PRIMARY EVALUATION OF SOME TEMPERATE FRUIT CULTIVARS INTRODUCED FROM TAIWAN

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Abstract

14 cultivars of 3 temperate fruits including 4 persimmon cultivars, 4 peach cultivars and 6 pear ones with low and medium chilling requirement introduced from Taiwan were primarily evaluated in 4 Northern Mountainous provinces and Lam Dong (Central Highlands) for its adaptability in Vietnam conditions and from which highly adapted promising cultivars should be screened for large scale production. After more than 3 years of study, some local rootstock cultivars having good compatibility with introduced ones were determined. In addition, introduced cultivars, named Mackawa Jiro (persimmon), B112 and A2-2-39 (peach), Mi Xue and Heng Shan (pear) were considered to be promising in terms of healthy growth, adaptable yield and high quality.

Keywords: Temperate fruits, Chilling requirement, adaptability

INTRODUCTION

Taiwan agricultural varieties in general and fruit ones in particular have good potential in productivity and quality as well as partly contributed to Vietnam agricultural production in past decades, indeed (Le Duc Khanh *et al.*, 2007; P. Blanchet, J. Bourdeaut, Ha Minh Trung, Le Duc Khanh. Dang Vu Thi Than *et al.*, 2000). Under a framework of planting material exchange between Taiwan Agricultural Research Institute (TARI) and Vietnam Academy of Agricultural Sciences (VAAS), 14 cultivars of 3 Taiwan temperate fruits were primarily evaluated at 6 local sites located in 4 Northern Mountainous provinces (Son La, Lao Cai, Bac Kan and Lang Son) and 1 Central Highland province (Lam Dong). Results conducted from the study were summarized in this paper.

MATERIALS AND METHODS

Materials

14 fruit varieties introduced from Taiwan of low to medium chilling requirement (250 - 450 CU) including 4 peach cultivars named B115; A2-2-39; Flordared and Tropic Beauty, 4 persimmon cultivars named Hiratone Nashi, Tone Wase, Nishimura Wase and Mackawa Jiro, 6 pear ones named Mixue, Ming Fu, Heng Shan, Jinxian, Zhizin and Gao Qiang were used for the study. Seedling rootstock varieties (sown in nurseries) are indigenous ones that have good growth and high resistance to main insects and diseases whereas both local and introduced cultivars (double grafting) were used as rootstock ones for Top-working implementation.

Methods

- The layouts of trials concerned were accordingly designed depending on purpose and particularity of the study in which RCBD applied for perennial fruits to make sure all treatments in one repeat having quite similar condition was prioritized (.R.A.I Drew, Ha Minh Trung, Le Duc Khanh 2001; A.P. George, R.J. Nissen, 1998).

- The percentage of grafted shoot survival was used as the indicators of compatibility of introduced varieties when grafted on rootstock seedlings in nurseries or top-worked on aged fruit trees in the orchards (P. Blanchet, J. Bourdeaut, Hà Minh Trung, Le Duc Khanh. Dang Vu Thi Than *et al*. 2000). This combines with the growth of grafted shoots presents the adaptability of fruit varieties introduced in different locations.

- Flowering process, fruit setting, productivity and fruit quality of introduced cualtivars were evaluated and calculated through the samples randomly taken from orchards in combination with bio chemical analysis in the laboratories.

- Collected data were then statistically treated by EXCEL program.

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RESULTS AND DISCUSSION

Adaptability evaluation of fruit cultivars introduced

Compatibility of persimmon cultivars

- In case of top-working

When grafted on aged fruit trees, high percentage of shoot survivals ranged from 77.5 to 100.0% was recorded in all 4 introduced cultivars of persimmon in which better results was reported in Hiratanenashi and Tone Wase ones in terms of high ratio of survived shoots, short duration from grafting to bud emergency and good growth of grafted shoots.

- In case of grafting on rootstock seedlings

When grafted on local rootstock cultivars named "Phu Tho trung persimmon" and "Sa Pa persimmon" high percentage of shoot survivals of all 4 introduced varieties varied from 76.5 to 82.8% and a little bit better results was observed in Nishimura and Tone Wase cultivars compared to the others.

