

Supplementary Data

Morphological and molecular analyses define the genetic diversity of Asian bitter gourd (*Momordica charantia* L.)

Supplementary Table 1 Bitter gourd accessions and their source along with their main traits used in present study

S. No.	Accession Name	Source of collection	The main traits
1.	DBG-13	Kerala, India	Medium long vine with long green fruits
2.	DBG-14	Kerala, India	Medium long vine with long light green fruits
3.	DBG-17	New Delhi, India	Short vine with long green fruits
4.	DBG-18	West Bengal, India	Medium long vine with long dark green fruits
5.	DBG-33	West Bengal, India	Medium long vine with long dark green fruits
6.	DBG-34	West Bengal, India	Medium long vine with small oval green fruits
7.	DBG-35	West Bengal, India	Medium long vine with small oval green fruits
8.	DBG-36	West Bengal, India	Long vine with long light green fruits
9.	DBG-37	West Bengal, India	Medium long vine with small green fruits
10.	DBG-38	West Bengal, India	Medium long vine with long dark green fruits
11.	DBG-39	West Bengal, India	Long vine with long light green fruits
12.	DBG-40	West Bengal, India	Short vine with small green fruits
13.	DBG-41	West Bengal, India	Short vine with medium long green fruits
14.	DBG-42	West Bengal, India	Medium long vine with long dark green fruits
15.	DBG-43	West Bengal, India	Short vine with medium long dark green fruits
16.	DBG-44	West Bengal, India	Medium long vine with long green fruits
17.	DBG-45	West Bengal, India	Medium long vine with small green fruits
18.	DBG-46	West Bengal, India	Medium long vine with medium long green fruits
19.	DBG-47	West Bengal, India	Medium long vine with small dark green fruits
20.	DBG-48	West Bengal, India	Short vine with small oval green fruits
21.	DBG-49	West Bengal, India	Short vine with small oval green fruits
22.	DBG-50	West Bengal, India	Short vine with long green fruits
23.	DBG-51	West Bengal, India	Medium long vine with long green fruits
24.	DBG-5	West Bengal, India	Medium long vine with long dark green fruits
25.	EC620325	Thailand	Medium long vine with small oval green fruits
26.	EC620326	Thailand	Medium long vine with long light green fruits
27.	EC620329	Philippines	Short vine with medium long dark green fruits
28.	EC620330	Philippines	Medium long vine with medium long green fruits
29.	EC620331	Philippines	Medium long vine with extra long light green fruits
30.	EC620332	Philippines	Medium long vine with extra long dark green fruits
31.	EC620333	Philippines	Short vine with medium long green fruits
32.	EC620334	Indonesia	Medium long vine with medium long light green fruits
33.	EC620335	Indonesia	Medium long vine with long light green fruits
34.	EC620337	Pakistan	Medium long vine with extra long dark green fruits

35.	EC620338	Lao People's Democratic Republic	Short vine with long dark green fruits
36.	EC620344	Bangladesh	Medium long vine with long light green fruits
37.	EC620346	Taiwan	Medium long vine with long light green fruits
38.	EC620353	Taiwan	Short vine with long white fruits
39.	EC620354	P.R. of China	Short vine with long green fruits
40.	EC620355	P.R. of China	Short vine with long light green fruits
41.	EC620356	P.R. of China	Medium long vine with long light green fruits
42.	EC620357	P.R. of China	Short vine with long dark green fruits
43.	EC620358	P.R. of China	Short vine with long light green fruits
44.	DBGy201	New Delhi, India	Short vine with medium long green fruits
45.	DBGy202	New Delhi, India	Short vine with medium long green fruits
46.	PusaDoMausami	New Delhi, India	Medium long vine with extra long dark green fruits
47.	Pusa Vishesh	New Delhi, India	Medium long vine with long green fruits
48.	Sel-1	New Delhi, India	Medium long vine with long white fruits
49.	Sel-2	New Delhi, India	Medium long vine with extra long dark green fruits
50.	Nakhra Local	New Delhi, India	Short vine with long green fruits

Short vine: <150 cm, Medium vine: 150-200 cm, Long vine: > 200 cm

Small fruit: <10 cm, Medium long fruit: 10-20 cm, Long fruit: 20-30 cm, Extra long fruit: >30 cm

Supplementary Table 2 Pooled data of 2009 and 2010 on mean performance of 50 bitter gourd genotypes evaluated for 12 morphological traits

