



THE EFFECT OF SOME AGRICULTURAL MEDIA, THE AMINO ACID ARGININE AND CPPU ON THE GROWTH OF *Rosa* SPP.

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Abstract

This research was conducted in the department of horticulture and landscape, Faculty of Agriculture, University of Kufa in 2018-2019 season to study the effect of some agricultural media and spraying of Arginine and CPPU on the growth of *Rosa* spp. The experiment was conducted with two main factors and designed using RCBD with five pots for each experimental unit which contains three replicates. The first factor was agricultural media and the second factor was spraying combinations of the amino acid Arginine and CPPU on the vegetative parts of plants. Results showed that *Rosa* spp. plants that grown in A₂ medium in 1:2 ratio were higher in plant height (8.30cm) while the number of branches was higher in A₃ medium in 1:1:2 ratio when it recorded 10.25 branch.plant⁻¹. The floral characteristics of *Rosa* spp. (flower petals number, flower diameter and the date of flower buds) were higher in A₂ in 1:2 ratio which reached 71.97 petal.plant⁻¹, 8.72cm and 29.63 day.bud. A₂ medium in 1:2 ratio was exceeded other media in chemical indicators of chlorophyll and carbohydrates which recorded 72.02mg.100gm⁻¹ fresh weight and 61.22mg 100.gm⁻¹ dry weight. B₈ combination was given the best vegetative growth when plant height reached 82.62cm and B₉ was higher in the number of side branches 10.63 branch.plant⁻¹. While in floral indicators B₈ was exceeded in petals number and the date of flower buds (81.74 petal.plant⁻¹ and 21.44 bud.day). The flower diameter was higher in B₃ combination and reached 8.76cm, whereas, the spraying of B₈ exceeded significantly in leaves contents of chlorophyll and total dissolved carbohydrates which recorded 75.40 and 64.13mg.gm⁻¹ respectively.

Key words: *Rosa* spp., agricultural media, Arginine, CPPU, cytokinin.

Introduction

Rose is an important ornamental plant, it was planted since ancient times for its commercial use in hot, cold and temperate areas. Most roses are shrubs or climbers, fallen leaves and have 3-7 oval leaflets usually have a serrated and dry margin depending on cultivar and species, stems and branches have short and sharp thorns. Flowers are varied in color, size and have many petals (Aldagawy, 2004). Rose genus comprised of more than 100 cultivars and more than 20000 commercial originally came from 8 wild species. Human has been grown rose since hundreds years globally because of its beauty, fragrance and industrial and medical benefit (Kim *et al.*, 2003). Due to its multiple uses, rose plant has become the main cut flower, as it contains active materials and the petals distinguished by a beautiful aromatic scent (Almyah, 2001). Plants of rose are short less than 30cm and have small leaves, its flowers can be decorated balconies and gardens (Abozaid, 2008).

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Materials and Methods

The factorial experiment was conducted with two main factors and designed using RCBD with five pots for each experimental unit which contains three replicates with a total experimental plants 405 then means were compared by Duncan test at 0.05 (AL-Rawi and Khalf, 2000) using Gensetate program.

Treatments : Current study was conducted with two main factors:

A- Agricultural media which prepared with three combinations as follows:

- 1- River alluvium only (A₁) from Kufa River.
- 2- River alluvium + Peat moss (A₂) from Faculty of agriculture factory /University of Kufa.
- 3- River alluvium + Peat moss + commercial perlite (A₃).

B- Combinations of Arginine and CPPU as follows:

- 1- B1 (control).
- 2- B2 (50 arginine) mg.l⁻¹.

- 3- B3 (100 arginine) mg.l⁻¹.
- 4- B4 (1 CPPU) mg.l⁻¹.
- 5- B5 (2 CPPU) mg.l⁻¹.
- 6- B6 (50 arginine + 1 CPPU) mg.l⁻¹.
- 7- B7 (50 arginine + 2 CPPU) mg.l⁻¹.
- 8- B8 (100 arginine + 1 CPPU) mg.l⁻¹.
- 9- B9 (100 arginine + 2 CPPU) mg.l⁻¹.

Solutions of amino acid arginine and cytokinin CPPU were prepared then few drops of Tween20 as a spread substance after that, plants were sprayed on leaves using hand sprayer three times and three weeks between each one.

The following traits were studied:

- 1- Plant height (cm) was measured using a roller then the mean of each treatment was recorded.
- 2- Branch's number (branch.plant) was calculated on each plant.
- 3- Dry weight of total vegetative (gm) was calculated for all plants after draying in electric oven at 70°C.
- 4- Petals number (petal.flower) was calculated in each treatment.
- 5- Flower diameter (cm).
- 6- The date of flower buds (bud.day).
- 7- Leaves content of total dissolved carbohydrates (mg/gm-dry weight) was estimated by Acid Colorimetric Method (Psacm) modification of phenol sulphuric (Dubois *et al.*, 1956).

