlaq Ahmad Khan, Southern Forest Zone, Multan

Representative to PTSC:

Name: Akhlaq Ahmad Khan
Title : Chief Conservator of Forests
Address:

Important Species of Tree Seeds:

Shisham (Dalbergia sissoo) Eucalyptus camaldulensis Morus alba, Salmalia malabarica, Azadirachta indica, Acacia nilotica

Most important problems currently in Tree Seeds:

Tree - stands of genetically better trees not identified. Old equipment method of seed collection, shortage of seed storage space. No facilities for long storage. Lack of staff trained/exposed to modern techniques, lack of funds.

Research needed in Tree Seeds:

1. Best time of seed collection in case of all Forest tree species.
2. Best method of seed collection & time in case of all Forest tree species.
3. Machinery that could be used/improvised for purification.
4. Storage period under normal condition.
5. Identification in field of genetically better tree-stands.

Equipment currently available for handling Tree Seeds:

Almost none. Different methods are used by professional tree-seed suppliers who don't have any established business or permanent labour.

Equipment needed for handling Tree Seeds:

Containers polythene bags for storage, screening machines for cleaning etc and stores, preferably where some of the seed is stored for about 2 years for the storage of seed of Mulberry and salmalia that remains viable for a very short time. Small store, with controlled temperatures and humidity would be very useful.

Training needed for handling Tree Seeds:

Training is required in all aspects - from seed collection to storage of cleaned/purified seed, testing need for viability, seed treatment.

Strength of our Tree Seed Program:

Seed is collected and transported very economically. No long storage is allowed and very fresh seed is used. Seed is obtainable from the areas that the Divisional Forest Officer demarcate but stands are required to be marked permanently by reports.

Weaknesses of our Tree Seed Program:

Seed is collected from uncertain source in some cases from poor stands - wastage is excessive as seed is not pure. Seed cannot be stored for any length of time.

Comments regarding cooperation among all provinces as well as support at the national level to improve tree seed handling in Pakistan:

Not much seed is required from other province. However, cooperation is not lacking.

Any additional comments regarding tree seeds:

In my opinion establishment of seed orchards would not be useful/helpful on account of the fact seed required would involve too large areas under seed orchards. A seed manual is essential and should prove very useful for the field Foresters.

Aside from Tree Seed needs, please comment on your use of asexual reproduction:

Cuttings
Coppice
Grafting
Other

Cuttings of Hybrid Poplar P. curamericana, Salix, Gamarise sp. are used extentively, mainly for raising saplings. Tamarix cuttings are planted directly.

Coppice is used to supplementing regeration of such species as Shisham, Mulberry and Eucalyptus through whole-sale planting.

February , 1992

Province: SINDH

CCF : MR. AFZAL HAQ

Representative to PTSC:

Name: MR.AFZAL HAQ
Title : Chief Conservator of Forests Sindh
Address: Hyderabad

Important Species of Tree Seeds:

Acacia nilotica, Eucalyptus camaldulensis, E. microtheca, Azadirachta indica, Albizzia procera, Ailanthus excelsa, Salmalia malabarica, Gmelina arborea, Syzgium cummini, Causarina spp., Tamarindus indica, Conocarpus lancifolius, Prosopis cineraria, Acacia senegal, Tecoma undulata. Mangrove spp.

Most important problems currently in Tree Seeds:

No regular authentic seed source has been established. Seed is collected from everywhere and anywhere and sown in nurseries and field.

Research needed in Tree Seeds:

Identification of seed sources, establishment of seed orchards, viability and germination per cent of seeds.

Equipment currently available for handling Tree Seeds:

None.

Equipment needed for handling Tree Seeds:

Seed collection ladders and shears, seed dryers, blowers, separaters, packing, storage and distribution equipments. Pick ups with field equipments for collection of seed. Seed testing laboratory.

Training needed for handling Tree Seeds:

One DFO and two RFOs for detailed seed handling training in U.S.A. at least for three months.

