

EVALUATION OF SOME SUGAR BEET VARIETIES TO POWDERY MILDEW INFECTION CAUSED BY *ERYSIPHE BETAE*.

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ABSTRACT: This study was to evaluate some sugar beet varieties to powdery mildew infection caused by *Erysiphe betae* under greenhouse conditions at Gemmeiza Agricultural Research Station, A.R.C. during 2021/2022 growing seasons. Fourteen sugar beet varieties (Belatos, Heba, Gazelle, Aminavhe, Oscar poly, Ribera, Puma, Toro, Lilly, Carnute, Ninagri, Dreeman, Kara and Hercules). The disease severity (DS%) was recorded at four times 14 day post artificial inoculation with *Erysiphe beta*. In addition, the areas under disease progress curve (AUDPC). The disease severity (DS%) at 105 days, sugar beet varieties can be categorized into three groups (resistant, moderate, and susceptible). The resistant varieties were Dreeman, Puma, Ribera, Lilly, Toro and Oscar poly. The moderately resistance varieties included Carnute, Heba, Gazelle, Ninagri, Kara, Belatos and Aminavhe. On the other hand, the maximum DS was recorded in Hercules variety. This means that Hercules variety was the most susceptible one to powdery mildew disease. According to the area under disease progress (curve), sugar beet varieties can be categorized into four groups as follows: resistant varieties (Dreeman, Puma and Ribera), moderately resistant (Lilly, Toro and Oscar poly), moderately susceptible (Carente, Heba, Gazelle, Ninagri, Belatos and Aminavhe), and susceptible (Hercules). As a result, the highly susceptible variety showed high levels of Final disease severity (FDS%) such as Heracles while the lowest of FDS were Derrman, puma, Ribera, Lilly, Toro and Oscar poly. The highest root yield (10.83Kg/plot) was achieved by Carnute varieties, while the lowest yield was observed in Hercules variety. Among sugar beet varieties, Heba attained the maximum TSS (19.66 %), while Hercules variety had the lowest TSS in the same time Oscar poly was the highest purity (90.46) while Hercules was the lowest in this respect (80.91). The highest sucrose concentration was observed in Heba variety, while Hercules variety possessed the lowest. Data Showed that Chl.a all sugar beet varieties non significantly in thesis respect. Howe ever varieties Dreeman, Carmute and Ribera gave the heighest concentration. In the same manner, Chl. b concentration was significantly increased due to sugar beet varieties. The heighest concentration was recorded varieties Puma, Dreeman, Oscar poly and Ribera While the lowest recorded concentration Chl. b varieties Hercules, Kara and Ninagri. Chl. a +b all varieties non significantly. While the lowest concentration of Chl. a +b were recorded varieties Hercules. Carotene concentration was significantly increased due to sugar beet varieties. The heighest concentration were recorded in varieties Dreeman, Ribera, Carnute and Oscar poly.

Key words: *Erysiphe betae*, Varieties, Sugar beet, Yield, Sucrose%, Chlorophyll, Carotene.

INTRODUCTION

Sugar beet (*Beta vulgaris* var. *saccharifera*, L.) is one of the most important sugar crops in Egypt, and throughout the world where it is a great source of sugar. In Egypt, sugar beet ranks first followed by sugar cane. The average production per unit (Fadden) is 20 tons and it reaches international levels (Desoky *et al.* 2021).

In the 2022/2023 season total harvested area of sugar beet in Egypt was about 597.923 acres producing about 12.52 million tons of sugar beet root and 1.708 million tons of sugar in 2022/2023 (FAO STAT 2023). Powdery mildew caused by *Erysiphe betae* is one of the important pathogens that attack sugar beet foliage growth causing a great reduction in the root yield

(Kontradowitz and Verreet, 2010). Under severe attack, up to 22% reduction in root yield and 13% reduction in sucrose content in sugar beet roots were took place, consequently lessened yield and yield quality (El-Fahar and Abou El-Magd, 2008).

Partial resistance of slow-mildewing type has been identified in sugar beet germplasm (Whitney *et al.* 1983). Commercial hybrids with partial resistance also have been made available to growers by the sugar beet industry. High resistance was identified recently in wild beet (*B. vulgaris* sub *sparitima*) accessions WB97 and WB242 and has been back crossed into sugar beet breeding lines, these enhanced lines were used as a sources of powdery mildew resistance to determine the inheritance of resistance (Lewellen and Schrandt, 2001). In previous breeding programs two monogenic dominant resistance genes against powdery mildew were found in different lines of wild beet (Lewellen and Schrandt, 2001 and Panella and Lewellen, 2007).

