**DAVIS EXPEDITION FUND**

**REPORT ON EXPEDITION/PROJECT**

**Expedition/Project Title:** Assessment of Palms (Arecaceae) in Jenaro Herrera, Peru

**Travel Dates:** April 27th – June 5th, 2009

**Location:** Jenaro Herrera**,** Department of Loreto, Peru

**Group Members:** Xinxin Xue, Euridice Honorio and Maria Sanchez (National Agricultural Univesity La Molina), with local helpers HugoVásquezya and Percy Raygada

**Aims:**

- To investigate the abundance, distribution and growth of Palms in four 5 ×500 m transects in the Terra firme palm forest. Record number of seedlings, juvenile and adults for each palm species.
- To examine the distribution of *Iriartea deltoidea* (stilt palm) by studying the abundance in 14 sites of different riverine forests. To test the theory that *I. deltoidea* favours to grow by the river.
- To produce a photographic guide for the palms in Jenaro Herrera. To achieve this, we will take high quality photos with both vegetative and fertile characters.

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**OUTCOME (not less than 300 words):-**

## Summary and a brief background

The expedition to the Peruvian rainforest took place at the end of the rain season and was based at the field station of Centro de Investigaciones Jenaro Herrera (CIJH, 4°55´S, 73°45´W). Jenaro Herrera (JH) is located 2.5 km east of the Ucayali River and 140 km Southwest of Iquitos in the Province of Requena, Department of Loreto (Fig. 1). JH has an average annual rainfall of 2521 mm, mean annual temperature of 26°C, and the vegetation is classified as low-terrace broadleaf tropical rain forest (Lopez Parodi and Freitas 1990). The region of JH is noted for its high diversity of palms, many of which are utilised by local people for edible fruits, timber and fibres. However, due to inaccurate species identification, such as the case for many species in *Bactris* and *Geonoma*, the detailed palm diversity in JH and in Peru is not well documented (Kahn et al. 1992). One of the team members Euridice Honorio has been conducting field research at JH surveying palms, the expedition team aims to use the same methodology to collect more data for a detailed inventory of palm population in JH.

Tropical wet rain forest trees use several root architectural strategies to cope with harsh edaphic conditions such as water logging, poorly developed soil profiles, and unstable soils (Dransfield 1978). Among the recognised 25 model root systems is the stilt or aerial adventitious roots. Most species with the stilt root system belong to the palm family and the stilt palms have been associated with areas prone to water-logging and flooding (Corner 1966). Several growth-related functions of stilt roots have been proposed, such as to facilitate the rapid vertical growth to the canopy and to achieve enhanced mechanical stability (Goldsmith and Zahawi 2007). Interestingly, one of the stilt root palms *Socratea exorrhiza* was nick-named “walking palm” by Bodley and Benson (1980) when they had observed the palm developing new roots on the opposite side of disturbance so as to allow for the old root rotting away. Also belongs to the Iriatenoid palm, *I. deltoidea* is of special interest because of the peculiar stilt root system and its unknown effect on habitat preference.

Therefore, a second project is to test the theory based on observations made in a previous


Edinburgh expedition (Maria Baden et al. 2007) that *Iriatea deltoidea* appears more abundant in riverine forest by the river. This may have implication to correlate stilt root with a specific growth habitat. At the end of the expedition, we achieved our set targets: we recorded the species abundance for 33 palm species in three transects (seedlings, juvenile, subadult and adult separately assessed). We sent photographs to field museum Chicago to print a JH palm photo guide. To study the habitat preference of *I. deltoidea,* we collected data from 14 creek sites. Our data showed a strong tendency of habitat preference for riverine forest hence the initial hypothesis was supported.

**Fig.1. Location of Jenaro Herrera.**

## Palm diversity

In total, we recorded 5486 individuals and 33 palm species and varieties in the three transects (5 ×500 m) in the *terra firme* (unflooded) forest of JH. The location of transects is shown as red circle in Fig. 2. The research sites were chosen in palm forest without obvious recent logging activity. Montufar and Pintaud (2006) found a dominance *Lepidocaryum tenue* var. *tenue* (*L. tenue* hereafter) and *Oenocarpus bataua* accounted for 58% of the individuals sampled in Jenaro Herrera. Our results showed a slightly higher value than Montufar and Pintaud, *L. tenue* and *O. bataua* accounted for 66.1%, 54.4% and 66.9% (ave. 62%) of the total palms in the three transects respectively. *L. tenue* is a dioecious plant actually treated as weedy. The villagers of JH commonly use the leaves of *L. tenue* as roof thatch (Fig. 4.). Since palms are common in Loreto, fruits of several palms are of important agricultural and economical value. Table 1 lists some well-known palm fruits.

