THE EFFECT OF SOIL MULCHING AND FOLIAR SPRAY OF
POTASSIUM CHLORIDE ON FLOWERING, FRUITING, FRUIT
CHARACTERISTICS AND YIELD OF OLIVE TREES CV.
MANZANILLO AT NORTH SINAI PENINSULA.
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ABSTRACT

Flowering, initial fruit set, fruit retention, fruit characteristics and yield of olive
trees cv. Manzanillo under the conditions of El-Maghara region, North Sinai Peninsula
as affected by soil mulching around the trunk (using Polyvinyl acetate 1:1 v/v) and
foliar spray of potassium chloride (0, 1 and 2 %) were studied in the two seasons of
2003 and 2004. The results obtained revealed that, soil mulching treatment
significantly increased the mean flower number per inflorescence, inflorescence
number per meter length, initial fruit set, fruit retention but did not affect the perfect
flower percentage. Meanwhile, fruit weight, volume and flesh weight increased
significantly by soil mulching, especially during the second season, while fruit shape
index, flesh/fruit % and flesh thickness did not differ significantly compared to control.
Foliar spray of 2 % KCl increased the mean flower number and inflorescence number
per meter. However, foliar spray of 2 % KCl followed by 1 % KCl increased
significantly initial fruit set, fruit retention compared with control trees. 2 % KCl spray
enhanced significantly fruit and flesh weight compared with both of 1% KCl and
control during the second season. Moreover, 1 % and 2 % KCl increased significantly
flesh thickness compared with control. Concerning the interaction between soil
mulching and foliar spray treatments, mean flower no., Initial fruit set and fruit
retention were increased significantly by soil mulching and 2 % KCl. However, fruit
volume and weight, flesh weight and flesh thickness increased significantly by soil
mulching and 2 % KCl during the second season.

Soil mulching and KCl foliar spray enhanced tree yield significantly. However,
Generally the yield in the second season was greatly increased than that obtained
during the first season.

Keywords: Olive (Olea europaea L.), cv. Manzanillo, Soil mulching, potassium
chloride, Foliar spray, Flowering, Fruiting, yield.

INTRODUCTION

The olive tree is native to the Mediterranean region, tropical and central
Asia and various parts of Africa. The olive has a history almost as long as
that of western civilization. At a site in Spain, Carbon- dating has shown olive
seed found there to be eight thousand years old. Olea europaea may have
been cultivated independently in two places, Crete and Syria.

Olive tree yields two main products, olive oil and various types of
pickled olives. Manzanillo is a double purpose cultivar and it characterized by
large, rounded- oval fruit, skin brilliant purple, changing to deep blue-back
when mature, excellent for oil and pickles.

Few studies were conducted on the effect of foliar spray of KCl and
soil mulching on flowering fruiting and fruit characteristics of olives. Laz
Hegazy (2001) reported that in Manzanillo olive trees, the perfect flower percentage varied from year to year. Sari El-Deen and Fadl (1977) in a study on some olive cultivars, they concluded that the increase in yield was a result of some increase in number of inflorescence and in number of perfect flowers, which consequently lead to an increase in fruit set and yield. Abbas and El-Khoreiby (1988) reported that fruit retention after about 20 days from the end of blooming was sharply reduced, then approximately steady up to harvest. They added that the critical period that affecting the yield of olive trees located within 20 days after petal fall.

Shaheen (1995) revealed that the initial fruit set as well as the final fruit set were improved by treatments of foliar spray, especially by Boron and Zinc treatments. He added that the density of flowers increased significantly, especially with application of B and Zn treatments, and the heaviest fruit yield of picual olive trees was obtained by spraying trees with B, Zn or Mg with the superiority of Zn treatments.

QinXuanNan et al., (1993) stated that foliar application of 2 % KCl on Eureka lemon resulted in improving the quality and yield of local lemon production. While, Brahmachari, et al., (1997) reported that foliar feeding of calcium (calcium chloride, 1 and 1.5 %) and potassium (potassium nitrate, 1 and 1.5 % and potassium chloride a and 1.5 %) resulted in improving yield of guava (Psidium guajava L.).

