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Measuring Resistance in Potato to *Phytophthora infestans* with Field, Laboratory and Greenhouse Assays

BUDDHI SHARMA¹, GREGORY A. FORBES², HK MANANDHAR¹, SM SHRESTHA³, RB THAPA³

¹Nepal Agricultural Research Council, National Potato Research Programme, Nepal

²International Potato Center, Peru

³Tribhuvan University, Institute of Agriculture and Animal Science, Nepal

Abstract

Host plant resistance against *Phytophthora infestans* was evaluated for twenty-five potato genotypes in 2010 and 2011 at Khumaltar, Lalitpur, Nepal. A locally isolated strain of *P. infestans* 'LPR-1' was used for inoculation in all the assays. Host resistance was measured with four assays, three for foliage resistance (field, whole-plant and detached leaf) and one for tuber resistance (tuber slice). The inoculum concentration was 6×10^3 sporangia ml⁻¹ in all the assays. Inoculum was equally distributed over the entire foliage using plastic atomizer in field and whole-plant assays. Detached leaves and tuber slices were inoculated with 50 μ l suspension of inoculum and incubated at $16.5 \pm 0.5^\circ\text{C}$ for 7 days. Infected foliage area in the field and whole-plant assays, lesion size on detached leaves and colony growth on tuber slices were all individually converted to a 0–9 interval scale for susceptibility. Field assessment was considered the most robust measure of resistance and therefore was used as the benchmark for comparing the other assays.

More than half of the genotypes had very little disease (scale value < 1), indicating they were probably expressing race-specific resistance. Susceptibility levels measured in the whole-plant assay were highly correlated ($r=0.90$) with field values, while the correlation was lower for detached leaf ($r=0.63$) and tuber slice ($r=0.46$) assays. Low correlation in the detached leaf assay was assumed to represent lower resolution of the single-cycle assay, and/or experimental error. Low correlation in the tuber assay may have also reflected genetic differences as foliage and tuber blight resistance are not always correlated.

Keywords: Assays, detached leaves, host resistance, late blight, quantification, tuber slice, potatoe