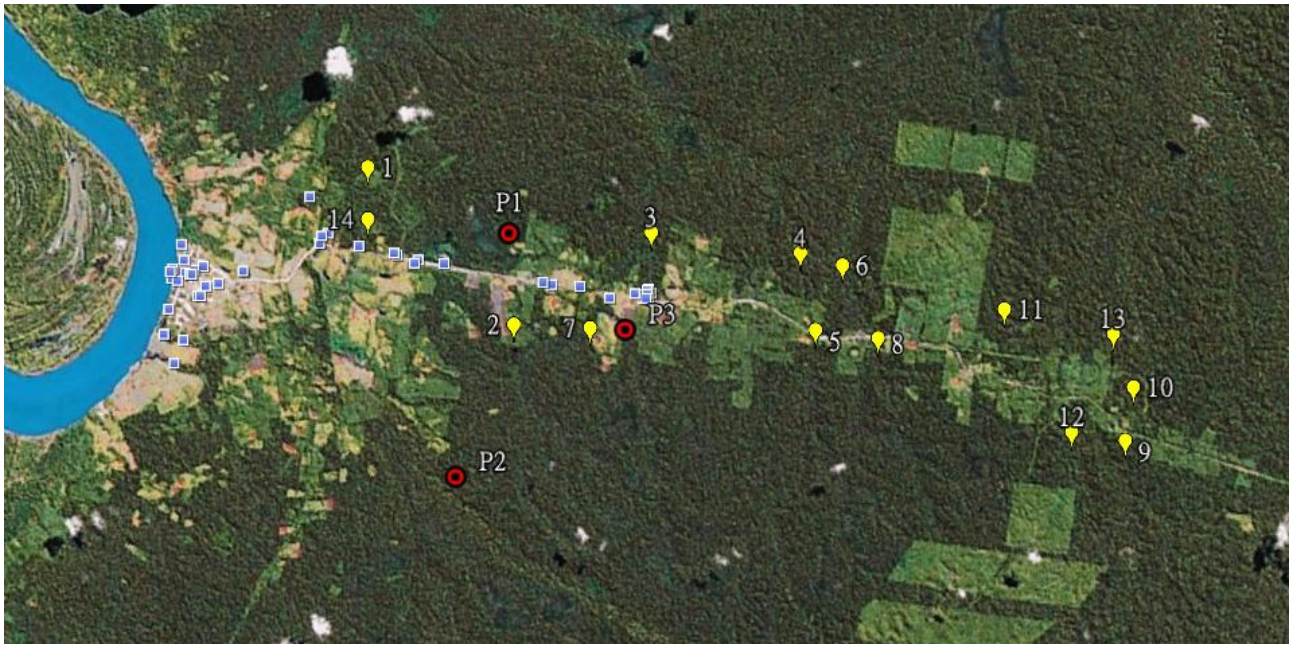


**Fig. 2. Geographic locations of the research sites in Jenaro Herrera.** Red circles labelled with P1, P2 and P2 are the palm transects; the yellow balloon indicates the 14 sites of the riverine forest where *I. deltoidea* was assessed.

**Table 1. Palm fruits in Loreto.**

| Local name | Scientific name |
|---|---|
| Aguaje (Fig. 3) | *Mauritea flexuosa* |
| Cashapona | *Socratea exorrhiza* |
| Chambira | *Astrocayum chambira* |
| Huacrapona | *Iriatea deltoidea* |
| Huasai | *Euterpe oleracea* & *Euterpe precatoria* |
| Irapay | *Lepidocarym tenue* |
| Pijuayo | *Bactris gasipaes* |
| Ungurahui | *Oenocarpus bataua* |


**Fig. 3.** Clockwise from upper left: An adult *Iriatea deltoide* (photo credit: Euridice Honorio); *Lepidocaryum tenue* as roof thatch; *Duroia hirsuta* found in "Devil's garden"; Aguaje (*Mauritea flexuosa*) fruits.

