

SHORT COMMUNICATION

Promising High Yielding Genotypes of Jojoba (*Simmondsia chinensis*)

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(Received: 19 January 2013; Revised: 21 August 2014; Accepted: 19 December 2014)

Jojoba (*Simmondsia chinensis*) is an underutilized shrub grown for extracted oil from seeds for liquid wax. Number of crosses were attempted among the selected parents of exotic collections grown at field genebank at NBPGR, Regional Station, Jodhpur. EC33198-Sel.5 for bold seededness and high yielding F₁ hybrid EC33198-Sel.1×EC99692 was obtained with 3 seeds/capsule with regular bearing and high seed yield.

Jojoba (*Simmondsia chinensis*) pronounced as *ho-ho-ba* – an underutilized shrub is native of Sonaran Deserts in North-western states of America and Mexico and Baja California (Gentry and Howard, 1958; Benzioni, 1995). Jojoba oil is the liquid wax produced in the seed of jojoba plant. The oil percentage in the seed by weight is approximately 50% (Kureel *et al.*, 2008). Jojoba oil is used as a replacement for sperm whale oil and its derivatives such as acetyl alcohol (Miwa and Rothfus, 1979). Jojoba biodiesel has been explored as a cheap sustainable fuel that can serve as a substitute for petroleum diesel (Selim *et al.*, 2003). Jojoba oil is relatively shelf stable than other oils like safflower, canola and almond oils as it does not contain triglycerides (Widyan and Al, 2010; Al, 2013). The oil may also be used as a fungicide to control mildew (Bream *et al.*, 2001).

In many regards jojoba oil has been found to be superior to the sperm oil for application in the cosmetics, pharmaceuticals, plastic industries (Benzioni, 1995). This oil is found as an additive in many cosmetic products, especially those marketed as being made of natural ingredients. A number of accessions introduced in India time to time, and few of them were high yielding and adapted to the climatic conditions of western Rajasthan. However, some of the introductions were high yielding and adapted to the climatic conditions of western Rajasthan. The promising progenies of introduced jojoba and developed hybrids have been identified to be high yielding, adapted to hot and arid climate and having comparative oil content in their seeds. These promising jojoba can be propagated and conserved in field genebank and also following the protocols developed by Tyagi

and Prakash (2004) under *in vitro* micropropagation and medium term conservation.

Promising bold-seeded high yielding jojoba: The most promising genotype EC33198-Sel.5 (Fig. 1) is a selection from progeny of jojoba identified in the jojoba field of NBPGR, Regional Station, Jodhpur. Plant flowers in the month of January and February and fruiting continues from February to May. The mature seeds are harvested during the month of May-June in 4-5 pickings at an interval of 10 days. It has very bold seed size (100 fully developed seed weight = 118.6 g) whereas the nearest bold seeded accession to this is EC272473 (100 seed weight = 84.4 g) (Fig. 2). Thus seed weight of EC33198 sel.5 is 40.64% higher than the closest bold seeded accession. The average yield of EC33198-Sel.5 is 7.5 kg/plant.

Promising hybrid of Jojoba: Most of the introduced jojoba were poor in yield and had irregular bearing of capsules. Therefore, a number of crosses were attempted among the selected parents with the objectives of genetic improvement and to develop desirable high yielding hybrids that should be adapted to the climatic conditions of arid and semi arid regions.

The crosses were attempted using the progeny EC33198-Sel.-1 of introduced accession EC33198 as female parent and accession EC52039, EC99690 and EC99692 as a male parents. The seeds of F₁s of these crosses were grown in the pots and transplanted in the field after one year. The identified shrub of jojoba hybrid of cross of EC33198-Sel.-1 × EC99692 flowered within two years of initial sowing and male and female

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Fig. 1. Promising jojoba plant progeny EC-33198 sel. 5 (left) and lower two rows of its bold seed and upper two rows of seeds of another accessions EC272473 (right)

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Fig. 2. Jojoba hybrid NBPGR-1 gives high yield, regular bearing (right) and 2-3 seeds/capsule (left)

Table 1. Traits of identified promising accessions of jojoba at NBPGR, Regional Station, Jodhpur

Accession	Seed size (mm.) (Length × breadth)		No. of seeds/ capsule (up to)	Seed bearing habit	Seed weight (g)	Oil (%)	Yield/tree (Kg)
EC 33198	16.365	09.254	2	alternate	69.84	**	5.86
EC 33198-sel.5	19.652	11.880	2	alternate	118.60	45.13	7.50
EC 342567	14.694	10.353	2	alternate	68.18	49.90	4.37
EC 342563	13.547	09.460	2	alternate	49.87	52.00	4.50
EC 342571	13.273	10.022	2	alternate	54.39	52.00	5.04
EC 342589	13.982	10.865	2	alternate	55.82	51.10	5.15
EC 342593	14.255	09.938	2	alternate	63.57	50.00	5.85
EC 33205	16.124	10.728	2	alternate	71.38	**	5.80
EC 99690	15.362	09.258	2	alternate	71.06	**	4.30
EC 99692	18.464	10.634	2	alternate	68.55	**	5.66
EC 134349	16.711	09.982	2	alternate	70.63	**	5.10
EC 52039	14.184	11.255	2	Alternate	71.38	**	5.62
EC 267781	18.454	10.468	2	alternate	81.55	**	6.05
EC 272472	15.970	12.011	2	alternate	80.26	**	5.50
EC 272473	15.948	11.486	2	alternate	84.40	**	4.90
EC 279586	14.562	11.638	2	alternate	76.48	**	6.60
EC 33198-sel.1 × EC 99692	17.698	11.869	3	regular	82.95	50.60	8.00
EC 33198-sel.1 × EC 99690	16.238	09.473	2	alternate	81.68	**	5.90
EC 33198-sel.1 × EC 52039	17.120	11.084	2	alternate	79.01	**	5.35

** not estimated.

flowers were observed. The seeds obtained from this F_1 (EC33198-sel.-1 $\times$ EC-99692) shrub were larger in size than the seed size of the parents. The developed F_1 plant yielded 8 kg seed on an average annually and exhibited regular seed bearing habit. The parents of this F_1 plant had irregular bearing of seed. Interestingly, number of seeds of this hybrid/capsule were up to 3 whereas, both parents had 1-2 seeds/capsule. The estimated oil content in the seed of this hybrid was high (50.60%).

Thus, genotype EC33198-sel.-5 and hybrid shrub of cross EC33198-sel.-1 $\times$ EC99692 have great potential to commercialize in the waste arid and semi-arid regions of Rajasthan.

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