Seed Germination and DNA genotyping of *Neolamarckia cadamba* (Roxb.) Progenies (half-sib family).

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Abstract

Neolamarckia cadamba or locally known as Kelampayan is an economically and ecologically important forest tree species. The species is an indigenous fast growing tree that gives early economic returns, within eight to ten years. Kelampayan has been planted in plantation for commercial purposes due to its wood characteristics that are suitable to produce different products, such as plywood and paper. In the present study, germination test was used to determine the seed viability and to gain more information with respect to field planting value of the Kelampayan seeds. Germination test also can provide results which can be used to compare the value of different seed lots. Fruits of ten mother trees from the Ravens Court, Lawas, Sarawak, were processed and air-dried to collect the seeds. The germination test was conducted on the filter paper under optimum condition and the growth rates between progenies of different mother trees were compared. Progenies from mother tree number 00059, showed the highest germination rate (88%) while progenies from mother tree number 00067 showed the lowest germination rate (14%). The information on germination test can be used to predict the rate of germinating progenies from different mother trees and to determine the planting value of seed lots to provide standardized marketing seed. For DNA genotyping, a total of 139 progenies from the 7 selected mother trees earlier were genotyped using four SSR primers, namely AC03, AC11, AC15 and GTG11. All 4 loci were successfully amplified and a total of 17 alleles were detected. The value for H_e was highest for NCAC11 (0.7190) and lowest for NCGTG11 (0.3832).

Introduction

Kelampayan *(Neolamarkcia cadamba)* is a fast growing tree species that grows naturally in Australia, China, India, Indonesia, Malaysia, Papua New Guinea, Philippines, Singapore and Vietnam. It is a favoured plantation species inside and outside its native range. It has been planted as an ornamental and plantation tree and has been successfully introduced into Costa Rica, Puerto Rico, South Africa, Surinam, Taiwan, Venezuela and other tropical and subtropical countries (Orwa *et al*. 2009). *N. cadamba* is lightweight hardwood. The wood is mainly suitable for multiple end uses, such as plywood, light construction materials, flooring, beams and rafters, boxes and crates, tea-chests, packing cases, shuttering, ceiling boards, toys, wooden shoes, bobbins, yokes, carvings, matches, chopsticks and pencils (Soerianegara and Lemmens 1993). The dried bark is used to relieve fever and as a tonic. A yellow dye, obtained from the bark of the roots, can serve as tannin or dyestuff (Soerianegara and Lemmens 1993). *N. cadamba* is considered as one of the best raw material for plywood industries and expected to become increasingly important for wood industries. Since most of the plywood industries are facing acute shortage of raw material, plywood manufacturers will be glad to purchase the trees at remunerative prices. The pulp is sometimes mixed with other, generally long-fibred material to produce medium quality paper. The tree is also suitable for ornamental use and shade along roadsides and villages as well as for shelter for other crops in agroforestry systems. It is also used in reforestation and afforestation programmes (Orwa *et al*. 2009).

Germination testing is designed to estimate the maximum number of seeds that will produce a normal seedling and to give results that are as repeatable as possible. Without uniform procedures, there would be no standard on which to base the value of seedlots for commercial transactions and the seed trade would be chaotic and filled with dispute. Germination also tells a grower about a seedlots potential (Karrfalt, 2004). A seed lot is composed of a population of individual seed units; each possessing its own distinct capability to produce a mature plant. A seed vigour test is an analytical procedure to evaluate seed vigour under standardized conditions. It enables a seed producer to determine and compare the vigour of a seed lot before it is marketed (McDonald, 1988). Seed testing played an important role in guaranteeing good quality seed to the farmer (Gassim, 1988). A normal seedling has all the essential plant structures necessary for the plant to continue to grow normally under favourable conditions (AOSA 1996; ISTA 1996).