

Conserving Rosewood genetic resources for resilient livelihoods in the Mekong

Trainings on *in situ/ex situ* conservation strategies for *Dalbergia*

Vientiane, Lao PDR, 5-6 March 2020

Phnom Penh, Cambodia, 9-10 March 2020

Hanoi, Vietnam, 11 March 2020



Introduction

The State of the World's Forest Genetic Resources (FGR) Report highlighted that populations of many important tree species are declining due to a variety of threats (FAO, 2014). The alarming results led to the development of a Global Plan of Action on Forest Genetic Resources, as a call for governments, international organisations and others to respond before it is too late. Forest trees are long-lived species with high genetic diversity that is crucial for their survival, regeneration and adaptation. Genetic diversity also provides the foundation for selection and breeding programmes to improve the productivity, resistance or quality of trees and their products. Conservation of tree genetic diversity can be achieved together with the use of trees to produce wood or non-wood products, including food for humans and animals – as long as management and sustainable use practices are designed to safeguard this diversity.

However, forest managers and conservationists often lack good information about the relevance of genetic aspects to meeting their objectives. This knowledge gap constrains conservation of tree species, increases genetic risks in subsequent generations and limits adaptation to climate change. Tertiary (universities, forestry colleges) forestry education curricula often show poor or no coverage of FGR issues, while biology teaching is often devoid of the social and practical realities. As such there is lack of training to assist forest managers, conservation practitioners and other non-specialists to effectively integrate genetic conservation of tree species in forest conservation and management.

As part of the regional project *Conserving Rosewood genetic diversity for resilient livelihoods in the Mekong* funded by the UK Darwin Initiative (Indicator 2.2: 60 forestry and conservation officers across 4 countries trained in *in situ/ex situ* conservation strategies for *Dalbergia*), the trainings covered:

- basic population genetic principles in terms of how they influence conservation decisions
- options and limitations of different strategies for tree conservation (*in situ, ex situ, circa situ*)
- conservation of tree genetic resources through tree improvement
- case study group work on conservation of an endangered species
- review of the status of *Dalbergia* spp in SE Asia
- application of course learning to derive options for *Dalbergia* spp

The trainings were led by Dr David Boshier (University of Oxford), with contributions from project country partners and Ms Tania Kanchanarak (Bioversity International) to the training in Lao PDR. The trainings were hosted by:

The National Agriculture and Forestry Research Institute (NAFRI), Vientiane, Lao PDR (20 participants)
Institute of Forest & Wildlife Research & Development, Phnom Penh, Cambodia (24 participants)
Center for Biodiversity & Biosafety, Institute of Agricultural Genetics, Vietnam Academy of Agricultural Sciences, Hanoi, Vietnam (8 participants)

Translation were provided by Mr Chaloun Bounithiphonh (Forest Research Centre; English and Lao), Mr Kim Sobon, Mr So Than and Dr So Thea (Institute of Forest & Wildlife Research & Development; English and Khmer). The training in Vietnam was conducted in English and delivered on-line. Last minute restrictions prohibiting gatherings due to COVID-19 forced the cancellation of the original training at the CITES centre in Hanoi. Instead a shortened training was conducted with a reduced number of participants who could attend online.

The programmes for the three trainings are given in Annex 1. Adjustments were made to the content of each training depending on the previously expressed interests of each country partner. Examples of the certificate presented to participants and of training materials translated into local language are given in Annexes 3 and 4.

