Comparison of belowground root production of the mangrove forests in the Western Pacific Ocean islands among tropical and subtropical regions and mangrove species.

*Kenji ONO¹, Kiyoshi FUJIMOTO², Rempei SUWA³, Rene ROLLON⁴, Ariel C. BLANCO⁴, Giannina MARIE G. ALBANO⁴, Green ANN A. CRUZ⁴, Yasmin H. PRIMAVERA-TIROL⁵, Ronald J. MALIO,⁵, Ryan M. BASINA⁵, Shingo TANIGUCHI⁷, Shin WATANABE⁷, Yasumasa HIRATA¹, Saimon LIHPAI^{6,8}, Kazuo NADAOKA⁶

1. Forestry and Forest Products Research Insititute, 2. Nanzan University, 3. Japan International Research Center of Agricultural Science, 4. University of the Philippines, 5. Aklan State University, 6. Tokyo Institute of Technology, 7. University of the Rhyukyu, 8. Pohnpei State Government, FSM

Mangroves with high productivity of belowground roots accumulate the organic matter in their substrata as mangrove peat, create their growth foundations by themselves, and consequently expand their habitat in intertidal zones. Our earlier studies estimated that the mangrove forests including above- and below-grounds generally have a great amount of organic carbon (OC) storage compared with general terrestrial forests. To accurately evaluate sequestration and storage of OC in mangrove ecosystems across tropical and subtropical regions, it is necessary to determine the root productivity in mangrove forests, being because their root productivity highly contributes huge OC storage in their ecosystem, including the substratum. In the present study, we aimed to clarify the variations of the root production in the several types of mangrove ecosystems among the species and the regions. We conducted the ingrowth core experiment according to Fujimaki et al. (2004 PLSO) to estimate the annual root production rates in soils of 30-cm deep by mangrove stands in Micronesia (FSM), Philippines, and Japan. More than three mesh cores filled with root-free sands, i.e., ingrowth cores, were put on the forest floors at interior and seaside positions, respectively, with different frequency of water immersion by daily tide in each forest. From the cores collected from the sites, all fine roots were picked up their mass determined, and their annual production rates estimated. Annual root productions (30-cm deep) in the mangrove stands ranged from 1.9 to 16.9 Mg ha⁻¹ yr⁻¹ (Table 1). Mangroves in FSM, located in 5.8°N, showed relatively higher root productivity than those in Philippines and Japan (11.8°N and 24.4°N, respectively). There was no clear differences of the root production among the species and between landward and seaward positions based on current data on hand. We continuously proceed with the detailed analyses of samples and data comparison and will report the results in this presentation.

Keywords: fine root production, mangrove, Pacific Ocean Islands

Dominant Species	Annua	Annual root pruduction				
	(Mg ha ⁻¹ yr ⁻¹)					
	Landw	Landward		Seaward		
	ave.	s.d.	ave.	s.d.		
	Pohnpei Is., FSM					
Rhizophora apiculata	8	.1 2	2.3	6.2	2.7	
R. stylosa	2	.4 1	.2	6.3	5.1	
Bruguiera gymnorrhiza	7	.6 3	3.6	6.7	3.1	
Xylocarpus granatum	8	.0 2	2.6	6.6	2.4	
Sonneratia alba	5	.2 2	2.0 1	6.9	2.6	
	Panay Is., Philippines					
Avicennia rumphiana	4	.9 2	2.6	4.0	2.0	
<u>Iriomote Is., Japan</u>						
R. stylosa	3	.5 1	0.1	3.5	1.0	
B. gymnorrhiza	1	.9 1	1.1	2.0	0.7	

Table 1. Annual root production of mangrove stands (30-cm deep) at the tropical and subtropical regions in the West Pacific Ocean.