



Original Contribution

**STUDY OF SOME YIELD TRAITS RELATIONSHIP IN MELON
(*CUCUMIS MELO* L) GERMPLASM GENE BANK OF IRAN BY
CORRELATION AND FACTOR ANALYSIS**

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ABSTRACT

The success of most crop improvement program largely depends on the understanding of relationship among characters and magnitude of this relation help to breeder to determine the selection criteria for breeding program. In order to evaluation of some agronomical characteristics and that relation in 49 melon genotypes of gene bank was studied in randomized complete block design with 3 replications in years 2005-2006 and 2006-2007 in Agriculture and Natural Resources Research Center of sistan-Iran. Combine analysis of variance showed between treatments in aspect of all characters except of number of fruit and plant length there are significant difference. Descriptive statistic results showed the most of coefficient variation belong to yield and yield range of genotypes was between 6101 to 25173 kg/ha⁻¹. Simple correlation coefficient among characters indicated to significant and positive relation between yield and fruit weight, flesh diameter. Factor analysis showed 4 factors define about 70 percent from variation among characters and finally cluster analysis grouped genotypes to 3 clusters.

Key words : Evaluation , Melon mass , Zabol , Correlation.

INTRODUCTION

Variation and selection is main two base of each breeding program and selection is depend upon existence of favor diversity in population and for use of this diversity should be happened evaluation of germplasm, Study of characters and that relation with yield is important specification while should be regarded relationship could obvious viewpoint of breeder than characters in plants (1,2). *Cucumis melon* L 2X=24 chromosome have different agronomic groups

include melon, muskmelon, et al and all of them are cross pollination and they have possible cross together (3). Lotfi and Kashi (4) was reported Iran's melon are various groups and don't study yet presently but specialists of breeding from 1952 till now presented seven patterns for classification of melon (5). There are doubt about of melon origins but some (6) introduced India is first area for domestication of this fruit because it found as undomesticated form in this country however many researchers have belief melons subgenus sources can be in Africa (7). Some specialists were classified melon to different groups after study of some morphological, physiological, molecular and geographical characters. Kuhpayegani et al (8) in a study of genetic

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variation in base of fruit characters in some genotypes melon showed all characters have significant difference in hundred genotypes melon were collected from different local of Iran. Taha et al (9) in study of relation among some characters with yield declared a well relation of yield components with yield in 30 lines melon as an example was relation between fruit number per plant and fruit weight with yield furthermore number main branch and sub branch had positive correlation with hole diameter (9). In other study (10) plant yield with fruit weight had negative relation but with stem length, number node and node intervals had positive and significant correlation. In one study with evaluation of regression only fruit number, flesh diameter and fruit width remained in final model (11). Saberi et al (12) was reported there are significant difference among agronomical characters for fruit yield, fruit number and fruit length and this characters are very efficient in final yield. Aliahmadi et al (13) with study of effective characters in yield was reported fruit weight, fruit width and fruit length are main factors in yield. In Aliahmadi study (13) objective was evaluation some characters in melon genotypes and relations that can be effective in yield. Rakhi and Rajamoni (14) with study of diversity and inheritance of some characters in one species of melon showed there are significant difference among studies characters and declared selection on base of phenotypic value in melon than genotypic value is possible and amount of inheritance for yield of single plant reported high. Rastogi and Deep (15) so reported similar results of Rakhi and Rajamoni in relation of studied characters in cucumber.

MATERIALS AND METHODS

49 genotypes representing different melon types (**Table 1**) were grown in replicated trials to evaluation of some agronomical characters and that relationship by using a randomized complete block design with three replications. This evaluation were conducted twice in spring season of 2006 and 2007. Five seeds were planted per hole in each planted line with 10 holes and 50 cm spacing and spacing among genotypes was 2.5m. Plants

were thinned to three plants per whole 10 days after sowing. Field experiments were conducted on a sandy-loamy soil at the agriculture and natural resources research center of sistan-Iran station with (30°54' latitude, 61°41' altitude, 483m). In both years the experimental area was fertilized at rate of 100 kg N ha⁻¹ and 80 kg P₂₀₅ ha⁻¹ before sowing. Additional 1/2 from total N was applied just before flowering. The crop was irrigated at an interval of ten days in during growth. Hand weeding and chemical spraying against insect was done whenever necessary. Characters studied were sugar percent, fruit weight, fruit number, fruit length, fruit width, flesh diameter, plant length and yield (ha⁻¹). Finally analysis of variance, factor analysis and cluster analysis was carried out with Spss. 10.