Concerning soil mulching practices, Sharma and Acharya (2000) found that mulching during standing crop of maize was most effective in conserving rainwater, mulching at maize harvest is either good as good or inferior to mulching in the standing crop of maize, depending on the rainfall events. Mulching significantly increased maize yield during third cropping cycle onwards. Kirchhof et al., (2000) indicated that mulch as a soil amendment tended to increase yields in drier areas due to its water conservation effect. In wet areas mulching was not necessary and could lead to yield reduction if conditions were too wet.

Generally, Alleviating the adverse environmental conditions is of a vital important for vigorous and long-term production of the agricultural crops.

From this point of view, the current study was conducting during the two seasons of 2003 and 2004 at El-Maghara region, which located at very dry conditions, hence, plants suffer from drastically processes of sand encroachment, limited water resources and other adverse climatological conditions.

The main objective of this study was to investigate the role of soil mulching and foliar spray of KCl on flowering, fruiting, fruit characteristics and yield of olive trees under the stress conditions of El-Maghara region.
MATERIALS AND METHODS

This investigation was carried out in El-Maghara Research Station, which located at 80-km southwest El-Arish City, during the two seasons of 2003 and 2004. The objective of this investigation is to study the effect of soil mulching using polyvinyl acetate (1:1 v/v) and foliar spray of KCl (0, 1 and 2 %) on flowering, fruiting, fruit characteristics and yield of 12-years old olive trees. Foliar spray of Potassium chloride (0, 1 and 2 %) was applied simultaneously with treatment of soil mulching during three periods of olive tree development. The first application was before full bloom (March), the second application after fruit set (June) and the last application was conducted 2-months before harvesting (September) during the two seasons of the study. The experiment designed in a randomized complete blocks. Three replicates were selected for each treatment, three trees for replicate.

Fifteen shoots one year old (Olea europaea L. cv Manzanillo) each tree were chosen at random and labeled. Thirty inflorescences were randomly chosen on each tree for estimating the perfect flower percentage. Twenty shoots of one year old on each tree were labeled for counting mean flower number at full bloom. Initial fruit set determined after 7 days of petal fall and fruit retention was recorded after 20 days of the end of blooming (Abbas and El-Khoreiby, 1988).

Fruit characteristics; weight, volume, shape index, flesh weight, flesh/fruit percentage and flesh thickness was recorded after harvesting on mid of October during the two seasons of study. Data were statistically analyzed according to Sendecor and Chochran (1972). Mean differences were conducted using Multiple Range Duncan’s LSD$_{0.05}$ by MSTATC Program.

RESULTS AND DISCUSSION

1. Effect of soil mulching
   1.1. Average no. of flowers/ Inflorescence
   The obtained data (table 1) showed that, the average no. of flowers/Inflorescence was increased significantly by soil mulching treatment as compared with control, in both seasons. The recorded values were 12.22 and 11.24; 11.45 and 10.85 respectively.

   1.2. Average no. of inflorescence/ meter
   Soil mulching treatment increased the inflorescence number/ meter as compared with the control. The records achieved during first and second seasons were 42.07 and 41.75; 51.79 and 51.01 respectively, table (1).

   1.3. Perfect flower percentage
   Table (1) show that, the perfect flower percentage was not affect by soil mulching.

   In general, it can be observed that, during the second season the inflorescence number/ meter and the perfect flower percentage increased than in the first season. This may be attributed to the increase of carbohydrates reserved from the previous “off ”year.
This result is in agreement with findings obtained by Laz (1993), Shaheen (1995) and Hegazi (2001), where they found that such parameters are changeable from season to season.

1.4. Fruit set

The results obtained, show that the initial fruit set increased significantly by soil mulching it recorded 11.18 and 10.26; 16.14 and 14.83% in trees treated by soil mulching and the control during the first and second season, respectively. (Table 1).

Fruit retention, also increased significantly by soil mulching treatment recording 1.391 and 1.282; 2.00 and 1.86 % in trees treated by soil mulching and in the control during the first and second season, respectively.

