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Assessing the invasion potential of Eucalyptus grandis in South Africa

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ABSTRACT

Alien invasive species can have serious negative impacts on the biodiversity and functioning of ecosystems, but identifying invaders early, before they cause problems, can dramatically reduce the costs of controlling them. There is substantial research in identifying key attributes of invasive species, which can potentially be used in this regard. Many Eucalypts have formed the backbone of forestry in South Africa since the 1800s. While many other plantation species such as pines and legumes, have become serious invaders in many parts of the world, Eucalyptus species have been not been nearly as successful in invading alien environments. This is surprising considering that in their native habitat; members of this genus dominate almost all vegetation types. This project used available theory on the qualities that characterise invasive species to assess the invasive potential of one Eucalyptus species: *Eucalyptus grandis (rose gum)*. Many alien plants take a long time to establish naturalised populations and spread through new ecosystems and this research will provide information on the likelihood that *E. grandis* will become a problem species in the future.

A field study was used to determine whether there is any indication that it is in fact, invading from plantations in Mpumalanga, and if so, which ecological processes affect this invasion potential. Belt transects (5 by 50 metres) were used in sampling the populations growing near plantations. To determine whether frost is affecting the populations, one site was at high elevation where it is exposed to frost (near Graskop) and the other at a low elevation area with infrequent frost (near White river). Key reproductive traits such as generation time and seed viability which are known to affect invasion potential were also studied. Demographic data was used to determine the rates of establishment of *E. grandis* outside of plantations. The results showed that *E. grandis* had a short generation time and its seeds had a viability of 97%. Assessing the shape parameter (c) of the Weibull distribution function showed that both the Graskop (c=1) and White River (c=1) size class distributions had reverse j-shaped curves, characteristic of good rejuvenation. However, some Graskop sites had a monotonic function ($c < 1$) showing that frost is affecting the rejuvenation process. Generally the results show that rate of spread is low and this might suggest that the populations are on the establishing populations' invasion stage. However, there is no indication that there are any environmental or life history factors that would prevent *Eucalyptus* from becoming invasive in the future, and I would recommend strict monitoring of its rates of spread out of plantation forests in various parts of the country.