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**EVALUATION OF CHARACTERISTICS OF IRANIAN *CUCUMIS MELO*
VAR. *FLEXUOSUS* GENOTYPES AND DETERMINATION OF THEIR
GENETIC RELATIONS**

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Melons

Cucumis melo flexuosus

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Monoecious

Cucurbitaceae

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Table1. Studied flexuosus genotypes with code and collected areas.

Area of collection	Genotype code	Genotype No.
1	TN-94-12	(Shiraz)
2	TN-94-9	(Ahvaz)
3	TN-94-8	(Shiraz)
4	TN-94-4	(Sharekord)
5	TN-94-42	(Shiraz)
6	TN-94-16	(Markazi)
7	TN-94-33	(Ahvaz)
8	TN-94-5	(Shiraz)
9	TN-94-2	(Sharekord)
10	TN-94-43	(Markazi)
11	TN-94-47	(Bushehr)
12	TN-94-34	(Shiraz)
13	TN-94-6	(Bushehr)
14	TN-94-35	(Shiraz)
15	TN-94-41	(Shiraz)
16	TN-94-11	(Shiraz)
17	TN-94-40	(Shiraz)
18	TN-94-15	(Shiraz)
19	TN-94-20	(Sharekord)
20	TN94-3	(Shiraz)
21	TN-94-44	(Ahvaz)
22	TN-94-10	(Kerman)
23	TN-94-28	(Kerman)
24	TN-94-7	(Bushehr)
25	TN-94-36	(Kerman)

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(Rib)

Table 2. Measured traits and related information.

Unit	Trait	No
(cm)	(Seed length) SL,	1
(cm)	(Seed width)S Wi,	2
(g)	(Seed weight) S We,	3
) :	(Seed shape) S Sh,	4
(Code: 1-ovate, 2- flatted, 3-elliptical, 4- elongated- ellipical, 5- elongated) .		
) :	(Seed color) S Co	5
Code: 1-cream, 2-dark cream, 3- yellow, 4- orange).		
, :	(Fruit shape) F Sh,	6
Code:1-globular, 2- ovate,3- pyriform, 4-elliptical, 5- elongated elliptical, 6- embowed-elongated, 7- elongated)		
:	(Fruit color) F Co,	7
Code: 1-high green, 2- green, 3-dark green, 4- mottled green.		
:	(Carpel number) Car No,	8
:	(Flesh color) Fl Co,	9
Code: 1-white, 2-cream, 3-dark cream, 4- yellow, 5-orange		
Code: (Presence:1 absence: 0) :	(Hair presence) Ha P,	10
	(Rib number)	11
(cm)		12
	(Fruit total diameter)	
(cm)	(Hole diameter) H D,	13
(cm)	(Fruit tip diameter) Ti D,	14
(cm)	(Fruit end diameter) End D,	15

Total Soluble Solids (TSS)

Table 2. Continued.

(cm)	(Pericarp diameter) Pe D,	16
(Brix)	(Total soluble solid)	17
(g)	(Fruit weight) F We,	18
(cm)	(Total plant length) P L,	19
(cm)	(Internod length) In L,	20
	(Branch number) B No,	21
	(Leaf shape) L Sh,	22
Code: 1-Palmately,2- palmately lobed, : 3-palmately part,4- palmately sect)		
- :	(Leaf color) L Co,	23
Code: 1-light green,2- green 3- dark green, 4- mottled green		
	(Lobe number) Lo No	24
Code: (Obtus:1 acute: 2)():	(Leaf tip angel) L An,	25
(:):	(Leaf margin) L Mar,	26
Code: (Distantly dentate:1 Minutely dentate: 3) (cm)	(Petiole length) Pet L,	27
Code: (Presence:1 absence: 0) :	(Presence of strip on fruit skin)	28

MSTATC
SPSS

Ward

Varimax

Rotation Factor

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(TN-94-47)

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(TN-94-11)

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Strip

Mottled rind pattern

Table 3. Mean comparison of measured traits for Iranian Flexuosus group genotypes.

