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Performance of tomato (*Solanum lycopersicum* L.) genotypes for yield and quality trait under Chhattisgarh plains

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Abstract

The experiment was conducted in the field of AICRP on vegetables crops, Horticultural Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C. G.), during the *rabi* season of 2019-20. Twenty two genotypes of tomato including two check Kashi Aman and Punjab Ratta were evaluated for yield and quality traits. All the experimental materials were raised in randomized block design and replicated three times. Among the genotypes, 2019/TODVAR-5 (364.20 q) performed higher yield per hectare (q) followed by the genotype 2019/TODVAR-4 (277.16 q) and Kashi Aman (266.51 q). The genotype 2019/TODVAR-5 was also recorded highest number of fruits per plant (29.87), fruit yield per plant (1.93 kg) and maximum fruit diameter (6.00 cm).

Keywords: tomato, yield, quality, genotypes

Introduction

Tomato (*Solanum lycopersicum* L.) is one of the most popular vegetable crops worldwide, due to its versatile use and higher nutritional value. It is self pollinated vegetable crop and have diploid chromosome number $2n=2X=24$. It belongs to the family Solanaceae. Due to its wider adaptability and demand it is widely cultivated in India with at total area 789 thousand ha and production of 19759 thousand metric tonnes (Anon., 2018) [1]. In Chhattisgarh, it is mainly grown in Jashpur, Durg, Raigarh, Rajnandgaon, Balodabazar and Bilaspur districts in an area 63.29 thousand hectare with production of 1087.33 thousand metric tonnes (Anon., 2018) [1]. The tomato fruit is composed mainly of water (90-95%), total sugars (2.5-4.5%), soluble and insoluble solids (5-7%), reducing sugar (1.5-3.5%), ascorbic acid (15-30 mg/100 g) and other minerals. In view of increasing value and demand of this crop every day, there is a need for evaluate such genotypes which provide good quality produce with higher yield and best suited for Chhattisgarh plains.

Materials and Methods

The experiment consisted of twenty two tomato genotypes including check. The tomato genotypes were raised in field experiment in randomized block design (RBD) with three replications in Horticultural Research cum Instructional Farm, Department of Vegetable Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C. G.), during the *rabi* season of 2019-20. From each experimental unit five plants were selected and tagged. In the present investigation the following characters were recorded *viz.* plant height (cm), number of branches per plant, days to first flowering, days to 50% flowering, number of flowers per cluster, number of fruits per cluster, days to first harvesting, fruit length (cm), fruit diameter (cm), weight of fruit, volume of fruit (ml), number of locules per fruit, pericarp thickness (mm), TSS (° Brix), moisture percentage of fruit, specific gravity of fruit, fruit yield per plant (kg) and fruit yield per hectare (q). The data recorded on different parameters during the period of experiment were subjected to statistical analysis as per method of analysis of variance by Panse and Sukhatme (1978) [5].

Results and Discussion

The analysis of variance of (ANOVA) indicated that the mean sum of squares due to genotypes were significant for most of the characters studied, thereby exhibiting the presence

of sufficient genetic variability in the genotypes. The data of mean performance of tomato genotypes for yield and yield attributing traits are presented in Table 1.

The highest plant height was observed in genotype 2019/TODVAR-8 (69.07 cm), whereas, the lowest plant height was recorded in genotype 2019/TODVAR-6 (53.13 cm) with overall mean of 62.32 cm. The maximum number of branches per plant was observed in genotype 2017/TODVAR-2 (12.33), while, the minimum number of branches per plant was observed in genotype 2018/TODVAR-5 (6.07) with an overall mean of 8.56. The earliest days to first flowering was obtained in genotype 2017/TODVAR-6 (17 days), whereas, the genotype 2018/TODVAR-1 and genotype 2017/TODVAR-4 (27 days) were found to be late flowering among all the genotypes with a general mean of 22.26 days. The genotype 2017/TODVAR-6 (29.67 days) taken least number of days to reach 50% flowering, while, genotype 2018/TODVAR-1 (41.33 days) taken longest duration for 50% flowering with overall mean of 34.85. The maximum number of flowers per cluster was recorded in genotype 2019/TODVAR-1 (6.27), whereas, minimum number of flowers per cluster was found in the genotype 2018/TODVAR-5 (4.13) with overall average of 5.41. Maximum number of fruits per cluster was found in the genotype 2019/TODVAR-1 (4.33), whereas, the minimum number of fruits per cluster was noted in the genotype 2018/TODVAR-5 (3.40) with an overall mean of 3.81. Similar findings were also reported by Kerketta *et al.* (2018) [3], Kiran *et al.* (2018) [4], Rojalin *et al.* (2018) [8], Prakash *et al.* (2019) [6].

Maximum number of fruits per plant was obtained in the genotype 2019/TODVAR-5 (29.87), whereas, the genotype 2018/TODVAR-5 (13.00) recorded minimum number of fruits per plant with the general mean of 23.31. Early first fruit harvesting was obtained in the genotype 2017/TODVAR-6 (61.00 days), while, the genotypes 2017/TODVAR-4 and 2018/TODVAR-1 (71.00 days) taken longest duration for first fruit harvesting with an overall mean of 66.32 days.

