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Comparative Efficacy of Triazole, Benzimidazole, Antibiotic, and Copper-Based Fungicide Against Cercospora Leaf Spot, *Cercospora beticola* Infecting Sugar Beet in Egypt

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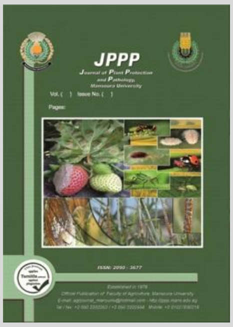

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ABSTRACT

Two field trials were conducted at Hatthout Farm, Kafr El-Sheikh, during the 2023 and 2024 growing seasons to evaluate the effectiveness of four fungicides: Montoro®, Qomizo®, Kasumin® and Crunch®, against Cercospora leaf spot in sugar beet under Egyptian conditions. The trials used a randomized complete block design (RCBD) with four replications, and fungicides applied once at the early stage of infection (~2 % leaf area). Disease severity was monitored by counting lesions on leaves before and after treatment at intervals of 3, 7, and 10 days. Results indicated that all fungicide treatments significantly reduced lesions development compared to untreated plots. Montoro® and Kasumin® were particularly effective after 10 days, achieving lesion reductions of over 99 % in 2023. In 2024, Kasumin® and Qomizo® showed similarly high efficacy. Crunch® also performed well, reducing disease by over 98 %. The suppression of CLS resulted in notable improvements in crop growth and sugar quality, with Montoro® leading to increases in root weight, leaf number, and leaf area index by over 50-60 %. It also boosted total soluble solids and sucrose percentage, though not significant. All treatments increased sugar quality metrics, with Montoro®, Qomizo®, and Kasumin® significantly enhancing recoverable sugar and yield components, such as root and sugar yields, by around 50-80 %. Crunch® was less effective across most parameters. The findings indicate that rotating multiple fungicides with different modes of action within an IPM approach is essential for controlling CLS, delaying resistance, and preserving sugar beet yields in Egypt.

Keywords: *Cercospora beticola*, sugar beet, fungicides, integrated pest management (IPM), and Cercospora leaf spot.

INTRODUCTION

Sugar beet (*Beta vulgaris* L.) is a key industrial crop cultivated worldwide as one of the primary sources of sugar, second only to sugarcane. In the 2010-11 periods, sugar beet accounted for nearly 60 % of global sugar production (Sugar Beet Production Guide, 2013). In Egypt, sugar beet cultivation has expanded rapidly as a strategic response to water scarcity, the need to reduce sugar imports, and efforts to diversify agricultural production (El-Sayed *et al*., 2017). The Nile Delta, particularly Kafr El-Sheikh Governorate, is a key production area due to its fertile soils and favourable climate (Fergani *et al*., 2023). However, sugar beet production in this region faces a serious challenge from Cercospora leaf spot (CLS), a destructive fungal disease caused by *Cercospora beticola* (Tan *et al*., 2023). *Cercospora* leaf spot (CLS), caused by the fungal pathogen *C. beticola*, is the most devastating foliar disease affecting sugar beet production (Rangel *et al*., 2020). In the Egyptian Delta, CLS disease causes major declines in sugar beet output, significantly diminishing leaf growth, root development, and sugar content(Gouda *et al.,* 2022), leading to reduced sucrose extraction, higher impurity accumulation, and processing inefficiencies, ultimately lowering profitability (Farahat, 2018). Crop loss attributable to Cercospora leaf spot is manifested as a high reduction 42 % in gross sugar, 32 % reduction in root weight and increased loss of sugar to molasses due to impurities (Smith and Martin, 1978), which include sodium, potassium, nitrate, amino acids, and betaine (Carruthers and Oldfield, 1961). Chemical fungicides remain the primary tool for CLS management (Finkner *et al*., 1966 and Vereijssen *et al*., 2007). The emergence of fungicide resistance in *C. beticola*, particularly to triazoles, benzimidazoles, and multi-site protectants, poses a significant challenge (Khan, 2009, 2018 and Tedford *et al*., 2024). Despite widespread fungicide use in Egypt, there is a lack of locally validated field efficacy data, leaving farmers and agronomists uncertain about optimal treatment choices. Therefore, this study aims to evaluate the field performance of four fungicides from distinct (FRAC, 2024) against CLS in sugar beet under Kafr El-Sheikh conditions, using lesion-count metrics. This research seeks to inform effective fungicide selection, reduce misuse, and promote sustainable sugar beet production in Egypt by supporting integrated pest management and sustainable pesticide use. The findings of this study are expected to provide crucial information for developing evidence-based recommendations for CLS management in sugar beet, ultimately benefiting Egyptian farmers and the national sugar industry.

