Kirkuk University Journal for Agricultural Sciences
ISSN:2958-6585
https://kujas.uokirkuk.edu.iq

RESEARCH ARTICLE
https://doi.org. 10.58928/ku25.16304

Chemical characterstic's response of Damask Rosa (Rosa damascene Mill) to Biofertilizer (azotobacter) and culture media.

Zainab Abbas Fadhil[1] Mateen Yilmaz Al-Bayati[1] Osamah Ibrahim Ahmed[1]
[1]*Department of Horticulture, College of Agriculture, University of Kirkuk-IRAQ.*
.*Corresponding Author: Znab37134@gmail.com.

Received: 13/03/2025 **Revised: 16/05/2025** **Accepted: 09/06/2025** **Published: 1/09/2025**

ABSTRACT

This study was conducted in a private nursery in Kirkuk Governorate during the growing season 2023-2024 on Damask Rose (Rosa damascene Mill).The plants were treated with media that consisting (Loamy soil +Sawdust) with three levels (0,5,10%) and biofertilizer (Azotobacter chroococcum) with four concentratios (0,8,16,24 g pot-1) which applied in three doses (2023/3/15 ,2023/9/15 ,2024/3/15). The experiment established according to Randomized Complete Block Design (R.C.B.D). The results showed that, the use of culture media with (10% saw shavings) led to a significant increase in leaves total chlorophyll content, anthocyanin pigment assessment in flower petals ,leaves nitrogen percentage, leaves phosphorus percentage and leaves potassium percentage compared with control treatment.Bio-fertilizer application with 24 g pot-1 led to significant difference in leaves total chlorophyll content, anthocyanin pigment assessment in flower petals, leaves nitrogen percentage, leaves phosphorus percentage and leaves potassium percentage compared with control treatment , when compared to the control characteristic, the following traits showed(leaves total chlorophyll content, leaves nitrogen percentage, leaves phosphorus percentage and leaves potassium percentage) notable variation as a result of the two-way interaction between the biofertilizer and culture media (24 g pot-1 +10%).

***Keywords*:** Rosa damascena , Azotobacter , Culture media , Biofertilizer, Azotobacter chroococcum.

Introduction

In general rose is a symbol of love and it is a source of beauty sense to satisfy human ,also it is an important popular commodity in global trade . The rose flower offers aesthetic and functional benefits, significantly enhancing the commercial and economic value of the plant [1]. Roses are deciduous or evergreen shrubs, depending on the species, with growth habits that may be upright ,creeping ,or climbing.Rose belonge to Rosaceae family, Rosa genus which contains 310 species and more than 30,000 commercial varieties[2]. Some varieties have stems with thorns arranged alternately. While the recent hybrid used as picking flowers, are free of thistles or may be very few[3]. The plant's compound leaves consist of leaflets arranged in opposite positions[4]. Additionally, the plant produces large, fragrant pink flowers , occasionally white. The flower has a thick, inverted flask-shaped receptacle containing dry fruits known as achenes , supported by a long pedicel . Whereas, sepals and petals numbers of panicle flowers multiples of five, with many stamen and carpel parts. The flower has a thick receptacle in an inverted flask shape contains inside dry fruits called seeds, with a long pedicel[5,6]. Growth media contain various substances that directly or indirectly influence plant growth and development. Which improves soil biological properties and creates a suitable environment for root system growth and soil microorganisms [7] .Sawdust considered as a growth media that can be used for ornamental plants growth, where it provides the plants with nutrients from the decomposition of their organic matter. Pine sawdust can be used for this purpose, where it contains a high percentage of carbon (50%) and (0.1%) of nitrogen[8] .A biofertilizer is a preparation containhng beneficial bacterial or fungi that colinize seeds or soil, enhancing plant nutrient uptake [9] . Azotobacter has beneficial effects on crop growth and productivity through biosynthesis of bioactive substances. Also, microbe stimulation in the root zone, fertilizers production and plant disease inhibitors, nutrient absorption modification and finally nitrogen fixation enhancement [10]. A study by [11] reported significant improvements in flower diameter, flower weight, flower yield and flower shelf life of *Dahlia variabilis* L. with (N80+P100+K100+ 2kg/ha Azotobacter) compared to the control. [12] demonstrated that treating gerbera plants with (*Azotobacter chrooccum + Bacillus subtilus + Glomus mosseae*) increased leaf area, chlorophyll total content, dry matter, floral stem diameter and anthocyanin pigment in petals.