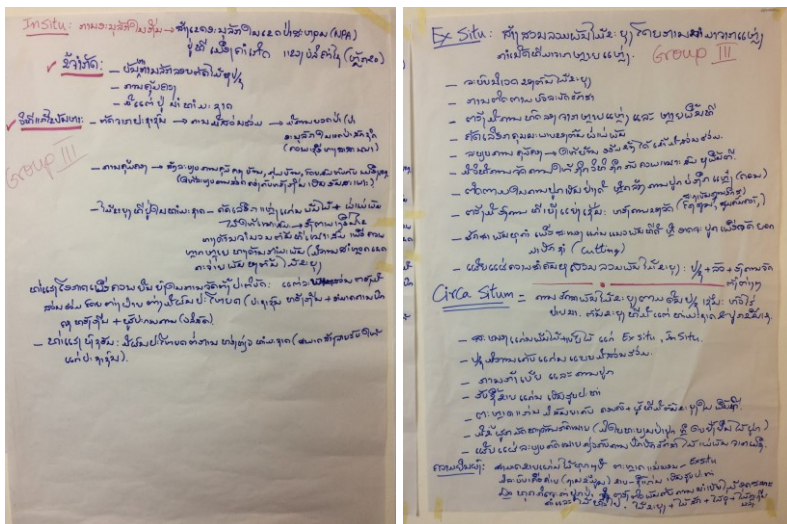
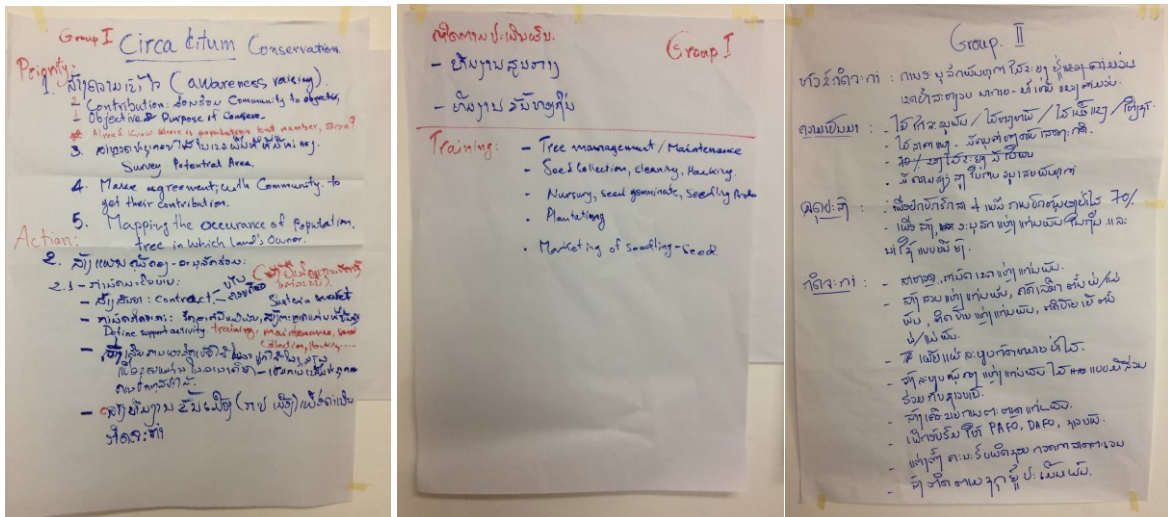
Group Dalbergia Discussions and Presentations

Following presentations on the status of *Dalbergia* species in South-East Asia and more specifically in each country, participants at the Lao and Cambodian trainings were split into 3 groups to discuss *Options for Dalbergia conservation in their country*. After 1-1.5 hours discussion each group presented their findings followed by questions and open discussion among the participants

Lao PDR



Group discussion and presentation in Lao training



Group I

Emphasis on *circa situm* – their data shows that most remaining trees are on-farm. Already know where the populations are, but what are the numbers and size?

Want training – tree management/maintenance, seed collection cleaning packing, nursery seed germination seedling production planting, marketing of seedling-seed

Map showing that need agreements at 2 levels – community and individual farm

Training – who would be the target for training? Normally mean a change towards agricultural extensionists, NGOs working with local communities

A particular/named geographical focus for this action?

Bansa very animated that *circa situm* doesn't work – contracts with individual farmers don't work. Too many risks. Emphasises why need for a combination of actions – *ex situ*, plus *circa* etc

Group II

Presented *in situ* for a particular population in an existing protected area in Central Lao – Nakai nam thuen National Park

Needs inventory for check how many trees the status of regen etc – recognise extent of resource

Training needed for PAFO, DAFO personnel

Local communities inside the park can collect seed and sell – such activities only allowed in buffer and other zone, not core zone

Currently no genetic conservation unit system – need consultation meeting at MAFF amongst stakeholders/responsible organisations, then guidelines, delimitation.

