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Hybrid Performance of Mini Cucumber (*Cucumis sativus*)

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ABSTRACT

Mini cucumbers for local market in Thailand are lacking of superior femaleness. The development of high-female aims for improving cucumber yield. The purpose is using high-female if not all female to develop hybrid cultivars. Evaluation of twenty one cucumber accessions collected from farmers, seed dealers and plant breeders indicated that populations C4, C5, C13 and C14 consisted high percentage of high-female plants. Selfed lines were maintained and crossing among s1-lines were made. The evaluation of crossess was carried out during November 1989 January 1990, at the KU-JICA experimental field, Central Laboratory and Greenhouse Complex (CLGC), Kasetsart University, Kampaengsaen, Nakhon Pathom. The experiment was conducted using randomized complete block design with three replications. The performance on flowering habits, yield and fruit characters were compared; and the heterosis of all characters were recorded. Results showed that crosses C5 X C4 and C14 X C5 were outstanding among 12 combinations. The cross C5 X C4 showed highest in the number of female flower per plant, fruit length, fruit width and average fruit weight with heterosis on most characters as mentioned including early flowering. The cross C14 X C5 was second to C5 X C4 due to its inferiority of the average fruit weight. The reciprocal crosses of the two combinations showed less in number of female flower per plant also less fruit per plant, but gave longer fruit length. The results revealed that the C5 line was most valuable parent and produced promising hybrids in combinations of C4 and C14 lines.

INTRODUCTION

Mini cucumbers of Asiatic types are important for Thailand market, and they are in the lack of superior femaleness. The development of high-female aims for improving yield in the mini cucumbers. Although the development of gynoecious lines is a common goal in breeding programs for hybrid cucumbers, the development of stable gynoecious inbreds is very complicated and time consuming (Lower and Edwards, 1986). Using high-female if not all female to develop hybrid cultivars is the purpose of this report.

MATERIALS AND METHODS

Twenty one accessions of slicing cucumbers for Thailand market were collected from farmers, seed dealers and plant breeeders in 1987. Results from the evaluation trial indicated that original populations C4, C5, C13 and C14 consisted high percentage of high-female plants (Ratanayingyong and Piluek, 1988). Selfed lines were maintained and crossing among s1-lines were made. The evaluation of crosses was carried out as following.

The evaluation trial was conducted during November 1989 January 1990, at the KU-JICA experimental field, Central Laboratory and Greenhouse Complex (CLGC), Kasetsart University, Kampaengsaen, Nakhon Pathom. There were 16 entries in the trial; those were included four s1-parents C4, C5, C13, C14 together with twelve possible crosses C4 X C5, C4 X C13, C4 X C14, C5 XC13, C5 X C14, C13 X C14 also the reciprocals C5 X C4, C13 X C4, C14 X C4, C13 X C5, C14 X C5, C14 X C13. The experiment was conducted using randomized complete block design with three replications. Individual plots were 1 X 12 m on a ridge of single row planting, consisted twelve plants in each plot. Nilon net was

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used for trellising. Fertilizer was basal application of cow manure 9 t/ha together with 15-15-15 complete fertilizer at 300 kg/ha, and followed by two times of side dressing with 46-0-0 (urea fertilizer) at 190 kg/ha each. Furrow irrigation was administered at planting and at 10-day intervals when the soil was dry. Data collection were made on flowering habits, yield and fruit characters. Analysis of data were made in order to compare the overall performance and heterosis of characters.

RESULTS AND DISCUSSION

Outstanding crosses among the 12 combinations were recorded to be C5 X C4 (represented by 2 X 1) and C14 X C5 (represented by 4 X 2). It can be pointed out that the cross C5 X C4 showed highest in the number of female flower per plant (Table 1) with highest fruit length, highest fruit width and highest average fruit weight (Table 2); furthermore it showed heterosis over mid-parent values on the number of female flower per plant, early flowering, fruit length, and average fruit weight (Table 3, 4). The cross C14 X C5 was considered to be second to C5 X C4 due to its inferiority of heterosis on the average fruit weight (Table 4). The reciprocal crosses of these two combinations showed less in number of female flower per plant with less fruit per plant (Table 1), but gave longer fruit length (Table 2). The crosses C4 X C13 (represented by 1 X 3) and C13 X C5 (represented by 3 X 2) in Table 1, although produced highest yield per plant but was not significantly different from the above crosses; and they showed inferiority of the femaleness and reciprocal crosses. Results from this

Table 1 Performance flowering habits and yielding ability of cucumber crosses and their parent lines. Central Laboratory and Greenhouse Complex (CLGC), Kampaengsaen, Nakhon Pathom, 1989.