Materials and methods

The experiment was conducted at Mohammed Nursery,Located on the main road between Kirkuk –Altun kobri ,Kirkuk Governotate, Iraq,during the 2023-2024 growing season (longitude 44.35 ,latitude 35.59). One-year- old Damask Rose (*Rosa damascene* Mill) seedlings were used this experiment. The following chemical characteristics were measured: total chlorophyll content in leaves , anthocyanin pigment assessment in flower petals(100 mg dry wt.$^{-1}$), leaves nitrogen percentage(%), leaves phosphorus percentage (%) and leaves potassium percentage(%). The Growth media consisted (loamy soil+ sawdust) at levels of (0,5,10%) and biofertilizer was applied at concentrations (0,8,16,24 g pot^{-1}). Data were statistically analyzed using the SAS (2001) program, and the means were compared using Duncan's Multiple Range Test at 5%. The experiment was designed using a randomized complete block design (R.C.B.D) with three replicates. Each replicate contained 12 experimental units and four observations for Each unit is experimental. Thus, the number of plants included in the experiment is 144.

Results

Table(1) showed that (Azotobacter) application at 24 g pot^{-1} gave a significant effect on leaves total chlorophyll content (17549) compared to control plants which gave the least value (16677.1). While, the highest significant influence of culture media was at level (10%) on leaves total chlorophyll content by recording (173653) compared to the non-application ,which amounted (16889.75). The interaction between culture media at (10)% and (24) g pot^{-1} of Azotobacter gave a significant effect of leaves total chlorophyll (17865.0) compared to the control treatment(15400.0).

Table1. Effect of Azotobacter biofertilizer and culture media on total chlorophyll content of *Rosa damascene* Mill.

Bio fertilizer gm Pot^{-1}	culture media%			
	0	5 % sawdust	10 %sawdust	Impact rate of bio fertilizer
0	15400.0 d	17266.3 bc	17365.0 abc	16677.1 c
8	17400.0 ab	17345.7 abc	16839.3 c	17164.6 b
16	17371.0 abc	17332.0 abc	17392.0 ab	17365 ab
24	17388.0 ab	17394.0 ab	17865.0 a	17549 a
Impact rate of Culture media	16889.75c	17334.5b	173653a	

The averages with similar letters for each factor separately and their interactions did not differ significantly according to Duncan's polynomial test at the 5% probability level.

Table(2) shows that (Azotobacter) application at 24 g pot^{-1} gave significant differences in anthocyanin pigment assessment in flower petals (8.87) compared to the control which gave the lowest value(6.00).The effect of culture Media noticed at (10%) which led to a significant difference in anthocyanin pigment assessment in flower petals (8.08)compared to control (7.74).The (10%)+24 g pot^{-1} interaction showed a significant effect on anthocyanin pigment assessment in flower petals by recording (8.77) compared to the control treatment (5.87).

Table 2. Effect of Azotobacter biofertilizer and culture media on anthocyanin pigment assessment in flower petals(100 mg dry wt.$^{-1}$) of *Rosa damascene* Mill.

Bio fertilizer gm Pot^{-1}	culture media%			
	0	5 % sawdust	10 %sawdust	Impact rate of bio fertilizer
0	5.87 d	6.14 cd	5.99 d	6.00 b
8	7.02 bc	7.36 b	8.34 a	7.75 ab
16	8.85 a	8.84 a	9.24 a	7.98 ab
24	9.20 a	8.65 a	8.77 a	8.87 a
Impact rate of Culture media	7.74 b	7.74 b	8.08 a	

The averages with similar letters for each factor separately and their interactions did not differ significantly according to Duncan's polynomial test at the 5% probability level.

Table (3) Azotobacter application at 24 g pot^{-1} gave significant difference on leaves nitrogen percentage (1.80%) compared to control plants (1.19%). Culture media had a significant effect on leaves nitrogen percentage which were higher in (10% saw shaving) (1.54%) compared to control (1.39%).Interactions between culture media and biofertiliser significantly affected leaves nitrogen percentage, where significant differences were observed between (10%) and Azotobacter with 24 g pot^{-1} (1.87%) copared to control treatment (1.13%).

Table 3. Effect of Azotobacter biofertilizer and culture media on the Leaf nitrogen content(%) of *Rosa damascene* Mill.

