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EVALUATION OF TOMATO GERMPLASM IN EARLY SPRING-SUMMER 2014 ON SANDY LAND IN THUA THIEN HUE

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Abstract. In this study, twenty-five tomato accessions were evaluated for bio-agronomic characteristics and yield component in sandy lowland field in Spring-Summer 2014 at Thua Thien Hue. The purpose of this study is to identify accessions of high yielding, good quality and high resistance to insects and diseases, adaptability to field conditions and climate for inclusion into province's crop system. The experiment was laid out in a CRD without replication. The plot size was 5m² with 10 plants. The results showed that 18 accessions could grow in sandy lowland field at Thua Thien Hue. Bi ĐP, Bi lào, GC171, GC173, Bi to and CLN1621L had high percentage of fruit-set (60-84%). Bi ĐP, Bi lào, GC171, GC173, CH154, G43, CLN1621L and CLN5915 had high resistance level to diseases and insects. Accessions G9, G5, G80, CLN2001A, CLN1621L, and CLN5915, CLN2418A and CLN2037B had high yield and good quality and can be grown in Thua Thien Hue. Other trials on these accessions need to be conducted in different seasons to confirm their ability.

Keywords: Tomato, sandy lowland field, *Solanum lycopersicum*, Thừa Thiên-Huế

1 Introduction

Tomato (*Solanum lycopersicum* L.) is one of the world's most important vegetables because of its high value of nutrition and economic. A large quantity of tomato is consumed all year round. It has roots in bunches, grown dynamics and shallow root development, which are appropriate with light clay, light heavy soil, sandy, humus or alluvial soil.

Thua Thien Hue is a province in the Center of Vietnam having large area of sandy land with the total area of about 39,706.7 ha. Sandy land has low natural fertility, light mechanical components, thus water and nutrition holding capacity is poor. In addition, a large area of sandy land appears embankment layers, somewhere only 0.5m above the ground creating layers holding the water during raining causing partial flooding. These layers barrier root development, prevent ground-water absorbing during drought season, and release ions Fe and Al that poison the root of the plants with deep roots (Đỗ Xuân Cẩm, 2007). With this particular feature, sandy

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lands are only suitable for growing vegetables, annual crops with shallow and spread root system like tomatoes.

Recently, vegetable production area is increasing in Thua Thien Hue. However, while a large of number of leafy vegetables and spices are grown here (Đoàn Xuân Cảnh, 2006), tomatoes are grown only at household size. Farmers are used to using local variety for cultivation and keep the seed for next season by themselves, which causes low yield, poor quality and low disease resistance ability. Thus, in order to increase tomato production area in Thua Thien Hue, OP varieties that adapted to sandy soil are needed. In this study, we conducted an experiment on "Evaluation of tomato germplasm in early spring-summer 2014 on sandy land in Thua Thien Hue" aiming at selection of appropriate tomato varieties for sandy land in Thua Thien Hue.

2 Materials and methods

2.1 Materials

A total of 25 introduced tomato accessions, which included 16 accessions provided by National Institute of Horticultural and Herbal Science (NIHHS), Korea, and 6 accessions provided by AVRDC-The World Vegetable Center, Taiwan, and 3 accessions provided by College of Agriculture and Forestry, Hue University were used in this study.

Table 1. List of tomato accessions used

Number	Accession name	Place of Collecting	Number	Accession name	Place of Collecting
1	Bi ĐP (Control check)	ĐHNL	14	G 44	NIHHS
2	GC 171	NIHHS	15	G 69	NIHHS
3	CC173	NIHHS	16	GC 9	NIHHS
4	G71	NIHHS	17	TS 33	NIHHS
5	G5	NIHHS	18	Bi To	ĐHNL
6	G49	NIHHS	19	Bi lào	ĐHNL
7	G77	NIHHS	20	CH 154	AVRDC
8	G50	NIHHS	21	CLN2001A	AVRDC
9	G45	NIHHS	22	CLN1621L	AVRDC
10	G43	NIHHS	23	CLN5915	AVRDC
11	G 9	NIHHS	24	CLN2418A	AVRDC
12	G 41	NIHHS	25	CLN2037B	AVRDC
13	G 80	NIHHS			

2.2 Methods

The experiment was conducted in Randomized Complete Design (RCD) without replication. Each plot was 5 m^2 with 10 plants per plot. The distance between plants was 50 cm^2. The seeds were sown in a 72 whole tray. The seedlings were transplanted after sowing 30 days. The process of planting and care was done according to the guidelines of the National technical regulations QCVN01-63: 2011/BNNPTNT by Ministry of Agriculture and Rural Development.