Strength of our Tree Seed Program:

negligible

Weaknesses of our Tree Seed Program:

Lack of equipment, staff and resources.

Comments regarding cooperation among all provinces as well as support at the national level to improve tree seed handling in Pakistan:

There is no infrastructure for such cooperation.

Any additional comments regarding tree seeds:

International liaison has to be established and strenghtened for transfer of seed and relevant information.

A tree seed manual is essential for the guidance of field staff.

Aside from Tree Seed needs, please comment on your use of asexual reproduction:

Cuttings ✓
Coppice ✓
Grafting
Other

Appendix - E

February , 1992

Province: N.W.F.P.

CCF : Yar Muhammad Khan, N.W.F.P.

Representative to PTSC:

Name: Yar Muhammad Khan
Title : CCF N.W.F.P.
Address: Shami Road, Peshawar

Important Species of Tree Seeds:

Pinus roseburqhii	Dalbergia sissoo
Pinus excela	Acacia nilotica
Cedrus deodara	Eucalyptus camaldulensis
Abies pindrow	Albizzia procera Prosopis cineraria
Quercus spp	Salmalia malbarica
Acer spp	

Most important problems currently in Tree Seeds:

1. Seed collection
2. Seed storage
3. Seed viability testing
4. Seed protection against insects and fungii etc.

Research needed in Tree Seeds:

Seed collection
Seed viability
Seed storage
Selection of plus trees
Protection of seeds from insetc etc. Improvement of germination.

Equipment currently available for handling Tree Seeds:

Nominal equipment is available in Mansehra

Equipment needed for handling Tree Seeds:

All the sophisticated equipment dealing with seed procurement, storage etc. etc. Fully equipped seed testing laboratory is required at Peshawar and Abbottabad.

Training needed for handling Tree Seeds:

We need a 3 months training on this subject for 3 to 4 officials in the U.S.A.

Strength of our Tree Seed Program:

Weaknesses of our Tree Seed Program:

It is imperative to start seed prcgram through establishment of seed procurement cell for NWFP

Comments regarding cooperation among all provinces as well as support at the national level to improve tree seed handling in Pakistan:

It is must to have cooperation on national as well as international levels to improve tree seed handling.

Any additional comments regarding tree seeds:

1. Any endeavour in this respect is the need of the hour.
2. Preparation of a tree seed manual is highly essential without which the desired achievement cannot be attained.

Aside from Tree Seed needs, please comment on your use of asexual reproduction:

✓Cuttings
✓Coppice
✓Grafting
Other Root suckers

February , 1992

Province: Azad Kashmir

CCF : Ch. Mohammad Sadiq, Azad Kashmir Forest Department

Representative to PTSC:

Name: Ch. Mohammad Sadiq
Title : Chief Conservator of Forests, Azad Kashmir
Address: CCF Azad Kashmir, Muzaffarabad

Important Species of Tree Seeds:

Pinus rosburghii	Pinus wallichiana	Cedrus deodara
Abies pindrow	Picea smithiona	Dalbergia sissoo
Albezzia lebbek	Syprocera, Leucaena, Eucalyptus, Salmalia,	
Acacia nilotica, Acacia modesta, Robinia pseudeacacia, Ailanthis,		
Froxinus, Acer spps. Wallnut spps. Aesalus spps. Prunus armenica,		
Alnus spps. Melia azaderach, Mulberry, Poplus spps. Quercus spps.		

Most important problems currently in Tree Seeds:

1. Not adequate identified seed sources for all the important spps.
2. No control over the seed quality.
3. Lack of awareness/about the importances of seed quality.
4. Posting of trained technical staff for research purpose.

Research needed in Tree Seeds:

We need to know all aspects of seed tech. and seed handling as listed in for para for instance seed longevity Germination, storage and pre treatment etc.

