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Comparative Study Between Two Grapevines Cultivars Recently Introduced to Egypt

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Abstract: A comparative study between H4 and Black Magic grapevine cultivars in horticulture and economic evaluation, under desert land conditions at Abo-Qurqas in Minia Governorate Egypt were achieved, during two successive seasons 2023 and 2024. The two cultivars were grown in well drained sandy soil and the water table depth is more than two meters. Furthermore, the economic studies which achieved during this work were applied in four villages famous for vineyard cultivation, Dafash, Al-Tofiquia, Fhana, and Eyboan. The results showed that H4 cultivar exhibited the best vegetative growth characteristics and bud behavior rather than Black Magic. Furthermore, H4 cv. recorded higher yield (kg/vine or ton/feddan). The Black Magic cv. recorded the best physical and chemical characteristics of berries. Through an economic evaluation and financial return analysis of these cultivars, supported by statistical analysis of economic data, the data indicated that due to high price of Black Magic crop resulting from high cluster quality, grapevines farmers in Minia Governorate, especially in new reclamation desert lands of Minia Governorate farmers prefer cultivate it.

Key words: Grapevines, H4, Black Magic, yield & berry quality, Economic valuation.

1. Introduction

Vineyard sector has been considered as one of the most important agricultural sectors in Egypt for thousands of year. The development of viticulture cultivation in Egypt dating back to the Pharaonic civilization, as depicted in ancient tombs and temples where viticulture and winemaking scenes are abundant (**Winkler *et al.*, 1984 and Kanellis & Roubelakis, 1993**). However, with the increasing impact of climate change, marked by rising temperatures, water scarcity, and erratic weather patterns, the need to develop and adapt modern grape varieties has become paramount.

The successful adaptation of newly grapevine cultivars to local climatic conditions is crucial to ensure sustainable productivity, high fruit quality, and resistance to biotic and abiotic stresses. Several recent studies have emphasized the importance of selecting cultivars that are tolerant to abiotic stress and have low chilling requirements, especially in the arid zones, such as Egypt. Currently, grapevine

cultivation remains one of the most economically significant horticultural sectors in Egypt. Grapevine cultivars such as H4 and Black Magic were introduced to Egypt in the last few years (at beginning of the current century) and are expected to spread widely in Egypt. These cultivars offer desirable traits including uniform berry size, high sugar content and attractive color, making them ideal for export (**El-Sese, 2019**).

Black Magic is an early-ripening black-skinned table-grape *cv.* developed at the Institute of Viticulture Chisinau (Moldova) under the name "Codreanca". It forms conical pyramidal bunches and oval to ellipsoidal berries weighing, covered in a dark blue-black skin. It has high sugar content and its early harvest window, making it commercially attractive for premium table grape markets (**Mohamed, 2023 and Vivai, 2024**). While, the H4 cultivar is an improved strain of the well-known Thompson Seedless cultivar, developed for higher yield and larger berry size. It produces yellow seedless berries suitable for both table and raisin purposes, with excellent sweetness and storage quality. H4 is widely cultivated in grape-producing regions such as California and Egypt due to its superior fruit quality and productivity (**Dokoozlian, 2000**). However, the economic evaluation of grape varieties aims to determine the profitability and long-term viability of different cultivars under varying environmental and market conditions (**Coban 2023** and **Vivai, 2024**).

The main objective of this experiment was to evaluate these two cultivars under desert lands conditions of Minia Governorate. The evaluation included the botanical and economic aspects.

2. Materials and Methods

The current study was carried out during 2023 and 2024 seasons on two newly introduced grapevines cultivars, namely; H4 and Black Magic. The two chosen cultivars were grown in well drained sandy soil and spaced at 2 X 3 m. The vine loading was adjusted at 80 eyes per vine (8 fruiting cans X 8 eyes + 8 renewal spurs X 2 eyes). Baron shape supporting system was used. The vines irrigated by using drip irrigation system. The field experiment was carried out at El-Dakhalia privet farm, located at Abo Qorqas "beside the Cairo-Assiut Western desert rod, El-Minia Governorate – Egypt. All vines under taken in this study received the recommended horticulture practices.

