

ASSESSMENT OF TOMATO CULTIVARS FOR SALAD PURPOSE TO SUPPLEMENT NUTRITION IN MID-HILLS OF NEPAL

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Background

In Nepal, tomato covers 16416 ha. (APSD, 2012). It is a good source of vitamin A, C and E and minerals that are very good for body and protect the body against diseases (Taylor, 1987). It improves the income of the growers, generates employment in rural and urban areas and expands export potential (Ojha, 2000). Tomato produced from mid-June to November months in the hills (400-1800m) fetches higher market price (Budhathoki *et al.* 2004). Habit of fresh sliced tomato eating as a salad is already adopted in city area and cherry tomato is also introducing. Some special farmers are cultivating salad type cultivars mostly imported hybrid targeting to the hotels and restaurants. Consumers are buying whatever available in the market. For the sustainable improvement and easily available in the market, our own suitable open pollinated cultivars should be available.

Objective

The main objective of this experiment was to select suitable open pollinated tomato cultivars for salad; either sliced or cherry type to fulfill the demand of consumers.

Methods

A salad tomato varietal trial was conducted in Horticulture Research Division, Khumaltar with eleven cultivars including check cultivar; these were collected and characterized in the previous years. Three weeks old seedlings of these cultivars were planted in open field on first week of April, 2014 with spacing of 60 X 60 cm line to line and plant to plant distance in three replications. Plants were fertilized with 200:150:120 kg NPK and 30 ton farm yard manure per hectare and minimum pesticide was applied. Data were recorded on vegetative growth, flowering and fruiting, disease response, yield and quality parameter, fruit characteristics and consumers preference.

Results

Vegetative and flowering characters

Cv. HRA-23, HRA-34 and HRA-43 showed excellent plant uniformity, and most vigorous cultivar was HRA-23 and HRA-34 followed by HRA-14, HRA-15 and HRA-33. Most of the cherry type cultivars were taller than slice type. Among the tested cultivars, days to first fruit harvesting was earlier in HRA-20 and HRA-23 (78 days) whereas HRA-43 and HRA-33 were late in maturity (Table 1)

Yield attributing characters

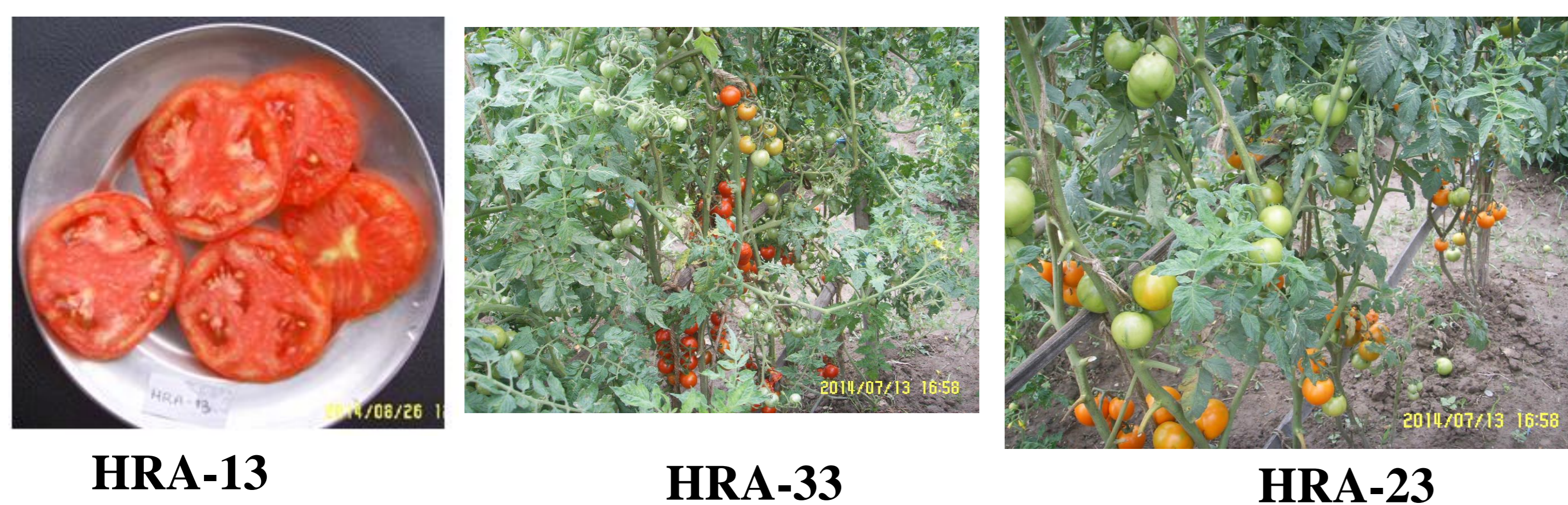
Number of fruits per plant was highest in HRA-33 (319) followed by HRA-34 (223) and HRA-43 (185). Among the cherry type cultivars, HRA-34 gave highest yield (18.952 t/ha) followed by HRA-33 (15.642 t/ha). Among the tested cultivars HRA-13 gave bigger sized fruits (166.7 g) followed by HRA-17 (166.5 g) whereas the smallest size fruits were obtained in HRA-43 (8.0g). On the basis of yield per plant HRA-17 was recorded as highest yielder (3353g) followed by Yellow Salad (2622g) and HRA-23 (2091g) respectively. Number of fruits per cluster was highest in HRA-34 (10.6) followed by HRA-43 (9.2) and least was in HRA-17 (2.4). Fruit set percent was highest in HRA-43 (88.9) followed by HRA-34 (86.5) and least was in HRA-17 (61.3) respectively (Table 2).

