

Session 4 : Mitigation, monitoring, restoration and rehabilitation

Seed Rain in Forest and the Adjacent Reforested Area at Mount Papandayan Nature Reserve, West Java, Indonesia

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Introduction

- Given the high rate of deforestation in tropical forest with high biodiversity, there is an urgent call for recovering the forest loss through reforestation that enables some level of biodiversity to be recovered → forest restoration.
- Understanding mechanism of succession is a key factor for designing a forest restoration program that can maximize the role of nature in forest regeneration.
- Factors affecting forest regeneration in abandoned field were dispersal, avoidance of predation, germination of seeds, survival and growth of seedlings (Holl, 2000).
- Lack of seed dispersal from surrounding forest has been reported as the major limiting factors in some part of the tropics (Holl, 1999).
- After initial planting, species diversification process rely on nearby sources of native forest species. Without it, the sites may never return to their previous levels of species diversity and complexity.



Introduction

- In this research, the extent of seed dispersal was examined through seed rain observation in two adjoining vegetation types, i.e. abandoned agricultural field and the adjacent forest.

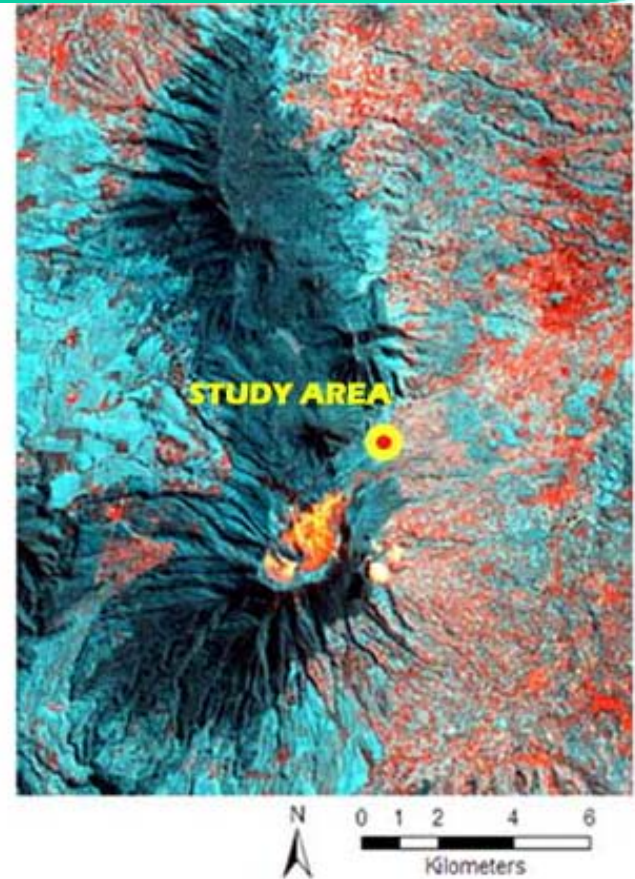
Objective :

- To determine whether the lack of seed dispersal is the limiting factor in abandoned agricultural field succession.



Methods : Site description

Mount Papandayan Nature Reserve



Site History

Some part of this nature reserve has been subjected to forest encroachment in the end of 1990s in which the natural mixed forest was converted into agricultural fields.

After the agricultural activity was ended, some abandoned agricultural fields have been reforested through community-initiative and government programs.

Presently, tall shrubs mostly *Eupatorium inulifolium* dominated the land; trees left from the initial planting were mostly dominated by *Schima wallichii*.