2.1. Plant materials

The chosen vines (ten vines from each cultivar) were trained according to cane pruning system using Baron supporting system. The vines are sex years old at the starting of experiment. Winter pruning was achieved at the last week of December during the tow experimental seasons.

2.2. Soil and irrigation water analysis

The physicochemical analysis of soil and irrigation water were achieved according to the procedures outlined by **Wilde *et al.*, (1985)** and **Walsh & Beaton (1986)**, the obtained results are shown in Table (1).

2.3. Experimental design

The experimental design were arranged in a complete randomized design (CRD) each cultivar was represented by 5 replications, two vine per each replicate was used.

2.4. Different measurements and determinations

The following horticulture and economical parameters were evaluated:

2.4.1. Vegetative growth

Including average shoot length (cm), leaves number per shoot, leaf area of adult leaves (**Ahmed & Morsy, 1999 and Ibrahim, 2010**).

2.4.2. Bud behavior

Including burst buds % and dormant buds %: calculated in base of total number of bud/vine (80 buds) for the two cultivars (**Ibrahim 2011**).

Table (1). Physicochemical analysis of soil and irrigation water

Soil analysis		Water analysis	
Constituents	**Values**	**Constituents**	**Values**
Sand %	74.1	**E.C (mmhos/cm/25C)**	1.9
Silt %	14.1	**Hardness**	17.1
Clay %	11.8	**pH**	7.74
Texture	Sandy	**Ca (mg/L)**	33.1
EC (1:2.5 extract) mmhos/cm/ 25	2.8	**Mg (mg/L)**	27.3
Organic matter %	0.09	**K (mg/L)**	8.17
pH (1 : 2.5 extract)	8.42	**Na (mg/L)**	75.6
Active lime ($CaCO_3$ %)	9.15%	**Sum of Cations (mg/L)**	9.16
Total N %	0.08	**Alkalinity (mg/L)**	177
Available Phosphorus (ppm)	2.85	**Chlorides (mg/L)**	119
Available Ca (meq/100g)	22.1	**Nitrate (mg/L)**	11.0
Available Mg (meq/100g)	3.03	**Sulphates (mg/L)**	47.9
Available K (meq/100g)	0.67	**Sum of anions (mg/L)**	8.19
C/N Ratio	19.8	**SAR**	3.26

2.4.3. Leaf mineral contents (N, P, K and Mg)

The same leaves which taken to measuring the leaf area which picked located opposite to the basal clusters (**Ibrahim 2010 and Martin-Preval *et al.*, 1984**). Leaves blades were discarded, the petioles only were used in mineral nutrients determination. The petioles washed with distillated water, dried at oven and grounded. Then 0.5 g of weight was digested by using H_2SO_4 and H_2O_2 until clear solution was obtained. The digested solution completed to 100 ml by distilled water. Thereafter, percentages of N. P, K, and Mg of each sample were determined as follows: Nitrogen determined by using the modified microkejldahl method (**Martin-Preval *et al.*, 1984**). Phosphorus determined by colorimetric method (**Wild *et al.*, 1985**), through measuring the optical density of phosphor-molibdo-vanadate complex by using Spectro-photometrically at 430 nm. Potassium determined by using flam photometer instrument, according **Martin-Preval *et al.*, (1984)**. Magnesium was determined by using Atomic Absorbtion methods (**Martin-Preval *et al.*, 1984**).