RESULTS AND DISCUSSION

Analysis of variance revealed the melon genotypes exhibited significant difference for all characters except for plant length (**Table 2**). Furthermore, high phenotypic coefficients of variation were recorded for yield and fruit weight (**Table 3**). Similar observations were reported by Rastogi and Deep (15) for cucumber. Results of this study indicated to flesh diameter range is 1.69-4.15cm but in other experiment (8) this range was 2.14-3.88. Number fruit is one of components yield in genotypes studied this range was measured between 1 and 1.75, in similar study number fruit was recorded 0.31-8.88. For fruit weight, range was 15677.75-1950.5 gr and about of minimum weight almost similar to kuhpayegani et al (8) results. From aspect of yield range was get 6101.7-25173.4 kg/ha for genotype KC357108 and maximum fruit weight was recorded for KC3577454 with mean 1950.5 g. Simple correlation of coefficients revealed in **Table 4**. yield with fruit weight and flesh diameter had a positive and significant relation and the most correlation was fruit width and flesh diameter ($r = 0.61^{**}$). Relation between fruit length with fruit width and flesh diameter with fruit length were positive while this condition describes by increase of fruit length, was affected flesh

diameter and fruit width but for well study about this relation. Factor analysis (**Table 5**) produced an eigen vector for each factor. Only four factors had eigen values greater than 1.0

needs to analysis of direct and indirect effects and factor 1, factor 2, factor 3 and factor 4 accounted for 31.24%, 16.37% , 12.01% and 10.07% of the variation respectively (**Table 4**).

Table1. Germplasm and numbers

No	KC	No	KC
1	357549	26	357300
2	357546	27	357287
3	357538	28	357282
4	357501	29	357068
5	357492	30	357247
6	357473	31	357243
7	357460	32	357242
8	357454	33	357241
9	357449	34	357240
10	357443	35	357236
11	357431	36	357064
12	357423	37	357216
13	357343	38	357214
14	357341	39	357213
15	357337	40	357193
16	357071	41	357188
17	357335	42	357149
18	357333	43	357108
19	357332	44	357106
20	357331	45	357105
21	357317	46	357098
22	357314	47	357097
23	357312	48	357093
24	357311	49	357092
25	357304		

Table2. Combined analysis of variance (Mean Squares)

SOV	DF	Fruit number	Sugar percent	Fruit weight	Fruit length	Fruit width	Flesh diameter	Plant length	yield
Year	1	0.73	25.71	28730.25	317.6	37.29	5.95	352.9	32646.8
Error	4	0.16	20.46	466572.1	2.04	5.79	0.36	1382.7	4667.3
Genotype	48	0.19	2.45*	428939.5**	102.55**	9.80**	1.016**	2679.8	84923*
Genotype × Year	48	0.21	1.63	266178.3	29.52	4.57	0.45	1375.3	63629.4
Error	192	0.16	1.47	200944.8	16.20	3.22	0.24	1198.35	52680.6
C.V		12.46	20.5	3.63	18.92	13.55	16.30	22.84	29.8

* and ** significant at 5% and 1% level respectively

Table3. Descriptive statistic of characters

Character	Number	Minimum	Maximum	Mean	Standard deviation	Phenotypic coefficient variation(%)
Percent sugar %	49	4.25	8.25	5.92	0.87	13
Fruit weight(gr)	49	677.7	1950.5	1313.5	227.46	23
Fruit number	49	1	1.75	1.24	0.21	17
Fruit length(cm)	49	10	34.25	21.27	5.06	23
Fruit width(cm)	49	8.75	16.25	13.24	1.56	11
Flesh diameter(cm)	49	1.69	4.15	3.05	0.50	16
Plant length(cm)	49	89.75	201	151.57	25.88	17
Yield(kg/ha ⁻¹)	49	6101.7	25173	1200.7	3522.7	30

Table 4. Simple correlation coefficients

Character	Sugar percent	Fruit weight	Fruit number	Fruit length	Fruit width	Flesh diameter	Plant length	yield
Sugar percent	1							
Fruit weight	0.11	1						
Fruit number	0.01	0.009	1					
Fruit length	0.21	0.50**	-0.25	1				
Fruit width	0.08	0.43**	-0.14	0.29*	1			
Flesh diameter	0.10	0.58**	0.03	0.45**	0.61**	1		
Plant length	-0.13	0.28*	-0.09	0.17	0.35*	0.38**	1	
yield	-0.10	0.53**	0.01	0.06	0.21	0.37**	0.20	1

* and ** significant at 5% and 1% level respectively

Table 5. Factor loadings and 8 characters on four principal factors

Characters	Rotated factors				Communality
	1	2	3	4	
Sugar percent	0.27	-0.29	-0.45	-0.19	0.916
Fruit weight	0.74	0.63	0.20	0.006	0.922
Fruit number	0.009	-0.002	0.31	-0.79	0.831
Fruit length	0.56	-0.17	0.19	0.56	0.927
Fruit width	0.71	0.007	-0.18	0.19	0.870
Flesh diameter	0.93	0.13	0.002	-0.01	0.919
Plant length	0.42	0.11	0.31	0.57	0.811
Yield	0.28	0.94	0.009	0.01	0.931
Variance	31.24	16.37	12.01	10.07	
Cumulative variance	31.24	47.62	59.64	69.71	

