Origins and distribution of Cohune Palm (*Attalea cohune*) forests in northwestern Belize

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Cohune palms (*Attalea cohune*) form monodominant stands, and consequently affect forest composition, forest heterogeneity, and soil morphology throughout Mesoamerica. Scientists have noted the association of these palm stands with deep and highly organic soils. Yet, we know little about the provenance and broader ecological implications of this dominance. I am investigating soil and geomorphological factors connected with cohune palm stands in northwestern Belize. The 2017 field season consisted of four soil sequences, from three different cohune palm forest stands (Figure 1). Through this work I intend to clarify the origins of cohune forests; as well as, monodominant stands' effect on associated environments, contributing to broader questions concerning tropical forest composition and function.

The 2017 field season for this project consisted of three weeks of intensive field work, resulting in four soil pits and fifty-five soil samples. The first two soil pits were dug in an area referred to as Cohune Palm Ridge. This stand has been regularly assessed since 1991 by Dr. Nicholas Brokaw and associates, as part of their long term study on tropical forest composition and dynamics. The first soil pit was dug in an area that is 57% cohune palm, with cohune palms in all age classes present. The second soil pit was located 60 meters away, where the topography changed, and at the base of a series of sinks (Figure 2). These two soil pits differed greatly in depth, with the first reaching bedrock at 110 centimeters while the latter was dug to 320 centimeters without reaching bedrock. This indicates interesting geomorphological questions arising within the cohune stand, partially seen from the LiDAR image in Figure 2. This is an area with activity from a nearby ravine, as well as karstic sinks.

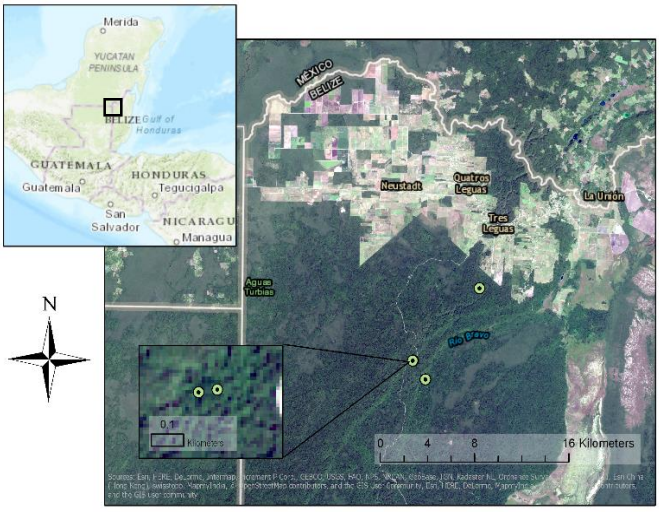

Figure 1: Study area in northwestern Belize with the study sites for the 2017 field season indicated.

While the first two pits seem to occur on upland depositional soils, the third pit was dug on a floodplain (Figure 3). The forest stand associated with this second study locale has also been regularly assessed by Dr. Nicholas Brokaw. The area where the pit was dug is 41% cohune palm. Lastly, the third study location is 50% cohune palm, and in a localized sink north of the previous two areas (Figure 4). This sink has many adjacent ancient Maya structures, and is considered to be associated with the ancient Maya site of Wari Camp. The results from this pit will hopefully help clarify whether there is an anthropogenic factor in cohune palm stand location. The digging of these four pits necessitated the aid of local associates and a vehicle for transport between the different field sites. Thus, all of my funds from the Conference of Latin American Geographers (CLAG) went to these two sources.

In addition to the soil collected during this field season, soil samples of three pits from previous years within cohune palm forests will be added to the analysis. The samples exported to the University of Texas at Austin will undergo a series of analyses in the coming weeks. In the field we were recorded

magnetic susceptibility (Figure 5) and found that the different areas under study have vastly different results. Magnetic susceptibility can indicate burning or a long period of soil formation, which will hopefully be better elucidated by the other analyses. The soils will be analyzed for organic matter, nitrate and nitrogen content, grain size, and elemental composition. Palm phytolith presence and radiocarbon dates will be included towards better understanding the environmental history of these forests. Exploratory studies into microcharcoal and *Sporormiella* analyses will also be undergone, with the intention to discern the prevalence of disturbance and megaherbivores, respectively, in these environments. Lastly, the locations of cohune palm forests will be assessed with LiDAR data to examine the topography and hydrology of the areas containing these forest stands. These analyses will better illuminate the origin of cohune palm forests and add to existing research on monodominance and tropical forest dynamics.