The experiment was performed during Spring-Summer season: from January to May, 2014 at Tu Ha crop research Center of Institute of Development Studies, College of Agriculture and Forestry, Hue University.

Collecting of data of morphological traits, plant structure, growth and development potential, flowering, fruiting, seeding and pest resistance, yield and fruit quality followed the guidelines of the National technical regulations QCVN01-63: 2011/BNNPTNT. Data was analyzed using Excel (2007) program.

2.3 Weather condition during experiment conducted

Table 2. Weather condition in Spring-Summer season 2014

Time	Target / Day	Temperature (°C)			Rainfall		A° (%)
		Mean Temp.	Max Temp.	Min Temp.	Total rainfall (mm)	Number of rainy days (day)	
January	1-30	18,7	28,5	28,5	75,9	12	90,0
February	1-10	17,9	27,9	14,9	28,0	1	90,8
	11-20	17,9	23,0	15,9	14,3	5	93,0
	21-28	21,3	26,1	14,3	0	0	71,1
March	1-10	23,9	25,9	20,4	1,4	3	93,4
	11-20	22,3	26,5	19,5	2,9	2	92,0
	21-31	22,8	20,1	19,9	12,4	2	82,0
April	1-10	26,4	27,3	22,3	19,75	4	77,2
	11-20	29,7	30,3	23,0	0	0	85,7
	21-31	28,0	29,0	23,0	0	0	88,0
May	1-10	30,0	35,2	22,3	0	0	82,0

(Source: Thừa Thiên Huế weather forecast)

Low mean temperature (18,7°C) and more rainy days in January influenced seedling stage during experiment (Table 2). High humidity, high rainfall, and low mean temperature (17-21°C) in February caused difficulties for plowing and transplanting. Tomatoes grew, flowered, and gave fruits rapidly in March. Weather conditions in this month were suitable for its growth and development. However, good weather also created favourable environment for insects and diseases to develop well and damage crops. In April and May, tomatoes still fruited and were ready for harvest. Mean temperature changing from 26 °C to 30°C, humidity from 77% to 88% and medium rainfall were suitable for development and ripeness of fruits.

3 Results and discussion

3.1 Timing of growth and development periods

The results showed that all of accessions were short-day and medium-day. Time from cultivating to flowering varied from 22 to 36 days. Control check accession group took 22 days to finish this period while other accessions longer than control check, especially, G9 and G80 took 36 days. Time from cultivating to harvesting lasted from 51 days (GC171) to 78 days (CLN2037B). In spring-summer season, the longest growth time was 120 days, including Control check, G5 and G9; the shortest ones including CLN2001A and CLN5915 (101 days). On the whole, all of accessions could grow under weather conditions of spring-summer season and sandy lowland field in Thua Thien Hue.

3.2 Morphological and structural traits

Morphological and structural traits are specific to varieties and affected by surrounding conditions such as cultivated techniques, weather, etc. These characters influenced yield, fruit quality and reflected growth capacity and were dominated by cultivated techniques. The height from foot to the first bunch of flower ranged from 21,8 to 53,4 cm (Table 3). The control check had lowest height from foot to the first bunch (21,8 cm) and all the remains were higher. Number of branches ranged from 2,4 to 10,6 and plant height ranged from 58,2 to 129,8 cm. Almost all accession had semi-determinate growth, some were indeterminate such as control check, Bito and G69, other varieties such as CLN2001A, CLN1621L, CLN5915, CLN2418A, CLN2037B and G71 were determinate. All accessions had structural traits suitable to grow in sandy lowland filed.

Table 3. Structural traits of 25 tomato accessions in spring-summer season ($\overline{X} \pm$ SD)

No.	Accession name	The height from foot to the first flower (cm)	Total of branches/stem (branch)	Plant height (cm)	Type of growth
1	Bi ĐP (Control check)	21,8 $\pm$ 2,77	10,6 $\pm$ 1,51	117,6 $\pm$ 4,50	Indeterminate

