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Effect of Nicosulfuron as Follow-Up Herbicide after Paraquat in Sweet Corn No-Tillage System

Pengaruh Penggunaan Herbisida Nicosulfuron sebagai Herbisida Susulan setelah Paraquat pada Budidaya Jagung Manis dengan Sistem Tanpa Olah Tanah (TOT)

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ABSTRAK
Jagung manis merupakan tanaman serealia bernilai ekonomi tinggi yang produktivitasnya sering dibatasi oleh infestasi gulma, terutama pada sistem tanpa olah tanah (TOT). Penelitian ini bertujuan untuk mengevaluasi efektivitas nicosulfuron sebagai herbisida susulan setelah aplikasi paraquat dalam pengendalian gulma pada budidaya jagung manis. Percobaan dilaksanakan di SPLPP Ciparay, Universitas Padjadjaran, pada bulan September hingga Desember 2021 menggunakan rancangan acak kelompok faktorial dengan dua faktor dan dua ulangan. Faktor pertama adalah dosis paraquat, yaitu 0; 0,297; 0,594; dan 0,891 kg ha^{-1}, sedangkan faktor kedua adalah dosis nicosulfuron, yaitu 0; 0,080; 0,160; dan 0,320 kg ha^{-1}. Parameter pengamatan meliputi fitotoksisitas, bobot kering gulma, pertumbuhan tanaman, dan hasil panen. Hasil penelitian menunjukkan bahwa paraquat pada dosis 0,891 kg ha^{-1} efektif menekan biomassa gulma total, sedangkan nicosulfuron pada dosis 0,160–0,320 kg ha^{-1} mampu mengendalikan gulma dominan, khususnya *Paspalum conjugatum* dan *Ageratum conyzoides*. Kombinasi paraquat 0,891 kg ha^{-1} dan nicosulfuron 0,320 kg ha^{-1} menghasilkan bobot kering gulma terendah dan hasil jagung manis tertinggi, yang menunjukkan bahwa aplikasi herbisida secara berurutan efektif diterapkan pada sistem tanpa olah tanah.

Kata Kunci:
Aplikasi herbisida berurutan;
Gulma dominan;
Hasil tanaman*;*
Pengendalian gulma*;*
Pertanian konservasi

ABSTRACT
Sweet corn is a high-value cereal crop whose productivity is often limited by weed infestation, especially under no-tillage (NT) systems. This study aimed to evaluate the effectiveness of Nicosulfuron as a follow-up herbicide after Paraquat application for weed control in sweet corn cultivation. The experiment was conducted at SPLPP Ciparay, Universitas Padjadjaran, from September to December 2021 using a factorial randomized block design with two factors and two replications. Paraquat was applied at doses of 0; 0.297; 0.594; and 0.891 kg ha^{-1}, followed by Nicosulfuron at 0; 0.080; 0.160; and 0.320 kg ha^{-1}. Observations included phytotoxicity, weed dry weight, crop growth, and yield. The results showed that Paraquat at 0.891 kg ha^{-1} effectively suppressed total weed biomass, while Nicosulfuron at 0.160–0.320 kg ha^{-1} controlled dominant weeds, particularly Paspalum conjugatum and Ageratum conyzoides. The combination of Paraquat 0.891 kg ha^{-1} and Nicosulfuron 0.320 kg ha^{-1} produced the lowest weed dry weight and highest sweet corn yield, indicating that sequential herbicide application is effective under NT systems.

