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Effect Sprayed the Organic Fertiliser (Hortiboost10) and Magnesium on the Vegetative and Chemical Characteristics of *Bougainvillea Sp*

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ABSTRACT

Bougainvillea glabra plants were the subject of this study, which was carried out at the Agricultural Research and Experiment Station connected to the University of Kirkuk's Faculty of Agriculture during 2024–2025. We acquired one-to two-year-old saplings from a Baghdad nursery. The experiment involved two factors. The first factor in the experiment was the application of organic fertiliser (HortiBoost10) at three different concentrations (0, 2, 4 ml L^{-1}). The second factor was the application of magnesium at three different concentrations (0, 3, and 6 g L^{-1}). Giving Bougainvillea glabra magnesium and organic fertiliser (HortiBoost10) greatly enhanced its chemical and botanical traits, according to the study. The organic fertiliser treatment with 4 ml L^{-1} resulted in an increase in plant height by 12.45%, 683.02 cm^2 leaf area, and 73.32% mean leaf number. The treatment also improved N, P, and K content. The best outcomes were obtained when the two treatments were combined. The greatest plant height growth rate was 13.42%, and the maximum leaf area was 932.30 cm^2. The leaf number rate reached 87.00% with the interaction between organic fertiliser and magnesium spraying. The improvement in leaf nitrogen content reached 1.85%, phosphorus 0.25%, and potassium 1.10% When spraying, use two different concentrations of magnesium (3, 6) g L-1 and the highest concentration of organic fertiliser (4 ml L-1). However, magnesium fertilizer had no clear effect. Magnesium at 6 g L^{-1} outperformed other concentrations when used alone, with a magnesium content in the leaves of 0.35% and a leaf area reaching 673.98 cm^2. The combined use of organic fertilizer and magnesium has a beneficial effect on the physiological and chemical functions of Bougainvillea glabra.

***Keywords*:** Bougainvillea sp, sprayed, HortiBoost10, Magnesium, Chemical characteristics.

INTRODUCTION

One of the most stunning and well-liked climbing plants is *bougainvillea spp*., which belongs to the Nyctaginaceae family. People adore it for its gorgeous blooms, quick growth, ease of propagation, and year-round blooming in sunny areas. However, the plant does not bloom in areas that receive little light [1]. Originating in South America, the firefly was first observed in Brazil in 1778 AD. It bears Louis Antoine de Bougainville's name after the French military commander who made the discovery [2]. The bougainvillea is a climbing plant that can reach a height of at least six meters. It is a resilient plant that can tolerate dry spells and high temperatures. It is used to cover fences and entrances and to adorn balconies. Beautiful flowering bonsai art can also be made with bougainvillea [3]. The flowering plant is appealing for use in central green areas or by the side of roads for safety, comfort, and aesthetic appeal. It can withstand pollution and aids in lowering air pollution from harmful gases released by automobile exhaust fumes [4,5]. The oval-shaped, glossy, green leaves contrast with the white and bluish-white flowers. The pink, red, purple, and yellow buds provide visual appeal [6]. While the absorption of nutrients in ionic form from solution is limited since the outer surface of the leaves is covered with cuticle, which is partially permeable to water and dissolved compounds, the aerial parts of plants have the ability to absorb nutrients through stomata [7]. In order to counteract the loss of organic matter in the soil due to intensive farming practices and to lessen environmental pollution and chemical residue contamination of agricultural soil, there is currently a global trend toward the use of organic materials derived from plants or animals as fertilizer [8]. This fertilizer increases plant vegetative growth, lowers mineral requirements, and enhances the physical characteristics and composition of the soil [9]. Reducing or even eliminating the use of chemical fertilizers without sacrificing plant growth and quality is a major goal of using organic fertilizers for plants, particularly in ongoing experiments [10]. Magnesium is an essential nutrient that is involved in the critical plant processes of photosynthesis and the synthesis of carbohydrates. Because of its involvement in the synthesis of chlorophyll, magnesium is an essential and

stable part of the chlorophyll molecule that is impossible to separate [11]. It is essential for the growth and development of plant organs, and fertilizing it affects a variety of physiological functions in various plants, including the activation of enzymes, the synthesis of proteins, the transfer of energy, and the acceleration of plant growth [12].