Genotypes	1	2	3	4	5	6	7	8	9	10	11	12
DBG-13	0.84±0.04	4.52±0.3	18.02±0.4	1.96±0.2	2.72±0.3	78.87±6.6	8.63±0.2	6075.36±14.3	178.72±6.1	1.52±0.1	23.17±1.2	18.67±1.2
DBG-14	0.78±0.02	5.45±0.2	16.78±1.8	2.07±0.4	2.25±0.3	80.02±4.1	8.93±1.0	6342.74±10.4	176.69±10.5	1.36±0.1	32.18±1.8	20.15±1.1
DBG-17	0.76±0.08	5.98±0.5	12.23±0.1	1.96±0.3	2.94±0.5	65.55±0.9	11.73±0.4	6797.59±26.2	140.19±10.6	1.62±0.1	26.95±0.3	10.35±1.4
DBG-18	0.65±0.02	4.92±0.4	18.62±1.0	1.74±0.3	2.36±0.2	72.54±3.3	8.92±1.5	5724.51±3.7	156.08±9.4	1.19±0.2	8.90±2.6	13.57±1.6
DBG-33	0.83±0.04	4.09±0.9	15.22±1.4	1.89±0.3	3.12±0.4	66.90±9.1	11.35±1.0	6746.30±15.8	163.00±2.6	1.55±0.2	13.50±2.0	23.00±1.0
DBG-34	0.77±0.01	4.28±0.6	21.10±4.1	1.22±0.2	1.42±0.1	19.38±1.6	42.85±3.1	7339.73±19.2	169.73±9.5	1.56±0.1	6.87±1.8	14.94±1.1
DBG-35	0.81±0.05	5.01±0.4	13.32±1.8	0.70±0.1	1.26±0.1	17.55±1.4	40.03±4.6	6267.45±9.1	172.45±3.8	1.64±0.1	4.75±0.6	21.87±1.6
DBG-36	0.92±0.02	5.17±1.0	19.65±0.7	1.68±0.2	2.16±0.3	70.32±3.2	11.30±1.4	7008.79±9.4	262.79±8.8	1.73±0.1	23.90±2.2	11.07±2.2
DBG-37	0.85±0.06	4.83±0.2	18.98±0.9	1.01±0.1	1.37±0.1	18.99±0.2	48.23±0.8	8114.59±8.6	173.83±7.3	1.35±0.0	15.71±3.1	13.32±2.1
DBG-38	0.80±0.05	4.82±0.1	16.45±1.2	1.22±0.1	2.68±0.3	67.47±3.6	10.87±1.4	6411.54±13.4	161.03±7.7	1.65±0.0	16.60±2.4	13.03±2.4
DBG-39	0.85±0.09	4.55±0.4	24.62±0.2	1.67±0.2	2.94±0.5	73.37±3.8	11.43±0.2	7424.44±11.6	211.20±20.2	1.42±0.2	25.13±3.0	15.10±2.0
DBG-40	0.84±0.04	4.56±0.2	15.65±1.0	0.71±0.1	1.80±0.1	23.58±0.3	45.22±4.8	9456.82±12.5	147.39±9.0	1.45±0.1	15.04±0.8	12.48±1.8
DBG-41	0.77±0.04	4.62±0.3	16.95±0.5	1.43±0.1	2.00±0.2	42.32±3.7	15.23±0.5	5780.78±9.3	143.76±8.5	1.58±0.1	11.99±2.1	10.48±2.1
DBG-42	0.76±0.07	4.31±0.1	21.98±1.2	2.23±0.2	2.99±0.4	66.09±3.0	16.78±1.8	9804.03±20.0	183.72±13.2	1.32±0.1	16.94±2.3	16.57±1.3
DBG-43	0.84±0.03	4.67±0.1	16.15±1.8	1.25±0.1	1.39±0.1	40.89±3.1	19.08±2.4	6860.70±6.5	147.38±9.0	1.56±0.2	11.15±0.5	15.53±1.4
DBG-44	0.80±0.02	5.70±0.3	13.27±2.0	2.10±0.2	2.39±0.5	70.28±11.4	12.22±0.3	7637.34±15.5	160.81±18.4	1.31±0.2	35.37±2.2	16.35±2.2
DBG-45	0.77±0.06	5.10±1.0	12.30±5.2	1.36±0.1	1.94±0.1	26.97±0.3	29.07±0.6	6872.79±7.5	166.31±8.9	1.65±0.2	9.43±2.6	19.63±2.6
DBG-46	0.81±0.03	4.43±0.1	12.00±0.9	1.43±0.2	2.41±0.2	45.51±3.4	16.82±1.0	6700.70±8.9	181.59±9.2	1.49±0.2	19.71±3.0	10.50±2.0
DBG-47	0.85±0.02	4.27±0.2	14.00±4.3	1.36±0.1	2.44±0.5	36.58±3.5	27.00±4.9	8806.42±10.5	153.81±6.7	1.51±0.2	21.98±0.3	11.73±1.9
DBG-48	0.76±0.07	3.96±0.2	20.07±2.0	0.73±0.1	1.58±0.1	19.87±3.3	48.24±1.5	8510.32±10.9	140.52±2.5	1.29±0.2	8.24±2.1	12.03±2.3
DBG-49	0.75±0.02	3.05±0.6	27.93±0.8	0.60±0.1	1.84±0.1	19.45±1.1	21.09±0.7	3629.55±7.6	150.99±6.4	1.32±0.1	14.30±1.7	12.89±1.7
DBG-50	0.79±0.02	4.16±0.3	18.00±1.6	1.25±0.1	2.11±0.2	63.68±5.0	13.68±1.1	7788.89±10.2	140.92±7.3	1.67±0.1	17.10±2.6	11.08±2.2
DBG-51	0.78±0.06	4.71±0.4	14.45±1.1	1.85±0.3	2.41±0.4	62.04±14.1	16.63±0.3	9210.96±21.2	186.01±10.4	1.46±0.1	20.65±2.3	15.13±2.3
DBG-52	0.76±0.04	5.50±0.9	13.37±1.0	1.57±0.2	2.61±0.4	57.80±0.4	10.63±5.2	5481.93±11.6	179.64±4.5	1.46±0.0	11.55±2.0	15.75±1.2
EC620325	0.78±0.02	4.02±0.6	22.18±0.3	1.53±0.2	1.29±0.1	25.61±3.5	26.85±0.2	6031.89±10.0	159.11±13.7	1.75±0.2	13.73±2.2	14.01±2.2