The maximum fruit length was found in the genotype 2017/TODVAR-3 (5.86 cm), while the genotype 2018/TODVAR-1 (3.95cm) showed minimum fruit length with the general mean 4.84 cm. The maximum fruit diameter

was obtained in genotype 2019/TODVAR-5 (6.00 cm), whereas, the minimum fruit diameter was recorded in 2018/TODVAR-1 and 2018/TODVAR-2 (4.34) with a grand mean of 5.16 cm. The maximum weight of fruit was found in the genotype 2017/TODVAR-5 (93.28 g), whereas, the minimum weight of fruit was recorded in the genotype 2017/TODVAR-1 (42.22 g) an average of 68.29 g. The genotype 2017/TODVAR-5 (90.87 ml) was recorded for maximum volume of fruit, while, the minimum volume of fruit was found in the genotype 2017/TODVAR-1 (41.00 ml) with an overall mean of 66.07 ml. Similar result also reported by Regassa *et al.* (2012) [7], Kanaujia *et al.* (2016) [2], Kiran *et al.* (2018) [4].

The maximum number of locules per fruit was recorded in genotype 2017/TODVAR-7 (4.20), whereas, the genotype 2019/TODVAR-3 (2.20) showed minimum number of locules per fruit with a grand mean of 2.98. The maximum pericarp thickness was obtained in the genotype 2019/TODVAR-7 (6.58 mm), while, the minimum pericarp thickness was found in the genotype 2019/TODVAR-4 (4.55 mm) with an overall mean of 5.45 mm. The maximum total soluble solid was recorded for genotype 2017/TODVAR-6 (4.96 °Brix), whereas, the genotype 2019/TODVAR-7 (3.49 °Brix) showed lowest total soluble solids with overall mean of 3.98 °Brix. The highest moisture percentage was noted in the genotype 2017/TODVAR-3 (94.43 %), while, the lowest moisture percentage was found in Punjab Ratta (89.56%) with an overall mean of 92.85%. The maximum specific gravity was observed in genotype 2017/TODVAR-4 (1.06), while, the minimum specific gravity was recorded in genotype 2019/TODVAR-3 (1.00) with a total mean of 1.03. Similar results also reported by Spaldon and Hussain (2017) [9], Kiran *et al.* (2018) [4], Prakash *et al.* (2019) [6].

The highest fruit yield per plant was obtained in genotype 2019/TODVAR-5 (1.93 kg), whereas, genotype 2018/TODVAR-5 (0.97 kg) showed least fruit yield per plant with overall mean of 1.45 kg. The genotype 2019/TODVAR-5 (364.20 q) had the maximum fruit yield per hectare, while, the minimum fruit yield per hectare was recorded in 2018/TODVAR-5 (95.99 q) with an overall mean of 192.47 q. These findings were in accordance with the result obtained by Kiran *et al.* (2018) [4], Rojalin *et al.* (2018) [8], Prakash *et al.* (2019) [6].

Table 1: Mean performance of tomato genotypes for yield and its components along with quality parameters

