Anusara Mihirani Herath Mudiyanselage, recipient of the 2012/13 New Zealand Plant Protection Society Research Scholarship, is a third year PhD student in the Ecology Department at Lincoln University. Her research project is entitled ‘Peronospora sparsa: biology and drivers of disease epidemics in boysenberry’, and is funded by the Ministry of Business, Innovation and Employment (postgraduate fellowship) with the support of the New Zealand Boysenberry Council Ltd.

*Peronospora sparsa* is the causal agent of downy mildew (dryberry disease) of boysenberry (*Rubus* spp.) and is considered the most economically important disease of boysenberry (*Rubus* spp.). It is a serious threat to boysenberry growers in New Zealand, and in 2001/02 in the Nelson region, downy mildew fruit infection reduced boysenberry yield by approximately 50% for crops grown under conventional management, with total losses valued at NZ$1.8 M. For organic growers, the situation was worse, with a total loss of fruit. More recently in Whakatane, downy mildew was estimated to reduce yields by up to 25% in 2009-2010.

The overall aim of Anusara’s thesis is to determine the factors affecting disease development in boysenberry to enable development of sustainable options for disease management in New Zealand. Since this is a biotrophic pathogen, the first objective was to develop an effective method for in vitro spore production and a long term storage method to enable on-going inoculum production for the remaining objectives. Anusara has successfully completed this objective and is routinely producing spore inoculum for other experiments. This work is published in the current volume of New Zealand Plant Protection, while Anusara presented a poster, ‘Evaluation of methods for sterilising boysenberry leaves for downy mildew infection studies’, at the 2012 NZPPS conference.

To visualize systemic infection by the pathogen within the plant tissues, Anusara has developed fluorescent staining techniques that have been used to track the pathogen in different tissue types. In addition to this method, a nested PCR method has been developed to enable detection of the pathogen from systemically infected plant material.

Results of initial experiments have shown that most boysenberry propagation material, including tissue culture-derived plants is systemically infected with the pathogen. Therefore, different heat and fungicide treatments are currently being tested for their ability to ‘cure’ planting material to be used for tissue culture. A method to enable the production of planting material free of the pathogen would be an extremely valuable outcome for this research, helping to limit the disease within the boysenberry gardens.

To-date, the results from excised and whole plants experiments have shown that dryberry production is caused by systemic infection or spore-initiated infection at either the flower or berry stage, and requires high relative humidity for symptom expression. Spore trapping in grower’s properties in Nelson and Motueka over two seasons showed that spore numbers were high, peaking in October and November in both years, with lower numbers of spores present in December. Ongoing research will investigate the use of fungicides and other chemicals to limit systemic disease development and/or spore infection.