IDENTIFIKASI MIKROBIA PENAMBAT NITROGEN PADA RIZOSFER TANAMAN TEMBAKAU (*Nicotiana tabacum* L.) TERPAPAR CEKAMAN KEKERINGAN

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INTISARI

Tembakau merupakan salah satu komoditas penting di Indonesia yang memberikan kontribusi signifikan terhadap perekonomian nasional. Cekaman kekeringan pada tanaman tembakau diketahui dapat menurunkan kualitas dan hasil panen, serta mengubah komposisi mikrobiota tanah di sekitarnya. Penelitian ini dilakukan untuk mengidentifikasi pengaruh cekaman kekeringan dan varietas tembakau terhadap kemelimpahan dan keragaman mikrobia penambat nitrogen pada rizosfer tanaman tembakau. Penelitian dilaksanakan di Kebun Penelitian Sawitsari pada bulan Maret hingga Oktober 2024 dengan perlakuan cekaman kekeringan 0% (kontrol), 25%, dan 50%. Metode penelitian meliputi pengambilan sampel bakteri rizosfer dari tiga kultivar tembakau (Bligon, Kemloko, dan Manilo), isolasi bakteri rizosfer menggunakan medium NA, PDA, dan Burk, dan skrining mikrobia dengan aktivitas penambat nitrogen. Cekaman kekeringan dan varietas tembakau terbukti berpengaruh signifikan terhadap kemelimpahan dan keragaman mikrobia, dengan kemelimpahan dan keragaman bakteri tertinggi pada cekaman 25%, khususnya pada rizosfer varietas Kemloko, menunjukkan penurunan kemelimpahan dan keragaman pada cekaman 0% dan 50%. Pada fungi, kemelimpahan tertinggi diperoleh pada cekaman kekeringan 50%, menunjukkan bahwa seiring meningkatnya intensitas kekeringan, kemelimpahan fungi meningkat sementara keragamannya menurun, dengan kemelimpahan dan keragaman tertinggi pada varietas Bligon. Indikasi bakteri penambat nitrogen tertinggi ditemukan pada cekaman 25% varietas Bligon. Di antara bakteri, fungi, dan bakteri penambat nitrogen, kemelimpahan tertinggi diperoleh dari bakteri pada cekaman kekeringan 25% varietas Manilo dengan jumlah koloni sebesar $(4.09 \pm 0.22) \times 10^8$ CFU/mL. Identitas dari bakteri terindikasi penambat nitrogen merujuk pada genus *Microbacterium*, dan *Bacillus*, dimana keduanya mampu menambat nitrogen.

KATA KUNCI: Kekeringan, mikrobiota, rizosfer, tanah, tembakau

IDENTIFICATION OF NITROGEN-FIXING MICROBIOTA IN RHIZOSPHERE OF TOBACCO PLANT (*Nicotiana tabacum* L.) EXPOSED TO DROUGHT STRESS

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ABSTRACT

Soil microbes play an essential role in maintaining soil health and productivity in the global agricultural sector. Several factors can influence the composition of soil microbiota, one of which is drought stress. Tobacco (*Nicotiana tabacum* L.) is an important agricultural commodity in Indonesia that contributes significantly to the national economy. Drought stress in tobacco plants is known to reduce yield and quality while also altering the composition of soil microbiota in the rhizosphere. This study aimed to identify the effects of drought stress and tobacco varieties on the abundance and diversity of rhizosphere microbes, with an emphasis on microbes exhibiting nitrogen-fixing capability. The experiment was conducted at the Sawitsari Experimental Garden from March to October 2024, using drought stress treatments of 0% (control), 25%, and 50%. Rhizosphere soil samples were collected from three tobacco cultivars (Bligon, Kemloko, and Manilo) and cultured on *Nutrient Agar* (NA), *Potato Dextrose Agar* (PDA), and *Burk Agar* to isolate bacteria, fungi, and nitrogen-fixing bacteria, respectively. Enumeration was performed by colony counting to determine microbial abundance and diversity, followed by screening for nitrogen fixation activity. Results showed that drought stress and tobacco variety significantly affected microbial abundance and diversity. The highest bacterial abundance and diversity were observed under 25% drought stress, particularly in the rhizosphere of the Kemloko variety. For fungi, the highest colony number was found under 50% drought stress, indicating that increasing drought intensity elevated fungal abundance but reduced diversity, with dominance observed in the Bligon variety. Meanwhile, the strongest indication of nitrogen-fixing activity was found in the Bligon variety, with the highest abundance under 25% drought stress and the greatest diversity under 50% drought stress. Among all microbial groups, the highest abundance was recorded for bacteria under 25% drought stress in the Manilo variety, with a total of $(4.09 \pm 0.22) \times 10^8$ CFU/mL. Identification results show that indication of nitrogen fixation, points towards the genus *Microbacterium,* and *Bacillus*, which are capable of nitrogen fixation.

KEYWORDS: Drought, microbiome, rhizosphere, soil, tobacco