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ORIGINAL ARTICLE

EFFECT OF UREA FOLIAR AND ORGANIC FERTILIZER HUMIMAX APPLICATION ON GROWTH OF *YUCCA ALOIFOLIA* L.

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Abstract : The effect of paper spray in urea on zero, 0.25, and 0.50% concentrations of muscle fat was studied in the treatment of 0, 1 and 2 ml/L^{-1} concentrations in vegetative growth and *Agave demeesteriana* L. (0.50% urea + 2 ml / L-1 HomyMax) review the results of significant superiority compared to plants that are not allowed (comparatively) most of them attributes studied (plant height, number of leaves, stem diameter and paper area) (10, 50 cm, 12.83 sheets, 3.50 cm, 1188.92 cm^2) on the finish, in the largest number of leaves 10 leaves/plant when treatment of interference (0.50% urea + 1 ml/L^{-1} Hume Max). (0.25% urea + 1 ml / L-1 Hymax) 64 64 and the highest percentage of nitrogen, phosphorus and potassium at the desired treatment of 15.16 North, 0.98 px, 2.55 kb comparison.

Key words : Organic fertilization, Hyme max, Urea, Fodder fertilization.

1. Introduction

Agave demeesteriana L belongs to the family, Asparagaceae. It is a native of South East United States [Sultan *et al*. (1992)]. The stem of the plant remains submerged and uncut whereas the leaves are green stripes that grow up to 60 cm long and 20 cm wide. Typically, the plant height is two meters. When the plant grows in its native, the flowers bring aesthetic value and great importance. It is used for coordination purposes [Chase *et al*. (1998)]. Fertilization is one of the important and necessary factors that influence the growth, development and production of many plants [AL-Taey and AL-Musawi (2019), Burhan and AL-Taey (2018)]. The most important factor in the growth and development of plant is nitrogen an essential element needed by the plant. It encourages vegetative growth of the plants and strengthens the root group, a basic component of the cell protoplasm only next to water. 4% of the dry matter of the plant is nitrogen which is also an essential part in the formation of Chlorophyll during photosynthesis process [Hopkins (2006)]. The importance of plant nitrogen comes from the fact that it involves the synthesis of most important biomaterials in the plant, such as proteins, enzymes, nucleic acids (RNA and DNA), amino acids and plant hormones [Havlin *et al*. (2005)]. Urea is one of the most suitable forms of nitrogen that can be easily observed by plants [Bondada *et al*. (2001). A number of studies pointed out the importance of using urea paper fertilization to improve growth specifications. However, the organic fertilizers are preferred as an alternative to mineral fertilizers in order to improve plant strength and harvest pollution-free plants [AL-Taey (2017), Manae *et al*. (2019)]. HumiMax organic fertilizer is one of the most important organic fertilizers used in agriculture. It is an organic acid produced naturally and humic compounds are derived from the decomposition of organic matter. When these fertilizers are added to the soil, it dismantles heavy soil granules, improve its physical, chemical and biological properties by breaking the mud particles and increasing the ability of the soil to retain water. It is safe, highly soluble in water and easy to add. Being an effective alternative, it does not leave any harmful effects on human beings and plants. Further, the uptake of nutrients by the plant has also increased and it acts as a medium to transfer the nutrients from soil to plants, especially in case of drought. This organic fertilizer increases the root growth of the root group and improves it by increasing its dry and wet weight [Hartwigsen

