

Effect of root extract of liquorice *Glycyrrhiza glabra* L. on growth parameters of *Gerbera jamesonii* L.

MEDIA IZADDIN M.AMIN

College of Agriculture / Salahaddin University / Erbil / IRAQ

Abstract

Gerbera (*Gerbera jamesonii* L.) belongs to family Asteraceae. Foliar application provides nutrients to plants by mist in a straight line onto foliage and flora. The current study is an attempt to observe the effect of foliar application of *Glycyrrhiza glabra* L. root extract on potted *Gerbera* using five levels of liquorice root extractions (0, 3, 5, 7 and 9) g.l⁻¹. Two sprays that are made on liquorice root extract are sprayed on *Gerbera* plants in two spraying intervals: the first time was after 15 days of transplanting and the second time was after 30 days of the first time of spraying.

In general the results showed augmentation in studied plant characteristics (number of branches per plant (NB), number of leaves per plant (NL), number of Flowers per Plant (NF), flower diameter (cm) (FD), stalk length (cm) (SL), stalk diameter (cm) (SD) and vase life (day) (VL) with increasing liquorice root extract levels.

Key words: liquorice root extract , Asteraceae , Foliar application , *Gerbera jamesonii* L.

Introduction

Gerbera jamesonii L. is a genus of ornamental plants from the sunflower family Asteraceae (Brenzel, 1995).

The Barberton, Transvaal, African daisy or *Gerbera*, is a flower with increasing commercial significance. *Gerbera* is one of the leading cut flowers and ranks among the top ten cut flowers of the world (Parthasarathy and Nagaraju, 1999), it is the fifth most used cut flower in the world after (Rose , Carnation , Chrysanthemum , and Tulip) (Broek *et al.*, 2004).

There are two types of technologies that are appropriate for foliar application. First is the use of electrostatic sprayers, which convey a charge to the mist particles and cause them to stick more eagerly to plants. The second technology, known as Sonic Bloom™, uses sound to boost the leaves absorption of nutrients (George, 2003).

Glycyrrhiza glabra L. is known as liquorice and sweet wood, is native to the Mediterranean and certain areas of Asia Chopra *et al.*, (2002)

Liquorices' root contains triterpenoid saponins (4–20%), mostly glycyrrhizin, a mixture of potassium and calcium salts of 18 β-glycyrrhizic acid (also known as glycyrrhizic or glycyrrhizinic acid and a glycoside of glycyrrhetinic acid), which is 50 times sweeter than sugar. Other triterpenes present are liquiritic acid,

glycyrrhetol , glabrolide , isoglabrolide and liquorice acid (Isbrucker and Burdock, 2006).

There are number of studies which were done to exhibit the role of foliar

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application by liquorice root extract in plant growth characteristics. (Sahi, 2005) noticed the development of *Gerbera jamesonii* L. plant traits as leaves number, leaf area, flowers number and flowers diameter when she applied foliar spraying by liquorice root extract at a concentration 5g.l^{-1} .

In the other study Sahi, (2006) obtained the best result in the leaf number and leaf area when she applied foliar application by liquorice extract on *Antirrhinum majus* L. at a concentration 10g.l^{-1} . Also, she discovered the superior number of spike , tallest flower stalk , highest diameter of flower stalk , greatest leaf dry weight and highest plant dry weight by spraying the plants by 5 g.l^{-1} liquorice root extract with calcium chloride. Whereas the treatment at 10g.l^{-1} liquorice root extract with calcium chloride significantly increased flower vase life and percentage of carbohydrates in leaves compared with control non treated plants.

Recently, foliar spaying are extensively used in vegetable, fruit crops and ornamental plants that contain various essential nutrients, which are necessary for the proper growth and yield. So, present study is planned to examine the appropriate doses of natural nutrients in foliar application on growth parameters of *Gerbera jamesonii* L.

Materials and Methods

The present experiment was carried out at College of Agriculture, University of Salahaddin in Spring 2011-2012 to observe the effects of foliar application of liquorice (*Glycyrrhiza glabra* L.) root extracts on growth and flowering of *Gerbera jamesonii* L. newly transplanted plants (43 days after seed culture) at equal height were taken from nursery in 10 inches pots diameter. The plastic pots were used. These pots were filled with standard growing media (sand:peatmoss, 1:1) according to the layout of the experiment and transplanted next day in College of Agriculture, University of Salahaddin.

First irrigation was given just after transplanting; while subsequent irrigation was applied when needed. Hoeing was done regularly to keep down the weeds and staking was done to support the plant. The data was recorded as (number of branches per plant (NB), number of leaves per plant (NL), number of Flowers per Plant (NF), flower diameter (cm) (FD), stalk length (cm) (SL), stalk diameter (cm) (SD) and vase life (day) (VL).The experiment were conceded according to Completely Randomized Design (CRD). There were three replications comprising each five levels of liquorice root extractions (0 , 3 , 5 , 7 and 9) g.l^{-1} were taken in the study.

The aqueous solution of liquorice root extractions were prepared by mashing the root powder in hot water then leave about 24 hours for cooling the solution and filtering it by lawn.

Two sprays that are made on liquorice root extract are sprayed on *Gerbera* plants in two spraying intervals: the first time was after 15 days of transplanting and the second time was after 30 days of the first time of spraying.

The data regarding all parameters was investigated statistically by performing analysis of variance techniques (Steel *et al.*, 1997) and interpreted according to Duncan's Multiple Range (DMR) test at (0.05) probability level to compare the differences among treatment means.