Need to follow up on this to facilitate as a project output? DB to find guidelines for EUFORGEN and send – plus suggestion as to how might modify.

Group III

Presentation split into 3 areas of action:

In Situ, Ex situ, *circa situm* – discussed the needs within each of these.

Cambodia



Group discussion and presentation in Cambodia training

- Group 1**
- Establishment of Seed Production Area (of *Dalbergia* species)
 - Site selection (preferably fertile soil)
 - Selection of mother trees (for seed or cutting collection)
 - Seedling production
 - Planting of seedlings
 - Maintenance of the SPA
 - Promote/disseminate the advantages of tree planting
 - Forest patrolling with participation of local authority
 - Provide legal assistance to register private forests
 - Mobilize funds from development partners for implementation conservation activities.

ကြပ် ၁

၁. ပတ်ဝန်းကျင် အကျိုးအမြတ် :

- ရှေးဟောင်း သစ်တော
- မြေသစ် မြေစွန်း (မြေ, မြေ)
- မိမိတို့ ရင်းနှီးမြှုပ်နှံမှု ပစ္စည်းများ
- အိမ်ခြံမြေ
- အိမ်ခြံ - ဓာတ် (ပစ္စည်း, အိမ်ခြံ)

၂. မြေပုံဆွဲရာတွင် ပါဝင်သည့် အကျိုးအမြတ် - မြေပုံဆွဲရာတွင် ပါဝင်

၃. မြေပုံဆွဲရာတွင် ပါဝင်သည့် အကျိုးအမြတ် - မြေပုံဆွဲရာတွင် ပါဝင်

၄. မြေပုံဆွဲရာတွင် ပါဝင်သည့် အကျိုးအမြတ် - မြေပုံဆွဲရာတွင် ပါဝင်

၅. မြေပုံဆွဲရာတွင် ပါဝင်သည့် အကျိုးအမြတ် - မြေပုံဆွဲရာတွင် ပါဝင်

- Group 2**
- Management of Samaki Community Forest containing 50 mature trees of *Dalbergia cochinchinensis* and 15 *D. oliveri*.
 - Conduct forest inventory
 - Mapping of the *Dalbergia* stands
 - Putting of tree numbering plates
 - Disseminate information
 - Protection
 - Guarding/patrolling of the forest
 - Establish forest fire lines
 - Implement law enforcement
 - Extraction of benefits
 - Conduct study on seed phenology and seed collection season
 - Promote the sites for research study and ecotourism
 - Documentation
 - Forest restoration
 - Establish a tree nursery
 - Conduct enrichment planting
 - Cooperation with development partners and research institutions.

ကြပ် ၂ သစ်တော ၅၀ ခု

သစ်တောများကို စောင့်ရှောက်ခြင်း

၁/ စောင့်ရှောက်ခြင်း

- စောင့်ရှောက်ခြင်း ၅၀ ခု
- မြေပုံဆွဲခြင်း ၂၀ ခု
- သစ်တော ၁၅ ခု

၂/ စောင့်ရှောက်ခြင်း

- စောင့်ရှောက်ခြင်း
- စောင့်ရှောက်ခြင်း
- စောင့်ရှောက်ခြင်း
- (UTM, ကုန်, စောင့်ရှောက်ခြင်း)

၃/ စောင့်ရှောက်ခြင်း

- စောင့်ရှောက်ခြင်း
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၅/ စောင့်ရှောက်ခြင်း

- စောင့်ရှောက်ခြင်း
- စောင့်ရှောက်ခြင်း

- Group 3**
- Objective are to conserving, production of good quality seed and seedlings of *Dalbergia cochinchinensis* and *D. oliveri*.
- Establishment of seed sources in natural forest
 - Establishment of Seed Production Area
 - Establishment of nursery
 - Establishment of commercial plantations
 - Restoration in community forests
 - Encourage involvement from stake holders
 - Strengthening law enforcement
 - Building capacity of stake holders
 - Identify sites for conservation
 - Prepare forest gene ecological zone
 - Mobilize funds and other resources.