Fruit characters

Fruits of cv. HRA-13, HRA-14, HRA-15 and HRA-20 was oblate in shape whereas HRA-16 and HRA-17 slightly flaten, Yellow Salad oval and the rest were round shaped. Generally consumers prefer oblate shaped fruits for slice and round for cherry type. Color of matured fruits was red in all the cultivars except in HRA-23 and Yellow Salad cultivar. Fruit shoulder was distinct in HRA-15, HRA-20 and feebly developed in HRA-13, HRA-14, HRA-16 HRA-17 and HRA-23, and the rest were without shoulder. Highest TSS was obtained in HRA-33 (7.2 brix score) followed by HRA-23 (7.1). Similarly, highest vitamin C content was noticed in HRA-33 (57.29mg/100g) and lowest in HRA-15 (27.77) but titratable acidity percent was highest in HRA-14 followed by HRA-33 (0.82). As far as taste is concerned, HRA-13, HRA-17 and HRA-33 had excellent taste followed by HRA-23, HRA-34, HRA-16 and HRA-14 respectively.

Conclusion

On the basis of over all characteristics, HRA-13 which had average fruit weight 167 g, yield 2376 g per plant, juicy, fleshy and superior taste for slice type and HRA-33 which had average fruit weight 10g, yield 1689g per plant, juicy, higher vitamin C content and superior taste followed by HRA-23 for cherry type were selected and recommended for further evaluation in farmer's field condition. By growing these few tomato plants in every family garden, most of the households could have new taste of salad tomato in their kitchen and be benefited their health status through supplementing nutrition with vitamin and minerals.



