

The effects of various salicylic acid treatments on morphological and physiological features of zoysia grass (*Zoysia species*)

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ABSTRACT: Regarding the extremely significance of grass in designing and making green space , It is necessary to use a regulator to keep its quality . So In this study , We studied the use of Salicylic acid as a regulator of plant growth. This study was implemented in from of totally random design with three repetitions .Treatments involved various densities of salicylic acid amounting to 0, 100, and 200 $\frac{mg}{L}$ Features suchas length , wet and dry weight of stem , The number of tillering , wet and dry weight of shoot , and root length were measured. According to the results It was observed that the application of salicylic acid (200 density) improved most of the features considered in this study.

Keywords: Salicylic acid, Morphological and Physiological, Zoysia species.

INTRODUCTION

One of the important objective of the green space improvement is to create beautiful and pleasant spaces and to create psychological calmness-Meanwhile, one of the most important factor of natural life resistance in urbanism is green space and grass as a key factor in making green spaces plays a significant rol in This case (Etemadi and kolahreez, 2000). Grasses are from angiosperms, mono cotyledons , Poales order , and poaceae family which Their various kind are Planted (Hessayon , 1991). *Zoysia species* is from warm season grasses and has a tiny tissue with hard leves .It has a deep root and spreads slowly by underground and flowing stems and make a dense cover . some of its kinds make a good cover in plays like golf (Naderi and kafi, 2005). The use of growth regulators has been turned into one of the most important strategies of grass management for reducing costs and consumption of sweet waters for irrigating (Ervin and Koski, 2001). Some of the plants events and processes are regulated by a group of matters made artificially in plants. These matters directly or indirectly influence on actions, reactions, physiological systems, and plant structures and coordinate life cycle, organizing structure, and physiological system of plant. Today, These group of matters are introduced as “ Plant growth regulators” (Fahimi,1997). Salicylic acid is a new group of these matters which is existant in the whole chain of plant and influences on the most physiological processes in plants with low densities (Fathi and Esmaeel Poor, 2000). The effects of salicylic acid and its key roles in regulating various physiological Processes involve: growth, Ions absorbtion by root, increasing photosynthesis actions and amount of chlorophyll, Prevention of ethylene biosynthesis, seed budding, fruit production, glycolysis, flowering, and heat production(khan, 2010). In a study by Razmjoo(1996), It was stated that the key factors of grass seeming quality are evenness, density, tissue, growth way, color, and cover Percent.Powell (1999) stated that density, color, and tissue are more significant. It is reports that salicylic acids and its derivatives control ethylene. Production in planting settings of carrot cell suspension, apple and pear pieces, and vetch hypocotyls; so, the role of salicylic acid is suggestes as an ethylene action antagonist (Choudhury, 2004) . Furthermore, It delays the ripening of banana by ethylene biosynthesis control (Manoj and Upendra, 2000). The role of salicylic acid as a growth regulator matter is known in to lerance inducing to various biological and non- biological stresses like bacteria, fungi,

viruses (AL-Hakimi, 2008) and dryness stress (Senaratna, 2003). It is reported that both salicylic acid and acetyl salicylic acid in densities of 0/1 and 0/5 mili mole protect tomato and bean against dryness stress and improve growth and performance of plants in this condition(Senaratna, 2000).

MATERIALS AND METHODS

This study was implemented in from of a totally random designe with three repetitions.Treatments involved various densities of salicylic acid amounting to 0 , 100, and 200 $\frac{mg}{L}$. Zoysia seeds were planted in vases at a depth of 70 ^{cm} and opening diameter of vases was 34 ^{cm} with holes at their ends and were filled with sand, soil, and manure, growing in a natural condition, three treatments in three repetition(totally 9 vases)were prepared. The amount of used seed was 30 g in square meter. Then seeds were covered by mulch to keep wetness and to prevent seed movement. Irrigation of vases was done daily. After planting, urea fertilizer(1gr for each vase)was applied mounthly. For 50 days, It was let the grasses grow completely. After complete settling, cutting action was done mounthly with 4 cm. spraying action was done regulary every 15 days in 3 times. It this study, The analyzed features were: wet and dry weight of cut stems, The length of cut stems, The number of tillerings, wet weight of shoot, dry weight of shoot, and the length of roots in each treatment. Analysis of features was done by SAS software and treetments average was compared, using Duncan’s test in 5% level.

RESULTS AND DISCUSSION

Results

1-The wet weight of cut grasses

According to the results from the average comparison of various salicylic acid densities, the most wet weight of cut grass in September 7 th was related to the absence of salicylic acid use. Furthermore, in all of the cut dates, The increase in salicylic acid density to 200 $\frac{mg}{L}$ reduced the length of cut grass remarkably(Table1).

Table 1. The average comparison of Wet weight of cut grass in dates

Measuring Date	July 3rd	August 5th	September 7th	October 7th
Control	52.12 ^a	58.30 ^a	60.24 ^a	41.82 ^a
Salicylic acid 100 (Mg/Lit)	50.32 ^a	54.11 ^b	59.54 ^a	38.32 ^b
Salicylic acid 200 (Mg/Lit)	32.45 ^b	37.80 ^c	46.08 ^b	31.99 ^c

*The means of each column, have not significant difference (P ≤ 0.05) Duncan's test.

