



Studies on the comparative performance of *in vitro* regenerated plantlets of *Simmondsia chinensis*

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Research Guide

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Abstract

Simmondsia chinensis an evergreen perennial shrub with extensive deep tap root system helps to withstand drought conditions thus making it a potential plant to be cultivated in the hilly tract of the monsoon region as well as in desert regions and wastelands of India. The name 'jojoba oil' is misleading, as it is not oil, but a wax ester made up of a complex mixture of naturally occurring long-chained linear esters with many functional cosmetic properties that are far superior to triglycerides.

Introduction:

Jojoba oil is sold at a high price for use in cosmetics and hair care products. As many as 300 products containing jojoba have appeared in recent years. As the supply of oil increases and price decreases, more uses will become economically feasible. For example, the viscosity index of jojoba oil is much higher than that of petroleum oil; therefore, it may be used as a high temperature, high pressure lubricant. The stability of jojoba oil makes it attractive to the electronic and computer industries.

Since jojoba oil contains no cholesterol or triglycerides and is not broken down by normal metabolic pathways, it may become an important low-calorie oil for human consumption. The oil can be used as an antifoam agent in antibiotics production and as a treatment for skin disorders. Other proposed uses include candles, plasticizers, detergents, fire retardants, transformer oil, and for the leather industry. However, the toxic compounds (simmondsins) make it currently hazardous as an animal feed

Objective of the research

Nowadays, people are marching forward rapidly in all the fields of research and with pollution on the rise the term organic has been given a heavenly acceptance. They identified endangered plant and animal species around the world. Thereafter, they outlawed the hunting and/or harvesting of these species and prohibited the use of any materials derived from these sources.

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In the late '60's and early '70's, two events transpired which brought Jojoba oil into the limelight of cosmetic research and development. First, many nations of the world started to become "environmentally conscious" and realized the finite limitations on many of the world's resources. These nations, either collectively or independently, identified endangered plant and animal species around the world. Soon thereafter, they outlawed the hunting and/or harvesting of these species and prohibited the use of any materials derived from these sources.

Review of Literature

Advances made in genetic engineering and molecular biology can be manifested in plants through the application of various techniques developed in the field of plant tissue culture (Murashige and Skoog, 1962). Considerable progress has been made in understanding somatic embryogenesis and embryogenic cultures (Naidu and Emehute, 1997). The application of tissue culture to plant breeding, horticulture, forestry, industrial production of compounds, and conservation of ever depleting natural genetic resources has been the focal point of research.

Asexual propagation of jojoba has been accomplished by layering (Reddy, 2003; Bashir *et al.*, 2005), grafting (Bashir *et al.*, 2006), cuttings (Singh *et al.*, 2003; Bashir *et al.*, 2007a) or tissue culture techniques (Tyagi and Prakash, 2004; Bashir *et al.*, 2007b,c,d) with limited success. Although the use of single node, double node, and three node cuttings from different individuals of jojoba by applying different PGRs will increase the total number of propagules obtained from a stock plant (Cao and Gao, 2003), yet the maximum number of possible propagules will still be limited to one or two thousands per year.

In recent years, micro-propagation has been successful in raising plants *in vitro* to a commercial level in many plant species (Chandra and Mishra, 2003). Multiple shoots can be produced *in vitro* and these can be developed into plantlets by regenerating their roots. Thus a

single explant source, shoot tip or nodal segment could conceivably provide thousands of new true-to-type plantlets per year.

Limitation of the study

The present work on *Simmondsia chinensis* will provide a preliminary step towards selection of elite plants after its comparative performance both *in vivo* and *in vitro*. Though, the economic seed formation occurs after 4 years of vegetative growth, it is anticipated that due to tissue culture obtained plantlets this period of seed formation may be reduced. However, time limitations may hinder the further field studies.

Conclusion:

Among the endangered species was the sperm whale, whose spermaceti waxes, a mixture of long chain esters, was greatly valued for its functionality in cosmetic applications. Scientists soon found that Jojoba oil could not only replace spermaceti in all applications but discovered that it was actually superior to it. Secondly, the cosmetic industry commenced a worldwide search for renewable, plant-sourced lipid materials to eventually replace nonrenewable, petrochemical sourced materials, when and if market, supply or cost factors dictated. Thus it was obvious to many that Jojoba completely satisfied the needs created by both of the aforementioned events.

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