Among the palm species in Fig. 4, *Chelyocarpus repens, Iriartella stenocarpa, Socratea salazarii, Astrocaryum chambira, Bactris killipii, Attalea insignis, Geonoma poeppigiana, G.camana* are know to be restricted to or centred in western Amazonian lowlands, whereas *Euterpe precatoria* var. *precatoria*, *Mauritia flexuosa*, *Bactris simplicifrons*, *Lepidocaryum tenue*, *Attalea maripa* and *Geonoma macrostachys* have a pan-Amazonian distribution (Montufar and Pintaud 2006).

The highly abundant *Oenocarpus bataua* in our study is known to grow on steep slopes in the Andes, up to 1000 m elevation or more. Descending the Andes, it maintains its edaphic preferences to *terra firme* forest, becoming an ecological indicator of welldrained conditions in eastern Ecuador. However, in Jenaro Herrera *O. bataua* grows mostly on hydromorphic or waterlogged soils, including seasonal swamps on upland valley floors and on waterlogged gleyic podzols developed on white sands.

Identifying Palms

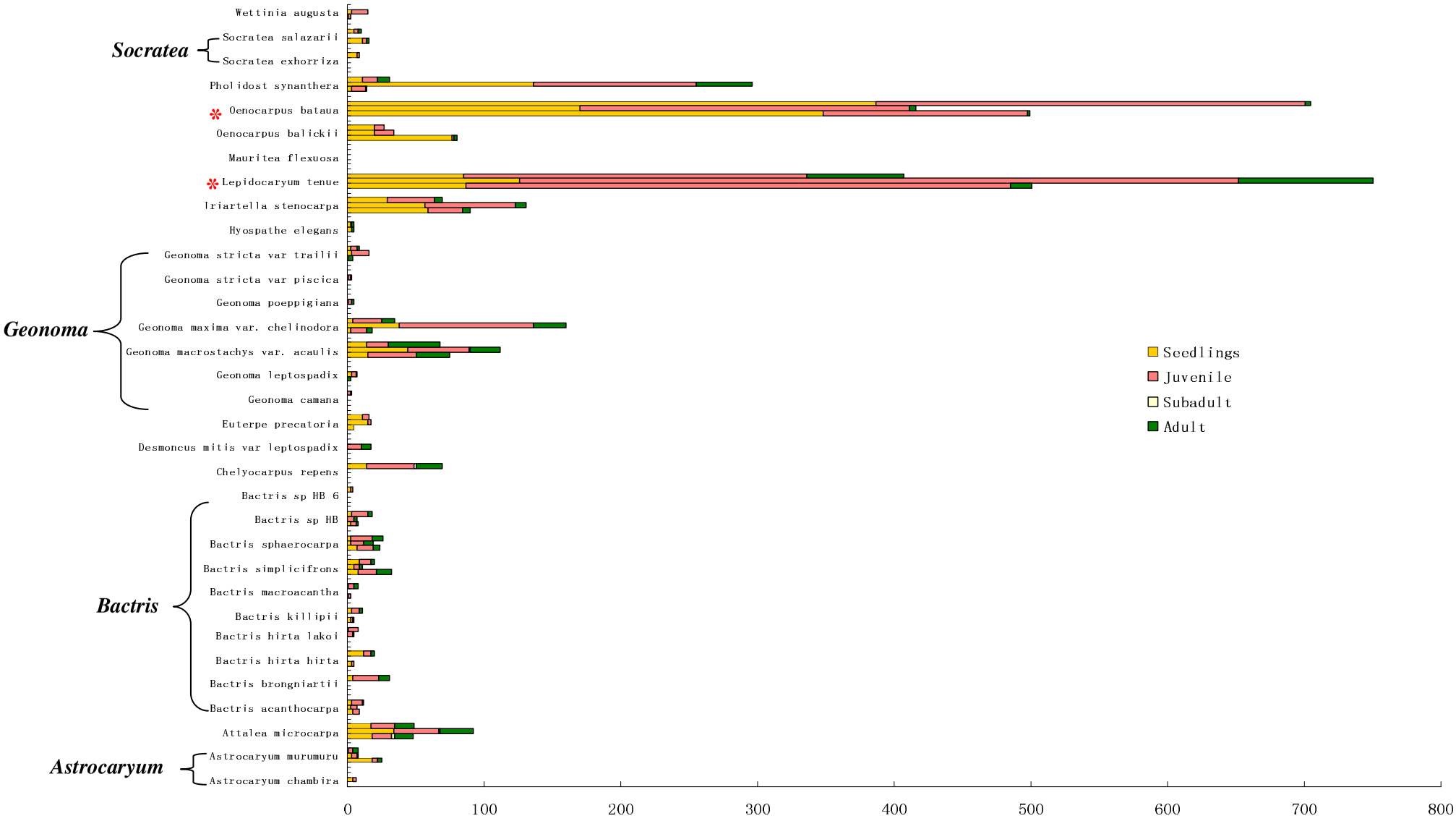


**Fig. 4. The abundance of 33 Arecaceae species recorded for 3 transects in the palm forests of Jenaro Herrera Amazonian forest.** For each species, comparison of abundance among the 3 transects were shown, the lowest bar represents transect 1, the middle bar represents transect 2 and the highest bar represents transect 3. The palm genera have the most species represented in these 3 transects are *Bactris, Geonoma, Astrocaryum* and *Socratea.* Two species *Oenocarpus bataua* and *Lepotocarum tenue* represent the two most abundant palm species in all three transects. There are two *Bactris* species that have not been identified, they are the same species as what Henrik Balslev called sp6 and sp respectively.

## Finding *Iriatea deltoidea*

*Iriatea deltoidea* (Fig. 3) is the only species in this genus. We recorded a total of 1121 individuals at different growth stages. The locations of the 14 sites were marked as yellow balloons in Fig. 2. For each site, we set a principle transect of 5x100 m along the river and 4 equal sized lateral transects perpendicular to the river (Fig. 5A). The data was collected in 5 × 5 m subunits on the principle transect and 5x10 m on the lateral transects. Our data (Fig. 5B) suggested a trend of decreasing *I. deltoidea* as the distance from the river increases; hence the data supported our hypothesis of *I. deltoidea* prefers riverine forest. There is also a trend of decreasing *I. deltoidea* species as the sites approached the village where human activity is much higher.

