Research request: Evaluation of Biocontrol for invasive alien pines in the Western Cape Province

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Background

The Western Cape has a massive problem with invasive Pine species. Invasive pines occur over at least 12,131 km2 of the Western Cape (Kotze et al. 2010) of which more than 6,500 hectares are within CapeNature reserves, negatively affecting biodiversity and provisioning of ecosystem services.

Not only is the extent of spread significant, and growing, but the densities (of *Pinus pinaster* in particular) reach very high levels. Very dense stands are problematic for a number of reasons not least being that they are very difficult and expensive to rehabilitate but also cause greater damage to natural ecosystems. This damage is mediated through direct competition with indigenous species for natural resources, increased water consumption, increased fire intensities and shorter burn cycles, resulting in damage-causing wild fires, and consequent loss of soil and seed bank (e.g. see review in van Wilgen & Richardson 2012).

Current application of manual clearing through the Working for Water Programme and other clearing initiatives is not yet sufficient to control the existing and expanding invasive populations of pines (Richardson 2004, Kraaij et al. 2011, van Wilgen & Richardson 2012, van Wilgen et al. 2012a, van Wilgen et al. 2012b, van Wilgen et al. 2016, Kraaij et al. 2017).

We are in urgent need of additional methods to combat the further spread of these pines, which have a serious direct and indirect effect on our catchments, their biodiversity and ecosystem provisioning. These risks are not just to CapeNature reserves and the globally significant biodiversity of the Cape Floristic Region, but also to farmers, residents, insurance companies, infrastructure managers, municipalities, and plantation managers alike. Previous efforts at evaluating biocontrol on pine invasions (Roques et al. 2004, Moran et al. 2000) using the seed-feeding weevil (Iberian clade of *Pissodes validirostris*) have stalled (Lennox et al. 2009) due to the potential risk of plantation pine trees becoming infected with pine pitch canker. However we do not know what the net increased risk of pine pitch canker with the release of conefeeding weevils is (Hoffman et al. 2011, A. Wood, PPRI, pers. comm.) i.e. will the release of this agent make a material difference to the spread and impact of this fungal disease in formal forestry plantations?

To this end CapeNature requests that research be undertaken to formally estimate the increased risk of pine pitch canker with the release of cone-feeding weevils and to evaluate this risk against the expense of controlling invasive pines manually. A useful adjunct or follow-on to this research would be to assess methods of controlling pitch pine canker in plantations and nurseries.

Research questions

What is the net increase in risk of commercial plantation pines becoming infected with pine pitch canker if the Iberian clade of *Pissodes validirostris* were to be released as a biocontrol agent in the Western Cape Province?

If this biocontrol agent was to be released, which methods of controlling pitch pine canker in plantations and nurseries would be appropriate to mitigate any increased risk?

It may also be useful to model the factors that may limit the spread of pitch pine canker in South Africa as a whole would probably also be very informative as it does seem to be distributionally contained elsewhere. Similarly, a model of the Iberian clade of *Pissodes validirostris* ability to spread in South Africa will be informative.

Equipment and support

The following equipment and services will be supplied by CapeNature: access to Protected Areas with invasive pines, access to data on distribution of pines in Protected Areas.

Collaboration from Scientists, Technicians, Regional Ecologists and Ecological Coordinators. Access to any other relevant data curated by CapeNature.

Funding

There is no direct funding currently available from CapeNature however we are actively pursuing funding for this research.

Sample sites

The scope of this research work should cover all the formal plantation areas in the Western Cape Province. Models of distribution of pine pitch canker and the Iberian clade of *Pissodes validirostris* should ideally cover the whole of South Africa.

Time lines

Ideally this research would be completed in two to three years and should start as soon as possible.

References

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