MATERIALS AND METHODS

Two field experiments were conducted during the 2023 and 2024 sugar beet growing seasons at Hatthout Farm, Shino Village, Kafr El-Sheikh Governorate, Egypt, to evaluate the efficacy of four fungicides against Cercospora

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leaf spot (*C. beticola*) and the expected return on sugar beet crop and quality. The experimental design was a randomized complete block design (CRBD) arrangement with four replicates in both seasons utilizing the Cercospora leaf spot sugar beet polygerm susceptible cv. Oscarpoly. Plants were hand-thinned on 20 September 2023, and 25 September 2024. The total experimental area measured 168 m², each treatment replicated in plots measuring 42 m² for each one, and the distance between hills was 20 cm. The buffer zones consisting of two untreated rows were maintained between treated and untreated plots to prevent treatment interference. Agricultural practices including furrow irrigation were applied as recommended by The Egyptian Ministry of Agriculture.

Fungicides foliar application

Fungicides application was initiated upon the appearance of CLS symptoms (affecting ~2 % of leaf area). Treatments were administered once per season (December 2023 and 2024) using a motorized 20-liter backpack sprayer, ensuring uniform coverage. All plots were treated using standard application rates, adhering to Agricultural Pesticide Committee guidelines. The fungicides used in this experiment are shown in Table (1).

Table 1. Qualifications of fungicides used.

Trade Name	Active ingredient	Formulation	Function group	Dose / 100 L	Company
Montoro®	Difenoconazole + Propiconazole	30 % EC	Triazole	50 cm³	Star Chem. Co.
Qomizo®	Thiophanate-methyl	70 % WP	Benzimidazole	100 g	Kanza Group Co.
Kasumin®	Kasugamycin	2 % SL	Antibiotic	250 cm³	Cairo Chemical Co.
Crunch®	Copper Sulfate	25.63 % SP	Copper-based fungicide	75 g	Delta Chemicals Co.

Disease assessment

Disease severity was evaluated by counting lesions on leaves from 10 randomly selected plants per plot prior to treatment application. At the time of application, 40 plants per treatment were randomly tagged for ongoing monitoring. Assessments were conducted at four intervals: pre-application (baseline), 1st, 7th, and 10th day post-application. During each evaluation, the number of lesions per leaf was recorded across all treatments, including for untreated controls.

The effectiveness of each treatment was quantified as the percentage reduction in lesion count relative to the untreated control, calculated using the Henderson-Tilton formula (Henderson and Tilton, 1955).

$$\textbf{Reduction \%} = \left\{1 - \frac{\text{Lesions in Control (before)} \times \text{Lesions in Treated(after)}}{\text{Lesions in control (after)} \times \text{Lesions in treated (before)}}\right\} \times 100$$

*** Lesions in treated = Treated plots**

*** Lesions in control = Untreated plots**

Plant parameters and yield assessment

Five sugar beet plants were randomly selected from two rows of each plot after 220 days from sowing during the two seasons. The selected plants transferred to the laboratory to weighted separately and evaluated as follows:

Growth characters: i.e., root weight (g/plant), leaf weight (g/plant), number of leaves (No./plant), and leaf area index (g/cm²).