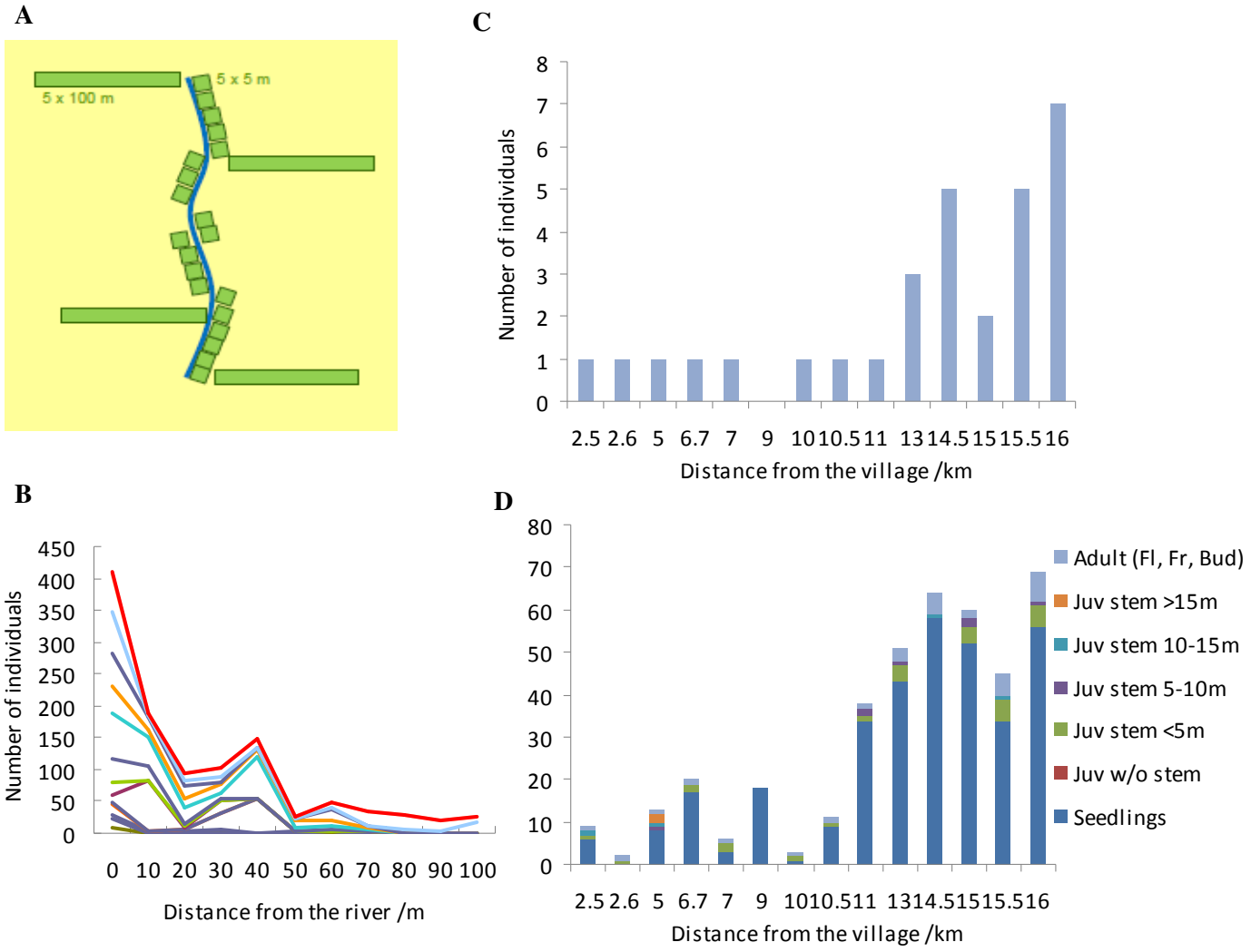


**Fig. 5. A) Illustration of how the transects were set in 14 creeks.** the lateral transects were placed so that two at the starting and ending points of the principle transects and two 25 metres from those points; **B) The accumulative abundance of *I. deltoidea* in relation to the distance of the subunits from the principle transects,** colour represents data from different sites; **C) The abundance of adults *I. deltoidea* across 14 creek sites**; and **D) The abundance of *I. deltoidea* across 14 creek sites.** As the transects get further away from JH village, there was a trend to have more *I. deltoidea.* Note that x-axis is not in proportion.

## Chuyathaqi

We had an interesting experience with the unique Amazonian culture hearing the forest spirits Chuyathaqi frequently mentioned on this expedition. The locals believe that Chuyathaqi have a pair of feet growing backwards, people following their footprints in the forest will get lost. Excitingly, we came across a forest patch called the 'Devil's garden' because the locals believe that Chuyathaqi live here. The site had a dry appearance comparing to the surrounding forests just 10 metres away and seemed to contain a single species of *Duroia hirsuta* (Rubiaceae; Fig.3). Besides, although ants were abundant in the wet rainforest, here in "Devil's garden', there seemed to host a hidden ants kingdom – constantly we saw ants