HRA-13

HRA-33

HRA-23

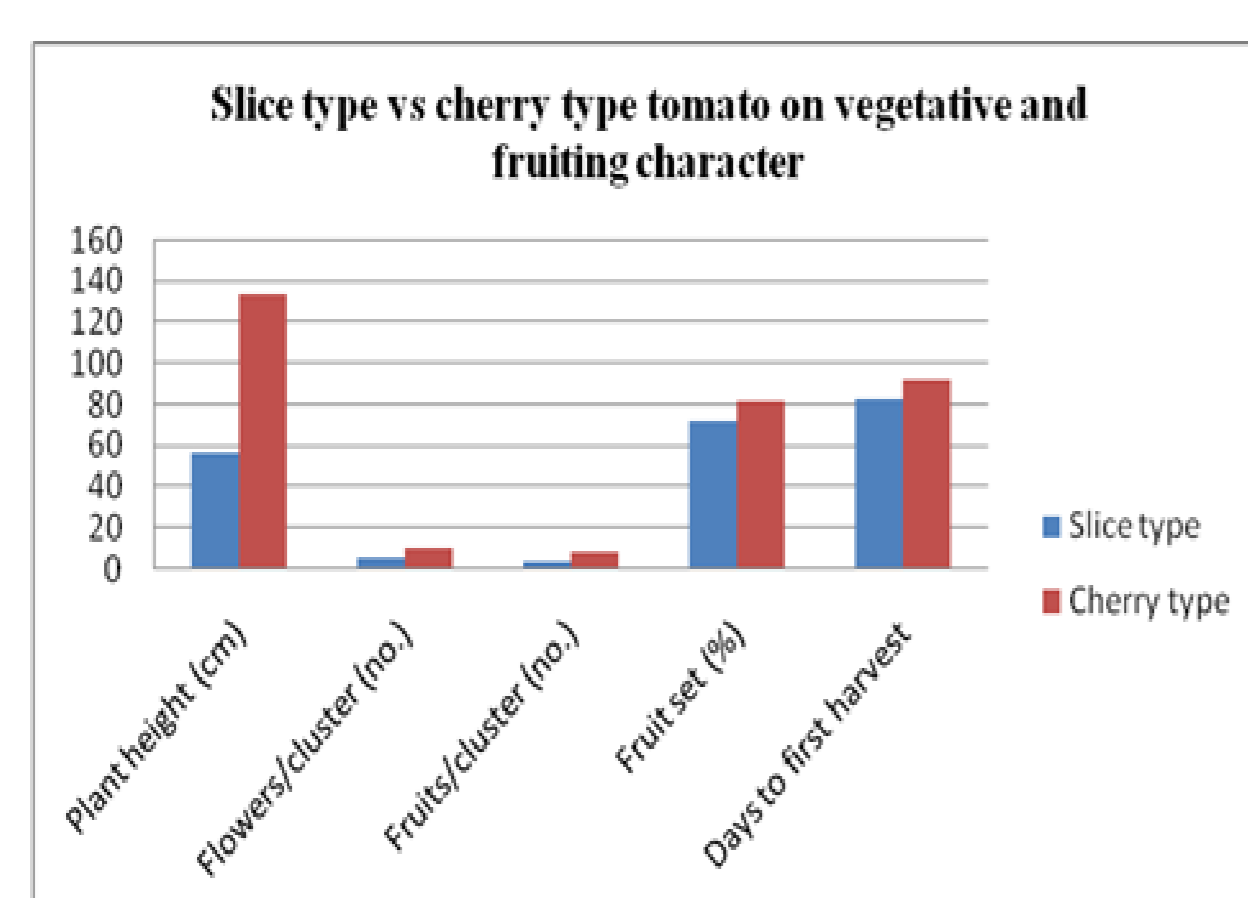


Fig. 1 Slice type vs Cherry type tomato on vegetative and fruiting character

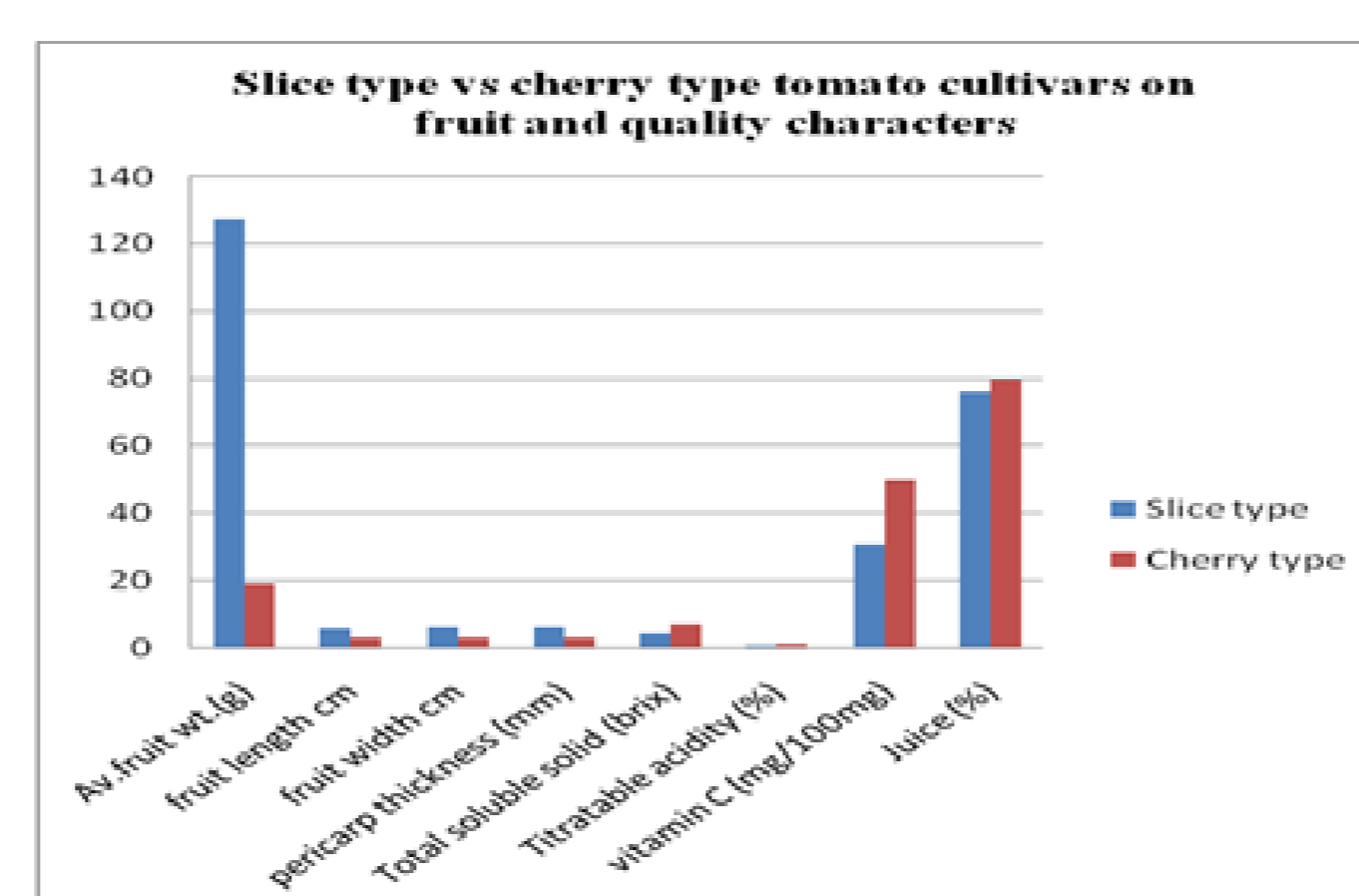


Fig. 2 Slice type vs Cherry type tomato on fruit and quality characters

Table 1 Vegetative and flowering characters of 11 tomato cultivars at Khumaltar, 2014

Type	Cultivar	Plant uniformity ^x	Plant vigor ^y	Plant height (cm)	Days to flowering	Days to fruit set	Days to first harvest
Slice type cultivars	HRA-13	9.0	8.5	71.2	34.5	51.5	84
	HRA-14	8.5	9.0	57.3	34.5	47.0	82
	HRA-15	9.0	9.0	52.5	34.5	43.5	79
	HRA-16	8.5	8.5	58.7	35.0	41.5	84
	HRA-17	9.0	8.5	53.5	36.0	50.5	86
	HRA-20	9.0	7.5	46.3	35.5	45.0	78
	Yellow Salad	7.5	7.5	52.7	34.0	46.5	79
Cherry type cultivars	HRA-23	9.5	9.5	139.4	32.5	52.5	78
	HRA-33	9.0	9.0	109.8	31.0	46.0	98
	HRA-34	9.5	9.5	134.5	30.5	44.5	93
	HRA-43	9.5	7.5	150.0	31.5	47.0	98
CV%		5.35	7.23	14.68	3.41	3.44	2.23
F-test (0.05)		*	*	**	**	**	**
LSD (0.05)		1.062	1.377	27.53	2.549	3.593	4.239

^xPlant uniformity ; 1: unacceptable, 10: excellent ^y Plant vigor ; 1: poor, 10: vigorous