Forest
area

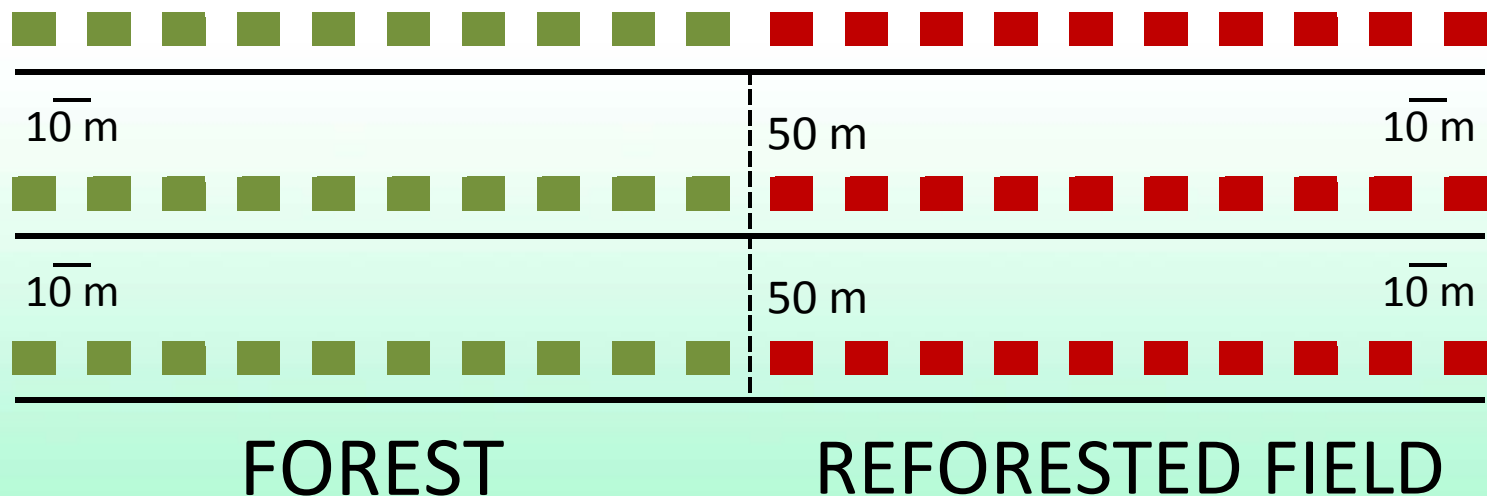


Abandoned field with *Schima wallichii* grown among the shrubs



Methods

- Placing 60 nylon mesh seed traps (50 x 50 cm² wide) on spots along three parallel transects. The seeds were collected every two weeks from March – October 2010
- Tree species within a radius of 5 m from each trap were identified and recorded.