It was reported that beet powdery mildew infection decreased yield and yield quality (Hills *et al.* 1980 and El-Fahar and Abou El-Magd 2008). Chlorophyll content decreased by increasing disease severity of powdery mildew (Magyarosy *et al.* 1976 and El-Fahar and Abou El-Magd 2008). They reported that chlorophyll content was highly affected because powdery mildew infection decreased photosynthetic activity. El-Sayed *et al.*, (2014). Found that, the results of the natural infection in the field and artificial infection in the greenhouse showed that there were wide differences in the tested sugar beet varietal susceptibility to powdery mildew disease ranged from highly resistant to highly susceptible. The highest resistance varieties were Ymer, Puma, Meridia HM, Ernestina, Oscarpoly, Panther and Carola. While, the highest susceptible ones were Herkl, Top, Maghribel, Mahara, Sultan and Raspoly. Resistant varieties gave the highest root weight as well as contained the highest percent of sucrose and total soluble solids (T.S.S). Abu-Ellail *et al.* (2019) reported the performance of ten sugar beet varieties for growth, yield and juice quality under different

soil salinity levels and found a wide difference among sugar beet varieties in powdery mildew infection severity and yield components and these diversity may be referred to their gene make-up effect. Farrag and El-Mansoub (2020) compared powdery mildew infection severity and yield component of ten sugar beet varieties at Al-Fayoum Governorate, Egypt, during 2017/2018 and 2018/2019 growing seasons. Results showed that varieties i.e. Heba, Pleno, Beta 382 and Sibel registered the lowest values of disease severity percentage (11.77, 13.64, 14.90 and 16.40% respectively). The lowest disease severity percentage (11.77%) along with the best yield (22.20 ton/fed) was observed in Heba variety. Li-Nogoumy, *et al.* (2022). In the current study, we aimed to evaluated the susceptibility of 25 sugar beet varieties to infection with powdery mildew disease under Egyptian conditions. They showed that, there were significant differences between these 25 varieties in their susceptibility to the disease under study. Hamad, (2022). She indicated that, the disease severity and AUDPC, the eight sugar beet varieties are classified into four groups: - 1) Puma and Gazelle were resistant varieties to powdery mildew disease, 2) Oscarpoly varieties was moderately resistant to powdery mildew disease, 3) Carola, Heba, Lola, and Toro varieties were moderately susceptible to powdery mildew disease, and 4) Top was the susceptible varieties. To powdery mildew disease. Among sugar beet varieties, Puma achieved the highest root yield (820 g/ plant), total soluble solids (18.5 %), sucrose concentration (16.2 %), sucrose content (133.1 g/ plant) and sucrose purity (87.8 %). On the other hand, the lowest root yield (353.3 g/ plant), total soluble solids (12.3 %), sucrose concentration (8.3 %), sucrose content (29.3 g/ plant) and sucrose purity (67.5%) were recorded in Top varieties.

The objective of this study was to evaluated some sugar beet varieties to infection with powdery mildew and also to determine the relationship between disease severity% and root weight, sucrose% and leaf biochemical components as Chlorophyll, Carotene.

MATERIALS AND METHODS

In this study a total of fourteen sugar beet varieties were evaluated to powdery mildew infection (*Erysiphe betae*) greenhouse conditions during 2021/2022 growing seasons at Gemmeiza Agricultural Research Station, A.R.C.

1. Evaluation the resistance of sugar beet varieties to powdery mildew

This experiment was carried out under greenhouse conditions to evaluate the resistance/susceptibility of fourteen sugar beet varieties to powdery mildew disease caused by *Erysiphe betae*. The seeds of fourteen sugar beet (*Beta vulgaris* L.) varieties namely, Belatos, Heba, Gazelle, Aminavhe, Oscar poly, Ribera, Puma, Toro, Lilly, Garnute, Ninagei, Dreeman, Kara and Hercule provided by Maize and Sugar Crops Dis. Res. Dept., Plant Pathol. Res. Inst., Agric. Res. Center (ARC), Giza, Egypt were utilized in the current study.

2. Experimental design and growth conditions

This experiment was carried out in a randomly complete block design (RCBD) with three replicated plots for each treatment. The experiment consisted of treatments with three replicates for each treatment distributed in plots, each plot (2 x 2 m²). Sugar beet seeds (Hercule variety) were planted at space of 60 cm between plants inter row and 80 cm between plant row at the rate of three seeds /hill and grown under normal greenhouse conditions (temperature: 25-30 °C; relative humidity 75-80%). After 15 days, the seedlings were alleviated to one for each hill.

