Explority the Influence of Planting Date and the Different Levels of Phosphorous Fertilizer on the Function and the Ingredients of Sesame Type GL13 in Jiroft Area

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ABSTRACT

To explore the effect of planting date and the different levels of phosphorous fertilizer on the function and the ingredients of sesame, an experiment was done in the three replications in 1390- 1391 by using the once- grind split plot based on the complete random block in the research field of the agricultural college in Azad university of jiroft. The planting date as the main factor in the four levels (1sth July, 10th July, 20th July, 30th July) and the phosphorous fertilizer level as the secondary factor in the four levels (75, 125, 175, 225 kg/hec p205) contain the sixteen treatments of this experiment. The result indicated that the oil function and the number of capsules in the shrub are affected by the planting date and the mutual reaction of phosphorous and the planting date. At the same time, the effect of planting date and the mutual reaction of these two factors on the seed function and the number of seeds was specification. The amount of protein (%) and the weight of cluster were not affected by the planting date and the different amounts of phosphorous. The planting in the 1sth July was done accompanied with the consumption of all levels of phosphorous and the date of 10th July and the consumption level in 75 kg of triple superphosphate led to the increase in the function and its ingredients. Therefore, according to the obtained results, it seems that planting in 1sth July and 10th July with the consumption of 75 kg/hec of triple superphosphate may lead to the significant increase in the specd function and the sesame oil level.

INTRODUCTION

Since many years ago, planting of the oily seed was one of the concerns of the farmers in the eastern countries. Some of them were considered as the export items of these countries Iran is one of the countries which has a great background in planting the oily seeds such as sesame, caster rose- colored and sunflower. Despite the great background and the different available potentials in producing the oily seeds, there is no significant progress in this field.

Recently, with the consideration of the increasing need of the country, for the oil, sesame can be mentioned as an important industrial and oily plant [1]. Sesame (sesame indicum L) is one of the important plants. The seeds of the plants are rich in oil, protein, carbohydrate, calcium and phosphorous [14]. Generally,

The growing period of sesame is influenced by genetics, the environmental factors such as the temperature and the applicable humidity photo period and the agricultural function like the planting date [6]. On the one hand, the importance of the mineral elements for growing and generating the plants has been determined since some centuries ago. The mineral feeding of the plant is still one of the most important determiners of the final generation of the plants. The studies show that the planting date is one of the effective factors on the growth of sesame and the primary planting fate will lead to the significant increase in the growth and function [14].

According to dehghan's report (2007), changing the planting date may affect the range of growing and generating thus the function of the plant by affecting the coordinating growth plant with the environmental conditions. Changing the planting date affect the plant growth by changing the environment degree. The temperature degree affect the duration of plant growth thus the duration of sun radiation absorbed by the plant and turned in to the dry material. The temperature degrees also affect the final number of leaves, the expanion of the plant cover and the leaf surface area index. Also, Patra et al [13] reported that the number of capsules in the shrub, the seed function and the oil is increased significantly by using from 40 to 100 kg/hec of the net
phosphorous (p<0.05). Ali Saker found that the increase in the net phosphorous to 45 kg/hectare cause the increase in the seed function and its ingredients. Akpara et al also sheehoo et al mention that the usage of the net phosphorous in the range of 45 to 60 kg/hectare cause the improvement of the seed function and its ingredients.

Since one of the basic dimension of management in planting of every product is the determination of the planting date and the appropriate level of fertilizer and since the planting date is different in every climate, most of farmers plant and its tolerance in the dry climate, most of farmers in the arid and semi-arid areas, plant sesame as the secondary planting after planting the grains for this reseam, it is necessary to advise the ways of increasing the product and the appropriate usage of resources by the field experiments

**MATERIALS AND METHODS**

This examination was done in three replications in the weather conditions by applying the statistical plan of plot split in the form random complete blocks in Jiroft in 1390-1391. To know and to determine the texture and the chemical properties of the soil, the sampling of the soil was done before performing the experiment. The results are shown in the table 1.