Sugar quality characteristics, i.e., Sucrose (Pol. %) and quality (QZ %), were determined by the Sugar Company laboratory, and total soluble solids (TSS %) was determined by hand refractometer (McGinnis, 1982).

Sugar yield characters: Two guarded rows of each plot harvested, topped, cleaned, and weighted and converted to tons to estimate root yield (ton/feddan). Recoverable sugar (ZB %) was calculated according to Reinefeld *et al.* (1974). Recoverable sugar % = pol. % - [0.343 (Na % + K %) + 0.094 × α-amino-N % + 0.29], Recoverable sugar yield (ton/feddan) = Root yield (ton/feddan) × Recoverable sugar %; Gross sugar yield (ton/feddan) = Root yield (ton/feddan) × Gross sugar (Pol %).

Statistical analysis

Lesion count data were analyzed using one-way ANOVA to detect significant differences between treatments. Analyses were conducted in SPSS (Version 2004), with statistical significance set at $P \leq 0.05$.

RESULTS AND DISCUSSIONS

Results

Lesion count reduction of CLS:

Season 2023

This field trial was conducted during the growing season of 2023 and revealed significant differences in the efficacy of the tested fungicides against *C. beticola*, as measured by lesion count reduction over time (Table 2).

Table 2. Efficacy of the tested fungicides in reducing spot lesion (%) caused by *Cercospora beticola* on sugar beet leaves during the growing season 2023.

Fungicide	Before treatment (Mean ± SE)	1st Day (Mean ± SE)	7th day (Mean ± SE)	10th day (Mean ± SE)	Total reduction
Montoro®	5.75±1.25*	6.5±0.64^{ab} (65.93%)	6.75±0.48^{b} (77.74%)	7.25±0.63^{b} (88.35%)	99.12%
Qomizo®	5.5±0.64	6.75±0.63^{ab} (63.01%)	7.25±0.63^{b} (75%)	7.5±0.65^{b} (87.40%)	98.83%
Kasumin®	5.25±0.47	6±0.41^{a} (65.53%)	6.5±0.65^{ab} (76.51%)	6.75±0.75^{b} (88.12%)	99.04%
Crunch®	5.5±0.5	6.75±0.48^{c} (63.02%)	7.5±0.65^{c} (74.13%)	7.75±0.63^{a} (86.98%)	98.75%

*** Means in the same column followed by the same letter(s) are not significant at P≥0.05**

All fungicidal treatments demonstrated progressive reductions in DS from day 1 to day 10 post-application, compared to the untreated check which showed continuous lesion expansion, reaching a mean of 59.5 lesions per leaf at the 10th day post-treatment. The spraying of Montoro® (triazoles combination) achieved the highest suppression, with lesion counts decreasing by mean of 7.25 lesions per leaf, corresponding to a total reduction of 99.12 % relative to the untreated plots. Kasumin®, an antibiotic fungicide, performed nearly equally well, reaching 88.12 % reduction at the 10th day and a total reduction of 99.04 %. Both of Qomizo® as a benzimidazole fungicide, and Crunch®, as a copper-based fungicide showed slightly lower efficacy with final lesion means by 7.5 and 7.75, with total reductions of 98.83 % and 98.75 %, respectively. Despite their high performance, the rate of disease suppression was marginally slower compared to the Montoro® and Kasumin® treatments. The untreated check experienced a rapid and uncontrolled increase in lesion counts over time, underscoring the aggressive nature of the disease under untreated conditions.

Season 2024

The data cleared in Table 3 exhibited similar trends in fungicidal performance, with all treatments reducing *C. beticola,* lesion counts relative to the untreated control through the 2024 growing season. Kasumin®had the first grade treatment, achieving a total lesion reduction of 99.04 % followed closely by Qomizo®, which reached 98.64 % total reduction. Interestingly, Kasumin® exhibited a slightly faster disease severity suppression during the early assessment period, with lesion counts increasing minimally from 6.25 (pre-treatment) to 6.0 at the 1st day post-treatment, suggesting early onset activity. At the 10th day, lesion counts had risen modestly to 9.5 per leaf. Qomizo® showed consistent efficacy across both seasons, with a total reduction of 98.64 %, while Crunch® showed a slightly reduced performance in 2024 compared to 2023, with a total reduction of 98.15 % and a lesion count of 11.75 lesions per leaf at the 10th day. In contrast, the untreated control recorded lesion counts reach to 69 lesions per leaf at the 10th day, confirming the aggressive progression of Cercospora leaf spot under natural field conditions.