Genotype No.	Seed length (cm)	Seed width (cm)	Seed weight (g)	Seed shape	Seed color	Fruit shape	Fruit color	Total diameter	Hole diameter (cm)	Tip diameter (cm)	End diameter (cm)	() Pericarp diameter (cm)
1	1.5bc	0.53a	72a	3c	4a	7a	3b	6.10ij	3.03g	2.41fghi	1.9gh	0.38ef
2	1.7a	0.50a	62.75abc	4b	1e	6a	2c	6.41hij	3.28efg	3.25cdefgh	2.6efgh	1.08abcd
3	1.4cd	0.50a	50.68cdefg	5a	2d	5b	4a	6.48hij	3.09fg	2.87efghi	2.2efgh	0.82abcdef
4	1.4cd	0.53a	61abcde	5a	4a	4b	3b	8.60bcde	5.38ab	5.06	2.9defg	1.25abc
5	1.5bc	0.55a	56.77bcdef	5a	2d	6a	3b	8.74bcde	4.18bcdefg	3.42bcdefg	3.3cdef	1.41a
6	1.4cd	0.50a	55.92bcdef	3c	2d	7a	2c	7.25efghij	3.96bcdefg	3.83bcde	2.2fgh	1.03abcde
7	1.4cd	0.50a	55.47bcdef	2e	2d	7a	1d	7fghij	3.36efg	3.21cdefghi	3.09defg	1.04abcde
8	1.5bc	0.56a	63.50ab	4b	2d	7a	2c	6.46hij	3.44defg	2.51fghi	3.36efgh	0.72bcdef
9	1.4cd	0.53a	60.07bcde	5a	2d	7a	1d	5.76j	3.01g	2.27ghij	1.7h	0.54def
10	1.3de	0.48ab	50.02defg	5a	2d	4bc	1d	8.21cdefg	4.58abcdef	2.15hij	1.59h	1.04abcdef
11	1.3de	0.20d	32.10i	5a	2d	6a	1d	6.30hij	3.59cdefg	1.26j	1.66h	0.41def
12	1.2e	0.40bc	46fgh	3c	4a	2d	3b	10.5a	5.80a	3.15cdefgh	4.26abc	0.48def
13	1.5bc	0.50a	60.15bcde	5a	2d	6a	2c	6.74ghij	4.06bcdefg	2.55fghi	2.23efgh	0.50def
14	1.5bc	0.50a	56.55bcdef	5a	2d	7a	2c	6.55hij	3.73cdefg	2.05ij	1.63 h	0.52def
15	1.3de	0.51a	33.33i	2e	2d	4bc	1d	9.98ab	4.58abcdef	4.51ab	4.42ab	1.34ab
16	1.5bc	0.48ab	43.17ghi	2e	4a	6a	2c	7.76defgh	3.35efg	4.19abc	4abcd	0.63cdef
17	1.3de	0.48ab	49efg	3c	4a	4b	3b	8.53bcde	4.01bcdefg	4.08abcd	4.49a	0.57def
18	1.4cd	0.50a	59.15bcde	2e	2d	6a	1d	9.31abc	4.73abcde	3.28cdefgh	3.03defg	0.92abcdef
19	1.3de	0.53a	56.08bcdef	3c	2d	5b	1d	8.83bcd	5.04abc	3.23cdefgh	2.73efgh	0.73bcdef
20	1.6ab	0.55a	51.33bcdefg	5a	2d	5b	4a	6.51hij	5.73a	3.48bcdef	2.60efgh	0.49def
21	1.3de	0.56a	46.33fgh	5a	1e	6a	3b	8.70bcde	4.68abcde	2.92defghi	3.82efgh	0.41def
22	1.6ab	0.50a	57.40bcdef	5a	2d	4bc	2c	8.31cdef	5.79a	3.88bcde	3.37bcde	0.43def
23	1.2e	0.40bc	35.78hi	2e	2.66bc	3.16c	4a	7.36defghi	5.11abc	3.10cdefghi	4.53a	0.37ef
24	1.3de	0.38c	36.77 hi	5e	3b	7b	3b	8.2cdef	4.78abcde	2.45fghi	3.20cdef	0.33f
25	1.4cd	0.41bc	61.90abcd	5a	4a	7a	3b	6.83fghij	4.96abcd	2.5fghi	2.75efgh	0.34f

† Means with the same letters are not significant at level of 1% probability.

