

**Morphological characterization of local landraces of rapeseed (*Brassica campestris L. var toria*) of Nepal**

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10 Dec. 2015**Keywords:**Characterization,
Genotypes, Oil,
Rapeseed**ABSTRACT**

Rapeseed (*Brassica campestris L. var toria*) is the main source of edible oil for Nepalese people. 54 rapeseed lines were collected from different hilly district of Nepal ranging from 987 m to 2550 m altitude. These lines were planted in augmented design for its traits characterization in Khumaltar 2013. Different traits of local rapeseed were characterized, and evaluated. NGRC 02778 performed better followed by SR-02 than local checks Morang-2, Chitwan Local and Unnati in terms of yield, days to maturity and pest infestation. Similarly, genotype SR-18 was late and SR-16 was earlier in terms of days to maturity. In conclusion, SR-02 was found better genotype based on different characteristics measured among all local rapeseeds planted in Khumaltar 2013. Thus SR-2 can be used as parents in crossing material for further breeding purposes and it can also be tested in further trial.

INTRODUCTION

The Oilseed crops play a crucial role in the Nepalese whole economy (NORP 2014). Among different oilseed crops, rapeseed (*Brassica campestris L. var toria*) is the main source of edible oil for Nepalese people (NORP 1993). It contributes 78.33 percentages of total oilseed cultivated area (MoAD 2013). It has productivity of 846 kg ha⁻¹ (MoAD 2013) and is grown as short season winter crop from hills to Terai region of the country. Though it is the main oilseed crop, varietal improvement work has not been done extensively (NORP 2013). Thus farmers are still growing traditional and local varieties which are very less productive, irresponsive to fertilizers, disease and pest susceptible. There is a need to address the varietal improvement work on rapeseed so as to boost the national economy by reducing import of edible oils and increasing farmer's profits. Genetic population of rapeseed (*Brassica campestris L. var toria*) grown by the farmers must be improved in order to realize new yield frontiers.

MATERIALS AND METHODS

Rapeseed (*Brassica campestris L. var toria*) (Local name: tori) is an asset of national plant genetic resource center, gene bank Nepal. Thus 54 lines of rapeseed were collected from different hilly district of Nepal. These lines were collected from different altitude ranging from 987 m to 2550 m from mean sea level. Rapeseed was of different local names based on its place of origin. A total of 37 rapeseed was obtained from gene bank, Khumaltar ranging from serial no 1 to 37 and the rest local seeds was collected by researcher himself. A detail of collected rapeseed names, gene bank entry number, district from where this line was collected, collected location, altitude and local names are provided (Table 1.)

The seeds collected from different places were grown in an augmented design for its traits characterization in Khumaltar 2013. A total of 63 entries (Table 2) with three checks Morang-2, Chitwan Local and Unnati were grown in three blocks with 1.2 m plot size/single row. The spacing between plant to plant and row to row was 10×30 cm². Fertilizers (NPK) were applied at 80:40:20 Kg ha⁻¹ as a basal dose in Khumaltar location. Ten traits namely days to flowering, days to maturity, plant height, branches per plant, siliqua per plant, siliqua length, seed per siliqua, yield, 1000 grain weight and pest score were characterized in Khumaltar 2013.

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Table 1. Collection of rapeseed local landraces