ကြပ် ၃ ၅၀ ခု

၁. အကျိုးအမြတ် : အကျိုးအမြတ် ဖန်တီးခြင်း

- စောင့်ရှောက်ခြင်း
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* စောင့်ရှောက်ခြင်း

Feedback

At the start of each training participants were invited to fill in a short questionnaire and similarly at the end of the training. The questionnaires gathered information on the participants' gender, education level and area, work role and aimed to capture views of their own knowledge levels about forest genetic resources, genetic principles, and application in their work both before and after the course. The full questionnaires and results are summarised in Annex 4. The responses in both Lao PDR and Cambodia show the following main points:

- majority of participants were male forestry graduates or MSc level
- majority working in the public sector, with a significant % in Lao employed in research
- a general improvement in level of understanding of Forest Genetic Resources
- an increased confidence in explaining the value of Forest Genetic Resources to others
- planning to apply training content to their work
- general satisfaction with the training
- desire to have an associated field trip to discuss the issues

By contrast in Vietnam the majority of participants were female biology graduates. Only 2 participants completed the post-training survey, so it is impossible to draw any conclusions in terms of changes in views as a result of the training. In Vietnam those who couldn't attend online studied the course materials and indicated that they found the materials useful for their work as they are working on forestry, with the training on *in situ/ex situ* conservation strategies for *Dalbergia* being very important. Their questions on small populations and their impact on genetics losses as well as population genetics were answered by the materials. The presentation on "*Tree Conservation options, opportunities and limitations*" was of most interest to them.

Annex 1: Training programmes

Lao PDR

Thursday, 5th March 2020

08:30	<i>Arrival – registration</i>
09:00	Opening - welcome and introduction of participants <i>Dr Bansa Thammavong, National Agriculture and Forestry Research Institute, Lao PDR</i>
09:15	<i>Pre-training survey of participants</i> Introduction: why is genetics important for trees? <i>Dr David Boshier, University of Oxford/Bioversity International</i>
10:30	<i>Coffee followed by Group Photo</i>
11:00	Computer simulation: basic population genetic concepts – <i>David Boshier</i>
12:00	<i>Lunch</i>
13:30	Tree Conservation options, opportunities and limitations – <i>David Boshier</i>
14:30	<i>Coffee break</i>
15:00	Status of <i>Dalbergia</i> spp in SE Asia – <i>Tania Kanchanarak, Bioversity International</i>
15:30	Status of <i>Dalbergia</i> spp in Lao PDR – <i>Chaloun Bounithiphonh (Forest Research Centre)</i>
16:00	<i>Close</i>

Friday, 6th December 2019

09:00	Conservation & use of tree genetic resources through tree improvement – <i>David Boshier</i>
10:30	<i>Coffee break</i>
11:00	Options for <i>Dalbergia</i> conservation in Lao PDR - <i>group work – all</i>
12:00	<i>Lunch</i>
13:30	Options for <i>Dalbergia</i> conservation in Lao PDR - <i>group work cont. – all</i>
14:15	Options for <i>Dalbergia</i> conservation in Lao PDR - <i>presentations by group</i>
15:45	Presentation of certificates – concluding remarks – <i>Bansa Thammavong;</i> <i>Post training evaluation by participants</i>
16:15	<i>Close</i>

Cambodia
Monday, 9th March 2020

08:30	<i>Arrival – registration</i>
09:00	Opening - welcome and introduction of participants <i>Dr So Thea, Institute of Forest & Wildlife Research & Development, Cambodia</i>
09:15	<i>Pre-training survey of participants</i> Introduction: why is genetics important for trees? <i>Dr David Boshier, University of Oxford/Bioversity International</i>
10:15	<i>Coffee followed by Group Photo</i>
11:15	Tree Conservation options, opportunities and limitations – <i>David Boshier</i>
12:00	<i>Lunch</i>
13:30	Conservation & use of tree genetic resources through tree improvement – <i>David Boshier</i>
15:00	<i>Coffee break</i>
15:20	Review of relevant legislation in Cambodia for <i>in situ/ex situ</i> conservation/protection <i>Dr So Thea</i>
16:00	<i>Close</i>