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Table 3. Continued.

Genotype No.	Rib number	Fruit weight (g)	TSS	Bush length (cm)	Internode length (cm)	Leaf shape	Leaf margin	Lob number	Petiol length (cm)
1	20.8abcd	977cdef	3.12abc	255.4bc	11.68ef	1d	1b	3cd	13.08fghi
2	23a	975cdef	3.25abc	241.7bcd	12.93c	1d	1a	3a	30.22a
3	0 h	1042cdef	4.2abc	210.5ef	10.51h	2b	1b	4b	26342 b
4	14g	1740a	3.90abc	210.2ef	9.40j	1d	1b	3cd	17.42de
5	22ab	1716a	2.46bc	177.4ghi	9.93i	1d	1b	4b	11.03hij
6	22ab	1437ab	2.61bc	210.3ef	9.93i	1d	1b	4b	6.23k
7	21.33abc	1327bc	3.28abc	219.2def	13.12c	3a	2ab	3cd	15.43defg
8	14.17g	1223bcd	3.23abc	261.7b	14b	1d	1b	4b	13.15fghi
9	19.67abcdef	832efghi	3.78abc	230.8cde	12d	3a	3a	3cd	14.60efh
10	18.17bcdefg	704fghi	4.93a	214.3def	10.40h	1.83c	1b	4b	12.36ghi
11	16.50defg	843efgh	2.17c	313.8a	16a	2b	2ab	3cd	15.71defg
12	0h	1432ab	2.23c	267.7b	12.25d	1d	1b	4b	8.59jk
13	15.93efg	1108bcde	2.75abc	201.4efg	10.25hi	3a	1b	3cd	11.14hij
14	16.67cdefg	1012cdef	3.82abc	192.5fgh	9.34j	1d	1b	3.16c	18350cd
15	23a	941defg	3.12abc	175.9ghi	10.16hi	3a	1b	3.83b	10.11ij
16	18.17bcdefg	1013cdef	3.08abc	164.4j	7.26l	3a	2ab	3.16c	10.24ij
17	0h	660fghi	3.50abc	164.7j	8.13k	3a	2ab	2.83de	14.36efgh
18	15fg	738efghi	2.3abc	153.3ij	9.09j	3a	1b	2e	17.31de
19	20.17abcde	1007cdef	3.74abc	170.4hij	9.39j	1d	1b	2e	21.89c
20	20.83abcde	789.3efghi	2.85abc	197.7fgh	1051h	3a	1b	4b	19.03cd
21	20abcd	679fghi	2.71bc	199.7fgh	9.96j	3a	1b	3cd	9.69ijk
22	0h	774.2efghi	2.72bc	242.7bcd	13.97b	1d	1b	2e	16.39def
23	0h	568.8ghi	4.57ab	253.5bc	11.34f	1d	1b	2e	16.70def
24	0h	478.8hi	2.27c	217.6def	11.92de	2a	2ab	2e	17.41de
25	19.83abcde	459i	3.45abc	159.6fgh	10.92g	2b	2ab	3e	13.24fghi

† Means with the same letters are not significant at level of 1% probability.

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Table 4. Correlation coefficients between traits for Iranian Flexuosus genotypes.