Results & Discussions

Seed species trapped



Lithocarpus dolichocarpa
Fagaceae



Engelhardtia spicata
Juglandaceae



Villebrunea rubescens
Urticaceae



Distylium stellare
Hamamelidaceae



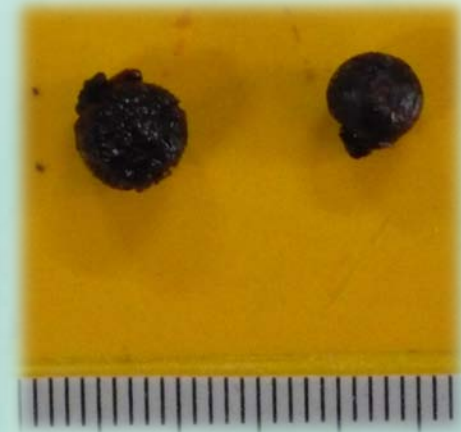
Acronidia punctata
Elaeocarpaceae



Omalanthus populneus
Euphorbiaceae

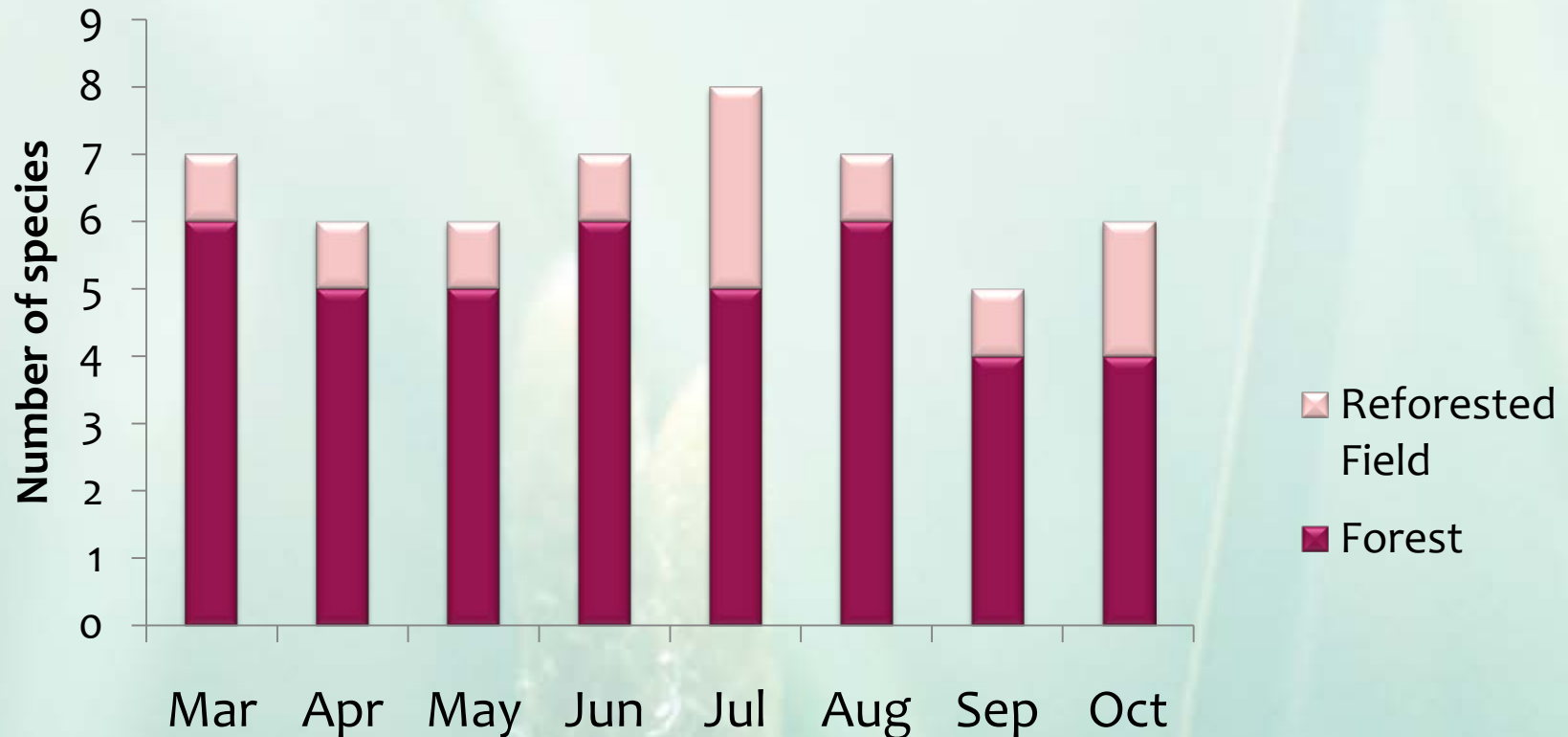


Schima wallichii
Theaceae



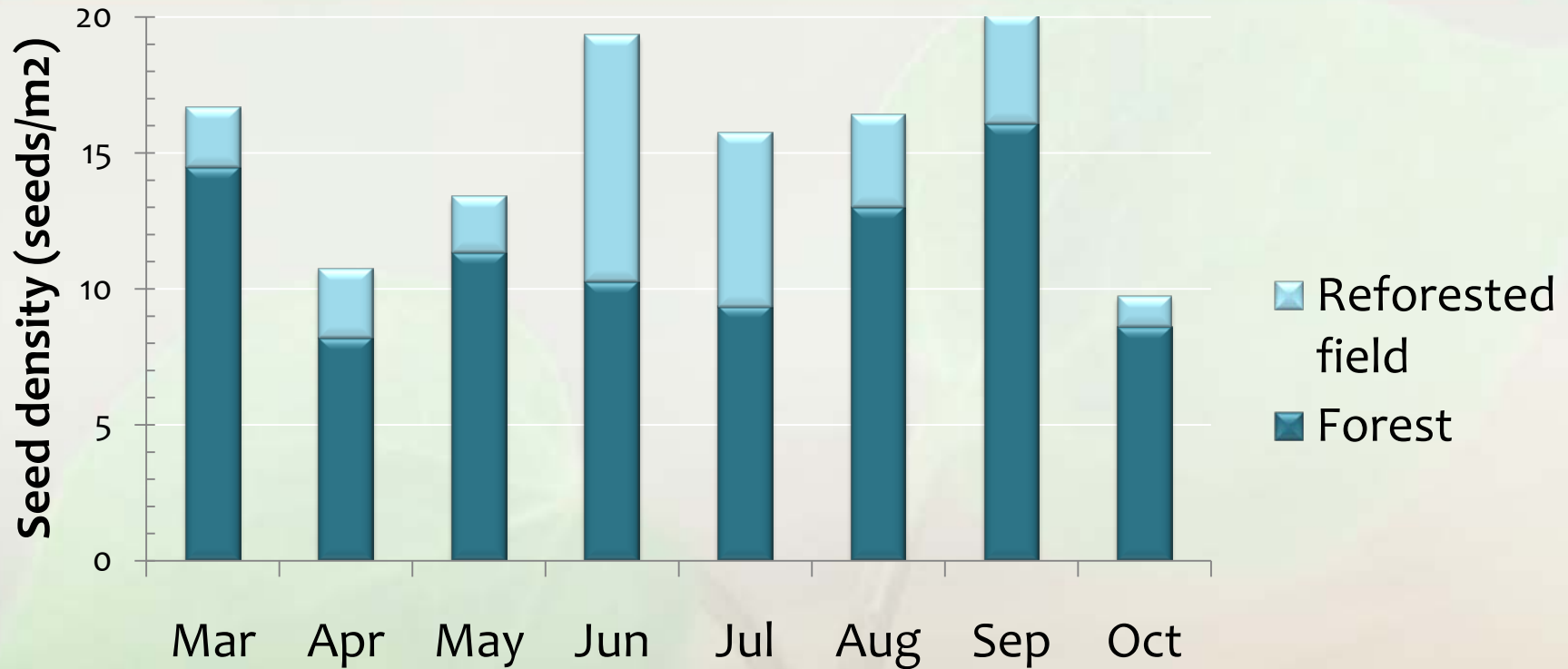
Astronia spectabilis
Melastomataceae

Species of seeds trapped each month