However, results of the second season indicated that the initial fruit set after 7 days from petal fall increased than in the first season, the same trend obtained in fruit retention. Moreover, during the two seasons of the study, the percentage of fruit retention after 20 days after the end of blooming was greatly decreased than result obtained after 7 days from petal fall. The results obtained are in agreement with that obtained by Abbas and El_khoreiby (1988).

1.5. Fruit characteristics

From data presented in table (2), it can be observed that, fruit weight, volume and flesh weight during the first season was not affected by soil mulching treatment compared with control. However, in the second season the same parameters increased significantly as affected by soil mulching compared with the control. Moreover, fruit shape index, flesh/fruit % and flesh thickness were not affected by soil mulching treatment compared with the control in the two seasons of study. This may be due environmental factor especially rainfall, Sharma and Acharya (2000).

1.6. Yield

Figures (1 and 2), show that the yield of olive trees was enhanced significantly by soil mulching treatment compared with control. The values obtained were 4.93 and 4.25; 11.99 and 11.57 kg/tree in trees which applied by soil mulching and the control in the first and second seasons, respectively. The results obtained is in agreement with that obtained by Kirchhof et al (2000).

2. Effect of Foliar spray of potassium chloride:

2.1. Average no. of flowers/ Inflorescence

From table (3), it can be concluded that, mean flower number increased by foliar spray of KCl 1% and 2 % as compared with control. In the second season, mean flower number increased significantly by application of KCl 2 % compared with using 1 % and control it recorded 11.78, 11.32 and 10.35, respectively.

2.2. Average no. of inflorescence/ meter

From the results obtained in table (3), during the first season, the average no. of inflorescence/ meter was not affected by foliar spray of KCl. However, in the second season the application of 1 % and 2 % KCl significantly affect the inflorescence no. per meter compared to control. The recorded values were 52.05, 51.75 and 50.42 respectively.
2.3. **Perfect flower percentage**  
Data of table (3) show that the effect of foliar spray of KCl was not significant on the perfect flower percentage during the two seasons of study. However, it increased in the second season than in the first season.

2.4. **Fruit set**  
Fruit set increased significantly by using 2 % KCl followed by 1 % KCl compared with the control. The recorded values were 11.90, 10.84 and 9.42; 17.48, 15.61 and 13.38 % respectively during the first and second season. Moreover, fruit retention reduced greatly to 1.51, 1.33 and 1.16; 2.16, 1.95 and 1.67 % in trees sprayed by 2%, 1 % KCl and the control during the first and second season respectively, table (3). These results are agreement with Abbas and El- khoreiby (1988), Hegazy (2001), Laz (1993) and Shaheen (1995).

2.5. **Fruit characteristics:**  
From table (4), fruit shape index and flesh/fruit percent were not affected by foliar spray of KCl during the two seasons of study. However, fruit weight, volume, flesh weight and flesh thickness were not affected by foliar spray of KCl during the first season, while in the second season, fruit weight increased significantly by using 2% KCl followed by 1 % KCl compared with control it recorded, 7.74, 7.25 and 7.14 gm, respectively. Fruit volume and flesh weight increased significantly by using 2 % KCl compared to both of 1 % KCl and the control. Moreover, flesh thickness increased significantly by foliar spray of 1 % and 2 % KCl compared with control. The results obtained are in agreement with those obtained by QinXuannan et al (1993)

2.6. **Yield**  
As shown in figures (1 and 2) the application of 2 % KCl was of superior affect on the yield/ tree followed by that applied with 1 % KCl compared with control trees. The recorded values were 5.09, 4.57 and 4.08; 12.05, 11.57 and 11.51 kg/tree respectively during the first and the second season. However, tree yield in the second season increased greatly than in the first season this may be due to the effect of previous low crop of the off year. The results obtained are in agreement with those obtained by Sari El-Deen and Fadl (1977), Shaheen (1995), Laz (1993) and Brahmachari et al., (1997).

3. **Effect of Soil mulching and Foliar spray of KCl**

3.1. **Average no. of flowers/Inflorescence**  
From table (5) it can observed that, average flower no. per inflorescence increased significantly in trees treated by both of soil mulching treatment and foliar spray of 2 % KCl as it recorded 12.60 and 12.13 in the first and second season respectively.

