Suhaizan Lob, recipient of the 2013/14 New Zealand Plant Protection Society Research Scholarship, is in her final year as a PhD student at Lincoln University. Her research project is entitled 'Identification of the causal agent and epidemiology of phoma blackleg disease of brassicas'.

Black leg (also called Phoma stem canker) is a major disease of brassica, caused by two related pathogens Leptosphaeria maculans and L. biglobosa. Although the disease is widespread in New Zealand, it was unclear which pathogens were responsible. Unlike other countries where oilseed rape is often the dominant brassica crop, New Zealand is unique in that forage, seed and vegetable brassica crops are important, and these are often grown in close proximity, potentially providing inoculum for adjacent and subsequently planted crops.

Suhaizan’s research firstly aims to determine which Leptosphaeria species cause black leg in New Zealand, and if both species are present whether there is any regional or host variations in their populations. Isolations have been made from diseased oilseed rape and forage brassica material that show typical leaf lesions, stem cankers and dry rot from around New Zealand. Identification of the isolates has been by colony morphology and PCR with species-specific primers, followed by sequencing various gene regions of representative isolates. This has shown that both species are present in New Zealand, although L. maculans was predominant.

In pathogenicity experiments Suhaizan has shown that all isolates cause similar disease severity in either swede or oilseed rape. Since L. maculans is heterothallic, she determined the ratio of the two mating types using PCR with primers specific for each mating type allele. The mating type ratio of NZ isolates was 4:1, compared to the 1:1 ratio observed overseas, which suggests that the asexual cycle is important for disease development in New Zealand. Since use of cultivars with Rlm resistance genes is the most effective method for controlling this disease, Suhaizan determined the avirulence alleles present in the New Zealand population. Results showed that AvrLm1, AvrLm6 and AvrLm4-7 avirulence alleles were present in the New Zealand population, with the frequencies varying between locations. Therefore New Zealand growers should use cultivars with resistance genes to overcome these avirulence alleles.

Suhaizan has also investigated the role of conidia, which are produced on leaf lesions, in causing stem canker/dry rot of tubers, since these lesions were reported to be caused by ascospores only. Stem inoculation of adult plant with conidial suspensions showed that they were able to cause stem lesions, while systemic growth of the pathogen from leaf lesions through petioles and into stems where they formed cankers was also demonstrated. The timing of ascospore release from diseased crop debris and the timing of disease development, from appearance of leaf lesions to stem cankers/tuber dry rot, is another aspect of Suhaizan’s research. Ascospores were detected from May to October, with a peak in August. These patterns of ascospore release will provide information on the optimum timing of fungicide application and optimum sowing dates. In addition, the effect of different stubble management practices on pseudothecia maturation and survival was determined in soil box bioassays. Most pseudothecia were mature in April and more than 50% were empty by June. This assay also showed that burial of stubble was effective at reducing the production of pseudothecia and therefore ascospores, the primary inoculum source.

This project is the first in-depth study on this pathogen in New Zealand, and will improve understanding of the disease epidemiology to enable sustainable control strategies to be developed.