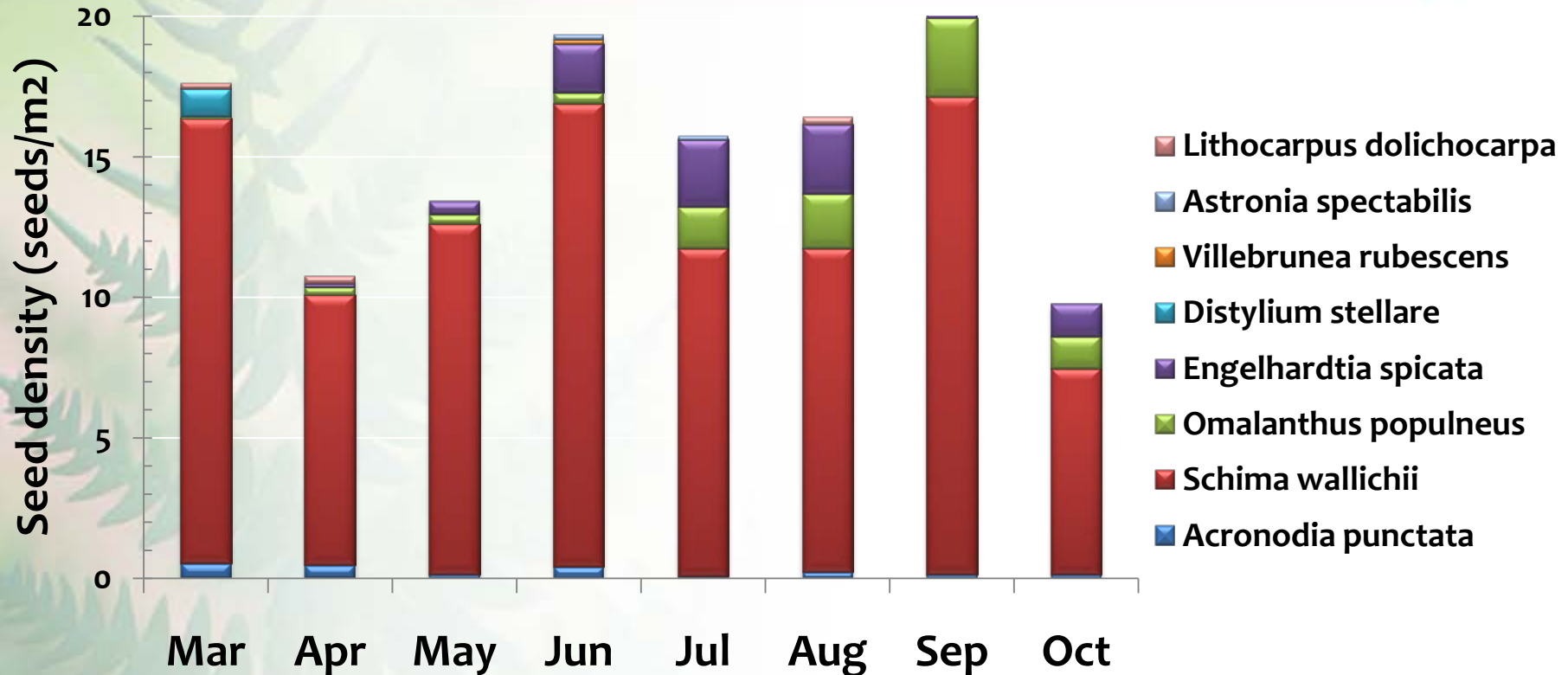
- Diversity of trapped seeds in the forest was always higher than in the reforested field.
- It appears that the diversity of trapped seed was related to the diversity of surrounding trees.

