Screening multiple pulse crops for resistance to root lesion nematodes in the field

Joshua Fanning[1]
Katherine Linsell[2], Isabel Munoz-Santa[3,4], Jon Baker[1], Alan McKay[2] and Grant Hollaway[1]

[1] Agriculture Victoria
[2] South Australian Research and Development Institute (SARDI)
[3] The University of Adelaide
[4] University of Valencia

The root lesion nematodes, *Pratylenchus thornei* and *P. neglectus*, cause grain yield losses internationally. Root lesion nematodes are controlled by planting resistant crops or varieties, which reduce nematode densities and therefore, the subsequent yield losses. In Australia, varieties of some pulse crops can vary in their resistance to specific species of root lesion nematodes. Therefore, it is important to screen and assign resistance classifications to new varieties, so growers can make informed decisions on variety selection to help manage root lesion nematodes. To compare the resistance to specific root lesion nematodes across pulses and cereals, a series of experiments were established with multiple crop species and varieties.

Three field experiments for each of *P. thornei* and *P. neglectus* were sown in Victoria. The *P. thornei* experiments had a minimum of four current varieties of field pea, lentil and faba bean, along with several breeding lines from each crop type. For the *P. neglectus* experiments at least four chickpea varieties were also included. Each experiment for both *P. thornei* and *P. neglectus* also included a fallow treatment and resistant and susceptible cereal varieties, as controls to assist with standardising the ranking of varieties for resistance to root lesion nematodes across crops. Pre-sowing and post-harvest nematode densities were quantified using qPCR (PREDICTA®B). The post-harvest nematode population densities were analysed using linear mixed models, incorporating spatial methods and residual maximum likelihood for variance parameter estimation. Nematode multiplication rates were derived from this analysis.

For *P. thornei* generalised crop effects were evident, even though there was variation within each crop type. Faba bean was the crop most susceptible to *P. thornei*, with four faba bean lines more susceptible than the susceptible wheat control, and all lines were more susceptible than the moderately resistant to moderately susceptible (MRMS) cereal control. Lentil and field pea varieties ranked more resistant than the MRMS cereal. The most resistant variety tested was the field pea var. PBA Percy, with several other field pea lines being more resistant than the fallow treatment.

For *P. neglectus*, all pulse crops were more resistant than the susceptible wheat varieties, and field pea was the most resistant crop. Lentil varieties were less resistant than the field pea varieties, but more resistant than the fallow treatment. Faba bean varieties tended to be more susceptible than the fallow treatment, and chickpea varieties were the most susceptible to *P. neglectus* of the pulses, with most varieties being slightly more susceptible than the moderately resistant (MR) wheat.

Excluding faba beans for *P. thornei*, pulses are an ideal option for managing high population densities of root lesion nematodes in south-eastern Australian paddocks. The methods used in this study with multiple crops in the same trial provide a viable option for testing the resistance to root lesion nematodes and ranking varieties across crop types.