

FISIOGENETIK, MORFOLOGI DAN ANATOMI TANAMAN TEBAKAU (*Nicotiana tabacum*) TOLERAN CEKAMAN GENANGAN

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ABSTRAK

Tembakau adalah tanaman yang sensitif terhadap musim/cuaca. penelitian ini bertujuan: (1) mempelajari respon fisiologi dan morfologi serta anatomi tanaman tembakau terhadap cekaman genangan secara periodik; (2) mempelajari dinamika ekspresi gen tanaman tembakau terhadap cekaman genangan secara periodik dan (3) mendapatkan varietas yang toleran terhadap cekaman genangan secara periodik. Penelitian menggunakan Rancangan Acak Lengkap (RAL) pola faktorial. Faktor ke satu adalah varietas tanaman tembakau (Jepun Palakean, Srumpung, Somporis, Marakot dan Manilo) dan faktor ke dua cekaman genangan secara periodik (cekaman *waterlogging* selama 7 hari dilanjutkan *cekaman flooding* selama 7 hari) yang masing-masing memiliki 5 kali ulangan. Data diuji dengan Analisis Varian (ANOVA). Sedangkan uji lanjutan menggunakan uji Tukey. Parameter yang diukur penanda morfologi, anatomi, fisiologi dan dinamika ekspresi gen. Hasil morfologi tanaman menunjukkan penurunan pertumbuhan yang meliputi tinggi tanaman ($\pm 37,04\% - 64\%$), jumlah daun ($\pm 28,57\% - 44,44\%$), panjang akar ($\pm 45\% - 57,14\%$), berat kering total ($\pm 58,71\% - 83,49\%$), berat kering akar ($\pm 75\% - 80\%$) dan berat kering tajuk ($\pm 57,44\% - 76,74\%$). Namun terjadi peningkatan diameter batang ($\pm 65,64\% - 114,75\%$), luas daun ($\pm 8,18 - 178,02\%$), rasio tajuk/akar (2,9) dan peningkatan jumlah akar adventif (11-16 buah/individu). Tanaman tembakau melakukan respon adaptasi anatomi akar melalui perubahan jaringan korteks, diameter stele, diameter xilem serta pembentukan aerenkim. Varietas Jepun Palakean, Marakot dan Manilo meningkatkan jaringan kortek, diameter stele dan diameter xilem. Sebaliknya varietas Srumpung dan Somporis menurunkan jaringan korteks, diameter stele dan diameter xilem. Respon anatomi daun tanaman tembakau menunjukkan adanya peningkatan jumlah stomata yang menutup dan trikomata. Sedangkan jumlah stomata yang membuka dan panjang porus stomata menunjukkan penurunan. Respon fisiologi menunjukkan adanya peningkatan laju fotosintesis ($\pm 17,95\%$), kadar klorofil ($\pm 146,15\%$) dan kadar etilen ($\pm 197,14\%$) pada cekaman genangan secara periodik. Karakter genetik ditandai adanya *up-regulasi* ekspresi relatif gen *NtADH1*, *NtABA2* dan *NtACSI* pada kelima varietas tanaman tembakau yang mendapat cekaman genangan secara periodik.

Kata Kunci: *Fisiogenetik, Morfologi, Anatomi, Nicotiana tabacum, Toleran, Genangan, Cekaman genangan secara periodik*

Physiogenetics, Morphology And Anatomy Of Tobacco Plant

(*Nicotiana tabacum*) Waterlogging Stress Of Tolerance

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ABSTRAC

Tobacco is a plant that is sensitive to the season / weather. The aim of this study: (1) study the physiology, morphology and anatomy of tobacco plants during periodic waterlogging condition; (2) study the dynamics of gene expression in tobacco (*Nicotiana tabacum*) during periodic waterlogging condition and (3) get a tolerant variety of waterlogging stress periodically. Research using completely randomized design (CRD) factorial design. Factor one is the tobacco plant varieties (Jepon Palakean, Srumpung, Somporis, Morakot and Manilo) and the second factor waterlogging stress periodically (stress waterlogging for 7 days followed by flooding stress for 7 days), each of which has 5 replications. Data were tested by analysis of variants (ANOVA). While further tests using the Tukey test. Parameters measured markers of morphology, anatomy, physiology and dynamics of gene expression. The results showed a decrease in the growth of plant height ($\pm 37.04\%$ - 64%), number of leaves ($\pm 28.57\%$ - 44.44%), root length ($\pm 45\%$ - 57.14%), total dry weight ($\pm 58.71\%$ - 83.49%), root dry weight ($\pm 75\%$ - 80%) and shoot dry weight ($\pm 57.44\%$ - 76.74%). But an increase in trunk diameter ($\pm 65.64\%$ - 114.75%), leaf area (± 8.18 to 178.02%), the ratio of the crown / root (2.9) and an increase in the number of adventitious roots (11-16 fruit / individual). Root anatomical adaptation response through changes in the cortex, stele diameter, the diameter of the xylem and the formation of aerenchyma. Varieties Jepon Palakean, Morakot and Manilo increase cortical tissue, stele diameter and the diameter of the xylem. Instead varieties Somporis, Srumpung and lowering the cortex, stele diameter and the diameter of the xylem. Response anatomy leaves of tobacco plants showed an increase in the number of stomata closing and trikوماتa. While the number of stomata that opened and the length of the porous stomata showed a decrease. The physiological response showed an increase in photosynthetic rate ($\pm 17.95\%$), chlorophyll content ($\pm 146.15\%$) and ethylene content ($\pm 197.14\%$) in during periodic waterlogging condition. Genetic characters showed up-regulation of gene expression relative *NtADHI*, *NtABA2* and *NtACSI* the five varieties of tobacco plants during periodic waterlogging condition.

Key words: Physiogenetic, Morphology, Anatomy, Nicotiana tabacum, Tolerant, During periodic waterlogging condition