Seed density in the forest and reforested field



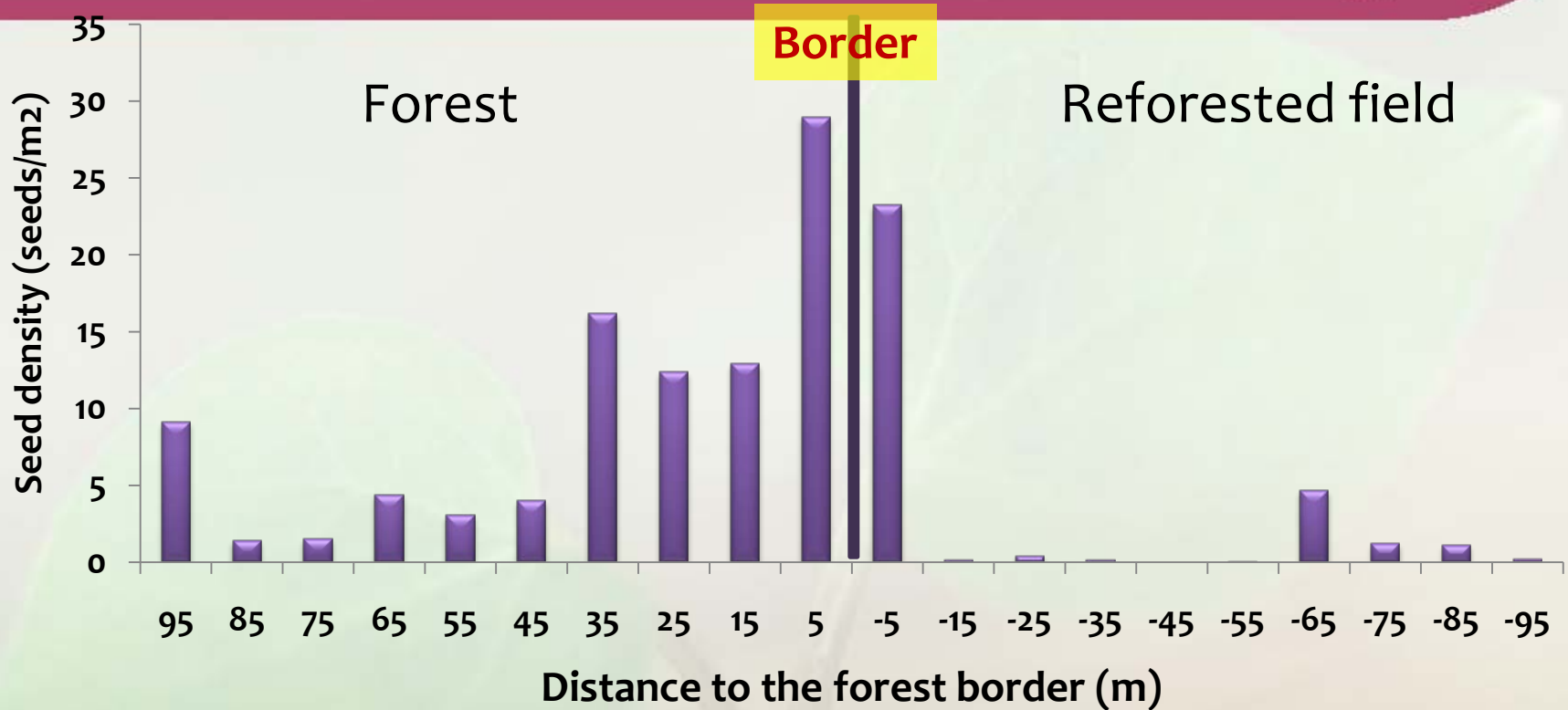
- A total of 1,879 seeds were collected : 1,411 (forest) & 468 (reforested field) .
- At every month, the number of seeds trapped in the forest was higher than the in reforested field.
- Average seed density/m²/month : 11 ± 3 (forest) & 4 ± 3 (reforested field).