2.4.4. Yield and berries physicochemical properties

The two examined clusters were harvested at physiological maturation stage (**Winkler *et al.*, 1974 and Weaver, 1976**). The number of clusters per vine was recorded, the cluster weight of 4 clusters was achieved, and then the average cluster weight was calculated. The yield (kg/vine) was done as a result of multiplying the number of cluster X average cluster weight. At harvesting time 3 clusters were taken random from the yield of each vine and using for determination the following physical and chemical parameters: cluster weight (g), cluster length (cm), cluster width (cm), berry weight (g), Berry dimensions (longitudinal and equatorial "cm"), Juice total soluble solids (TSS %), total acidity % (expressed as grams tartaric acid per 100 grams of berries juice (**AOAC, 2000**), and total reducing sugar % (**Rangana 1990**).

2.4.5. Economic Evaluation

The economic evaluation of H4 and Black Magic cultivars was conducted in 2023 season in four villages famous for grape cultivation and production in Minia Governorate (Dafash, Al-Tofiquia, Fhana, and Eyboan). Farmer's surveys and economic data collection were carried out using a data model identical to that used by **Gianluca, *et al.*, 2022 and Kynda *et al.*, 2023**. The primary objective was to determine the performance of the two cultivars through the analysis data of economic specialized study.

2.5. Statistical analysis of data

The obtained data were tabulated and subjected for the statistical analysis; by analysis of variance (ANOVA) using the statistical package MSTATC Program, using least significant differences (L.S.D) at P= 0.05 (**Snedecore and Cochran, 1990**).

3. Results and discussion

3.1. Evaluation of vegetative growth parameters

3.1.1. Shoot length

Data listed in Table (2) shows the effect of cultivar type on the average shoot length of H4, and Black Magic *cvs.* grown in sandy soil under El-Minia Governorate conditions, during the two experimental seasons (2023 and 2024). The obtained results showed that, the length of the main shoots of the two cultivars under study differed significantly. H4 cultivar recorded the highest shoot length during the two experimental seasons (83.6 and 81.8 cm) rather than Black Magic cultivar which presented 77.6 and 70.2 cm), during 2023 and 2024 seasons respectively.

3.1.2. Number of leaves per shoot

It is clear from Table (2) that the number of leaves per shoot of the two examined cultivars (Black Magic and H4) differed significant, during 2023 and 2024 seasons. The obtained results showed that the cultivar H4 presented higher and significant number of leaves per shoot (32.4 and 28.7) rather than Black Magic, which presented (28.1 and 26.4 leaves/shoot, during the two experimental seasons respectively.

3.1.3. Main shoot diameter (cm)

Data presented in Table (2) showed that, non-significant differences were observed between H4 and Black Magic cultivars, neither in the first season nor in the second one.

3.1.4. Leaf area (cm^2)

Data illustrated in Table (3) showed the differences between H4 and Black Magic cultivars in average adult leaf area (cm^2), during 2023 and 2024 seasons. The obtained date showed that, Black Magic cultivar presented the higher leaf area values (168.3 and 150.6 cm^2) rather than H4, which presented 100.8 and 94.9 cm^2, during the two experimental seasons respectively.

Table (2). Shoot length (cm), number of leaves and leaf area of H4, and Black Magic cultivars, during 2023 and 2024

Treatments	Shoot length (cm)		Number of leaves		Shoot diameter (cm)	
	2023	2024	2023	2024	2023	2024
H4	83.6	81.8	32.4	28.7	0.49	0.46
Black Magic	77.6	70.2	28.1	26.4	0.52	0.51
Mean	**80.6**	**76.0**	**30.3**	**27.6**	**50.5**	**48.5**
LSD 5%	**5.2**	**7.8**	**2.4**	**2.1**	**NS**	**NS**

3.2. Bud behavior

3.2.1. Burst and dormant buds %

Data in Table (3) shows the comparison between the two cultivars (H4 and Black Magic) in burst and dormant buds percentages., during 2023 and 2024 seasons. It is clear from the obtained results that H4 cultivar produced the highest percentages of burst bud (79.5% and 78.3 %) rather than Black Magic which presented 76.7% and 76.3%). in both experimental seasons respectively. Concerning the percentage of dormant buds, it is clear from the data announced in Table (3) that the Black Magic cultivar present the highest percentages of dormant (unopened) buds (23.3% and 23.9%), in comparison to H4, which presented 19.5% and 21.7%. These findings were true during the two experimental seasons respectively.