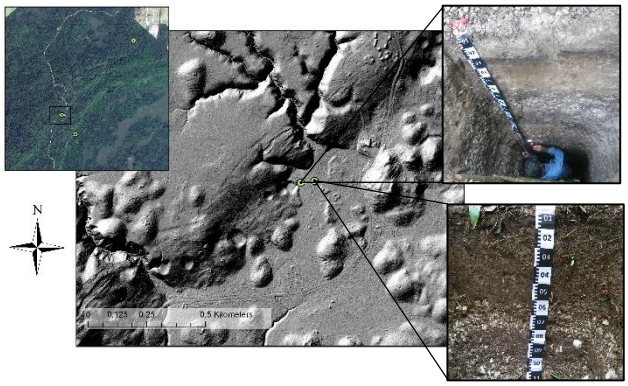

Figure 2: The two study sites and soil pits within the Cohune Palm Ridge area.

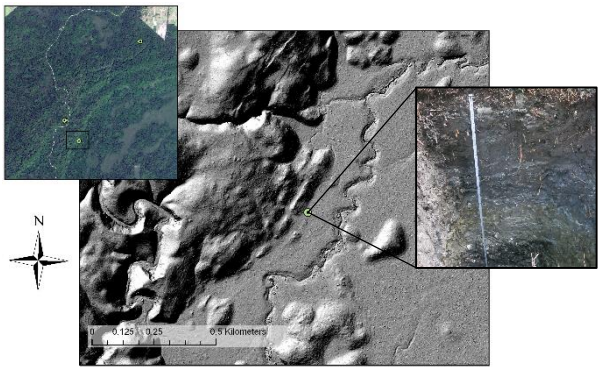

Figure 3: Location and profile of the soil pit excavated in the floodplain of the Rio Bravo.

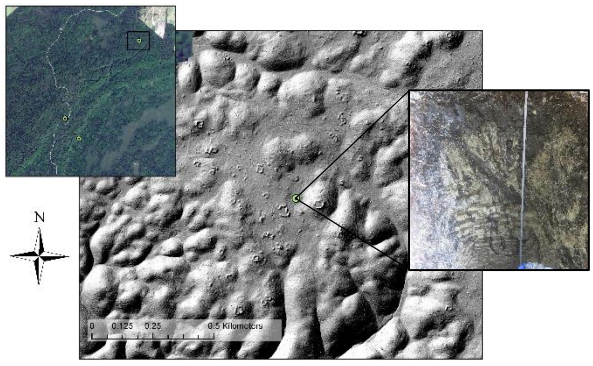

Figure 4: Location and profile of the soil pit excavated within an aguada at the ancient Maya site of Wari Camp.

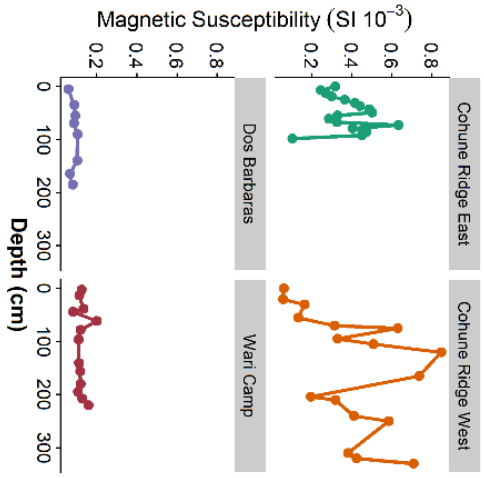

Figure 5: Magnetic susceptibility readings for each of the four pits excavated during the 2017 field season.

Sara Eshleman and Leila Donn sifting through backfill for artifacts at the soil pit near Wari Camp.

The cohune forest at Cohune Palm Ridge. Taken from the eastern soil pit.