Research project of counterparts funded at Tadulako University

Name	Counterpart	Title
Henry Novero Barus, Nur Edy	**Z01**	DNA barcoding of arbuscular mycorrhizal fungi from Central Sulawesi

Research summary

Arbuscular mycorrhizal fungi (AMF) is a term to describe a mutualistic symbiotic relationship between plant roots and fungi. AMF supports the decomposition of soil organic materials, the translocation of soil nutrients, especially phosphorus, and the ability of plant roots to absorb plants and protecting roots from pathogens in the rhizosphere.

This study aims to identify arbuscular mycorrhizae at the species level by DNA barcoding and publish them on a data bank website. The results of this study will contribute to national biodiversity data on arbuscular mycorrhizae from Central Sulawesi.

Sampling was carried out in three different land uses in Central Sulawesi: monoculture cocoa plantations, cocoa agroforestry, and forest areas. Isolation of mycorrhizal spores using the pour filter method (Brundrett *et al.*, 1996), which has been modified according to INVAM (https://invam.ku.edu). DNA extraction and amplification by polymerase chain reaction (Edy *et al.*, 2022) were carried out at the Faculty of Agriculture, Tadulako University. DNA sequencing analysis is in process and will be carried out at IPB University.

In total, 25,502 spores from 21 different genera of AMF have been collected and identified (Table 1).

Table 1. The identified AMF from three different land uses; cocoa plantation, cocoa agroforestry, and forest.

No.	AMF genera	Cocoa plantation	Cocoa Agroforestry	Forest
1	*Acaulosporalaevis*	364	366	543
2	*Acausporalaevislike*	626	335	784
3	*Chetaspora*	57	441	558
4	*Claoroidelgomus*	393	1,741	388
5	*Racocetragregaria*	723	9,453	3,116
6	*Rhizopagus*	77	752	1,138
7	*Gigaspora* MT-1	5	72	106
8	*Gigaspora* MT-2	84	36	52
9	*Gigaspora* MT-3	-	9	15
10	*Funneliformis* MT-1	30	383	324
11	*Funneliformis* MT-2	-	74	24
12	*Funneliformis* MT-3	-	46	38
13	*Claoroidelgomuse*	-	51	118
14	*Diversisporagaea*	-	18	18
15	*Acaulospora* MT-1	-	2	3
16	*Acaulospora* MT-2	-	21	69
17	*Acaulospora* MT-3	-	-	4
18	*Dentiscutata*	230	44	140
19	*Sclerocystis*	1	2	39
20	*Rhizopagus*	-	2	176
21	*Racocetra*	-	3	1,408
	Total	2,590	13,851	9,061
	%	10.16	54.31	35.53

The species richness of a certain number of samples is based on the rarefaction curve. The rarefaction curve is a plot of the number of species against the number of samples. This curve is constructed by randomly resampling a set of N samples several times and then plotting the average number of species found in each sample. Generally, it grows rapidly initially (as the most common species found) and then flattens slightly (as the rarest species remains in the sample). The rarefaction curve shows that forest areas have higher AMF richness than those found in cocoa agroforestry and cocoa plantations (Fig. 1).

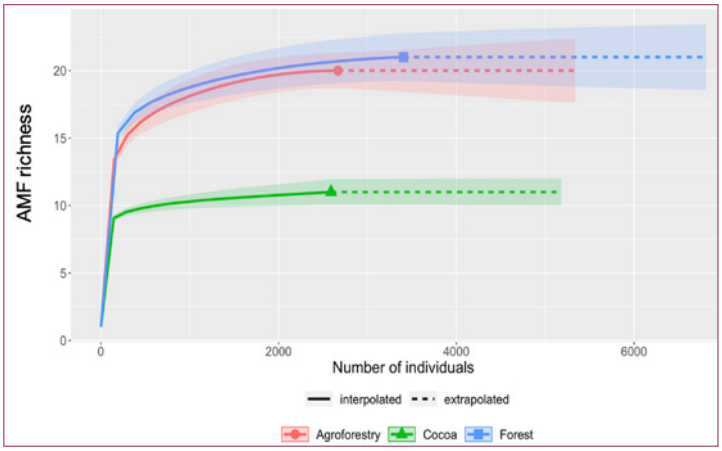

Figure 1. Rarefaction curves of arbuscular mycorrhizal richness in cocoa plantations (cocoa), cocoa agroforestry (agroforestry), and forest areas (forest)

References

Brundrett MC, Bougher N, Dell B, Grove T, Malajczuk N (1996) Working with mycorrhizas in forestry and fgriculture. Canberra: Australian Centre for International Agricultural Research

Edy N, Barus HN, Finkeldey R, Polle A (2022) Host plant richness and environment in tropical forest transformation systems shape arbuscular mycorrhizal fungal richness. Front. Plant Sci. 13: 1004097 doi: doi.org/10.3389/fpls.2022.1004097

INVAM (2022) The International Collection of (Vesicular) Arbuscular Mycorrhizal Fungi