ABSTRACT

The expression of plant defense genes encountering virulence-related genes in Indonesian isolates of *Fusarium oxysporum* f.sp *cubense* (*Foc*) has not been intensively studied. This research was conducted to recognize the relative expression of plant defense genes in responding the expression of *Secreted In Xylem* (SIX) effector genes using qPCR analysis. Fourteen *Foc* isolates were collected from several banana production regions in Indonesia. They were previously confirmed as *Foc* with molecular method using *FocEf3* primer sets. Disease severity index analysis was performed to categorize their virulence level based on indexs of leaf symptom and rhizome discoloration. The representative *Foc* isolates from different virulence level were artificially inoculated on a *Musa acuminata* (Cavendish and Barangan cultivars) and incubated for 48, 72 and 96 h. The expressed genes were quantitatively analyzed using qPCR technique. The results categorized those isolates into moderate (KD-2, Ciamis, Batu-2, KJG, LMP and Batu-3), virulent (Prembun, Sdt-1a, BDG-1a and GnK2) and high virulent (Pujon, BDG-2, KP-3 and Batu-4). The isolates of KJG and Batu-4 were selected for gene expression test, representing moderate and high virulent groups, respectively. The results of *in planta* assay found that the expression of plant defense genes (*chitinase* and *PR-protein1*) and virulence-related genes (*SIX1b* and *SIX1c*) was upregulated on the inoculated plants during incubation period. However, the expression of these two gene groups was increasingly upregulated in both of banana at early stage inoculation. We assumed that plant defense genes of banana might actively encounter the common virulence mechanisms of *Foc* at initial stage inoculation.

Keywords: gene expression, six, *Fusarium oxysporum* f.sp *cubense*, *pr-protein1*, *chitinase*

INTISARI

Studi tentang ekspresi ketahananan tanaman terhadap gen virulensi pada isolat *Fusarium oxysporum* f.sp *cubense* di Indonesia belum banyak dilakukan. Penelitian ini dilakukan untuk mengetahui ekspresi relatif pada gen ketahanan terhadap ekspresi gen efektor *Secreted In Xylem* (*SIX*) menggunakan analisis *quantitative*-PCR. Isolat *Foc* yang digunakan berjumlah 14 merupakan hasil koleksi dari beberapa daerah sentra produksi pisang di Indonesia. Isolat tersebut terkonfirmasi sebagai *Foc* dengan menggunakan primer *FocEf3*. Analisis indeks keparahan penyakit digolongkan menjadi beberapa kategori virulensi berdasarkan gejala luarnya dan diskolorisasi rhizom. Isolat *Foc* yang mewakili dari tingkat virulensi yang berbeda-beda dilakukan inokulasi secara artifisial pada pisang *Musa acuminata* kultivars Cavendish dan Barangan kemudian diinkubasi selama 48, 72 dan 96 jam. Ekspresi gen secara kuantitatif dengan menggunakan analisis teknik qPCR. Hasil kategorisasi virulensi dibagi menjadi 3 grup yaitu, virulensi sedang (KD--2, Ciamis, Batu-2, KJG, LMP dan Batu-3), virulen (Prembun, Sdt-1a, BDG-1a dan GnK2) dan sangat virulen (Pujon, BDG-2, KP-3 dan Batu-4). Isolat KJG dan Batu-4 dipilih untuk merepresentasikan grup sedang dan sangat virulen untuk uji ekspresi gen. Hasil inokulasi pada tanaman baik ekspresi gen ketahanan yang berupa (*chitinase* dan *PR-protein1*) dan gen virulensi (*SIX1b* dan *SIX1c*) meningkat ekspresinya. Peningkatan ekspresi gen pada 2 gen baik gen ketahanan maupun virulensi meningkat upregulated pada 2 jenis kultivar pisang pada saat awal inokulasi. Hal ini diasumsikan bahwasanya gen ketahanan pada pisang teraktifasi untuk melawan aktifitas mekanisme virulensi pada *Foc* saat fase awal inokulasi.

Kata kunci : ekspresi gen, *SIX, Fusarium oxysporum* f.sp *cubense*, *pr-protein1*, *chitinase*