J. Agric. Sci. Mansoura Univ., 28 (9): 6879 - 6896, 2003

EVALUATION OF MORPHOLOGICAL AND PATHOLOGICAL PERFORMANCE FOR SOME LOCAL MELON LANDRACES

El-Shimi,I.Z.A. and M.I. Ghoneim*
Veg. Res. Dept., Hort. Res. Inst.
*** Plant Pathol. Res. Inst.,Agric. Res. Center, Giza, Egypt.**

ABSTRACT

Eleven local melon landraces were collected from different regions of A.R.E, seeds of these melon populations were sown in complete randomize block design at El-Kassasien Horticulture Research Station, Ismaelia Governorate, to evaluate the morphological performance, yield, quality as well as genetic relationships, and pathogenicity test for damping-off caused by *fusarium spp*. and *Verticillium albo-atrum*. The results indicated that:

1) There were significant differences and wide range of variations for mean performance of all melon landraces, for all studied traits.
2) Kenna melon landrace exhibited the highest values for plant height and internode length, on main stem, meanwhile, Kahera-6, exhibited the highest value for number of nodes, on the main stem, while fayoum melon landrace exhibted the lowest value for the above mentioned characters.
3) Melon landraces of Sandfa, El-Wahat el Bahria, fayoum and Brolussi, as well as Kahera-6, exhibited earliness for male and female flowers opening on 50% of the plants, while Ismaelawi and Waraki exhibited the opposite.
4) For yield and fruit quality, Ismaelawi and Waraki were superior for total yield (ton/ fed.), fruit yield/ plant, as well as average fruit weight, and average fruit length, width, while Fayoum melon landrace and Anannas El-Dokki recorded the lowest values for aforementioned characters.
5) Analysis of variance indicated that, all morphological traits were influenced by genetic background of melon landraces, except net assimilation rate. All the studied traits also differed greatly by seasonal effect, except plant height, number of nodes, on the main stem, leaf area at the first sample, as well as, net assimilation rate average fruit weight, fruit width, and total yield per plant.
6) Genetic variance was higher than phenotypic and environmental variances, for all studied traits, except earliness of anthesis as well as flesh thickness. Meanwhile heritability in broad sense was high for all studied traits except time of anthesis of male and female flowers, net assimilation rate and flesh thickness.
7) Gentic diversity analysis revealed that, there was a wide range of divergence between melon landraces, from (0.08) to (0.38) and the eleven melon landraces were distributed in five clusers, where Marsa matrouh landrace was found alone in the fifth group.
8) Wahat melon landrace was the least susceptible to infection when sown in infested soil with *F. oxysporium F. sp. melonis* being 8.3% of wilt disease, while Sandfa and Fayoum landraces were highly susceptible which recorded 13.5% and 11.5% of wilt disease, respetively.
9) On the other hand, Waraki and Anannas El-Dokki genotypes were less susceptible when sown in infested soil with *Verticillium albo-atrum* being 4.7% of wilt disease for each of them, while Sandfa and Fayoum melon landraces being 21.3% and 18.7%, respectively.
10) Total phenolic compounds were increased after infection, in Ismaelawi, Kenna and Waraki, while Brolussi landrace was less in their phenolic compound contents, when sown in infested soil with *F.oxysporium F. sp. melonis*.
11) Moreover, Ismaelawi and Kahera-6 melon landraces recorded the highest values of total phenols when sown in soil infested with *Verticillium albo-atrum.*

INTRODUCTION

All over the world, many investigators are interested in collecting their landraces or accession lines and estimate their agronomic traits or pathogenicity test in order to raise a new genotype for breeding programs. (Nuez *et al*., 1992, in Spain; Pan-RS and More, 1996, in India, Dumitru *et al*., 1996, in Romania; Garcia *et al.,* 1998, in Spain; and Silberstein *et al*., 1999 in Israel.

In Egypt, recently attention has been focused on screening of our landraces from different geographic areas and evaluate its agronomic characters, then preserve them in a national gene bank.

So, we try to imply this idea, especially before applying the G.A.T agreement, which there are many areas like Assuit, Menia, Fayoum, El-Wahat el Bahria etc. containing many landraces of melon belonging to these geographic area which has characterized with some features for a long time, i.e reticulation, fruit shape, flesh color, shelf life and resistance to some pathogens …… etc.

The aim of this investigation was to collect some melon landraces and identify, characterize them pathogenically tests even also conducted in order to establish a breeding program for melon to improve this crop and raise a new hybrid.

MATERIALS AND METHODS

Material:

The present investigation was carried out at the Experimental farm of El-Kassasien Horticulture Research Station, Ismaelia Governorate during three successive seasons of 2000 until 2003, to obtain detail information about the morphological and pathological performance of eleven egyptian melon landraces. These locally eleven populations of Egyptian melon landraces were colected from primitive cultivares at different geographic regions of Egypt, i.e, kenna, Assiut, Sandfa, Fayoum, El-Wahat el Bahria, (Al-Boutti), Marsamatrouh and Ismaielia Governorates.

Isolation, identification and pathogenisty test of the causal organisms:

Fusarium oxysporum f.sp. melonis and Verticillium albo-atrum were isolated from naturally infected melon seedling collected from different locations at Ismaelia Governorate and was identified by Plant Pathology Research Institute, Agriculture Research Center, Giza according to Booth (1971) and Barnett (1964).

Methods:

In 2000 season, seeds of eleven Egyptian melon landraces were sown under the green house conditions; to selfing was carried out before the beginning of studding economic traits to maintain their purity, (*EL- Adl 1996).* Then, two field experiments were conducted during 2001 and 2002 summer seasons in the open field where seeds of all locally landraces were directly sown in a complete randomized block design with three replicates. The plot area was $20m^2$ and the plot included 3 ridges of 10m. long and 2m. wide. At 30 and 60 days after planting date guarded plants were taken from the second inner terminal of each plot to determine, plant height (cm), days to opening 50% of male and female flowers, on 50% plants, dry matter content (gm/ plant), leaf area meter (cm^2) and net assimilation rate (gm/ cm^2/ day) which is dry weight accumilated per unit of leaf area per unit of time, was determined by the formula:

$NAR = (W_2 - W_1) (\text{Log } L_2 - \text{Log } L_1) / (t_2 - t_1) (L_2 - L_1)$

where = L_1 and L_2 are total area at times t_1 and t_2 and W_2, W_1 are dry weigh per plant at t_1, t_2 times, respectively.