Results

The effect of agricultural media and spraying of combinations of Arginine and CPPU on vegetative growth indicators

Plant height (cm)

Results of Table 2 showed that there were significant effect of A2 medium (River alluvium + Peat moss) when it gave the highest value of plant height 80.30cm compare to other media, while A3 (River alluvium + Peat moss +

commercial perlite) gave the lowest plant height and recorded 71.28cm.

The spraying of combinations of Arginine and CPPU gave significant effect on plant height when it reached 82.cm in the combination B₈ (100 arginine + 1 CPPU) mg.l⁻¹, while B₆ (50 arginine + 1 CPPU) mg.l⁻¹ gave 66.35cm. The interaction between agricultural media and combinations of Arginine and CPPU gave also significant effect on plant height when A₂ medium and B₈ result in the highest value of plant height 94.21cm while A₃ and B₆ gave the lowest height 46.51cm.

Branches number (branch.plant).

Table 3 results showed that A3 medium had significant effect on side branches number and recorded 10.25 branch.plant, while A1 gave 8.75branch.plant only.

The effect of spraying of combinations of Arginine and CPPU recorded the lowest value of branches number when B₉ gave 10.63 branch/plant, while B₃ gave the highest value 11.54 branch/plant. The interaction between studied factors gave also significant effect on branches number when A₁ medium and B₆ result in the highest value 11.53 branch/plant⁻¹ while A₁ and B₃ gave the lowest number 5.33 branch/plant⁻¹.

Dry weight of total vegetative (gm)

Results of table 4 showed that there was significant effect on the dry weight of total vegetative when A₂ medium gave higher average value and recorded 18.21gm, while A₁ gave the lowest average value of dry weight 17.11gm.

Table 1: Peat moss contents.

Contents	Percentage%
N	2.2–2.8
P ₂ O ₅	0.8–1.2
K ₂ O	1.5–1.8
Na	0.01
CL	0.8
O.M.	60–70
PH	5.7–6.5
Moisture	12–15
C:N	1 : 14–1 : 18

Table 2: The effect of agricultural media and spraying of combinations of Arginine and CPPU mg/L on the average of plant height (cm).

Average A	Combinations of Arginine and CPPU mg/L ⁻¹									Media
	B9	B8	B7	B6	B5	B4	B3	B2	B1	
74.77b	78.27abcde	79.14abde	83.86abcd	84.18abcd	77.53abcde	73.83bcdef	6.16bcde	2.81ef	57.13fg	A1
80.30a	78.92abcde	94.21a	86.58abc	68.35def	77.14abcde	67.87def	80.32abcde	85.45abcd	83.83abcd	A2
71.28 b	78.22abcde	74.52bcde	69.18cdef	46.51g	65.48ef	90.27ab	68.45def	72.13cdef	76.80abcde	A3
	78.47ab	82.62a	79.87ab	66.35c	73.38abc	77.32ab	74.97abc	73.46abc	72.59bc	AverageB

*similar letters means there were no significant difference in Duncan test.

Table 3: The effect of agricultural media and spraying of combinations of Arginine and CPPU mg/L on the average of side branches number (branch/plant⁻¹).

Average A	Combinations of Arginine and CPPU mg/L ⁻¹									Media
	B9	B8	B7	B6	B5	B4	B3	B2	B1	BA
8.75c	10.57abcde	9.50cdefgh	11.16abcd	11.53a	8.23ghi	8.13ghi	5.33j	7.80hi	6.53ij	A1
9.35b	10.36abcde	8.56fgh	7.83hi	9.63abcde	10.73abcd	7.80hi	9.46defgh	10.46abcde	9.36defgh	A2
10.25a	10.66abcd	11.43ab	11.36ab	9.83abcde	11.33abc	8.30ghi	8.80efgh	9.90abcde	10.36abcde	A3
10.63a	9.83ab	10.12ab	10.33ab	10.10ab	8.07d	7.86d	9.38bc	8.75cd	AverageB	

*similar letters means there were no significant difference in Duncan test

Table 4: The effect of agricultural media and spraying of combinations of Arginine and CPPU mg/L on the average of the dry weight of total vegetative (gm).