Results and Discussion

Results showed that the *Gerbera* plant parameters significantly affected by liquorice root extract treatments. The data in (Table1) related to liquorice root extract levels which affects on the plant characteristics (number of branches per plant (NB), number of leaves per plant (NL), number of Flowers per Plant (NF), flower diameter (cm) (FD), stalk length (cm) (SL), stalk diameter (cm) (SD) and vase life (day) (VL). The highest value of all above plant traits were recorded by L9 (9 g.l⁻¹ liquorice root extract) which there were significant differences between this treatment and the other treatments except for number of leaves and stalk length where there were no significant differences between L9 and L7 for these two plant parameters in comparison with the other treatments (Table 1). As for L0, the lowest value was recorded for all studied plant characteristics.

The data in (Table 1) show that there were significant differences between L5 and L7 for number of leaf and stalk length characteristics, but there were no significant differences between L5 and L7 for the other plant parameters.

With regard to L3 and L5 the recorded data showed that there were significant differences between these two treatments for all plant traits excluding for vase life which not showed significant differences between L3 and L5.

This may be due to the role of some macro nutrients and micro nutrients in liquorice root extract such as N, Cu, Zn, Mn, Mg (Morsi *et al.*, 2008), Ca, K, Na (Al-Bachir, 2004) and it is very rich in Fe contents > 4000 µg/g (Ansari *et al.*, 2004). For instance N play several roles in plant growth which is necessary for formation of amino acids, the building blocks of protein, essential for plant cell division, vital for plant growth, directly involved in photosynthesis, necessary component of vitamins, aids in production and use of carbohydrates and affects energy reactions in the plant. As for micro-elements such as Cu, Zn, Mn and Mg in ethanol or water extract of liquorice contained these elements, for example: Mg plays a brisk role in the chlorophyll molecules and in many enzyme activities and is required for crops to capture the sun's energy for growth and production. While

Iron have very important role in many plant enzyme systems including the formation of chlorophyll (Barker and Pilbeam, 2006).

The above data are in close agreement with the results that represented by Bashir *et. al.*, (2013) who discovered that the number of branches per plant, number of leaves per plant, stalk length (cm) and flower diameter were significantly influenced by foliar application of micro nutrients on growth and flowering of *Gerbera jamesoni* L.

Also Khosa *et. al.*, (2011) demonstrated that Plant height, number of branches per plant, length of branches per plant, number of leave per plant, leaf area, stalk length, days to first flower emergence, flower diameter and flower quality increased with increasing fertilization level when they used Foliar Application of macro and micro nutrients on growth and flowering of *Gerbera jamesonii* L.

Finally the difference between the results of the present study and the results of the other investigators may be due to one or more of the following reasons: type, varieties, geographical origins, environmental condition or the method applied in the extraction-transportation and storage of the root.

Table (1): Effect of liquorice root extractions on *Gerbera* Plant Parameters

P.P. L.E.L. g.l ⁻¹	NB/plant	NL/plant	NF/plant	FD (cm)	SL (cm)	SD (cm)	VL (day)
L 0	1.7 c	22.7 d	6.3 e	8.0 c	20.3 d	0.38 c	8.3 c
L 3	3.0 c	38.3 c	11.7 cd	9.3 c	34.3 c	0.41 c	11.0 b
L 5	6.0 b	54.3 b	14 bc	11.3 b	38.3 b	0.46 b	11.7 b
L 7	7.3 b	62.7 a	16.0 b	12.0 b	41.7 a	0.48 b	12.7 b
L 9	12.0 a*	64.0 a	22.3 a	15.0 a	44.7 a	0.52 a	15.3 a

* Means followed by the same letter are not significantly different according to Duncan's multiple range test at 0.05 level

P.P.: Plant Parameters L.E.L.: Liquorices' root extract levels

L 0: 0 g.l⁻¹ L 3: 3 g.l⁻¹ L5: 5 g.l⁻¹ L7: 7 g.l⁻¹ L9: 9 g.l⁻¹

NB: Number of branches NL: Number of leaves NF: Number of flowers FD: Flower diameter

SL: Stalk length SD: Stalk diameter VL: Vase life

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تأثير مستخلص جذور عرق السوس *Glycyrrhiza glabra* L. في صفات النمو للجريبيرا *Gerbera jamesonii* L.

ميديا عز الدين محمد امين

كلية الزراعة / جامعة صلاح الدين / اربيل - العراق

الخلاصة

تعود الجربيرا (*Glycirrhiza glabra* L.) إلى العائلة (Asteraceae). تهدف الدراسة الحالية لبيان تأثير الاضافة الورقية لمستخلص عرق السوس لنباتات الجربيرا النامية في الاصص باستخدام التراكيز (0 و 3 و 5 و 7 و 9) غم.لتر⁻¹ صممت تجربة التصميم العشوائي الكامل (CRD) بثلاث مكررات. تم الرش بمستخلص جذور عرق السوس على نباتات الجربيرا برشتين: الاولى كان بعد 15 يوما من الزراعة والثانية كانت بعد مرور (30) يوماً من الرشة الاولى. أظهرت النتائج بشكل عام ازدياد قيم الصفات المدروسة (عدد الفروع في النبات، عدد الأوراق للنبات، عدد الزهور في النبات، قطر زهرة (سم) وطول ساق (سم) وقطر الساق (سم) وحياة الازهار (يوم)) مع ارتفاع مستوى تركيز مستخلص جذور عرق السوس.

الكلمات المفتاحية: مستخلص جذور عرق السوس و Asteraceae و الرش الورقي و *Gerbera jamesonii* L.