EC620326	0.71±0.05	5.17±0.5	13.60±2.0	1.58±0.2	2.38±0.2	73.45±0.5	9.51±6.1	6215.81±4.8	163.27±12.8	1.62±0.0	18.31±2.1	14.80±2.1
EC620329	0.79±0.01	4.27±0.2	11.58±1.5	0.76±0.1	1.84±0.1	48.47±3.4	13.03±0.4	5649.04±9.1	128.79±10.2	1.78±0.0	19.77±2.5	13.80±1.0
EC620330	0.73±0.05	6.45±1.2	13.15±1.1	1.52±0.1	1.51±0.1	39.20±3.5	11.93±1.6	4124.05±8.8	162.62±14.0	1.28±0.2	6.15±2.6	12.93±1.6
EC620331	0.74±0.03	5.18±0.2	16.38±1.0	1.85±0.1	4.79±0.5	98.33±4.0	6.65±0.7	5827.98±8.6	153.52±8.6	1.57±0.2	25.32±2.1	12.70±2.5
EC620332	0.85±0.08	4.05±0.1	11.62±0.9	2.48±0.5	3.66±0.4	129.85±16.2	5.67±4.4	6582.92±16.3	168.73±9.0	1.64±0.1	22.79±0.4	8.88±1.4
EC620333	0.84±0.06	4.72±0.3	11.48±0.6	1.79±0.1	1.98±0.3	46.23±3.8	10.03±0.5	4111.69±9.4	144.68±9.4	1.64±0.0	15.30±1.7	11.59±1.0
EC620334	0.81±0.03	3.78±0.2	13.17±6.2	1.62±0.1	1.87±0.3	64.75±3.1	13.37±0.4	7671.47±8.5	168.56±8.5	1.53±0.0	14.40±1.8	15.09±1.7
EC620335	0.82±0.09	6.00±1.0	12.68±1.0	1.52±0.1	2.39±0.4	70.36±3.2	10.60±6.3	6624.26±11.6	156.67±21.0	1.83±0.1	18.69±0.4	15.87±1.3
EC620337	0.79±0.04	6.63±0.6	14.87±0.8	1.88±0.1	3.48±0.4	80.04±3.1	8.42±2.2	6012.78±18.0	171.62±10.0	1.64±0.0	30.20±2.3	13.83±1.1
EC620338	0.83±0.02	4.90±0.2	13.08±0.7	2.24±0.4	2.90±0.4	74.25±0.4	7.98±4.4	5236.51±7.5	141.68±7.7	1.65±0.2	17.79±2.0	16.86±2.4
EC620344	0.85±0.04	5.58±1.0	10.85±0.9	2.06±0.2	1.96±0.2	77.04±5.2	9.63±1.2	6570.66±19.4	176.82±13.4	1.42±0.0	7.87±2.1	12.40±2.2
EC620346	0.85±0.03	3.97±0.2	12.13±1.0	2.05±0.4	2.43±0.3	74.54±4.2	8.65±2.8	5600.60±7.5	151.01±7.5	1.59±0.1	7.92±1.9	16.25±1.9
EC620353	0.86±0.04	5.85±1.1	12.27±1.1	1.68±0.1	1.95±0.2	78.54±0.9	8.97±0.3	6367.01±12.4	144.28±12.4	1.35±0.1	12.82±1.8	7.67±1.2
EC620354	0.80±0.08	4.60±0.3	16.57±3.8	1.71±0.1	1.97±0.2	77.13±4.0	10.10±1.0	6941.59±10.2	119.70±7.5	1.32±0.1	10.20±2.2	9.81±1.0