Table 3. Reduction percentages of spot lesion count of *Cercospora beticola* by the tested fungicides on sugar beet plants during the growing season 2024.

Fungicide	Before treatment(Mean ± SE)	1st Day	7th day	10th day	Total reduction
Montoro®	5±0.41*	6±0.41ab (57.65%)	7±0.41b (73.33%)	9±0.41b (84.35%)	98.23%
Qomizo®	6.25±0.85	7±1.08ab (60.47%)	7.75±1.32b (76.38%)	10.5±0.87b (85.38%)	98.64%
Kasumin®	6.25±0.25	6±0a (66.12%)	6.75±0.25b (78.57%)	9.5±0.29b (86.78%)	99.04%
Crunch®	6.25±0.25	7.5±0.29b (57.65%)	8.75± 0.25b (73.33%)	11.75±0.48b (83.64%)	98.15%

*** Means in the same column followed by the same letter(s) are not significant at P≥0.05**

Sugar beet yield and quality components after CLS disease management

Sugar beet growth characters recorded in Table 4 showed that root weight/plant, leaves weight/plant, number of leaves/plant, and leaf area index in all the fungicide-treated plots were higher than the check plots using the data of the combining both seasons of the study. Spraying Montoro® increased root weight/plant, number of leaves/plant, and leaf area index more than the other treatments, with 1809.30, 42.00, and 7.00 with increasing 53.37 %, 32.49 %, and 62.79 % followed by Kasumin® being 1725.00, 37.00 and 7.00, respectively. In contrast, spraying Crunch® and Kasumin® increased leaves weight/plant higher than other treatments by 717.00 g/plant and 712.00 g/plant with increasing 58.52 % and 57.42 %, respectively with significant differences between them and Qomizo® and untreated treatments.

Table 4. Effect of the tested fungicides against CLS on sugar beet growth characters using the data of the combining both growing seasons 2023 and 2024.

Fungicide	Root weight (g/plant)	Increase %	Leaves weight (g/plant)	Increase %	No. of leaves (No./plant)	Increase %	Leaf area index (g/cm^2)	Increase %
Montoro®	1809.30	53.37	611.30	35.15	42.00	32.49	7.00	62.79
Qomizo®	1303.00	10.45	478.70	5.84	37.00	16.72	5.30	23.26
Kasumin®	1725.00	46.22	712.00	57.42	37.00	16.72	7.00	62.79
Crunch®	1218.30	3.27	717.00	58.52	35.00	10.41	5.00	16.28
Untreated	1179.70	---	452.30	---	31.70	---	4.30	---
$LSD_{0.05}$	112.30		133.70		3.40		1.00	

Data presented in Table 5 showed significant improvement in the percentages of TSS, sucrose and QZ with treated plants compared with the check plots. Spraying Montoro® increased significantly the total soluble solids (TSS %) compared to Kasumin®, Qomizo® and Crunch®with averages of 21.33, 20.67, 20.33 and 20.00 %, respectively. Spraying Montoro®, Qomizo®, and Kasumin® increased sucrose % with 17.53 %, 17.52 %, and 17.12 % by increasing 13.02 %, 12.96 %, and 10.38 %, respectively, without significance between them, but comparing them with Crunch® and Untreated treatments showed significant differences. Ultimately, all treatments improved quality (QZ %) more than the check plots, with 86.81 %, 86.53 %, 85.87 %, and 85.57 %, by increasing 6.09 %, 5.74 %, 4.94 %, and 4.57 % without significant differences between them but the significant differences appeared compared with the untreated treatment except the treatment of Qomizo®.