marching along tree trunks and on the fallen leaves. It turned out to be that the ants *Myrmelachista schumanni* and *Duroia hirsuta* formed a symbiotic relationship, the ants kill all the other trees by injecting formic acids, apart from its nests *Duroia hirsuta* which has a hollow stem allowing the ants to establish a kingdom. An indigenous person once said "The earth is our historian, our educator, the provider of food, medicine, clothing and protection. She is the mother of our races." The stories of Chuyathaqi reflect a simple but profound relationship between forest and people in the Amazonian jungle.

## Expenditure

| **Items** | **GBP** |
|---|---|
| Flights | 1100 |
| Insurance | 100 |
| Vaccination | 250 |
| Local transportation (boat, buses, taxi and mototaxi) | 40 |
| Insect repellent, Wellington boots, head lamp, kettle, bucket, gas tank for cooking hot water etc | 70 |
| Accommodation | 400 |
| Food | 150 |
| Book ´´Palms of the Amazons´´ donated to CIJH | 100 |
| One research assistant from Lima | 200 |
| Two Local helpers | 325 |
| Horse, food and personals for camping | 175 |
| **Total** | **2910** |

## References


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Goldsmith, G.R. & Zahawi, R.A. 2007. The function of stilt roots in the growth strategy of *Socratea exorrhiza* (Arecaceae) at two neotropical sites. *Rev. Biol. Trop*. **55** (3-4):787-793.

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