Traits	Seed													
	length	Seed width	Seed weight	Seed shape	Seed color	Fruit shape	Fruit color	Carpel No.	Flesh color	Hair presence	Rib	Total diameter	Hole diameter	Tip diameter
Seed length	1.000													
Seed width	0.332 [†]	1.000												
Seed weight	0.787 ^{††}	0.540 ^{††}	1.000											
Seed shape	0.276	-0.111	0.183	1.000										
Seed color	-0.166	0.006	0.070	-0.417 [†]	1.000									
Fruit shape	0.161	0.322 [†]	0.266	0.008	-0.389 [†]	1.000								
Fruit color	-0.182	-0.162	0.023	0.142	0.519 ^{††}	-0.300	1.000							
Carpel No.	-0.206	-0.669 ^{††}	-0.304	0.175	0.204	-0.369 [†]	0.146	1.000						
Flesh color	-0.125	-0.281	-0.185	0.401 [†]	0.053	-0.350 [†]	0.266	0.477 [†]	1.000					
Hair presence	0.234	0.026	0.134	0.253	-0.175	-0.247	0.120	-0.060	0.144	1.000				
Rib	0.209	0.381 [†]	0.348 [†]	0.195	-0.411 [†]	0.806 ^{††}	-0.294	-0.315	-0.182	-0.454 ^{††}	1.000			
Total diameter	0.007	-0.116	-0.081	-0.039	0.338 [†]	-0.526 ^{††}	0.081	0.138	-0.003	-0.013	-0.376 [†]	1.000		
Hole diameter	-0.058	-0.270	-0.111	0.167	0.255	-0.659 ^{††}	0.237	0.355 [†]	0.232	0.044	-0.424 [†]	0.745 [†]	1.000	
Tip diameter	0.275	0.024	0.070	-0.228	0.413 [†]	-0.369 [†]	-0.046	0.037	-0.114	0.015	-0.271	0.727 ^{††}	0.435 [†]	1.000
End diameter	-0.206	-0.355 [†]	-0.385 [†]	-0.385 [†]	0.549 ^{††}	-0.582 ^{††}	0.180	0.493 ^{††}	0.074	-0.168	-0.597 ^{††}	0.574 ^{††}	0.416 [†]	0.629 ^{††}
Pericarp diameter	0.301	0.240	0.146	-0.243	-0.029	0.005	-0.416 [†]	-0.203	-0.274	-0.102	0.100	0.379 [†]	0.007	0.640 ^{††}
Strip presence	0.284	0.018	0.202	0.175	-0.013	-0.237	0.020	-0.042	-0.009	0.692 ^{††}	-0.315	0.131	0.239	0.185
Brix	-0.200	-0.074	-0.104	0.081	0.156	-0.708 ^{††}	0.219	0.248	0.464 ^{††}	0.148	-0.422	0.358 [†]	0.496 ^{††}	0.042
Fruit weight	0.488 ^{††}	0.167	0.323 [†]	0.174	0.142	-0.009	-0.098	-0.098	-0.227	-0.266	0.207	0.329 [†]	0.232	0.498 ^{††}
Bush length	-0.173	-0.151	-0.079	0.147	-0.068	-0.078	0.164	0.202	0.161	-0.088	0.011	-0.327 [†]	-0.082	-0.578 [†]
Internode length	0.005	-0.125	-0.019	0.208	-0.337 [†]	-0.037	-0.041	0.048	0.047	0.206	-0.027	-0.300	-0.051	-0.503 ^{††}
Branch No.	0.250	-0.020	0.126	0.311	-0.324 [†]	0.125	-0.204	0.067	0.021	0.097	0.101	-0.165	0.013	-0.294
Leaf shape	-0.244	-0.127	-0.462 ^{††}	-0.305	-0.113	0.164	-0.085	-0.214	-0.137	-0.148	-0.041	-0.199	-0.291	-0.040
Leaf color	-0.368 [†]	-0.459 ^{††}	-0.419 [†]	-0.246	0.442 ^{††}	-0.118	0.420 [†]	0.484 ^{††}	0.158	-0.108	-0.228	-0.028	-0.028	0.020
Leaf color	0.024	0.083	-0.090	-0.033	0.050	-0.047	-0.036	-0.189	0.206	-0.084	0.010	0.254	0.255	0.000
Lobe No.	0.077	-0.033	0.032	0.249	-0.107	-0.207	0.116	0.075	0.016	0.109	-0.208	0.341 [†]	0.271	-0.027
Tip angel	-0.093	-0.149	-0.133	-0.225	-0.211	0.251	-0.165	-0.141	-0.228	-0.204	0.209	-0.297	-0.479 ^{††}	-0.218
Leaf margin	0.297	0.053	0.057	0.088	-0.271	-0.029	-0.105	0.033	0.037	0.305	-0.108	-0.080	-0.100	-0.065
Petiole length														

.(P<0.01†† P<0.05 †)