Seed density of eight species trapped



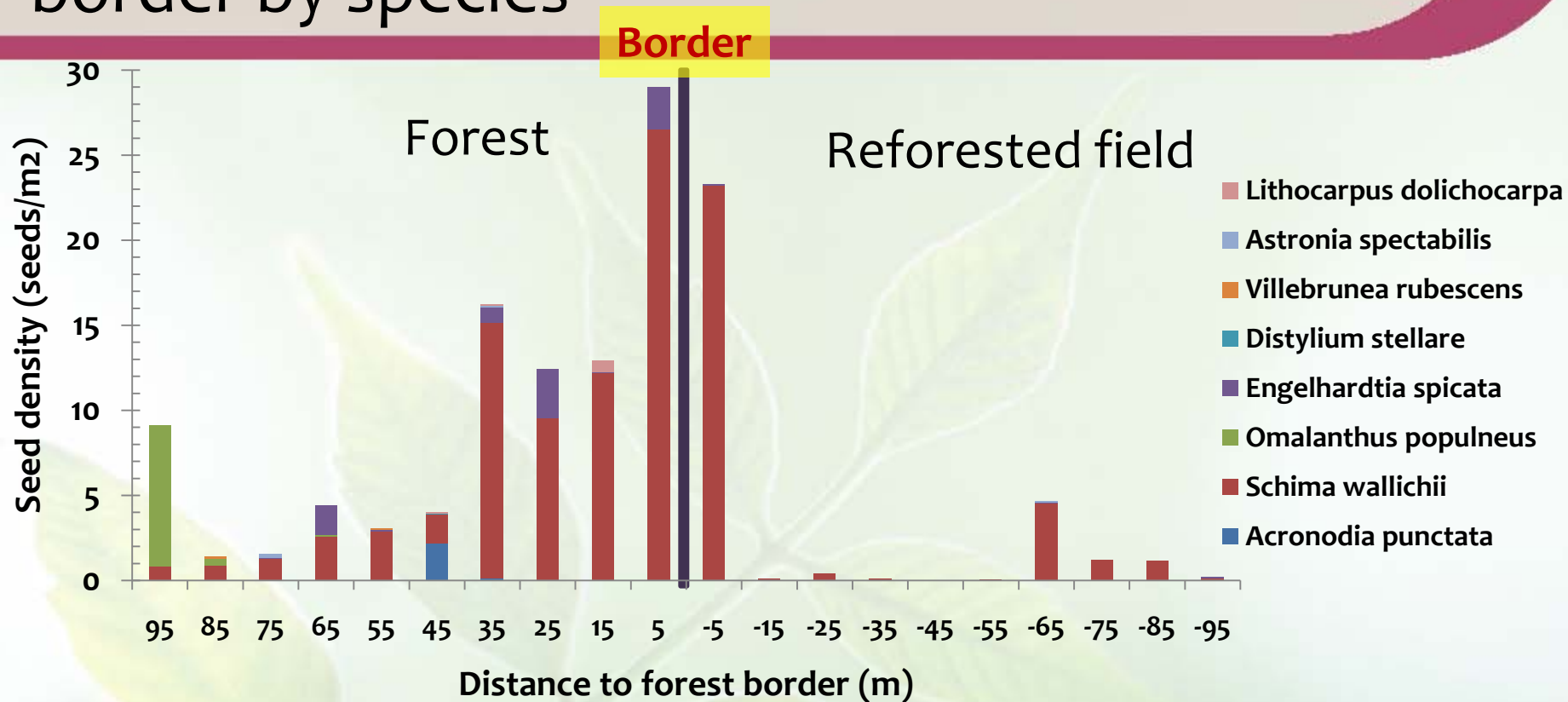
- *Schima wallichii* seed was dominant in every month.
- The next abundant seeds were *Omalanthus populneus* and *Engelhardtia spicata*.