At harvest, the control of $10m^2$ weighted and used to determine yield and fruit quality, i.e, average fruit weight (kg), average fruit length and width (cm), fruit yield per plant (kg) and fruit yield/ (ton/ fed). for each plot. Besides flesh thickness (cm) and total soluble solids were recorded.

SDS- PAGE for soluble proteins of seeds:

Electrophoretic banding patterns of seed proteins were studied. The method of polyacrylamide gel electrophoresis in the presence of sodium dodecyl sulphate (SDS – PAGE) was applied as described by *Laemmli (1970).*

Pathogenicity test:

Pathogenisty test was carried out using melon cultivar c.v. Ananas El-Dokki at Kassasien Horticulture Research Station in a greenhouse. Plastic pots (25 cm in diameter) were sterilized for 15 min. by immersing them in 5% formalin solution and left to dry for 7 days until formalin odour disappeared. Inoculum was prepared by using autoclaved barley grain medium, and then the media was inoculated with the tested fungi Fusarium oxysporum f.sp. melonis and Verticillium albo-atrum and incubated at 28˚c for 15 days.

Inoculum was mixed thoroughly with sterilized soil at rate of 20g inoculated barley grain medium/pot for *Fusarium oxysporum f.sp. melonis (Ali, 2000)* and *Verticillium albo-atrum,* then placed in the previously sterilized pots. Control pots were filled with the same amount of the sterilized barley medium without inoculum. A set of five pots with five – surfaced sterilized seeds/ pot was employed for each tested isolate.

Reaction of certain melon land-races to *F. oxysporum f.sp. melonis* and *V. albo-atrum* under greenhouse condition:

Barley seeds medium was inoculated with the tested isolate and added at the rate of 20g inoculated barley grain medium/pot (25cm in diameter). Five melon land-races seeds were planted per pot and three replicates were employed for each treatment. Five pots containing healthy melon seeds were used as control. Percentage of pre, post emergence damping-off, survived plants and wilt disease was recorded.

Disease assessment:

Wilt diseases were assessed and calculated as percentage of pre, post emergence damping-off, survived plants and wilt disease according to *(Ciccarese, 1987).*

Determination of phenolic compounds:

To study the nature of resistance in some landraces of melon, the phenolic compounds (free, conjugated and total phenols) in healthy and infected plants with *Fusarium oxysporum f.sp. melonis* and *Verticillium albo-atrum* were determined using the calorimetric methods described by *(Snell and Snell 1953)*

Statistical analysis:

Differences among locally landraces means for studied traits were examined according to the F-test, for each plot the analysis of variance were made according to *Snedecor and Cochran (1967).* The differences between means was tested for significance using the least significant differences value (L.S.D).

The amount of genetic parameters like, genotypic (V_g), phenotypic (V_p), environmental (V_e) variances and heritability in broad sense (h^2_b) were calculated according to *Johnson et al. (1955)*

RESULTS AND DISCUSSION

(I) Evaluation of morphological and yield characters:

Data in Table (1) indicate that, there were significant differences in the mean performance of eleven melon landraces. In general, data revealed a wide range of variation for all studied traits. However, kenna melon landrace recorded the highest values for plant height and internodle length, in the two growing seasons, while Fayoum melon and Anannas El-Dokki exhibited the lowest values for the above mentioned characters followed by Anannas El-Dokki in the second season. Moreover, Kahera-6 genotype exhibited the highest value for number of internodls in the two growing seasons.

For the flowering date, the melon landraces of Sandfa, EL-Wahat el-kharga, kahera 6 and Brolussi exhibited earliness for male flower opening, while El-Waraki and Ismailawi genotypes were late than the others, in the two growing seasons.

On the other hand, Sandfa, El-Wahat el Bahria, Fayoum and Brolussi melon landraces were earlier than the other melon landeraces in time of opening 50% of female flowers. This indicates that there was a genetic diversity between the studied landraces. These findings are in agreement with those obtained by *Solanki et al. (1980); Ragab (1984); abd El-Raheem et al. (1986a); McCollum (1987), Kitroongruang et al. (1992) and Mc Collum, (1987) Dumitru et al. (1996).*

Concering dry weight content per plant, data in Table (1) reveale that, Fayoum melon landrace exhibited the highest mean value for dry matter content followed by Kahera - 6 in the second sample, for the second season. Foe leaf area, Sandfa melon landrace exhibited the highest values for leaf area at the first and second samples, Meanwhile, Waraki melon recorded the highest value for leaf area at the second sample for the second season. For net assimilation rate, Marsa Matrouh melon landrace exhibited the top rank in the two growing seasons.

These findings indicate that, these melon landraceses differed in their morphological characters expressions indicating exsistance of difference in their genetic background. These finding were found in agreement with those obtained by *Kyle et al. (1993) and Hatem et al. (1996).*

For total yield and fruit quality, data in Table (2) show that, there were significant differences for all studied characters, implying that, these melon landraces differed in their genetic background. For average fruit weight, fruit length, and fruit width, data showed that, Waraki and Ismaelawi genotypes recorded the highest values for the above mentioned traits, while Fayoum and Annanas EL-Dokki recorded the lowest values for the two growing seasons. Meanwhile the same genotypes above mentioned ranked first for average fruit length and width while Anannas El-Dokki and Shahd El-Dokki recorded the lowest values for the above mentioned characters. For total fruit yield per plant and total fruit yield per feddan, data in Table (2) indicate that, Waraki and Ismaelawi exhibited the highest values for fruit yield (ton/ fed) in the two growing seasons, respectively.

These findings could be due to differences in genetic background for all melon landraces. These results were found in harmony with those obtained by*. EL-Meghawry et al. (1991); and Hateim et al. (1996).*

As for yield quality, i-e, flesh thickness and total soluble solids, data in table (2) show that, the highest value was obtained for flesh thickness by Waraki and Anannas El-Dokki while, Ismaelawi for total soluble solids in the two growing seasons. However the lowest values for these characters were obtained by Brolussi. These findings were found in agreement with those obtained by *Vijay (1987) and A.K. Hatem et al. (1997).*

Analysis of variance for genotypes, replicates and environmental effects:

Mean square values presented in Table (3) show highly significant differences due to genotypes for all studied traits except for net assimilation rate in Egyptian melon landraces. This is logic and expected because the materials under study consisted of a large number of entries, which differed, in their origin and genetic background.