3. Greenhouse conditions and artificial inoculation

Greenhouse experiment was conducted under artificial inoculation (When the plants were in the age of two months (8weeks)) with the causal agent of sugar beet powdery mildew (*Erysiphe betae*). Seeds of the tested varieties were sown in microplot. This experiment was designed in a completely randomized block within three-replicates. The inoculation method for powdery mildew was done as follow; the sugar beet

varieties, 8 weeks in growth age, were sprayed with spores of *E. betae* by gently shaking the conidia from the leaves of giver mildewed plants on the top of the tested plant leaves (El-Zahaby *et al.*, 1995), then irrigated and incubated under controlled conditions until disease development.

4. Disease assessment

Disease severity (DS %) was assessed (for 3 times) after 14, 35 and 49 days post artificial inoculation for each variety according to powdery mildew scale as recorded by Descalzo *et al.* (1990) with a simple modification by El-Habbak (2003).

The disease severity percentage (DS %) was calculated utilizing the equation suggested by Townsend and Heuberger (1943) as follows:

Disease severity (%) =

$$\frac{[\Sigma (\text{rating no.}) (\text{no. leaves in rating category}) (100)]}{(\text{Total no. leaves}) (\text{highest rating value})}$$

The efficiency of each treatment in the reduction of DS (%) compared to control was calculated utilizing the followed equation:

$$\text{Efficiency (\%)} = ((\text{control} - \text{treatment}) / \text{control}) \times 100$$

In addition, the mean of area under disease progress curve (AUDPC) for each replicate was calculated as suggested by Pandey *et al.* (1989) as follows:

$$\text{AUDPC} = D [1/2 (Y_1 + Y_k) + (Y_2 + Y_3 + \dots + Y_{k-1})]$$

Where D equals time interval; Y₁ expresses first disease severity; Y_k abbreviates for last disease severity; while the whole equation is for calculating the disease intermediate disease severity (Y₂, Y₃,... Y_{k-1}).

5. Root yield and quality

At harvest, root yield (g plant⁻¹) was recorded for each variety. Additionally, quality features including total soluble solids (TSS %), sucrose concentration (%) and content (g plant⁻¹) and sucrose purity (%) were measured in the fresh root. TSS was determined by using the hand refractometer (McGinnis, 1982), Sucrose was determined by using saccharometer

(A.O.A.C., 1990) and purity percent was recorded by dividing the sucrose by TSS.

6. Chlorophyll concentration

According to Deer *et al.* (1998), fresh leaves (0.1 g) were cut into small fragments (1mm x 1 mm) and immersed for 24 h at 4°C in 20 ml methanol (96%) and then filtered through Whatman 47 mm GF/C filter paper. The absorbance of each filtrate was measured against a blank of 96% methanol at wavelengths of 666 and 653 nm for chlorophyll a and b, respectively. Results were expressed as mg g⁻¹ fresh weight (FW) and calculated using the following formulas:

$$\text{Chl a} = [(15.65 \times A_{666} - 7.34 \times A_{653}) \times (V/W)] / 1000$$

$$\text{Chl b} = [(27.05 \times A_{653} - 11.21 \times A_{666}) \times (V/W)] / 1000$$

Where V is the volume of methanol extract (ml), and W is the weight of plant leaf sample (g).

7. Statistical analysis

The obtained data were subjected to analysis of variance (Steel and Torrie, 1960). Least significant differences (L.S.D) were compared between two means. A simple correlation and regression between two data set was calculated in an Excel Spread Sheet.

RESULTS AND DISCUSSION

Sugar beet (*Beta vulgaris* subsp.) are attacked by several pathogens leading to seriously disease and crop losses. Powdery mildew disease is one of popular and also prevalent disease of sugar beet in mostly regions of the globe and could be a main production trouble. *Erysiphe betae* is seemed to be the major causal factors of powdery mildew in sugar beet through different areas of the globe. (Aguiar *et al.*, 2012; Gupta and Sharma, 2012).

Varietal resistance to beet Powdery mildew

Greenhouse trial was carried out to screen the available sugar beet varieties for their susceptibility to infection with Powdery mildew under artificial infestation. This experiment was

done at Gemmeiza Agricultural Experiment Station in 2021/2022 season.

1. Evaluation the resistance of sugar beet varieties to powdery mildew
2. The Disease severity (%)

Data also showed in (Fig. 1) in a greenhouse experiment, fourteen sugar beet varieties (Belatos, Heba, Gazelle, Aminavhe, Oscar poly, Ribera, Puma, Toro, Lilly, Carnute, Ninagri, Dreeman, Kara and Hercules) were evaluated for their resistance/ susceptibility to artificial infection with the causal agent of powdery mildew disease (*Erysiphe betae*). Sugar beet varieties showed differential responses to the infection with *Erysiphe betae*. These different responses were more cleared after 60,75,90 and 105 days post inoculation .

