Native species in plantation: Cordia alliodora

This neotropical species is widely used in plantations within its natural range. Caution should be used when planting it offsite

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TROPICAL plantations can provide fuel, timber and other crops; contribute to site restoration; and reduce the conversion of forestland to alternative land uses. The species and provenances used, however, must be matched to site conditions and objectives so that plantation functions and ecosystem processes are complementary. If sufficient information is available to guide site selection, plantation establishment and management, native species may offer both ecological and economic advantages over non-native or 'offsite' species.

Cordia alliodora, a shade-intolerant, semi-deciduous neotropical tree, is an example of a species that may be well suited for plantations within its natural range, which extends from Mexico to Argentina and includes the Caribbean. The tree is commonly used in Central and South American agroforestry systems because it provides shade to understorey crops and, when harvested, yields wood comparable in appearance and properties to mahogany (*Swietenia macrophylla*), teak (*Tectonis grandis*) and walnut (*Juglans regia*). It captures a site quickly by investing in aboveground biomass (Haggar & Ewel 1995) and may contribute to site nutrient retention (Ewel 1999). These characteristics, together with a favourable price for its wood, suggest a role for the species in reforestation projects for site restoration, wood production and carbon sequestration.

However, there are important potential limitations to the use of *C. alliodora* in plantation. Given its observed invasive tendencies (Tolfts 1997), it may not be appropriate to introduce the species outside its native range; screening trials for invasibility should thus precede offsite establishment. The susceptibility of *C. alliodora* to competition from grasses during establishment, perhaps because of low initial resource allocation to roots, is another important consideration. For this reason, it may not be a good candidate in afforestation programs, especially on fallow pastureland or sites with extensive herbaceous vegetation.

Mixed-species vs monoculture

C. alliodora can be grown either in mixed-species or single-species (monoculture) plantations, depending on site objectives. Previous studies of its performance in plantations are dominated by mixed-species systems and research on its form, growth and yield in monocultures is limited. Its open-crown architecture is valuable if filtered light to other plantation species is desired. In such plantations, *C. alliodora* should be planted with species that have different architectures and light requirements (Menalled et al. 1998) to improve site nutrient use efficiency. In contrast, understorey vegetation may compete for resources during the establishment of monoculture plantations and thus will need to be controlled. To improve the performance of *C. alliodora* in monoculture, data are also needed on the different components of tree growth and form at different tree ages and plantation densities. These data would modify existing taper equations and volume tables currently based on open-grown trees, and would help refine the preliminary density management diagram developed for *C. alliodora* (Hummel 1997).

Site

Site selection is important. *C. alliodora* has a high demand for macronutrients such as nitrogen and phosphorus; growth can suffer from belowground competition when resources become limiting (Hiremath 2000). Reducing understorey competition by planting at high densities may not therefore be feasible in monocultures; instead, site fertility may dictate maximum density.

Form

C. alliodora often has forked stems and branches that decrease merchantable wood recovery. Data on stem form and pruning associated with spacing will help improve silvicultural treatments in plantations. Lower branch self-pruning in *C. alliodora* does not appear to be density-dependent (Hummel unpublished data) and silvicultural treatments to increase wood product yield could therefore include manual pruning. Although this would undoubtedly increase the income received by landowners, additional information on net financial returns is needed to fully assess the economics of different management options for the species.

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