2.Materials And Methods

Bougainvillea glabra plants were the subject of this study, which was carried out at the Agricultural Research and Experiment Station connected to the University of Kirkuk's Faculty of Agriculture during the 2024–2025 growing season, from 1 April 2024 to 1 February 2025. We acquired one- to two-year-old saplings from a Baghdad nursery. We separated the soil into three sections, each with three rows spaced 2.5 meters apart, and separated each plant by 2.5 meters after calculating the land's area and getting it ready for planting. Then, for every sapling, we made holes that were 30 cm in diameter and 35 cm deep. In order to determine some of the physical and chemical characteristics of the field soil, we randomly select samples for laboratory analysis at the Kurdistan Chemistry and Physics Association laboratory (Table 1). The experiment involved two factors. The first factor in the experiment was the application of organic fertilizer (HortiBoost10) at three different concentrations (0, 2, 4) ml L^{-1}. The second factor was the application of magnesium at three different concentrations (0, 3, 6) g L^{-1}. After the materials were weighed on an electric scale and combined with distilled water to the necessary concentration, the volume was calculated. Three batches of spraying were done in a row, separated by ten days. Early in the morning, in the proper environment, the spraying procedure was completed with a hand sprayer. With three replicates and three observations per experimental unit, a global experiment will be carried out using the complete randomized block design (RCBD) [13].

Table 1 lists the field site's soil's physical and chemical characteristics prior to cultivation.

Component	Analytical outcome	measurement unit
PH	7.6	
Nitrogen (N)	0.32	%
Phosphorus (P)	0.102	%
Potassium (K)	0.588	%
E.C.	0.79	ds.m□¹
Organic matter	0.75	%
Clay	50	%
Sand	35	%
Silt	15	%
Texture	Sandy clay	

* The soil was tested at the Kurdistan Chemistry and Physics Association lab.

2-1. Features Under Investigation

Data gathered when flowers appeared on all plants.

2-1-1. Characteristics Of Vegetative Growth

Plant height increase rate (%): Use a measuring tape to take measurements of the plants' height at the start and finish of the experiment, then compute the plant height growth rate.

Leaf area (cm^2): A computer program used by the US National Institutes of Health was used to measure the leaves of plants. The unit of measurement for leaf area is (cm^2)[14].

Rate at which the number of leaves on the main branches is increasing (%): Determine how many leaves each seedling in the experimental unit has, then pull the averages at the start and finish of the experiment. Finally, figure out how quickly the number of leaves is growing.

2-1-2. Evaluation Of The Chemical Makeup Of Leaves

Estimation of the percentage of nitrogen in leaves (%): The percentage of nitrogen is estimated using a Micro-Kjeldahl device [15].

The percentage of phosphorus in leaves (%) is measured using a spectrophotometer set to 620 nanometers [16].

The percentage of potassium in leaves (%) A flame photometer is used to estimate the potassium percentage [17].

Magnesium percentage in leaves (%): Magnesium is estimated using the perchlorate method with buffer solution, E.B.T. indicator, and titration with (EDTA Na2) 0.05% solution [18].

3. Results And Discussion

1.Plant height increase rate (%): Table (2) demonstrates that when the organic fertilizer HortiBoost10 was applied, there were notable variations in the trait of average plant height. With the greatest rise of 12.45% and the lowest value of 5.86% in the control treatment, the treatment containing 4 mL L□¹ performed better than the other treatments. On the other hand, the concentrations of magnesium applied topically did not differ significantly; instead, they ranged from 8.85% to 9.73%, which is rather near to the control. Nonetheless, there were notable variations in the way magnesium and the organic fertilizer applied topically interacted. Plant height increased most when 4 mL L□¹ HortiBoost10 was combined with all magnesium concentrations (11.73%, 12.19%, and 13.42%, respectively). The value that was lowest (5.59%) was measured using 0 mL L□¹ organic fertilizer and 6 g L□¹ magnesium. The rate for the control treatment was 6.24%.

Table (2) effect of different concentrations of organic fertilizers (HortiBoost10) and magnesium and how they interact with each other on the plant height increase rate of the *Bougainvillea* plant.

HortiBoost10 ml L^{-1}	Magnesium gm L^{-1}			HortiBoost10 ml L^{-1} mean
	0	3	6	
0	6.24 cd	5.76 cd	5.59 d	5.86 c
2	9.01 a-d	8.61 b-d	10.21 a-c	9.27 b
4	11.73 a	12.19 ab	13.42 a	12.45 a
Magnesium gm L^{-1} mean	9.00 a	8.85 a	9.73 a	

* Significant differences are not reflected in numbers that contain letters that are similar to the individual factors and their interactions. based on the 0.05 probability level of the Duncan multiple range test.