Parent/Cross		Female Fl/Plt	Days to Flowering		M/F	Fruit /Plt	Weight Yield g/plt
			male	female			
Parents							
C4	(1)	16.0bc	25.8b	28.7b	3.2c	10.3	725.2
C5	(2)	24.5a	25.9b	28.2b	0.3d	8.2	578.9
C13	(3)	19.5b	30.1a	35.4a	6.8b	10.4	695.3
C14	(4)	14.6c	29.5ab	35.7a	13.5a	9.8	688.0
	Mean	18.6	27.8	32.0	5.9	9.7	671.8
	LSD (0.05)	4.06	3.92	2.53	2.53	2.44	180.99
Crosses							
1X2		18.4b	24.5d	27.8d	3.4b	8.9bc	655.3b
1X3		16.1b	25.3d	29.7cd	7.2a	10.7a	696.1a
1X4		18.5b	28.5c	34.7ab	6.1a	9.5ab	677.8ab
2X3		19.5b	31.2b	32.2bc	2.7b	7.3c	521.6c
2X4		26.7a	28.1c	29.9cd	2.0b	8.7bc	607.8bc
3X4		16.3b	35.0a	36.5a	6.1a	9.9ab	633.7bc
	Mean	19.3	28.8	31.8	4.6	9.2	648.7
	LSD(0.05)	6.89	2.56	3.28	2.47	1.73	129.82
2X1*		32.9a	25.7c	25.5c	0.9c	9.1ab	679.2ab
3X1		14.5c	32.0b	34.8a	4.5b	8.1b	575.6ab
4X1		19.5bc	33.9ab	36.7a	3.4b	7.7b	544.2b
3X2		27.0ab	35.6a	34.1a	0.4c	10.7a	727.3a
3X2*		31.3a	34.8ab	34.5a	0.9c	8.8ab	592.4ab
4X3		13.8c	28.3c	30.4b	6.5a	9.6ab	643.2ab
	Mean	23.2	31.7	32.7	2.8	9.0	627.0
	LSD(0.05)	9.77	3.12	2.85	1.43	1.99	166.24
Overall mean		20.6	29.6	32.2	4.3	9.2	646.3
Overall LSD (0.05)		6.99	2.64	2.51	1.86	1.72	136.82

experiment revealed that C5 line was the most valueable parent among four s1-lines in this experiment while the essential to strengthen fixation of C4, C5 and C14 characters in further generations to develop inbred parents for hybrid varieties.

CONCLUSION

Evaluation on 12 crosses together with 4 parent lines in mini cucumbers for superior femaleness during November 1989 January 1990 at Kasetsart University, Kampaengsaen, Nakhon Pathom.

Among the 12 combinations the crosses C5 X C4 and C14 X C5 kp were recorded to be most outstanding. The cross C5 X C4 showed superiority in the number of female flower per plant, fruit length, fruit width and average fruit weight; and heterosis of the cross over its mid-parent values were obtained in most characters mentioned including female earliness as indicated by days to flowering. The cross C14 X C5 was recorded to be second to C5 X C4 due to its inferiority of heterosis on the average fruit weight. The reciprocal crosses of the two combinations had less in number of female flower per plant, less fruit per plant; but gave longer fruit length. It can be concluded that the C5 lines was the most valueable parent among the four lines and produced promising hybrids in combination with C4 and C14.

LITERATURE CITED

Lower, R.L. and M.D. Edwards. 1986. Cucumber breeding. In M.J. Basett (Ed). Breeding Vege-

Table 2 Performance on fruit traits of cucumber crosses and their parent lines. CLGC, Kampaengsaen, 1989.