Table 4.. Continued

Traits	End diameter	Pericarp diameter	Strip presence	TSS	Fruit weight	Bush length	Internode length	Branch No.	Leaf shape	Leaf color	Lobe No.	Tip angel	Leaf margin	Petiole length
End diameter	1.000													
Pericarp diameter	0.221	1.000												
Strip presence	-0.096	-0.071	1.000											
Brix	0.233	-0.172	-0.074	1.000										
Fruit weight	0.103	0.470 ^{††}	-0.131	-0.087	1.000									
Bush length	-0.226	-0.228	-0.117	0.106	-0.060	1.000								
Internode length	-0.308	-0.150	0.312	-0.008	-0.099	0.813 ^{††}	1.000							
Branch No.	-0.267	-0.038	0.154	-0.039	0.220	-0.632 ^{††}	-0.746 ^{††}	1.000						
Leaf shape	0.094	-0.112	-0.214	-0.225	-0.157	-0.311	-0.258	-0.363 [†]	1.000					
Leaf color	0.427 [†]	-0.342 [†]	-0.075	0.022	-0.082	0.112	-0.018	-0.127	0.215	1.000				
Lobe No.	-0.067	-0.088	0.074	0.108	0.104	0.023	0.082	0.041	0.322 [†]	0.038	1.000			
Tip angel	-0.004	-0.002	0.075	0.142	-0.139	0.229	0.160	0.199	-0.419 [†]	-0.202	-0.133	1.000		
Leaf margin	-0.053	-0.031	-0.141	-0.349 [†]	-0.224	0.072	0.157	-0.215	0.373 [†]	0.149	-0.074	-0.131	1.000	
Petiole length	-0.005	0.156	0.033	-0.102	-0.071	0.105	0.188	0.076	-0.089	0.005	-0.048	0.255	0.264	1.000

.(P<0.01†† P<0.05 †)

Table 5. Total sum of squares, % of variance and % cumulative variance for ten principle factors.

Percentage of cumulative variance	Percentage of variance	Total sum of squares	Factors
11.66	11.66	3.26	1
23.14	11.47	3.21	2
34.30	11.15	3.12	3
45.14	10.84	3.03	4
53.33	8.18	2.29	5
61.43	8.10	2.26	6
69.10	7.67	2.14	7
75.23	6.12	1.71	8
80.68	5.44	1.52	9
86.06	5.38	1.50	10

Table 6. Principle component analysis of measured traits for Iranian Flexuosus genotypes.

