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Study of qualitative traits of germplasm of tomato (*Solanum lycopersicum* L.)

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Abstract

Forty genotypes of tomato germplasm under present investigation were characterized based on 11 qualitative traits viz., leaf colour, leaf pubescence, leaf / foliage cover, petiole pubescence, stem type, stem thickness, stem pigmentation, flower size, flower colour, fruit size, fruit shape. Tomato genotypes exhibited high variability for all qualitative traits viz., Leaf characters, stem characters, flower characters and fruit characters. Therefore, it is emphasized to lay attention on the traits viz., days to first flowering, number of fruits per plant, fruit weight in crop improvement programme of tomato in future.

Keywords: Tomato, qualitative traits, minimal descriptors

Introduction

Tomato (*Solanum lycopersicum* L.) belonging to the family Solanaceae is the native of Peru and Ecuador region (Rick, 1969) [3]. It is one of the most popular and widely grown crops of commercial and dietary significance in the world as it is a very versatile vegetable. Due to its high consumption rate in developed and developing countries, it is often referred to as a luxury crop. Considering the potentiality of this crop, there is a need for improvement and to develop varieties suited to specific agroecological conditions and also for specific use. Since, it is used as fresh vegetable and it also in processing industry for preparations of various value added products such as soup, ketchups, sauces, concentrates, purees, juices etc. It contributes as an important source of lycopene (an antioxidant), ascorbic acid and β carotene.

Morphological characterization is intended to protect the genetic resources that are usually lost by in the crop mismanagement either by replacing varieties originating of a region by improving varieties or destruction of mountain vegetation [IBPGR Annual Report, 1974] [2]. To be effective, the methodology needed to correctly describe each accession in order to differentiate between accessions in the same collection and promote collaboration among plant genetic resource (PGR) workers in different countries. The need for agronomic and molecular characterization among genotypes, which is essential for its use, conservation and in turn identify promising traits that will be useful for fruit growers and helps in solving agricultural problems related to production, adaptability and resistance to different pests and diseases (Albornoz, 1992) [1]. Keeping the above in view, the present investigation was carried out to characterise the germplasm in tomato using minimal descriptors.

Material and methods

The data on qualitative characters were recorded as per minimal descriptors of NBPGR (Srivastava *et al.*, 2001) [4]. Qualitative data on 11 traits were recorded in each genotype and the details of trait, classification and stage of scoring are presented in Table 1.

Results and discussion

Forty genotypes of tomato germplasm under present investigation were characterized based on 11 qualitative traits (Table 2). The observations revealed that twenty three genotypes exhibited dark green leaf colour, nine genotypes showed green leaf colour and eight genotypes showed light green colour. For leaf pubescence twenty two genotypes exhibited sparse pubescence, 10 genotypes showed absence, 5 genotypes recorded dense pubescence and 3 genotypes showed medium pubescence. For foliage cover 14 genotypes exhibited excellent foliage cover, 19 genotypes were showed good foliage cover and 7 genotypes showed moderate foliage cover. For petiole pubescence 23 genotypes showed sparse pubescence, 6 genotypes showed dense pubescence and 6 genotypes recorded moderate and 5 genotypes showed absence of pubescence. For stem type 33 genotypes showed round stem type and 7 genotypes recorded angular stem type.

For stem thickness 21 genotypes showed thick stem and 13 genotypes showed moderate and 6 genotypes showed thin stem. For stem pigmentation 38 genotypes showed green pigmentation on the stem and 2 genotypes recorded with anthocyanin (red) pigmentation. For flower size 20 genotypes showed large flowers, 17 medium and 3 genotypes recorded with small flowers. For flower colour 23 genotypes showed deep yellow colour flowers and 17 genotypes showed light yellow colour flowers. For fruit size 1 genotype recorded very large fruit size, 2 genotypes showed large, 5 medium large, 22

medium, 2 small and 8 very small fruit sizes. For fruit shape 12 genotypes showed round fruit shape, 8 genotypes showed slightly flattened, 4 oval, 6 heart shape, 2 flat round, 7 plum shape and one genotype showed lengthened cylindrical shape. From the study, it is concluded that Quality traits revealed that there is a considerable variability in tomato germplasm for most of the traits. So, this study significantly contributes to the knowledge of conservation of genetic resources and breeding of tomato. It will be useful for selection of traits.