Tuesday, 10th December 2019

09:00	Status of <i>Dalbergia</i> spp in SE Asia – <i>David Boshier</i>
09:30	Status of <i>Dalbergia</i> spp in Cambodia – <i>Dr So Thea</i>
10:00	<i>Coffee break</i>
10:30	Options for <i>Dalbergia</i> conservation in Cambodia - <i>group work – all</i>
11:30	Options for <i>Dalbergia</i> conservation in Cambodia - <i>presentations by group</i>
12:30	Presentation of certificates – concluding remarks – <i>Dr So Thea</i> ; <i>Post training evaluation by participants</i>
13:00	<i>Lunch and Close</i>

Vietnam
Wednesday, 11th March 2020

10:00	Opening - welcome and introduction of participants <i>Dr Tran Thi Hoa, Center for Biodiversity and Biosafety, Institute of Agricultural Genetics, Vietnam Academy of Agricultural Sciences</i>
10:15	<i>Pre-training survey of participants</i> Introduction: why is genetics important for trees? <i>Dr David Boshier, University of Oxford/Bioversity International</i>
11:15	<i>Coffee break</i>
11:45	Computer simulation: basic population genetic concepts – <i>David Boshier</i>
12:30	<i>Lunch</i>
13:45	Tree Conservation options, opportunities and limitations – <i>David Boshier</i>
15:00	Status of <i>Dalbergia</i> spp in SE Asia – <i>David Boshier</i>
15:30	Status of <i>Dalbergia</i> spp in Vietnam – <i>Dr Tran Thi Hoa</i>
16:00	<i>Close</i>

Annex 2: Pre/post training questionnaires and summary of responses

	Lao PDR	Lao PDR	Cambodia	Cambodia	Vietnam	Vietnam
Number Attending training	20	20	24	24	8	8
Number questionnaire respondents	17	19	18	17	8	2
<i>1. Gender</i>						
Male	64.7	68.4	94.4	80.0	37.5	100.0
Female	35.3	31.6	5.6	20.0	62.5	0.0
<i>2. What best describes your role / position?</i>						
Student	5.9	5.3	11.1	6.7	12.5	0.0
Employed - public sector forestry	41.2	47.4	77.8	66.7	0.0	0.0
Employed - NGO	0.0	0.0	0.0	6.7	0.0	0.0
Employed- Private sector forestry	0.0	0.0	0.0	0.0	0.0	0.0
Employed - education	11.8	0.0	0.0	6.7	0.0	0.0
Employed - research	35.3	42.1	11.1	13.3	87.5	100.0
Other (please specify)	5.9	5.3	0.0	0.0	0.0	0.0
<i>3. What best describes your highest level of education?</i>						
High School	5.9	5.3	11.1	6.7	0.0	0.0
University	29.4	36.8	44.4	33.3	25.0	0.0
MSc	58.8	52.6	38.9	53.3	50.0	50.0
PhD	5.9	5.3	5.6	6.7	25.0	50.0
Other (please specify)	0.0	0.0	0.0	0.0	0.0	0.0
<i>4. What best describes the course for your highest level of education?</i>						
Forestry	64.7	73.7	83.3	93.3	12.5	0.0
Biology	17.7	10.5	0.0	0.0	50.0	100.0
Environmental Sciences	11.8	15.8	11.1	6.7	25.0	0.0
Agriculture	0.0	0.0	5.6	0.0	12.5	0.0
Other (please specify)	5.9	0.0	0.0	0.0	0.0	0.0
<i>5. Before the course, I had a good understanding of forest genetic resources</i>						
Strongly agree	11.8		11.1		0.0	
Agree	29.4		38.9		75.0	
Neither agree nor disagree	41.2		38.9		25.0	
Disagree	17.7		11.1		0.0	
Strongly disagree	0.0		0.0		0.0	
<i>5. After the course, I had a good understanding of forest genetic resources</i>						
Strongly agree		15.8		40.0		100.0
Agree		79.0		60.0		0.0
Neither agree nor disagree		5.3		0.0		0.0
Disagree		0.0		0.0		0.0
Strongly disagree		0.0		0.0		0.0
<i>6. Before the course, I was confident in explaining the value of forest genetic resources to others</i>						
Strongly agree	5.9		11.1		0.0	
Agree	23.5		33.3		50.0	
Neither agree nor disagree	58.8		44.4		50.0	
Disagree	11.8		11.1		0.0	
Strongly disagree	0.0		0.0		0.0	

