

**THE UNIVERSITY OF HONG KONG
SCHOOL OF BIOLOGICAL SCIENCES**

Postgraduate Student Public Seminar

**“POPULATION GENETICS AND CONSERVATION BIOLOGY OF
THE ENDANGERED TREE *AQUILARIA SINENSIS*
(*THYMELAEACEAE*) IN HONG KONG”**

Mr. KWOK Wan Hin

PhD Student, School of Biological Sciences, HKU
(Supervisor: Prof. Richard M. K. Saunders)

**on Monday 16 January, 2023 at 9:00 am
Room 6N-11, Kadoorie Biological Sciences Building**

Abstract

Poaching, habitat loss, and human-induced fragmentation are global issues that threaten species with extinction. Economically important species are especially susceptible. *Aquilaria sinensis* (Thymelaeaceae) is an evergreen tree endemic to South China that is intensively poached as a source of agarwood. Agarwood is the resinous heartwood of a small group of related trees that is highly prized in many Asian cultures for its fragrance and purported medicinal properties. As a result of agarwood's popularity for use in a variety of products, all *Aquilaria* species have been heavily exploited in the wild, bringing about a drastic decrease in population sizes. *Aquilaria sinensis* is now assessed as Vulnerable in the IUCN global Red List.



In this study, I use this species as an example to study the genetic legacy of a long history of anthropogenic disturbance on its conservation. Poaching, in addition to habitat loss and fragmentation, has resulted in the depletion of large individuals as well as a decrease in effective population size.

A total of 1,464 individuals from 34 populations were sampled across Hong Kong. I genotyped the samples using 15 microsatellite markers to examine genetic diversity and population structure, test for bottlenecks and restricted gene flow, and identify priority populations for conservation. In this seminar, I present my research findings on the life history traits and demographic structure of *A. sinensis* in Hong Kong. Genetic diversity was also compared between life history stages, as defined by size-class thresholds for onset of reproductive maturity and increased poaching risk, in order to understand whether life history traits confer tolerance to the genetic consequences of illegal poaching. An array of life history traits associated with high fecundity and r-selection were confirmed in *A. sinensis*, and comparable levels of genetic diversity between life stages suggest that life history traits do grant a degree of genetic resilience.

I also present the spatial distribution of genetic diversity and its population genetic structuring of *A. sinensis* in Hong Kong. A pronounced genetic structure was observed: populations on Lantau and Lamma Island on the one hand, and in the New Territories and on Hong Kong Island on the other. The Lantau-Lamma cluster exhibits lower heterozygosity and allelic richness, as well as a less diverse genetic composition. The results imply that the two clusters have been subject to different demographic histories, genetic processes, and/or levels of anthropogenic disturbance, and thus require different conservation approaches.

To inform management decision-making, I identify conservation priorities among the 34 populations with respect to their heightened evolutionary distinctiveness and extirpation risk. I reveal that different populations have varying levels of extirpation risk, and populations occupying longer branches in the Unweighted Pair Group Method with Arithmetic Mean (UPGMA) tree were consistently prioritised for conservation. This research presents a practical case study to bridge research output and management action.

--- ALL ARE WELCOME ---