

Effect of water types on some growth parameters of wheat and broad bean plants under Al Baha KSA environmental condition

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Abstract: Effect of water types on some growth parameters of wheat and broad bean plants was investigated at Al Baha KSA. Wheat plant watered with sole Zamzam or Zamzam combined with either treated-water or tap-water gave pronounced increases in percentage of seed germination, shoot length, and shoot fresh and dry weight. Variation in growth parameter within water treatments on broad bean was negligible. However, percentage of flowering broad bean plants watered with Zamzam was considerable high compared with other water treatments.

Introduction

It is established that tap-water is one of the essential factor for planting. Several investigations have been focused mainly on the effects of water regime or drainage water on growth and subsequently yield of the plants (Sutcliffe, 1979).

As far as literature review concern, a very few. If any research work investigated the influence of Zamzam water on seed germination and growth of the plants. However, effect of Zamzam water on treated some human diseases is undertaken.

It is well known that Zamzam water existed from old time at Makkah in KSA since Prophet Abraham, and used for drinking. The amount of Zamzam water to consume by people visiting Makkah for Umra and Hajj is increasingly high. A considerable amount of Zamzam water goes into sewages. Therefore, the aim of this research work was to investigate the effect of zamzam water singly or in combination with either treated or tap water on percentage of seed germination and some plant growth parameter of wheat and broad bean. Both wheat and broad bean are the oldest crops as maintained in the Holly Quran “Surah Yussof part -12 and Surah Al-Baqarah part 2 ". These crops were used for human and animals diet and belong to different plant families.

Materials and Methods

This investigation has been carried out at faculty of community Al-Baha KSA., during (1428 H / 2008 G) growing season.

The experiment was design to investigate the effect of water type on percentage of seed germination and some growth characters of wheat (cereal) and broad bean (legume). Sterilized soil (Potting soil, Appendix 1) was placed in black plastic bags (10 cm in diameter) four seeds of wheat (*Triticum vulgare L.*) c.v. commercial or broad bean

(*Vicia faba L.*) c.v. Spain were sown in each bag. Ten replicates were used for each treatment. The plants were watered every 48 hours intervals.

The water treatments were:

- 1- Zamzam water (Appendix 2).
- 2- Treated water (Appendix 3).
- 3- Tap-water (Appendix 4).
- 4- Zamzam + treated water.
- 5- Zamzam + tap water.
- 6- Treated water + tap-water.
- 7- Zamzam + treated + tap-water.

Percentage of seed germination, some plant growth parameter were recorded *i.e.* shoot length (cm), shoot fresh weight (g) and shoot dry weight (g) as well as percentage of flowering for broad bean after two months of sowing. Physical, chemical and bacteriological analyses are listed in Appendix 2, 3, 4, 5, and 6.

Results

1- **Wheat:** Germination of wheat seeds was more rapid than faba bean seeds about 10 days earlier. Percentage of wheat seeds germination varied significantly ($P=0.05$) among the treatment under the study. Plant watered with Zamzam performed the highest percentage of seed germination (87.5%), followed by the plants watered with mixture of tap and treated water (80.5%), as illustrated in Fig. (1).

In terms of plant growth parameters, shoot length differed significantly ($P=0.5$) within the treatments. The highest shoot length was found in the plants watered with mixture of Zamzam and treated water (17.39 cm) followed by the plants watered with sole Zamzam water (17.32cm), then the plants watered with mixture of Zamzam and tap water (16.24cm) respectively as shown in Table (1).

A high significant difference was detected among the treatments. The highest value was found in the plants watered with Zamzam water (4.12g) followed by the plants watered with mixture of Zamzam and tap (3.60g) and that watered with mixture of Zamzam and treated water (3.49g). Nevertheless, the lowest value of shoot fresh weight was detected in the plants watered with either treated water (2.23g) or tap water (2.58g) Table(2).

The highest shoot dry weight was found in the plants watered with Zamzam water (1.93g), followed by the plants watered by mixture of Zamzam and treated water (1.25g). Whereas, the lowest value was recorded in the plants watered with tap water (0.62g), Table (3).

2- **Broad bean:** Data illustrated in (Fig. 2) demonstrated percentage of faba bean seed germination. No significant differences among the treatments under study were found.

In regards to growth characters of broad bean, a significant differences ($P=0.5$) among the treatment in shoot length was found, (Table 4). However, the highest shoot length was recorded in the plants watered with tap water (25.40cm), followed by the plants

watered with treated water (24.80cm) then the plants watered with mixture of Zamzam and treated water (24.70cm).

