Effect of spraying of Beta carotene on growth behaviour and chemical constituents of Acalyphya plants

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please mention correct botanical name with author citation *Acalypha wilkesiana* Müll.Arg or *Acalypha racemosa* Wall. ex *Acalypha marginata* (Poir.) F.W.Andrews Spreng. :[2S]Comment

1- Abstract

~~In a greenhouse of National Research Centre, Dokki, Giza, Egypt.~~ In July 2020 and 2021, a pot experiment was carried out in a greenhouse of National Research Centre, Dokki, Giza, Egypt to evaluate the effect of Beta-Carotene ~~Beta Carotene~~ (0,150, 200 and 250 ppm) spraying on growth and chemical constituents of Acalypha plants. The present study shows a considerable difference in the growth parameters when treated with Beta-Carotene ~~Beta Carotene~~ in two sprays, in four concentrations of (0,150, 200 and 250 ppm) with the control plants. Beta carotene showed unsignificant increase effect for all growth parameters except fresh weight of plant. The highest values for plant height, branches number, stem diameter, fresh and dry weight of plant, were obtained due to the use of beta carotene sprayed (150, 250, 0, 250 and 250 ppm), respectively. Also, the spraying beta carotene increased total chlorophyll, protein, carotenoids, K% and N % by 150 and 200 ppm respectively, while sprayed by beta carotene (250 ppm) gave the highest values of carbohydrate and anthocyanin percentage compared with the control. The aim of this work is known toeffect of beta carotene on growth and chemical compounds in this plant.

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Keywords: *Acalypha*, growth stimulant, Beta Carotene, ornamental plants.

2- Introduction

~~Acalypha wilkesiana~~ *Acalypha wilkesiana* Müll.Arg. belongs to family: Euphorbiaceae. ~~Acalypha~~ It has copperleaf, vegetative storage proteins are proteins that accumulate in vegetative tissues such as leaves, stems and tubers, depending on the plant species **[1]**. Plants are reservoirs of different phytochemical compounds and enzymes. These compounds can be alkaloids, tannins, volatile oils, flavonoids, saponins, tannins, phenolics, glycosides, etc. which has been assessed for their antioxidant, anti-mutagenic, anti-carcinogenic and other biological effects **[2]** and **[3]**.

Beta-Carotene is a member of the carotenoids, a group of red, orange, and yellow pigments. Beta-carotene can be found in green plants, carrots, sweet potatoes, green peppers, fruits, apricots, and whole grains. Carotenoids are natural pigments that play pivotal roles in many physiological functions. However, most reviews on this subject focus on carotenoids obtained from several microalgae, vegetables, fruits, and higher plants.

The importance of ~~b-carotene~~ β-Carotene as a source of vitamin A with special regards to pregnant and breast feeding women. In addition, they represent essential components of light-

harvesting and reaction center complexes of photosynthetic organisms **[4]**. Due to its high bioactivity, it is also widely used in medicine. It is considered as an inhibitor of some genes; moreover, it exhibits anticancer and antioxidant. Aim of work is known to effect of beta carotene on growth and chemical compounds in Acalypha wilkesiana ~~acalypha~~ plant.

3- Materials and Methods

On shoot of ~~*Acalypharacemose*~~*Acalypha racemosa* ,Wall. ex F.W.Andrews were transplanted in each plastic pots 20 cm in diameter which contain homogenous equal amount of soil contain a mixture of sand and loamy soil (1: 1) by volume. The pot were irrigated daily will equal amount of top water and were left in a greenhouse of National research centre under natural conditions of day length and illumination. The transplanting date were in the first week of July 2019. After 2 month from transplant in two sprays of Beta-Carotene ~~Beta Carotene~~ were carried out, the first was at 5 - 9 - 2019 and the second 15 days later. The experiment design was completely randomized block design. Growth parameters were carried put after 190 day from the first spray. When *Acalypha racemosa* Wall. ex F.W.Andrews ~~*Acalypha racemose*~~ greatly affected. The growth parameters of the plant statistically analyzed using T test at 5 % level of probability described by **[5].** The following date wasr_ecorded:

- Plant height., Branches number, Stem diameter,Fresh weight of pant. Dry weight of pant, Total Chlorophyll %, Carbohydrate %, Protein %, Anthocyanin %,10- Carotenoids,Na%,P %, k % and N %.