3.2. **Average no. of inflorescence/ meter**  
Average no. of inflorescence/ meter, during the first season was not differ significantly by foliar spraying of KCl levels and by soil mulching.
However, in the second season, treatments of soil mulching with 1 % KCl, soil mulching with 2 % KCl and without soil mulching with 1 % KCl recorded the highest values, recording 52.34, 52.24 and 51.76 inflorescence, respectively, table (5).

3.3. Perfect flower percentage
It did not affected by soil mulching with foliar spray of KCl levels, table (5).

3.4. Fruit set
The data achieved show that the soil mulching treatment with application of 2 % KCl significantly enhanced fruit set and fruit retention compared the other treatments, table (5). The recorded values were 12.52 and 18.41% for fruit set percentage, and 1.60 and 2.27 % for fruit retention in the first and second season respectively.

3.5. Fruit characteristics
Fruit shape index did not affect by soil mulching and KCl levels during the two seasons. Although, during the first season fruit weight, volume, flesh weight, flesh/fruit % and flesh thickness did not differ significantly between treatments, however, during the second season, fruit weight, volume and flesh weight increased significantly by using foliar spray of 2 % KCl with soil mulching compared with the other treatments, they recorded 8.03 gm, 8.01 cm^3 and 6.93 gm, respectively.

While flesh thickness increased significantly, by using 1 % and 2 % KCl with soil mulching treatment compared with other treatments, table (6). The different response of the studied parameters to treatments during the two seasons may be attributed to the different climatic conditions. Where during the first season climatic conditions were low adverse than that obtained during the second season, hence the applied treatments can be more efficiency under the very adverse conditions. These results are in agreement with those obtained by Brahmachari et al. (1997), Qinxuannan et al. (1993) and Sharma and Acharya (2000).

3.6. Yield
Figures (1 and 2) showed that 2 % KCl application with soil mulching increased tree yield significantly in first season compared with the other treatments.
In second season, treatments of 1 % KCl with soil mulching and 2 % KCl with soil mulching enhanced significantly tree yield compared with the other treatments.

Moreover, tree yield increased greatly in the second season than in the first season. This may be due to the increase in inflorescence number and increase of perfect flower percentage, which consequently lead

**Conclusion**

From the results obtained it could be concluded that the soil mulching treatment increased average no. of flowers, while it did not affect perfect flower percentage. Moreover, fruit characteristics except, fruit shape index, flesh/fruit % and flesh thickness were improved during the second season by soil mulching compared with the control. In addition, yield was significantly increased by soil mulching treatments. The different trend of fruit characteristics as affected by treatments during the two seasons may be due to the different climatic conditions during the two seasons, especially rainfall which was greater in the first season than that obtained in the second one. In addition to the beneficial effect of soil mulching on fruit set and fruit retention and to the water conservation effect of soil mulching especially under the dry condition of the region of study. Also foliar spray of KCl 2 % have had a beneficial effects on flowering except perfect flower percentage. KCl 2%
followed by KCl 1 % enhanced initial fruit set and fruit retention compared with control. Application of KCl treatments increased significantly fruit weight, volume and flesh thickness. Tree yield increased significantly by foliar spray of KCl. Applying Soil mulching treatment with 2 % KCl increased significantly floral characteristics, initial fruit set, fruit retention fruit weight, volume, flesh weight and flesh thickness especially in the second season. Tree yield was enhanced significantly by soil mulching and 2 % KCl. In general view, floral density, perfect flowers, fruit set, fruit retention and yield were greatly increased during the second season than in the first season. This may be due to the previous crop load. From the concluded results it could be recommended that soil mulching and foliar spray of 2 % KCl were important especially under the adverse conditions in the dry areas.

REFERENCES


دراسات على تأثير تغطية التربة والرش الورقي بكلوريد البوتاسيوم على نمو الأشجار والثمار، ونتاجها. هذه الدراسة أجريت على أشجار الزيتون صنف مانزانيللو بمحطة بحوث المغارة شمال سيناء.