In this experiment, the planting date as the min factor (A) in the four levels (1<sup>th</sup> July, 10<sup>th</sup> July, 20<sup>th</sup> July, 30 July) and the fertilizer level as the secondary factor (B) in the four levels (75, 125, 175, 225 kg/hec triple super phosphate) in the sixteen treatment of this experiment. These treatments were examined in 48 experimental plots. The length of every court is 6m and the width is 4m. The distance between every replication is 2m and between the courts is 1m. Every court contain 12 lines of planting and the distance between lines is 50 cm and the distance between the shrubs is 20 cm. After preparing the field, the planting lines (routs), the first irrigation was done before planting, then the seed, the type CH3 was determined as it was necessary. Planting the seeds was done manually in the depth of 1-2 cm in both sides of the streams. The first irrigation was done after preparing the streams and the drais in 1/4/1391. To accelerate the greening process of the second irrigation, the second irrigation was done immediately after planting. In the primary growth, the period of every irrigation was short and was in every tree days periodically. After the establishment and enough growth of shrubs, the irrigation duration reached to every 5 to 7 days according to the climate and the plant need. In2-3 leaves stage, after the complete establishment of the shrubs, the sparing activities were performed and one healthy and fresh shrub was kept in every hole and the extra shrubs were emitted. The weeding and removing the weeds such as Lambsquarters, pigweed, Avrbslam, field bindweed,etc. was done every week. Adding the soil to the shrubs was done simultaneously with the primary weeding. In order to the appropriate distribution of nitrogen and its splitness in the different levels of plant growth and its optimized consumption, one third of nitrogen fertilizer was consumed in the time of planting and the rest was consumed in the form of surplus in the two stages, once after scattering the plant and once before the flourishing of the plant. At the end of growth period, s shrubs were selected randomly from every court, then they were transferred to the lab. After passing same day of drying in the outdoor, the properties of the number of capsules in the shrub, the number of seeds in the capsule, the weight of cluster, the percentage of oil and the seed protein amount were determined. To measure the seed function in the harvest period after omitting the margins of the middle rows, every court was calculated harvested in 6m<sup>2</sup> (6square meters) area.

Finally, the analysis of the gathered data was conducted by SAS software. The average amount were compared by applying danken’s multi field test. The data was drawn by excel software

**Table 1:** The physical and chemical properties of the soil in the experimental field.

<table>
<thead>
<tr>
<th>depth</th>
<th>EC</th>
<th>PH</th>
<th>organic carbon</th>
<th>total N</th>
<th>absorb phosphorous</th>
<th>absorbable potassium</th>
<th>texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>1/50</td>
<td>7/9</td>
<td>0/153</td>
<td>0/026</td>
<td>60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Results:**