Table (3). Leaf area (cm^2), dormant buds%, and burst buds %, of H4, and Black Magic cultivars, during 2023 and 2024 seasons

Treatments	Leaf area (cm^2)		Dormant buds %		Burst buds %	
	2023	2024	2023	2024	2023	2024
H4	100.8	94.9	19.5	21.7	79.5	78.3
Black Magic	168.3	150.6	23.3	23. 9	76.7	76.3
Mean	**134.6**	**122.7**	**21.4**	**22.8**	**78.1**	**77.3**
LSD 5%	**12.7**	**13.8**	**2.9**	**2.1**	**2.4**	**2.8**

3.3. Leaf mineral contents

Data presented in Table (4) shows the differences in macro nutrients contents (N, P, K, and Mg) of the two evaluated cultivars grown under El-Minia Governorate conditions, during 2023 and 2024 seasons. The obtained data showed that the four major macro-elements were varied significantly between the two cultivars.

33.1. Leaf Nitrogen %: data illustrated in Table (4) showed that, the Black Magic cultivar showed a significant superiority in the percentage of Nitrogen in the petiole of adult leaves (1.92% and 1.93%) than H4 which presented 1.87% and 1.98%, during the two experimental seasons respectively.

3.3.2. Leaf phosphorus content: data illustrated in Table (4) showed that, the H4 cultivar showed a significant superiority in adult leaves phosphorus % (0.22% and 0.21%) compared to Black Magic cultivar (0,17% and 0.17%), during the two experimental seasons respectively.

3.3.3. Leaf Potassium contents: it is clear from Table (4) that the adult leaves of the two evaluated cultivars were significantly varied in potassium contents between the two evaluated cultivars. It is clear that, cultivar H4 exhibited the highest significant potassium in their leaves (1.82% and 1.85%) in comparison with Black Magic cultivar, which presented 1.53% and 1.51% respectively. These results were true during the two experimental seasons

3.3.4. Leaf Magnesium contents: it is clear from Table (4) that, the adult leaves of the two examined cultivars were significantly varied in Magnesium percentage. It is clear that, cultivar Black Magic exhibited the highest significant Magnesium percentage in their adult leaves (0.69% and 0.71%) in comparison with H4 cultivar, which presented 0,51% and 0.55% during 2023 and 2024 seasons respectively.

Table (4). Nitrogen, Phosphorus, potassium, and Magnesium contents (%) of H4 and Black Magic cultivars adult leaves, during 2023 and 2024 seasons

Treatments	Nitrogen%		Phosphorus%		Potassium%		Magnesium%	
	2023	2024	2023	2024	2023	2024	2023	2024
H4	1.80	1.83	0.22	0.21	1.82	1.85	0.51	0.55
Black Magic	1.92	1.93	0.17	0.17	1.53	1.51	0.69	0.71
Mean	**1.86**	**1.88**	**0.19**	**0.19**	**1.68**	**1.68**	**0.60**	**0.63**
LSD 5%	**0.11**	**0.10**	**0.03**	**0.03**	**0.11**	**0.12**	**0.08**	**0.09**

3.4. Evaluation of productive capacity

3.4.1. Number of cluster per vine: Data illustrated in Table (5) showed the differences in cluster number of vine between the two evaluated cultivars, in both seasons 2023 and 2024. The obtained data during the two experimental seasons as shown in Table (5) displayed that, the H4 cultivar present higher

productive capacity of vines in term of higher numbers of clusters per vine (40.2 and 37.9) compared to Black Magic *cv.* (32.4 and 30.8), during the two experimental seasons respectively.