Table 2 Yield attributing characters of 11 tomato cultivars at Khumaltar, 2014

Type	Cultivar	Fruits/cluster (no.)	Flowers/cluster (no.)	Fruit set (%)	Yield (g/plant)	Fruits/plant (no.)	Yield (t/ha)	Av. fruit wt. (g)
Silice type cultivars	HRA-13	3.2	4.3	73.6	2376	17	22.000 ab	166.7
	HRA-14	3.3	4.2	77.6	1402	13	12.983 b	163.0
	HRA-15	3.7	4.8	77.3	1830	12	16.946 ab	141.5
	HRA-16	3.8	5.1	73.8	1826	16	16.915 ab	66.4
	HRA-17	2.4	4.0	61.3	3353	22	31.050 a	166.5
	HRA-20	3.2	4.5	72.2	981	17	9.091 b	74.9
	Yellow Salad	3.7	5.6	66.1	2622	31	24.285 ab	106.9
Cherry type cultivars	HRA-23	4.5	7.0	65.0	2091	72	19.364 ab	45.8
	HRA-33	7.9	9.4	84.1	1689	319	15.642 ab	10.3
	HRA-34	10.6	12.2	86.5	2046	223	18.952 ab	12.0
	HRA-43	9.2	10.3	88.9	974	185	9.018 b	8.0
CV%		17.79	12.12	9.4	45.2	28.9	45.2	22.17
F-test (0.05)		**	**	ns	*	**	*	**
LSD (0.05)		2.02	1.77	15.9		54.1		39.1

Table 3 Fruit characters of 11 tomato cultivars at Khumaltar, 2014

Type	Cultivar	Length (cm)	Width (cm)	Pericarp thickness (mm)	Shape	Size ^y	Color ^x	Shoulder shape ^z	End shape
Slice type cultivars	HRA-13	5.8±0.5	6.6±1.4	6.0±1.5	Oblate	VB	R	2	Flat
	HRA-14	5.7±0.74	7.1±0.57	6.5±0.4	Oblate	B	R	2	Flat
	HRA-15	5.3±0.55	6.9±0.29	6.3±0.5	Oblate	VB	R	3	Flat
	HRA-16	4.3±0.19	5.0±0.45	4.1±1.4	Sl.flaten	VB	R	2	Flat
	HRA-17	7.8±3.2	6.7±1.1	7.0±1.1	Sl.flaten	VB	R	2	Flat
	HRA-20	4.1±1.1	5.3±0.6	3.5±0.4	Oblate	M	LR	3	Intended
	Yellow Salad	5.5±2.4	5.8±0.4	8.6±0.5	Oval	B	Y	1	Depressed
Cherry type cultivars	HRA-23	3.8±0.2	4.4±0.4	3.9±0.4	Round	M	Y	2	Flat
	HRA-33	2.5±0.2	2.5±0.2	2.9±0.3	Round	S	R	1	Flat
	HRA-34	2.5±0.2	2.6±0.2	2.9±0.8	round	S	R	1	Flat
	HRA-43	2.2±0.6	2.3±1.5	2.4±0.6	round	S	DR	1	Flat

^xR:red, LR:light red, Y:yellow ^yS:small, M:medium, B:big, VB:very big
^z1:none, 2:feebly developed, 3:distinct

Table 4 Fruit quality characters of 11 tomato cultivars at Khumaltar, 2014

Type	Cultivar	Total soluble solid (Brix)	Titrate acidity (%)	Vitamin C (mg/100g)	Juice (%)	Taste
Slice type cultivars	HRA-13	4.1	0.48	29.51	80.3	Excellent
	HRA-14	4.8	1.19	38.19	65.4	Very Good
	HRA-15	4.5	0.46	27.77	83.2	Good
	HRA-16	3.3	0.44	32.11	71.6	Very good
	HRA-17	3.4	0.41	29.51	80.8	Excellent
	Yellow Salad	4.2	0.34	26.04	74.0	Fair
	Cherry type cultivars	HRA-23	7.1	0.62	50.3	80.7
HRA-33		7.2	0.82	57.29	77.9	Excellent
HRA-34		6.0	0.44	39.93	82.3	Very good
HRA-43		7.0	0.64	52.08	77.5	Good

Acknowledgement

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