In general, data classified three groups Based on the disease severity (DS%) at 105 days, sugar beet varieties can be categorized into three groups (resistant, moderate, and susceptible). The resistant varieties were Dreeman, (Puma), Ribera, Lilly, Toroand Oscar poly,. The moderately resistance varieties included Carnute, Heba, Gazelle, Ninagri, Kara, Belatos and Aminavhe. On the other hand, the maximum DS was recorded in Hercules varieties. This means that Hercules varieties was the most susceptible one to powdery mildew disease.

In the line of this finding (El-Sayed, *et al.* 2014) Found that, The results of the natural infection in the field and artificial infection in the greenhouse showed that there were wide differences in the tested sugar beet varietal susceptibility to powdery mildew disease ranged from highly resistant to highly susceptible. The highest resistance varieties were Ymer, Puma, Meridia HM, Ernestina, Oscarpoly, Panther and Carola. While, the highest susceptible ones were Herkl, Top, Maghribel, Mahara, Sultan and Raspoly. Resistant varieties gave the highest root weight as well as contained the highest percent of sucrose and total soluble solids (T.S.S).

Attempted this results according to definition of gene for gen concept that dependent on the antigenic relation between host plants and their pathogens (Flor, 1971). In plant host – parasite

systems, the resistance and susceptibility to infection and disease development may be dependent on the antigenic relationship between the host plants and their pathogens. Plants have antigenic substances in shared with parasitic micro-organisms termed as common antigens (El-Shamy, 2006). It could be noticed that the number of the detected common antigens were associated with the degree of resistance and/or susceptibility, since more antigens were common between the fungus and the susceptible varieties. Abu-Ellail *et al.* (2019) reported the performance of ten sugar beet varieties for growth, yield and juice quality under different soil salinity levels and found a wide difference among sugar beet varieties in powdery mildew infection severity and yield components and these diversity may be referred to their gene make-up effect.

Similar results were obtained with other crops and pathogens who used the same technique (Agrios. 2005; El-Sayed *et al.*, 2014; Vogel *et al.*, 2018; Abu-Ellail *et al.* 2019; Farrag and El-Mansoub 2020 and Hamad, 2022).

El-Sayed *et al.*, (2014). Found that, the results of the natural infection in the field and artificial infection in the greenhouse showed that

there were wide differences in the tested sugar beet varietal susceptibility to powdery mildew disease ranged from highly resistant to highly susceptible. The highest resistance varieties were Ymer, Puma, Meridia HM, Ernestina, Oscarpoly, Panther and Carola. While, the highest susceptible ones were Herkl, Top, Maghribel, Mahara, Sultan and Raspoly.

According to the area under disease progress curve, sugar beet varieties can be categorized into four groups as follows: - resistant varieties (Dreeman, Puma and Ribera), moderately resistant (Lilly, Toro and Oscar poly), moderately susceptible (Carente, Heba, Gazelle, Ninagri, Belatos and Aminavhe), and susceptible (Hercules). Hamad, (2022). She indicated that, the disease severity and AUDPC, the eight sugar beet varieties are classified into four groups: - 1) Puma and Gazelle were resistant varieties to powdery mildew disease , 2) Oscarpoly varieties was moderately resistant to powdery mildew disease, 3) Carola, Heba, Lola, and Toro varieties were moderately susceptible to powdery mildew disease, and 4) Top was the susceptible variety.

Table (1): Susceptibility of different sugar beet varieties to artificial inoculation with *Erysiphe betae* the causal of powdery mildew and area under greenhouse conditions.

Varieties	% Disease severity after days:				AUDPC*
	60	75	90	105	
Belatos	3.83	14.66	25.99	36.12	909.375
Heba	3.12	14.16	24.66	34.79	866.65
Gazelle	4.37	14.58	24.7	34.83	883.2
Aminavhe	4.28	15.16	27.45	37.58	953.15
Oscar poly	3.04	9.66	14.2	19.29	525.375
Ribera	2.45	7.95	12.54	18.79	466.675
Puma	2.03	7.49	12.18	18.54	449.375
Toro	3.33	9.74	13.79	19.22	522.075
Lilly	2.66	8.12	13.54	19.12	488.275
Carnute	3.83	13.95	24.04	34.12	854.5
Ninagri	3.95	14.5	24.95	35.08	884.525
Dreeman	0.7	5.08	10.62	12.08	331.4
Karta	4.2	14.7	25.16	35.24	893.75
Hercules	14.2	24.7	35.16	57.24	1433.7

* Area under disease progress curve.