3.4.2. Cluster weight (g): Data illustrated in Table (5) shows the differences in average cluster weight (g) between the two evaluated cultivars, during 2023 and 2024. The obtained data showed that, the average clusters weight (g) varied significantly among the two examined cultivars. It is clear from this Table that, cultivar Black Magic presented the highest average cluster weight (570.7 g and 510.1 g) in comparison to H4 cultivar, which presented (466.9 and 430.1 g), during the two seasons respectively.

3.1.3. Yield quantity (kg/vine and tons/fad.): Data regarding the differences between the yield quantities estimated in kg/vine and tons/fad at harvesting date, during 2023 and 2024 seasons of the two evaluated cultivars (H4 and Black Magic) are presented in Table (5). There are significant differences in the productive capacity of the vines of the two examined cultivars, expressed in terms of yield, whether measured in kilograms per vine or tons per feddan yearly. The obtained results showed that H4 cultivar produced the highest yield during the two experimental seasons (18.97 & 16.30 kg/vine and 13.441 & 11.410 tons/fad.) in compared to Black Magic cultivar, which presented 18.49 & 15.71 kg/vine and 12.945 & 10.999 tone per feddan.

Table (5). Number of cluster, cluster weight, yield of H4 and Black Magic cultivars, during 2023 and 2024 seasons

Treatments	No. of cluster Per vine		Cluster Weight (g)		Yield (kg/ vine)		Yield (ton/feddan)	
	2023	2024	2023	2024	2023	2024	2023	2024
H4	40.2	37.9	466.9	430.1	18.97	16.30	13.410	11.410
Black Magic	32.4	30.8	570.7	510.1	18.49	15.71	12.945	10.999
Mean	**36.3**	**34.35**	**518.8**	**470.1**	**18.73**	**16.01**	**13.178**	**11.205**
LSD $_{5\%}$	**4.2**	**4.1**	**25.5**	**29.3**	**0.45**	**0.67**	**0.231**	**0.345**

3.5. Physical properties of cluster

3.5.1. Cluster length (cm): The obtained data during the two experimental seasons as shown in Table (6) present the variation of cluster length (cm) between the two evaluated cultivars, during the two experimental seasons (2023 and 2024). It is clear from this table that the data took the same trend during the two experimental seasons (2023 and 2024), however, the length of cluster varied significantly between the two cultivars. H4 cultivar recorded the best cluster length (24.3 cm and 23.7 cm) during the two experimental seasons respectively. On the opposite side, Black Magic presented lowest cluster length (20.2 and 17.3 cm). These findings were true during the two experimental seasons respectively.

3.5.2. Cluster width (cm): The data presented in Table (6) shows the differences between the cluster width of the two examined cultivars (H4 and Black Magic) grown in sandy soil under Minia Governorate conditions, during the two experimental seasons (2023 and 2024). It is clear from this table that the cluster width varied significantly between the two cultivars, also it varied as from season to other. During the first season, the cultivar Black Magic presents highest significant cluster width (16.2 cm) in comparison to H4 *cv.*, which presented 14.2 cm. while, during the second season the cultivar H4 presented the highest and significant cluster width (12.5 cm) rather than Black Magic, which presented (10.7 cm)

3.5.3. Number of berries / cluster: It is clear from the data illustrated in Table Data presented in Table (6) that the number of berries per cluster of the two evaluated cultivars was differed significantly, during the two experimental seasons. It is clear that H4 cultivar presented significant higher berries number / cluster (190.9 and 182.3 berries). While, Black Magic *cv.* presented only 113.9 and 105 berries/cluster. These data were true during the two seasons respectively.

Table (6). Cluster length, cluster width, cluster shape index and number of berries / cluster of H4 and Black Magic cultivars, during 2023 and 2024 seasons

Treatments	Cluster length (cm)		Cluster Width (cm)		No. of Berries per cluster	
	2023	2024	2023	2024	2023	2024
H4	24.3	23.7	14.2	12.5	190.9	182.3
Black Magic	20.2	17.3	16.2	10.7	113.9	105.6
Mean	**22.3**	**20.5**	**15.2**	**11.6**	**152.4**	**143.9**
LSD 5%	**3.1**	**2.8**	**1.5**	**1.5**	**24.1**	**21.7**

4.6. Berry physical properties

Data concerning the berry physical properties of two examined cultivars (H4, and Black Magic) grown in sandy soil under Minia Governorate conditions during 2023 and 2024 seasons, in terms of average berry weight and berry dimensions, are illustrated in Table (7).