Besides, data in Table (3) reaveled that, highly significant difference were observed for some morphological studied traits due to season effect only for internode length, time for opening 50% of male and female flowers, dry matter content per plant, leaf area (2^{nd} sample) and total soluble solids. This indicate that, melon landraces had considerable different responses to environmental influences, on their morphological performances and some morphological traits had interacted with environmental factors owing to these melon landraces came from different geographic areas of Egypt.

It is worth to mention that, fruit characters and yield i.e, average. fruit weight, average fruit length and width, fruit yield per plant and fruit yield ton/ fed did not influence by seasonal effects. This indicate that, these landraces possessed high stability in genetic materials and gene expression for yield components which did not differ from microclimate to another. This means that, improvement for traits by selection depending on variability present in germplasm may led to genetic improvement. These results were found in agreement with those obtained by *Kosba and EL-Diasty (1991); EL-Adl et al., 1996. and Ram et al., 1996*.

Genetic variability of melon landraces:

Data in Table (4) showed that genetic variance (V_g) was higher than environmental variance (V_e) for all studied traits except time until opening 50% of male, female flowers and flesh thickness, confirming the previously mentioned results. This may be ascribed to the great number of landraces studied with diverse genetic background.

These results indicate that, the influence of environmental factors on morphological characters of these melon genotypes as well as their yield components and total soluble solids are less on these characters.

As consequence of the aforementioned results, heritability (in broad sense) estimates (h^2_b) were high for plant height (0.92), number of internodes (0.83), internodes length (0.94), leaf area (1^{st} sample) (0.88), dry matter content for plant (2^{nd} sample) (0.82), and all the yield characters and total soluble solids, while time until opening 50% of male and female flowers recorded the lowest values (0.21), (0.23), respectively.

This indicate that all vegetative characters, except time until opening of 50% male and female flowers and yield characters were highly influenced by genetic background and still stable anti environmental factors.

Also, data in Table (4) indicated that, yield components of melon landraces, i.e, average fruit weight, average fruit length, width and fruit yield per plant recorded the highest heritability values followed by fruit yield (ton/ fed.) and total soluble solids. These results referred to the quantative characters were influence by environmental factors, indicating the magnitude role of genetic background for these germplasm and illustratig that, the expression of most of these traits were govened by additive gene effects, these phnotypic selection is likely to be beneficial in improving these landraces. These finding were found in harmony with those obtained by *Solanki et al. (1980) Awny (1992) and A.K. Hatem et al. (1997).***(II) Nature of genetic divergence among eleven local melon landraces:**

Analysis of genetic divergence in melon landraces can provide some information about differentiation, adaptability and interrelationships of Egyptian melon landraces and give graphical assessment of genetic variability. Materix of local melon landraces versus SDS-PAGE banding patterns (Fig.1) was analyzed. Pairwise similarities were computed and the similarity matrices were constructed for all the genotypes examined based on Nei's estimate of similarity *(Nei and Li, 1979)*. Using the disjoint cluster analysis on the basis of Euclidean distances *(Spark; 1973)*, the dendro-gram was made among the eleven melon genotypes through Bio ID gel analysis software version 10.01 VILBER Inc., France, running on an IBM. Compatible personal computer. The genotypes were subjected to non-hierachical Euclidean cluster analysis to determine the genetic similarity among Egyptian melon landraces.

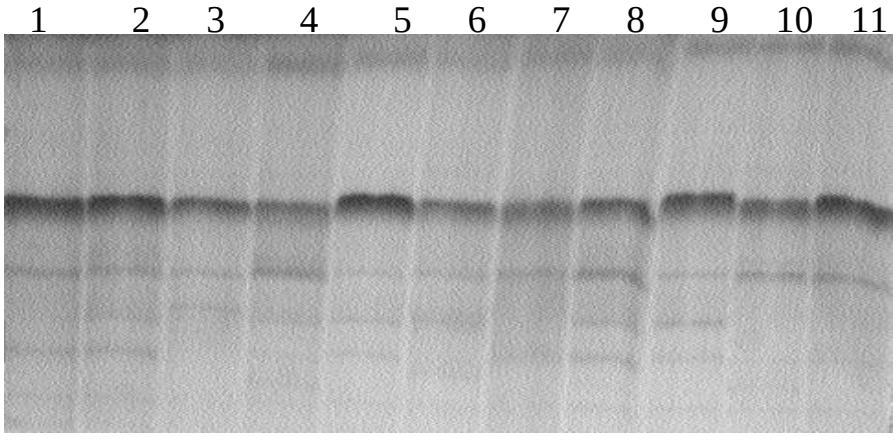

Fig (1): SDS - PAGE banding patterns of soluble seed proteins for eleven local melon landraces (*Cucumis melo* L.)

1- Kenna melon	**2- Sandfa melon**	**3- EL-Wahat melon**
4- Fayoum melon	**5- Anannas EL-Dokki**	**6- Shahd EL-Dokki**
7- Kahera 6	**8- EL-Waraki**	**9- Marsa matrouh**
10- Brolussi	**11- Ismaelawi**	

The actual values of genetic similarity corresponding to the eleven comparisons are given in Table (5). The genetic similarity materix obtained between the eleven populations showed a wide range from 0.08 to 0.38. The magnitude of genetic similarity measured the extent of genetic diversity between the genotypes, the maximum genetic similarity (0.38) was recorded between Sandfa melon and EL-Fayoum, followed by genetic similarity of (0.31) between kahera 6 and Brolussi, followed by genetic similarity of (0.25) between Fayoum and Shahd EL-Dokki, followed by genetic similarity of (0.24) between EL-Waraki and Brolussi, followed by genetic similarity of (0.22) between Sandfa and Shahd EL-Dokki, Sandfa and EL-Wahat el Kharga, Kenna melon and Ismaelawi, Anannas EL-Dokki and EL-Waraki followed by genetic Similarity of (0.21) between Brolussi and Ismaelawi.

