Project Update: November 2021

We are currently a couple of months away from closing this project. We successfully sampled 30 individuals per species in two out of the three locations under study, the Cerro del Potosí and the Sierra de la Marta. Our sample in the third site, the Sierra Peña Nevada took us by surprise as the area is currently suffering from an extreme drought and conifer populations are declining. We were only able to find one out of the two species we intended to sample, *Pinus culminicola* populations in this site appear to be extinct, which might be due to fires in the last decades. This site proved to have the most arid and fire prone conditions, we were only able to sample in this location 20 individuals of *Pinus hartwegii* in the altitudinal gradient this study is focused on. DNA from all individuals was extracted and amplification trials were done. Aqua-MIP, a candidate gene related with hydric stress, appears so far to be the most promising one, specially taking in consideration the contrast in aridity between populations.



A possible gene duplication has been found for *P. culminicola*; more tests need to be done to confirm a possible sign of evolution through duplication. Little genetic variation has been observed in both species, which is a concerning sign of negative selective pressure due to drastic shifts in climatic conditions. Translocation seed zones were mapped for the Sierra Madre Oriental and polygons under study were carefully reviewed to start building possible assisted migration strategies for populations under study (Fig.1-2). This was also implemented as part of the project in a proposal for germplasm translocation of different conifer species after a severe fire that happened in March 2021 and affected 12,000 ha of the Sierra Madre Oriental's mountain range - fortunately it did not reach any high montane ecosystems. We worked alongside a governmental institution as part of the committee in charge of the restoration measures to submit the proposal. We are currently sequencing the remaining individuals to finish our analysis and conduct the final mapping process. We hope our results prove to be useful to inform more decisions in regional forest ecosystems.





Figure 1. Climatic zones 1996-2015 for the Sierra Madre Oriental



Figure 2. Climatic zones 2050 RCP 8.5 for the Sierra Madre Oriental

*These photos are mine. I agree to post them on Rufford's website.

References:

Zhou, Y., Zhang, L., Liu, J., Wu, G., & Savolainen, O. (2014). Climatic adaptation and ecological divergence between two closely related pine species in Southeast China. Molecular Ecology, 23(14), 3504-3522.

Castellanos-Acuña, D., Vance-Borland, K. W., Clair, J. B. S., Hamann, A., López-Upton, J., Gómez-Pineda, E., ... & Sáenz-Romero, C. (2018). Climate-based seed zones for Mexico: guiding reforestation under observed and projected climate change. New forests, 49(3), 297-309.