4.6.1. Berry Weight: Concerning the berry weight (g) of the four evaluated cultivars data shown in Table (7) declared that the berry average weight varied significantly between the two cultivars, during the two experimental seasons. Black Magic cultivar present the significant higher berry weight (4.92 g and 4.75 g) in comparison with H4 cultivar (2.40 g and 2.31 g), during the two experimental seasons respectively.

4.6.2. Berry dimensions: It is clear from Table (7) that berry length and diameter in both experimental seasons were varied significant between the two examined cultivars. It is clear from Table (7) that cultivar Black Magic presented the highest berry length (1.92 cm and 1.88 cm) and diameter (1.84 cm and 1.57 cm) in comparison with H4 cultivar, which recorded 1.19 cm & 1.12 cm of berry length and 0.99 cm & 0.89 cm of berry diameter. These data were true during the two experimentally seasons respectively.

4.6.3. Berry shape index: Data illustrated in Table (7) showed a significant difference in berry shape index of the two examined cultivars namely H4 and Black Magic, grown in sandy soil, under El Minia Governorate conditions. It is clear from this table that cultivar Black Magic have an almost spherical shape, with the fruit shape index value close to one. In Contrary, the berry of H4 cultivar was slightly elongate, it has a 1.21 and 1.26 shape-index values during the two seasons respectively.

Table (7). Berry weight (g), berry length (cm), berry diameter (cm), and number of berries per cluster of H4 and Black Magic cultivars, during 2023 and 2024 seasons

Treatments	Berry weight (g)		Berry length (cm)		Berry diameter (cm)		Berry shape index	
	2023	2024	2023	2024	2023	2024	2023	2024
H4	2.40	2.31	1.19	1.12	0.99	0.89	1.21	1.26
Black Magic	4.92	4.75	1.92	1.88	1.84	1.57	1.03	1.19
Mean	**3.66**	**3.53**	**1.56**	**1.50**	**1.42**	**1.23**	**1.12**	**1.23**
LSD 5%	**1.22**	**1.19**	**0.23**	**0.28**	**0.28**	**0.21**	**0.12**	**0.13**

3.7. Berry chemical properties

Data concerning the effect of cultivar type on berry chemical properties “in terms of total soluble solids (TSS%), total acidity %, and reducing sugars %” of the two examined cultivars (H4 and Black Magic), grown in sandy soil under El-Minia Governorate conditions, during 2023 and 2024 seasons.

Table (10) shows that, it is clear that the chemical properties of berries were significantly varied between the two cultivars.

3.7.1. TSS and reducing sugars percentages: It is clear from Table (8) that the TSS% were significantly varied between the two evaluated cultivars in both experimental seasons (2023 and 2024). Cultivar H4 exhibited significant higher of total soluble solids (22.6% and 21.5%) in comparison with Black Magic cultivar, which presented 18.9% and 17.9%. These data were true during the two experimental seasons respectively. Data listed Table (8) clearly showed that, the percentage of reducing sugars was positively correlated with the percentage of soluble solids in the juice, as the H4 cultivar, which recorded the highest TSS%, also recorded the highest percentage of reducing sugars in the juice (21.3% and 19.8%). In contrast, the Black Magic cultivar, which recorded the lowest TSS% also recorded the lowest percentage of reducing sugars (17.5% and 16.6%). These findings were true during the two experimental seasons respectively.

3.7.2. Total acidity %: It is clear from Table (8) that, during both experimental seasons, the total acidity % of berry juice was significantly differed between the two evaluated cultivar. The H4 cultivar presented lower and significant total acidity percentage (0.302% and 0.351%) in their berries, during the two experimental seasons respectively. In the contrary, cultivar Black Magic *cv*. presented highest and significant total acidity percentage (0.412% and 0.452%), these results were true during the experimental seasons respectively.