No significant differences were found among the treatments in terms of shoot fresh weight, (Table 5). However, the highest value was detected in the plants watered with tap water (31.38g) followed by the plants watered with mixture of Zamzam and tap water (30.66g) and the plants watered with Zamzam and treated water (30.31g).

Concerning shoot dry weight (Table 6), the highest value was recorded in the plants watered with tap water (5.98 g), followed by the plants watered with Zamzam (4.89g).

Data illustrated in (Fig. 3) demonstrated percentage of flowering in broad bean plants. The highest percentage of flowering was shown in the plants watered with either Zamzam or mixture of Zamzam and treated water (35.0%). Followed by the plants watered with treated and tap water (30.0 %).

Discussion

The obtained results clearly demonstrated that wheat plants irrigated with sole Zamzam water or Zamzam combined with either treated or tap water gave high percentage of seed germination and obvious increase in plant growth parameters. On the other hand, broad bean—unlike wheat irrigated with Zamzam water did not improve plant growth parameter compared with other types of water. However, flowering status was improved in broad bean treated with Zamzam water.

It is known that tap water - in general – affects all aspects of plants physiological process. These including seed germination, leaf expansion, maintenance of leaf area, stomata status, photosynthetic rate and flowering as well as grain production (Day and Legg, 1983). The variations between water treatments with Zamzam and often water types on wheat plant growth may be attributed to the physical and chemical analysis of the water used.

It is well established that the mineral elements essentials for the successful development of wheat and /or broad bean are not very different from those of any other plant (Peat, 1983). However, most of the detailed work on minerals metabolism has been restricted to a few of the micronutrients and heavy elements. Thus the dramatic reduction in meristem activity following some mineral deficiency were reported by Slack and Whittington (1964) and found to be associated with reduction in cell division and extension, probably caused by abnormalities of cell wall synthesis and growth rather than by interference with mitosis parse.

Accordingly, the chemical analysis of the water used. Appendix (2-4) demonstrated that Zamzam water contained a considerable amounts of elements than that found in treated or tap water *i.e.* total hardness, calcium, magnesium , potassium , copper , chlorides, nitrate , bicarbonate , and total dissolved solids (T.D.S). Whereas, iron, ammonium, and lead were exist in Zamzam water with less amount than that in tap and treated water. These elements contents in Zamzam water may be responsible – partly – to the increase in plant growth of wheat compared with tape /or treated water.

Also, the physical analysis of water used indicated that Zamzam water is not sediment unlike tap water. Moreover, the most striking differences were conductivity. The conductivity of Zamzam water was 5 and 3 fold of that in treated and tap water respectively.

The reason(s) why wheat plants were more affected by Zamzam water than broad bean plants in this investigation – is not known. Nevertheless, differences between legume (Broad bean) and cereal (wheat) in growth habits and their response to water treatment are more likely to explain partially, such differences occur. However, flowering percentage increased in broad bean plants treated with Zamzam water. These increases in flowering can attribute to forming grain and subsequently increase the total yield of crop (Alvino et al, 1982).

Finally, according to the present investigation one can speculate about get benefits from the huge amounts of Zamzam water to be use in different aspect of agriculture especially in water culture technique, tissue culture droplet irrigation or sprinkler system irrigation in green house.

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الحسن محمد إبراهيم و الممتاز إبراهيم صالح 1908 ملوثات البيئة أضراره ومصادرها وطرق مكافحتها، الطبعة الأولى (55-73). الرياض مكتبة الخريجي

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تأثير أنواع مختلفة من المياه علي خصائص النمو في نباتات القمح و الفول البلدي تحت ظروف منطقة الباحة بالسعودية

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تم دراسة تأثير أنواع المياه علي خصائص النمو في نباتات القمح و الفول البلدي تحت ظروف منطقة الباحة بالسعودية . أظهرت النتائج أن نباتات القمح التي رويت بماء زمزم فقط أو خليط من ماء زمزم مع الماء المحلاة أو ماء الصنبور أعطت زيادة ملحوظة في نسبة إنبات الحبوب وأطوال المجموع الخضري والوزن الطازج والجاف للمجموع الخضري.

الاختلافات بين المعاملات المائية علي نمو الفول البلدي كانت غير معنوية. ولكن أظهرت النباتات التي رويت بماء زمزم زيادة في نسبة التزهير مقارنة بالنباتات التي رويت بالمعاملات المائية الأخرى.

تأثير أنواع مختلفة من المياه علي خصائص النمو في نباتات القمح و الفول البلدي تحت ظروف

منطقة الباحة بالسعودية

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