SN	E.No/A.No.	Source	District	Location	Alt (m)	Local Name
1	NGRC 02749	NAGRC, Khumaltar	Kavreplanchok	Mangaltar-6	1452	Tori
2	NGRC 02750	NAGRC, Khumaltar	Nuwakot	Raluka-8, Danda gaon	1225	Tori
3	NGRC 02751	NAGRC, Khumaltar	Rasuwa	Chilime-2, Chilime	1908	Toda
4	NGRC 02752	NAGRC, Khumaltar	Kavreplanchok	Pokharichauri-5	1380	Tori
5	NGRC 02753	NAGRC, Khumaltar	Kavreplanchok	Pokharichauri-5	1450	Tori
6	NGRC 02754	NAGRC, Khumaltar	Dolkha	Jiri-1, Kalan	2460	Thulo tori
7	NGRC 02756	NAGRC, Khumaltar	Dolkha	Jiri-1, Kahwa	2530	Tori
8	NGRC 02757	NAGRC, Khumaltar	Dolkha	Jiri-1, Kalan	2230	Rato tori
9	NGRC 02759	NAGRC, Khumaltar	Dolkha	Jiri-1, Kahwa	2537	Thulo tori
10	NGRC 02760	NAGRC, Khumaltar	Dolkha	Jiri-1, Kahwa	2510	Sanu tori
11	NGRC 02761	NAGRC, Khumaltar	Kavreplanchok	Chaubas-2	1829	Tori
12	NGRC 02762	NAGRC, Khumaltar	Rasuwa	Chilime-3, Chilime	2068	Toda
13	NGRC 02763	NAGRC, Khumaltar	Sallyan	Dhanbang-1, Kimmuchaur	1344	Local tori
14	NGRC 02765	NAGRC, Khumaltar	Sallyan	Dhanbang-7, Kapurkot	1495	Local tori
15	NGRC 02766	NAGRC, Khumaltar	Dolkha	Khare-4, Lungata	1091	Tori
16	NGRC 02767	NAGRC, Khumaltar	Dolkha	Margi-9, Yarsha	1990	Tori
17	NGRC 02768	NAGRC, Khumaltar	Sindhupalchok	Thumpakhar-9, Simaldanda	1488	Tori
18	NGRC 02769	NAGRC, Khumaltar	Rasuwa	Goljung-5, Goljung	1947	Toda
19	NGRC 02772	NAGRC, Khumaltar	Kavreplanchok	Chaubas-5	1991	Thulo tori
20	NGRC 02775	NAGRC, Khumaltar	Myagdi	Arman-6, Poka	987	Lumle tori
21	NGRC 02776	NAGRC, Khumaltar	Myagdi	Arman-6, Poka	987	Lumle tori
22	NGRC 02777	NAGRC, Khumaltar	Rasuwa	Bhorle-1, Upallo jibjibe	1532	Local tori
23	NGRC 02778	NAGRC, Khumaltar	Rasuwa	Bhorle-1, Upallo jibjibe	1532	Local tori
24	NGRC 02781	NAGRC, Khumaltar	Rasuwa	Chilime-2, Chilime	1908	Toda
25	NGRC 02782	NAGRC, Khumaltar	Myagdi	Ghatan-4, Kosepani	1383	Lumle tori
26	NGRC 02783	NAGRC, Khumaltar	Rasuwa	Goljung-1, Goljung	1947	Toda
27	NGRC 02785	NAGRC, Khumaltar	Ramechhap	Chuchure-7, Shivalaya	1783	Rato masino tori
28	NGRC 02786	NAGRC, Khumaltar	Rasuwa	Bhorle-1, Upallo jibjibe	1532	Toda
29	NGRC 02789	NAGRC, Khumaltar	Kavreplanchok	Shaping-5	1178	Tori
30	NGRC 02790	NAGRC, Khumaltar	Ramechhap	Thosey-6, Tapu	1783	Rato tori
31	NGRC 02791	NAGRC, Khumaltar	Dolkha	Jiri-1, Khurpe	2550	Tori
32	NGRC 02792	NAGRC, Khumaltar	Rasuwa	Bhorle-6, Tallo jibjibe	1252	Toda
33	NGRC 02793	NAGRC, Khumaltar	Kavreplanchok	Pokharichauri-3	1461	Tori
34	NGRC 02795	NAGRC, Khumaltar	Baitadi	Patan-5, Patan	1210	Toda
35	NGRC 02797	NAGRC, Khumaltar	Sindhupalchok	Thumpakhar-9, Simaldanda	1488	Sano tori
36	NGRC 02798	NAGRC, Khumaltar	Tanahun	Damuli	1340	Tori
37	NGRC 02800	NAGRC, Khumaltar	Dolkha	Sunkhani-2, Meldanda	1571	Sanu tori
38	SR-01	ABD Collection	Dolkha	Kabre-6		Thulo tori
39	SR-02	ABD Collection	Dolkha	Kabre-6		Tori
40	SR-03	ABD Collection	Dolkha	Kabre-6		Tori
41	SR-04	ABD Collection	Dolkha	Kabre-6, Jyamire		Thulo tori
42	SR-05	ABD Collection	Dolkha	Kabre-7		Sano tori
43	SR-06	ABD Collection	Dolkha	Kabre-7		Tori
44	SR-07	ABD Collection	Dolkha	Jugu-3		Thulo tori
45	SR-08	ABD Collection	Dolkha	Jugu-3		Tori
46	SR-09	ABD Collection	Dolkha	Jugu-3		Mahili tori
47	SR-10	ABD Collection	Dolkha	Namdu-3		Thulo tori
48	SR-11	ABD Collection	Dolkha	Namdu-3		Thulo tori
49	SR-12	ABD Collection	Dolkha	Mirge-2		Tori
50	SR-14	ABD Collection	Dolkha	Bhimtar-1		Tori
51	SR-15	ABD Collection	Dolkha	Bhimtar-6		Chitwane tori
52	SR-16	ABD Collection	Dolkha	Methinkot-1, Bhakunde		Local tori
53	SR-17	ABD Collection	Dolkha	Methinkot-1, Bhakunde		Tori
54	SR-18	ABD Collection	Lalitpur	Bisankhunaryan-1		Kalo tori