Table (5): Genetic Similarity materix among eleven local melon landraces calculated according to the differences in SDS - PAGE.

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}	L_{11}
L_1	1.00										
L_2	0.10	1.00									
L_3	0.00	0.22	1.00								
L_4	0.11	0.38	0.13	1.00							
L_5	0.10	0.00	0.12	0.00	1.00						
L_6	0.00	0.22	0.11	0.25	0.00	1.00					
L_7	0.11	0.00	0.00	0.00	0.00	0.00	1.00				
L_8	0.18	0.11	0.11	0.00	0.22	0.00	0.00	1.00			
L_9	0.08	0.10	0.10	0.00	0.10	0.00	0.11	0.09	1.00		
L_{10}	0.00	0.13	0.13	0.00	0.00	0.00	0.13	0.24	0.21	1.00	
L_{11}	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

The minimum genetic similarity of (0.08) was recorded between Kenna melon and Marsa matrouh, also between EL-Waraki and Marsa Matrouh (0.09).

The genetic similarity among the eleven melon landraces is also shown diagrammatically by linkage dendrogram (Fig. 2). The linkage dendrogram provide visual idea about clustering and variability present in the population based on the extent of relative dissimilarity among melon landraces on the basis of protein, the eleven melon populations were grouped into five clusters (Fig. 2). Cut off point at 40 dissimilarity points was fixed as minimum dissimilarity.

The clusters and genotypes included in each cluster are listed in Table (6).

Table (6): Distribution of local melon landraces:

Cluster	No. of genotypes	Genotyes
I	2	Kenna melon, Ismailawii
II	2	Annanas EL-Dokki, Waraki
III	4	Sandfa, Fayoum, Wahat, Shahd EL- Dokki
IV	2	Kahera 6, Brolussi
V	1	Marsa Matrouh

The clustering pattern indicated that, local melon landraces were distributed over five clusters. Considerable variation was observed resulted from variability in their genetic background. The clustering pattern show that, kenna melon and Ismaelawi were together in cluster I, while Anannas EL-Dokki and Waraki were together in one group, cluster II. Moreover Sandfa was located with Fayoum and Wahat and Shahd El-Dokki in cluster III. Mean while, kaher 6 and Brolussi were clustered in one groupe, cluster IV. Furthermore, Marsa matrouh landrace was located alone, in cluster V. differing in their genetic pool and genetic resources. Similar finding were reported by *Sidhu and Bar (1985) in Citrullus sp., Garcia et al. (1998), Benedetteli et al. (1999). Silberstein et al. (1999) and Guirgis (2000)* in melon.

(III) Isolation, identification and pathogenisty test of the causal organisms:

The fungi recovered from the artificially infected melon seedling proved to be pahtogenic melon seedling and identical symptoms of *Fusarium oxysporum f.sp. melonis* and *Verticillium albo-atrum* appeared, if compared with the control plants. The reisolated of *F. oxysporum f.sp. melonis* and *V. albo-atrum* was similar in its morphological, culture characteristic and microscopic examination with the original used isolates.

Reaction of certain melon landraces to *F. oxysporum f.sp. melonis* and *V. albo- atrum* under greenhouse condition:

Data in Table (7) indicate that, Wahat melon landraces was the less susceptible to infection when sown in infested soil with *F.oxysporum* ***f.sp.*** *melonis* being 8.3% of wilt disease. While Sandfa melon and Kenna melon landraces were the highly susceptible which recorded 13.5% and 11.5% of wilt disease, respectively.

On the other hand, Anannas EL-Dokki, Waraki and Shahd ELDokki landrace were the least susceptible when sown in infested soil with *Verticillium albo-atrum* being 80.1%, 80.1% and 73.4% of survived plants, respectively and exhibited the lowest of percentage of wilt disease (4.7%, 4.7% and 5.5%) respectively, while Sandfa melon landraces was the highly susceptible when sown in infested soil with *Verticillium albo-atrum* being 21.3% of wilt disease followed by, Brolussi being 18.8% of wilt disease, respectively.

The differences between landraces and infection may be attributed to mechanical and physiological resistance and may be depend upon the lack of nutrient or a substance the pathogen needs for development or it may be due to a toxic or repellent substances that is either performed or formed only in response to infection with *Fusarium oxysporum f.sp. melonis* and *Verticillium albo-atrum.*

Table (7): Percentage of pre, post emergence damping-off, survived plants and disease severity of some cultivars under artificial inoculation with *F. oxysporum f.sp* melon and *V. albo-atrum*.

Tested Isolates / Cultivars	*F. oxysporum f.sp. melonis*				*V. albo-atrum*			
	Pre	Post	Survived plants	Wilte plants%	Pre	Post	Survived plants	Wilte plants%
Kenna	53.3	6.6	40.1	11.5	33.3	6.6	60.1	11.1
Sandfa	73.3	13.3	13.4	13.5	73.3	0.0	26.7	21.3
Wahat	26.6	0.0	73.4	8.3	40.0	13.3	46.7	18.3
Fayoum	71.5	14.9	13.6	13.4	73.3	0.0	26.7	21.3
Anannas EL-Dokki	26.6	6.6	66.8	11.3	13.3	6.6	80.1	4.7
Shahd EL-Dokki	26.6	0.0	73.4	9.5	20.0	6.6	73.4	5.5
Kahera – 6	26.6	6.6	66.8	10.5	53.3	6.7	46.7	18.8
Waraki	26.6	6.6	66.8	11.3	13.3	6.6	80.1	4.7
Marsa matrouh	13.3	13.3	73.4	9.5	53.3	0.0	46.7	18.7
Brolussi	26.6	6.6	66.8	10.5	53.3	6.6	46.7	18.8
Ismaelawi	13.3	13.3	74.4	10.8	33.3	0.0	66.7	11.1

Determination of phenolic compounds:

Data presented in Table (8) demonstrated that, the wilt infection increased the total, free and conjugated phenols content in the inoculated seedlings in all tested landraces.

Table (8): Effect of wilt disease *(F. oxysporum f.sp. melonis* and *V. albo-atrum)* on phenolic contents (mg catechol/ g fresh weight) in some landraces of melon after days of inoculation under greenhouse conditions.