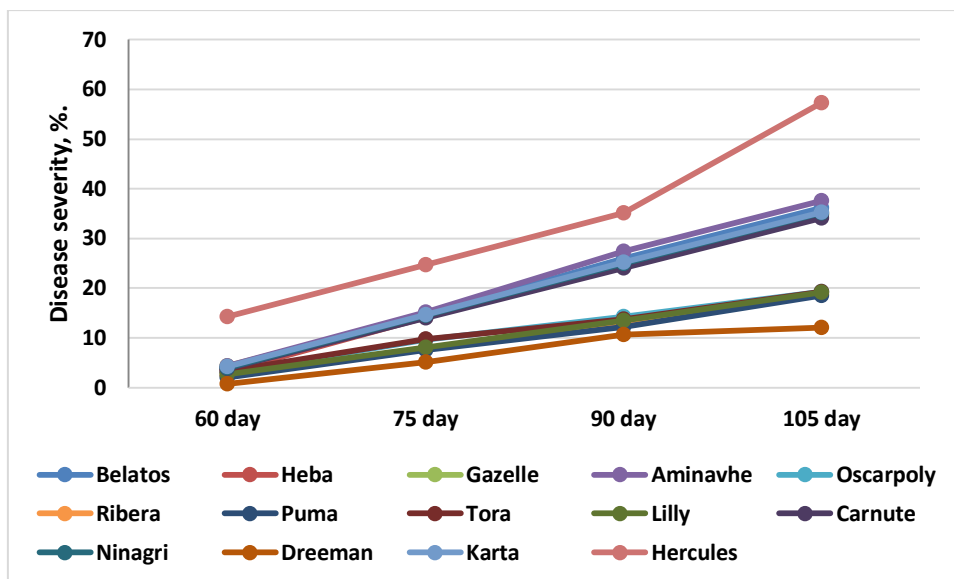


Fig. (1): Effect of artificial inoculation with *Erysiphe betae* on the disease severity (%) of fourteen sugar beet varieties under greenhouse conditions (60, 75, 90 and 105 days after artificial inoculation).

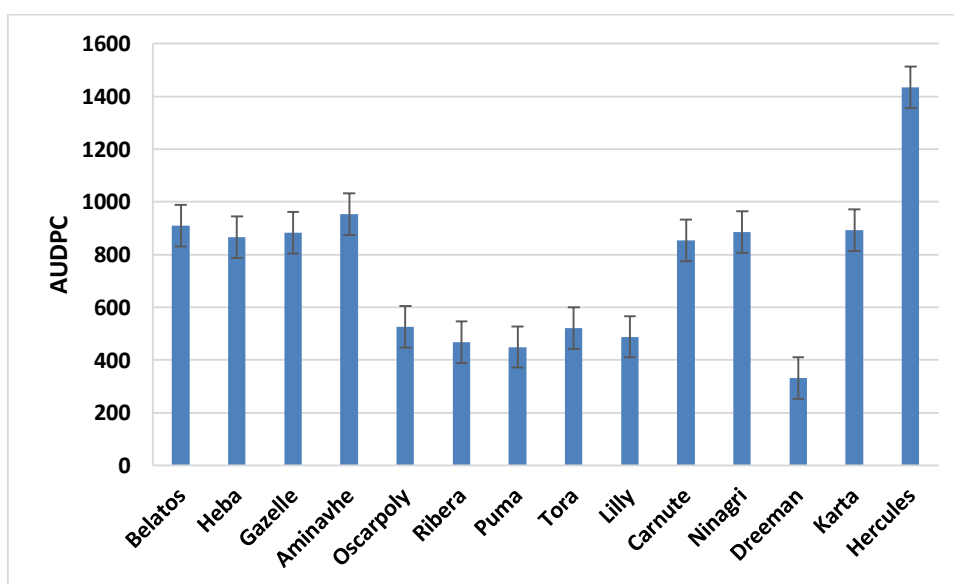


Fig. (2): Effect of artificial inoculation with *Erysiphe betae* area under disease progress curve (AUDPC) of fourteen sugar beet varieties under greenhouse conditions at different three periods (60, 75, 90 and 105 days post artificial inoculation).

3. Final disease severity (FDS%)

Data also showed in (Figs 2,3) indicated that, a significant powdery mildew epidemic was documented in Gemmeiza greenhouse. As a

result, the highly susceptible variety showed high levels of FDS such as Heracles while the lowest of FDS were Derrman, puma, Ribera, Lilly, Toro and Oscar poly.

