Indian J. Genet., 68(4): 463-466 (2008)

Short Communication

Oil percentage in *Jatropha curcas* L. germplasm of National Agroforestry Repository

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(Received: January 2008; Revised: September 2008; Accepted: November 2008)

The non-edible oil of *Jatropha curcas* has requisite potential of providing a promising and commercially viable alternative to diesel. The *Jatropha curcas* are available in almost all the states but in scattered manner that too in traditional plantations with low productivity and oil content in the seed. There is a lot of variability for growth and seed characteristics in this species [1, 2]. Hence, an exploration was made to collect the superior trees having good growth and seed yield from different parts of the country. All these superior accessions were analyzed for oil content also. This work may provide useful information on oil percentage of *Jatropha curcas* germplasm of National Agroforestry Repository, Jhansi, which will ultimately help to provide quality-planting material for farmers as well as other growers at national level.

Eighty-five accessions of *Jatropha curcas* were used in the present study. These accessions along with their place of collection are listed in Table 1. The seeds collected from different parts of India were used for estimation of oil percentage. The oil content of seeds was estimated by Nuclear Magnetic Resonance (NMR) technique. For this a random sample of 13g of seeds was taken from each replication of bulk produce of each entry from each replication.

Among eighty-five accessions, the oil content in seeds ranged from 22.79 (NRCJ-57) to 40.31 per cent (NRCJ-32) (Table 1). A total of 45 accessions had 30-35 percent seed oil content, 24 accessions had more than 35 percent of oil and 16 accessions had less than 30 percent oil . The accessions which are having more than 35 per cent seed oil content can be utilized for hybridization programme to develop high yielding hybrids. The difference observed in the oil percentage between accessions was also found adequate for analyzing the extent of genetic variability at the intra-specific level. Wide range of variations was recorded for different variance components (Table 2). The genotypic variance (Vg) for oil percentage was 10.20 whereas phenotypic variance (Vp) was 10.39. The environmental variance (Ve) for this character was only 0.19. The small value of error or environmental variance for the oil percentage suggests that this trait is largely under genetic control. Simultaneously, the value for genotypic co-efficient of variation (GCV) was 9.73 and phenotypic co-efficient of variation (PCV) was 9.82. Here, value for environmental coefficient of variation (ECV) was 1.32 only. The phenotypic and genotypic variance and their co-efficient of variability for the trait concerned were found to be higher than corresponding environmental variance and environmental coefficient of variability suggesting that this trait is genetically governed. Similarly, the phenotypic and genotypic variance and their co-efficient of variability for the trait concerned were found to be very close for each other and accompanied with high heritability (98.19%). Heritability in broad sense may give useful indication about the relative value of selection of the material at hand [3]. The value for genetic advance was 6.52 whereas for genetic gain it was 19.86. The genetic gain obtained is suggesting that the additive gene effects were highly heritable. Therefore, good amount of heritable additive genetic component can be exploited for overall genetic improvement of this species.

Table 1. Accessions of *J. curcas* along with their place of collection and seed oil content (%)