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and Evans (2000)]. These fertilizers trigger the development of chlorophyll, collect sugars, amino acids and enzymes and assist in photosynthesis process [Chen *et al*. (2004)]. They also reduce the protein content in plants and reduce excess salinity problems that cause toxicity to the plant which burns the roots due to this increase [Al-Taey and Majid (2018)]. Al-Obaidi (2001) found the length of the stem, the number of leaves and the stem diameter of Indian rubber plant, *Ficus elastica* var. The yield of Decora got increased when fertilizing the plant with nitrogen and phosphorus using urea fertilizer (46%) and superphosphate (45%) in the concentration of (2 g urea + 2 g super phosphate) / pot with an increase in 22.24 cm and 22.88 sheets and 0.948 cm, respectively. The paper area was 2671.45 cm^2, the percentage of nitrogen was 4.97% and the percentage of phosphorus was 1.05% at the same concentration. El-Khateeb *et al*. (2010) concluded that the supplementation of *Chamaedora elegans* with Hemogreen fertilizer at a concentration of 5 g / pot with a diameter 40 cm, yielded the lengthy plant of height 76.33 cm compared to 52.67 cm from other such treatments. Phosphorene, at a concentration of 5 g/pot of diameter 40 cm, resulted in high leg diameter of 16.40 mm and large number of leaves with 11.67 sheets compared to 12.62 mm and 7.67 sheets in other such treatments. El-Tayeb and El-Sayed (2010) explained that the treatment with organic fertilizers Rhizobacterien, Biogien and Nitrobien for seedlings is limited to *F. binnendykii* (Amstel Queen cv.). When added in the rate of 0, 3 and 6 gm / pot five times and after one month every two times, it was inferred that all the fertilization factors added in this study resulted in significant improvement of all the measurements of vegetative and root growth, plant height cm, diameter of the leg mm, the number of branches and leaves / plant, fresh weight and dry cloud for each leaf, chlorophyll and carotenoids content in leaves in terms of mg / g fresh weight, percentage of total carbohydrates, nitrogen, phosphorus and potassium. The sovereignty was measured in all previous measurements of the treatment with peyogen at a rate of 6 g/pot.

The objective of the current study is to understand the effects of urea spraying and the addition of Hume Max organic fertilizer upon vegetative growth and chemical content of the plant so as to ensure green growth characteristics. The plants used in the study were transferred to large plants with high coordination value in the shortest possible time.

2. Materials and Methods

The study was carried out in wooden canopy at the Department of Gardening and Garden Engineering, College of Agriculture and Forestry, University of Mosul from March 2013 to June 2017 on *Agave demeesteriana* L. The plants planted in plastic pots of diameter 30 cm containing soil which was composed of garden soil and river sand in the ratio of 2: 1. The average height of plants was 30-35 cm with 10-12 leaves, and 1.50-2.00 cm stem diameter. The plants were then randomly distributed according to the experimental scheme. The soil was fertilized with 2 mm slot sieve after drying for 24 hours. Physical and chemical properties were estimated as shown in Table 1. Organic Hume Max, Urea and Hume Max organic fertilizers were added separately and their joint overlap in addition to the treatment of comparison. So, a total of nine sets of samples were experimented

1. Comparison.
2. Urea with 0.25% concentration.
3. Urea with a concentration of 0.50%.
4. HumiMax at 1 ml/L^{-1} concentration.
5. HumiMax at a concentration of 2 $ml/liter^{-1}$
6. Urea 0.25% + 1 ml/L^{-1} HumiMax.
7. Urea 0.25% + 2 ml/L^{-1} HumiMax.
8. Urea 0.50% + 1 ml/L^{-1} HumiMax.
9. Urea 0.50% + 2 ml/L^{-1} Hume Max.

The seedlings were sprayed with urea fertilizer in the early morning until it was fully wet. 1 cm^3/5 l of 20-Tween was added to homogenize the solution on leaves, and the organic humomax fertilizer was added to the soil by dissolving 1 mL of 1 liter water to prepare the concentration of 1 ml/L^{-1}. This concentration was then added to experimental seedlings (4) so that each of the seedlings received 1 liter as well as for the preparation of concentration 2 ml/l^{-1} melted with 2 ml humus max. water. All service operations, such as irrigation and hoeing, were carried out for all the seedlings in a similar manner and whenever needed. In the implementation of the study, randomized whole-world experiments (RCBD) design was followed with two factors: Urea and Homme Max with three levels each and three replicates, using 4 plants per experimental unit. The number of plants in this study was 108 plants whereas

the average was calculated through Duncan's Multiplicity test below 5% probability level [Daoud and Abd Elias (1990)]. The following characteristics were studied:

Leg length: The leg length of each plant was measured and recorded at the beginning and end of the study.

Number of leaves: The number of leaves per plant was calculated at the beginning and end of the study.

Leg diameter: The leg diameter of each plant was measured and recorded at the soil level using Vernier and the increase in leg diameter was calculated at the end of the experiment.

Paper area: The paper area was measured on the basis of dry weight according to the method followed in literature [Abdali (2002)]. In this method, a known area of the paper was taken and blown under electric oven at a temperature of 70 m until the weight is stabilized after 72 hours. Once the dry weight of that part known space was measured, then the calculations were carried out according to the following law:

Area Paper = Area of paper known × Dry weight of plant leaves total / dry weight of paper area information.