2	GC 171	22,8 ± 2,77	4,6 ± 0,54	95,40 ± 13,4	Semi-determinate
3	CC173	43,8 ± 2,38	4,8 ± 0,83	95,00 ± 4,0	Semi-determinate
4	G71	34,9 ± 5,48	-	-	Determinate
5	G5	37,0 ± 4,06	5,8 ± 1,30	100,8 ± 3,76	Semi-determinate
6	G49	53,4 ± 4,72	6,4 ± 1,14	120,2 ± 9,52	Semi-determinate
7	G77	48,0 ± 5,14	7,6 ± 2,30	129,8 ± 10,52	Semi-determinate
8	G50	24,2 ± 3,83	-	-	Semi-determinate
9	G45	43,4 ± 4,92	6,2 ± 1,09	96,80 ± 2,68	Semi-determinate
10	G43	46,4 ± 12,2	6,8 ± 1,30	109,0 ± 4,84	Semi-determinate
11	G 9	31,6 ± 5,85	5,6 ± 1,14	83,20 ± 6,01	Semi-determinate
12	G 41	33,2 ± 5,16	6,2 ± 1,78	89,20 ± 2,58	Semi-determinate
13	G 80	38,7 ± 5,04	6,2 ± 1,48	90,00 ± 6,96	Semi-determinate
14	G 44	33,3 ± 5,16	6,0 ± 1,0	124,6 ± 4,09	Semi-determinate
15	G 69	37,4 ± 1,67	5,8 ± 0,44	120,6 ± 1,94	Indeterminate
16	GC 9	38,2 ± 9,52	-	-	Semi-determinate
17	TS 33	37,8 ± 4,54	6,6 ± 0,89	95,80 ± 11,56	Semi-determinate
18	CH 154	40,6 ± 4,21	5,2 ± 0,83	58,20 ± 8,07	Semi-determinate
19	Bi To	32,2 ± 6,64	5,6 ± 1,14	110,8 ± 7,36	Semi-determinate
20	Bi lào	21,8 ± 11,07	9,8 ± 1,48	121,2 ± 8,34	Semi-determinate
21	CLN2001A	17,8 ± 2,58	5,4 ± 0,89	61,00 ± 5,24	Determinate
22	CLN1621L	24,9 ± 0,89	7,0 ± 1,41	73,60 ± 3,64	Determinate
23	CLN5915	26,0 ± 1,41	6,6 ± 1,34	68,00 ± 5,00	Determinate
24	CLN2418A	30,8 ± 3,47	2,4 ± 0,54	72,20 ± 10,7	Determinate
25	CLN2037B	51,4 ± 2,96	3,0 ± 1,0	105,8 ± 10,3	Determinate

Note: - data was not collected

3.3 Flowering and fruiting

The results from Table 4 showed that total flowers per bunch ranged from 4,92 ± 0,67 flowers (G49 and G77) to 9,44 ± 1,24 flowers (TS33). Number of flowers per bunch varies greatly among varieties. Number of flower bunches ranged from 4,2 ± 0,83 bunches (TS33) to 8,8 ± 0,83 (Bito). This trait is one of specific targets of variety and depends on cultivating techniques and surrounding conditions. For example: Under warm weather conditions, daytime temperature from 20°C

to 25°C, night temperature from 13°C to 15°C, full light, dry weather, medium humidity and sufficient nutrients are good for producing more flower bunches. When temperature is about 20°C, tomatoes have bigger flower (Tạ Thị Thu Cúc, 2007; Lê Thị Khánh, 2006). Thus, temperature and humidity in spring-summer season are suitable for flowering and fruiting periods of the accessions.

However, fruiting ratio were different between accessions in this experiment. Among 25 accessions, 18 accessions were recorded about fruiting ratio and the remained (G71, G77, G45, G50, L3708, TS33 and GC9) had no data because of poor adaptability and low fruiting. The accession Bito had highest fruiting ratio (84%), next was Bi ĐP (71%) and other accessions had fruiting ratio ranged from 41% to 69%. Number of fruits per plant is one of yield components and different between varieties. All accessions had few fruits and most fruits were small. The number of fruits ranged from 8,2±2,38 fruits (G43) to 28,8±9,78 fruits (CLN5915) for big fruit group; and for small fruit group, it ranged from 24,0±5,9 fruits (GC171) to 101,8±8,22 fruits (Bi ĐP). Ability of seeding is different among accessions. Number of seeds changed from 40,0 $\pm$ 8,88 seeds (CH154) to 114,8 $\pm$ 20,05 seeds (G9).