The obtained data confirmed the negative correlation between the total acidity and sugars percentages in grape vines was observed, this negative correlation recently confirmed by **(Renyier, 2000)**. It's worth to noting that several researchers have confirmed that during the period of grape ripening stage. Whereas, considerable percentage of malic acid is broken down, resulting in a significant decrease in total acidity. Others, such as (**Ibrahim 2001 and Renyier, 2000**), believe that tartaric acid is more stable than malic acid, requires higher temperatures for breakdown, and is rarely used in metabolism. From this standpoint, the total acidity of ripe grapes depends on their content of malic and tartaric acid. The higher the ratio of tartaric to malic acid in the fruit, the more acidic the fruit will be when ripe (**Ibrahim 2001**).

Table (8). Berry chemical properties of H4 and Black Magic cultivars, during 2023 and 2024 seasons

Treatments	TSS %		Reducing Sugars %		Total acidity %	
	2023	**2024**	**2023**	**2024**	**2023**	**2024**
H4	22.6	21.5	21.3	19.8	0.302	0.351
Black Magic	18.9	17.9	17.5	16.6	0.412	0.452
Mean						
LSD $_{5\%}$	**1.32**	**1.49**	**0.99**	**1.02**	**0.034**	**0.031**

3.8. Economical evaluation

Table (9) shows the economic analysis for the two evaluated cultivars (H4 and Black Magic). This table presented the mainly highlighted the method to calculate farmer's gross margin per feddan from selected grapevines cultivars as grapes (). The gross margin is the difference between the total values of farmer's production of an agricultural crop and the cost of producing that crop, divided by the total number of units in production feddan of crops, Gross margin is a measure of net income from that farm (**Michalson, 1975; Schwerz *et al.*, 2023 and Topcu, & Baser, 2025**).

Through a questionnaire data collected from farmers representing the farmers of the most important selected grapes cultivars in Minia Governorate during 2023 grown season according to their geographic area. The results of calculating farmers gross margin per feddan showed that the 'Black Magic' produced are the best crops for expansion and increase in production valued 68203 EGP. Farmer

who wants to choose the appropriate plan to grow his land will select Blak Magic grapes as the first alternative followed by H4 cultivar as a second alternative. Where these selected grapes crop are increasingly in both local and international markets, especially in the EU countries, as well as the role that can play in increasing Egyptian exports as the most important cash crops in the selected grapes groups, suitable and profitable in local markets their effective role in decreasing the current deficit in the Egyptian agricultural trade balance.

Table (9). Farmer's gross margin for Early Sweet, Super Thompson, H4, and Black Magic cultivars crop sample results in Minia Governorate season 2023

Grapevines cultivars – 2023	H4	Black Magic
Total sales value EGP	85579.13	133500
Production inputs variable cost EGP	63852.96	68634.6
Total sales Quantity (T0ns)	11411	8900
Productivity (Tons/ Feddan)	11.40	8.9
Price (EGP / ton)	7500	15000
Farmers gross Margin (EGP/ Feddan)	8574.165	49250.7
profitability's	**2**	**1**

4. Conclusion

The results of concerning the evaluation of the two examined cultivars (H4 and Black Magic) under newly reclaimed desert land conditions in Minia Governorate, showed that the H4 cultivar exhibited the best vegetative growth characteristics and bud behavior rather than Black Magic. Furthermore, H4 *cv.* recorded highest yield (kg/vine or ton/feddan). The Black Magic *cv.* recorded the best physical and chemical characteristics of berries. Through an economic evaluation and financial return analysis of these cultivars, supported by statistical analysis of economic data, the study indicated that the Black Magic *cv.* is more preferable for grapevines farmers in Minia Governorate, especially in new replicated desert lands of Minia Governorate.

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