Promoting the Use of N_2-fixing casuarinas for Profitable Farm-Forestry in Australia: Realising the Vision

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Abstract

Casuarinas and acacias are well-recognised indigenous components of the Australian flora, both families making significant contributions to the nitrogen economy of our natural ecosystems. For the brigalow-belah dominated areas in northern Australia, their inputs of nitrogen allowed production of wheat using the high levels of NH_4^+-saturated clay for many years after land clearing. However, their potential in Australian agroforestry has been little explored, despite the centres of origin for both families being in Australasia. Currently, research into the practical application of Casuarinaceae (*Allocasuarina, Casuarina, Gymnostoma, Ceuthostoma*) and its N_2-fixing microsymbiont *Frankia* is largely restricted to China, India and France. Farmers in India are pioneering profitable farming of casuarinas for paper manufacture on a 3-year cycle in rotations with rice. We propose a major investment in Australia to promote the application of casuarinas on farms. Their future use in these rotations offers prospects for large scale carbon sequestration (up to 20 tonnes dm/ha/annum) with reduced fertiliser-N use and nitrous oxide emissions, expanding farmers' product options and cash flow. Farm-forestry is increasingly regarded as having potential for vertically integrated production to maximise the value of products. These include wood products and pellets, paper pulp, charcoal for hydrogen production, N-fertiliser and volatile chemicals; for example, 1 million ha of casuarinas could produce $250 million worth of C-neutral N-fertiliser per annum. This review will examine the needs and prospects for coordinating better use of these genetic resources with plans for necessary research and development in profitable landscape design and community economic development. The ultimate aim would be to provide farmers with more options for the profitable and sustainable use of their farmlands, in this coming era of climate change.