Compatibility of peach cultivars

- In case of top-working

When grafted on local rootstock cultivars named "Thoc peach" and "Son La peach" good result was observed in all 4 introduced peach cultivars and shoot survival ratio was 80% up and no significant difference was recorded between cultivars and locations implemented as well.

- In case of grafting on rootstock seedlings

The same rootstock cultivars mentioned above were used and high percentage of grafted shoot survivals (84.5 to 88.7%) were also obtained. It is obvious that all 4 introduced cultivars having good compatibilities with the local rootstock ones in which Tropic beauty gave the best result, A 2-2-39 ranked the second, a little bit better than Flodared and B115.

Compatibility of pear cultivars

- In case of top-working

When grafted on aged trees of Tainong pear cultivar that had been budded on local rootstock seedlings, good compatibility and high ratio of shoot survival were recorded in all introduced varieties, in which better result was observed in Mi Xue and Heng Shan cultivars (more than 95%) comparing to the others (about 93% of shoots survived).

- In case of grafting on rootstock seedlings

The same situation with the above mentioned case was also reported, good compatibility of introduced varieties with local ones named " Big fruit Macoc" and "Small fruit Macoc" indicated that high percentage of grafted shoot survival was observed in both implementing locations: Moc Chau and Sa Pa (94,5% and more than 80% respectively).

The growth of grafted shoots of introduced cultivars

Apart from scion-roostock cultivars compatibility, the growth of introduced varieties was also evaluated through the heath of grafted shoots indicated by 2 main criteria: diameter measured at the site close to grafting point and its length, collected data are presented in table 2 and it can be generally summarized that all introduced varieties from Taiwan had quite good growth and no significant difference in the growth of the same cultivars tested in various locations.

Table1. Diametter (D) and length (L) of grafted shoots of introduced cultivars in different locations (cm)

Persimmon			Peach			Pear		
Cultivars	D	L	Cultivars	D	L	Cultivars	D	L
Bac Ha - Lao Cai								
Hiratone Nashi	0.34	29.6	B115			Mixue	2.23	94.5
Tone Wase	0.30	28.6	Flordared			Heng shan	2.16	90.5
NishimuraWase	0.39	31.7	Tropic Beauty			Ming Fu	2.01	88.2
Mackawa Jiro	0.41	33.5	A2-2-29			Jin xian	1.56	76.2
						Zhì Zì	1.73	82.2
						Gao Qiang	1.85	87.9
Sa Pa - Lao Cai								
Hiratone Nashi	0.30	25.3	B115	4.45	140.2	Mixue	4.25	148.2
Tone Wase	0.30	24.1	Flordared	3.97	136.5	Heng shan	3.97	139.5
NishimuraWase	0.32	22.9	Tropic Beauty	4.93	148.6	Ming Fu	3.83	132.6
Mackawa Jiro	0.36	25.7	A2-2-29	4.82	152.5	Jin xian	3.47	118.5
						Zhì Zì	3.54	123.7
						GaoQiang	3.67	130.6

Table1. Diametter (D) and length (L) of grafted shoots of introduced cultivars in different locations (cm) *(continued)*