Table 4. Ability of flowering, fruiting and seeding ($\overline{X} \pm SD$)

No.	Accession name	No. of flowers per bunch (flower)	No. of flowers bunch/plant (bunch)	Fruiting ratio (%)	Number of fruits per plant (fruit)	Number of seeds (seed)
1	Bi ĐP (Control check)	5,56 $\pm$ 0,16	6,0 $\pm$ 0,70	71	101,8 $\pm$ 8,22	75,8 $\pm$ 7,69
2	GC 171	5,12 $\pm$ 1,16	8,2 $\pm$ 0,83	69	24,0 $\pm$ 5,9	40,40 $\pm$ 12,83
3	CC173	6,04 $\pm$ 0,69	7,8 $\pm$ 0,83	60	26,20 $\pm$ 3,03	52,6 $\pm$ 7,26
4	G71	10,2 $\pm$ 2,16	5,2 $\pm$ 0,44	-	-	-
5	G5	9,72 $\pm$ 2,08	5,2 $\pm$ 0,83	41	15,40 $\pm$ 3,36	103,2 $\pm$ 6,83
6	G49	4,92 $\pm$ 0,67	6,0 $\pm$ 0,70	-		-
7	G77	4,92 $\pm$ 0,80	6,6 $\pm$ 0.54	-	-	-
8	G50	5,20 $\pm$ 0,14	7,0 $\pm$ 0,70	-	-	-
9	G45	6,52 $\pm$ 1,15	5,8 $\pm$ 1,30	-	-	-
10	G43	6,24 $\pm$ 0,57	4,8 $\pm$ 0,83	49	8,20 $\pm$ 2,38	73,4 $\pm$ 3,97
11	G 9	6,20 $\pm$ 0,58	6,2 $\pm$ 1,30	50	21,2 $\pm$ 4,38	114,8 $\pm$ 20,05

12	G 41	6,24 ± 1,17	6,8 ± 0,44	51	21,0 ± 3,16	88,4 ± 33,5
13	G 80	7,84 ± 0,38	5,6 ± 1,14	52	8,80 ± 1,92	95,8 ± 9,23
14	G 44	5,32 ± 0,87	7,6 ± 0,89	54	15,2 ± 2,16	88,4 ± 33,5
15	G 69	6,28 ± 0,55	5,6 ± 1,14	55	60,6 ± 5,13	93,6 ± 7,23
16	GC 9	5,48 ± 0,39	5,0 ± 0,70	-	-	-
17	TS 33	9,44 ± 1,24	4,2 ± 0,83	-	-	-
18	CH154	12,05± 1,97	8,0 ± 0,70	36,9	52,6 ± 3,91	40,0 ± 8,88
19	Bi To	7,28 ± 0,48	8,8 ± 0,83	84	92,0 ± 5,09	66,8 ± 6,4
20	Bi lào	7,28 ± 0,39	7,4 ± 0,54	69	81,6 ± 4,67	72,80 ± 19,48
21	CLN2001A	7,96 ± 0,92	6,6 ± 0,54	52	19,2 ± 4,96	109,2 ± 13,78
22	CLN1621L	7,68 ± 0,90	4,8 ± 0,45	61	24,2 ± 3,27	96,00 ± 16,0
23	CLN5915	9,00 ± 0,94	6,8 ± 0,83	57	28,8 ± 9,78	84,60 ± 25,48
24	CLN2418A	6,88 ± 0,94	4,8 ± 0,83	57	11,8 ± 3,63	84,40 ± 17,25
25	CLN2037B	7,12 ± 1,38	4,0 ± 0,70	50	12,4 ± 8,38	62,80 ± 5,1

Note: - Not collect data

3.4 Insects and diseases

Study on disease and insect infection and damages aims to assess adaptability and pest resistance ability under local ecological conditions and quality of varieties. The results were recorded in Table 5.

Table 5. Infected diseases and insect damage to accessions in the field

No.	Accession name	Late blight (Score)	Bacterial wilt (%)	Southern blight (%)	Ratio of fruit damaged by fruit worm (%)
1	Bi ĐP	2	9	0	0
2	GC 171	1	0	0	8,3
3	CC173	1	0	0	7,6
4	G71	1	33	67	-

5	G5	1	6	6	26,0
6	G49	1	14	0	-
7	G77	1	25	0	-
8	G50	2	60	40	-
9	G45	2	0	0	-
10	G43	1	0	0	4,9
11	G 9	1	0	0	14,1
12	G 41	1	0	0	19,0
13	G 80	1	0	0	11,4
14	G 44	1	0	13	19,7
15	G 69	2	9	1	0
16	GC 9	1	33	67	-
17	TS 33	1	0	0	-
18	CH 154	1	0	0	0
19	Bi To	1	0	8	0
20	Bi lào	5	0	0	0
21	CLN2001A	1	0	0	20,8
22	CLN1621L	1	0	0	12,4
23	CLN5915	1	0	0	10,4
24	CLN2418A	1	0	0	25,4
25	CLN2037B	1	0	18	16,2

Note: - Not collect data

Late blight (*Phytopthora infestans*): Almost all accessions were infected with this disease. Accessions such as Bi ĐP, G50, G45, G45, G69 and Bi lào had low level of infection. The reasons were suitable humidity (over 80%) and temperature (20-30°C) for late blight to develop and infect plant.

