SHORT COMMUNICATION

Fusarium species in forest soil of Bird Valley

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ABSTRACT

Fusarium species were isolated from seven sites in Bird Valley, a forested area in Universiti Sains Malaysia, Pulau Pinang, Malaysia. A total of 59 Fusarium isolates were recovered in which two species were identified namely, F. solani and F. oxysporum. The most prevalent species was F. solani (84.7%) and F. oxysporum comprised 15.3%. The present study showed that only two species of Fusarium were identified in forest soil of Bird Valley.

Keywords: Fusarium, forest soil

INTRODUCTION

Fusarium species are widely distributed in a variety of soil types and are mostly associated with organic matter, plant debris and plant roots (Burgess, 1981). In cultivated soils, majority of Fusarium species occur in plant debris and plant roots, and can either be parasite or saprophyte (Smith, 1967; Burgess, 1981). Unlike cultivated soils, the occurrences of Fusarium species in uncultivated soils were not as diverse as in cultivated soils. The present study was conducted to determine the occurrences of Fusarium species in Bird Valley or ‘Lurah Burung’, a forested area in Universiti Sains Malaysia (USM), Minden, Pulau Pinang, Malaysia.

MATERIALS AND METHODS

Soil samples were collected from eight different sites representing different microhabitats within Bird Valley (also known as Durian Valley), a forested area located at the east side of USM main campus, Minden, Pulau Pinang (Table 1). Two samples were collected from each site.

Soil dilution plate was used to isolate Fusarium species from the soils. The soils were taken from a depth of 10 – 12 cm and stored in paper bags. After air-dried at room temperature (27 ± 1 °C) for 24 – 48 h, the soils were ground in a mortar. A 1 g of the soils were suspended in 100 mL of sterile distilled water and mixed thoroughly. One mL of the soil suspension was used to prepare a dilution series of 10⁻² and 10⁻³ and 1 mL of each dilution series was uniformly dispensed onto peptone chloro-nitro benzene (PCNB) media, with four replicates. The PCNB plates were incubated at room temperature (27 ± 1 °C) for 4 – 7 days or until visible sign of colony growth. The colonies formed on PCNB were transferred onto potato sucrose agar (PSA). The media used for identification and morphological descriptions of Fusarium species were according to the description by Nelson et al. (1983).

The soil samples were also analyzed for their pH and texture. Soil texture was determined using feel method (Brady and Weil, 1999). Soil pH was measured by weighing 30 g of soils and mixed in 50 mL of water. The mixture was shaken for 2 h and pH value was measured.

Table 1: The site and vegetation of soil samples collected in Bird Valley

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Closed canopy</td>
</tr>
<tr>
<td>B</td>
<td>Open canopy</td>
</tr>
<tr>
<td>C</td>
<td>Cariota mitis tree (Palmae family)</td>
</tr>
<tr>
<td>D</td>
<td>Area without any vegetation</td>
</tr>
<tr>
<td>E</td>
<td>Shrub</td>
</tr>
<tr>
<td>F</td>
<td>Grassy area (at the edge of Bird Valley)</td>
</tr>
<tr>
<td>G</td>
<td>Pterocarpus indicus tree</td>
</tr>
<tr>
<td>H</td>
<td>Near rotting trunks</td>
</tr>
</tbody>
</table>

RESULTS

A total of 59 Fusarium isolates were recovered from seven soil samples from different sites in Bird Valley. Fusarium isolates were not recovered from site D soil sample i.e. an area without any vegetation. Based on morphological description by Nelson et al. (1983), two species were identified namely, F. solani (84.7%) and F. oxysporum (15.3%). F. solani isolates were recovered from all seven sites, and F. oxysporum isolates from sites B, F, G and H. The Fusarium species successfully isolated, the soil texture and pH are shown in Table 2.

Fusarium solani and F. oxysporum were presence in soils with acidic condition with pH ranging from 3.56 – 4.26. The soil texture varied from sandy loam to sandy clay loam.

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DISCUSSION

Only two Fusarium species were isolated from Bird Valley, a forested area in USM main campus, Pulau Pinang. The present study was in accordance with a study by Smith (1967) who reported that Fusarium species may be difficult to become established in forest land; and a study by Lim (1974) in which field and forest soils yielded less fusaria compared to cultivated soils. Generally, uncultivated soils such as forest soil, the diversity and occurrences of Fusarium species was low compared to cultivated soils. In cultivated soils, Fusarium species were more prevalent and associated with plant debris (Burgess, 1981).

Fusarium solani was more prevalent in the forested area and was recovered from seven sites with different vegetation. The results from this study contrasted with the results from Lim and Chew (1970) in which they reported that Fusarium species were not recovered from three forest reserves in Singapore. Fusarium solani is one of the most common Fusarium species distributed in the soils and have been isolated from numerous soil samples in sub-tropical, semi-arid and grassland soils (Burgess and Summerell, 1992). Fusarium solani is also the most common species isolated from cultivated soils (Lim and Chew, 1972; Latiffah et al., 2007) and from sandy soils (Sanquis and Borba, 1997).

The occurrence of F. oxysporum was smaller and was recovered from fewer sites. Fusarium oxysporum is a well-known plant pathogen and is common in various types of soil. However, many isolates of F. oxysporum from soils are also considered to be non-pathogenic (Gordon and Okamoto, 1992). Low percentage occurrences of F. oxysporum could be attributed to the soil type and vegetation as F. oxysporum is commonly associated with plant debris and can survive in the soil as active hyphae in plant debris especially in cultivated soils (Burgess, 1981).

Microbial communities in soil are largely influence by the soil type. Most of the soil type in Bird Valley was sandy loam soil which has lower water holding capacity. Therefore, sandy soil types may not have enough water content to support Fusarium growth although the acidic condition is suitable for fungal growth.

In conclusion, only two Fusarium species, F. solani and F. oxysporum were recovered from several sites in Bird Valley, a forested area in USM main campus. The present study showed that unlike cultivated soils, Fusarium species are not diverse in forest soil in Bird Valley.

REFERENCES


