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Metasilicate Grown Under Drought Stress
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GROWTH AND PHYSIOLOGICAL RESPONSES OF TOBACCO (*Nicotiana tabacum* L. '*Gombleng*') TREATED WITH SODIUM METASILICATE GROWN UNDER DROUGHT STRESS

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ABSTRACT

The cultivation of tobacco (*Nicotiana tabacum* L.), faces significant challenges due to global climate change, particularly in terms of water scarcity and drought stress. The *Nicotiana tabacum* L. '*Gombleng*' is chosen by its status as a high value regional landrace in the Boyolali tobacco plantation. Treatments consisted of a 3×3 combination of three field capacity levels (50%, 75%, and 100%) and three sodium metasilicate dosages (0, 200, and 400 mg) per plant, arranged in a Randomized Complete Block Design with 3 replications. Data collection involves growth parameters, biomass, membrane stability index (MSI), relative water content (RWC), chlorophyll, and carotenoid content. Data were analyzed using Analysis of Variance followed by Duncan Multiple Range Test at 5% significance level. Results indicate that drought stress causes a significant decline of relative water content, while photosynthetic pigments, membrane stability, and most morphological parameters remain unaffected and significantly shift biomass allocation toward greater root investment as drought intensifies. Sodium metasilicate (Na_2SiO_3) application efficacy are dependent on drought severity, it significantly enhanced chlorophyll a, chlorophyll b, total chlorophyll, carotenoid content, leaf number, and dry root weight, with 400 mg producing the greatest improvements. The significant field capacity and sodium metasilicate interaction confirmed that Na_2SiO_3 works best at higher dosages and under well watered conditions.

Keywords: Drought stress, *Nicotiana Tabacum*, Sodium Metasilicate