Table 5. Effect of the tested fungicides against CLS on the quality parameters of the sugar beet using the combining data of both growing seasons 2023 and 2024.

Fungicide	TSS %	Increase %	Pol. (Sucrose %)	Increase %	Quality(QZ %)	Increase %
Montoro®	21.33	6.65	17.53	13.02	86.81	6.09
Qomizo®	20.33	1.65	17.52	12.96	85.57	4.57
Kasumin®	20.67	3.35	17.12	10.38	85.87	4.94
Crunch®	20.00	0.00	15.74	1.48	86.53	5.74
Untreated	20.00	---	15.51	---	81.83	---
$LSD_{0.05}$	0.51		1.14		3.80	

Data presented in Table 6 showed that all tested fungicides increased sugar beet yield characters compared to the check plots. Spraying the tested fungicides increased significantly root yield (ton/feddan) compared to untreated treatment except in case of the Crunch® treatment with averages of 48.85, 41.40 and 39.09 for Montoro®, Kasumin®and Qomizo®, respectively. Also, the same trend cleared with the gross sugar yield (ton/feddan) with averages of 8.56, 7.09 and 6.85 for Montoro®, Kasumin®and Qomizo®, respectively. Spraying Montoro®, Qomizo®, and Kasumin® increased significantly the recoverable sugar (ZB %) compared to untreated treatment with averages of 14.70 %, 14.99 %, and 15.23 %, increasing 12.73 %, 14.95 %, and 16.79 %, respectively. Spraying the same previous fungicides had the highest significant recoverable sugar yield compared to untreated treatment with 7.18 %, 5.86 %, and 6.3 %, by increasing 83.07 %, 49.39 %, and 60.75 %, respectively. Generally, Crunch® had the least increase with most of the studied sugar beet yield characters.

Table 6. Effect of the tested fungicides against CLS on sugar beet yield characters during the combining growing seasons 2023 and 2024.

Fungicide	Root yield (ton/feddan)	Increase %	Gross sugar yield (ton/feddan)	Increase %	`Recoverable sugar (ZB %)	Increase %	Recoverable sugar yield (ton /feddan)	Increase %
Montoro®	48.85	62.40	8.56	83.55	14.70	12.73	7.18	83.07
Qomizo®	39.09	29.95	6.85	46.79	14.99	14.95	5.86	49.39
Kasumin®	41.40	37.63	7.09	51.92	15.23	16.79	6.31	60.75
Crunch®	31.07	3.29	4.89	4.82	13.62	4.45	4.23	7.89
Untreated	30.08	---	4.67	---	13.04	---	3.92	---
$LSD_{0.05}$	8.14		2.05		1.12		1.30	