Traits	1	2	3	4	5	6	7	8	9	10
Seed length	0.445	0.671	-0.161	0.035	0.275	0.369	-0.040	-0.083	-0.076	0.304
Seed width	0.890	0.077	-0.022	-0.065	-0.048	-0.120	-0.060	-0.064	0.012	0.002
Seed weight	0.723	0.344	-0.130	0.050	0.137	0.291	0.198	-0.059	-0.252	0.061
Seed shape	-0.024	-0.008	0.059	0.149	0.125	0.884	-0.070	0.170	-0.032	-0.011
Seed color	-0.033	0.264	0.234	-0.168	-0.047	-0.392	0.748	-0.052	-0.064	-0.194
Fruit shape	0.302	-0.146	-0.752	0.005	-0.267	0.206	-0.171	-0.232	-0.031	-0.039
Fruit color	-0.053	-0.175	0.162	-0.048	0.059	0.117	0.843	0.158	0.001	-0.046
Carpel No.	-0.748	0.094	0.303	0.104	-0.065	0.233	0.187	-0.057	-0.305	0.025
Flesh color	-0.250	-0.166	0.629	0.018	-0.037	0.490	0.122	-0.200	0.079	0.108
Hair presence	0.107	-0.157	0.202	0.002	0.864	0.127	-0.047	-0.018	-0.096	0.193
Rib	0.369	0.018	-0.716	0.048	-0.489	0.378	-0.207	-0.178	0.002	-0.096
Total diameter	-0.166	0.550	0.342	-0.273	0.073	-0.128	0.036	0.663	0.201	-0.142
Hole diameter	-0.260	0.367	0.602	-0.038	0.158	0.120	0.113	0.472	0.203	-0.277
Tip diameter	-0.103	0.771	0.136	-0.466	0.175	-0.241	0.009	0.110	-0.018	-0.052
End diameter	-0.651	0.395	0.317	-0.267	-0.042	-0.434	0.225	0.081	-0.068	0.070
Pericarp diameter	0.154	0.658	-0.014	-0.116	-0.092	-0.312	-0.433	0.055	-0.138	0.155
Strip presence	0.033	0.082	-0.047	0.102	0.921	0.058	0.031	0.071	0.047	-0.094
Brix	-0.003	-0.091	0.891	0.017	-0.043	0.019	0.057	0.100	0.034	-0.081
Fruit weight	0.128	0.841	-0.085	0.101	-0.194	0.134	0.026	-0.049	0.097	-0.112
Bush length	-0.060	-0.211	0.099	0.901	-0.197	0.001	0.150	0.059	-0.042	0.093
Internode length	-0.054	-0.154	-0.042	0.915	0.223	0.014	-0.090	0.039	0.075	0.120
Branch No.	0.013	0.163	-0.042	0.858	0.101	0.197	-0.194	0.015	-0.035	-0.089
Leaf shape	-0.227	-0.253	-0.259	-0.372	-0.071	-0.243	-0.120	-0.316	0.661	0.084
Leaf color	-0.87	-0.050	-0.071	0.024	-0.064	-0.153	0.693	-0.255	0.078	0.090
Lobe No.	0.096	0.100	0.148	0.080	-0.014	0.058	0.046	-0.035	0.920	-0.033
Tip angel	0.037	-0.064	0.099	0.158	0.031	0.117	0.011	0.864	-0.180	0.182
Leaf margin	-0.154	-0.244	-0.478	-0.015	-0.164	-0.228	-0.055	-0.070	0.116	0.622
Petiole length	0.024	0.045	0.019	0.093	0.119	0.066	-0.089	0.117	-0.042	0.895

Extraction method: principle component analysis.

Rotation Method: Varimax with Kaiser Normalization that Rotation converged in 24 iterations.

Numbers 1 to 10 are principal factors that contain measured traits.

($r > 0.6$ is significant)

$r > 0.6$)

(/)

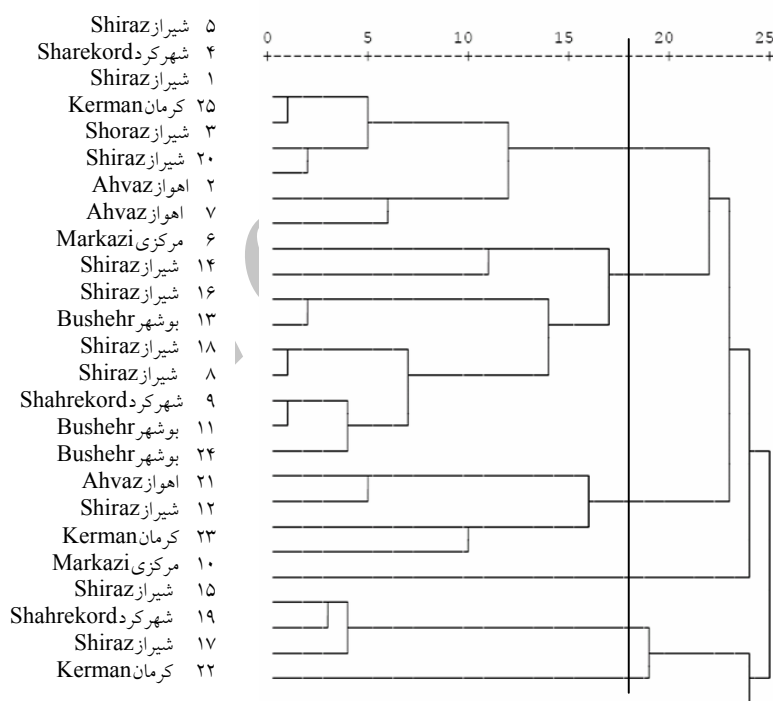


Fig.1. Classification of studied genotypes using 10 principal factors based on Ward method.

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inodorus

.RAPD

Cucumis melo

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