

PENGARUH SUPLAI BENIH, TEMPAT TUMBUH BENIH, DAN LINGKUNGAN TERHADAP POTENSI PERMUDAAN BEBERAPA SUMBER BENIH CENDANA DI GUNUNG SEWU

INTISARI

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Beberapa raslahan di Gunung sewu berpotensi untuk menjadi sumber benih karena keberadaan alel langka, tingginya keragaman genetik, kemampuan berkawin silang, dan kelimpahan biji. Namun meskipun memiliki sifat yang superior, masih terdapat masalah krusial terkait regenerasinya yang terbatas karena sedikitnya suplai benih, buruknya tempat tumbuh, dan kendala lingkungan. Penelitian ini bertujuan untuk mengetahui pengaruh suplai benih, tempat tumbuh benih, dan parameter lingkungan terhadap potensi permudaan beberapa sumber benih cendana terpilih di Gunung Sewu; selama periode pembungaan November 2022 sampai Maret 2023.

Suplai benih direpresentasikan oleh kelimpahan bunga, kelimpahan biji, dan aspek genetik. Tempat tumbuh direpresentasikan oleh suhu tanah, kedalaman tanah, ketebalan serasah, dan tutupan tumbuhan bawah. Parameter lingkungan yang diukur adalah cahaya matahari, suhu lingkungan, dan kelembapan udara. Potensi permudaan dinilai dengan kelimpahan biji dan permudaan alam, serta *reproductive success (RS)* pada variabel suplai benih. Simpanan benih dalam tanah diidentifikasi dengan menggunakan petak ukur ukuran 10m x10m. Permudaan alam diinventarisasi secara menyeluruh di setiap raslahan, dan data tempat tumbuh serta lingkungan diukur menggunakan alat ukur. Analisis bertahap dalam model regresi dua arah diterapkan untuk menentukan pengaruh suplai benih, tempat tumbuh dan parameter lingkungan terhadap kelimpahan benih dan semai yang bertahan hidup. Analisis bertahap lainnya juga dilakukan untuk menentukan pengaruh terhadap keberhasilan reproduksi cendana.

Hasil penelitian menunjukkan komponen suplai benih heterozigositas induk signifikan terhadap jumlah biji; kelimpahan bunga dan biji signifikan terhadap potensi permudaan. Komponen tempat tumbuh benih menunjukkan hasil bahwa suhu tanah tidak signifikan terhadap potensi permudaan, sedangkan kedalaman solum, ketebalan serasah, dan tutupan tumbuhan bawah berpengaruh signifikan. Solum yang dangkal membatasi pertumbuhan semai karena keterbatasan ruang perakaran. serasah menjaga kelembapan dan suhu tanah, serta tutupan tumbuhan bawah berpotensi menunjang perakaran semai karena cendana bersifat hemiparasit. Komponen lingkungan berupa suhu signifikan terhadap jumlah semai karena suhu yang lebih tinggi mendukung proses perkecambahan benih, kelembapan signifikan terhadap simpanan biji di tanah dan permudaan karena lingkungan yang lebih lembap dan lebih sejuk mendukung kelangsungan hidup benih dan semai, serta cahaya matahari signifikan terhadap semua potensi permudaan karena intensitas cahaya yang cukup meningkatkan proses fotosintesis dan pertumbuhan semai, meskipun naungan tetap penting untuk melindungi semai dari paparan cahaya berlebih. Penelitian ini menyimpulkan bahwa suplai benih tidak dapat menjadi penentu keberhasilan regenerasi, kecuali jika terdapat tempat tumbuh yang cukup baik dan lingkungan yang mendukung.

Kata Kunci: Cendana, permudaan alam, *soil seedbank*, suplai benih, tempat tumbuh benih (*seedbed*), faktor lingkungan

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THE EFFECTS OF SEED SUPPLY, SEEDBED AND ENVIRONMENTAL FACTORS ON THE REGENERATION POTENTIAL OF SEVERAL SANDALWOOD SEED SOURCES IN GUNUNG SEWU

ABSTRACT

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Several landraces are projected to be the seed sources because of importance for several reasons including the presence of rare alleles, the high genetic diversity, the cross-mating ability and the abundant seed sets. However, despite these superior traits, there are still crucial problems related to their poor regeneration due to limited seed supplies, lack of seedbeds, and environmental constraints. This study aimed to determine the effects of seed supplies, seedbeds and environmental parameters on the reproductive ability of several selected sandalwood seed sources in Gunung Sewu; during November 2022 to March 2023 flowering period.

Seed supplies were represented by the number of flowering trees, the number of flower per trees, and the genetic aspect. Seedbeds were represented by soil temperature, soil depth, litter thickness, and understory cover. Environmental parameters measured were solar radiation, ambient temperature and humidity. Reproductive potential were assessed by measuring the abundance of seed sets, natural regeneration, and reproductive success (RS) on seed supply variabel. Seed reserves in the soil were identified using 10m x 10m plots, natural regeneration was thoroughly inventoried in each plot, and data on growing place and environment were measured using measuring instruments. The stepwise analysis in a two-way regression model was then applied to determine the effect of seedbeds, seed supplies and environmental parameters on the total seed sets and survived seedlings. Another stepwise analysis was also conducted to determine the effects of seed supplies and environmental parameters on the sandalwood reproductive success.

The results showed that the component of seed supply; the parent heterozygosity was significant to the number of seeds; the abundance of flowers and seeds were significant to reproductive potential. The seedbed component indicated that soil temperature was not significant for regeneration potential, whereas soil depth, litter thickness, and understory coverage had significant effects. The shallow solum limits seedling growth due to the restricted root space. Litter maintains soil moisture and temperature, while understory cover potentially supports seedling roots because sandalwood is a hemiparasite. The environmental component, including temperature, was significant for seedling quantity as higher temperatures promote the seed germination process. Humidity was significant for soil seed bank storage and regeneration because a more humid and cooler environment supports seed and seedling survival. Solar radiation was significant for all regeneration potential because sufficient light intensity increases photosynthesis and seedling growth, although shade remains important to protect seedlings from excessive light exposure. These results implied that the seed supplies could not be determinants for the successful regeneration, unless there are sufficient seedbeds and supporting environmental features.

Keywords: natural regeneration, sandalwood, soil seed bank, seed supplies, seedbed, environmental factors

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