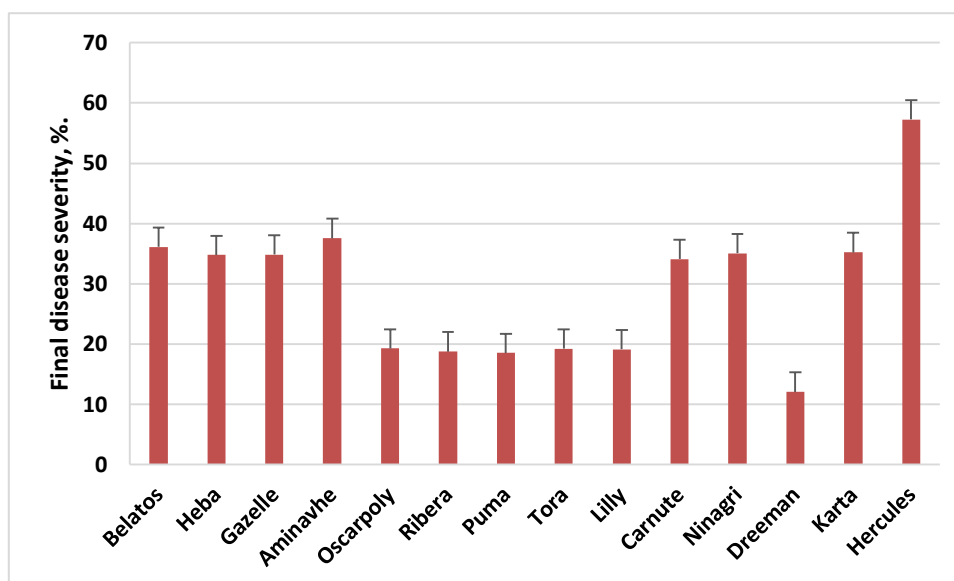


Fig. (3): Final disease severity (FDS%) of Powdery mildew recorded on fourteen varieties of suger beet, under greenhouse condition at Gemmeiza during 2021/2022 growing season.

4. Sugar beet yield and quality

Under greenhouse conditions, the root yield (Kg/ plant), total soluble solids (TSS %), sucrose (%), sucrose content (g/ plant) and purity (%) of sugar beet varieties were also evaluated under artificial inoculation with *E. betae*.

Results shown proved that the highest root yield was achieved by Carnute variety, while the lowest yield was observed in Hercules variety. Gazelle, Toro, Belatos, Aminaghe and Lilly varieties possessed moderate yield, Ribera and Puma had low yield K g/plot.

Among sugar beet varieties, Heba attained the maximum TSS, while Hercules variety had the lowest TSS. Additionally, the TSS in Gazelle, Aminavhe, Oscar poly, and Ribera varieties.

The highest sucrose concentration was observed in Heba variety, while Hercules variety possessed the lowest. The other sugar beet variety can be arranged from high to low sucrose concentration (%) as follows: Belatos, Aminavhe, Oscar poly, and then Gazelle.

According to sucrose purity, the tested sugar beet varieties can be categorized into three groups as follows: -

- 1) Varieties with high sucrose purity (Oscar poly, Heba, Lilly, Aminavhe and Ribera.
- 2) Varieties with moderate sucrose purity, which included Gazelle, Puma, Carnut, Ninagri, Belatos, Dreeman, Toro and Kara.
- 3) The third group included only one variety (Hercules), which attained the lowest sucrose purity.

These results were similar to (El-Sayed *et al*, 2014) who founded that, in the greenhouse showed that there were wide differences in the tested sugar beet varietal susceptibility to powdery mildew disease ranged from highly resistant to highly susceptible. The highest resistance varieties were Ymer, Puma, Meridia HM, Ernestina, Oscarpoly, Panther and Carola. While, the highest susceptible ones were Herkl, Top, Maghribel,

Mahara, Sultan and Raspoly. Resistant varieties gave the highest root weight as well as contained the highest percent of sucrose and total soluble solids (T.S.S).

El-Fahar and Abou El-Magd (2008). Indicated that, it was reported that beet powdery mildew infection decreased yield and yield quality.

Hamad, (2022). She indicated that, Among sugar beet varieties, Puma achieved the highest root yield, total soluble solids, sucrose concentration, sucrose content and sucrose purity. On the other hand, the lowest root yield, total soluble solids, sucrose concentration,

sucrose content and sucrose purity were recorded in Top variety. Results of (Ibrahim, *et al.*, 2016) they reported that, puma varieties was the heist root yield, sugar yield, total souluble solids% and sucrose%.

Table (2): Effect of artificial inoculation with *Erysiphe betae* on the root yield (Kg/ plot), Total soluble solid, Sucrose percentage and Purity of fourteen sugar beet varieties under greenhouse conditions.