2- Leaf area (cm^2): It is evident from Table (3) that there are significant differences in the treatment of spraying with (HortiBoost10) fertilizer, as the treatment with this fertilizer at a concentration of 4 ml L^{-1} outperformed and showed the highest leaf area of 683.02 cm^2, while the control treatment had a leaf area of 427.23 cm^2. The magnesium fertilization treatment at a concentration of 6 g L^{-1} outperformed the other treatments, reaching 673.98 cm^2, while the control treatment had the lowest value at 428.93 cm^2. As for the interaction between the treatments, the highest values were recorded in this context at 932.30 cm^2 for the interaction treatments between spraying with organic fertilizer (HortiBoost10) at the highest used concentration and magnesium at a concentration of 6 g L^{-1}, while the lowest values were recorded at 412.13 cm^2 for the control treatment, 412.62 cm^2 for the treatment without magnesium spraying and fertilization (HortiBoost10) at a concentration of 2 mL L^{-1}, and 416.81 cm^2 for the interaction treatment between not spraying with organic fertilizer and magnesium at a concentration of 3 g L^{-1}.

Table (3) effect of different concentrations of organic fertilizers (HortiBoost10) and magnesium and how they interact with each other on the Leaf area of the *Bougainvillea* plant.

HortiBoost10 ml L^{-1}	Magnesium gm L^{-1}			HortiBoost10 ml L^{-1} mean
	0	3	6	
0	412.13 c	416.81 c	452.77 c	427.23 c
2	412.62 c	666.86 b	636.88 b	572.12 b
4	462.05 c	654.71 b	932.30 a	683.02 a
Magnesium gm L^{-1} mean	428.93 c	579.46 b	673.98 a	

* Significant differences are not reflected in numbers that contain letters that are similar to the individual factors and their interactions. based on the 0.05 probability level of the Duncan multiple range test.

3- Rate at which the number of leaves on the main branches is increasing (%): We observe in Table (4) that there are significant differences in the treatment of spraying with the organic fertilizer (HortiBoost10), which increased linearly with the concentration. The organic fertilizer spray at a concentration of 4 ml L^{-1} outperformed the others, giving the highest rate of increase in the number of leaves, reaching 73.32%, while it was 50.34% at a concentration of 2 ml L^{-1}. The control treatment recorded the lowest value at 26.97%. However, regarding the magnesium fertilization treatments, we notice no significant

differences between the treatments, with the highest percentage being 55.64% at a concentration of 3 g L^{-1} and the lowest percentage being 43.35% in the control treatment. Through the interaction between spraying with HortiBoost10 fertilizer and magnesium, significant differences were observed between them the interaction between applying 4 ml L□¹ of HortiBoost10 fertilizer and 3 g L□¹ of magnesium produced the highest values, 87.00%. The interaction between magnesium at a concentration of 6 g L□¹ and the lack of organic fertilizer had the lowest percentage (22.58%), whereas the control treatment values were 25.08%.

Table (4) Effect of different concentrations of organic fertilizers (HortiBoost10) and magnesium and how they interact with each other on the rate at which the number of leaves on the main branches of the *Bougainvillea* plant.

HortiBoost10 ml L^{-1}	Magnesium gm L^{-1} 0	3	6	HortiBoost10 ml L^{-1} mean
0	25.08 d	33.25 d	22.58 d	26.97 c
2	41.79 cd	46.69 b-d	62.55 a-c	50.34 b
4	62.86 a-c	87.00 a	70.12 ab	73.32 a
Magnesium gm L^{-1} mean	43.25 a	55.64 a	51.74 a	

* Significant differences are not reflected in numbers that contain letters that are similar to the individual factors and their interactions. based on the 0.05 probability level of the Duncan multiple range test.

