

Multiutility of *simarouba glauca*

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Simarouba (Paradise tree), being promoted as wonder tree, is a good source of edible oil and other utilities. Every segment of simarouba plant is beneficial, Source of biodiesel and biofuel, Shells can be used in hard board industry, Beverage industries can proficiently use the fruit pulp, composing 11-12 percent sugar, Productive manure can be concocted from leaf litter, Bark and Leaves have pharmaceutical value.

Utilities of paradise tree

1. Source of biodiesel and biofuel

Simarouba seeds are considered economically important as they contain 60-70 % oil that can be easily refined, bleached, deodorized and fractionated. It is suitable for edible and non-edible purposes. One such oil could be *S. glauca* which is obtained from seeds of *Simarouba* tree commonly known as paradise tree (Jena *et al* 2010). *S. glauca* is considered for biofuel production (Azam *et al* 2005). Joshi and Joshi (2002) reviewed the application of *S. glauca* seed oil and pulp. They speculated that filtered crude oil can be used to blend with diesel @ 5-10% while the surplus oil produced can be subjected to trans-esterification to manufacture biodiesel, a 100% substitute for diesel (1000-2000 kg/ha/yr). The sugar rich fruit pulp can be used in the manufacture of ethanol (800-1000 liters/ha/yr). Semi-sweet fruit pulp, containing 11-12% sugars is eaten and is well suited for fermentation or beverage industry (Rath *et al* 1987). Seeds of *S. glauca* are engine tested for alternative biodiesel-feedstock (Devan and Mahalakshmi 2009). Biodiesel of *Simarouba glauca* is a simple biodegradable, nontoxic and essentially free from sulphur and aromatics and can be used in compression – ignition quality even when blended in petroleum diesel. The oil cake, fruit pulp, leaf litter and unwanted wood can be used to generate biogas. The shell and waste wood can be used in thermal power generation. The lignocellulose contained in the huge amount of biomass produced (about 15 tones/ha/yr) can be used as feedstock for manufacturing second generation biofuels. The shells of endocarp can be used in activated charcoal industry. They can be used to heat boilers as they possess high calorific value.

According to Joshi and Joshi (2002) the fruit pulp contains about 11% sugars. The pulp can be used in preparation of squash, beverage and jam which is very well accepted because of their attractive natural color, flavor and good taste. The fruits can be a source of natural colorant. *Simarouba* seed contains 35-40% kernel. *Simarouba* fat is primarily used for edible purposes and compares favorably with other fats (Severen 1953).

2. Source of vegetable oil

Simarouba forms an important source of edible oil for various South and Central American Countries and is widely grown in countries like Costa Rica, EI-Salvador, Honduras Cuba, Nicaragua, Mexico, Haiti, Jamaica (Govindaraju *et al* 2009) From 1950 onwards, in EI-Salvador and other Central American Countries the oil marketed for edible purposes under the trade name manteca



vegetal “nieve” and oil is well accepted (**Joshi and Joshi 2003**). The use of *S. glauca* as a vegetable oil crop was first considered near the end 1939. The oil extracted from seeds in existing oil mills and processed by adopting conventional methods. **Monseur and Motte (1983)** reported that the seeds of *S. glauca* are rich in edible fat (nearly 60% W/W) that has been used for cooking in tropical countries. In other developing countries, also it can be used to manufacture vanaspati, vegetable butter and margarine. The Refined, Bleached and Deodorized (RBD) oil is further fractionated to separate the liquid and solid fractions. The liquid fraction with very high oleic acid content (about 85%) is comparable to olive oil in its chemical composition. This oil is free from bad cholesterol (free fatty acids 0.06%). The solid fraction rich in steric acid and palmitic acids can be used as coco-butter substitutes (CBS) or coco-butter extenders in confectionary and bakery industries (**Jeyarani and Reddy 2001**). The palmito stearin fraction is also useful in preparation of ice cream and mayonnaise. Fruit is good source of vegetable oil which is rich source of fat-soluble vitamins like A and E. *Simarouba* oil is also used in industrial manufacture of soap, lubricant, paint; polishes and pharmaceuticals etc. shells (endocarp) are used in hard board industry (**Givindaraju et al 2009**). The physical properties of oilseed are important in designing and fabricating particular equipments and structures for handling, transporting, processing, and storage and also for assessing the behavior of product quality (**Kashaninejad et al 2006; Bart-Plange and Baryeh 2003**). Physical properties of *Simarouba* fruit and kernel are essential to design equipments for decoration, drying, cleaning, grading, storage and oil extraction. Though literatures are available on *Simarouba* plants and its oil characteristics (**Reddy et al 2003; Joshi and Hiremath 2000**) no study has been done on its physical properties.

