INTISARI

Pengembangan tanaman nyamplung (*Calophyllum inophyllum*) untuk mendukung NDC (*Nationally Determined Contribution*) Indonesia dalam adapatasi dan mitigasi perubahan iklim akan bermanfaat dalam penurunan emisi sekaligus sekuestrasi emisi karbondioksida di atmosfer. Nyamplung merupakan salah satu jenis tanaman multifungsi yang akhir-akhir ini banyak direkomendasikan sebagai sumber biodisel alternatif dan memiliki kemampuan penyerapan CO_2 yang tinggi. Selain itu, pengembangan jenis ini tidak akan berkompetisi dengan kepentingan pangan, pemanenan hasilnya tanpa menebang pohon, memiliki persebaran alam yang luas, berbuah sepanjang tahun dengan produktivitas yang tinggi, toleran pada berbagai jenis tapak dan pada lahan terdegradasi, serta mudah dibudidayakan. Penelitian ini bertujuan untuk mengetahu simpanan karbon pada biomassa tanaman dan simpanan karbon organik tanah pada provenan nyamplung dari 8 pulau di Indonesia di plot Uji Provenan Nyamplung di Gunung Kidul. Pengambilan sampel tanaman dan tanah dilakukan pada 32 titik dengan 4 sampel pada tiap provenan yang terdiri dari 1 individu pada pohon berdiameter kecil, 2 individu pada pohon berdiameter sedang, dan 1 individu padap pohon berdiameter besar. Analisi varian dilakukan untuk mengetahui variasi simpanan karbon pada biomassa tanaman dan bagian-bagiannya (batang, cabang, ranting, daun, tunggak, akar, dan seresah) serta simpanan karbon organik tanah antar provenan nyamplung. Persamaan alometrik terbaik dibuat untuk estimasi simpanan karbon biomassa tanaman berdasarkan nilai koefisien determinasi (R^2) dan RMSE (*Root Mean Square Error*). Analisis RDA (*Redundancy Analysis*) dilakukan untuk mengetahui pengaruh sifat fisika kimia tanah dan kandungan serat seresah terhadap simpanan karbon total pada biomassa tanaman dan simpanan karbon organik tanah yang dilanjutkan dengan analisis parsial (*Variation Partitioning Anlysis*). Hasil analisis menunjukan bahwa variasi simpanan karbon pada biomassa tanaman total (tBC) serta bagian-bagian kompartemennya dan simpanan karbon organik tanah total (tSOC) tidak berbeda nyata antar provenan nyamplung yang diuji. Polynomial (kuadratik) menunjukan model alometrik terbaik untuk estimasi simpanan karbon biomassa tanaman total dengan volume batang dan diameter setinggi dada (DBH) sebagai variabel prediktor. Sebagian besar variasi simpanan karbon (C) pada biomassa tanaman dan simpanan C organik tanah dipengaruhi oleh sifat kimia tanah (76%). Rasio C:N, dan P total berpengaruh kuat secara positif terhadap simpanan C organik tanah total (tSOC) sedangkan P tersedia, C organik terlarut, NH_4 dan K total berpengaruh positif terhadap C biomassa tanaman total (tBC). Kedalaman/ketebalan lapisan tanah berpengaruh kuat secara positif terhadap tSOC sedangkan kandungan pasir, kejenuhan basa, dan kandungan hemiselulosa pada seresah berbanding terbalik dengan tSOC demikian pula indeks stabilitas agregat berbanding terbalik dengan tBC.

Kata kunci: *Calophyllum inophyllum*; simpanan karbon; provenan; kandungan serat seresah; sifat fisika kimia tanah

ABSTRACT

Nyamplung (Calophyllum inophyllum) plantation to support Indonesia's NDC (Nationally Determined Contribution) in climate change adaptation and mitigation will be beneficial in reducing emissions as well as carbondioxide sequestrasion in the atmosfer. Nyamplung is a mutipurpose tree species which has recently been proposed as an effective source of biodiesel and was reported to have huge CO_2 sequestrasion, besides that it has a wide natural distribution, bears fruit throughout years with high productivity, not compete with food interests, harvests the products (seeds) without eliminating trees, able to grow on various types of site as well as on degraded land, and easy to cultivate. The purpose of this study was to determine carbon storage in plant biomass and soil organic carbon on nyamplung provenances from 8 islands in Indonesia in Nyamplung Provenance Trial plot in Gunungkidul. Plant and soil samples were taken at 32 points with 4 samples in each provenance consisting of 1 individual on a small diameter tree, 2 individuals on a medium diameter tree, and 1 individual on a large diameter tree. Analysis of variance was carried out to determine variations among provenances on carbon storage in plant biomass and its components (stems, branches, twigs, leaves, stumps, roots, and litter) as well as in soil organic carbon. The best allometric equation was selected to estimate the total plant biomass carbon based on the value of coefficient determination (R^2) and RMSE (Root Mean Square Error). Redundancy Analysis (RDA) was carried out to determine the effect of the soil physico-chemical properties and litter fiber content on total biomass carbon and soil organic carbon followed by a partial analysis (Variation Partitioning Analysis). The results of this study showed that variations on carbon storage in plant biomass and its components as well as soil organic carbon s were not significantly different among the provenances. Polynomial was the best allometric model for estimating carbon storage on plant biomass with log volume and diameter at breast height (DBH) as a predictor variable. Most of the variation in total plant biomass carbon and soil organic carbon was influenced by soil chemical properties (76%). The C:N rasio, and total P had a strong positive effect on total soil organic carbon (tSOC) compared to other soil chemical properties, while available P, dissolved organic carbon, NH_4 and total K positively correlated with total plant biomass carbon (tBC). Soil depth has a strong positive correlation with tSOC while the content of sand, base saturation and hemicellulose content in litter was inversely correlated to tSOC as well as aggregate stabilization index negatively correlated to tBC.

Keywords: *Calophyllum inophyllum; carbon stock; provenances; litter fiber content; soil physicochemical properties*