

Sex determination of young nursery Jojoba (*Simmondsia chinensis* L.) plants using morphological traits in semi arid areas of Voi, Kenya

S.K. Inoti, S.A.O. Chamshama, W.M. Thagana, L.L.L. Lulandala, R. Dodson

Abstract

Jojoba (*Simmondsia chinensis* L.) is a dioecious desert shrub that produces highly valued oil for cosmetics and lubrication. Most of the existing plantations have low yields due to high ratio 1:1 of the males compared to the females. However, there is no existing morphological trait method for distinguishing sex at an early age in Jojoba. Use of morphological traits for identifying sex at the juvenile stage is economical and more practicable for field workers hence more preferred than the molecular marker technique. To overcome this problem, two experiments were carried out with an objective of identifying sex of young Jojoba plants using morphological traits. The first experiment was set up using nursery seedlings whereas the second used rooted cuttings. The experimental design was a Randomized Complete Block Design (RCBD) consisting of 8 treatments replicated 3 times. The treatments consisted of 4 males and 4 females per replicate which were selected using stratified random sampling. Foliage morphological data was collected from both the seedlings and rooted cuttings according to a modified Jojoba descriptors procedure. The nursery seedlings were raised in an open nursery whereas those of the rooted cuttings were carried out in a polythene sheet tunnel. These experiments were carried out from February to August 2012. Data was analyzed using SAS statistical package whereas means were separated by Least Significant Difference (LSD). The results for seedlings showed that foliage morphological traits for single leaf area in male seedlings (4.4 cm²) were significantly higher ($p < 0.05$) compared to the female seedlings (3.2 cm²). However, all the other foliage variables did not show any significant difference although male seedlings were greater in leaf length, leaf width, number of leaves, total leaf area and leaf area/0.3m relative to the female seedlings by 13%, 14%, 19%, 63% and 69% respectively. The females were superior in only leaf shape index by 1.4% compared with the males. On the other hand, rooted cuttings showed a similar pattern with those of seedlings although there was no significant difference in all the morphological traits measured. However, males showed higher foliage growth compared with the females in leaf length, leaf width, single leaf area, number of leaves and total leaf area by 37%, 43%, 95%, 155% and 458% respectively. The results indicate that single leaf area can be used for sex differentiation in juvenile Jojoba plants hence recommended at the nursery stage in order to determine the right planting ratio of male to female of 1: 10 respectively in the field for maximum stand production. Further research is recommended for a longer period to identify other foliage traits useful for sexing of Jojoba nursery plants.

Keywords: Jojoba plants, sex determination, morphological traits