Number of Alkhalfat : The number of calves formed at the end of the experiment was calculated.

Determination of amount of chlorophyll in leaves using SPIL (Soil-Plant Analysis) type 502 Minolta USA [Perez-Sanz *et al*. (2002) and Sotiropoulos *et al*. (2005)].

Determination of nitrogen, phosphorus and potassium: The percentage levels of nitrogen, phosphorus and potassium were determined. The fourth is, following the developing summit of each replicator according to Johnson and Ullrich (1959).

3. Results and Discussion

The results shown in Table 2 indicate that there is a significant effect when treating paper spray between 0.50% + 2 ml/L^{-1} HumeMax in increasing the average leg length, number of leaves, leg diameter. The values for the interference treatment were 10 cm, 12.83 sheets/plant, 3.50 mm and 92.1188 cm^2 respectively, while the values for the comparison treatment were 2.34 cm, 2.06 leaves/leaves, 0.90 mm and 550.44 cm^2 respectively. The highest number of leaves was obtained from the treatment of 50.0% urea + 1 ml/L^{-1} of Hume Max, which significantly exceeded the comparison treatment but did not exceed most of the fertilizer treatments.

The positive effects of both urea and HumiMax can be explained by the increase in vegetative growth rates in this study, such as plant height to their content of NPK nutrients. Nitrogen affects some biological processes. It involves in the synthesis of proteins and nucleic acids that leads to increased growth whereas the role of potassium is critical in general physiological processes such as photosynthesis and respiration [Jendieh (2003)]. The reason for the increase in plant height is due to the role of elements in these fertilizers. During photosynthesis, these elements enters Porphyrin and during the construction of chlorophyll so as to reduce the respiration process and the construction of protoplasm once they also enter the synthesis of nucleic acids such as RNA and DNA which are necessary for division of cells and the increase in plant height [Al-Sahaf (1989), Metton and Dufault (1991) and Havlin *et al*. (2005)]. The increase in the number of leaves in above-mentioned treatments may be due to the fact that the nutrients in HumeMax. The increase in the number of leaves in plants is consistent with Abdul (1978), Metton and Dufault (1991), who found that the treatment of different plants with organic fertilizer increases the number of leaves in the plant. Previous results argue that the addition of both nitrogen and phosphorus increase the plant length, which is reflected in the increased number of leaves.

The effect of organic fertilization treatments on Qatari growth, as mentioned by Abdelkader *et al*. (2010) may be due to the role played by nitrogen in the process of building nutrients while increasing the rate of photosynthesis by increasing the paper area and its role in mesothelioma and cell division.

On the other hand, Al-Rayes (1982) discussed about the important role played by nitrogen in promoting the photosynthesis through the stimulation of enzymes. This increased the susceptibility of green tissue cells (containing chlorophyll) and increase its number and volume resulting in new mesothelioma that finally shows case Vegetative growth as outcome. It is believed that this increase in vegetative growth of plants is also due to the increased production of many vital and important plant materials such as proteins, nucleic acids (DNA and RNA) and chlorophyll. These vital materials that

possess nitrogen in their composition and their stimulation upon other materials is reflected in the increased paper area of plant (Table 2). The entry of nitrogen into IAA structure and the abundance of IAA encourages the increase in the number of cells, which in turn increases the paper area of the plant [Jendieh (2003)].

The results in Table 3 shows that most fertilizer treatments recorded a significant increase in the mean properties shown when compared with the comparison treatment. The highest percentage of chlorophyll achieved in the treatment of interference (25.0% urea + 1 ml/L^{-1} Hymax) was 64.30%, which also showed the highest significant increase in the average properties (percentage of nitrogen, phosphorus and potassium) compared with comparison treatment. The values of these characteristics were 15.16%, 98.0% and 55.2% respectively whereas the comparative treatment characteristics were 98.5%, 25.0% and 43.0%, respectively.

Table 3 shows the effect of urea paper spraying and addition of Hume Max in the percentage of chlorophyll and the percentage of nitrogen, phosphorus and potassium of yucca.