4- Estimation of the percentage of nitrogen in leaves (%): Table (5) indicates significant variations in results when utilizing organic fertilizer (HortiBoost10). The maximum nitrogen content in the leaves was reported at concentrations of (2, 4) ml L^{-1}, which were 1.64% and 1.68% respectively. The control treatment had the lowest nitrogen content (1.33%). The magnesium spray therapy also performed well, with concentrations of 3 and 6 g L^{-1} resulting in the highest values of 1.59% and 1.67%, respectively, whereas the control treatment had the lowest at 1.38%. The control therapy had the lowest result for the same feature, with 1.33%. Magnesium spray treatment performed well, with doses of 3 and 6 g L□¹ yielding the highest values of 1.59% and 1.67%, respectively, whereas the lowest control treatment's proportion was 1.38%. Furthermore, we discover that there are notable variations between the two treatments of organic fertilizer and magnesium spray when they interact. The combination of magnesium at a concentration of 6 g L□¹ and organic fertilizer spray (HortiBoost10) at a concentration of 2 ml L□¹ proved to be the most effective therapy. The lowest percentage was 1.32% in the control treatment and the treatment with 3 g L□¹ magnesium without the use of organic fertilizer, while the highest values were 1.78, 1.80, and 1.85%, respectively, in the organic fertilizer at a concentration of 4 ml L□¹ with the interaction of magnesium spray at concentrations of 3 and 6 g L□¹.

Table (5) effect of different concentrations of organic fertilizers (HortiBoost10) and magnesium and how they interact with each other on Estimation of the percentage of nitrogen in the leaves of the Bougainvillea plant.

HortiBoost10 ml L^{-1}	Magnesium gm L^{-1} 0	3	6	HortiBoost10 ml L^{-1} mean
0	1.32 c	1.32 c	1.37 c	1.33 b
2	1.47 bc	1.66 ab	1.78 a	1.64 a
4	1.39 c	1.80 a	1.85 a	1.68 a
Magnesium gm L^{-1} mean	1.38 b	1.59 a	1.67 a	

* Significant differences are not reflected in numbers that contain letters that are similar to the individual factors and their interactions. based on the 0.05 probability level of the Duncan multiple range test.

5 - The percentage of phosphorus in leaves (%): Table (6) shows that there are significant differences between the levels of spraying with the organic fertiliser (HortiBoost10) in the phosphorus content in the leaves. The treatment with the organic fertiliser at a concentration of 4 ml L□¹ was significantly superior, reaching 0.24%While the lowest value for the control treatment was 0.17%, there are no appreciable variations between the concentrations of 3 and 6 g L□¹ of magnesium spray,

which were 0.19% and 0.20%, respectively. Regarding the interaction between treatments, the highest phosphorus content values in the leaves were found at 0.24% and 0.25% when organic fertiliser (HortiBoost10) was sprayed at a concentration of 4 ml L□¹ and followed by successive concentrations of 3 and 6 g L□¹ of magnesium fertiliser. The treatment with a concentration of 2 mL L□¹of HortiBoost10 without the magnesium fertiliser interaction, the 6 g L□¹ of magnesium spray treatment without the organic fertiliser interaction, and the control treatment at the same level had the lowest percentage, which was 0.15%.

Table (6) effect of different concentrations of organic fertilizers (HortiBoost10) and magnesium and how they interact with each other on the percentage of phosphorus in leaves of the Bougainvillea plant.

HortiBoost10 ml L^{-1}	Magnesium gm L^{-1}			HortiBoost10 ml L^{-1} mean
	0	3	6	
0	0.15 e	0.16 e	0.15 e	0.15 c
2	0.15 e	0.18 de	0.20 cd	0.18 b
4	0.22 bc	0.24 a	0.25 a	0.24 a
Magnesium gm L^{-1} mean	0.17 b	0.19 a	0.20 a	

* Significant differences are not reflected in numbers that contain letters that are similar to the individual factors and their interactions. based on the 0.05 probability level of the Duncan multiple range test.

6- The percentage of potassium in leaves (%) : It can be inferred from the results in Table (7) that there are significant differences in the treatment with the organic fertiliser spray (HortiBoost10), as this fertiliser outperformed with a higher concentration of 4 ml liter□¹ and the highest potassium retention in the leaves, reaching 1.02%. The lowest percentage was recorded in the control treatment with 0.60%. As for the magnesium fertiliser spray, there are no significant differences, recording 0.81%, 0.82%, and 0.84% from the control to the higher concentration, respectively. Through the interaction treatments between spraying with (HortiBoost10) fertiliser and magnesium fertilization we find significant differences between the treatments. The interaction treatment of organic fertiliser spray at a concentration of 4 ml L□¹ with magnesium spray at concentrations of 3 and 6 g L□¹ recorded the highest values of 1.10 and 1.02%, respectively. While the lowest percentages of 0.58, 0.60, and 0.63% were recorded for plants treated with magnesium spray at concentrations of 6 and 3 g L□¹ without the organic fertiliser and the control treatment, respectively.