The following chemical constituents were determined:

1- Determination of pigments content (mg/g F.W) of chlorophyll A, B and carotenoids was carried out according to the method described by **[6]** and **[7].**

2- Determination of carbohydrates content (mg/g D.W.) was carried out according to the method described by **[8].**

3- Determination of elements content (mg/g D.W.) of Na %, N %, k % and P % was carried out according to the method described by **[9].**

4- Results and Discussion

Vegetative growth:

The results obtained in Tables (1) showed that the above-ground vegetative growth of *Acalypha marginata*, including plant height, branches number / plant, stem diameter, fresh and dry weight of plants, as affected by beta carotene sprayed concentration (150, 200 and 250 ppm), all previous growth parameters gave un significant increase effect, except fresh weight of plant. The highest values for plant height, branches number, stem diameter, fresh and dry weight of plant, were obtained due to the use of beta carotene sprayed (150, 250, 0, 250 and 200 ppm), respectively. In

1.Please provide Identification and collection details of *Acalypha wilkesiana* Müll.Arg or *Acalypha racemosa* Wall. ex F.W.Andrew used here for the Experiment **:[4S]Comment**
2. Please see here You have mentioned *Acalypha wilkesiana* plant name in Introduction and in Material and Method you mentioned *Acalypha racemosa* Wall. ex F.W.Andrews ...and in result and discussion *Acalypha marginata* (Poir.) Spreng. Which one is correct .....Or both plants used here for experiment.. please check it.

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this respect **[10]** them results showed that increasing antioxidant concentrations insignificantly ($P \leq 0.05$) decreased rate of seed germination except for sole beta-carotene treatments, as well as lower concentrations of Beta-Carotene ~~beta-carotene~~ resulted to increase in radical, hypocotyls length sand fresh weigh plant. Also, the previous mentioned results hold true with **[11]** mentioned that carotenoid metabolism will remain an intriguing and important research field in plant science, connecting photosynthesis, the primary metabolic process, with plant growth and development. Also, **[12]; [13]; [14] and [15]** mentioned that many works are focused on the different species of yeast synthesizing β-Carotene~~β-carotene~~, due to their high growth rate.

Chemical composition:

Our present study in Table (2) show increased in total chlorophyll, protein, carotenoids, and N % by spraying β-carotene, while sprayed by beta carotene (250 ppm) gave the highest values of carbohydrate and anthocyanin percentage. Whereas, untreated with beta carotene gave the highest values of Na, P and K percentage. In this regard, Carotenoids included compounds such as β-carotene have pronounced effect for plant growth, **[16]** reported that in photosynthetic tissues, carotenoids act as accessory light harvesting pigments and extend the range of light absorption and play a very important role in photoprotection and that maybe due to increase plant growth and elements uptake will be affected as will.

Table (1). Effect of carotene concentrations on growth parameters of *Acalypha* plants.

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Measurements / Treatments	Plant height	Branches number	Stem diameter	Fresh weight of plant	Dry weight of plant
0 ppm beta carotene	53	9.67	0.92	27	15.67
150 ppm beta carotene	61	13.33	0.74	35.33	12.67
200 ppm beta carotene	58.67	13.67	0.80	49	20.67
250 ppm beta carotene	59.67	14	0.73	51.33	16.33
L.S.D. 0.05	12.56	7.94	0.32	18.37	10.06

Table (2). Effect of carotene concentrations on chemical constituents of *Acalypha* plants.

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Measurements / Treatments	Total chlorophyll content %	Carbohydrate's content %	Protein content %	Anthocyanin content %	Carotenoid's content %
0 ppm beta carotene	0.18	3.41	11.59	0.20	0.14
150 ppm beta carotene	0.38	3.08	12.55	0.26	0.69
200 ppm beta carotene	1.28	3.29	13.51	0.32	1.65

250 ppm beta carotene	0.81	4.5	9.8	0.4	1.04
L.S.D. 0.05	0.02	0.10	0.09	0.02	0.02

Table (3). Effect of carotene concentrations on chemical constituents of elements analysis of *Acalypha* plants.

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Measurements / Treatments	Sodium content (Na %)	Phosphorus content (P %)	Potassium content (K %)	Nitrogen content (N %)
0 ppm beta carotene	1.33	0.41	1.84	1.85
150 ppm beta carotene	1.33	0.37	2.96	2.07
200 ppm beta carotene	1.12	0.34	2.24	2.16
250 ppm beta carotene	1.26	0.40	2.88	1.57
L.S.D. 0.05	0.02	0.11	1.31	0.02

5- References

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