RESULTS AND DISCUSSION

Among all rapeseed genotype SR-16 (32 days) had shortest days to flowering and longest days to flowering were found in SR-18 (92 days). Longest days to maturity was observed in genotype SR-18

(154 days) followed by Morang-2 and Chitwan Local (128 days) and genotypes SR-16 (110 days) was earliest. Genotype NGRC 02754 (69.3 cm) was tallest and SR-16 (41.1 cm) was found shortest in terms of plant height. Maximum number of branches was observed in NGRC 02749 (5) and

Table 2. Characterization and evaluation of local landraces of rapeseed at Khumaltar-2013

SN	Acc/Coll. Number	DF	DM	Pl.ht (cm)	Br/pl	Sil/pl	Sil.lth (cm)	Seed/Sil	Yield (kg/ha ⁻¹)	1000 SW(g)	Pest (0, 1-5)
1	NGRC 02749	36.0	122.0	65.4	5.0	96.8	6.4	15.2	706.08	2.75	1
2	NGRC 02750	36.0	122.0	53.5	3.8	89.6	5.8	19.2	546.17	2.91	1
3	NGRC 02751	36.0	122.0	68.3	3.2	54.8	5.8	17.4	804.23	2.64	2
4	NGRC 02752	33.0	122.0	53.9	2.8	49.0	5.6	15.2	881.39	2.85	1
5	NGRC 02753	33.0	122.0	65.0	3.6	65.8	5.8	16.2	615.27	2.48	1
6	Morang 2	44.0	128.0	67.8	3.4	70.8	5.9	13.8	604.37	2.31	1
7	NGRC 02754	41.0	126.0	69.3	4.0	76.0	5.5	11.2	753.93	2.17	1
8	NGRC 02756	33.0	121.0	53.0	2.6	36.4	5.4	12.6	529.04	2.94	1
9	Chitwan local	44.0	128.0	58.7	3.4	73.4	6.2	11.8	538.20	2.18	1
10	NGRC 02757	33.0	121.0	61.9	2.8	69.8	5.3	12.8	595.87	2.28	1
11	NGRC 02759	33.0	121.0	58.4	3.0	55.4	5.8	14.0	579.08	1.97	1
12	NGRC 02760	33.0	115.0	62.8	2.4	47.2	5.4	14.8	407.54	2.28	1
13	NGRC 02761	33.0	115.0	65.4	2.4	46.8	7.0	11.8	681.63	2.47	1
14	Unnati	44.0	116.0	42.8	2.8	48.0	5.4	11.8	525.00	2.49	1
15	NGRC 02762	43.0	116.0	57.8	4.0	61.6	6.1	16.2	415.86	2.28	1
16	NGRC 02763	33.0	122.0	59.0	3.0	57.8	5.9	13.2	334.25	2.71	1
17	NGRC 02765	33.0	121.0	66.6	4.4	78.8	5.7	15.4	413.41	2.39	1
18	NGRC 02766	36.0	121.0	53.3	3.0	42.6	7.0	10.6	427.00	2.17	1
19	NGRC 02767	36.0	120.0	49.8	3.0	47.4	6.8	9.8	505.05	2.33	1
20	NGRC 02768	36.0	116.0	51.2	2.2	27.6	6.1	9.4	445.49	2.21	1
21	NGRC 02769	44.0	122.0	47.2	2.8	35.0	5.5	11.4	376.78	1.91	1
22	NGRC 02772	33.0	121.0	47.2	3.4	71.6	6.7	15.6	657.67	2.61	1
23	NGRC 02775	41.0	121.0	46.9	2.0	26.8	5.5	12.8	407.25	2.53	1
24	NGRC 02776	33.0	116.0	54.9	2.0	22.4	6.4	12.6	539.72	2.61	1
25	NGRC 02777	33.0	116.0	48.4	3.2	60.8	4.9	11.8	595.08	2.13	2
26	NGRC 02778	41.0	122.0	53.2	2.8	41.6	5.9	16.2	987.67	2.49	1