Bacterial wilt (*Ralstonia solanacearum*): Some accessions showed high level of infection such as G77, G50, G49, G7, G5, Bi ĐP, G69 and GC9. This disease developed under high temperature and humidity, rainy and sunny conditions erratically and sandy soil (Lê Lương Tề và Vũ Triệu Mân, 1999).

Southern blight (*Sclerotium rolfsii*): Several accessions were highly infected such as G71, G5, G50, G44, Bito, G69, GC9 and CLN2037B. This disease appears in light loam or sandy soil at tomatoes fields and hot and wet weather (Nguyễn Văn Hiền et al, 2010). In this experiment, high

temperature and high humidity conditions (over 80%) in March and April are suitable for disease development.

Tomato fruit worm (*Helicoverpa zea*): Damage caused by fruit worm ranged from 4,9% to 26% because of medium temperature, and high humidity.

3.5 Yield components and yields.

Density, average fruit weight, and number of fruits per plant are constituent elements of tomato yields. Average fruit weight is one of specificities of each variety and affected by genetic factors and cultivated techniques. Among 18 accessions, only 6 accessions had small fruit, namely Bi ĐP, GC171, GC173, G69, Bito and Bi lào, while others had big fruit. An average fruit weight ranged from 4,55 gram to 85,1gram.

The theoretic yield ranged from 6,36 to 36,68 ton/ha. Bi ĐP gained 9,26 ton/ha for theoretic yield. While theoretic yield of two accessions GC171 and GC173 were lower than Bi ĐP, others were higher.

Yields ranged from 3,35 to 16,2 ton/ha. The Control check gained 6,75 ton/ha, GC171 accession gained 3,75 ton/ha (less than 44,44% compared with control check) and GC173 gained 3,35 ton/ha (less than 50,37% compared with control check). Other accessions had higher yield than control check such as CLN1621L gaining 10,5 ton/ha (gained 155,56% compared with control check).

Table 6. Yield components and yields ($\overline{X} \pm$ SD)

No.	Accession name	Density (plant/m²)	Average fruit weight (gram)	Theoretic yield (ton/ha)	Yield (ton/ha)	Increase or decrease compared with Control check	
						Ton/ha	%
1	Bi ĐP (Control check)	2	4,550 ± 0,65	9,26	6,75	0	0
2	GC 171	2	13,26 ± 2,83	6,36	3,75	-3	-44,44
3	CC173	2	13,96 ± 2,96	7,31	3,35	-3,4	-50,37
4	G5	2	48,98 ± 6,09	15,08	11,25	4,5	66,67
5	G43	2	85,10 ± 5,55	13,95	8,55	1,8	26,67
6	G 9	2	69,90 ± 9,97	29,63	16,2	9,45	140
7	G 41	2	49,18 ± 4,39	20,65	9,45	2,7	40
8	G 80	2	83,58 ± 8,95	14,71	10,5	3,75	55,56
9	G 44	2	47,16 ± 7,10	14,33	7,8	1,05	15,56
10	G 69	2	9,400 ± 2,05	11,39	8,4	1,65	24,44

11	CH 154	2	10,31 ± 0,77	10,85	8,1	1,35	20
12	Bi To	2	19,94 ± 2,46	36,68	10,8	4,05	60
13	Bi lào	2	15,80 ± 0,94	25,78	9,75	3	44,44
14	CLN2001A	2	45,48 ± 4,48	17,46	16,05	9,3	137,78
15	CLN1621L	2	45,21 ± 3,17	21,88	17,25	10,5	155.56
16	CLN5915	2	41,30 ± 4,77	23,78	13,5	6,75	100.00
17	CLN2418A	2	70,62 ± 7,07	16,66	16,95	10,2	151.11
18	CLN2037B	2	59,40 ± 0,91	14,73	12,6	5,85	86.67