Variety	Kg/plot*	Total Soluble Solid %	Sucrose %	Purity %
Belatos	9.33	18.83 ab	16.13 ab	85.67 bcde
Heba	8.91	19.66 a	17.46 a	88.79 abc
Gazelle	9.51	18 abc	15.61 bc	86.76 abcd
Aminavhe	9.27	18abc	15.71 bc	87.31 a
Oscarpoly	8.95	17.33 bcd	15.66 bc	90.46 abcd
Ribera	8.41	16.66 cde	14.51 cd	87.13 abcde
Puma	8.44	15 ef	12.96 efg	86.41 abcde
Toro	9.36	14.66 f	12.35 fg	84.23 def
Lilly	9.25	16.33 cdef	14.34 cde	88.01 abcd
Carnute	9.69	16 def	13.76 def	86.02 bcde
Ninagri	8.75	16.33 cdef	14 de	85.68 bcde
Dreeman	10.83	15 ef	12.83 fg	85.48 cde
Kara	9.27	15 ef	12.4 fg	82.82 ef
Hercules	5.33	15 ef	11.86 g	80.91 f
LSD at 0.05	0.05=Non	0.05=1.930	0.05=Non	0.05=4.114

* Area of Plot= 2.4 m²

5. Sugar beet: chlorophyll A,B , A+B and Carotenoids.

The concentration of chlorophyll (Chl) a , b, and carotene that was determined in sugar beet leaves after inoculation, exhibited different some sugar beet responses due to of artificial inoculation with *Erysiphe betae*.

Data present Showed that Chl. a all sugar beet varieties non significantly in thesis respect. Howe ever varieties Dreeman, Carnute and Ribera gave the highest concentration. On the other hand, varieties Hercules and Puma the lowest chlorophyll concentration. In the same manner, Chl b concentration was significantly increased due to sugar beet varieties. The heist concentration were recorded varieties Puma, Dreeman, Oscar poly and Ribera. While the les recorded concentration Chl. b bvarieties Hercules, Kara and Ninagri. Data also declared that, Chl. a +b all varieties non significantly.

Sugar beet varieties Dreeman, Carrmute, Oscar poly and Ribera were the highly concentration. While the lowest concentration of Chl. a +b were recorded varieties Hercules, Toro and Puma .

On the other hand, data also showed that, carotene concentration was significantly increased due to sugar beet varieties. The heist concentration were recorded varieties Dreeman, Ribera, Carnute and Oscar poly. In the same time, varieties Hercules and Ninagri were recorded the lowest in thesis respect.

Chlorophyll content was highly affected by powdery mildew infection decreased photosynthetic activity. The changes in chlorophyll concentration might be due to the effects of the pathogen influence. Decline in chlorophyll content dued to chloroplast structural modification by the fungus such as dilation of whole chloroplast, separation of grana accumulation of starch granules, which have a

direct bearing on the photosynthetic capacity of chloroplast (Raghavendra, *et al.*, 2007). (Hafez, *et al.*, 2018) also indicated that the reduction of photosynthetic pigment due to powdery mildew infection may be associated with inhibition of electron transport, alternation in the chloroplasts ultra structure and reduction of enzymes activity. Powdery mildew can inhibit the phoyosynthetic processes by lower supply of light energy due to covering of the leaf by mycelium and inhibition of CO₂ influx due to stomata closure.

Similar results were obtained with other crops and pathogens who used the same technique. El-Kafrawy and Sadoma (2009). Tested Pepper varieties in their response to

Leveillulataurica infection at Tokh and Sakha location. Gedeon F1 cv. was very susceptible (71.93), while Parma cv. was the least susceptible one (9.78%). The highest values of the area under disease progress (AUDPC) and rate of powdery mildew increase (r- value) were recorded with highly susceptible varieties Gedeon F1 followed by panta F1 while the lowest values in these respect were in the least susceptible Maro and Parma cv. Both chlorophyll a, b and carotene contents in healthy of the least susceptible Parma cv. Was higher than that of highly susceptible Gedeon F1 cv. *L taurica* infection decreased the content of chlorophyll and carotene in both varieties.

Table 3: Effect of some varieties on the concentration of chlorophyll A, B, A+B and caroteneoids in sugar beet leaves with *Erysiphe betae*.

