Evaluate Characteristics of new cherry tomato varieties of Mahasarakham University

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Abstract The new cherry tomatoes varieties were pollinated from two commercial tomato varieties (F1-hybrid) and selected by pure line method. The study was conducted between October 2017 and February 2018 at Walai Rukhavej Botanical Research Institute, Mahasarakham University and Wang Nam Khiao district, Nakhon Ratchasima Province. The farmer practice method was used for all sites. The results showed two new cherry tomato varieties are better than tomato commercial varieties. The MSU50-1 variety gave averaged yield of 1,468.2 Kgs/plant, 11.48 g fruit weight, 8.56 brix, 13.50 fruit/cluster fruit set number and 50% flowering since 35.83 day after planting. The MSU50-6 variety gaved average yield of 1,084.7 Kgs/plant, 11.0 g fruit weight, 8.60 brix, 7 fruit/cluster fruit set number and 50% flowering since 40.33 day after planting.

Keywords: cherry tomato, characteristics, breeding, pure line selection

Introduction

The Cherry tomato (*Solanum lycopersicum* L.) has small fruit with blight red color and sweet flaver compare to other kinds of tomatoes (Filgueira, 2006; Charlo *et al.,* 2007). The cherry tomao has good productivity and excellent taste and has high commercial value (Souza & Resende, 2003; Batista de Campos Menezes *et al.,* 2012). The cherry tomato is found in the tropical and subtropical zone of America but have been widely propagated and produced in Asia and Africa (Alwis *et al.,* 2008). Cherry tomato was selected from the wild type of solanum in breeding programs (Cheema and Dhaliwal, (2005) and Opena *et al.,* (2001)). Because there are valueable characteristics in term of genetic diversity for selection of parental material. In breeding programs, the

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parental material was used for crossing to produce F1-hybid. The short cut of breeding programs in selection of a new varieties of cherry tomatoes could be conducted by selecting from F1-hybrids variety due to F1-hybrid variety already possess pool of high genetic diversity.

The objective of this research is to select new Cherry tomato varieties from commercial variety pool (F1-hybrid) and compare the characteristics between two new cherry tomatoes varieties and two commercial varieties of cherry tomatoes.

Materials and methods

The new cherry tomatoes varieties were pollinated from two different F1-hybrid commercial tomato varieties (SW and TT) and then selected by pure line method. New cherry tomato variety of Mahasarakham University was F_6 - cherry tomato. The experiment was conducted during October 2017 – February 2018 at the research station of Walai Rukavej Botanical Research Institute, Mahasarakham University, Kantrawichai, Maha Sarakham Province and the farmer field at Wang nam Khiao district, Nakhon Rachasima provice. The following data on characteristics were recorded: days of 50% flowering after planting (DAP), fruit set number, flower set number, yield, and %brix (sweetness). The data was analyzed using the Statistix v.8 package. The difference beween data on characteristics of all experimented cherry tomato were tested using ANOVA for randomized complete block design (RCBD) with three replications. Then, pairwise means between varieties were compared using LSD.

Results

The fruit shape of new MSU cherry tomatoes was different to parent. MSU50-1 variety (A) has high-round fruit shape and obtuse fruit blossom end shape. The parents (C) of MSU50-1 has high-round fruit shape but fruit blossom end shape is pointed. MSU50-6 variety (A) has pyriform or pear fruit shape and obtuse fruit blossom end shape. The parents (D) of MSU50-6 has round fruit shape (Figure 1).

The results on yield of MSU cherry tomato line tested in Maha Sarakham province showed that MSU50-1 vareity had better growth and yield than MSU50-6 variety (Table 1). However, both varieties had higher yield than parents (SW and TT). The test results were the same at Nakorn Rachasima province (Table 2). Nevertheless, there is a tendency for tomatoes growed in

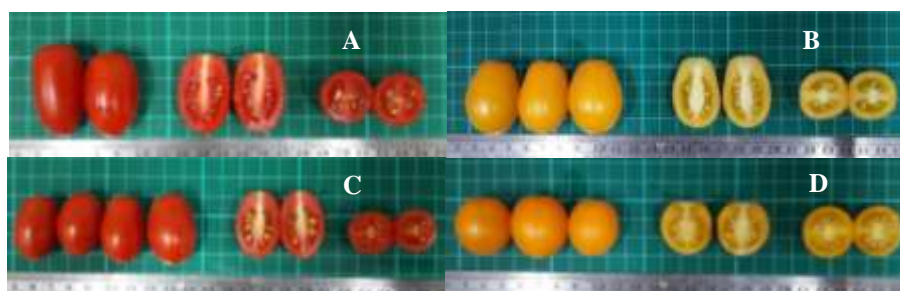Maha Sarakham to have better yield than ones growed in Nakorn Rachasima province.