Average A	Combinations of Arginine and CPPU mg/L ⁻¹									Media
	B9	B8	B7	B6	B5	B4	B3	B2	B1	BA
17.11b	19.74bcdef	22.14ab	19.16bcdefg	18.32cdefgh	15.83hijk	15.02ijkl	20.73abcd	11.87mn	10.81n	A1
18.21a	19.66bcdef	23.43a	19.59bcdefg	19.41bcdefg	16.92fghij	17.48efghi	21.22abc	14.29jklm	12.22lmn	A2
17.29b	20.31bcde	22.04ab	14.08jklm	16.60ghijk	17.95defghi	16.16ijk	22.04ab	13.77klm	12.68lmn	A3
	19.90b	22.54a	17.61cd	18.11c	16.90cd	16.22d	21.33ab	13.43e	11.79f	AverageB

*similar letters means there were no significant difference in Duncan test.

From table 4, it can be noticed that the effect of spraying combinations of Arginine and CPPU mg/L on the average of the dry weight of total vegetative gave significant differences when B₈ recorded 22.54gm compare to 11.79gm in B₁. While the interaction between the two studied factors gave also significant effect when A₂ and B₈ gave 23.43gm. Whereas, A₁ and B₁ gave the lowest value 10.81gm.

The number of flower petals (petal.flower)

Table 5 showed that there was significant effect of agricultural medium A₂ on increasing of flowers petals when it recorded 71.97petal/flower⁻¹, while A₁ medium

decreased the average number to 62.91petal/flower⁻¹.

The effect of spraying of combinations of Arginine and CPPU had significant effect on the number of flowers petals when B₈ gave 81.74petal/flower⁻¹, while B₂ gave the lowest number 57.61petal/flower⁻¹. The interaction between studied factors gave also significant effect on increasing petals number when A₂ medium and B₅ result in the highest number of petals 98.32petal/flower⁻¹ while A₁ and B₉ gave the lowest number 42.85petal/flower⁻¹.

Flower diameter (cm).

Results of table 6 showed that A₂ medium had significant effect and increased the average of flowers

Table 5: The effect of agricultural media and spraying of combinations of Arginine and CPPU mg/L on the average of flower petals number (petal.flower⁻¹).

Average A	Combinations of Arginine and CPPU mg/L ⁻¹									Media
	B9	B8	B7	B6	B5	B4	B3	B2	B1	BA
62.91c	42.85n	81.01c	73.28fg	46.73mn	74.95ef	80.07cd	61.52jk	46.09mn	59.66jk	A1
71.97a	78.27cde	76.09def	47.67m	52.53i	98.32a	59.28jk	88.30b	69.57gh	77.69cde	A2
65.56b	66.63hi	88.11b	63.17ij	85.79b	60.90jk	76.46def	45.18mn	57.16k	46.44mn	A3
	62.65e	81.74a	61.37e	61.68e	78.06b	71.94c	65.00d	57.61f	61.26e	AverageB

*similar letters means there were no significant difference in Duncan test.

Table 6: The effect of agricultural media and spraying of combinations of Arginine and CPPU mg/L on the average of flower diameter (cm).

Average A	Combinations of Arginine and CPPU mg/L ⁻¹									Media
	B9	B8	B7	B6	B5	B4	B3	B2	B1	BA
7.69b	8.99abc	5.89cde	8.21abc	6.91abcde	7.89abcd	6.38bcde	8.91abc	8.57abc	7.47abcd	A1
8.72a	7.11abcde	8.57abc	8.31abc	8.78abc	9.32ab	8.80abc	8.93abc	9.40ab	9.28ab	A2
7.04b	6.38bcde	8.02abcd	6.69abcde	5.13de	6.34bcde	9.63a	8.44abc	4.75e	7.97abcd	A3
	7.49ab	7.49ab	7.73ab	6.94b	7.85ab	8.27ab	8.76a	7.57ab	8.24ab	AverageB

*similar letters means there were no significant difference in Duncan test

Table 7: The effect of agricultural media and spraying of combinations of Arginine and CPPU mg/L on the average of flowers buds date (bud/day).

Average A	Combinations of Arginine and CPPU mg/L ⁻¹									Media
	B9	B8	B7	B6	B5	B4	B3	B2	B1	BA
32.63b	26.33bcde	22.00ab	32.00fghijkl	37.33lm	31.00efgh	33.00ghijkl	36.33hijklm	37.00lm	38.67m	A1
29.63a	28.67defg	20.00a	31.33efghij	29.33efg	31.33efghjk	31.33efghi	23.00abc	36.67ijlm	35.00hijklm	A2
30.56a	24.00abcd	22.33ab	27.33cdef	29.33efg	32.67ghijkl	32.67ghijkl	33.67gijklm	36.67ilm	36.33ijklm	A3
	26.33b	21.44a	30.22c	32.00c	31.67c	32.33c	31.00c	36.78d	36.67d	AverageB

*similar letters means there were no significant difference in Duncan test.

