1st ASEA PhD Days

Virtual meeting

1st - 2nd December, 2021 | 14:00-17:00 GMT+7
Histological and molecular analysis of the incompatible interaction between *Meloidogyne graminicola* and *Oryza sativa*

NGUYEN Thi Hue - PhD student

Supervisors: Dr. Stephane Bellafiore - IRD- France
Assoc. Prof. Ha Viet Cuong- VNUA- Vietnam
Meloidogyne graminicola - a significant economic impact pathogen
**Meloidogyne graminicola** - a threat pathogen to rice

- **Juvenile stage 2 Mg**

- **Disease**
- **Pesticide**
- **Genetic resistance**
Rice resistance response act at several steps against *Mg*

The HR-dependent reaction is often observed in the incompatible interaction

Sato et al., 2019 *Front. Plant Sci*

Mantelin et al., 2016

Kyndt et al., 2014

Degeneration of feeding sites
Zhonghua11- *O. sativa japonica* is resistance rice to *Mg*

The post-infection resistant mechanism

Rf in the Zhonghua11 and F1 was greatly reduced suggesting the dominant R gene in Zh11

The HR-like reaction at early stage of infection

HR –like presence in the Zh11 var. A Hallmark of R gene

(Phan et al., 2017)
Genetic study: inheritance of resistant gene in Zh11

The two Resistant genes appear to involve in the Zh11 resistance to \( Mg \)

![Diagram showing interspecific cross and F2 results]

The F2 generation shows a ratio of 11 R: 5 S.
Genetic study: inheritance of resistant gene in Zh11

The two Resistant genes appears involve in the Zh11 resistance to Mg
Evidence of the ROS accumulation following *Mg* migration in resistant root

<table>
<thead>
<tr>
<th>IR64</th>
<th>Zh11</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image](110x275 to 296x426)</td>
<td>![Image](300x274 to 486x425)</td>
</tr>
<tr>
<td>![Image](110x113 to 296x264)</td>
<td>![Image](495x273 to 681x424)</td>
</tr>
<tr>
<td>![Image](303x114 to 489x265)</td>
<td>![Image](694x272 to 880x423)</td>
</tr>
</tbody>
</table>

Longitudinal sections of Zh11 and IR64 root after infection by *Mg* after DAB staining observed under UV light or white light
Cell death are observed along Mg migration in resistant variety

IR64

Zh11

Control -( Non-infected)  1dpi  2dpi  4dpi
The involvement of autophagy expression to the Zh11 resistance
The complex involvement of phytohormones to Zh11 resistance
The spectra resistance of *Mg*

The spectra resistance of *Mg*
Summary

• There are two dominant Resistant genes that unlinked and complementary involved in the Zh11 resistance to Mg.

• Defence response in Zh11 is characterized by an HR, with autophagy that maybe involved in the HR-mediated cell death.

• The resistance in Zh11 is associated with transcriptional reprograming of defence-related genes at early stages of infection, involving hormonal pathways.
Acknowledges

Dr. Stephane Bellafiore

Assoc. Prof. Ha Viet Cuong

Phan Thi Ngan - PhD student
Anne Sophie Masson - PhD student
Nguyen Trang Hieu - Dr. Jamel Abiri

Dr. Sophie Manteline - INRAE

Dr. Malyna Suong
ITC, Cambodia

Dr. Trinh Quang Phap
Dr. Duyen
Mr. Tien - Ph.D student

1st ASEA PhD Day | 1st - 2nd December 2021

LMI RICE 2
Thank you for your listening!