<i>6. After the course, I feel more confident in explaining the value of forest genetic resources to others</i>						
Strongly agree		21.1		35.3		50.0
Agree		52.6		58.8		50.0
Neither agree nor disagree		26.3		5.9		0.0
Disagree		0.0		0.0		0.0
Strongly disagree		0.0		0.0		0.0
<i>7. Before the course, I had rarely considered genetic issues in my role</i>						
Strongly agree	0.0		22.2		0.0	
Agree	41.2		44.4		50.0	
Neither agree nor disagree	41.2		22.2		25.0	
Disagree	11.8		11.1		25.0	
Strongly disagree	5.9		0.0		0.0	
<i>7. After the course, I plan to apply content from the course in my role</i>						
Strongly agree		21.1		29.4		50.0
Agree		73.7		64.7		50.0
Neither agree nor disagree		5.3		5.9		0.0
Disagree		0.0		0.0		0.0
Strongly disagree		0.0		0.0		0.0
<i>8. Before the course, I was confident in applying genetic principles in my work</i>						
Strongly agree	0.0		11.1		0.0	
Agree	23.5		50.0		25.0	
Neither agree nor disagree	52.9		16.7		62.5	
Disagree	23.5		22.2		12.5	
Strongly disagree	0.0		0.0		0.0	
<i>8. Did the course meet your expectations?</i>						
Strongly agree		47.4		29.4		50.0
Agree		42.1		64.7		50.0
Neither agree nor disagree		10.5		5.9		0.0
Disagree		0.0		0.0		0.0
Strongly disagree		0.0		0.0		0.0
Comments or suggestions						
<i>9. Please add any further comments on organisation, content or relevance of the course</i>						
Lao PDR						
<i>This training on in situ/ex situ conservation strategies for Dalbergia is very important</i>						
<i>So good</i>						
<i>field observation during training</i>						
<i>more field work</i>						
<i>It is good, more field work needed for learning</i>						
Cambodia						
<i>should have field trip. Please continue this project</i>						
<i>please explain more detail about forestry genetic and diversity</i>						
<i>the course should include field trip to see the species conservation in somewhere to reflect with theory.</i>						
<i>Please share ppt doc to participants</i>						
<i>add more training like this</i>						

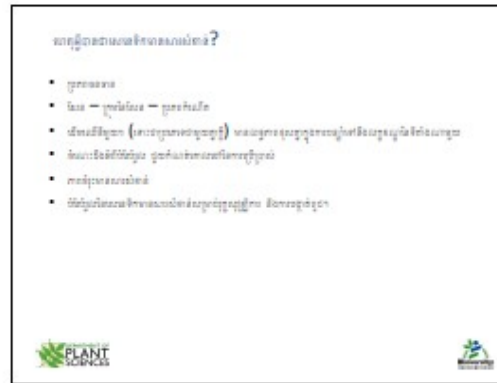
Annex 3: Example of Certificate presented to participants