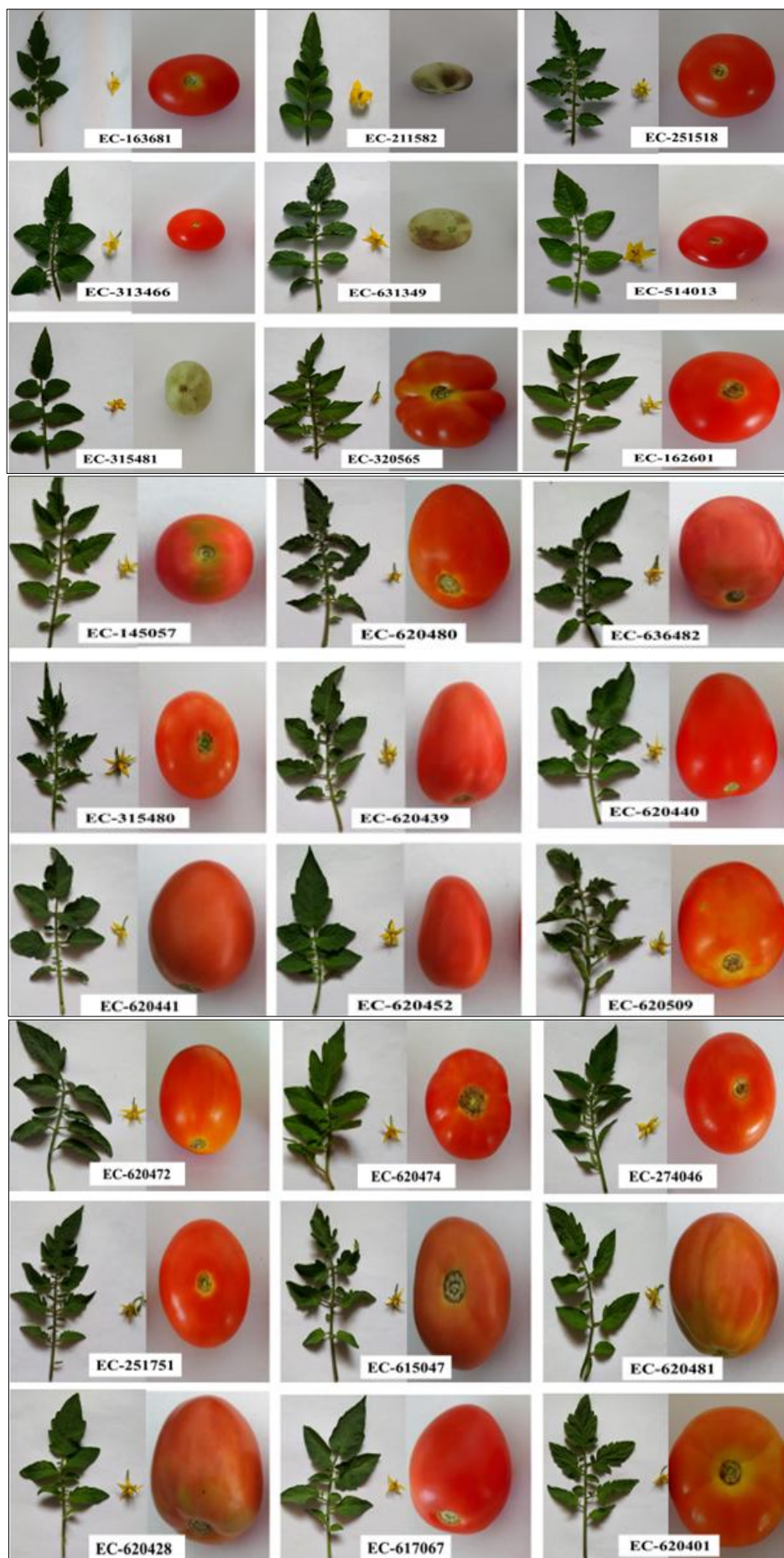
Table 1: Classification and stage of scoring of 11 qualitative traits in tomato

S.N	Qualitative trait	Classification	Stage of scoring
1.	Leaf colour	Light green	At full foliage stage
		Green	
		Dark green	
2.	Leaf pubescence	Absent	At full foliage stage
		Sparse	
		Medium	
3.	Leaf/foilage cover	Dense	At full foliage stage
		Poor	
		Moderate	
		Good	
4.	Petiole pubescence	Excellent	At full foliage stage
		Absent	
		Sparse	
		Medium	
5.	Stem type	Dense	At full foliage stage
		Round	
6.	Stem thickness	Angular	At full foliage stage
		Thin	
		Medium	
7.	Stem pigmentation	Thick	At full foliage stage
		Green	
		Anthocyanin (red)	
8.	Flower size	Small	At full blossom stage
		Medium	
		Large	
9.	Flower colour	Light yellow/ cream	At full blossom stage
		Deep yellow Reddish yellow (Orange gold crimson)	
10.	Fruit size	Very small (≤ 20 g)	At near maturity stage
		Small ($>20-30$ g)	
		Medium ($>30-80$ g)	
		Medium large ($>80-100$ g)	
		Large ($>100-175$ g)	
11.	Fruit shape	Very large (>175 g)	At near maturity stage
		Flat round	
		Slightly flattened	
		Round	
		Oval	
		Heart shaped	
		Lengthened cylindrical (banana type)	
Pyriiform			
		Plum shaped	

