POPULATION STRUCTURE AND GENETIC DIVERSITY OF PASANG BATU (*Lithocarpus kostermansii* SOEPADMO) as A JAVAN ENDEMIC SPECIES

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ABSTRACT

As one of the biodiversity hotspots, plant diversity in Indonesia is threatened mainly by intrinsic biological factors and habitat loss. The conservation effort is therefore critical to prevent the extinction of the endemic and threatened species. Pasang Batu (*Lithocarpus konstermansii* Soepadmo) is one of the Javan plant endemic species with the conservation status of Endangered. Thus, the species is critical to be conserved. The information related to the population status and genetic diversity of Pasang Batu is required to optimize the conservation efforts. This research aimed to understand the population structure and genetic diversity within and among populations of the species.

The population survey was conducted in four locations, i.e West Nusakambangan Nature Reserve, Yanlappa Nature Reserve, Mt. Gombong of Perhutani Sukabumi Forest Management Unit (FMU), and Sawarna of Banten FMU. Using a focused survey method, all located individuals of the species were recorded for their diameters and coordinates. The following environmental parameters were also measured at the location where Pasang Batu was found: slope, aspect, and altitude. A histogram of the population was made based on the life stage of the species, consisting of seedlings, saplings, poles, and trees. The life table and survival curve were made based on the classifications of individual groups of class I-X. For DNA analysis, living tissues of the mature plants were extracted and then amplified using PCR-ISSR. The results were further analyzed to understand the number of alleles (Na), effective allele (NE), heterozygosity (He), Shannon Index (I), polymorphic percentage (P%), Genetic diversity coefficient (Gst), Gene flow (Nm), and the genetic distance among populations.

The populations of Pasang Batu in all locations had a small population size with a total number of mature individuals of 60. The largest population was found in Sawarna with 32 individuals, followed by Mt. Gombong (8), Yanlappa Natural Reserve (8), and West Nusakambangan Natural Reserve (7). Population structures in West Nusakambangan and Yanlappa Natural Reserves did not form an inverse-J pattern which indicates there might be regeneration problems. DNA analysis showed that Pasang Batu has a low genetic diversity, in which most of the genetic diversity is within populations. The results of population classification based on genetic distance showed that the population of West Nusakambangan Natural Reserve formed its population as the population on Nusakambangan Island. Meanwhile, the other three populations formed a population group of Java Island. The results of this study could be used as the basis for developing a conservation plan for Pasang Batu.

Keywords: Endemic, Threatened Species, Genetic Diversity, Conservation

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STRUKTUR POPULASI DAN KERAGAMAN GENETIK PASANG BATU (*Lithocarpus kostermansii* SOEPADMO) SEBAGAI JENIS ENDEMIK JAWA

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INTISARI

Keragaman tumbuhan Indonesia yang merupakan salah satu titik panas (*hotspot*) prioritas konservasi menghadapi ancaman berupa faktor biologis intrinsik dan hilangnya habitat. Diperlukan upaya konservasi keragaman tumbuhan khususnya yang berstatus endemik dan terancam kepunahan. Pasang Batu (*Lithocarpus kostermansii* Soepadmo) merupakan salah satu tumbuhan endemik Jawa dengan status konservasi Genting (*Endangered*) sehingga perlu dilakukan usaha konservasi. Informasi mengenai status populasi dan keragaman genetik Pasang Batu diperlukan agar usaha konservasi dapat berjalan lebih efisien. Penelitian ini dilakukan dengan tujuan untuk mengetahui struktur populasi dan keragaman genetik di dalam dan antar populasi dari Pasang Batu.

Kajian dilakukan di empat lokasi, yaitu Cagar Alam (CA) Nusakambangan Barat, CA Yanlappa, Gunung Gombong (Kesatuan Pemangkuan Hutan (KPH) Sukabumi) dan Sawarna (KPH Banten). Survey populasi menggunakan metode survey terfokus dengan seluruh individu yang ditemukan didata serta diukur diameter dan dicatat koordinatnya. Parameter lingkungan yaitu kelerengan, arah lereng, dan ketinggian tempat dari lokasi Pasang Batu ditemukan diukur. Histogram struktur populasi dibuat berdasarkan tingkatan hidup pohon, yaitu semai, sapihan tiang dan pohon. Tabel kehidupan dan kurva kesintasan dibuat berdasarkan klasifikasi kohort kelas I – X. Jaringan hidup tumbuhan dewasa diekstraksi untuk analisis DNA menggunakan PCR-ISSR. Produk PCR-ISSR divisualisasi dan dibuat skoring untuk mengetahui ada atau tidaknya pita DNA. Hasil skoring dianalisis menggunakan POPGENE untuk mengetahui jumlah alel (Na), alel efektif (Ne), heterozigositas (He), Indeks Shannon (I), persen polimorfik (P%), koefisien perbedaan genetik (Gst), Aliran Gen (Nm), dan jarak genetik antar populasi.

Populasi pasang batu di seluruh lokasi memiliki ukuran yang kecil dengan jumlah total individu dewasa 60 individu. Jumlah individu dewasa yang paling besar ditemukan di Sawarna (37 individu) diikuti Gunung Gombong serta CA Yanlappa (masing-masing 8 individu) dan terakhir CA Nusakambangan Barat (7 individu). Strukur populasi CA Nusakambangan Barat dan Yanlappa tidak menunjukan pola J-terbalik yang mengisyaratkan adanya permasalahan regenerasi. Secara umum keragaman genetik Pasang Batu adalah rendah dengan sebagian besar keragaman genetik ada di dalam populasi. Hasil pengelompokan populasi berdasarkan jarak genetik menunjukan populasi CA Nusakambangan Barat membentuk kelompok sendiri sebagai populasi Pulau Nusakambangan sedangkan tiga populasi lainnya membentuk kelompok populasi di Pulau Jawa. Hasil kajian ini dapat digunakan untuk menyusun strategi dan rencana aksi konservasi dari Pasang Batu.

Kata Kunci: Endemik, Terancam punah, Keragaman genetik, Konservasi

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