

DETECTION OF STUNTED VIRUS AND ANALYSIS OF CROP LOSS ON RICE PLANT VARIETIES OF CIHERANG AND SITU BAGENDIT IN YOGYAKARTA

ABSTRACT

The Rice Stunted Virus is one of the divider factors on the reduction of rice production in Indonesia. The virus consists of Rice grassy stunt virus (RGSV) and Rice ragged stunt virus (RRSV) that are transmitted by brown planthopper (BPH) in a persistent propagative manner. This study aims to find out the existence of Rice Stunted Virus in Bantul, Yogyakarta through fast detection using RT-PCR and identification of protein profile on healthy and infected by virus as well as analyzing crop loss based on different severity in the field. The result showed that rice plant varieties of Cihorang and Situ Bagendit in Bantul were positively infected with two Rice Stunted Viruses (double infection) in the severity of mild, moderate, severe and parched. Homology analysis using BioEdit showed that the nucleotide sequence of RGSV Bantul isolate, Indonesia had the highest percentage of nucleotide base similarity with Klaten isolate, Indonesia (98.1%), while RRSV Bantul isolate, Indonesia had the highest percentage of nucleotide base similarity with Philippines isolate (99.5%). Analysis of protein profiles using SDS-PAGE showed pattern of protein profiles formed on the sample of infected rice by stunted virus and not visible on the sample of healthy rice. The proteins found were presumably from RGSV that was nonstructural p5 with molecular weight ~22 kDa and Nucleocapsid protein (NCP) with molecular weight around 34-35 kDa. Proteins were presumably from RRSV there were the viral spike protein with size ~39 and capsid protein (S8) with molecular weight ~43 kDa. Based on the result of varieties test concerning on the attack of stunted virus on rice plants showed that both Cihorang and Situ Bagendit varieties were not significantly different to the stunted virus attack. Analysis of yield loss on each variety showed that there were differences in plant height, tiller per hill, number of panicles, wet weight, dry weight, panicle length, panicle branch, grain per panicle, 100 grains weight and total weight on different severity. Linear regression analysis also showed the reduction in yield at each level of severity. The rice stunted virus attacked on Cihorang gave linear correlation $y = -0,2374X + 0,9231$; $R^2 = 0.9809$ in which the results of yield loss in mild severity around 31.1%, followed by moderate severity 54.2%, severe 85.4%, and parched 96.3%. Meanwhile, on the varieties of Situ Bagendit gave linear correlation $y = -0.2374X + 0.9231$; $R^2 = 0.9808$ in which the results of yield loss in mild severity around 36.2%, followed by moderate 68.6%, severe 90.9%, and parched 98.3%.

Keywords: Rice stunted virus, brown planthopper, *Rice ragged stunt virus*, *Rice grassy stunt virus*, protein profile, crop loss analysis

DETEKSI VIRUS Kerdil DAN ANALISIS KEHILANGAN HASIL PADA TANAMAN PADI VARIETAS CIHERANG DAN SITU BAGENDIT DI YOGYAKARTA

INTISARI

Virus kerdil padi merupakan salah satu faktor pembatas terjadinya penurunan produksi padi di Indonesia. Virus ini terdiri dari *Rice grassy stunt virus* (RGSV) dan *Rice ragged stunt virus* (RRSV) yang ditularkan oleh wereng batang coklat (WBC) secara persisten propagative. Penelitian ini bertujuan untuk mengetahui keberadaan virus kerdil pada padi di Bantul, Yogyakarta melalui deteksi cepat menggunakan RT-PCR dan identifikasi profil protein tanaman padi sehat dan bergejala serta menganalisis kehilangan hasil berdasarkan tingkat keparahan di lapangan. Hasil penelitian menunjukkan bahwa tanaman padi varietas Ciherang dan Situ Bagendit di Bantul positif terinfeksi dua virus kerdil (*double infection*) pada tingkat keparahan ringan, sedang, berat dan puso. Analisis homologi menggunakan BioEdit menunjukkan bahwa sekuen nukleotida RGSV isolat Bantul, Indonesia memiliki persentase kesamaan basa nukleotida tertinggi dengan isolat Klaten, Indonesia (98.1%), sedangkan RRSV isolat Bantul, Indonesia memiliki persentase kesamaan basa nukleotida tertinggi dengan isolat Filipina (99.5 %). Analisis profil protein menggunakan SDS-PAGE menunjukkan adanya pola pita protein yang terbentuk pada sampel padi terinfeksi virus kerdil dan tidak terlihat pada sampel padi sehat. Ditemukan pita protein yang diduga milik RGSV yaitu *nonstructural p5* dengan berat molekul ~22 kDa dan *Nucleocapsid protein* (NCP) dengan BM sekitar 34-35 kDa. Pita protein diduga milik RRSV yaitu *viral spike protein* berukuran ~39 dan *capsid protein* (S8) dengan BM ~43 kDa. Berdasarkan hasil uji varietas terhadap serangan virus kerdil padi menunjukkan bahwa baik varietas Ciherang dan Situ Bagendit tidak berbeda terhadap serangan virus kerdil. Analisis kehilangan hasil pada masing-masing varietas menunjukkan bahwa terdapat perbedaan tinggi tanaman, anakan per rumpun, jumlah malai, berat basah, berat kering, panjang malai, cabang malai, bulir per malai, berat 100 butir dan berat total pada tingkat keparahan yang berbeda. Analisis regresi linear juga menunjukkan terjadinya penurunan hasil panen pada setiap tingkat keparahan. Serangan virus kerdil padi varietas Ciherang memberikan hubungan linier $y = -0,2374X + 0,9231$; $R^2 = 0,9809$ dimana untuk kehilangan hasil pada tingkat keparahan ringan sekitar 31,1%, diikuti tingkat keparahan sedang 54,2%, berat 85,4%, dan puso 96,3%. Sedangkan pada varietas Situ Bagendit memberikan hubungan linier $y = -0,2374X + 0,9231$; $R^2 = 0,9808$ dimana untuk kehilangan hasil pada tingkat keparahan ringan sekitar 36,2% diikuti tingkat keparahan sedang 68,6%, berat 90,9%, dan puso 98,3%.

Kata Kunci: Virus kerdil padi, wereng batang coklat, *Rice ragged stunt virus*, *Rice grassy stunt virus*, profil protein, analisis kehilangan hasil