



IEA Bioenergy
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Summary Series

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Integrated biomass residue management in Sandalwood Plantations

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Project Summary

Sandalwood plantations in Australia offer a unique opportunity in the supply of woody biomass into regional bio-hubs in support of the circular economy. The plantations are established in such configurations that for each sandalwood tree planted, on average two long-term host trees are planted to support the growth of this hemiparasitic crop. As a result, a significant proportion of the aboveground biomass in the plantation is not a sandalwood product and is considered to be waste. To support emerging local and regional biomass markets and to improve the sustainable management of the tropical sandalwood plantation resource, this study explores the potential availability and market feasibility of integrated biomass supply for bioproducts. A desktop biomass assessment was performed to ascertain indicative market viabilities by determining biomass quantities from plot based-measures and developing host species-specific aboveground biomass profiles. These species profiles and the unique planting configurations were combined and extrapolated across the sandalwood plantation estate to estimate the current and project woody biomass profile of the plantation. Results indicate that at a mature age (15 years), up to 10 oven-dry tonnes of woody biomass is potentially available per hectare of sandalwood plantations. Increasing host species selection and optimised planting configurations may enable increased biomass availability. This work was made possible with the support of QUINTIS (Australia) Pty Limited and lays the groundwork for future productive research outcomes. [The full report is available through....](#)

“The current and projected sandalwood plantation profile offers good insight for QUINTIS Pty Limited in their current and future potential biomass supply from host trees. This information enables the plantation grower to strategically develop market opportunities for the waste woody biomass and offer employment and business opportunities for some of Australia’s most remote regions.”

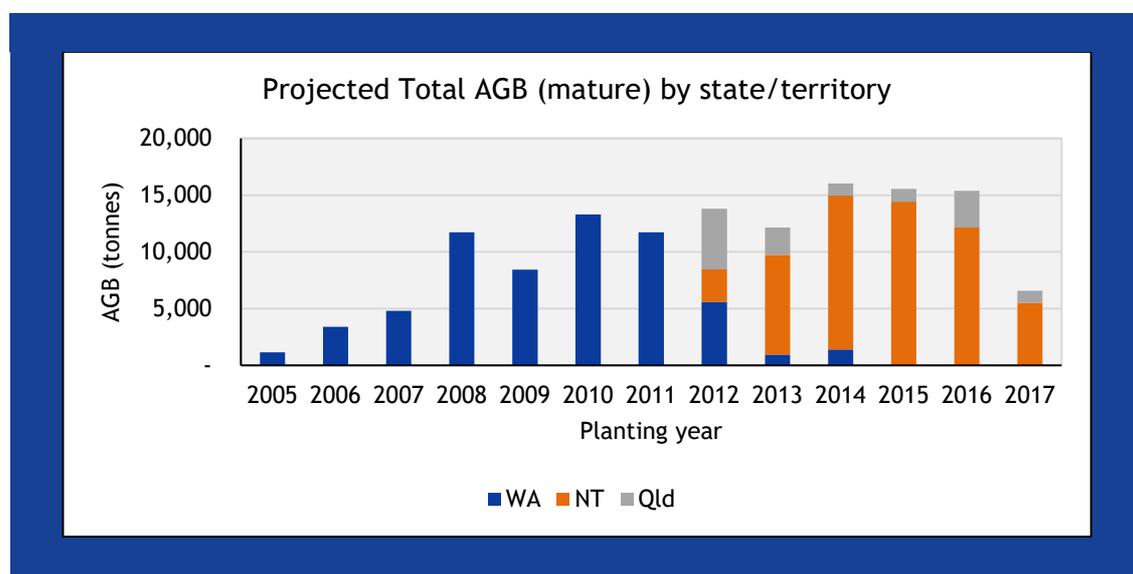
OBJECTIVES AND APPROACH

Within the QUINTIS Sandalwood estate of northern Australia, the study aimed to:

1. Determine host species-specific aboveground biomass (AGB) profiles in a plot-based biomass assessment to analyse the suitability of altered host plants and/or planting configurations and their commercial implications.
2. Determine the AGB plantation profile from the plot-based plantation inventory assessments and specific plantation configuration provided by QUINTIS Pty Limited.
3. Provided a limited market insight for use of biomass feedstock to develop a suite of recommendations surrounding the feasibility of biomass utilisation in sandalwood plantations.

PROJECT CONCLUSIONS

This study found that Sandalwood plantations offer a unique opportunity in the supply of woody biomass that could potentially feed regional circular economies through localised bio-hubs. Most of the waste biomass from host trees in sandalwood plantations is readily available for collection and transport. The average oven-dry AGB at a mature age for long-term host species of Sandalwood is 9.43 tonnes/ha, including 2.78 tonnes/ha from *Senna siamea*, 2.08 tonnes/ha from *Cathormion umbellatum* and 4.57 tonnes/ha from *Dalbergia lanceolaria*. Additional biomass can be sourced from sandalwood residues, host-tree residues from intermittent pruning or short-term and other long-term hosts, however, more research is required to quantify and validate the potential of these sources and evaluate their quality before market sales.



The bar chart presents the total AGB (oven-dry tonnes) for long-term host species in the QUINTIS Sandalwood estate on a state/territory basis. The projection assumes the plantation has reached a mature age. The cumulative and projected biomass availability from long-term host species in the QUINTIS Sandalwood estate planted between 2005 and 2017 is estimated at 133,962 tonnes.

(WA = Western Australia, NT = Northern Territory, Qld = Queensland)