السيد إسماعيل حجازى، طاهر أحمد حبي، مصطفى النحاس، أبو علي الحديدي، وأ أور عبد الروؤف الخربوطلي

مركز بحوث الصحراوية - شعبة البيئة وزراعة المناطق الجافة، القاهرة، مصر

* قسم الفاكهة، كلية الزراعة جامعة القاهرة، مصر.

تتميز هذه الدراسة بسيط النص من خلال استخدام صور ثلاثية الأبعاد والرسومات اليدوية، وتوفر نتائجه المفصلة وتحليلها. تناولت الدراسة نمو الأشجار والثمار ونتاجها في ظروف تغطية التربة والرش بالكلوريد البوتاسيوم.

1- زاد عدد الأزهار/نور والثمار إذا تم تغطية التربة بالكلوريد البوتاسيوم بثانيات 
2- لم تؤثر نسبة الأزهار الذائبة على تعاملات تغطية التربة أو بالرش بذلوريد البوتاسيوم على النتيجة بأكثر من ملء النمو. 
3- بالنسبة لبوتاسيوم النباتات، فإن وزن الثمار وحجمها ووزن اللحم تتأثر في الدراسة الثاني حيث زادت معنوية تغطية التربة وكأدا الري بذكرف البوتاسيوم في هذا الدراسة تكراري في 2003 و 2004، بالنتيجة على الأذى وحمجها وزيادة وزن الكلم مقارنة بالأشجار الأخرى.
4- أدت المعاملات المتنوعة نمو الأشجار بالرش بذلوريد البوتاسيوم إلى تغيير النمو في إنتاج الأشجار، بالإضافة إلى أن الاستخدام في إنتاج الأشجار الفاسدة مع معاملات تغطية التربة إلى زيادة معنوية في النمو.
5- نتائج الدراسة الفصلية تأثر عنزي نسبا الأزهار الذائبة ونسبة الثمار المتبقية ونسبة الإنتاج في الدراسة الأول.

بصفة عامة، وصلت نتائج الدراسة إلى أن الري بالكلوريد البوتاسيوم يساعد على زيادة نمو الأشجار ونتاجها. ملء النمو، وزيادة النمو، وزيادة النمو، وزيادة النمو.
Table (1): Effect of Soil mulching on flowering and fruit set of olive trees during the seasons of 2003 and 2004.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Flowering</th>
<th>Fruit set %</th>
<th>Flowering</th>
<th>Fruit set %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2004</td>
<td>2003</td>
<td>2004</td>
</tr>
<tr>
<td></td>
<td>Mean flower no./ inflorescence</td>
<td>Inflorescence no./ meter</td>
<td>Perfect flower %</td>
<td>Initial fruit set %</td>
</tr>
<tr>
<td>M1</td>
<td>12.22 a</td>
<td>42.07 a</td>
<td>45.66</td>
<td>11.18 a</td>
</tr>
<tr>
<td>M0</td>
<td>11.24 b</td>
<td>41.75 b</td>
<td>45.40</td>
<td>10.26 b</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>0.31</td>
<td>0.76</td>
<td>N.S</td>
<td>0.26</td>
</tr>
</tbody>
</table>

M0: without mulching. And M1: soil mulching using polyvinyl acetate (1:1 v/v).
* After 7 days from petal fall and** After 20 days after the end of blooming.
N.S: Not significant differences

Table (2): Effect of Soil mulching on fruit characteristics of olive trees during the seasons of 2003 and 2004.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Fruit weight (gm)</td>
<td>Fruit volume (cm³)</td>
</tr>
<tr>
<td>M1</td>
<td>8.38</td>
<td>8.38</td>
</tr>
<tr>
<td>M0</td>
<td>8.18</td>
<td>8.11</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>N.S</td>
<td>N.S</td>
</tr>
</tbody>
</table>

