

INTISARI

Saat ini teknik pemuliaan tanaman telah berkembang dengan memanfaatkan bioteknologi. Di Indonesia produk rekayasa genetik (PRG) overekspresi gen SPS di tebu telah dirakit dan berpotensi menjadi varietas unggulan karena dapat meningkatkan rendemen dan biomassa tanaman. Kementerian pertanian Republik Indonesia telah mengatur pengujian terhadap serangan hama dan penyakit utama tanaman. Pada tanaman tebu respons yang perlu diketahui adalah terhadap serangan hama penggerek batang. Oleh karenanya penelitian mengenai respon tanaman tebu terhadap serangan hama penggerek batang perlu dilakukan. Penelitian ini dilaksanakan pada Oktober 2023 – Mei 2024 bertempat di Green House dan Laboratorium Biologi Molekuler UPT. Laboratorium Terpadu dan Sentra Inovasi Teknologi CDAST (*Center for Development of Advanced Science and Technology*) Universitas Jember. Penelitian ini menggunakan Rancangan Acak Lengkap (RAL) faktor tunggal yaitu varietas dengan tiga ulangan. Varietas yang digunakan pada penelitian kali ini adalah SP1, SP3, WT, dan HW. Pengamatan dilakukan untuk mengamati respon morfologi dengan adanya gejala *dead heart* dan fisiologi pada setiap tanaman yang terserang ulat penggerek batang. Hasil penelitian meunjukkan bahwa tanaman secara morfologis menurut klasifikasi ketahanan tanaman tebu varietas SPS3, HW, dan WT memiliki tingkat resistensi yang sama yaitu *Suceptible* (S) namun pada varietas SPS1 memiliki tingkat resistensi *Moderate Resistant* (MR) sedangkan secara fisiologis semua varietas tanaman tebu yang diuji memiliki pola ekspresi gen (katalase, ascorbit perosidase, SPS, dan rubisco) yang sama ketika terjadi cekaman biotik atau serangan hama penggerek batang. Perbedaan ini dapat terjadi karena adanya perbedaan lokasi luka gerakan di bagian titik tumbuh dan pucuk yang menyebabkan *dead heart*.

Kata kunci: Gen SPS, Larva penggerek batang, Ekspresi gen, Dead heart

ABSTRACT

*Sugarcane (*Saccharum officinarum* L.) is one of the important crop as the main source of sugar in Indonesia. Government has an attention to increase sugarcane productivity for supporting self-sufficiency level by 2028. Currently, overexpression sucrose-phosphate synthase (SPS) in sugarcane has been developed, which can potentially increased sugar yield in sugarcane crop. One of the requirements that has to be assessed in GM crop, including sugarcane is to evaluate and ensure the pest and disease resistance in GM sugarcane. According to the regulations of the Ministry of Agriculture, one of the pests of sugar cane is the stem borer and the gene expression of the pest attack will be seen. The sugarcane varieties used are WT (Bululawang), SP1, SP3, and HW. Fourty five days after planting (DAP), the sugarcane was inoculated with *Chilo sacchariphagus*. Gene expression analysis was conducted by extracting RNA from each plant variety at 0, 1, and 2 week after inoculation. The gene encoding catalase, ascorbate peroxidase (apx), sucrose phosphate synthase (SPS), and rubisco (RbcS). The expression of catalase and APX as antioxidant genes have been increased after 1 weeks after inoculated, while the expression of RbcS and SPS-1 are similar. During 2 week of observation, stem borer attack show any morphological response “dead heart”, leading to molecular analysis to understand the physiological response. The analysis results indicated there were morphologically, according to the classification of sugarcane resistance, the varieties SP3, HW, and WT had the same resistance level, categorized as Susceptible (S), while the SP1 variety had a Moderate Resistant (MR) level. Physiologically, all tested sugarcane varieties exhibited the same gene expression patterns (catalase, ascorbate peroxidase, SPS, and rubisco) under biotic stress or stem borer attacks. These differences could be attributed to the varying locations of the wounds caused by the borers at the growth points and tips, leading to dead heart symptoms and could be because of overexpression of SPS that change the fiber composition and plant walls.*

Key words: *SPS gene, Stem borer larvae, Gene expression, Dead heart*