Variety	Concentration of chlorophyll A,B,A+B and carotene (Mg/g fw)			
	Cholorophyll A	Cholorophyll B	Cholorophyll A+B	Carotenoids
Belatos	1.58	0.64 bc	2.22	0.46 de
Heba	1.42	0.76 abc	2.18	0.59 bcde
Gazelle	1.36	0.81 a	2.17	0.69 abc
Aminavhe	1.48	0.73 abc	2.22	0.65 abcd
Oscarpoly	1.34	0.85 a	2.44	0.71abc
Ribera	1.61	0.82 a	2.43	0.72 abc
Puma	1.2	0.88 a	2.09	0.62 bcde
Tora	1.36	0.78 ab	2.14	0.61 bcde
Lilly	1.45	0.83 a	2.28	0.51 cde
Carnute	1.78	0.76 abc	2.54	0.71 abc
Ninagri	1.53	0.62 bc	2.15	0.43 e
Dreeman	1.95	0.85 a	2.73	0.79 a
Kara	1.54	0.62 c	2.16	0.47 de
Hercules	1.18	0.39 d	1.57	0.09 f
LSD at 0.5	0.05= NON	0.05=0.162	0.05= NON	0.05=0.2

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تقييم بعض أصناف بنجر السكر للإصابة بمرض البياض الدقيقي المتسبب عن الفطر اريسيفى بيتا

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الملخص العربي

فى هذه الدراسة تم تقييم بعض أصناف بنجر السكر للإصابة بمرض البياض الدقيقي المتسبب عن الفطر اريسيفى بيتا تحت ظروف العدوى الصناعية بالصوبة بمحطة البحوث الزراعية بالجميزة موسم ٢٠٢١/٢٠٢٢ م . اربعة عشر صنفا وهى (بلتوز- هبة - جازيل - إمنفتاح - اوسكاربولى - ربييرا - بوما - ليلى -كارنت - نيجيرا - ديرمن - كارا -هيركليز). تم تقدير شدة الإصابة (D.S) بالمرض ٤ مرات بعد ١٤ يوماً من العدوى الصناعية بالإضافة الى تقدير المساحة الواقعة تحت منحنى تقدم المرض (AUDPC) وبتقدير شدة الإصابة بعد ١٠٥ يوم من الزراعة قسمت الاصناف الى (مقاوم - متوسط - حساسة) فكانت الاصناف المقاومة (ديرمان - بوما - ربييرا - ليلى - تورو - واسكاربولى) والاصناف متوسطة المقاومة (كارنت - هبة - جزيل - نيجيرا - كارا - بلتوز - إمنفتاح) اما الصنف هيركليز فكان هو أكثر الأصناف المختبرة حساسية للمرض . وبتقدير المساحة الواقعة تحت منحنى تقدم المرض (AUDPC) للأصناف المختبرة تم تقسيمها الى اربعة مجاميع أصناف مقاومة (ديرمان - بوما - ربييرا) أصناف متوسطة المقاومة (ليلى - تورو - اوسكاربولى) أصناف متوسطة القابلية للإصابة (كارنت - هبة - جازيل - نيجيرا - بلتوز - إمنفتاح) اما الصنف هيركليز فكان هو أكثر الأصناف المختبرة حساسية للمرض. وبتقدير الشدة النهائية للإصابة (FDS) كان الصنف (هيركليز) أعلى شدة اصابة بالمرض بينما كانت الاصناف (ديرمان - بوما - ربييرا - ليلى - تورو - اوسكاربولى) الاقل فى شدة الاصابة . وبتقدير محصول الجذور للقطعة التجريبية كان الصنف كارنت الاعلى (١٠.٨٤/كجم) للقطعة التجريبية بينما كان الصنف هيركليز الاقل . وبتقدير المواد الذائبة الكلية كان الصنف هبة اعلى قيمة (١٩.٦٢%) بينما الصنف هيركليز الاقل وبتقدير درجة نقاوة العصير كان الصنف اوسكاربولى اعلى فى درجة النقاوة (٩٠.٤٦%) والاقل فى درجة النقاوة هو الصنف هيركليز (٨٠.٩١) . وبتقدير النسبة المئوية للسكروز% كان الصنف هبة اعلى الاصناف بينما كان الصنف هيركليز الاقل فى هذا المقام . تم تقدير محتوى الاوراق من الكلوروفيل aوالكلوروفيلbو الكلوروفيل (a+b) بالنسبة للكلوروفيل a لاتوجد فروق معنوية بين الاصناف المختبرة بينما فى حالة الكلوروفيل b كاتن هناك فروق معنوية حيث اعطت الاصناف بوما و درمان واوسكاربولى وربيرا اعلى قيمة بينما كانت الاصناف هركليز وكار ونيجيرا الاقل نسبة . اما بالنسبة للكلوروفيل (a+b) لاتوجد فروق معنوية بين الاصناف ولكن كان الصنف هيركليز الاقل نسبة . وبتقدير الكاروتينات كانت هناك فروق معنوية بين الاصناف المختبرة حيث كانت اعلى قيمة للأصناف ديرمان وربيرا كارنت واسكاربولى .