Discussion

The current field study, conducted over two successive growing seasons, 2023 and 2024, provides critical insights into the comparative efficacy of four fungicidal treatments against *C. beticola*, the causal agent of Cercospora leaf spot (CLS) in sugar beet, to evaluate their effect on disease severity and yield components under Egyptian field conditions. The obtained data from this study showed that the tested fungicides reduced disease severity clearly, and all tested fungicides significantly increased root weight and sugar content. Among the tested fungicides, Montoro® consistently demonstrated the highest efficacy, achieving over 98 % reduction in lesion count at the 10th day post-application in both seasons. This result consistent with prior studies, which reported that triazoles, which inhibit C14-demethylase in the ergosterol biosynthesis pathway (FRAC Group 3), provide strong systemic and protective activity against CLS when applied early and at optimal rates (Tedford *et al*., 2024). Kasumin®, an aminoglycoside antibiotic (FRAC Group 24), also achieved excellent performance, achieving 99.04 % disease reduction in 2024 and maintaining strong efficacy across both seasons. In this respect, Tanaka *et al*., (1966) mentioned that Kasumin® inhibits bacterial poly-peptide synthesis through the binding of aminoacyl-tRNA to the messenger-ribosome complex, resulting to inhibition of poly- peptide synthesis. Although primarily labelled for bacterial pathogens, recent studies confirm its antifungal activity against CLS and its potential role in fungicide rotation programs (Horita and Tsuchiya, 2020). There is a moderate performance of copper-based fungicide (Crunch®) and benzimidazole (Qomizo®) fungicides (FRAC Group 1). Qomizo® performed well, although slightly less effectively than Montoro® and Kasumin®. The mode of action of Qomizo® operates by inhibiting fungal cell division. As a systemic fungicide, it works by penetrating plant tissues, translocating within, and inhibiting fungal mitosis by preventing spindle formation during cell division. This mechanism effectively hinders the growth and reproduction of pathogens on the treated crops, offering both protective and therapeutic benefits. Crunch®, a multi-site contact fungicide (FRAC Group M1), demonstrated the lowest efficacy among the treatments but still maintained total lesion reductions above 98 %. Copper formulations might be best characterized as multi-site inhibitors. They are non-systemic, preventive fungicides that form a protectant barrier on the plant surface, inhibiting pathogen development before penetration into the tissue (Gisi and Sierotzki, 2008). The consistent results across two seasons reinforce the reliability and practical applicability of these recommendations for growers in the Nile Delta region, especially under rising humidity and temperature trends that favour disease development. The future prospect strategies must incorporate routine field monitoring and resistance screening, adoption of Integrated Pest Management (IPM) principles, and educational programs for farmers focusing on fungicide rotation and dosage compliance. These actions will contribute to prolonging fungicide lifespan, improving sugar beet productivity, and safeguarding Egypt's sugar industry against evolving disease threats. Cercospora leaf spot (CLS) is a pervasive disease affecting sugar beet cultivation worldwide, with documented gross sugar yield losses reaching up to 42 % (Shane and Teng, 1992). CLS compromises yields by forcing plants to expend energy on replacing damaged leaves rather than storing sugar in roots (Vereijssen *et al*., 2003; Steinkamp *et al*., 1979). The combined effects of reduced root mass (twice as impactful as sucrose loss), elevate melassigenic impurities (Na, K, α-amino N, betaine), and poor juice quality lead to significant yield and processing penalties (Smith and Martin 1978; Rossi *et al*., 2000). Yield losses occur through immediate reduction in photosynthetic surface area and under severe infection, a dual effect of diminished late-season carbon fixation coupled with resource diversion to foliar re-growth at the expense of root sucrose storage (Rossi *et al*., 2000). Montoro® fungicide emerged as the most effective treatment for CLS control, followed by Kasumin®, resulting in significantly improved yield components (root weight, leaf biomass, and canopy parameters) compared to untreated plants by maintaining photosynthetic capacity and preventing resource diversion to compensatory leaf growth. The main documented cause of yield reduction following CLS disease is plant leaf injury, which provides a small assimilation area required for photosynthesis (Varga *et al*., 2021). The suppression of

Cercospora leaf spot (CLS) through fungicide application significantly enhanced the potential sugar yield (recoverable sugar %) of sugar beet crops. This improvement resulted from concurrent increases in both root biomass and sucrose content percentage. Our findings demonstrate that effective CLS management directly translates to superior yield performance compared to untreated controls. These results align with previous studies by Percich *et al*., (1987) and Khan and Smith (2005), who similarly observed that fungicide-mediated CLS control led to enhanced yield components (root weight and size), increased sucrose accumulation (1.2 - 1.8 % higher recoverable sugar) and improved overall crop productivity. The consistency between these studies underscores the critical importance of timely CLS management in maximizing both the quantitative and qualitative (sugar content) aspects of sugar beet production. Rotation of fungicides with different FRAC codes is essential to reduce resistance risk and ensure long-term control of *C. beticola* in sugar beet fields.