Keywords:
Conservation agriculture;
Crop yield;
Dominant weeds;
Sequential herbicide application;
Weed suppression

INTRODUCTION

Sweet corn (*Zea mays* saccharata Sturt.) is one of the economically important cereal crops and contributes significantly to Indonesia's food security. Besides being consumed as fresh produce, sweet corn is also widely used as a raw material for various processed products such as animal feed, corn flour, syrup, and snack foods, which has led to a steadily increasing demand. According to the Indonesian Central Bureau of Statistics BPS (2021), maize serves as an important food and feed commodity in Indonesia; however, its productivity remains highly variable due to differences in cultivation practices, environmental conditions, and input efficiency. Consequently, improving crop management strategies and production efficiency is essential to enhance maize yields and strengthen national production capacity in order to meet the growing domestic demand (Syafrizal et al., 2024). This situation presents a major challenge for national food security, particularly as demand continues to rise from the food, feed, and agro-processing industries, thereby emphasizing the need for more effective and sustainable crop management practices.

Weed infestation is one of the main factors limiting sweet corn productivity, as weeds compete with crops for essential resources such as water, light, nutrients, and growing space. In addition, weeds may act as alternative hosts for pests and plant diseases, potentially causing yield losses of up to 75% or even complete crop failure in dryland conditions (Ngawit & Fauzi, 2021). These impacts not only reduce yield quantity but also lower crop quality, resulting in substantial economic losses. Consequently, effective weed management is a critical component of sweet corn cultivation. Various weed control methods have been developed, including preventive, mechanical, cultural, biological, integrated, and chemical approaches using herbicides (Ambarwati et al., 2020). Among these, chemical control is often preferred by farmers due to its efficiency on large-scale fields and reduced labor requirements (Wahyudin et al., 2016).

In no-tillage (NT) systems, herbicide application becomes even more essential for land preparation and weed suppression, while simultaneously supporting soil conservation by reducing erosion, improving water retention, and enhancing fertilizer use efficiency (Wahyudin et al., 2018). One herbicide commonly used in agricultural production systems is paraquat, a non-selective contact herbicide. Its mode of action involves the transfer of electrons from photosystem I to molecular oxygen, leading to the formation of reactive oxygen species (ROS), particularly superoxide radicals, which cause lipid peroxidation and severe damage to cell membranes, ultimately resulting in rapid desiccation of plant tissues. However, due to its contact activity and limited translocation within plant tissues, paraquat primarily affects only the sprayed parts of plants, allowing untreated tissues to survive and potentially regrow (Tanveer et al., 2024). To improve weed control effectiveness, systemic herbicides such as nicosulfuron are also widely used. Nicosulfuron is a selective herbicide that is absorbed through plant leaves and translocated to meristematic tissues, where it inhibits acetolactate synthase (ALS), a key enzyme involved in the biosynthesis of branched-chain amino acids, thereby disrupting plant growth and development. This mechanism enables nicosulfuron to control a wide range of weeds, including grasses, broadleaf species, and sedges such as *Cyperus* spp. Nevertheless, previous studies have shown that although nicosulfuron applied alone can suppress several weed species, its effectiveness is strongly influenced by weed composition, dosage, environmental conditions, and the growth stage of the crop (Herdiana et al., 2020).

Despite the widespread use of both herbicides, information regarding the effectiveness of Nicosulfuron as a follow-up herbicide after Paraquat application under NT systems in sweet corn cultivation remains limited. Most previous studies have focused on single-herbicide applications without evaluating dose interactions or weed-specific responses, resulting in uncertainty regarding optimal combination strategies. This knowledge gap underscores the importance of investigating sequential herbicide applications as a potentially more effective weed management approach. Therefore, this study aimed to evaluate the effectiveness of Paraquat in suppressing weeds under NT conditions, assess the performance of Nicosulfuron as a follow-up herbicide, and determine the optimal dose combination to enhance sweet corn growth and yield. The results demonstrate that an appropriate sequential application of Paraquat and Nicosulfuron effectively suppresses dominant weeds and improves sweet corn productivity, providing a practical and sustainable weed management strategy for no-tillage systems.