27	NGRC 02781	43.0	122.0	57.6	3.8	89.4	5.2	14.8	829.83	2.98	1
28	NGRC 02782	33.0	122.0	62.2	2.8	70.8	4.9	14.4	731.75	2.81	1
29	Chitwan local	43.0	122.0	61.6	3.2	45.0	5.2	9.6	540.88	2.48	1
30	NGRC 02783	41.0	122.0	44.1	3.0	55.8	5.2	16.4	536.33	1.19	1
31	NGRC 02785	33.0	122.0	53.4	1.8	25.4	6.1	14.4	455.90	2.84	1
32	NGRC 02786	33.0	122.0	43.6	2.8	51.0	5.5	14.2	479.27	2.63	2
33	Morang 2	43.0	122.0	57.3	2.6	32.6	5.2	8.6	452.50	3.06	2
34	NGRC 02789	36.0	120.0	55.6	2.2	31.2	6.4	9.4	792.75	2.61	1
35	NGRC 02790	33.0	123.0	44.2	3.0	47.0	5.5	14.4	522.20	2.57	1
36	NGRC 02791	33.0	122.0	53.1	3.0	41.4	5.7	13.2	481.08	2.76	1
37	NGRC 02792	36.0	121.0	55.6	2.4	35.2	6.3	8.2	451.90	2.29	1
38	NGRC 02793	33.0	123.0	67.0	2.4	46.8	5.9	15.4	531.96	2.45	2
39	NGRC 02795	33.0	123.0	67.7	3.4	68.6	5.3	15.8	749.83	2.52	1
40	NGRC 02797	36.0	118.0	47.7	2.4	48.4	6.2	11.0	476.65	2.47	1
41	NGRC 02798	33.0	123.0	54.2	3.0	53.0	5.6	18.2	534.13	3.46	1
42	Unnati	43.0	115.0	47.4	3.0	50.0	5.1	12.0	520.83	2.49	1
43	NGRC 02800	36.0	122.0	60.9	3.4	71.8	5.3	12.0	624.50	2.51	1
44	Chitwan local	46.0	122.0	50.9	2.2	42.8	5.1	11.6	642.96	2.59	1
45	SR-01	43.0	122.0	42.5	2.2	46.4	4.8	8.2	438.92	2.59	1
46	SR-02	43.0	122.0	63.9	4.4	99.8	6.0	14.8	915.87	2.33	1
47	SR-03	36.0	122.0	51.3	1.6	26.0	4.9	12.2	506.04	2.44	2
48	SR-04	43.0	123.0	50.6	4.4	75.8	6.4	11.4	450.10	2.33	1
49	SR-05	43.0	123.0	56.9	3.0	47.8	6.1	11.8	553.85	2.36	1
50	SR-06	33.0	121.0	42.5	1.4	23.0	5.8	12.8	516.15	2.28	1
51	SR-07	44.0	115.0	62.9	3.2	36.8	6.3	14.4	437.08	2.96	0
52	SR-08	43.0	120.0	43.9	2.6	29.0	5.4	14.2	430.83	2.82	1
53	SR-09	44.0	120.0	49.7	1.8	25.2	7.1	13.6	591.83	2.88	1
54	SR-10	44.0	122.0	39.8	2.8	29.8	5.8	10.8	517.73	2.55	1
55	Morang 2	43.0	122.0	56.9	2.8	35.4	6.2	11.0	680.00	2.59	2
56	SR-11	43.0	122.0	46.6	2.6	49.8	6.1	14.2	819.50	2.64	2
57	SR-12	43.0	121.0	48.4	2.6	44.6	5.5	10.8	478.05	2.68	2
58	SR-14	43.0	123.0	58.0	2.0	27.6	6.3	7.4	500.90	2.63	2
59	SR-15	41.0	123.0	65.6	3.4	45.4	6.2	9.0	561.20	2.57	2
60	SR-16	32.0	110.0	41.1	2.0	22.4	4.8	9.2	373.75	3.18	1
61	SR-17	33.0	112.0	50.5	1.6	24.0	6.6	12.0	676.00	3.07	1
62	SR-18	92.0	154.0	78.1	2.4	37.0	7.1	11.6	545.90	1.87	2
63	Unnati	46.0	116.0	48.4	2.0	26.0	5.5	11.8	609.25	2.28	1
	Min.	33.0	110.0	39.8	1.4	22.4	4.8	7.4	334.3	1.2	
	Max.	92.0	154.0	78.1	5.0	99.8	7.1	19.2	987.7	3.5	