Sl. No.	Accessions (CPT)	Place of collection	Seed Oil Content (%)		
			Minimum	Maximum	Mean ±SEm
1.	NRCJ-31	Kesharpurakhan, Bhilwara (Rajasthan)	36.61	36.93	36.77± 0.09
2.	NRCJ-32	Dhaunrishuda, Bhilwara (Rajasthan)	40.19	40.47	40.31± 0.08
3.	NRCJ-33	Dhandhichabutra, Bhilwara (Rajasthan)	28.22	28.42	28.34± 0.06
4.	NRCJ-34	Dhandhichabutra, Bhilwara (Rajasthan)	30.44	30.63	30.53± 0.06
5.	NRCJ-35	Rajgarh, Chittorgarh (Rajasthan)	37.34	37.59	37.45± 0.07
6.	NRCJ-36	Rajgarh, Chittorgarh (Rajasthan)	36.38	36.81	36.61± 0.12
7.	NRCJ-37	Rajgarh, Chittorgarh (Rajasthan)	32.37	33.17	32.72± 0.24
8.	NRCJ-38	Baldarkha, Chittorgarh (Rajasthan)	31.70	31.99	31.83±0.08
9.	NRCJ-39	Devari, Chittorgarh (Rajasthan)	34.37	35.09	34.65±0.22
10.	NRCJ-40	Thur, Udaipur (Rajasthan)	26.99	28.08	27.61±0.32
11.	NRCJ-41	Thur, Udaipur (Rajasthan)	30.62	31.31	30.91±0.21
12.	NRCJ-42	Thur, Udaipur (Rajasthan)	33.23	34.17	33.70±0.27
13.	NRCJ-43	Isbal, Udaipur (Rajasthan)	34.91	35.52	35.17±0.18
14.	NRCJ-44	Gogunda, Udaipur (Rajasthan)	33.85	34.91	34.32±0.31
15.	NRCJ-45	Suwanto ka Gura, Udaipur (Rajasthan)	33.51	34.16	33.87±0.19
16.	NRCJ-46	Suwanto ka Gura, Udaipur (Rajasthan)	32.90	33.43	33.13±0.16
17.	NRCJ-47	Saira, Udaipur (Rajasthan)	25.68	26.39	25.95±0.22
18.	NRCJ-48	Brahman ka Kalwana, Udaipur (Rajasthan)	34.89	35.47	35.18±0.17
19.	NRCJ-49	Delwara, Rajsamand (Rajasthan)	34.55	35.56	34.93±0.32
20.	NRCJ-50	Delwara, Rajsamand (Rajasthan)	33.76	34.27	34.04±0.15
21.	NRCJ-51	Majera, Rajsamand (Rajasthan)	27.94	28.69	28.35±0.22
22.	NRCJ-52	Ghoraghati, Rajsamand (Rajasthan)	35.03	36.14	35.72±0.35
23.	NRCJ-53	Nathdwara, Rajsamand (Rajasthan)	34.49	35.28	34.80±0.24
24.	NRCJ-54	Madari, Rajsamand (Rajasthan)	32.54	33.66	32.99±0.34
25.	NRCJ-55	Rawcha, Nadhdwara, Rajsamand (Rajasthan)	35.97	37.01	36.43±0.31
26.	NRCJ-56	Rawcha, Nadhdwara, Rajsamand (Rajasthan)	35.82	36.69	36.27±0.25
27.	NRCJ-57	Nichali Oran, Haldighati, Udaipur (Rajasthan)	22.41	23.30	22.79±0.26
28.	NRCJ-58	Khamnore, Haldighati, Udaipur, (Rajasthan)	28.92	29.63	29.23± 0.21
29.	NRCJ-59	Kaya, Udaipur (Rajasthan)	33.13	33.81	33.48±0.20
30.	NRCJ-60	Kaya, Udaipur (Rajasthan)	33.93	34.99	34.48±0.31
31.	NRCJ-61	Borikuan, Udaipur (Rajasthan)	29.78	30.65	30.29±0.26
32.	NRCJ-62	Tiri, Banswara (Rajasthan)	34.66	36.01	35.34±0.39
33.	NRCJ-63	Tiri, Banswara (Rajasthan)	34.73	35.71	35.15±0.29
34.	NRCJ-64	Jasora, Lalitpur (Uttar Pradesh)	32.97	33.73	33.31±0.22
35.	NRCJ-65	Basi, Lalitpur (Uttar Pradesh)	32.27	32.97	32.61±0.20
36.	NRCJ-66	Basi, Lalitpur (Uttar Pradesh)	35.47	36.07	35.86±0.19
37.	NRCJ-67	Niwai, Lalitpur (Uttar Pradesh)	34.97	35.93	35.41±0.28
38.	NRCJ-68	Pali, Lalitpur (Uttar Pradesh)	30.93	31.34	31.12±0.12
39.	NRCJ-69	Pali, Lalitpur (Uttar Pradesh)	30.74	31.39	31.11±0.19
40.	NRCJ-70	Pali, Lalitpur (Uttar Pradesh)	30.91	31.46	31.23±0.16

