

STRUKTUR GENETIK CENDANA DI IMOGIRI SEBAGAI SALAH SATU RAS LAHAN TERTUA DI KAWASAN GUNUNG SEWU

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Abstrak

Cendana merupakan spesies yang terancam terutama dikarenakan eksploitasi dan fragmentasi lahan. Cendana adalah spesies hemi-parasit yang memerlukan inang primer dan sekunder untuk kebutuhan nutrisinya. Hal ini turut berkontribusi terhadap penurunan populasi cendana dan memperkuat kebutuhan re-introduksi cendana untuk menjaga populasi cendana di alam. Materi re-introduksi cendana diambil dari kawasan Gunung Sewu, yang memiliki beberapa ras lahan yang bervariasi dalam struktur populasi dan keragaman genetik. Salah satu dari ras lahan tersebut, dipertimbangkan sebagai ras lahan tertua, dibuktikan dengan herbarium cendana pada tahun 1853. Imogiri terletak di zona barat daya Gunung Sewu yang memiliki formasi geologi dipengaruhi oleh aktivitas vulkanik gunung api purba sehingga membentuk berbagai bentang lahan. Penelitian ini menggunakan penanda isoenzim untuk meneliti struktur genetik cendana di berbagai kelompok cendana di berbagai bentang lahan di Imogiri. Sampel isoenzim berupa daun juvenil dengan intensitas sampling 100% (metode sensus), terbagi di lima area: (1) Kawasan Hutan Wisata Mangunan, (2) Bukit Panguk-Kediwung, (3) Telaga Giri, (4) Bukit Mojo Gumelem dan (5) Dusun Karangtengah. Lokasi pertama hingga ketiga terletak pada bentang lahan jurang mengarah ke Sungai Oya. Lokasi keempat dan kelima terletak di lahan pribadi. Lokasi kelima, yang berada dekat dengan Makam Raja-Raja Mataram, juga dipertimbangkan sebagai lokasi area tertua di Imogiri.

Dari 222 sampel yang diambil terdiri dari 136 fase reproduktif dan 88 fase semai. Terdapat 22 fase reproduktif yang berbunga dan berbuah, serta fase semai banyak ditemukan di lahan pribadi warga. Hanya satu semai ditemukan di lanskap jurang. Secara spasial, variasi genetik tertinggi terdapat di Dusun Karangtengah (H_e 0.512; H_o 0.672; F_{is} -0.313) yang dipertimbangkan sebagai lokasi tertua. Variasi genetik di lain tempat bervariasi (H_e 0.436 hingga 0.471; H_o 0.462 hingga 0.603; F_{is} -0.382 hingga 0.020). Secara temporal, variasi genetik fase reproduktif lebih tinggi (fase reproduktif: H_e 0.483; H_o 0.539; F_{is} -0.117) dibandingkan fase semai (fase semai: H_e 0.404; H_o 0.419; F_{is} -0.037). Secara umum, cendana di ras lahan Imogiri menunjukkan sistem perkawinan *outcrossing* diindikasikan dengan nilai indeks fiksasi negatif.

Kata kunci: struktur genetik, Gunung Sewu, ras lahan Imogiri, Cendana

Genetic Structure of Sandalwood in Imogiri as One of The Oldest Landrace in Gunung Sewu

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Abstract

Sandalwood is known as endangered species mainly because of exploitation and land fragmentation. Beside, it is a hemi-parasite species with a need of primary and secondary hosts for providing its nutrition. This fact also contributed to the decrease of sandalwood population in nature, thus strengthen the need of re-introduction to preserve its population diversity. The re-introduction materials were taken from Gunung Sewu area, which consisted of several sandalwood landraces which were varied in population structures and genetic diversity. One of those landraces, which is also considered the oldest, was Imogiri landrace in which the oldest sandalwood specimens were dated on 1853. Imogiri was located on the south-west zone of Gunung Sewu, with the geological formations were influenced by ancient volcanic activities, resulted in the recent landscapes. This research applied isoenzyme analysis to examine genetic structure of sandalwood in several sandalwood stands differed by landscapes in Imogiri. The isoenzyme samples, a juvenile leaf, were taken with 100% IS (census method), along its natural distribution in five areas: (1) Mangunan Forest, (2) Panguk-Kediwung Hill, (3)Giri Lake, (4) Mojo Gumelem Hill and (5) Karangtengah Village. The first to third areas are formed in cliff landscapes which are lead to Oya River. The fourth and fifth areas are located in the local private. The fifth area, which is located near the Makam Raja-Raja Mataram, is also considered as the oldest sandalwood stands in Imogiri.

A 222 samples collected consisted of 136 parent trees and 88 seedlings. There were 22 trees found bearing flowers, and as well as the seedlings, mostly were found in the private yard. Only one seedling was found in the cliff landscapes. Spatially, the highest genetic diversity (H_e 0.512; H_o 0.672; F_{is} -0.313) was found on the Karangtengah Village which is considered as the oldest sandalwood stands in Imogiri. Genetic diversity on other stands are varied (H_e 0.436 to 0.471; H_o 0.462 to 0.603; F_{is} -0.382 to 0.020). Temporally, genetic diversity is higher on the older phase (parents: H_e 0.483; H_o 0.539; F_{is} -0.117) in compared to the younger generation (seedlings: H_e 0.404; H_o 0.419; F_{is} -0.037). Generally, sandalwood in Imogiri landraces performed outcrossing mating system which is indicated by the negative fixation index.

Keywords: genetic structure; Gunung Sewu; Imogiri landrace; sandalwood