Table 2: Qualitative traits of 40 genotypes of tomato

S. No.	Accession number	Leaf colour	Leaf pubescence	Leaf / foliage cover	Petiole pubescence	Stem type	Stem thickness	Stem pigmentation	Flower size	Flower colour	Fruit size	Fruit shape
1	EC-163681	Light green	Sparse	Moderate	Dense	Round	Medium	Green	Medium	Light yellow	Very small	Round
2	EC-211582	Green	Absent	Moderate	Absent	Angular	Thin	Green	Medium	Deep yellow	Very small	Round
3	EC-251518	Light green	Absent	Good	Medium	Round	Thick	Green	Medium	Light yellow	Very small	Oval
4	EC-313466	Dark green	Absent	Excellent	Absent	Angular	Thin	Anthocyanin (red)	Small	Light yellow	Very small	Oval
5	EC-631349	Light	Absent	Good	Absent	Angular	Thin	Green	Large	Deep	Very	Round

		green								yellow	small	
6	EC-514013	Green	Absent	Excellent	Absent	Angular	Medium	Green	Small	Light yellow	Very small	Round
7	EC-315481	Light green	Absent	Moderate	Absent	Angular	Thin	Anthocyanin (red)	Medium	Light yellow	Very small	Slightly flattened
8	EC-320565	Green	Sparse	Excellent	Dense	Round	Thick	Green	Medium	Light yellow	Medium	Flat round
9	EC-162601	Green	Sparse	Excellent	Sparse	Round	Thick	Green	Large	Light yellow	Small	Slightly flattened
10	EC-145057	Green	Sparse	Excellent	Sparse	Round	Thick	Green	Medium	Light yellow	Medium	Round
11	EC-620480	Green	Sparse	Good	Sparse	Round	Thick	Green	Large	Light yellow	Medium large	Lengthened cylindrical
12	EC-636482	Dark green	Sparse	Good	Sparse	Round	Thick	Green	Large	Light yellow	Medium	Plum shaped
13	EC-315480	Dark green	Medium	Excellent	Dense	Round	Thin	Green	Large	Light yellow	Medium	Slightly flattened
14	EC-620439	Light green	Sparse	Excellent	Sparse	Round	Thick	Green	Medium	Light yellow	Medium large	Heart shaped
15	EC-620440	Dark green	Sparse	Good	Sparse	Round	Thick	Green	Large	Deep yellow	Medium	Heart shaped
16	EC-620441	Dark green	Sparse	Excellent	Sparse	Round	Thick	Green	Large	Deep yellow	Medium	Heart shaped
17	EC-620452	Dark green	Sparse	Good	Sparse	Round	Medium	Green	Large	Deep yellow	Medium	Heart shaped
18	EC-620509	Dark green	Sparse	Good	Sparse	Round	Medium	Green	Medium	Light yellow	Large	Plum shaped
19	EC-620472	Green	Sparse	Good	Sparse	Round	Medium	Green	Medium	Deep yellow	Medium	Plum shaped
20	EC-620474	Dark green	Absent	Good	Sparse	Round	Thick	Green	Medium	Deep yellow	Medium large	Slightly flattened
21	EC-274046	Dark green	Dense	Excellent	Sparse	Angular	Medium	Green	Medium	Light yellow	Small	Round
22	EC-251751	Light green	Medium	Excellent	Medium	Angular	Medium	Green	Medium	Light yellow	Medium	Slightly flattened
23	EC-615047	Dark green	Sparse	Good	Sparse	Round	Thick	Green	Large	Light yellow	Medium	Round
24	EC-620481	Light green	Dense	Excellent	Medium	Round	Medium	Green	Medium	Light yellow	Medium	Plum shaped
25	EC-620428	Green	Dense	Good	Sparse	Round	Thick	Green	Medium	Deep yellow	Large	Plum shaped
26	EC-617067	Dark green	Dense	Good	Sparse	Round	Thick	Green	Large	Deep yellow	Medium	Plum shaped
27	EC-620401	Dark green	Sparse	Good	Sparse	Round	Medium	Green	Large	Light yellow	Medium	Slightly flattened
28	EC-620446	Dark green	Absent	Good	Sparse	Round	Thick	Green	Large	Deep yellow	Very large	Round
29	EC-654286	Green	Sparse	Good	Sparse	Round	Thick	Green	Medium	Deep yellow	Medium large	Plum shape
30	EC-315479	Dark green	Dense	Excellent	Medium	Round	Medium	Green	Small	Light yellow	Very small	Round
31	Arka Vikas ©	Dark green	Absent	Good	Sparse	Round	Thick	Green	Large	Deep yellow	Medium	Flat round
32	Pusa Ruby ©	Light green	Absent	Moderate	Dense	Round	Medium	Green	Large	Deep yellow	Medium	Slightly flattened
33	Money maker	Dark green	Sparse	Good	Sparse	Round	Thick	Green	Large	Deep yellow	Medium	Round
34	AVTO-1219	Dark green	Sparse	Moderate	Sparse	Round	Thin	Green	Large	Deep yellow	Medium	Heart shaped
35	AVTO-1314	Dark green	Sparse	Moderate	Medium	Round	Medium	Green	Large	Deep yellow	Medium	Heart shaped
36	LA-3667	Dark green	Medium	Moderate	Sparse	Round	Thick	Green	Large	Deep yellow	Medium large	Oval
37	PKM-1 ©	Dark green	Sparse	Excellent	Sparse	Round	Thick	Green	Medium	Light yellow	Medium	Slightly flattened
38	Marutham ©	Dark green	Sparse	Good	Medium	Round	Medium	Green	Medium	Light yellow	Medium	Round
39	Arka Meghali ©	Dark green	Sparse	Good	Dense	Round	Thick	Green	Large	Light yellow	Medium	Round
40	Arka Alok ©	Dark green	Sparse	Excellent	Dense	Round	Thick	Green	Large	Light yellow	Medium	Oval