Annex 4: Example of training materials in local language



1



2



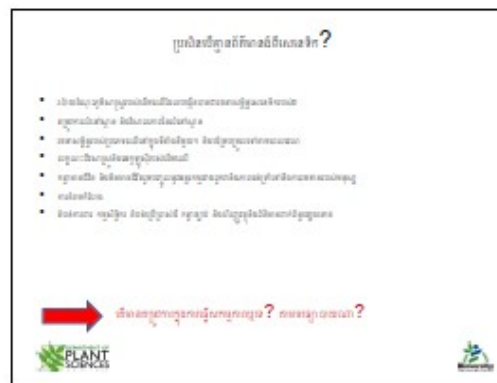
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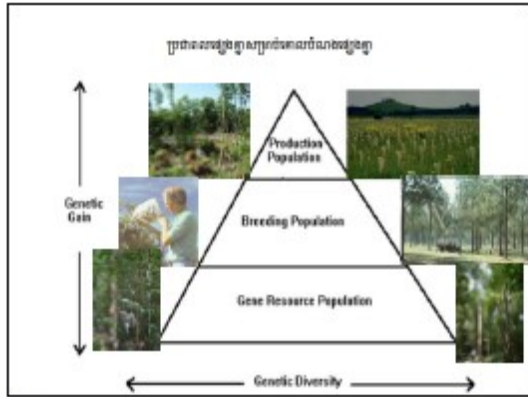
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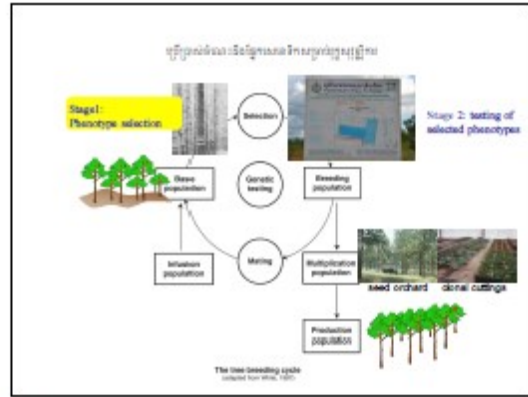
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6



19



20

ဗဟိုချုပ်ကွပ်ရေး

အချုပ်ကွပ်ရေး နည်းစနစ်များကို အသုံးပြုခြင်းဖြင့် အကျိုးရှိစေရန်အတွက် အကျိုးရှိစေရန်အတွက် အသုံးပြုခြင်း

အကျိုးရှိစေရန် (OECD 1974)

Deployment (e.g. plantations) in mixed seedlots or half-sib families

21

အကျိုးရှိစေရန် - အကျိုးရှိစေရန်

အကျိုးရှိစေရန် = အကျိုးရှိစေရန်အတွက်

- အကျိုးရှိစေရန်အတွက်
- အကျိုးရှိစေရန်အတွက်
- အကျိုးရှိစေရန်အတွက်

• အကျိုးရှိစေရန်အတွက် 10-30

• အကျိုးရှိစေရန်အတွက် e.g. poplar in France

approved clones

of mixture Escherode []

of mixture Yessen []

clones (approval 2006)

22

အကျိုးရှိစေရန် (*Dalbergia cochinchinensis*)

23

အကျိုးရှိစေရန်

အကျိုးရှိစေရန်အတွက် အကျိုးရှိစေရန်

Stock order	Stock type	£	€
30,000	Container	0.29	0.31
30,000	Bareroot	0.26	0.28
200,000	Bareroot	0.24	0.21
800,000	Bareroot	0.20	0.21
2,000,000	Bareroot	0.18	0.195

Catch-22: low demand = higher cost/plant
High cost = low demand

Clonal deployment maybe more attractive when clones 100% of final harvest, but only 25-50% of planting stock

Wildstar™ 7 clone mixture, x 2-5 seedling price

24

Արտադրանքի որակի ապահովումը • Խանութի անվտանգություն

Խանութի որակը • Խանութի որակի ապահովումը


Խանութի որակը • Խանութի որակի ապահովումը



25

Acacia auriculiformis - % Խանութի որակի ապահովումը

	SSO select	SPA select	natural prov.	commercial
height	113	106	100	91
dbh	115	107	100	87
stem volume	144	120	100	63
straightness	110	104	100	98



26

Խանութի որակի ապահովումը



Խանութի որակի ապահովումը

- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը

Խանութի որակի ապահովումը

- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը

27

Խանութի որակի ապահովումը?

- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը

Խանութի որակի ապահովումը

28

Խանութի որակի ապահովումը?

- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը
- Խանութի որակի ապահովումը

29

Խանութի որակի ապահովումը

1. Խանութի որակի ապահովումը
2. Խանութի որակի ապահովումը
3. Խանութի որակի ապահովումը
4. Խանութի որակի ապահովումը
5. Խանութի որակի ապահովումը
6. Խանութի որակի ապահովումը
7. Խանութի որակի ապահովումը

30