Table (7) effect of different concentrations of organic fertilizers (HortiBoost10) and magnesium and how they interact with each other on the percentage of potassium in leaves of the *Bougainvillea* plant.

HortiBoost10 ml L^{-1}	Magnesium gm L^{-1}			HortiBoost10 ml L^{-1} mean
	0	3	6	
0	0.63 e	0.60 e	0.58 e	0.60 c
2	0.85 cd	0.80 d	0.84 cd	0.83 b
4	0.94 bc	1.10 a	1.02 ab	1.02 a
Magnesium gm L^{-1} mean	0.81 a	0.82 a	0.84 a	

* Significant differences are not reflected in numbers that contain letters that are similar to the individual factors and their interactions. based on the 0.05 probability level of the Duncan multiple range test.

7 – Magnesium percentage in leaves (%): The results of Table (8) for estimating the magnesium percentage in the leaves show that there are no significant differences for the treatment with the organic fertiliser (HortiBoost10). The percentage recorded was 0.30% for the sprays with concentrations of 2,4 ml L□¹, and a percentage of 0.31% for the control treatment. As for the magnesium fertiliser spray, there are significant differences, with the highest percentage being 0.35% for the magnesium treatment at a concentration of 6 g L□¹, compared to the control treatment, which gave the lowest percentage of 0.26%. And regarding the interaction between the two treatments used, we find significant differences between the treatments. The interaction between magnesium spray at a concentration of 6 g L^{-1} and all concentrations of the organic fertiliser (HortiBoost10) (0, 2, 4 ml L^{-1}) showed the highest values of 0.34% and 0.36%, respectively. The lowest magnesium content

in the leaves was recorded at 0.23% from the organic fertiliser spray at a concentration of 4 ml L^{-1} without magnesium spray, while the control treatment recorded 0.29%.

Table (8) effect of different concentrations of organic fertilizers (HortiBoost10) and magnesium and how they interact with each other on the magnesium percentage in leaves of the Bougainvillea plant.

HortiBoost10 ml L^{-1}	Magnesium gm L^{-1}			HortiBoost10 ml L^{-1} mean
	0	3	6	
0	0.29 bc	0.29 bc	0.34 ab	0.31 a
2	0.27 cd	0.28 c	0.36 a	0.30 a
4	0.23 d	0.30 bc	0.36 a	0.30 a
Magnesium gm L^{-1} mean	0.26 c	0.29 b	0.35 a	

* Significant differences are not reflected in numbers that contain letters that are similar to the individual factors and their interactions. based on the 0.05 probability level of the Duncan multiple range test.

Discussion

As Tables 2–8 show, foliar spraying with HortiBoost10 fertiliser significantly improved most of the features under study, particularly at the higher concentration of 4 ml. L□¹. The highest values were found for plant height, leaf area, number of leaves, and leaf nutritional content (nitrogen, phosphorus, and potassium) This implies that this organic fertiliser is effective in promoting vegetative plant growth. When HortiBoost10 was administered at a dose of 4 ml L□¹, the rate of increase in plant height (12.45%) was significantly greater than that of the control treatment (5.86%) (Table 2).Furthermore, Table 4 demonstrates that this treatment produced the largest leaf area (683.02 cm2) and the fastest rate of leaf growth (3.32%).these results are in line with their study organic fertilizer high humic acid and division as well as nutrient absorption, all of which have an impact on vegetative development. In line with the [19],[20] experiment on the impact of humic acid foliar spraying on bougainvillea plants, the study discovered that applying humic acid at a concentration of 6 ml L^{-1} increases vegetative growth and nutrient uptake, even in situations where water is scarce, and influences the size and quality of flowers. The HortiBoost10 treatment at concentrations of 2 ,4 ml L□¹ significant increases in nitrogen content (1.64 and 1.68%) compared to the control treatment (1.33%) (Table 5). It also excelled in phosphorus content (0.24%) and potassium (1.02%) (Tables 6 and 7). This is associated with increased nutrient absorption due to the effect of HortiBoost10 components, which enhance foliar absorption efficiency [21]. With a concentration of 30 g L^{-1} in the summer, humic acid spray significantly improved vegetative development, increased the amount of total chlorophyll in leaves, and increased the amount of N, P, and K elements, as reported by [22]. With the exception of leaf area in Table 3 and magnesium concentration in leaves—Table 8—the majority of attributes were not significantly impacted by magnesium spraying alone. Significant gains resulted from the interaction of organic fertiliser with magnesium. In addition to having the greatest nitrogen content (1.85%) and potassium (1.10%) (Tables 5 and 7), the treatment of the interaction between HortiBoost10 at a concentration of 4 ml/L□¹ and magnesium at 3 g L^{-1} produced a higher leaf count (87.00%). According to [23], when combining macro- and micronutrients with organic fertilizers these results show a synergistic link between magnesium and organic fertiliser in improving growth and nutritional content. The magnesium content in the leaves increased to 0.35% when magnesium was applied at a concentration of 6 g L□¹, however HortiBoost10 had no effect on the magnesium content (Table 8). The efficiency rose to 0.36% when HortiBoost10 was included. This supports [24] findings about the function of magnesium in the synthesis of chlorophyll and the activation of enzymes.