41	NRCJ-81	Naderaigate, Eata (Uttar Pradesh)	28.92	29.67	29.31±0.20
42	NRCJ-82	Sorogate, Eata (Uttar Pradesh)	29.49	30.71	30.05±0.36
43	NRCJ-83	Hanumangarhi, Eata (Uttar Pradesh)	32.17	32.87	32.55±0.20
44	NRCJ-84	Halduchode, Nanital (Uttaranchal)	32.49	33.09	32.69±0.20
45	NRCJ-85	Halduchode, Nanital (Uttaranchal)	28.96	30.19	29.55±0.36
46	NRCJ-86	Halduchode, Nanital (Uttaranchal)	25.83	26.55	26.12±0.22
47	NRCJ-87	Gangabihar, Nanital (Uttaranchal)	26.23	27.01	26.64±0.23
48	NRCJ-88	Durgapalpur, Nanital (Uttaranchal)	26.83	27.67	27.23±0.24
49	NRCJ-89	Kavarpurgolapar, Nanital (Uttaranchal)	29.03	30.17	29.58±0.33
50	NRCJ-90	Kavarpurgolapar, Nanital (Uttaranchal)	28.79	29.74	29.19±0.29
51	NRCJ-91	Derlatalla, Nanital (Uttaranchal)	34.03	34.85	34.51±0.25
52	NRCJ-92	Madanpur, Nanital (Uttaranchal)	32.09	33.67	32.78±0.47
53	NRCJ-93	Madanpur, Nanital (Uttaranchal)	26.63	27.65	27.26±0.32
54	NRCJ-94	Madanpur, Nanital (Uttaranchal)	33.17	35.12	33.99±0.58
55	NRCJ-95	Forest madanpur, Nanital (Uttaranchal)	35.62	36.51	36.04±0.26
56	NRCJ-96	Jagatpur, Nanital (Uttaranchal)	31.93	33.57	32.57±0.51
57	NRCJ-97	Kherra, Nanital (Uttaranchal)	32.93	34.00	33.43±0.31
58	NRCJ-98	Haldayani, Nanital (Uttaranchal)	30.70	32.01	31.32±0.38
59	NRCJ-99	Lamachodkhhas, Nanital (Uttaranchal)	34.27	35.07	34.70±0.23
60	NRCJ-100	Parvatidavi, Udamsinghnagar (Uttaranchal)	32.75	34.02	33.33±0.37
61	NRCJ-101	Guljarpurbanki, Nanital (Uttaranchal)	30.20	31.61	30.95±0.41
62	NRCJ-102	Guljarpur, Nanital (Uttaranchal)	31.44	32.09	31.84±0.20
63	NRCJ-103	Dwaarahat, Nanital (Uttaranchal)	31.69	32.83	32.21±0.33
64	NRCJ-104	Forest, Almora (Uttaranchal)	29.19	30.01	29.62±0.24
65	NRCJ-105	Kafli, Bagashwar (Uttaranchal)	25.97	27.03	26.54±0.31
66	NRCJ-106	Uderkhani, Bagashwar (Uttaranchal)	29.73	31.02	30.25±0.39
67	NRCJ-107	Gadiagaon, Bagashwar (Uttaranchal)	35.23	36.24	35.79±0.30
68	NRCJ-108	Billona, Bagashwar (Uttaranchal)	32.61	33.27	32.96±0.19
69	NRCJ-109	Bagashwar city, Bagashwar (Uttaranchal)	34.21	35.41	34.81±0.35
70	NRCJ-110	Bagashwar city, Bagashwar (Uttaranchal)	35.56	36.87	36.18±0.38
71	NRCJ-111	Adoli, Bagashwar (Uttaranchal)	31.44	32.47	31.90±0.30
72	NRCJ-112	Diyaganj, Bagashwar (Uttaranchal)	35.63	36.49	36.08±0.25
73	NRCJ-113	Bahuli, Bagashwar (Uttaranchal)	35.81	36.53	36.16±0.21
74	NRCJ-114	Bharjnath, Bagashwar (Uttaranchal)	31.71	32.49	32.02±0.24
75	NRCJ-115	Month, Bagashwar (Uttaranchal)	35.23	35.91	35.48±0.22
76	NRCJ-116	Wamradi, Bagashwar (Uttaranchal)	35.40	36.39	35.99±0.30
77	NRCJ-117	Nolakot, Ranikhet (Uttaranchal)	36.77	37.61	37.13±0.25
78	NRCJ-118	Chomoli, Ranikhet (Uttaranchal)	35.85	36.41	36.07±0.17
79	NRCJ-119	Raualshera, Almora (Uttaranchal)	34.36	35.01	34.69±0.19
80	NRCJ-120	Chonagolu, Almora (Uttaranchal)	36.79	37.61	37.24±0.24
81	NRCJ-121	Patlee, Almora (Uttaranchal)	35.41	36.02	35.77±0.18
82	NRCJ-122	Avvinna , Guna (Madhya Pradesh)	33.55	34.15	33.89±0.18
83	NRCJ-123	Kotra, Guna (Madhya Pradesh)	32.98	33.70	33.26±0.22
84	NRCJ-124	Chochoda , Guna (Madhya Pradesh)	32.76	33.61	33.06±0.28
85	NRCJ-125	Bhathpura , Rajgarh (Madhya Pradesh)	33.13	33.87	33.43±0.22

NRCJ = National Research Center Jatropha, CPT = Candidate Plus Tree

Table 2. Variances, coefficient of variability and estimates of genetic component for oil percentage in *Jatropha curcas* accessions

S.No.	Characters	Oil%
1.	Genotypic variance (Vg)	10.20
2.	Phenotypic variance (Vp)	10.39
3.	Environmental variance (Ve)	0.19
4.	Genotypic Coefficient of variation (GCV)	9.73
5.	Phenotypic Coefficient of variation (PCV)	9.82
6.	Environmental Coefficient of variation (ECV)	1.32
7.	Heritability	98.19
8.	Genetic advance	6.52
9.	Genetic gain	19.86
10.	Mean ± SEm	32.83±0.20
11.	SD	3.21
12.	CV (%)	9.80
13.	CD at 5%	0.68

Acknowledgement

The authors are thankful to Dr. S. K. Dhyani, Director, NRCAF, Jhansi for providing facilities to conduct this study. Authors are also thankful to NOVOD Board, Gurgaon for providing financial assistance to carry out this work.

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