Equipment currently available for handling Tree Seeds:

1) Tree bicycles 6 sets. 2) Cutting hooks
4) Binoculars. 5) Camping arrangements
6) First Aid facilities 7) Ovens
8) Moisture meters 9) Seed counters
10) Clipper & cleaner 11) Purity workboard
12) Germinator 13) Microscope 14) Digital Scientific balance and 15) Tester breaker Die. etc.

Equipment needed for handling Tree Seeds:

1) Tumbler 2) Cutting hooks 3) Seed collection vehicles
4) Seed testing chemicals 5) Seed sampler
6) Clipper/seed grader 7) Seed blowers
8) Seed dring kilns

Training needed for handling Tree Seeds:

1. Seed biology. 2) Seed handling process from collection to storage & testing, presowing treatment sp sowing.
Along with training of seed handling we need to-train staff in nursery techniques.

Strength of our Tree Seed Program:

We have recently established and seed processsing unit at Gari Dopatta, Muzaffarabad

Weaknesses of our Tree Seed Program:

1. We do not have sufficient tech. staff like seed analyst,S. Botanist etc.
2. We do not have adequate facilities for seed collection and transportation.
3. Working facilities are not at par with those working on other branches.
4. We need to strenghten the seed unit by providing more equipments.

Comments regarding cooperation among all provinces as well as support at the national level to improve tree seed handling in Pakistan:

There is no strong links/close associations with different seed organizations in the country.

Any additional comments regarding tree seeds:

We need to have a good document on trees seed biology, handling and processing, for persons associated with tree seed handling. Nursery raising and planting programme are not at all aware of importance subjects on seed technology.

Aside from Tree Seed needs, please comment on your use of asexual reproduction:

Cuttings	Yes
Coppice	Yes
Grafting	Yes
Other	-

February , 1992

Province: Balochistan

CCF : Dr. Zahoorul Haque

Representative to PTSC:

Name: Dr. Muhammad Saleem
Title : Conservator of Forests
Address: Joint Road, Quetta

Important Species of Tree Seeds:

Pinus elderica	(Quetta Pine)
Juniperus macropoda	(Juniper)
Ailanthus altissima	(Asmani)
Morus australus	(Mulberry)
Cupressus arizonica	(Arizona cyprus)

Most important problems currently in Tree Seeds:

No facility for collection, cleaning and storage of seed.
No laboratory or equipment for testing of seeds.
No forest tree seed manual

Research needed in Tree Seeds:

Identifying good seed sources
Finding out efficient storage methods
Scarification methods to hasten germination
Good methods of field sowings
Protecting field soron seeds from termites and other insects.

Equipment currently available for handling Tree Seeds:

None

Equipment needed for handling Tree Seeds:

One or more green houses.
Seed testing laboratory.
Seed storage equipment and facilities.
Pine cone collection devices.

Training needed for handling Tree Seeds:

All kinds of related training required

Strength of our Tree Seed Program:

Looks quite strong since it deals with all the related problems and guides through in case of laboratory as well as field. Such programme is fundamental to any forestry operation or training.

Weaknesses of our Tree Seed Program:

None that I could see

Comments regarding cooperation among all provinces as well as support at the national level to improve tree seed handling in Pakistan:

Such programme is absolutely necessary to promote scientific forestry in Pakistan

Any additional comments regarding tree seeds:

Very little attention is given to seed source, collection, hendling, sowing and other seed related operations in Pakistan. The proposed conference/workshop would definitely prove very useful with regard to forest tree handling.

Aside from Tree Seed needs, please comment on your use of asexual reproduction:

Cuttings - We have problem in raising bedded Dalbergia nursery.

Coppice

Grafting - Some training to our field staff is needed.

Other - Polythene tube filling mix of appropriate qualities as used in USA is not available in Pakistan. If some cheap mix could be devised for greenhouse plant production, it would be very useful for forest department.

Some training in green house establishment would be very useful for me.