Table 8: The effect of agricultural media and spraying of combinations of Arginine and CPPU mg/L on the average of total dissolved carbohydrates (mg.gm⁻¹dry weight).

Average A	Combinations of Arginine and CPPU mg/L ⁻¹									Media
	B9	B8	B7	B6	B5	B4	B3	B2	B1	BA
33.85c	24.68nop	73.67de	41.14ijk	31.94klmn	10.92r	27.22mnop	44.72hij	16.93pqr	33.45klmn	A1
61.22a	60.09fg	90.75ab	39.06ijkl	22.23nopq	48.72hi	79.22cd	88.39bc	68.15ef	54.37gh	A2
39.75b	83.29bcd	27.97lmnop	29.46lmno	22.17nopq	18.84opqr	25.96nop	37.31jklm	99.52a	13.25ar	A3
	56.02b	64.13a	36.55d	25.45e	26.16e	44.14c	56.81b	61.54ab	33.68d	AverageB

*similar letters means there were no significant difference in Duncan test.

diameter of rose plants recording 8.727cm compare with 7.043cm in A₃.

The spraying of combinations of Arginine and CPPU gave significant increasing in the average of flower diameter when B₃ results recorded 8.763cm, while B₆ gave the lowest average 6.941cm. The interaction between the two factors gave also significant effect on increasing flower diameter when A₃ medium and B₄ result in the highest number of petals 9.637cm compare to A₃ and B₂ gave the lowest average of flower diameter 4.757cm.

The date of flowers buds (bud/day)

Table 7 results showed that A₂ medium was increased the date of flowers buds 29.63bud/day in comparison with A₁ which gave 32.63bud/day.

The spraying of combinations of Arginine and CPPU gave significant effect on the average of flowers buds date when B₂ results recorded 21.44bud/day compare to B₈ which gave the highest average 36.38bud/day. The interaction between the two studied factors gave also significant effect on the average of flowers buds date when A₂ medium and B₈ result in the lowest average 20.00bud/day compare to A₁ and B_{1(control)} gave the highest average of flower buds date 38.67bud/day.

Leaves contents of total dissolved carbohydrates (mg.gm⁻¹dry weight)

Table 8 results showed that there was no significant effect between agricultural media on leaves contents of carbohydrates and A₂ gave 61.22mg.gm⁻¹ dry weight, A₁ gave 33.85mg.gm⁻¹ dry weight.

Current study results showed that the spraying of

combinations of Arginine and CPPU gave significant effect on the average carbohydrates when B₈ results recorded 64.13mg.gm⁻¹ dry weight compare to 25.45mg.gm⁻¹ dry weight in B₆. The interaction between the two studied factors gave also significant effect on the average carbohydrates when A₃ medium and B₂ gave 99.52mg.gm⁻¹ dry weight compare to A₁ and B₅ which gave average carbohydrate of 10.92mg.gm⁻¹ dry weight.

Discussion

This study shows that rose plants in A₂ medium exceeded in vegetative growth characteristics, plant height (80.30cm), while plants in A₃ exceeded in side branches number (10.25) branch.plant⁻¹. The reason for that may be because the high percentage of organic material in peat moss which estimated up to 94-99%, in addition to low level of pH and high porous which make the peat moss absorbs water up to 8 times of its weight (Pleasant, 2008). Flowering characteristics improved in A2 medium such as petals number, flower diameter and flower buds date recording (71.97petal/plant⁻¹, 8.72cm and 29.63bud/day respectively). Alshekly, (2010) confirmed that peat moss medium was the best for cultivation and flower characteristics compare to sandy and mix soil.

Moreover, Nikrazm *et al.*, (2011) mentioned that peat moss + perlite medium was the best to improve the number and quality of *Lillium longiflorum*. While Altapakjely, (2012) studied the effect of spraying Brassinoliode, CPP and the intensity of magnetic field on the growth and flowering of two cultivars of snapdragon plant and mentioned an increasing in leaves contents of chlorophyll and total dissolved carbohydrates. Another

study confirmed that spraying 20mg.L of CPPU on *Zantedeschia aethiopica* increased flowers number significantly (Jwaied and Qassim. 2015).

Chemical indicators of rose plant showed an improving in A2 medium in comparison with other media particularly chlorophyll and total carbohydrates. Kakoei and Salehi, (2013) found when planting *Spathiphyllum* in different media, perlite + sand was the best in leaves area, the number of leaves, dry and fresh weight and stem height. Another study conducted by Alhassan, (2011) found that the spraying of proline and arginine on *Matricaria chamomilla* increased leaves content of carbohydrates and flowers number.

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