Bio fertilizer gm Pot^{-1}	culture media%			
	0	5 % sawdust	10 %sawdust	Impact rate of bio fertilizer
0	1.13 g	1.22 fg	1.22 fg	1.19 c
8	1.23 fg	1.33 ef	1.42 de	1.33 b
16	1.44 de	1.50 d	1.64 c	1.53 ab
24	1.74 bc	1.80 ab	1.87 a	1.80 a
Impact rate of Culture media	1.39 c	1.47 b	1.54 a	

The averages with similar letters for each factor separately and their interactions did not differ significantly according to Duncan's polynomial test at the 5% probability level.

Table (4) showed that ,Azotobacter application at 24 g pot^{-1} gave significant difference on leaves phosphorus percentage (2.88%) compared to control plants which gave the lowset value (2.30%). Culture media had Significant influence on leaves phosphorus percentage , where using (10%saw shaving) led to significant record (2.66%) compared to control(2.54%). There was a significant culture media and biofertiliser interaction on leaves phosphorus percentage, where Azotobacter application with 24 g pot^{-1} gave significant percentage of leaves phosphorus(2.92%) compared to control treatment(2.22%).

Table 4. Effect of Azotobacter biofertilizer and culture media on the Leaf phosphorus content(%) of *Rosa damascene* Mill.

Bio fertilizer gm Pot^{-1}	culture media%			
	0	5 % sawdust	10 %sawdust	Impact rate of bio fertilizer
0	2.22 g	2.29 g	2.38 f	2.30 d
8	2.46 ef	2.54 de	2.57 d	2.53 c
16	2.63 cd	2.67 c	2.78 b	2.69 b
24	2.85 ab	2.88 a	2.92 a	2.88 a
Impact rate of Culture media	2.54 c	2.60 b	2.66 a	

The averages with similar letters for each factor separately and their interactions did not differ significantly according to Duncan's polynomial test at the 5% probability level

Table(5) Azotobacter application by 24 g pot^{-1} gave significant difference in leaves potassium percentage (2.33%) compared to control which gave the lowest value(1.85%). While , culture media at (10% saw shaving) led to significant difference in leaves potassium percentage ,where it amounted (2.11%) compared to the control (1.99%). The interaction between culture media at(10%) and addition 24 g pot^{-1} of Azotobacter gave significant difference in leaves potassium percentage (2.39%) compared to the control treatment(1.81%).

Table 5 . Effect of Azotobacter biofertilizer and culture media on the Leaf potassium content (%)of Rosa damascene Mill

Bio fertilizer gm Pot^{-1}	culture media%			
	0	5 % sawdust	10 %sawdust	Impact rate of bio fertilizer
0	1.81 i	1.87 h	1.88 h	1.85 c
8	1.91 gh	1.94 fg	1.97 f	1.94 b
16	1.96 f	2.07 e	2.20 d	2.07 b
24	2.27 c	2.33 b	2.39 a	2.33 a
Impact rate of Culture media	1.99 c	2.05 b	2.11 a	

The averages with similar letters for each factor separately and their interactions did not differ significantly according to Duncan's polynomial test at the 5% probability level.

discussion

The results in table (1 and 2) shows a significant influence of biofertiliser and culture media on leaves total chlorophyll content and anthocyanin pigment assessment in flower petals. This influence may be due to the ability of fixation which links to nitrogen enzyme activity that contributed in inceasing plant nitrogen content [13]. Also, producing growth- stimulating hormones, especially auxin, some organic acids secretion and phosphate breakdown enzymes. This cloud improved phosphorus availability for the plant which also noticed results from table (3, 4 and 5) shows leaves nitrogen , phosphorus and potassium percentage responded significantly to the biofertilizer and culture media. This may be dua to the incease in elements concentration for the grown plants in growth media. This pushed the compounds to work as growth regulators to Enhance root establishment process to absorb nutrients from the soil solution. This outcome participate in increasing leaves total chlorophyll content and anthocyanin pigment assessment in flower petals [14, 15]. Also, nutrient content of organic media might improve vegetative growth traits, especially nitrogen and magnesium which are important in increasing leaves content of chlorophyll and anthocyanin pigment. Furthermore, may it linked to the content of culture media of necessary elements such as cellulose and hemicellulose or other compounds that encouraging plant growth[16, 17, 18]. Increased vegetative growth, which affected the increased of carbon metabolism products and elements accumulation, with the findings[19, 20, 21, 22]. It may also due to the biofertilizers effect in improving plant growth ,and the role of these bacteria in colonizing plant roots, which leads to an increase in adventitious roots number and root length and increasing plant nutrients absorption [23].