Conclusion

The results confirm the effectiveness of HortiBoost10 in enhancing plant growth and nutritional content, especially at a concentration of 4 ml L□¹, while the greatest effectiveness was observed when combined with magnesium at concentrations of 3 and 6 g L□¹, reflecting the importance of integrated fertilization programs that combine organic and mineral sources.

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تأثير الرش بالسماد العضوي HortiBoost10 والمغنسيوم في الصفات الخضرية والكميائية لنبات الجهنمية (*Bougainvillea sp.*)

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الخلاصة

تم إجراء هذه الدرسة على النبات الجهنمية (***Bougainvillea glabra***) في محطة البحوث والتجارب الزراعية التابعة لكلية الزراعة – جامعة كركوك خلال الموسم الزراعي 2024-2025. تم الحصول على شتلات بعمر يتراوح بين سنة إلى سنتين من مشتل بغداد. تضمنت الدراسة عاملين : العامل الأول هو رش بسماد العضوي ***HortiBoost10*** بثلاثة تراكيز (0، 2، 4) مل لتر-1، والعامل الثاني هو الرش بالسماد المغنسيوم بثلاثة تراكيز أيضاً (0، 3، 6) غم لتر-1. أظهرت نتائج الدراسة أن رش نبات الجهنمية بالسماد العضوي والمغنسيوم يؤدي الى تحسين الصفات الخضرية والكيميائية للنبات. حيث حقق السماد العضوي ***HortiBoost10*** بتركيز 4 مل لتر-1 أدي الى زيادة في ارتفاع النبتات بلغت 12.45 %، مساحة ورقية 683.02 سم2، ومتوسط عدد أوراق بلغ 73.32 % كما ادي غلى تحسين محتوى النيتروجين والفسفور والبوتاسيوم في الاوراق. وكانت افضل النتائج عند التداخل بين رش بالسماد ***HortiBoost10*** والمغنسيوم، ادي الى زيادة معدل الإرتفاع نمو النبات بنسبة 13.42 %، والمساحة الورقة بلغت 932.30 سم2، في حين وصل عدد الأوراق إلى 87.00 %، وايضاً تحسين محتوى الاوراق من العناصر الغذائية كما النيتروجين بلغ 1.85 %، الفوسفور 0.25 % والبوتاسيوم 1.10 % عند رش بالتداخل الثنائي من اعلى تركيز السماد العضوي (4 مل لتر-1) والمغنسيوم بتركيزين (3، 6) غم لتر-1. وعلى الرغم من ان تأثير رش المغنسيوم لم يكن واضحاً بشكل كبير عند استخدمه بشكل منفرد، إلا أن تركيز 6 غم لتر-1 تفوق على تركيزات الاخرى في الصيفة المحتوى الأوراق من المغنسيوم وبلغ 0.35 % ، والمساحة الورقية وصلت 673.98 سم2. وتشير النتائج الى أن الاستخدام التداخل بين السماد العضوي ***HortiBoost10*** والمغنسيوم له تأثير إيجابي على الوظائف الفسيولوجية والكيميائية لنبات الحهنمية.

الكلمات المفتاحية: الجهنمية، الرش، هورتيبوستد10، المغنسيوم، الخصائص الكيميائية.