Persimmon			Peach			Pear		
Dong Van - Ha Giang								
Hiratone Nashi	0.31	31.6	B115	4.23	143.6	Mixue	4.04	144.5
Tone Wase	0.30	29.6	Flordared	3.84	137.2	Heng shan	3.66	135.3
NishimuraWase	0.33	34.7	Tropic Beauty	4.71	146.1	Ming Fu	3.52	130.2
Mackawa Jiro	0.35	36.5	A2-2-29	4.56	155.4	Jin xian	3.28	115.6
						Zhì Zì	3.15	121.8
						Gao Qiang	3.35	128.1
Ngan Son - Bac Kan								
Hiratone Nashi	0.34	28.5	B115	4.03	99.8	Mixue		
Tone Wase	0.34	27.1	Flordared	3.89	103.2	Heng shan		
NishimuraWase	0.36	25.8	Tropic Beauty	4.23	105.2	Ming Fu		
Mackawa Jiro	0.41	28.9	A2-2-29	4.41	99.6	Jin xian		
						Zhi Zi		
						Gao Qiang		
Trang Dinh - Lang Son								
Hiratone Nashi	0.38	33.3	B115	3.98	93.4	Mixue	2.70	94.5
Tone Wase	0.34	32.2	Flordared	4.02	104.3	Heng shan	-	-
NishimuraWase	0.44	35.7	Tropic Beauty	4.11	101.2	Ming Fu	-	-
Mackawa Jiro	-	-	A2-2-29	4.27	98.7	Jin xian	2.02	83.3
						Zhì Zì	-	-
						Gao Qiang	2.27	86.3
Moc Chau - Son La								
Hiratone Nashi	0.28	38.3	B115	3.98	63.13	Mixue	4.04	74.8
Tone Wase	0.29	35.1	Flordared	4.02	57.25	Heng shan	3.66	76.6
NishimuraWase	0.30	29.6	Tropic Beauty	4.11	55.5	Ming Fu	3.52	43.7
Mackawa Jiro	0.27	30.3	A2-2-29	4.27	65.63	Jin xian	3.28	34.6
						Zhi Zi	3.15	57.9
						Gao Qiang	3.35	78.9
Don Duong - Lam Dong								
Hiratone Nashi	2.98	68.6	B115			Mixue		
Tone Wase	2.6	38.2	Flordared			Heng shan		
NishimuraWase	23.7	55.6	Tropic Beauty			Ming Fu		
Mackawa Jiro	2.98	-	A2-2-29			Jin xian		
						Zhi Zi		
						Gao Qiang		

Productivity and main fruit characteristics of introduced cultivars

The yields (Kg/tree) of introduced cutivars presented in Table 2 were the means of same cultivars grafted on 4 - 6 years old trees grown in different locations in two crops.

It is also mentioned that the yield and quality of perennial fruits including persimmon, peach and pear should be significantly improved with time until 10 to 12 years even more after growing.

Table 2. Yields and fruit characteristics of introduced cultivars

Cultivars	Yields (Kg/tree)		Fruit characteristics (means)			
	Min	Max	Diametter (cm)	Length (cm)	Weight (g)	Brix (%)
Persimmon						
Hiratanenashi	12.8	19.3	6.1	6.5	128.0	19.3
Tone Wase	11.7	16.1	6.6	5.3	142.7	16.1
Nishimura Wase	14.7	20.2	5.8	4.6	94.6	20.2
Mackawa Jiro	15.6	21.3	7.2	4.6	254.7	21.3
Peach						
B115	6.6	8.4	5.2	4.7	71.3	11.8
Flodared	6.0	7.0	6.0	4.5	82.1	9.7
Tropic beauty	6.9	8.9	4.8	4.6	68.3	9.2
A2-2-39	6.6	8.9	5.7	5.3	91.2	11.5
Pear						
Mixue	6.2	10.2	8.1	7.4	295.2	13.2
Heng Shan	3.5	5.8	6.3	5.5	263.7	12.1
Ming Fu	-	-	-	-	-	-
Jin Xian	4.5	6.5	6.6	5.8	145.3	11.3
Zhi Zi	5.7	8.7	6.3	5.2	130.7	10.4
Gao Qiang	4.3	5.3	6.8	5.8	164.3	11.2

From the above mentioned criteria related to the productivity and quality of cultivars studied, general considerations should be primarily summarized as follow:

- Almost cultivars introduced from Taiwan except Ming Fu (pear) can flower and fruit at the first and second year after top working on aged fruit trees.

- Of all cultivars studied, Mackawa Jiro (persimmon) B115 and A2-2-39 (peach) and Mi Xue and Hebg Shan (pear) can be considered as promissing ones.

CONCLUSION

(1) Introduced fruit varieties have had good compatibility with rootstock cultivars available in Vietnam and the cultivars named "Hong trung"; "Hong Chat" (for persimmon); "Dao Thoc"; Dao Sa Pa" (for peach) and "Big fruit Macoc"; Small fruit Macoc" can be used as seedling rootstocks for multiplication.