Conclusion

The results showed that culture media (10% sawdust) and biofertilizer (Azotobacter) at level (24 g pot^{-1}) led to a significant increase in (leaves total chlorophyll content, anthocyanin pigment assessment in flower petals, leaves nitrogen percentage, leaves phosphorus percentage and leaves potassium percentage) compared to other treatments.

Recommendation

The research recommends the use of culture media and biofertilization with higher concentrations on other ornamental plants.

References

[1.] Onder S, Tonguc¸ M, Erbas¸ S, Onder D, Mutlucan M. 2022. Investigation of phenological, primary and secondary metabolites changes during flower developmental of Rosa damascena. Plant Physiol Biochem. 192:20–34. https://doi. org/10.1016/j.plaphy

[2.] Bisby, F.A.; Roskov, Y.; Orrell, T.M.; Nicolson, D.; Paglinawan, L.E.; Bailly, N.; Kirk, P.M.; Bourgoin, T.;Baillargeon, G.; Ouvrard, D. Species 2000 and ITIS Catalogue of Life; 2020-09-01 Beta; Species 2000: Leiden,The Netherlands, 2020.

[3.] Andre, J.P. 2003 . Shoots and stems . In: AV Roberts, T Debener, S Gudin, eds. Encyclopedia of Rose Science, Vol. 2. pp 491-497.

[4.] Torre, S. 2003. Leaves . In : AV Roberts, , T Debener, S Gudin, eds. Encyclopedia of Rose Science, Vol. 2. pp 497-504.

[5.] Wissemann, V., and Ritz C.M., 2007. Evolutionary pattern and processes in the genus Rosa (Rosaceae) and their implications for host-parasite co-evolution . Plant Systematics and Evolution 266: 79-89.

[6.] Zielinski J. ;D. Tomaszewski ; M. Guzicka ;I. M. Rutkowska .2010. stomata on the pericarp of species of the genus Rosa L. (Rosaceae). Plant syst evol .284:49-55.
[7.] Ghehsareh, A. M. 2013. 'Effect of date palm wastes and rice hull mixed with soil on growth and yield of cucumber in greenhouse culture', pp. 1–5.
[8.] Gohil P, Gohil M, Rajatiya J, Halepotara F, Solanki M)Malam VR. et al Role of growing media for ornamental pot plants Int J Pure App Bio sci 2018;6(1):1219-24.
[9.] Jama, A. 2018.'Nitrogen Mineralization from Biofertilizer Azolla Mexicana Compared to Traditional Organic fertilizers؛ ,Colorado State University:1-50.
[10.] Lenart, A. (2012). Occurance characteristics and genetic diversity of Azotobacter chroococcum in various soils of southern Poland. Pol j environ stud. 21(2):415-424.
[11.] Kumar Narendar ,V.M. Prasad and Netra Pal Yadav (2019). Effect of chemical fertilizers and bio fertilizers on flower yield , tuberous root yield and quality parameter on dahlia (Dahlia variabilis L.) cv. Kenya orange . Journal of Pharmacognosy and Phytochemistry , 8(4):2265-2267.
[12.] Abdullatif,S.A.,and Mustafa,H.A.(2019).Effect of Biofertilizers and carbolizer on growth of Gerbera plant (Gerbera jamesonii).Plant Archives.19(1):1733-1754.
[13.] Kandil,H.,Gad.N., and Abdelhamid.M.T.(2013).Effect of Different Rates of Phosphorus and Molybdenum Application on Two Varieties Common Bean of (Phaseolus vulgarisL.).J.Agric.Food.Tech.3(3):8-16.
[14.] Abou I-yazeid EA, Abou-Aly E, Moussa M. (2007). Enhancing growth productivity dissolving microorganism (Bio-phosphor) combined with boron foliar. Agric. Biol. Sci. 3(4):274-86.
[15.] Mohammed A. H. and Abbas A. K.(2022) Evaluation of two promising chickpea genotypes for yield and its components under different levels of bio-fertilizer. Journal of kirkuk University for Agricultural Sciences ...Vol (13) No. (1).
[16.] Gordon,J.:R.J.Lightbourn; J.A.Griesbach; B.A.Novotny ; D .D. R. Clevidence and R.S,John .2008. Efeccts of anthocyanin and carotenoid combinations on foliage and immature fruit color of Capsicum annum L.journal of Heredity , 99(2): 105-111.
[17.] Fakhraddin M. H. S., Hasan S. S M.and Faraydwn K. A.(2018) Effect Of Growing Media, Seed Sizes And Stratification On Germination And Subsequent Seedling Growth Of Loquat (Eriobotrya Japonica L). Journal of kirkuk University for Agricultural Sciences ...Vol (9) No. (2).
[18.] AL-Bayati, M. Y. I., Ziad K. S., Kareema A. I. , Mohammed A. A. Lateef and Ahmed K. All-Kalefa (2020). EFFECT OF THE CULTURE MEDIA AND DIFFERENT LEVELS OF POTASSIUM FERTILIZER ON THE GROWTH AND FLOWERING On DIANTHUS CARYOPHYLLUS L. Int. J. Agricult. Stat. Sci. Vol. 16, Supplement 1, pp. 1275-1280.
[19.] Garai, S ., K, Brahmachari., S, Sarkar ., M, Mondal., H, Banerjee., M, K. Nanda and K, Chakravarty . 2021 . Impact of seaweed sap foliar application on growth, yield, and tuber quality of potato (Solanum tuberosum L.) Journal of Applied Phycology.33:1893-1904.
[20.] Abd-Alrahman, H. A. and F, S. Aboud. 2021. Response of sweet pepper plants to foliar application of compost tea and dry yeast under soilless conditions. Bulletin of the National Research Centre.45(1):1-9.
[21.] Yousif A. A.(2019) Effect of wounding and growing media on rooting of Barberry shrub (Berberis vulgaris) hard wood cuttings. Journal of kirkuk University for Agricultural Sciences ...Vol (10) No. (4).
[22.] AL-Bayati, Mateen Yilmaz I. and Ziyad Khalaf Salih (2021). Production of Dianthus Caryophyllus L. Cultivar (Haytor White) as Cut Flowers Using Day-Extension Treatment and Mulching . IOP Conf. Series: Earth and Environmental Science 910 - 012068.
[23.] Margit,O.(2016) The Effect ,P,R,C. 1982. Vermicompos Based Growth Substrates on Tomato growth . Journal of Agricultural Science .XXVII.38-41.021-10-03.