Tested Isolates / Cultivars	*F. oxysporum f.sp. melonis*			*V. albo-atrum*			Healthy plants		
	Free	Conj.	Total	Free	Conj.	Total	Free	Conj.	Total
Kenna	0.54	0.61	1.15	0.77	0.30	1.07	0.10	0.60	0.70
Sandfa	0.04	0.19	0.23	0.38	0.37	0.75	0.11	1.00	1.11
Wahat	0.33	0.47	0.80	0.78	0.23	1.01	0.29	0.84	1.13
Fayoum	0.60	0.35	0.95	0.22	0.80	1.02	0.22	0.88	1.10
Anannas EL-Dokki	0.02	0.61	0.63	0.73	0.08	0.81	0.08	0.75	0.83
Shahd EL-Dokki	0.08	0.55	0.63	0.75	0.07	0.82	0.67	0.16	0.83
Kahera – 6	0.47	0.61	1.08	1.14	0.10	1.24	1.10	0.22	1.32
Waraki	0.79	0.32	1.11	0.22	0.89	1.11	0.55	0.15	0.70
Marsa matrouh	0.28	0.56	0.84	0.69	0.14	0.83	0.70	0.05	0.75
Brolussi	0.16	0.40	0.56	0.71	0.43	1.14	1.09	0.31	1.40
Ismaelawi	1.14	0.79	1.93	1.51	0.39	1.90	0.75	0.04	0.79

The less susceptible melon landraces, were Wahat melon and Marsa matroh which had the greatest value of both total and conjugated phenols if compared with the other tested landraces under the infection with *F. oxysporum f.sp. melonis* and *V. albo-atrum* under greenhouse conditions. On the contrary, the high susceptible landraces sandfa, Kenna and Ismailawi melon exhibited the lowest value of free and total phenols.

It is well known that, correlation may exist between the degree of resistance and the phenol levels in healthy plants. In this study, free, conjugated and total phenols were found in high quantities in the infected plants than in the healthy ones. This might be attributed to that, the phenols synthesized by plant tissues after infection appear to have a broad antifungal spectrum *(Kosuge, 1969).*

ACKNOWLEDGEMENT

I want to express my deepest gratitude to Prof. Dr. S.A mohamedein the manager of improving principle vegetable crops project and hybrid production, for valuable support for seed materials.

REFERENCES

Abd EL-Raheem, A. A.; F.A. Ommar; A.E. Abd El-Moneam and S.A. Baha EL-Din (1986 a). Genetical studies of some morphological and yield characters in cantaloup and melon (*Cucumis melo* L.) J. Agric. Res. Tanta Univ., 12 (4): 8-108.

EL-Meghawry A.; S. Awny and M. Moursy (1991). Studies on hybrid vigour in muskmelon (*Cucumis melo* L.) between local and imported rarities. Egypt. J. Appl. Sei., 6 (9): 19-56.

Hatem, A.K.; M.I. Ragab and Abd EL-Mageed (1997). Genetical studies of some fruit characteristics in melon. (*C. melo* L.) Menafyia J. Aglic. Res., 22 (1993) (3): 889-904.

Abd EL-Rhman, G. Toader (2001). Studies on Verticillium wilt disease on cucurbits. Ph. D. Thesis, Fac. of Agric., Cairo Univ., PP 129.

Ali, M.H.M. (2000). Studies on certain cucrurbits disease in Egypt. Ph. D. Thesis, Fac. of Agric., Alex. Univ., PP 101.

Barrnett, H.L. (1964). Macroparasitism. Mycologia, 56, 1.17.

Benedettelli, S.; G. Chisci.; A. Nencini; R. Tesi; K. Adak (Ed.) and S. Buyukalaca(1999). Multiple Variables evaluation of some melon hybrids (*C. melo* L. Var. reticulatus Naud). Acta - Horticulture. 1999, 492: 57 - 64.

Booth, C. (1971). The genus *Fusarium*. Commonwealth Mycological Institute. Kew, Surrey, England.

Ciccarese, F.; S. Frisullo and M. Cirulli (1985). sever out breaks of Verticillium wilt on Cicharium intybus and Brassica rape and pathogenic variation among isolates of V. dahliae. Plant Disease, 71: 1144-1145.

Dumitru, M.; C. Diaconescu and I. Iordan (1996). Comparative study on local and foreign germplasm sources with a view to developing a breeding programme for water melon (*Citrullus lanatus* thumb. Mansf.). Anale. Institutul - de - Cercetari - pentru - Legumicultura - si - Floricultura - Vidra., 14 : 147 - 156; 7 Ref.

EL-Adl, A.M.; Z.A. Kosba; Z.M. EL-Diasty and A.H. Abd EL-Hadi (1996). Types of gene action associated with the performance of hybrids among newly developed inbred lines of Agoor, *Cucumis melo* var.Chate., L.J. Agric. Sci. Mansoura Univ., 21 (8), august, 1996.

Garcia,E.; M. Jamilena; Ji. Alvarez; T. Arnedo; JL. Oliver and R . Lozano (1998). Genetic relationships among melon breeding lines revealed by RAPD markess and agronomic traits. Theoretical and Applied Genetics, 96 : 6-7, 878-885; 31 Ref.

Guirgis, A.A. (2000). Random amplified poly morphic DNA and protein marker analysis for genetic diversity in *Cucumis*. Zagazig J. Agric. Res., 27 (2): 2000.

Hatem, A.K.; H. H. El-Doweny and H.H.A Shaheen (1996) Hesterosis for yield components and plant growth Analysis in Melon (*C. melo* L.) Menofyia J. agric. Res., 21 (1): 153-174.

Johnson, M. W.; H.F. Robinson and R.E. Comstock (1955). Estimates of genetic and environmental variability in soybean. Agron., J. 47 : 314-318.

Kitroon groun, M; W.P. Swang and S. Tokumasu (1992). Evaluation of combining ability, helerosis and qeuetic variance for plant growth and fruit quality characteristics in thai-melon (*Cucumis melo* L.var. acidulus Naud).