The increase in the percentage of chlorophyll in Table 3 is explained by the introduction of nitrogen element during porphyrin synthesis that enters the construction of chlorophyll [Havlin *et al*. (2005), Hopkins (2006)], as well as the construction of new plant proteins. IAA plays an important role in cell division and elongation with increased plant activity [Singh (2003)]. With regards to the interpretation of increased concentration of nitrogen in leaves, it may be due to the cooperative effect between urea and Hume Max due to increased absorption of urea by leaves. This decomposition occurs within the plant and release the nitrogen which gets concentrated in the leaves when compared to the seedlings of treatment of comparison, leading to increased concentration in the papers. In addition, spraying with urea may increase the amount of energy processed for the root system in the form of ATP, which makes the roots more efficient to absorb the nitrogen from the soil biologically and late season [Dong *et al*. (2002)]. The HumiMax increases the membrane permeability and helps in improved absorption of nutrients such as Kalntroyjan and the rest of the elements such as potassium, calcium, magnesium and phosphorus. This increases the movement through root hairs [Pascual *et al*. (1999) and acts as a chelating

Table 1 : Some physical and chemical properties of the soil used in the study.

Character	Value	Unit
Sand	46,55	$g.kg^{1}$
Salt	30.55	$g.kg^{1}$
clay	22.90	$g.kg^{1}$
pH	7.11	-
EC	1.10	$Disim.m^{-1}$
Organic matter	4.30	$g.kg^{1}$
$CaCO_3$	24	$g.kg^{1}$
Texture	Mixture	-
NO_3	20	$g.kg^{1}$
P	7	$g.kg^{1}$
K	3.3	$g.kg^{1}$

Table 2 : shows the effect of paper spray in urea and the addition of homytowards the increase in plant height, number of leaves, leg diameter, paper area and number of leaves of the yucca plant.

Tretmants	Number of abscesses	Leaf area (cm^2)	Increase in diameter of the stem head (mm)	Increase in the number of papers	Increase in plant height (cm)
Control	2d	44,550d	90, 0d	06,2e	34,2 e
25,0 % Urea	4c	61,671c	20,1c	88,3d	13,4 d
50,0 % urea	4c	67,630c	46,1c	88,3d	56,4 d
1 ml/l^{-1} HumiMax	4c	42,805bc	00,2bc	38,4d	86,4d
2 ml/l^{-1} HumiMax	7b	13,815bc	20,2bc	46,5cd	98,6c
Urea 25,0 % +1 ml HumiMax	8ab	64,856b	60,2b	66,7c	66,7 b
Urea 25,0 % + 2 ml HumiMax	8ab	55,867b	90,2b	66,8b	66,7 b
Urea 50,0 % +1 ml HumiMax	10a	21,946b	40,3a	75,9b	00,8 b
Urea 50,0 % + 2 mlHumiMax	8ab	92,1188a	50,3a	83,12a	00,10a

* Meanings followed by different letters and for each attribute indicating significant differences between them at the 5% probability level according to the Dunkin polynomial test

Table 3 : Effect of urea paper spraying and the addition of Hume Max in the percentage of chlorophyll and the percentage of nitrogen, phosphorus and potassium of yucca.

Tretmants	K%	P%	N%	Chlorophyll %
Control	43,0d	25,0cd	98,5d	80,50b
Urea 25,0%	61,0d	31,0c	04,8cd	53,55ab
Urea 50,0%	14,1c	48,0bc	08,8cd	73,54ab
HumiMax 1 ml/l^{-1}	32,1bc	57,0bc	44,10bc	73,59ab
Humi Max 2 ml / l^{-1}	55,1b	56,0bc	66,10bc	93,55ab
Urea 25,0% +1 ml HumiMax	94,1b	69,0bc	31,11bc	16,57ab
Urea 25,0% + 2 ml HumiMax	11,2b	75,0b	11,43bc	66,59ab
Urea 50,0% +1 ml HumiMax	55,2a	98,0a	16,15a	30,64a
Urea 50,0% + 2 ml HumiMax	00,2b	77,0b	60,13ab	93,63a

* Meanings followed by different letters and for each attribute indicating significant differences between them at the 5% probability level according to the Dunkin polynomial test.

prevent that washes the nutrients from soil standing and processing plant [Karmegam and Daliel (2008), Lateef *et al*. (2018) and Noori *et al*. (2018)].

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