

POLICY BRIEF



Call for a Tree Domestication Strategy in Vietnam



Key messages

A national strategy for tree domestication is needed to guide efforts to promote conservation and use of priority indigenous tree species in Vietnam.

- Investment policies are needed to support breeding production and promote breeds quality management.
- Eco-physiological characterisation is needed to study a range of tree species that are well matched to varying environment conditions and climate change.
- Conservation efforts should be performed at both genebank and on-farm levels in order to support domestication.
- A set of criteria for prioritising species selection for domestication should include: National importance, Eco-regional importance, Domestic suitability for farm and plantation, Market demand, Product value, Gaps in collection, Level of Threat, and Adaptive traits (Figure 1).



Figure 1: Stakeholders' preference of species selection criteria for tree domestication

Background

The forestry sector has been successful in implementing forest restoration over the last 25 years, although forest quality remains limited and germplasm sources contain poor genus.

Current tree domestication efforts focus on exotic fast growing species rather than indigenous trees and Non Timber Forest Products (NTFP).

Development of a domestication strategy will enable the acceleration of tree domestication activities for selected indigenous tree species, supporting improvement of livelihood for forest growers and conservation efforts whilst complementing the role of exotic species in forest plantations across Vietnam.

What is tree domestication?

The concept of tree domestication is interpreted differently by various scientists (Leakey & Newton 1994).

At its core, tree domestication refers to human-induced changes in the genetics of a plant, to adapt it to human agro ecosystems (Harlan 1975).

For food crops, the term 'domestication' is generally used to describe the selection, breeding and adaptation of germplasm to increase production and quality during cultivation. Genetic changes are made in order to meet particular human needs and to fit production into particular environments. There can be a continuum of activity, from management in the wild, through traditional plant breeding, all the way to the creation of transgenic (genetically modified) organisms using modern biotechnology methods (Dawson 2012).

Tree domestication in Vietnam

- Vietnam's forestry sector has produced various policy documents supporting germplasm development, such as the Ordinance of Germplasm, the Decree of Administrative Sanctions on Germplasm Production and the Regulation of Forest Tree Germplasm Management.
- The Ministry of Agriculture and Rural Development (MARD) has identified 166 varieties of forest trees species (such as *Acacia*, *Eucalyptus*, *Pine* and *Macca*) across 47 of Vietnam's provinces, and 119 species have been identified as clones.
- MARD has issued a list of forest tree germplasm which must comply with the Vietnam Forestry Sector Standard to ensure that production efforts meet the needs of the business sector and consumers.
- Currently there are 446 recognized producers of seedlings (including individuals, the private sector and organizations), of which, 145 State Organization bodies supply approximately 30% of seedlings for forestry production annually. The private sector and households supply the remaining 70%.
- Up to date, there are 153 identified germplasm sources ensuring the supply of seeds for reforestation.
- A seed bank was established at the Vietnamese Academy of Forest Science (VAFS) and is currently storing 3134 individual seedlots, including 11 *Eucalypts*, 6 *Acacias*, 4 native pines,



Casuarina equisetifolia, *Chukrasia tabularis*, *Pterocarpus macrocarpus*, *Dalbergia cochinchinensis*, *Azadirachta indica*, *Sindora siamensis*, *Dacrydium pierrei*, *Toxicodendron succedanea*, *Podocarpus imbricatus*, *Tectona grandis*, *Erthrophleum fordii*, *Calocedrus macrolepis*, *Calocedrus rupestris*, *Pinus krempfii*, *Fokienia hodginsii* and *Shorea siamensis*.

- Both in-situ and ex-situ methods are being applied in tree domestication. Conservation activities have been carried out in on-station and genebanks.
- Vietnam has successfully domesticated species such as cinnamon, illicium verum, amomum, manglietia, dalbergia, acacia, eucalyptus, etc; however the number of indigenous species remains limited.
- MARD has produced a national strategy on NTFPS that includes tree domestication.