The scores of the major characters describing the first four factors. The arithmetic sign of the coefficients is irrelevant since a common rule of thumb for determining the significance of a character coefficient is to treat coefficients greater than 0.3 as having a large effect to be considered important (16). Characters having less than 0.2 coefficient value were considered to be of no effect to the over-all variation observed in this study. The first factor which accounted for the highest proportion (31.24%) was mostly correlated with characters such as fruit weight, fruit length, fruit width and flesh. Second factor was dominated by fruit weight and yield. The third factor was dominated by sugar per cent, fruit number and plant length. Fourth factor was mostly correlated with characters such fruit number, fruit length and plant length. First factor indicated to fruit weight was affected by flesh diameter, fruit width and fruit length could call this factor weight factor because these main characters are effective in fruit weight. One basic assumption in the use of numerical analysis is that numerical evaluation of overall similarity is a measure of genetic similarity (17). The genotypes were clustered based on base

minimum variance method of WARD (18). The ward method optimizes an objective function that is. it minimizes sum of squares within groups and maximizes the sum of squares between groups. Clustering method grouped the 49 genotypes in 3 clusters (**Figure 1**). On base of ward method two genotypes KC357314 and KC357546 had the least kinship and are good for hybridization and genotype number 17 (KC357335) was established separate cluster and had a good yield than other genotypes. In first cluster almost were inserted genotypes with high fruit weights, fruit length, fruit width and flesh diameter. Genotype number 17 established separate cluster and this genotype had a most yield 25173 kg/ha⁻¹ and in third cluster inserted remained genotypes. Kuhpayegani et al (8) with study of hundred melons germplasm was grouped all of them to 9 clusters and described ninth cluster related to genotypes with high sugar but third cluster had the biggest fruits with high fruit number plants. At last especially with correlation and factor analysis characters include fruit weight, fruit length, fruit width and flesh diameter are effective in final yield and breeders should be

notice to some characters that have good effects on yield and apply in breeding projects.

CONCLUSION

Fruit weight and flesh diameter were the good characters in this study for yield relationship

then fruit length and fruit width were in second stage from aspect of important.

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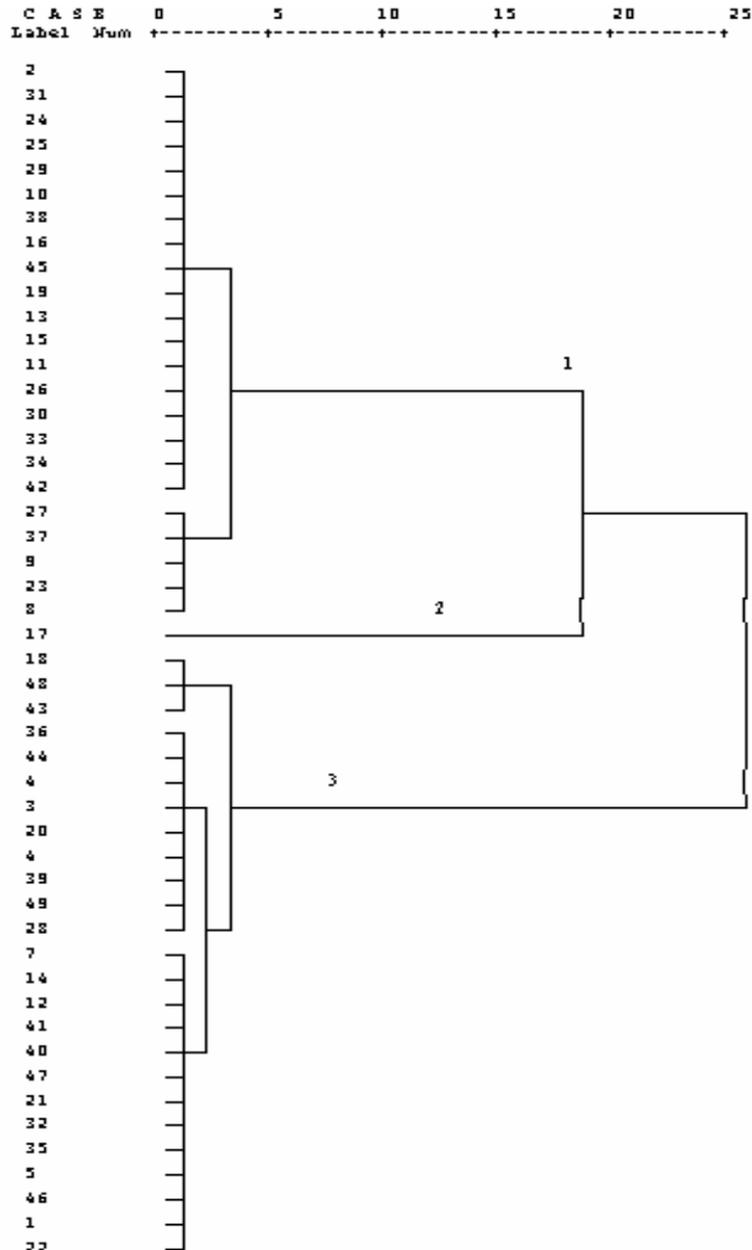


Figure 1. Dendrogram 49 genotypes of cluster analysis by method Ward

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