(2) The growth of introduced fruit varieties indicated by the health of grafted shoots was as good as local ones and no significant differences in the growth of the same varieties grown at various location was recorded.

(3) Introduced varieties named Mackawa Jiro (for persimmon), B112 and A2-2-39 (for peach) and Mi Xue and Heng Shan (for pear) are primarily considered as promissing ones in terms of its health, yield and fruit quality.

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DEVELOPMENT OF HIGH YIELD, DROUGHT TOLERANT MAIZE HYBRIDS FOR CENTRAL HIGHLAND PROVINCES

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Abstract

The Central Highlands is one of three main maize regions in Vietnam. Drought could be considered as the greatest reason of reduction in maize grain yield and production, therefore it is necessary to develop drought tolerant maize hybrids with high yield potential. Through testing and demonstration trials, it was found that three maize hybrids named LVN66, LVN092, LVN146 were of well drought tolerance, yield of 9-11 tons.ha^{-1}, 6-30% higher than of popular local hybrids and an increase in economic efficiency by 3-8 million VND.ha^{-1}, accepted by farmers for production development in the Central Highlands and should be developed in the next years.

Key words: Drought tolerance, maize hybrids, Central Highlands

INTRODUCTION

After more than 20 years of developing maize hybrids in Vietnam, maize production agro-ecological zones have been formed, including Red River Delta, North Upland and Mountainous regions, North Central Coast, South Central Coast, South East, the Central Highlands and the Mekong River Delta. According to General Statistics Office of Vietnam, maize area, grain yield and production in the Central Highlands in 2012 was 235,000 ha, were equivalent to 20.6% maize area of Vietnam, 5.1 tons.ha^{-1} and 1.2 million tons, respectively. It was 5.03 times in maize area and 13.0 times in production as much as in 2005.

As one of the main maize regions in Vietnam but maize production in the Central Highlands is facing so many challenges such as drought, diseases, low investment, obsolete processing and storage and so on, in which drought and diseases should be two factors that are most responsible for limiting maize yield, production and area expansion in Autumn-Winter and Winter-Spring crop seasons. In order to develop maize production in these seasons for the Central Highland provinces, it is essential to develop high yield hybrids quite well tolerant to drought.

MATERIALS AND METHODS

Materials

Materials used in the study included LVN66, LVN092, LVN146, VN595, CP888.

Methods

- VCU testing method: in compliance with the Value of Cultivation and Use testing on maize (QCVN 01-56:2011/BNN-PTNT), issued by the Ministry of Agriculture and Rural Development and conducted by Center for Plant Testing of South Region.

- The demonstrations were carried out at different ecological locals with 1-5 ha for each and cultivated by the procedures of National Maize Research Institute.

- Identifying hybrid varieties based on demonstrations, farming conferences/workshops and the feedback of experts, scientists, managers, farmers and enterprises.

- Transferring new hybrid varieties into practice based on demand, investment and development capacity of farmers and companies.

RESULTS AND DISCUSSION

The yield of some promising maize hybrids on basic testing and production testing in Central Highland provinces

From the most promising varieties, Maize Research Institute selected some best varieties for basic testing, conducted at official testing system in the Central Highlands. Results are presented in Table 1.

Through basic testing in 4 crop seasons, it showed that average grain yield of LVN66 was 9.0 tons.ha^{-1} which was higher than that of C919 (11.1%) and CP888 (11.3%) while both LVN092 and VN595 up to 9.5 tons. ha^{-1}) increased by 17.2% over C919 and by 20.2% compared with CP888. Especially, Hybrid LVN146 produced superior yield (10 tons.ha^{-1}) to C919 and CP888 by 28.3% and 31.6%, respectively.

The production testing results (Table 2.) also indicated that the grain yield of LVN66 was 9.3 tons.ha^{-1}, 5.6% higher than C919 and 6.8% higher than CP888 and of VN595 was 9.4 tons.ha^{-1}, increased by 6.8% and 8.0% compared with C919 and CP888, respectively; and the highest average yield obtained on production testing was 10.7 tons.ha^{-1} for Hybrid LVN146, superior to C919 (21.5%) and CP888 (22.9%) but for LVN092, it was not significantly different in yield to these checks.

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