minimum number of branches in SR-6 (1.4). SR-2 (99.2) had maximum siliqua per plant and NGRC 02776 (22.4) had minimum siliqua per plant. SR-16 (4.8 cm) had shortest siliqua length whereas SR-9 and SR-18 (7.1 cm) was longest. Least number of seed was found in SR-14 (7.4) and NGRC 02750 (19.2) had maximum number of seed per siliqua. NGRC 02778 (987.67 kg ha^{-1}) was recorded maximum yield and minimum yield was obtained from NGRC 02763 (334.25 kg ha^{-1}). Thousand grain weight was maximum in NGRC 02798 (3.46 g) and minimum in NGRC 02783 (1.19 g). Though different genotypes performed in different way, NGRC 02778 (987.67 kg ha^{-1}) was better than SR-02 (915.82 kg ha^{-1}) in terms of yield, days to maturity, plant height and other agronomic characteristics. Genotype SR-07 had almost no aphid pest infestation and was scored as zero (0) where as little pest was observed in genotypes SR-12, SR-14, SR-15, SR-18, SR-11, Morang 2, SR-03, NGRC 02793, Morang 2, NGRC 02786, NGRC 02777 and NGRC 02751 and scored (2) (Table 2).

Different traits of local rapeseed were characterized, analyzed and evaluated. Based on different characteristics NGRC 02778 performed best followed by SR-02 than local checks Morang-2, Chitwan Local and Unnati in terms of yield, days to maturity and pest infestation. Similarly, genotype SR-18 had late maturity and SR-16 was earlier. Siliqua per plant was maximum in SR-2. Thus, SR-2 was found better genotypes based on

different characteristics measured among all local rapeseed planted in Khumaltar 2013.

CONCLUSION

Characteriation is the basic step of plant breeding. Local rapeseed characterization is still a challenge to Nepalese oil seed breeding. Among 54 rapeseeds, SR-2 was found better genotypes based on different characteristics measured among all local rapeseed planted in Khumaltar 2013. Thus SR-2 can be used as parents in crossing material for further breeding purposes and it can also be tested in further trial.

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