MATERIALS AND METHODS

Study Site and Experimental Materials

The study was conducted at the Sanggar Penelitian, Latihan, dan Pengembangan Pertanian (SPLPP) Ciparay, Faculty of Agriculture, Universitas Padjadjaran, Baleendah District, Bandung Regency, West Java, Indonesia, from September to December 2021. Sweet corn (*Zea mays saccharata* Sturt.) hybrid cultivar was used as the test crop. The materials included herbicides containing Paraquat dichloride and Nicosulfuron as active ingredients, as well as inorganic fertilizers (NPK and urea). The main equipment used comprised a semi-automatic knapsack sprayer, an analytical balance (±0.01 g accuracy), a drying oven, scissors, sickle, hoe, measuring tape, and a digital camera for documentation.

Experimental Design and Treatments

The experiment was arranged in a two-factor factorial randomized block design with two replications. The first factor was Paraquat dose, consisting of 0, 0.297, 0.594, and 0.891 kg ha^{-1}, while the second factor was Nicosulfuron dose, consisting of 0, 0.080, 0.160, and 0.320 kg ha^{-1}. Each treatment combination was applied to a prepared plot with uniform plant spacing. Paraquat was applied at the early growth stage of sweet corn, whereas Nicosulfuron was applied as a follow-up herbicide three weeks after planting.

Data Collection and Observations

Observed variables included crop phytotoxicity, weed biomass, sweet corn growth, and yield components. Phytotoxicity was assessed using a visual injury scale ranging from 0 (no injury) to 9 (plant death) at one, two, and three weeks after herbicide application. Weed dry weight of dominant species, including *Paspalum conjugatum*, *Panicum repens*, *Ageratum conyzoides*, and other weeds, was measured at two, four, and six weeks after application. Sweet corn growth was evaluated based on plant height and number of leaves per plant. Yield components included number of ears per plant, ear length and diameter, ear weight per plot, and estimated yield per hectare based on total ear weight.

Sampling Procedure

Weed samples were collected by cutting all weeds within the observation plots and oven-dried at 70°C until constant dry weight was achieved. Growth parameters were measured from three randomly selected plants per plot, while yield components were recorded from all plants within each plot. Observations were conducted at predetermined intervals to comprehensively evaluate crop and weed responses to herbicide treatments.

Statistical Analysis

All data were analyzed using a two-way analysis of variance (ANOVA) at the 5% significance level to determine the effects of Paraquat dose, Nicosulfuron dose, and their interaction on all measured variables. When significant differences were detected, Duncan's Multiple Range Test (DMRT) at the 5% significance level was used to compare treatment means. Statistical analyses were performed using appropriate software for factorial experimental designs (Direktorat Pupuk dan Pestisida, 2012).

Data Availability and Ethical Considerations

The data generated in this study are available from the corresponding author upon reasonable request. This study did not involve human participants or animals; therefore, ethical approval was not required. All experimental procedures were conducted following safety guidelines for herbicide application and good agricultural practices to ensure environmental and operator safety.

RESULTS AND DISCUSSIONS

Sweet Corn Phytotoxicity

The results showed that the application of Paraquat and Nicosulfuron at all tested doses did not cause any phytotoxic symptoms in sweet corn plants. Phytotoxicity scores remained at 0 at 1, 2, and 3 weeks after application (WAA), indicating there was no visible damage to the sweet corn plants due to the herbicide. This result can be attributed to the application method, in which Paraquat was applied prior to planting as a land preparation herbicide, while Nicosulfuron was applied using a protective shield to prevent direct contact with the crop.

These findings are consistent with Umiyati (2019) who reported that Paraquat does not induce phytotoxicity in corn when applied before planting. Similarly, Nicosulfuron is known to be selective to corn and is therefore safe for the crop when applied at recommended doses (Tkalich et al., 2018).

