

屏東林後四林造林地樹幹呼吸初探 Preliminary study on stem respiration in Pingtung plantation site

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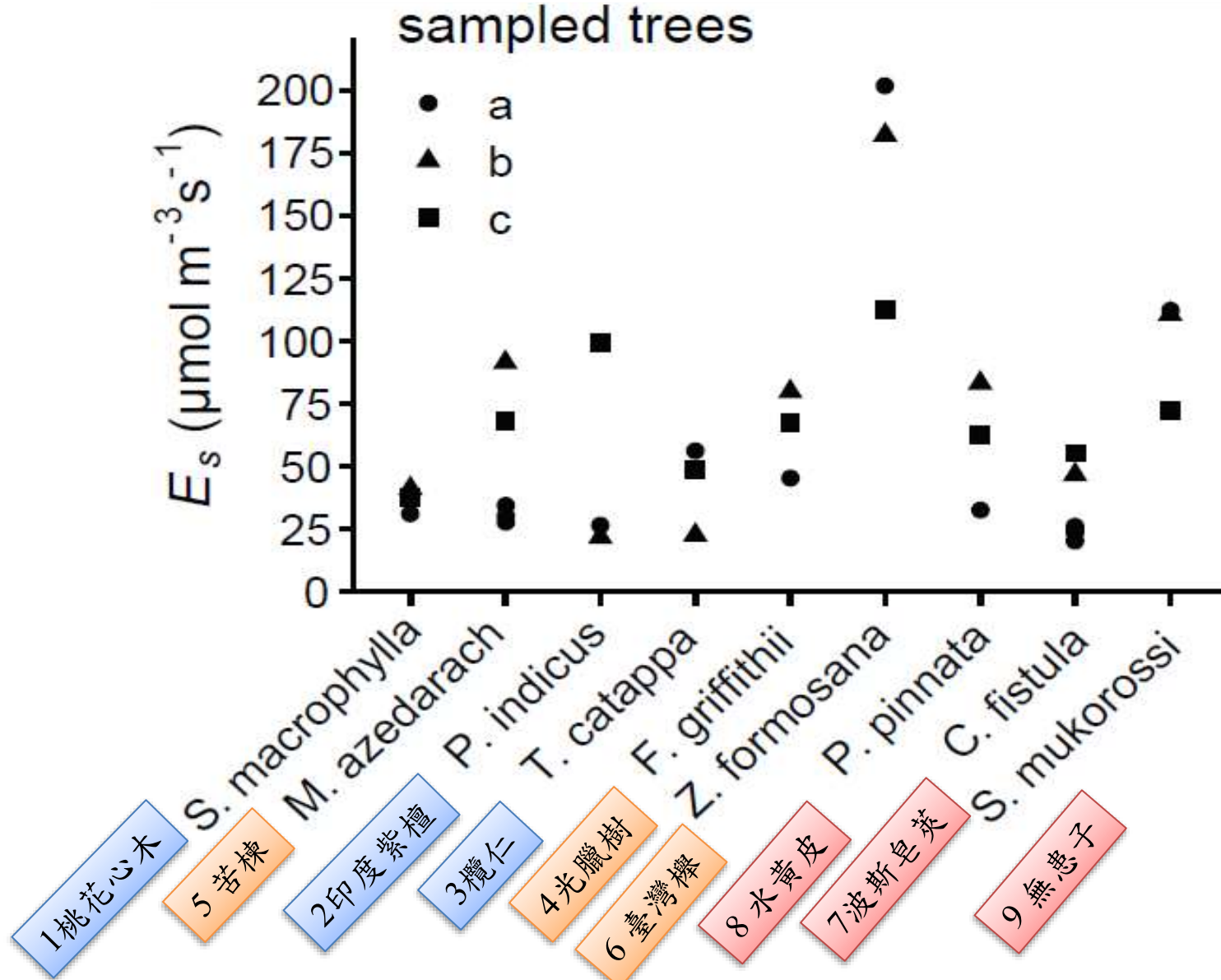
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本研究欲了解屏東林後四林造林地優勢樹種由樹幹所排放出來的二氧化碳量，於2019年6月進行了短暫的測量。總計測量了11個樹種，結果顯示不同樹種間存在顯著的差異性，活存率較高且數量較多的大葉桃花心木與印度紫檀和其他造林樹種相比具有相對較低的樹幹呼吸率，利用2018年2月的林木調查資料上推，整個林分的樹幹呼吸量為 $155 \text{ g C m}^{-2} \text{ yr}^{-1}$ ，變異範圍約為 $132 - 189 \text{ g C m}^{-2} \text{ yr}^{-1}$ ，此比例約占生態系呼吸量的6.2%，比起其他熱帶森林約12-30%顯著較低。。

This study focusses on measuring one contributor to the overall ecosystem respiration, namely stem respiration (E_s). Measurement of E_s was made in a young forest plantation in tropical southern Taiwan using a novel flexible stem respiration chamber in 2019 June. 11 tree species were measured. The results of the individual E_s measurements show obvious inter-specific variation. Namely, *Zelkova formosana* had the highest E_s but little forest biomass, whereas the dominant species *Swietenia macrophylla* and *Pterocarpus indicus* showed relatively low E_s . Therefore, the stand stem respiration contributes only about 6.2 % to the total respiration of the ecosystem. This contribution is smaller than the respective ratios of other tropical forests (12 % – 30 %). Overall, Total E_s of the forest was estimated as $155 \text{ g C m}^{-2} \text{ yr}^{-1}$ with an interquartile range of $132 - 189 \text{ g C m}^{-2} \text{ yr}^{-1}$. Despite the uncertainties associated with the quantification of $E_{(f,tot)}$, the combination of stem respiration chamber measurements and representative upscaling seems to lead to robust results.

9種樹種的樹幹呼吸量

Stem respiration in 9 tree species



- 具有較高光合作用潛力(A_{\max})的樹種，不一定有較高 E_s
- 部分二氧化碳可能隨樹液流輸送至樹冠層
- Species with high A_{\max} not always got high respiration
- Part of CO_2 could transport to canopy with sap flow.

Species 樹種	A_{\max} ($\mu\text{mol m}^{-3} \text{s}^{-1}$)	E_s ($\mu\text{mol m}^{-3} \text{s}^{-1}$)	Volumn ratio (%)
<i>Swietenia macrophylla</i> 桃花心木		37.1	33.7
<i>Pterocarpus indicus</i> 印度紫檀		26.4	26.9
<i>Terminalia catappa</i> 欖仁	23.8	48.5	13.6
<i>Fraxinus griffithii</i> 光臘樹	23.0	67.7	12.2
<i>Melia azedarach</i> 苦楝	34.6	34.5	5.5
<i>Zelkova formosana</i> 臺灣檉	25.4	182.3	4.9
<i>Cassia fistula</i> 波斯皂莢		25.7	2.3
<i>Pongamia pinnata</i> 水黃皮	18.0	62.5	0.6
<i>Bischofia javanica</i> 茄苳			0.2
<i>Sapindus mukorossi</i> 無患子	18.9	110.7	0.1