EC620355	0.80±0.02	4.03±0.4	11.37±0.9	1.33±0.1	1.73±0.2	68.77±0.5	6.28±4.2	3813.38±6.7	112.47±3.7	1.31±0.1	25.20±2.7	13.36±1.1
EC620356	0.87±0.03	4.13±0.2	15.85±0.8	1.51±0.1	1.97±0.3	62.96±4.0	7.87±2.5	4317.83±20.1	156.80±10.1	1.50±0.1	19.25±2.9	11.36±2.0
EC620357	0.84±0.05	4.07±0.4	12.55±1.0	1.32±0.2	1.47±0.1	77.19±3.5	9.13±0.5	6184.25±9.2	138.69±9.2	1.72±0.2	34.16±0.2	14.12±1.8
EC620358	0.85±0.06	4.47±0.4	11.83±1.3	1.86±0.3	2.46±0.4	90.74±5.3	8.58±5.4	6924.88±7.6	149.60±2.6	1.33±0.2	11.92±2.5	12.16±2.4
DBGy201	0.75±0.02	4.21±0.9	9.49±4.8	1.40±0.1	2.91±0.3	69.67±0.2	15.52±0.4	9600.65±8.4	144.26±2.2	1.40±0.1	23.83±2.2	11.55±2.0
DBGy202	0.72±0.04	3.42±0.8	9.20±0.9	1.55±0.1	3.25±0.4	56.84±3.2	14.52±2.6	7318.49±10.6	142.25±7.8	1.30±0.0	20.23±1.8	14.07±1.6
P D M	0.75±0.08	3.72±0.1	16.62±1.0	2.67±0.4	4.32±0.5	61.73±4.0	15.22±4.0	8405.52±8.4	185.47±8.7	1.32±0.2	18.71±1.1	12.62±2.0
P V	0.74±0.05	4.51±0.2	16.95±1.1	1.83±0.2	2.94±0.4	63.50±0.9	9.27±4.2	5246.02±9.4	177.01±4.5	1.40±0.1	15.42±1.5	15.45±1.2
Sel-1	0.74±0.02	4.34±0.4	19.62±0.6	1.43±0.1	2.68±0.3	67.48±3.4	12.80±0.4	7662.40±10.1	168.65±19.0	1.54±0.1	16.65±0.2	13.03±1.4
Sel-2	0.84±0.03	5.18±1.1	16.13±1.5	2.93±0.4	5.50±0.5	96.53±0.4	12.68±2.5	10866.89±22.3	181.85±11.4	1.64±0.1	28.53±2.1	18.55±1.6
N L	0.84±0.01	4.56±0.2	25.92±0.1	1.53±0.1	2.84±0.4	60.43±3.6	13.47±4.0	7269.424±19.1	113.14±4.6	1.53±0.1	20.55±2.0	13.48±1.0
Mean	0.80	4.69	15.64	1.61	2.43	60.79	15.85	6759.45	160.60	1.50	17.74	14.03
Range	0.65–0.92	3.05–6.63	9.20–27.93	0.60–2.93	1.26–5.50	17.55–129.85	5.67–48.24	3629.55–10866.89	112.47–262.79	1.19–1.83	4.75–5.37	7.67–23.00
SE	0.04	0.42	1.50	0.16	0.27	3.34	1.99	100.56	9.22	0.10	1.79	1.54
LSD 5%	0.07	0.82	2.94	0.31	0.52	6.54	3.90	196.64	18.07	0.19	3.50	3.01
CV	6.25	15.77	26.59	29.81	35.39	38.52	69.52	22.89	15.26	10.00	41.54	22.30