Parent/Cross		Length cm	Width cm	Shape Index L/W	Flesh Thick-ness (cm)	Av.Fruit Weight g
Parents						
C4	(1)	8.6b	3.3b	2.6	0.8a	70.3a
C5	(2)	9.9a	3.6a	2.8	1.0a	71.0a
C13	(3)	8.9ab	3.1c	2.9	0.6b	66.8b
C14	(4)	8.9ab	3.2bc	2.8	0.7b	69.9a
	Mean	9.1	3.3	2.8	0.8	69.5
	LSD(0.05)	1.03	0.19	0.31	0.22	2.08
Crosses						
1X2		10.6a	3.4a	3.1	1.1a	74.1a
1X3		9.3b	3.3abc	2.9	0.8bc	74.1a
1X4		9.3b	3.1bc	3.0	0.6c	71.5a
2X3		9.9ab	3.2abc	3.1	0.7bc	71.3a
2X4		10.1ab	3.4ab	3.0	0.9ab	70.1a
3X4		9.4b	3.1c	3.1	0.7bc	63.7b
	Mean	9.8	3.3	3.0	0.8	70.8
	LSD(0.05)	0.80	0.25	0.34	0.26	4.06
2X1*		9.7	3.4a	2.9	0.8	74.9a
3X1		9.4	3.2ab	2.9	0.7	70.3ab
4X1		9.5	3.1b	3.0	0.7	71.0ab
3X2		9.8	3.2ab	3.0	0.9	67.5b
4X2*		9.7	3.2ab	3.0	0.7	66.8b
4X3		9.4	3.1b	3.0	0.7	66.9b
	Mean	9.6	3.2	3.0	0.8	69.6
	LSD(0.05)	0.55	0.18	0.21	0.21	4.59
Overall mean		9.5	3.2	2.9	0.8	70.0
Overall LSD (0.05)		0.76	0.20	0.28	0.20	3.97

Table 3 **Heterosis (%H) on flowering and yielding characters of cucumber crosses over mid-parent.**

Cross	Female Fl/Plt	Days of Flowering		M/F	Fruit /Plt	Weight Yield g/plt
		male	female			
1X2	-9.23	-5.07	-2.25	98.84	-3.90	0.49
1X3	-9.41	-9.31	-7.29	44.29	3.47	12.08
1X4	20.72	2.99	7.77	-26.56	-5.96	-4.07
2X3	-11.23	11.55	0.94	-22.59	-20.93	-18.12
2X4	36.59	1.34	-6.48	-70.5	-3.34	-4.05
3X4	-4.17	17.49	2.33	-39.64	-1.68	-8.38
LSD(0.05)	7.44	3.74	2.13	23.25	3.08	3.71
2X1*	63.46	-0.43	-10.23	-50.87	-1.73	4.16
3X1	-18.09	14.57	8.61	-9.82	21.60	-18.95
4X1	27.25	22.41	13.99	-58.89	-23.83	-22.98
3X2	22.73	27.28	6.99	-88.14	15.75	14.16
4X2*	60.09	25.63	8.11	-86.61	-1.11	-6.49
4X3	-19.01	-5.10	-14.70	-35.79	-4.95	-6.99
LSD(0.05)	13.42	5.15	3.34	11.23	5.47	5.18
Overall LSD (0.05)	8.14	3.55	2.45	14.96	3.14	3.21

Table 4 **Heterosis (%H) on fruit traits of cucumber crosses over mid-parent.**

Cross	Length cm	Width cm	Shape Index L/W	Flesh Thick-ness(cm)	Av.Fruit Weight g
1X2	14.18	0.59	15.30	23.53	4.93
1X3	6.75	4.15	-1.03	6.94	7.56
1X4	6.16	-2.79	9.23	-23.51	1.95
2X3	5.77	-2.71	8.48	-11.25	1.16
2X4	7.03	-0.30	6.01	0.00	-0.53
3X4	6.19	-0.96	7.69	5.97	-6.86
LSD(0.05)	1.20	0.96	1.97	6.05	1.85
2X1*	4.98	-0.59	7.09	-4.71	6.05
3X1	7.44	1.92	1.03	-6.94	2.51
4X1	8.56	-3.09	12.18	-2.78	1.31
3X2	5.13	-2.41	7.07	6.25	-4.16
4X2*	2.77	-3.86	5.30	-14.12	-5.09
4X3	5.39	0.94	4.55	7.46	-2.14
LSD(0.05)	0.76	0.86	1.37	3.05	1.59
Overall LSD (0.05)	0.76	0.66	1.22	3.41	1.24

table Crops. Vegetable Crops Dept., University of Florida. AVI Publishing Co., Inc.; Westport, Connecticut: p 173-207.

Ratanayingyong, S. and K. Piluek. 1988. An evaluation for high-female cucumber. Poster session on the Sixth Annual Conference on Methodological Techniques in Biological Sciences; November 16-17, 1988. Central Laboratory and Greenhouse Complex, Kanpaengsaen, Kasetsart University. 8p.