Key challenges for forest tree domestication in Vietnam

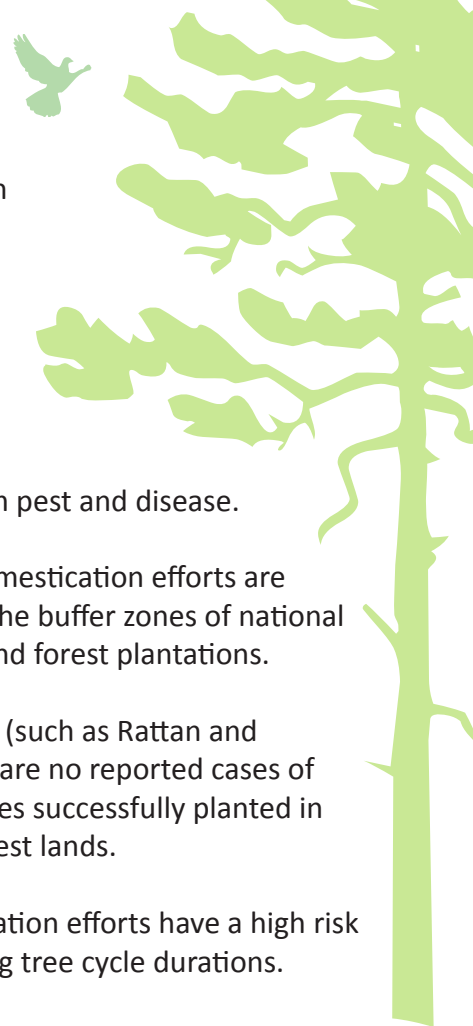
- Lack of national strategy and policy to encourage forest tree domestication. Existing NTFP strategy produced by MARD needs to be broadened to include multi-purpose and native tree species.
- Although MARD has identified 166 varieties of forest trees species across Vietnam, the percentage of species applied into production systems is very low (representing approximately 20 %). Furthermore, the distribution of new breeds is uneven in the 9 eco-regions.
- There is a lack of existing knowledge and research on the evaluation of product values, chemical properties, genetic improvement and propagation of domesticated species.
- Selection criterion for tree species selected for domestication has not been systematized or consistent in terms of economic value, market, environment and science.
- Low productivity of domesticated species. Few fast growing indigenous species have

been identified to complement timber supplies in Vietnam.

- Over reliance on exotic timber species such as acacias and eucalypts leads itself to risks from pest and disease.
- Conservation/domestication efforts are concentrated in the buffer zones of national parks, reserves and forest plantations.
- For some species (such as Rattan and Amomum) there are no reported cases of domesticated trees successfully planted in areas outside forest lands.
- On-farm conservation efforts have a high risk of loss due to long tree cycle durations.

Recommendations

- Formulate and approve a national strategy on forest tree domestication.
- Prioritize tree domestication and breeding of species located at elevations > 700 m above sea level (asl) such as NTFP species (*Amomum*, *Morinda*, *Illicium verum*, *Cinnamon* etc).
- Promote domestication of indigenous species.
- Develop on-station genebank while continuing to engage with farmers, to support implementation of the domestication programme to meet their specific needs.
- Consider alternative native species for timber supply purposes, while paying attention to managing: the negative impacts of pests and diseases caused by species introduction, the enhancement of landscape hydrology functions, and the loss of habitat through species invasiveness.
- Evaluate genetic improvement through





phenology study of domesticated species, gene-ecological surveys to assess genetic variation, natural distribution, populations/stands and gene values.

- Perform Isoenzyme and DNA marker analysis in order to evaluate genetic diversity. Work should be focused on domesticated species.
- Increase farmers' access to improved germplasm of priority tree species, enhance conservation of tree diversity and ensure better functioning of tree seed and seedling supply systems.

References

1. Dawson I, Harwood C, Jamnadass R, Beniest J (eds.) (2012) Agroforestry tree domestication: a primer. The World Agroforestry Centre, Nairobi, Kenya. 148 pp.
2. Harlan JR: Crops and Man. Madison, WI, USA. 1975. The American Society of Agronomy and the Crop Science Society of America.
3. Leakey, R.R.B., Tchoundjeu, Z., Schreckenberg, K., Shackleton, S. and Shackleton, C. 1994. Agroforestry Tree Products (AFTPs): Targeting Poverty Reduction and Enhanced Livelihoods. International Journal of Agricultural Sustainability 3: 1-23.

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