N.S: Not significant differences
Table (3): Effect of foliar spray of KCl on flowering and fruit set of olive trees during two seasons of 2003 and 2004.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Flowering 2003</th>
<th>Fruit set % 2003</th>
<th>Flowering 2004</th>
<th>Fruit set % 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean flower no./ inflorescence</td>
<td>Inflorescence no./ meter</td>
<td>Perfect flower %</td>
<td>Initial * fruit set %</td>
</tr>
<tr>
<td>KCl 1%</td>
<td>11.75 ab</td>
<td>41.90</td>
<td>45.53 a</td>
<td>10.84 b</td>
</tr>
<tr>
<td>KCl 2%</td>
<td>12.16 a</td>
<td>42.22</td>
<td>45.51 a</td>
<td>11.90 a</td>
</tr>
<tr>
<td>Control</td>
<td>11.28 b</td>
<td>41.60</td>
<td>45.56 a</td>
<td>9.42 c</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>0.61</td>
<td>N.S</td>
<td>1.106</td>
<td>0.536</td>
</tr>
</tbody>
</table>

Table (4): Effect of foliar spray of KCl on fruit characteristics of olive trees during the seasons of 2003 and 2004.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Fruit weight (gm)</td>
<td>Fruit volume (cm³)</td>
</tr>
<tr>
<td>KCl 1%</td>
<td>8.12</td>
<td>8.09</td>
</tr>
<tr>
<td>KCl 2%</td>
<td>8.33</td>
<td>8.30</td>
</tr>
<tr>
<td>Control</td>
<td>8.39</td>
<td>8.34</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>N.S</td>
<td>N.S</td>
</tr>
</tbody>
</table>
Table (5): Effect of Soil mulching and foliar spray of KCl on flowering and fruit set of olive trees.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>2003 Flowering</th>
<th>2004 Flowering</th>
<th>2003 Fruit set</th>
<th>2004 Fruit set</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean flower no./ inflorescence</td>
<td>Inflorescence no./ meter</td>
<td>Perfect flower %</td>
<td>Initial * fruit set %</td>
</tr>
<tr>
<td>M0 × B0</td>
<td>10.74 d</td>
<td>41.76</td>
<td>45.06</td>
<td>9.05 e</td>
</tr>
<tr>
<td>M0 × B1</td>
<td>11.25 cd</td>
<td>41.68</td>
<td>45.55</td>
<td>10.45 c</td>
</tr>
<tr>
<td>M0 × B2</td>
<td>11.73 b</td>
<td>41.79</td>
<td>45.60</td>
<td>11.28 b</td>
</tr>
<tr>
<td>M1 × B0</td>
<td>11.81 b</td>
<td>41.44</td>
<td>45.95</td>
<td>9.79 d</td>
</tr>
<tr>
<td>M1 × B1</td>
<td>12.25 ab</td>
<td>42.12</td>
<td>45.50</td>
<td>11.23 b</td>
</tr>
<tr>
<td>M1 × B2</td>
<td>12.60 a</td>
<td>42.65</td>
<td>45.53</td>
<td>12.52 a</td>
</tr>
</tbody>
</table>

LSD 0.05 = 0.53
N.S = Not significant

M0: without mulching. And M1: soil mulching using polyvinyl acetate (1:1 v/v).
B0: Without foliar spray of KCl, B1: foliar spray of 1 % KCl and B2: 2 % KCl.

Values of the same letters are not different significantly.

Table (6): Effect of Soil mulching and foliar spray of KCl on fruit characteristics of olive trees.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Fruit weight (gm)</td>
<td>Fruit volume (cm³)</td>
</tr>
<tr>
<td>M0 × B0</td>
<td>8.39</td>
<td>8.35</td>
</tr>
<tr>
<td>M0 × B1</td>
<td>7.69</td>
<td>7.63</td>
</tr>
<tr>
<td>M0 × B2</td>
<td>8.44</td>
<td>8.36</td>
</tr>
<tr>
<td>M1 × B0</td>
<td>8.38</td>
<td>8.33</td>
</tr>
<tr>
<td>M1 × B1</td>
<td>8.55</td>
<td>8.55</td>
</tr>
<tr>
<td>M1 × B2</td>
<td>8.21</td>
<td>8.25</td>
</tr>
</tbody>
</table>

LSD 0.05 = N.S
N.S = Not significant

M0: without mulching. And M1: soil mulching using polyvinyl acetate (1:1 v/v).
B0: Without foliar spray of KCl, B1: foliar spray of 1 % KCl and B2: 2 % KCl.

Values of the same letters are not different significantly.