1. Leaf L: D ratio, 2. Internode length (cm), 3. Node bearing first female flower, 4. Ovary length (cm), 5. Fruit L: D ratio, 6. Fruit weight (g), 7. Number of fruits per plant, 8. Yield per hectare (kg), 9. Vine length (cm), 10. Seed L: D ratio, 11. Number of seeds per fruit, 12. 100 seed weight (g)

PDM: Pusa Do Mausami; PV: Pusa Vishesh; N L:Nakhra Local

Supplementary Table 3 Banding pattern and discriminative statistics of RAPD and ISSR primers (Supplementary)

Primer ID	Sequence	Total banc	Polymorphic bands	Percent polymorphic	PIC	RP	MI	Band size range (bp)
RAPD								
OPW-7	CTGGACGTCA	6	3	50.00	0.16(±0.17)	1.36	0.99	300-1200
OPW-6	AGGCCCGATG	5	3	60.00	0.16(±0.06)	0.92	0.82	350-1500
OPW-5	GGCGGATAAG	6	2	33.33	0.21(±0.15)	1.64	1.26	375-1700
OPW-20	TGTGGCAGCA	7	1	14.28	0.13(±0.14)	1.12	0.90	200-1200
OPX-1	CTGGGCACGA	5	3	60.00	0.26(±0.22)	2.12	1.29	600-1425
OPD-15	CATCCGTGCT	7	2	28.57	0.06(±0.04)	0.44	0.42	500-1450
OPW-16	CAGCCTACCA	4	2	50.00	0.12(±0.20)	0.68	0.50	540-850
OPE-19	ACGGCGTATG	5	1	20.00	0.06(±0.13)	0.36	0.30	525-900
OPC-16	CACACTCCAG	3	2	66.66	0.25(±0.17)	0.96	0.74	800-1500
OPW-8	GACTGCCTCT	3	2	66.66	0.21(±0.16)	0.80	0.64	300-1500
OPW-19	CAAAGCGCTC	5	3	60.00	0.25(±0.19)	1.84	1.27	550-1400
OPX-5	CCTTCCCTC	6	2	33.33	0.12(±0.19)	0.96	0.72	600-1500
OPF-12	ACGGTACCAG	3	1	33.33	0.17(±0.29)	1.00	0.50	500-1600
OPW-11	CTGATGCGTG	5	2	40.00	0.25(±0.15)	1.64	1.23	600-1400
OPW-13	CACAGCGACA	6	2	33.33	0.24(±0.19)	2.16	1.42	525-1350
OPW-18	TTCAGGGCAC	3	1	33.33	0.19(±0.26)	0.96	0.57	500-1100
OPW-2	ACCCCGCAA	5	1	20.00	0.09(±0.10)	0.48	0.43	600-1200
	Average	4.94	1.94	41.34	0.17(±0.17)	1.14	0.82	-
	Sub Total	84	33	-	-	-	-	-
ISSR								
UBC-848	CACACACACACACAAGG	8	6	75.00	0.35(±0.17)	4.60	2.84	450-1350
UBC-850	GTGTGTGTGTGTGTCTC	5	4	80.00	0.29(±0.16)	1.92	1.43	425-1500
UBC-825	ACACACACACACACT	5	2	40.00	0.25(±0.29)	1.80	1.24	500-1200
UBC-861	ACCACCACCACCACC	4	3	75.00	0.30(±0.22)	1.96	1.20	500-1000
UBC-854	TCTCTCTCTCTCTCAGG	6	5	83.33	0.19(±0.12)	1.32	1.11	415-1500
UBC-888	CGTAGTCGTCACACACACACA	4	2	50.00	0.36(±0.42)	0.88	1.42	375-800
UBC-855	ACACACACACACACCTT	5	4	80.00	0.58(±0.37)	0.36	2.88	350-1200
UBC-890	ACGACTACGGTGTGTGTTGTGT	5	4	80.00	0.55(±0.28)	3.00	2.75	450-1550
UBC-880	GGAGAGGAGAGGAGA	5	4	80.00	0.48(±0.43)	1.36	2.38	200-1100
UBC-841	GAGAGAGAGAGAGACTC	6	4	66.66	0.55(±0.48)	1.16	3.29	650-1125
UBC-856	ACACACACACACACCTA	5	3	60.00	0.54(±0.38)	2.16	2.69	400-1150
	Average	5.27	3.72	70.00	0.40(±0.30)	1.87	2.11	-
	Sub Total	58	41	-	-	-	-	-
	Average (RAPD+ISSR)	5.07	2.64	52.60	0.26	1.42	1.33	-
	Total (RAPD+ISSR)	142	74	-	-	-	-	-