Figure 1. fruite shape, A; MSU50-1, B; MSU50-6, C; TT, D; SW

Table 1. Mean of tomato Characteristics tested in Mahasarakham province between October 2017 and February 2018

Variety	yields	%brix	Flower set No.	Fruit set No.	First flowering (DAP)	50% Flowering (DAP)	100% Flowering (DAP)
MSU50-1	1688.8[a1/]	8.33	19.33[a]	12.67	31.00[c]	33[c]	36.33[d]
MSU50-6	1350.1[b]	9.80	15.67[ab]	10.33	36.33[a]	40[b]	46.00[b]
SW	679.6[c]	7.60	10.67[b]	9.00	34.33[b]	38[b]	41.00[c]
TT	452.1[c]	7.87	11.67[b]	8.67	34.00[c]	45[a]	49.67[a]
LSD	233.11	NS	5.06	NS	1.59	2.23	1.37
CV	11.19	9.86	17.67	16.72	2.35	2.87	1.59

NS; non significant   DAP; day after planting CV; Coefficient of variation
1/; Mean followed the same letter in the column do not differ significantly by LSD test (p<0.05)

In testing of MSE ratio between two sites, the data on characteristics was derived from of cherry tomato varieties across different environment (data was not shown) and varieties (represent genetically homogeneous groups). The analyze of the sources of variation on growth and yield was shown on table 3-4.

Table 2. Mean of tomato Characteristics tested in Nakorn Rachasima province between October 2017 and February 2018

Variety	yields	%brix	Flower set No.	Fruit set No.	First flowering	50% flowering	100% flowering
MSU50-1	1247.6[a1/]	8.80	16.33	14.33[a]	34.33[c]	38.67	40.00[d]
MSU50-6	819.3[b]	7.40	11.67	5.00[b]	40.33[a]	40.67	45.00[a]
SW	445.6[c]	7.93	10.67	9.33[ab]	35.67[b]	38.67	41.33[c]
TT	419.6[c]	8.33	15.00	14.33[a]	35.67[b]	39.33	42.33[b]
LSD	364.50	NS	NS	5.32	1.20	NS	0.88
CV	24.89	10.41	21.26	24.76	1.65	1.94	1.05

NS; non significant   DAP; day after planting CV; Coefficient of variation
1/; Mean followed the same letter in the column do not differ significantly by LSD test (p<0.05)

Table 3. Compare mean of the characteristics of cherry tomatoes tested in Mahasarakham and Nakhon Ratchasima between October 2017 and February 2018

characteristic	location		LSD	CV
	Mahasarakham	**Nakorn Rachasima**		
yields	1042.7$^{a1/}$	733.0^{b}	*	16.42
%brix	8.40	8.12	NS	9.39
Flower set No.	14.33	13.42	NS	17.72
Fruit set No.	10.17	10.75	NS	21.65
first flowering	34.08^{b}	36.50^{a}	*	1.83
50% flowering	39.00	39.33	NS	2.27
100% flowering	43.25^{a}	42.17^{b}	*	2.24

NS; non significant   *; significant at α=0.05 CV; Coefficient of variation
1/; Mean followed the same letter in the row do not differ significantly by LSD test (p<0.05)

Table 4. Comparison of mean of new varieties of cherry tomato with commercial varieties tested in Mahasarakham and Nakhon Ratchasima between October 2017 and February 2018

characteristic	variety				LSD	CV
	MSU50-1	**MSU50-6**	**SW**	**TT**		
yields	1468.2$^{a1/}$	1084.7^{b}	562.6^{c}	435.8^{c}	*	16.42
%brix	8.56	8.60	7.77	8.10	NS	9.39
Flower set No.	17.83^{a}	13.67^{b}	10.67^{b}	13.33^{b}	*	17.72
Fruit set No.	13.50^{a}	7.00^{c}	9.83^{b}	11.50^{ab}	*	21.65
first flowering	32.67^{c}	38.33^{A}	35.00^{b}	35.167^{b}	*	1.83
50% flowering	35.83^{d}	40.33^{b}	38.33^{c}	42.17^{a}	*	2.27
100% flowering	38.17^{c}	45.50^{a}	41.17^{b}	46.00^{a}	*	2.24

NS; non significant   *; significant at α=0.05 CV; Coefficient of variation
1/; Mean followed the same letter in the row do not differ significantly by LSD test (p<0.05)

The results showed that yields, first flowering day after planting (DAP) and 100% flowering DAP were varied according to the different of environment. while the variation of sweetness (%brix), 50% flowering DAP, flower set No. and Fruit set No. are strongly related with genes, without significant effect from the environment (table 3). The mean performance of different yield traits of 4 cherry tomato genotypes was presented in Table 4. The results showed that characteristics on yields, flower set number, fruit set number, and flowering day were varied among different varieties and environments. Only the variation of sweetness (%brix) is not realated to environment, but is strongly related to varieties.

Discussion

This study was to propose the pure line selection methods of new cherry tomato breeding program of Mahasarakham University by cross pollinating over two good commercial variety (high yield and good taste). At first, pure line selection breeding method was used in order to select for predominant sweet tomato varieties. Then the selected varieties were consequently chosen for the higher yield (high flower set number and fruite set number/cluster). Therefore, MSU50-1 and SU50-6 are cherry tomato varieties that came from the same prevailingly sweet parent material. The fruit shape and fruit color are segregated on the next generation if it will be selected again. In agreement with the previous work Venkadeswaran *et al.* (2018) and Osei *et al.* (2015), Development of genotype with more flower number or fruit set number/cluster help increase the yield and increase productivity. And consistent with Watkin (2009) selections were made among segregating progenies of two successful, commercial F_1 hybrids, and the performance of the selected lines, up to the F_4 generation, shows that the superiority of the hybrids over their parents can be fixed in pure breeding lines.

Acknowledgement

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