IPM CRSP Trip Reports

Country(s) Visited: USA

Dates of Travel: June 2007 to May 2008

Travelers Names and Affiliations:
Dr. Karthikeyan Gandhi  
Department of Plant Pathology  
Center for Plant Protection Studies  
Tamil Nadu Agricultural University  
Coimbatore 641 003  INDIA

Purpose of Trip: To receive advanced training in Plant Virology, with emphasis on diagnosis of viruses by biotechnological approaches

Sites Visited: Washington State University-Irrigated Agriculture Research and Extension Center, Prosser, WA 99350

Description of Activities/Observations:
I participated in an advanced training in Plant Virology under the direction of Dr. Naidu A. Rayapati, Department of Plant Pathology, Irrigated Agriculture Research and Extension Center, Washington State University, Prosser, WA 99350, USA, between June 2007 and May 2008. I learned molecular diagnostic techniques in Plant Virology using biotechnology/molecular biology techniques. For this purpose, I participated in different on-going projects related to virus diseases of wine grapes, vegetables, and ornamentals in Dr. Rayapati’s lab. Such an opportunity to participate in a wide range of projects helped to learn biological and molecular properties of different viruses and the diseases they cause in different plant species. The experience gained and knowledge acquired will be of great help for building a dynamic research program on virus diseases infecting a wide variety of vegetable and other horticultural crops grown in Tamil Nadu state. In addition, the interaction with different members in Dr. Rayapati’s lab and attending meetings helped to expand my knowledge valuable for teaching plant virology course at Tamil Nadu Agricultural University.

The significant achievements are:

- I have optimized molecular diagnostic assays (Reverse transcription-polymerase chain reaction or RT-PCR assay) for the detection of several viruses (Cucumber mosaic virus, Tomato spotted wilt virus, Impatiens necrotic spot virus, Tobacco streak virus, Tobacco etch virus, Lettuce mosaic virus, Wisteria vein mosaic virus, and Grapevine leafroll-associated viruses) infecting different vegetables, ornamentals and horticultural crops. Cucumber mosaic virus.
- I gained experience in the diagnosis of tospoviruses like Tomato spotted wilt virus and Impatiens necrotic spot virus. I have used ‘universal’ primers that can detect a broad range of tospoviruses in vegetables.
I gained experience in cloning and sequence analysis of viral genes using recombinant DNA techniques and bioinformatics tools.

I standardized a simplified sample extraction method and used in molecular diagnosis of a range of plant viruses. This method has several advantages over other extraction protocols and will be of great value for developing countries, especially for my research on viruses in vegetables in India.

The research experiences I gained in the epidemiology of grapevine leafroll disease will help in documenting viruses infecting wine and table grapes in India and promoting ‘healthy’ growth of wine grape industry in the country.

I made scientific presentations at WSU-Academic Showcase and Plant Science Retreat, and annual meeting of the Washington Association of Wine Grape Growers.

The following are a list of publications in peer-reviewed scientific journals and presentations at different scientific meetings. Some more manuscripts are in preparation.

Research publications


Research presentations


**Impact and Outcome of the program**

The IPM CRSP gave me opportunities to gain hands-on experience in various aspects of plant virology, including detection of different groups of plant viruses, cloning and sequencing of viral genomes, analysis of virus genome sequences using different bioinformatics tools and biological and epidemiological aspects of virus diseases. This experience will help me in establishing a strong program of research, outreach and education in Plant Virology at Tamil Nadu Agricultural University, Coimbatore, India. I am looking forward to opportunities of collaboration with IPM CRSP projects in India. My training program was also supported by the Washington State Department of Agriculture and Washington Wine Commission.

**List of Contacts Made:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title/Organization</th>
<th>Contact Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Naidu Rayapati</td>
<td>Assistant Professor</td>
<td><a href="mailto:naidu@wsu.edu">naidu@wsu.edu</a></td>
</tr>
<tr>
<td></td>
<td>Department of Plant Pathology,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Washington State University</td>
<td></td>
</tr>
<tr>
<td>Dr. M. K. N. Ochwo-</td>
<td>Department of Crop Science</td>
<td><a href="mailto:mknossemakula@agric.mak.ac.ug">mknossemakula@agric.mak.ac.ug</a></td>
</tr>
<tr>
<td>Ssemakula</td>
<td>Makerere University, Uganda</td>
<td></td>
</tr>
</tbody>
</table>
Fig. Dr. Karthikeyan showing tomato fruits with tospovirus symptoms to colleagues in the lab (top left), grading tomato fruits for virus testing (top right), squeezing tomato juice for virus testing (bottom left) and collecting samples in a vineyard bottom right (above) and collating results in the lab (bottom right below).
Fig. Dr. Karthikeyan displaying a research poster at one of the scientific meetings.

Fig. Dr. Karthikeyan Gandhi showing symptoms (left) and RT-PCR diagnosis (right) of tospoviruses in tomatoes to Dr. Mildred Ochwo-Ssemakula, Molecular Virologist (Horticulture), Department of Crop Science, Faculty of Agriculture, Makerere University, Uganda, during her visit in September 2007 to Dr. Rayapati’s lab.