Name	Counterpart	Title
Bambang Irawan, Gindo Tampubolon, Mohd. Zuhdi, Leti Sundawati, Prijanto Pamoengkas, Iskandar Z. Siregar	**B11**	Nucleus Tree Planting for Biodiversity Enrichment in Second Generation of Oil-Palm Landscapes

Background and Methodology

Replanting of old oil palm trees has been conducted by several oil palm companies in Indonesia. The purpose of replanting should not only be for replacement of old oil palm trees with the young and more productive trees but also for redesigning of the overall oil palm landscape. The poor ecological function and diversity of monoculture planting design of oil palm leads to debate and discussion for many reasons. Studies that have investigated biodiversity in oil palm plantations have, almost universally, found lower biodiversity than in the forest (Koh and Wilcove 2008; Danielsen et al. 2009). The riparian sites are the most potential areas that can be used for increasing ecological function of the landscape. Those riparian areas should also be considered as Riparian Reserves or center of biodiversity in the oil palm landscape under the standard of RSPO. Barclay et al. (2017) suggested that the Riparian reserves can help to reduce some of the impacts of oil palm expansion on biodiversity by: (1) Maintaining natural processes in rivers and streams so that can they contain a wider range of species; (2) Providing habitats for terrestrial species; and (3) Acting as 'wildlife corridors' which enable animals and plants to move through the landscape between larger areas of forests.

Except for the species selection as suggested by Barclay et al. (2017), the planting design and tree density are believed to be the most important factors that determined the success of secondary succession processes on the bare land after oil palm replanting. The planting design and tree density will also directly influence the velocity of land cover during the early stage of secondary succession. Land cover is important for improving soil stability and improving microclimate that are required for further stages of succession. Earlier studies found that applied nucleation such as island planting is a promising strategy for facilitating forest recovery, especially with a corresponding reduction in planting and maintenance costs over the first few years. However, forest restoration via enrichment planting in regular manners is also needed especially for large-seeded tree species to accelerate forest recovery (Reid et al. 2015; Bechara et al. 2016; Holl *et al*. 2017).

This research was conducted in PT. Perkebunan Nusantara Persero VI (PTPN VI), Tanjung Lebar, Jambi. The experimental design applied was Complete Randomized Block Design with

Figure 1. Field conditions at PT. Perkebunan Nusantara Persero VI (PTPN VI), Tanjung Lebar, Jambi.

Figure 2. Petai (*Parkia speciosa*) seedlings

Figure 3. Malapari (*Pongamia pinnata*) seedlings.

Figure 4. Pulai (*Alstonia scholaris*) seedlings.

six replications. Six pairs of tree planting designs and tree densities will be applied as the treatments namely (1) 100% tree density with line planting design; (2) 66% tree density with line planting design; (3) 33% tree density with line planting design; (4) 66% tree density with island planting design; (5) 33% tree density with island planting design; and (6) no planting (natural succession). The plot size is about 0.25 ha with the number of trees per plot being 417 as the standard for 100% tree density. The total size of core plots is 10 ha. Between the plot there will be 2 rows of sungkai trees laid as a border. Six tree species will be planted, namely *petai* (*Parkia speciosa*, Fabaceae); *jengkol* (Fabaceae), *malapari* (*Pongamia pinnata*, Fabaceae); *sungkai* (*Peronema canescens, Verbenaceae)*; *tempunek (Artocarpus rigidus*, Moraceae); and *pulai* (*Alstonia scholaris*, Apocynaceae). The total number of seedlings needed were 8.600 seedlings (with 15% spare for replanting).
The seedlings had been chosen for several reasons i.e. (1) indigenous species to Sumatra and the Jambi forest ecosystem; (2) belongs to pioneer species; (3) adapted to riparian areas; (4) combination between timber and fruit producing tree species; (5) combination between trees which produce large and small seeds; and (6) combination between nitrogen fixing trees and non-nitrogen fixing trees.

Objectives

The overall objective of this research is to study the effects of nucleus tree planting for biodiversity enrichment in the second generation of oil-palm landscapes. While the specific objectives are (1) to study the effects of planting design to the biodiversity enrichment in the second generation of oil-palm landscapes; (2) to study the effects of tree density to the biodiversity enrichment in the second generation of oil-palm landscapes.

Results

The trees had been planted starting from the middle of January 2020. The delay of planting was due the irregular rainy season in 2019–2020. There is no data available yet.