3.6 Fruit quality traits

Fruit quality traits are important elements to assess the quality of a variety for preferred markets. Of the 25 accessions used in the experiment, 18 had fruits and were assessed in terms of fruit quality. The results showed that the color of ripe fruits of most accessions was red, while that of some accessions such as CLN5915, CLN2001A and G9 were orange (Table 7). Thickness of flesh fruit is genetic characteristic of variety, and ranged from 0,16cm to 0,58cm. Some accessions such as G80, G9 and Bito had slightly sweet taste, Bi lào had sweet taste and all the remains were sour or tasteless. Fruit shape was different among accessions. Some accessions such as G9, G14 and G50 had flattened circle fruit (I<0,8) and other had circle fruit (0,8<I<1,25). Brix was affected by surrounding conditions and care methods. In dry weather, it will be higher than wet weather (Đoàn Xuân Cảnh, 2006). In the harvesting period, because of high humidity, Brix were low and changed from 3,52 to 5,76. The number of locules is one of features for assessment of fruit hardness. If the number of locules is low, the fruit will be softer and have shorter storage time compared with the ones having high of locule number. In this experiment, the number of locules ranged from 2,0 to 5,4. G43 had the highest number of locules; while Cotrol check, GC171, and GC173 had the lowest number of locules.

Table 7. Fruit quality traits of tomato germplasm

No.	Accession name	Fruit color	Thickness of fruit flesh (cm)	Wet flesh	Taste	Brix	I= H / D	No. of locules (locule)
1	Bi DP (Control check)	Red	0,16	Wet	Sour	5,92	1,02	2,0
2	GC 171	Red	0,34	Dry	Sour	4,96	1,17	2,0
3	CC173	Red	0,45	Dry	Sour	5,08	1,11	2,0
4	G5	Fresh red	0,54	Wet	Sour	4,88	1,15	3,0
5	G43	Red	0,41	Wet	Sour	5	0,77	5,4

6	G 9	Red-Orange	0,58	Wet	Slightly sweet	4,36	0,78	4,4
7	G 41	Red	0,45	Dry	Sour	4,76	0,86	4,4
8	G 80	Red	0,48	Average	Slightly sweet	5,16	0,89	3,8
9	G 44	Red	0,44	Dry	Sour	4,44	0,92	3,8
10	G 69	Red	0,21	Dry	Slightly sweet	5,76	0,93	3,0
11	CH 154	Red	0,28	Wet	Sour	4,84	1,15	2,2
12	Bi To	Red	0,34	Wet	Slightly sweet	4,64	1,05	2,4
13	Bi lào	Red	0,32	Average	Sweet	5,76	0,95	2,2
14	CLN2001A	Red-Orange	0,47	Wet	Tasteless	3,72	1,17	3
15	CLN1621L	Red	0,51	Dry	Tasteless	3,88	1,0	3
16	CLN5915	Red-Orange	0,50	Wet	Sour	3,52	1,18	2,2
17	CLN2418A	Red	0,51	Wet	Sour	3,84	0,91	4
18	CLN2037B	Red	0,45	Wet	Sour	4,36	0,95	3,4

4 Conclusions and suggestions

Conclusions

1. Ability of growth and development: accessions G71, G49, G77, G50, G45, GC9 and TS33 had poor adaptability, 18 remaining accessions grew well in sandy lowland field in spring-summer season of 2014.
2. Ability of flowering and fruiting: Among 18 accessions giving fruits, CH154, G43 and G5 had low fruiting, and other accessions had higher. Bito had highest fruiting (84%).
3. Yield: Some accessions such as G9, G5, G80, CLN2001A, CLN1621L, CLN5915, CLN2418A and CLN2037B had high yield.
4. Quality: Almost all accessions had similar fruit quality, while some accession had high Brix. Accessions G9, G80, G69 and Bito had sweet taste.
5. Level of pest infection in field: G77, G50, G49, G7, G5, Bi ĐP, G69, G71, G5, GC9 and CLN2037B were infected with bacterial wilt and Southern blight.

Thus, accessions G9, G5, G80, CLN2001A, CLN1621L, CLN5915, CLN2418A and CLN2037B had high yiled, high level of pest resistance, good fruit quality and suitable to cultivate under Thua Thien Hue condition.

Suggestions

Continue further research on promising varieties in different seasons to assess varieties completely.

Continue research to complete tomatoes cultivated techniques in sandy lowland field at Thua Thien Hue.

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