تأثير استبدال الذرة بنشأ البطاطا مع أو بدون مكملات انزيمية في علائق الدجاج البياض على صفات جودة البيض.

زينب عباس فاضل[1] متين يلماز البياتي[1] أسامة ابراهيم احمد[1]
[1]قسم البستنة وهندسة الحدائق، كلية الزراعة، جامعة كركوك، كركوك، العراق .

الخلاصة
اجريت هذه الدراسة في احدى المشاتل الأهلية العائدة لمحافظة كركوك في الموسم الزراعي 2024-2023 على نباتات الورد الدمشقي *Rosa damascene Mill* اذ تم معاملة النباتات بالوسط المكون من (التربة المزيجية+نشارة الخشب) بثلاث مستويات مختلفة (0,5,10%) واضافة المخصب الحيوي (*Azotobacter chroococcum*) بأربعة تراكيز مختلفة من سماد المخصب الحيوي (0,8,16,24 غم اصيص-1) على ثلاث دفعات . استخدم تصميم القطاعات العشوائية الكاملة(*R.C.B.D*). اظهرت النتائج ان استخدام الوسط الزراعي بمستوى (10% نشارة خشب) ادى الى تفوق معنوي في محتوى الاوراق من الكلوروفيل الكلي ، تقدير صبغة الانثوسيانين في بتلات الازهار ، النسبة المئوية للنتروجين في الاوراق، النسبة المئوية للفسفور في الاوراق، النسبة المئوية للبوتاسيوم في الاوراق مقارنة مع نباتات المقارنة. ادى اضافة المخصب الحيوي بتركيز 24 غم اصيص-1 الى فروقات معنوية في محتوى الاوراق من الكلوروفيل الكلي، تقدير صبغة الانثوسيانين في بتلات الازهار ، النسبة المئوية للنتروجين في الاوراق ، النسبة المئوية للفسفور في الاوراق ، النسبة المئوية للبوتاسيوم في الاوراق وذلك عند

مقارنتها بعدم اضافة المخصب الحيوي، وبالمقارنة مع صفة المقارنة اعطت الصفات التالية (محتوى الاوراق من الكلوروفيل الكلي ، النسبة المئوية للنتروجين في الاوراق، النسبة المئوية للفسفور في الاوراق، النسبة المئوية للبوتاسيوم في الاوراق) فرقاً معنوياً نتيجة التداخل الثنائي بين المخصب الحيوي ووسط النمو (24 غم اصيص-1 + 10%).

الكلمات المفتاحية: الورد الدمشقي، الوسط الزراعي ، التسميد الحيوي ،*Azotobacter chroococcum*, *Azotobacter*.