Kosba, Z. A. and Z. M. El-diasty (1991). The manifestation of hybrid vigor and the magnitudes of the different genetic variances in intervarital crosses of melon (*Cucumis melo* var. reticulatus L.). J. Agric. Sci. Mansoura Univ., 16 (11): 2648-2657.

Kosuge, T. (1969). The role of phenolics in host response to infection. Ann. Rev. Phytopath., 7 : 195-222.

Kyle, M.; G. Moriarty and H. M. Munger (1993). Cucumber, melon and wquash germplasm from the Cornell Collection. Report-Cucurbit-Genetics Cooperative. No. 16, 90-91; 6 Ref.

Laemmli, U.K (1970). Cleavage of structural proteins during the assembly of the head bacteriophage T_4. Nature (London), 227 : 680-685.

Martyn,R.D.and D. Netzer (1991). Resistance to races 0, 1 and 2 of *Fusarium* wilt of water melon in *Citrullus sp.* PI 296341-FR. Hort Science, 26 (4): 429-432, 22 Ref.

Nei, M. and W.H. Li. (1979). Mathematical model for study genetic variation in terms of restriction endonucleases. Proc. Variation in terms of restriction endonucleases. Proc. Natl. Acad. Sci. Usa, 74: 5267-5273.

Nuez,F.; Fernandez-de cordova-P; die3-Mj (1992). Collecting vegetable germplasm in the Iberian peninsula. Plant genetic Resources Newsletter., 90: 31-33, 14 Ref.

Pan-RS; More TA (1996). Screening of melon (*Cucumis melo L.*) germplasm for multiple disease resistance. Euphytica., 88 (2):125-128; 15 ref.

Ram H. H. D. K. Singh, P.C. Tripathi and P. N. Rai (1996). Indigenous germplasm resource in cucurbits. Recent Hort. 3: 70-75.

Awny, S.A.. (1992). Combining ability and genetic parameters for fruit quality and yield characteristics in muskmelon (*Cucumis melo* L.) Egypt J. Appl. Sci., 7 (2): 1992, 199-199. Scientia Hort., 50 : 102, 79-87

Silberstein,L.; I. Kovalski; R. Huan; K . Anagnostou; M.M.K. Jahn- and R..Perl Treves (1999). Molecular variation in melon (*Cucumis Melo* L.) as revealed by RFLP and RAPD markers. Scientia-Horticalture, 79(1-2): 101-111; 22 Ref.

Snedecor, G. and Cochran (1967). Statistical methods. Oxford and IBH Publishing Co. 6th Ed. 299-312.

Snell and Snell (1957):Colorimetric methods of analysis including some turbidimeteric and nephelometeric methods. D. Van. Nostrand London, 111: 606.

Solanki, S.S. and J.N. Seth (1980). Studies on genetic variability in (*Cucumis Sativus* L-) Prog. Hort., 122 (1): 43-49.

Spark, D.N. (1973). Euclidean cluster analysis algorithm, Appl. Stat, 22 : 126-130.

Mc Collum, T.G.; D.J. Cantliffe and H.S. Paris (1987). Flowering, Fruit set, and fruit development in Birdsnest-type Muskmelons. J. Amer. Soc Hort. Sci., 112(1): 161: 164.

Vijay, O. P. (1987). Genetic variabilit, correlation and path analysis in muskmelon (*Cucmis melo* L.). Indian J. Hort., 44 (3-4) 233-238.

Zink, F.W.; W.D. Gubler and R.G.Grogam (1983). Genetics of *Fusarium* wilt resistance in muskmelon. Hort Science, 18: 4, 11, 602.

تقييم الأداء المورفولوجى والمرضى لبعض الأصول الوراثية المحلية للقاوون

إبراهيم زكى عبد الوهاب الشيمى و مجدى إبراهيم غنيم *
أقسام بحوث الخضر - معهد بحوث البساتين - مركز البحوث الزراعية
*** معهد بحوث أمراض النبات – مركز البحوث الزراعية – الجيزة - القاهرة**

تم تجميع إحدى عشر سلالة محلية للقاوون من مناطق جمهورية مصر العربية المختلفة وزرعت هذه السلالات فى تجارب مصممة بطريقة القطاعات العشوائية تماماً- بمحطة بحوث البساتين بالقصاصين فى أعوام 2002 ، 2003 لتقييم الأداء المورفولوجى وكمية المحصول وجودته - وكذلك العلاقة الوراثية بين هذه السلالات المحلية - وكذلك إختبار القدرة المرضية لها ضد بعض الفطريات المسببة للذبول المفاجئ مثل فطرى الفيوزاريوم والفيرتسليوم وقد أظهرت النتائج ما يلى:

1) كانت هناك فروق معنوية فى متوسط أداء جميع السلالات، وكذلك ظهر مدى واسع من الاختلافات بينها لجميع الصفات المدروسة.
2) أظهرت سلالة القاوون القادمة من قنا أعلى قيمة لصفة طول النبات - طول العقدة على الساق الرئيسى وفى نفس الوقت أظهر التركيب الوراثى الخاص بـ القاهرة 6 أعلى قيمة لصفة عدد العقد على الساق الرئيسى بينما أظهرت سلالة الفيوم أقل قيم للصفات المذكورة سابقاً.
3) سجلت سلالات القاوون القادمة من صندفا، الواحات البحرية، الفيوم، البرلس وكذلك القاهرة 6 صفة التبكير فى تفتح الأزهار المذكرة والمؤنثة على 50% من النباتات بينما أظهرت سلالات الإسماعيلاوى والوراقى التأخير لنفس الصفة.
4) بالنسبة لصفة كمية المحصول ومكوناته: أظهر التركيب الوراثى لكل من الإسماعيلاوى والوراقى أعلى قيمة لكل من كمية المحصول الكلى/ الفدان - ومحصول النبات الواحد وكذلك متوسط وزن الثمرة، طول وعرض الثمرة، بينما سجلت سلالة الفيوم وأناناس الدقى أقل قيمة لنفس الصفات المذكورة، فى حين سجل التركيب الوراثى الخاص بالإسماعيلاوى وأناناس الدقى أعلى قيمة لصفة المواد الصلبة الزائبة الكلية وفى نفس الوقت سجلت سلالة البرلس أقل قيمة لنفس الصفة المذكورة. بينما كانت أعلى قيمة لصفة سمك اللحم الداخلى للتركيب الوراثى لكل من الإسماعيلاوى والوراقى.
5) أظهر تحليل التباين بين السلالات: أن كل صفات النمو - تأثرت معنوياً جداً نتيجة اختلاف التركيب الوراثى بين السلالات فيما عدا صفة معدل التمثيل الصافى كذلك فإن جميع الصفات المدروسة تأثرت معنوياً جداً بتأثير الموسم فيما عدا صفة طول النبات - وعدد العقد على الساق الرئيسى ومساحة الورقة فى العينة الأولى - وكذلك معدل التمثيل الصافى وكذلك متوسط وزن الثمرة وكذلك عرض الثمرة وكذلك محصول النبات الواحد.
6) أظهرت النتائج أن: مكونات التباين الوراثى كانت أكبر من التباين المظهرى والبيئى لكل الصفات المدروسة فيما عدا صفة ميعاد فتح الأزهار المذكرة والمؤنثة على 50% من النباتات وكذلك صفة سمك اللحم الداخلى وفى نفس الوقت كانت كفاءة التوريث بمعناها الواسع مرتفعة لكل الصفات المدروسة فيما عدا صفتى ميعاد تفتح الأزهار المذكرة والمؤنثة على 50% من النباتات وكذلك معدل التمثيل الصافى وكذلك سمك اللحم الداخلى.
7) أظهر تحليل التباعد الوراثى بين السلالات أن هناك مدى واسع من التباعد بين السلالات وأن هذا التباعد تراوحت قيمته بين (0.08) إلى (0.38) مسافة وراثية وأن الإحدى عشر سلالة قد وزعت فى 5 مجموعات وأن سلالة مرسى مطروح قد وجدت فى المجموعة الخامسة بمفردها.
8) أوضحت نتائج إختبارات القدرة المرضية ضد فطرى الفيوزاريوم والفيرتسليوم أن سلالة القاوون القادمة من الواحات البحرية كانت الأكثر تحملاً للإصابة بفطر الفيوزاريوم حيث وصلت نسبة الإصابة بها إلى 8.3% بينما سجلت سلالة صندفا والفيوم نسبة إصابة 13.5% ، 11.5% على الترتيب. وفى نفس الوقت سجل التركيب الوراثى لكل من أناناس الدقى، والوراقى أقل نسبة إصابة بفطر الفيرتسليوم حيث بلغت 4.7% فى كل منهما، بينما بلغت نسبة الإصابة فى صندفا والفيوم 21.3%، 18.7% على الترتيب.
9) أوضحت النتائج ارتفاع المحتوى الكلى للفينولات بعد الإصابة فى الصنف الإسماعيلاوى يليه سلالة قاوون قنا ثم الوراقى بينما كانت سلالة البرلس الأقل فى محتواها من الفينولات الكلية وذلك فى حالة الإصابة بالفيوزاريوم – بينما سجلت التراكيب الوراثية للإسماعيلاوى والقاهرة-6 أعلى محتوى من الفينولات الكلية بعد الإصابة بفطر الفيرتسليوم.

Table (1): Mean values of morphological characters for eleven Egyptian melon land races *(Cucumis melo L.)*

Characters	Plant height (cm)		No. of inter modes on main stem		Internoole length (cm)		Time of opening 50% of male flowers		Time of opening 50% of female flowers		Dry weight (gm/ plant)				Leaf area meter(cm^2)				Net assimilation rate (gm/ cm^2/ day)	
											1st sample		2nd sample		1st sample		2nd sample			
Genotypes	2001/ 2002	2002 /2003	2001/ 2002	2002/ 2003	2001/ 2002	2002/ 2003	2001/ 2002	2002/ 2003	2001/ 2002	2002/ 2003	2001/ 2002	2002/ 2003	2001/ 2002	2002/ 2003	2001/ 2002	2002/ 2003	2001/ 2002	2002/ 2003	2001/ 2002	2002/ 2003
Kenna melon	156	145	24.32	25	10.67	9.83	28	29	31	32	12.58	21.95	44.60	38.59	32.97	31.77	49.96	41.71	140	62
Sandfa melon	121.66	127	24.32	24.5	7.33	6.90	27	29	29	32	12.32	19.32	33.43	32.72	35.41	36.89	67.86	51.63	68	42
Wahat melon	130	129	20.66	20	9	9	27	29	29	32	15.54	23.72	44.28	39.75	30.18	32.15	61.01	45.59	97	60
Fayoum	105	115	17	17.5	7	6.9	28	29	29	30	17.84	25.59	47.09	41.80	33.72	32.89	53.47	43.59	108	62
Anannas EL-Dokki	110.65	105	20	21	4	4	30	30	31	32	13.84	18.68	25.92	29.71	36.71	34.42	54.32	44.21	35	40
Shadol EL-Dokki	117.33	107	21.65	21.5	5	5	30	30	31	32	14.11	18.93	24.29	30.03	26.94	25.54	49.22	36.42	43	52
Kahera-6	121	123	25.66	25	8.32	8	27	30	29	30	17.71	24.5	41.06	39.38	31.89	30.78	50.12	40.46	82	61
Waraki	121.33	123	20.66	21.5	8	7.66	30	30	31	32	12.79	20.63	40.38	35.29	19.47	27.36	76.19	44.83	96	52
Marsa matrouh	108	119	17.66	21	8	7.67	28	29	31	30	12.85	22.86	47.33	40.42	29.46	30.06	53.11	41.20	143	73
Brolussi	107.32	116	22.33	21.5	7.65	7.16	27	28	29	30	10.64	17.31	31.14	29.71	26.96	30.64	63.82	45.26	69	44
Ismailawii	125.67	120	25	22.5	5	5	30	30	33	33	17.55	21.32	26.73	32.14	21.76	20.62	31.66	26.71	45	66
L.S.D $_{0.05}$	15.32	9.42	2.82	3.14	0.69	0.73	1.69	1.52	1.53	1.44	4.04	3.60	6.38	4.97	5.92	3.51	10.13	4.76	50	132
L.S.D. $_{0.01}$	20.87	12.88	3.84	4.27	0.94	1.00	2.30	2.08	2.08	1.96	5.50	4.91	8.07	6.77	8.07	4.78	13.81	6.49	69	180

