Developing an ecological risk-based approach to manage phytosanitary pest risks on export *Pinus radiata* logs from New Zealand

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New Zealand currently exports \$4.7 billion of wood products, including more than 12.7 million m³ of logs (almost all *Pinus radiata*). Currently all logs are treated to eliminate infestation by phytosanitary pests, with these treatments being specified by the import requirements of trading partners. The most common treatment used at present is fumigation with methyl bromide, or in the case of China, phosphine, which is permitted on the basis of an experimental use permit. The primary pests of concern are two species of bark beetles (*Hylurgus ligniperda* and *Hylastes ater*), two species of wood borers (*Arhopalus fesus* and *Prionoplus reticularis*) and *Sirex noctilio*. *Sirex* is rare in New Zealand due to the combination of a successful biological control programme and improved forest management practices. However, trading partners are sensitive to *Sirex* due to its impact in other countries.

Scion has just embarked on a 4-year programme of research to evaluate the necessity of current mandatory end point phytosanitary treatments, such as fumigation. As an alternative we propose an ecologically-based assessment process that determines actual phytosanitary risk so that the need for pre-export treatments can be evaluated. This concept uses ecological information, e.g. pest phenology, habitat requirements, developmental biology and dispersal capabilities, to determine if the potential pest pressure at a given time and place warrants the need for the application of an end point phytosanitary treatment.

This programme is adopting a Bayesian Network approach to model infestation risk both spatially and temporally. The models rely heavily on: (1) quantifying the thermal development of pest species so that phenology can be predicted from current and future meteorological conditions, (2) understanding the influence of landscape context on pest abundance and (3) accurate estimates of pest dispersal abilities throughout the landscape. The programme is supported by a national Quarantine Pest Trapping Network (QPTN) that will provide 4 years of pest abundance data from sites in both forests and ports. The QPTN data will be used to make an initial case for a winter pest-free area of production, contribute to the validation of the Bayesian Network models, and provide the backbone of a future official assurance monitoring programme to support the adoption of an ecologically-based assessment of phytosanitary risks to reduce the need for treatments of export logs.