Genotypes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
2019/TODVAR-1	63.40	7.47	18.67	31.33	6.27	4.33	24.00	62.67	5.06	5.66	66.99	65.33	3.47	5.89	3.95	92.41	1.01	1.55	158.64
2019/TODVAR-2	55.13	8.07	21.00	33.67	5.80	3.87	15.67	65.00	5.01	5.52	70.72	69.13	3.07	5.55	3.91	91.97	1.02	1.00	126.85
2019/TODVAR-3	67.53	7.27	23.00	35.00	6.00	4.27	25.67	70.33	5.32	5.87	86.27	84.60	2.20	5.68	3.83	92.01	1.00	1.47	206.17
2019/TODVAR-4	53.60	6.53	22.33	35.00	5.60	3.42	29.53	66.67	4.47	4.73	65.76	63.60	2.40	4.55	4.04	94.34	1.03	1.60	277.16
2019/TODVAR-5	64.13	8.93	19.67	31.67	6.00	3.84	29.87	64.00	4.80	6.00	83.66	82.27	3.73	5.49	3.63	92.95	1.01	1.93	364.20
2019/TODVAR-6	53.13	6.13	24.33	37.00	5.87	3.73	27.07	68.33	5.41	5.90	78.44	76.73	3.93	5.11	3.59	93.39	1.01	1.88	251.08
2019/TODVAR-7	57.27	9.13	18.00	30.67	5.13	3.73	24.27	62.00	5.48	5.19	70.91	68.00	2.73	6.58	3.49	90.75	1.04	1.30	166.67
2019/TODVAR-8	69.07	7.07	25.33	38.00	5.20	3.53	26.93	66.33	4.60	4.77	60.30	58.60	2.60	5.72	4.55	90.49	1.03	1.75	220.37
2018/TODVAR-1	55.87	10.13	27.00	41.33	4.60	3.41	26.87	71.00	3.95	4.34	48.02	45.93	2.87	4.88	3.88	93.91	1.03	1.90	187.96
2018/TODVAR-2	60.93	8.27	22.67	35.33	5.00	3.53	16.60	66.67	4.46	4.34	53.68	50.93	2.40	5.36	4.08	93.68	1.04	1.14	127.16
2018/TODVAR-3	66.67	7.07	24.00	36.00	4.60	3.67	22.07	68.00	4.34	4.35	59.11	55.53	2.33	5.54	3.91	92.88	1.03	1.37	145.91
2018/TODVAR-5	62.40	6.07	21.00	32.67	4.13	3.40	13.00	65.33	4.84	5.64	90.42	88.27	4.13	6.27	3.89	93.28	1.02	0.97	95.99
2017/TODVAR-1	68.87	10.73	23.33	35.67	5.00	4.00	24.00	67.33	4.73	4.36	42.22	41.00	2.53	4.97	3.71	93.23	1.04	1.41	184.95
2017/TODVAR-2	65.07	12.33	17.33	30.67	5.40	4.20	20.00	61.33	4.86	5.62	85.37	82.67	3.40	4.91	4.00	93.64	1.03	1.11	146.30
2017/TODVAR-3	60.20	8.80	25.00	37.00	5.60	4.13	15.20	69.00	5.86	5.60	73.74	72.80	2.47	5.72	4.08	94.43	1.01	1.08	127.93
2017/TODVAR-4	65.13	7.47	27.00	38.33	5.27	3.41	20.00	71.00	4.41	5.01	72.46	68.50	2.60	5.92	4.00	92.82	1.06	1.30	166.05
2017/TODVAR-5	63.13	10.07	25.33	39.00	5.60	3.73	25.07	69.33	5.38	5.59	93.28	90.87	3.13	4.83	4.09	93.86	1.02	1.46	227.05
2017/TODVAR-6	67.73	8.73	17.00	29.67	5.80	4.13	22.53	61.00	4.52	4.49	68.34	66.33	3.33	4.84	4.96	94.06	1.02	1.48	193.91
2017/TODVAR-7	67.80	9.33	24.00	36.67	5.40	4.20	26.60	68.00	4.15	5.28	63.33	61.60	4.20	5.15	4.40	91.84	1.02	1.47	220.06
2017/TODVAR-8	66.67	8.60	26.00	39.67	5.33	3.60	24.40	70.00	5.21	4.99	71.54	70.07	2.33	6.01	3.88	93.29	1.01	1.36	202.47

Kashi Aman	58.20	9.67	18.67	31.67	5.27	3.53	27.53	62.67	5.13	5.40	49.02	46.80	2.67	5.73	4.12	93.93	1.04	1.66	266.51
Punjab Ratta	59.20	10.47	19.00	30.67	6.13	4.13	25.93	63.00	4.41	4.78	48.83	44.07	3.13	5.15	3.65	89.56	1.04	1.76	170.96
MEAN	62.32	8.56	22.26	34.85	5.41	3.81	23.31	66.32	4.84	5.16	68.29	66.07	2.98	5.45	3.98	92.85	1.03	1.45	192.47
C.D.	6.65	1.10	2.11	2.90	0.64	0.42	8.80	3.64	0.58	0.48	7.46	7.61	0.30	0.51	0.34	2.15	0.04	0.46	62.73
SE(m)	2.32	0.38	0.74	1.01	0.22	0.15	3.07	1.27	0.20	0.17	2.61	2.66	0.10	0.18	0.12	0.75	0.01	0.16	21.90
SE(d)	3.28	0.54	1.04	1.43	0.32	0.21	4.34	1.80	0.29	0.24	3.69	3.76	0.15	0.25	0.17	1.06	0.02	0.23	30.97
C.V.	6.45	7.75	5.74	5.02	7.18	6.71	22.83	3.32	7.26	5.63	6.61	6.97	5.98	5.64	5.15	1.40	1.68	19.17	19.71

1. Plant height (cm)	2. No. of branches per plant	3. Days to first flowering	4. Days to 50% flowering
5. No. of flowers per cluster	6. No. of fruits per cluster	7. No. of fruits per plant	8. Days to first harvesting
9. Fruit length (cm)	10. Fruit diameter (cm)	11. Weight of fruit (g)	12. Volume of fruit (ml)
13. No. of locules per fruit	14. Pericarp thickness (mm)	15. TSS (° Brix)	16. Moisture percentage of fruit
17. Specific gravity	18. Fruit yield per plant (kg)	19. Fruit yield per hectare (q)	

Conclusion

On the basis of result of mean performance in present investigation the genotype 2019/TODVAR-5 and genotype 2019/TODVAR-4 was found superior from the other genotypes in terms of fruit yield per hectare and most suitable for Chhattisgarh plains.

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