Table 1. Phytotoxicity scoring of sweet corn plants

Treatment	Plant phytotoxicity level		
	1 WAA	2 WAA	3 WAA
Paraquat (kg ha^{-1})			
0	0	0	0
0.276	0	0	0
0.552	0	0	0
0.828	0	0	0
Nicosulfuron (kg ha^{-1})			
0	0	0	0
0.080	0	0	0
0.160	0	0	0
0.320	0	0	0

Note: WAA = weeks after application

Weed Dry Weight

Paspalum conjugatum

Observations at 2, 4, and 6 weeks after application (WAA) showed that Paraquat at doses of 0.297–0.891 kg ha^{-1} significantly suppressed the growth of *Paspalum conjugatum* compared with the untreated control. Similarly, Nicosulfuron applied at doses of 0.080–0.320 kg ha^{-1} reduced weed dry weight, reaching near-zero values at 6 WAA.

The effectiveness of Paraquat is associated with its contact mode of action, which rapidly generates reactive oxygen species, particularly hydrogen peroxide (H_2O_2), leading to disruption of weed cell membranes (Murti et al., 2015). However, in stoloniferous weeds such as *P. conjugatum*, single applications of contact herbicides are often less effective because the weed can regenerate from vegetative tissues. Consistent with the findings of Vencill (2002),the subsequent application of Nicosulfuron, a systemic herbicide, enhanced weed control by inhibiting meristematic growth.

Table 2. Dry weight of *Paspalum conjugatum* following herbicide treatments

Treatment	*P. conjugatum* weed dry weight (g 0.25 m^{-2})		
	2 WAA	4 WAA	6 WAA
Paraquat (kg ha^{-1})			
0	15.5325 c	17.4687 b	20.6163 c
0.297	6.1188 a	5.8900 a	16.7075 b
0.594	10.2700 b	18.2450 b	17.9475 b
0.891	5.1763 a	3.8688 a	9.2513 a
Nicosulfuron (kg ha^{-1})			
0	27.5050 b	34.6538 b	58.7888 b
0.080	3.8625 a	2.1250 a	5.7337 a
0.160	3.9013 a	7.3463 a	0.0000 a
0.320	1.8288 a	1.3475 a	0.0000 a

Note: Mean values followed by the same letter within the same column are not significantly different according to Duncan's Multiple Range Test (DMRT) at the 5% significance level.

Panicum repens

The dry weight of *Panicum repens* decreased significantly under Paraquat treatments at 0.297–0.891 kg ha^{-1} and Nicosulfuron treatments at 0.080–0.320 kg ha^{-1} at 2 and 4 weeks after application (WAA). However, at 6 WAA, no significant differences were observed among treatments. This response is attributed to the reproductive biology of *P. repens*, which propagates through both seeds and rhizomes, making it tolerant to both contact and systemic herbicides (Moenandir, 1993).

This phenomenon supports the findings of Susanti et al. (2021), who reported that *P. repens* exhibits high regrowth capacity following weed control, indicating that repeated herbicide applications or integration with mechanical control methods may be required for effective long-term suppression.

Table 3. Dry weight of *Panicum repens*

Treatment	*P. repens* weed dry weight (g 0.25 m^{-2})		
	2 WAA	4 WAA	6 WAA
Paraquat (kg ha^{-1})			
0	7.2938 b	9.8037 c	5.2212 a
0.297	1.9925 a	4.2288 ab	5.3275 a
0.594	3.3838 a	2.8100 a	7.1362 ab
0.891	2.6900 a	7.1938 b	8.6138 ab
Nicosulfuron (kg ha^{-1})			
0	6.2400 b	9.1538 b	5.3413 a
0.080	6.2238 b	5.3038 a	12.7938 b
0.160	1.8313 a	5.5212 a	5.0325 a
0.320	1.0650 a	4.0575 a	3.1313 a

Note: Mean values followed by the same letter within the same column are not significantly different according to Duncan's Multiple Range Test (DMRT) at the 5% significance level.

