Recent changes in the population of *Stagonosporopsis tanaceti*, the cause of ray bight of pyrethrum in Australia

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Pyrethrum is a perennial species in the Asteraceae, and the source of natural pyrethrins. Australia has the largest pyrethrum industry worldwide, supplying ca. 70% of the global pyrethrum demand.

Ray blight, caused by *Stagonosporopsis* spp., occurs on various Asteraceae worldwide, causing leaf lesion and flower blight. Ray blight of pyrethrum in Australia is caused by *S. tanaceti*.

Disease control depends on heavy use of fungicides; no resistant pyrethrum varieties are yet available.

**Microsatellite library development**

A partial de novo genome of *S. tanaceti* was assembled and used for microsatellite discovery. Of the 44 primer pairs tested, 13 gave reproducible polymorphic bands in *S. tanaceti*. Also, 12 (27%) and 20 (22%) markers were transferrable to *S. inoxydabilis* and *S. chrysanthemi*, respectively.

**Population analyses**

In total, 407 *S. tanaceti* isolates were genotyped. This included isolates from 2010, 2012 & 2013 as well as an old population collected from 1998 to 2004. AMOVA results showed a higher proportion of genetic variation existed among years (42%) than among localities within years (9.5%).

**Conclusions**

- Linkage disequilibrium, high clonality and lack of recombinant haplotypes confirmed the absence/very low levels of sexual reproduction
- Two hypotheses are proposed to explain the major change in the genetic composition of *S. tanaceti* over time:
  - **Hypothesis 1**: Detection of previously unobserved clonal lineages in 2012 (pink sub-network in Fig 2) may be the result of a second introduction of *S. tanaceti* to the pyrethrum growing region
  - **Hypothesis 2**: Rapid increase in the frequency of the newly discovered haplotypes in 2013 suggests presence of strong selection

  The rapid change in population composition coincided with a switch of fungicides and release of new pyrethrum varieties. Future studies need to investigate the pathogenicity and fungicide resistance of the newly detected haplotypes.

**References**