2-Dry weight of cut grasses

According to the results from the average comparison of various salicylic acid densities, The most dry weight of cut grass in september 7 th was related to the absence of salicylic acid use .Furthermore , in all of the cut dates, the increase in salicylic acid density to 200 $\frac{mg}{L}$ reduced the dry weight of cut grass remarkably (Table 2).

Table 2. The average comparison of Dry weight of cut grass in dates

Measuring Date	July 3rd	August 5th	September 7th	October 7th
Control	13.29 ^a	15.23 ^a	15.61 ^a	10.63 ^a
Salicylic acid 100 (Mg/Lit)	13.11 ^a	12.42 ^b	15.21 ^a	9.43 ^b
Salicylic acid 200 (Mg/Lit)	8.14 ^b	9.35 ^c	12.40 ^b	7.77 ^c

*The means of each column, have not significant difference (P ≤ 0.05) Duncan's test.

3-The lengh of cut grass

According to the results from the average comparison of various salicylic acid densities, The most length of cut grass in Julu3rd related to the absence of salycilic acid use.

The increase in salicylic acid density to 200 $\frac{mg}{L}$ reduced the length of cut grass remarkably (Table3).

Table 3. The average comparison of the length of cut grass in dates

Measuring Date	July 3rd	August 5th	September 7th	October 7th
Control	141.80 ^a	148.00 ^a	113.14 ^a	105.40 ^a
Salicylic acid 100 (Mg/Lit)	135.53 ^a	139.12 ^b	110.14 ^a	95.34 ^b
Salicylic acid 200 (Mg/Lit)	108.32 ^b	119.90 ^c	85.29 ^b	88.56 ^c

*The means of each column, have not significant difference (P ≤ 0.05) Duncan's test.

4-The number of tillering

Results from the average comparison of various salicylic acid densities showed that The spraying on Zaysia grass with salicylic acid 200 increased the number of tillerings(61/44 tillerings). The application of salicylic acid 100 was not different significantly with control treatment (Table4).

5-Wet Weight of shoot

Results from the average comparison of various salicylic acid densities showed that The spraying on Zaysia grasses with salicylic acid 200 increased the wet weight of shoot (18g) .The application of salicylic acid 100 was not different significantly with control treatment and resulted in the reduction of wet weight shoot (Table 4).

Table 4. The comparison of various salicylic acid treatment on the number of tillering, dry and wet weight of shoot and the length of root

Factors measured	The number of tillering	Wet weight of shoot	Dry weight of shoot	The length of root
Control	48.05 ^b	12.02 ^b	2.25 ^b	113.05 ^b
Salicylic acid 100 (Mg/Lit)	50.00 ^b	11.00 ^b	2.00 ^b	112.00 ^b
Salicylic acid 200 (Mg/Lit)	61.44 ^a	17.05 ^a	4.06 ^a	121.70 ^a

*The means of each column, have not significant difference ($P \leq 0.05$) Duncan's test.

6-Dry weight of shoot

Results from the average comparison of various salicylic acid densities showed that The spraying on Zaysia grasses with salicylic acid 200 increased the dry weight of shoot (4g) .The application of salicylic acid 100 was not different significantly with control treatment and resulted in the reduction of dry weight shoot (Table 4).

7-The length of root

Results from the average comparison of various salicylic acid densities showed that the spraying on zaysia grasses with salicylic acid 200 increased the length of root (121/70 mm).

The application of salicylic acid 100 was not different significantly with control treatment and resulted in the reduction of root length (Table 4).

Discussion and conclusion

According to the results of this study , the length of cut grasses which were sprayed by salicylic acid was lower than cut grasses in control treatment . salicylic acid regulates spread , division , and cell death and makes a balance between growth and oldness(Popova, 1997).From the results of this study, it is estimated that the total weight of grasses shoot which were treated by salicylic acid increased remarkably. In most cases, This increase was due to increase of tillering. The increase of weight and tillering can be due to the increase of rooting depth and the increase of root absorption ability that cause to absorb more water and subsequently increase wet and dry weight, and tillering.

Since the efficiency of water use by plant opens the stomata and increases the gaseous interchange, This action increases the photosynthesis rate in plant (shekari, 2010).

Eventually, The increase of shoot dry weight can be due to the increase of leaf photosynthesis rate. According to the results of this study, planting grass in natural condition and control treatment is not recommended due to increase in the speed of grass growth and more caring. So, during the growth period, It is better to treat grasses with regulators like salicylic acid in order to prevent drying stress losses. Further more, the results showed that the salicylic acid 200 in form of spraying can be applied for increasing the quality and for keeping the Zoysia species.

Suggestions

- Regarding the Positive impact of salicylic acid spraying, it is recommended to carry out the other studies in relation to spraying times and spraying on the other grass species.
- Implementing the complementary researches in this case by researchers with various densities.

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