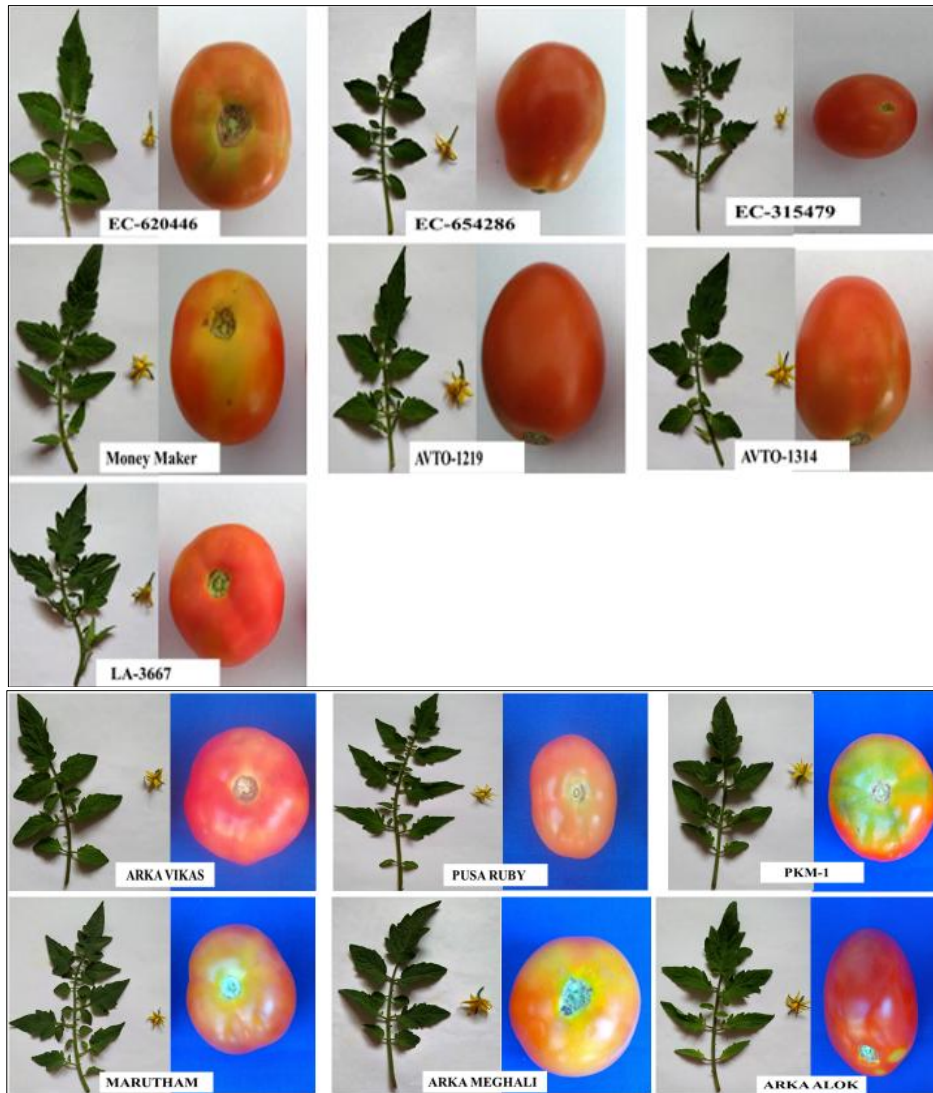


Plate 1: Qualitative traits of 40 genotypes of tomato

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