Table (2): Mean values of yield components and its quality for eleven Egyptian melon land races *(Cucumis melo L.)*

Characters	Average fruit Weight (kg)		Average fruit Length (cm)		Average fruit width (cm)		Fruit yield (kg/ plant)		Fruit yield (ton/ fed)		Flesh thickness (cm)		Total soluble solids (%)	
Genotypes	**2001/ 2002**	**2002/ 2003**	**2001/ 2002**	**2002/ 2003**	**2001/ 2002**	**2002/ 2003**	**2001/ 2002**	**2002/ 2003**	**2001/ 2002**	**2002/ 2003**	**2001/ 2002**	**2002/ 2003**	**2001/ 2002**	**2002/ 2003**
Kenna melon	0.800	0.783	12.03	11.52	8.82	8.51	2.28	3.90	6.56	7.05	2.66	2.60	9.06	8.51
Sandfa melon	0.780	0.780	12.03	11.53	8.67	8.73	2.23	3.91	5.60	6.99	2.40	2.41	9.52	9.50
Wahat melon	0.839	0.791	14.12	13.73	6.80	7.16	2.23	3.90	6.87	7.06	2.37	2.40	9.21	9.17
Fayoum	0.559	0.536	11.67	11.51	8.50	8.53	1.61	3.07	6.28	6.72	2.02	2.00	10.11	10.85
Anannas EL- Dokki	0.529	0.578	8.23	8.41	8.16	8.23	1.65	2.38	6.41	6.30	2.27	2.27	11.28	11.16
Sandfy	0.570	0.527	11.37	11.26	6.43	6.66	1.58	2.70	6.42	6.74	2.36	2.40	9.72	10.77
Kahera-6	0.629	0.683	14.73	14.30	8.50	8.40	2.02	3.12	6.64	6.42	2.50	2.50	10.59	10.98
Waraki	11.857	11.637	23.70	24.34	12.98	12.40	10.69	18.96	12.56	11.04	4.00	4.00	8.82	8.90
Marsa matrouh	0.788	0.697	10.23	10.23	10.23	9.83	2.09	3.74	7.96	8.97	2.66	2.80	11	11
Brolussi	0.861	0.832	12.74	2.70	12.26	12.66	2.50	2.58	7.25	6.77	3.71	3.86	8.71	8.51
Ismailawii	6.198	6.264	15.66	15.60	9.13	9.03	5.96	11.32	8.39	11.39	3.00	3.00	11	11.43
L.S.D $_{0.05}$	0.50	0.14	1.16	0.77	1.20	0.69	0.34	8.50	0.73	0.58	0.19	0.08	0.41	0.51
L.S.D. $_{0.01}$	0.69	0.19	1.59	1.05	1.64	0.94	0.46	11.58	0.99	0.79	0.26	0.11	0.56	0.70

Table (3): Analysis of variance for genotypes, replicates and season effects based on mean of replicates of morphological and quantitative characters for eleven melon landraces *(Cucumis melo L.).*

Charcter S. O. V	d.f	Mean Squares														
		Plant height (cm)	No. of internod-es	Internod-e length (cm)	Time opening 50% of male flowers	Time opening 50% of females	Dry matter content (gm/ plant)		Leaf area meter (cm^2)		Net assimilation rate (gm/ cm2/ day).	Average fruit weight (kg)	Average fruit length (cm)	Average fruit width (cm)	Fruit yild		Fruit quality	
							1st samp.	2nd samp.	1st samp.	2nd samp.					(kg/ plant)	(Ton/ fed)	Flesh thickness (cm)	Total soluble solids
Reps	2	1.77	1.52	0.058	4.14	0.14	17.02	30.92	18.24	25.77	1.37	0.06	0.318	0.502	0.018	0.003	79.04	0.120
Genotypes	10	883.94 **	41.28 **	20.57 **	5.43 **	7.28 **	33.77 **	269.74 **	135.02 **	452.86 **	3.97	76.89 **	101.51 **	22.80 **	2.36 **	6.28 **	92.77 **	19.01 **

Seasons	1	3.41	4.38	1.12 **	16.50 **	19.63 **	809.69 **	38.11 **	7.98	3033.5 **	3.64	0.009	1.22 **	0.014	0.010	0.42 **	84.59 **	2.76 **
Error	52	65.79	2.97	0.169	0.89	1.02	4.77	14.72	8.88	31.97	4.12	0.04	0.32	0.295	0.007	0.125	9.39	0.51

****, * denotes significace at 1% and 5% probability, where F at these levels is 2.00, 2.66, respectively.**

Table (4): Genetic parameters genotypic, phenotypic and environmental variances as well as heritability in broad sense of morphological and yield characters for eleven melon landraces *(Cucumis Melo L.)*

Characters / Genetic parameter	Plant height (cm)	No of internodes	Internode length (cm)	Time of 50% opening male flowers	Time opening of 50% femals flowers	Dry weight content (gm/ plan)	Leaf area meter (cm2)	Net assimilation rate gm/cm2/day	Average fruit weight (kg)	Average fruit length (cm)	Average fruit width (cm)	Fruit field		Fruit quality	
												(kg/ plant)	(Ton/ fed)	Flesh thickness (cm)	Total solid
V**G**	**272.715**	**12.76**	**6.799**	**1.509**	**2.086**	**5.01**	**42.04**	**5.26**	**25.61**	**33.72**	**7.50**	**0.783**	**2.05**	**27.79**	**6.166**
V**P**	**295.784**	**15.22**	**7.229**	**7.309**	**8.97**	**102.61**	**47.66**	**2.53**	**25.63**	**33.90**	**7.60**	**0.789**	**2.23**	**59.12**	**7.25**
V**e**	**23.069**	**2.45**	**0.430**	**5.79**	**6.88**	**17.60**	**5.62**	**2.58**	**0.016**	**0.17**	**0.10**	**0.006**	**0.18**	**31.32**	**1.08**
h^2**b.s**	**0.92**	**0.83**	**0.94**	**0.21**	**0.23**	**0.82**	**0.88**	**0.02**	**0.99**	**0.99**	**0.98**	**0.99**	**0.92**	**0.47**	**0.85**