Ageratum conyzoides

Paraquat applied at doses of 0.297–0.891 kg ha^{-1} effectively suppressed *Ageratum conyzoides* at 2 weeks after application (WAA), but its effectiveness declined by 6 WAA. In contrast, Nicosulfuron applied at doses of 0.160–0.320 kg ha^{-1} consistently suppressed *A. conyzoides* up to 6 WAA.

Invasive weeds such as *Ageratum conyzoides* have widely invaded agricultural ecosystems and interfere with crop growth, posing significant management challenges for farmers and natural resource managers (Kaur et al., 2023). The superior performance of Nicosulfuron is attributed to its systemic mode of action, which allows translocation to meristematic tissues, thereby inhibiting weed regeneration and resulting in more sustained control (Herdiana et al., 2020).

Table 4. Dry weight of *Ageratum conyzoides*

Treatment	*A. conyzoides* weed dry weight (g 0.25 m^{-2})		
	2 WAA	4 WAA	6 WAA
Paraquat (kg ha^{-1})			
0	4.6763 b	4.2063 b	1.2700 a
0.297	0.4713 a	5.4763 b	8.7238 b
0.594	1.6763 a	3.1587 b	2.2900 a
0.891	0.2725 a	0.9375 a	0.5875 a
Nicosulfuron (kg ha^{-1})			
0	4.4500 b	9.4175 b	5.9162 b
0.080	0.8800 a	3.6463 a	6.2800 b
0.160	0.8438 a	0.5675 a	0.6163 a
0.320	0.9225 a	0.1475 a	0.0588 a

Note: Mean values followed by the same letter within the same column are not significantly different according to Duncan's Multiple Range Test (DMRT) at the 5% significance level.

Other Weed Species and Total Weed Biomass

Other weed species identified in the experimental field included *Leptochloa chinensis*, *Echinochloa indica*, and *Leersia hexandra*. At 2–4 weeks after application (WAA), Paraquat applied at doses of 0.594–0.891 kg ha^{-1} effectively suppressed the growth of these weeds; however, regrowth was observed at 6 WAA. In contrast, Nicosulfuron applied at doses of 0.160–0.320 kg ha^{-1} exhibited more stable and sustained weed control over the observation period.

Table 5. Dry weight of other weed species

Treatment	Other weed species dry weight (g 0.25 m^{-2})		
	2 WAA	4 WAA	6 WAA
Paraquat (kg ha^{-1})			
0	1.8950 b	0.4300 b	6.9513 b
0.297	0.1663 a	1.9350 c	8.1000 b
0.594	0.1913 a	0.4638 b	3.6188 a
0.891	0.0700 a	0.0350 a	4.6963 a
Nicosulfuron (kg ha^{-1})			
0	1.3738 b	0.2463 b	8.4375 b
0.080	0.5550 a	2.2263 c	13.3100 c
0.160	0.1675 a	0.3250 b	1.5325 a
0.320	0.2263 a	0.0663 a	0.0863 a

Note: Mean values followed by the same letter within the same column are not significantly different according to Duncan's Multiple Range Test (DMRT) at the 5% significance level.

Total Weed Dry Weight

Paraquat applied at 0.297–0.891 kg ha^{-1} significantly reduced total weed dry weight compared with the untreated control at 2 and 4 WAA. At 2 WAA, the lowest biomass was recorded at 0.297 and 0.891 kg ha^{-1}, while 0.891 kg ha^{-1} provided the greatest reduction at 4 WAA. However, weed biomass increased at 6 WAA in several paraquat treatments, indicating regrowth and limited residual activity. In contrast, nicosulfuron at 0.160 and 0.320 kg ha^{-1} consistently maintained lower total weed dry weight throughout the observation period, particularly at 6 WAA, demonstrating more sustained weed suppression. Overall, the response pattern suggests that weed reduction was mainly determined by the individual herbicide doses, with no additional enhancement observed from their combined application across observation times. This finding is in accordance with Sari (2020), who reported that contact herbicides cause rapid visible injury but generally have a shorter duration of weed control compared with systemic herbicides.