Seed trapped along the distance to the forest border



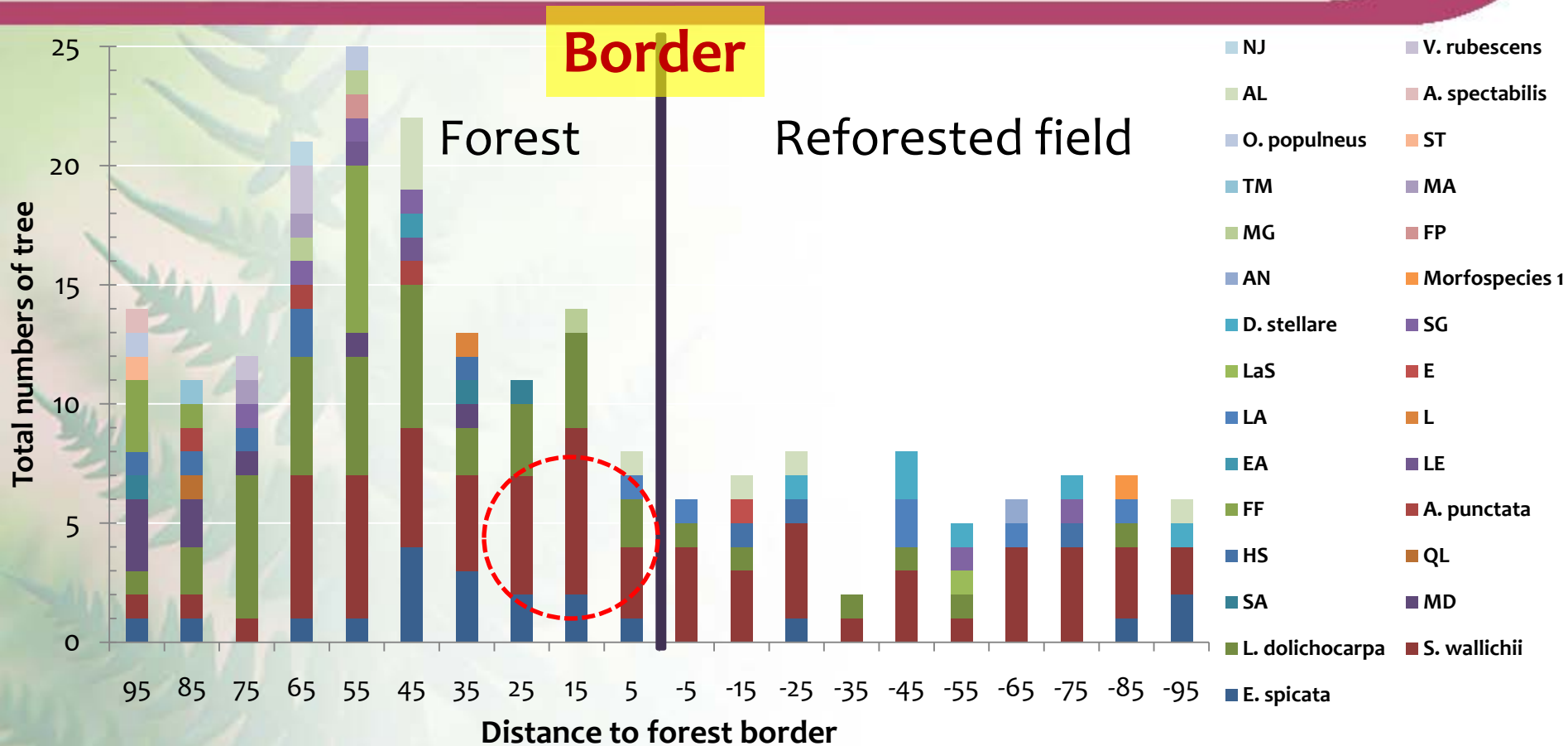
- Seeds trapped tend to be higher as the trap distance was closer to the border, either from the forest side or the reforested field.
- In the reforested field, high density of trapped seeds were found in a very close distance to the border.

Seed trapped along the distance to the forest border by species



- *Schima wallichii* seed rain in the reforested field was concentrated in a very close distance from the forest border. Beyond 5 m from the border, seed rain was almost absent except in the segment - 65 m.
- Possible factors that may explain the high seed rain of *S. wallichii* near the forest border include the high abundance of *S. wallichii* trees and dispersal of seeds from the adjacent forest.

Tree species found on each trap



- *S. wallichii* trees were abundant in almost every segment.
- Of 22 species in the forest, the reforested field receive seed rain only from *S. wallichii*.
- The high seed rain of *S. wallichii* in one segment of the reforested field may due to a number of factors, i.e. high abundance of trees both in forest and reforested field, high fruit production, and also characteristics of fruit (dehiscent) and seed (wind-dispersed).

Conclusions

- The total seed rain found during eight months in the forest area was 1,411, while in the reforested field was 468.
- The low number of seeds found in the reforested area indicates a limited seed dispersal of forest species on the adjacent reforested area.
- This might have been one of the major limiting factors to spontaneous natural regeneration of trees in the reforested abandoned field in Mount Papandayan.



Thank you very much for your attention