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## How *Corymbia citriodora* from various origins genetically differ in their environmental adaption in China

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*Corymbia citriodora* subsp. *citriodora* has a long history of cultivation as a multipurpose tree in China and many other countries of southeast and south Asia. Despite its over 100-year history of introduction outside from Australia, the genetic differences on environmental adaption among and/or within provenances/seed sources when introduced to the other hemisphere are rarely reported. To test and genetically improve this species, a field trial was established in southern China in 2015. In this trial, 5 natural stand seed sources from Australia and 6 seed sources from exotic plantings in China were tested, 171 families in total. Significant variation was found among and within both seed sources and families within these seed sources for pest (cockchafer) and disease (*Quambalaria pitereka*) resistance, survival, growth and stem form up to age 81 months. Australian seed sources were generally superior for most of the traits to Chinese ones. There was also significant difference among sources within each country. In the Australian sources, sources 2 (Glen Gorden) and 5 (NE Mareeba) were significantly better than the other Australian seed sources. But source 4 (Hughenden) was notably inferior to all other Australian sources. Survival rate of the three sources at 81 months were 55.1%, 50.7% and 26.1%. It is noteworthy that source 4 was from a further southern location in Australia, while the four other Australian sources were from far north in North Queensland. Significant differences were also found among the Chinese seed sources for these traits, with source 8 (Huizhou) and source 10 (Dongmen) being significantly better than the other Chinese sources on most traits, and with a survival rate of 31.6% and 28.0%. The individual tree heritability for the assessed traits was low to moderate ranging from  $0.11 \pm 0.24$  for an index of tree crown health at age 31 months up to  $0.48 \pm 0.60$  for disease resistance at age 10 months. Phenotypic and genetic correlations ( $r_g$ ) among traits were generally favourable, age 10-month Disease susceptibility and age 81-month tree volume ( $r_g = 0.53 \pm 0.32$ ), and age 31-month tree volume and age 81-month tree volume ( $r_g = 0.96 \pm 0.49$ ). Overall, the genetic variation observed in the field trial along with the heritability and genetic correlation indicate good potential for reasonable genetic gains in this species from selection and ongoing breeding.

**Keywords:** *Corymbia citriodora*, pest and disease resistance, survival rate, provenance variation, adaption