Table 6. Total weed dry weight

Treatment	Total weed dry weight (g 0.25 m^{-2})		
	2 WAA	4 WAA	6 WAA
Paraquat (kg ha^{-1})			
0	29.5225 c	31.9088 c	34.0588 b
0.297	8.7488 a	17.5300 ab	38.8588 c
0.594	15.5213 b	24.6775 b	30.9925 b
0.891	8.2088 a	12.0350 a	23.1488 a
Nicosulfuron (kg ha^{-1})			
0	39.5688 c	53.4713 c	78.4838 c
0.080	11.5213 b	13.3013 b	38.1175 b
0.160	6.8688 a	13.7600 b	7.1813 a
0.320	4.0425 a	5.6187 a	3.2763 a

Note: Mean values followed by the same letter within the same column are not significantly different according to Duncan’s Multiple Range Test (DMRT) at the 5% significance level.

Sweet Corn Growth

Plant Height

The data showed that all tested doses of Paraquat and Nicosulfuron had no significant effect on sweet corn plant height at 2, 4, and 6 weeks after application (WAA). Mean plant height ranged from 190 to 200 cm at the final observation. This result indicates that herbicide application did not cause phytotoxic effects or growth inhibition. Similar findings were reported by Zami et al. (2021) who stated that early vegetative growth of corn is more strongly influenced by genetic factors and root physiological conditions than by weed interference.

Table 7. Sweet corn plant height

Treatment	Sweet corn plant height (cm)		
	2 WAA	4 WAA	6 WAA
Paraquat (kg ha^{-1})			
0	52.7113 a	120.7438 a	192.1575 a
0.297	57.3900 a	126.5150 a	197.0688 a
0.594	50.1400 a	121.4775 a	200.0675 a
0.891	54.6213 a	120.1375 a	192.4963 a
Nicosulfuron (kg ha^{-1})			
0	56.8913 a	121.0675 a	184.7650 a
0.080	53.1563 a	122.3163 a	198.8350 a
0.160	53.8188 a	125.7812 a	199.3350 a
0.320	50.9963 a	119.7088 a	198.8550 a

Note: Mean values followed by the same letter within the same column are not significantly different according to Duncan’s Multiple Range Test (DMRT) at the 5% significance level.

Number of Leaves

At 2–4 WAA, the number of leaves did not differ significantly among treatments, indicating a similar vegetative response across herbicide doses. At 6 WAA, nicosulfuron applied at 0.320 kg ha^{-1} produced the highest number of leaves (11.25 leaves plant^{-1}) compared with the control; however, the general trend shows that leaf development remained relatively uniform among treatments. These findings suggest that sweet corn leaf growth was not substantially influenced by the combined application of paraquat and nicosulfuron throughout the observation period. This response is attributed to reduced weed competition, allowing plants to utilize light and nutrients more efficiently (Hafsah et al., 2019). Leaves, as the primary photosynthetic organs, play a crucial role in assimilate production that supports reproductive growth (Karya et al., 2021), emphasizing the importance of effective weed control during the early vegetative stage.

Table 8. Number of leaves of sweet corn

Treatment	Number of leaves (leaves plant)		
	2 WAA	4 WAA	6 WAA
Paraquat (kg ha^{-1})			
0	6.1250 a	8.8750 a	10.7500 a
0.297	6.5000 a	9.0000 a	10.5000 a
0.594	6.1250 a	8.3750 a	10.6250 a
0.891	6.5000 a	8.3750 a	10.7500 a
Nicosulfuron (kg ha^{-1})			
0	6.2500 a	8.3750 a	10.1250 a
0.080	6.1250 a	8.5000 a	10.5000 ab
0.160	6.3750 a	8.7500 a	10.7500 ab
0.320	6.5000 a	9.0000 a	11.2500 b

Note: Mean values followed by the same letter within the same column are not significantly different according to Duncan's Multiple Range Test (DMRT) at the 5% significance level.