CONCLUSION

The obtained results indicate that Montoro® and Kasumin® are the most effective fungicides for controlling CLS, offering rapid and sustained suppression of lesion development. Qomizo® and Crunch® also offer high efficacy, though their performance is slightly slower or variable. The decrease in disease severity attributed to fungicide efficacy caused a significant increase in yield components and sugar content. These findings support the strategic use of multiple fungicide classes within an Integrated Pest Management (IPM) framework to mitigate resistance development and sustain crop health. Based on these results, the use of Montoro® and Kasumin® may be ecommended in CLS management programs.

Future prospect

Future research could focus on evaluating the long-term sustainability of these fungicide programs, including monitoring for the emergence of fungicide resistance in *C. biticola* populations under continuous application. Further studies are also warranted to investigate the optimal timing and number of fungicide applications under varying environmental conditions and disease pressure levels to refine current management recommendations and enhance economic viability for growers.

Ethics approval and consent to participate

The authors don't conduct any human or animal experiments for this publication.

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Declaration of Competing Interest

The authors have no known financial interests or personal ties that might have influenced the work presented in this publication.

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مقارنة فعالية مبيدات الفطريات من فئة تريازول، بنزيميدازول والمضاد الحيوي ومبيد من أصل نحاسي ضد التبقع السيركسبوري، سيركوسبورا بيتيكولا الذي يصيب بنجر السكر في مصر

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الملخص

أجريت تجربتان حقليتان في مزرعة حتحوت، كفر الشيخ، خلال موسمي زراعة ٢٠٢٣ و٢٠٢٤، لتقييم فعالية أربعة مبيدات فطرية: مونتورو®، و كوميزو®، و كازومين® وكرانش®، ضد مرض تبقع الأوراق السركسبوري في بنجر السكر تحت الظروف المصرية. أستخدم في التجربتين تصميم القطاعات العشوائية الكاملة (RCBD) مع أربعة مكرارات، حيث تم تطبيق المبيدات مرة واحدة في المرحلة المبكرة من الإصابة (حوالي ٢ % من مساحة الأوراق). تمت مراقبة شدة المرض عن طريق عد الإصابات على الأوراق قبل العلاج وبعده بفواصل زمنية من ٣ و٧ و١٠ أيام. أشارت النتائج إلى أن جميع المعاملات بإستخدام المبيدات تقلل بشكل ملحوظ من تطور الإصابه مقارنة بالنباتات غير المعاملة. كانت مبيدات مونتورو® وكازومين® أكثر فاعلية بعد ١٠ أيام، حيث حققت تقليلًا في الإصابه بنسبة تزيد على ٩٩٪ في عام ٢٠٢٣. في عام ٢٠٢٤، أظهر المبيدان كازومين® وكوميزو® كفاءة عالية مماثلة. كما أدّى إستخدام مبيد كرانش® إلى تقليل المرض بنسبة تزيد عن ٩٨٪. أسفرت معاملة مونتورو® لتقليل تطور الإصابه المرضيه وبالتالى تحسن ملحوظ في نمو المحصول وجودة السكر وزيادة وزن الجذر، وعدد الأوراق، ومؤشر مساحة الأوراق بنسبة تتجاوز ٥٠-٦٠ %. كما رفع نسبة المواد الذائبة الكلية والسكروز، وإن كان بدرجه غير معنويه. زادت جميع المعاملات من جودة السكر، خاصة مع مونتورو®، وكوميزو®، وكازومين®، التي حسّنت بشكل كبير من السكر القابل للاستخراج ومكونات المحصول، مثل محصول الجذور والسكر، بنسبة تتراوح بين ٥٠-٨٠ %. وكان مبيد كرانش® أقل فاعلية من باقى المعاملات المعاملات .تشير النتائج إلى أن التناوب بين عدة مبيدات فطرية ذات طريقة تأثير مختلفة، ضمن نهج إدارة الآفات المتكاملة (IPM)، ضروري للتحكم في مرض تبقع الأوراق السركسبوري، وتأخير تطور مقاومة الفطر للمبيدات، والحفاظ على إنتاجية بنجر السكر في مصر.