Yield Components

The results presented in Table 9 indicate that sweet corn yield components were not influenced by the combined application of paraquat and nicosulfuron. The number of ears per plant (approximately one ear plant^{-1}) and ear length (approximately 18–19 cm) did not differ among treatments, suggesting that these traits were more strongly determined by genetic characteristics than by herbicide application. In contrast, ear diameter was significantly affected by individual herbicide doses. Paraquat at 0.594–0.891 kg ha^{-1} and nicosulfuron at 0.160–0.320 kg ha^{-1} resulted in larger ear diameters (5.3–5.4 cm) compared with the control. However, the response pattern did not indicate any distinct combined dose effect, suggesting that yield components were influenced independently by each herbicide rather than by their interaction. This improvement is likely due to reduced weed competition, which enhanced nutrient availability for ear development (Ginting et al., 2017).

Table 9. Sweet corn yield components

Treatment	Sweet corn yield components		
	Number of ears plant	Ear length (cm)	Ear diameter (cm)
Paraquat (kg ha^{-1})			
0	1.19642 a	19.0588 a	5.2975 b
0.297	1.19642 a	18.9288 a	5.1813 a
0.594	1.08929 a	19.3025 a	5.3925 c
0.891	1.16071 a	18.5700 a	5.3025 c
Nicosulfuron (kg ha^{-1})			
0	1.08929 a	18.6238 a	5.0925 a
0.080	1.10714 a	18.6763 a	5.3325 b
0.160	1.14286 a	19.4213 a	5.4213 c
0.320	1.30357 a	19.1388 a	5.3275 b

Note: Mean values followed by the same letter within the same column are not significantly different according to Duncan's Multiple Range Test (DMRT) at the 5% significance level.

Sweet Corn Yield

Based on Table 10, sweet corn yield increased with higher doses of both herbicides. Paraquat applied at 0.891 kg ha^{-1} resulted in the highest productivity (18.34 t ha^{-1}) compared with lower doses, while nicosulfuron at 0.320 kg ha^{-1} produced the greatest yield, reaching 21.00 t ha^{-1}. These findings indicate that yield enhancement was associated with the individual effects of each herbicide rather than a specific combined dose treatment. Effective weed control minimized competition for resources and allowed more efficient translocation of photosynthates to reproductive organs (Karya et al., 2021). These results are consistent with the findings of Zandvakili et al. (2020) who reported that the application of Nicosulfuron at appropriate doses increased corn productivity through sustained weed suppression.

Table 10. Sweet corn yield

Treatment	Sweet corn yield	
	Yield per plot (kg 12.5 m^{-2})	Yield per hectare (t ha^{-1})
Paraquat (kg ha^{-1})		
0	21.6428 a	17.3143
0.297	21.6428 a	17.3142
0.594	21.7500 a	17.4000
0.891	22.9285 b	18.3428
Nicosulfuron (kg ha^{-1})		
0	18.8571 a	15.0857
0.080	18.9643 a	15.1714
0.160	23.8929 b	19.1142
0.320	26.2500 c	21.0000

Note: Mean values followed by the same letter within the same column are not significantly different according to Duncan's Multiple Range Test (DMRT) at the 5% significance level.

CONCLUSION

Paraquat at 0.891 kg ha^{-1} effectively suppressed early weed growth in no-tillage sweet corn, while nicosulfuron at 0.160–0.320 kg ha^{-1} provided more consistent post-emergence control of dominant weeds, particularly *Paspalum conjugatum* and *Ageratum conyzoides*. Higher sweet corn yield was associated with paraquat at 0.891 kg ha^{-1} and nicosulfuron at 0.320 kg ha^{-1}, reaching up to 21 t ha^{-1}. These results indicate that weed suppression and yield improvement were influenced by the individual effects of each herbicide rather than by a specific dose combination.

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