**Table 2:** The analysis variance of the effect of planting date and phosphorous on the function and the ingredients.

<table>
<thead>
<tr>
<th>the protein percentage</th>
<th>Weight of cluster(g)</th>
<th>the number of seeds in the capsule</th>
<th>the number of capsules in shrubs</th>
<th>the oil function(kg/h)</th>
<th>the seed (kg/h)function</th>
<th>the freedom degree</th>
<th>the change sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/41 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>1/87 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>13/91 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>49/56 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>8/35 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>2/69 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>2</td>
<td>replication</td>
</tr>
<tr>
<td>8/61 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>0/11 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>10/1/1*</td>
<td>29/51*</td>
<td>11/49&lt;sup&gt;2&lt;/sup&gt;</td>
<td>36/84&lt;sup&gt;3&lt;/sup&gt;</td>
<td>3</td>
<td>planting date(A)</td>
</tr>
<tr>
<td>4/44</td>
<td>0/87</td>
<td>14/47</td>
<td>42/26</td>
<td>3/03&lt;sup&gt;1&lt;/sup&gt;</td>
<td>7/04&lt;sup&gt;3&lt;/sup&gt;</td>
<td>6</td>
<td>the error a</td>
</tr>
<tr>
<td>1/12 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>0/61 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>76/91**</td>
<td>28/70**</td>
<td>7/95&lt;sup&gt;5&lt;/sup&gt;</td>
<td>29/95&lt;sup&gt;3&lt;/sup&gt;</td>
<td>3</td>
<td>phosphorous(B)</td>
</tr>
<tr>
<td>3/53 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>0/60 &lt;sup&gt;**&lt;/sup&gt;</td>
<td>23/07*</td>
<td>57/65*</td>
<td>7/21&lt;sup&gt;3&lt;/sup&gt;</td>
<td>26/56&gt;5&lt;sup&gt;3&lt;/sup&gt;</td>
<td>9</td>
<td>the planting date xphosphorous (AB)</td>
</tr>
<tr>
<td>1/92</td>
<td>0/73</td>
<td>9/85</td>
<td>50/52</td>
<td>3/03&lt;sup&gt;1&lt;/sup&gt;</td>
<td>12/99&lt;sup&gt;6&lt;/sup&gt;</td>
<td>24</td>
<td>The error (B)</td>
</tr>
<tr>
<td>7/15</td>
<td>16/68</td>
<td>4/91</td>
<td>24/99</td>
<td>1/76</td>
<td>15/72</td>
<td>-</td>
<td>The changes ratio</td>
</tr>
</tbody>
</table>

ns, * and ** signification and insignification respectively in the level %1 and %5
Table 3: The comparison of the effect of planting date on the function and the ingredients of sesame.

<table>
<thead>
<tr>
<th>Planting date x Phosphorus</th>
<th>The seed function (kg/h)</th>
<th>The oil function (kg/h)</th>
<th>the number of capsules in shrubs</th>
<th>the number of seeds in the capsule</th>
<th>Weight of cluster (g)</th>
<th>The protein percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 July: 75 kg Hectare</td>
<td>1627/78a</td>
<td>872/28a</td>
<td>31.86 ab</td>
<td>60/71ef</td>
<td>3.75</td>
<td>20.91a</td>
</tr>
<tr>
<td>1 July: 125 kg Hectare</td>
<td>1611/11a</td>
<td>880/11a</td>
<td>38.29 a</td>
<td>69/11ab</td>
<td>3.72</td>
<td>18.33a</td>
</tr>
<tr>
<td>1 July: 175 kg Hectare</td>
<td>1575/00a</td>
<td>914/37a</td>
<td>32.94 ab</td>
<td>62/87c.e</td>
<td>3.50</td>
<td>20.17a</td>
</tr>
<tr>
<td>1 July: 225 kg Hectare</td>
<td>1708/33a</td>
<td>950/38a</td>
<td>30.89 ab</td>
<td>63/07c.e</td>
<td>3.72</td>
<td>17.75a</td>
</tr>
<tr>
<td>10 July: 75 kg Hectare</td>
<td>1663/89a</td>
<td>946/49a</td>
<td>34.81 a</td>
<td>60/80ef</td>
<td>3.15</td>
<td>19.03a</td>
</tr>
<tr>
<td>10 July: 125 kg Hectare</td>
<td>716/67b</td>
<td>400/16ab</td>
<td>36.14 a</td>
<td>62/40c.f</td>
<td>4.67</td>
<td>20.29a</td>
</tr>
<tr>
<td>10 July: 175 kg Hectare</td>
<td>483/61b</td>
<td>279/70bc</td>
<td>28.92 b</td>
<td>64/93b.e</td>
<td>3.73</td>
<td>19.69a</td>
</tr>
<tr>
<td>10 July: 225 kg Hectare</td>
<td>490/24b</td>
<td>290/92bc</td>
<td>25.18 b</td>
<td>71/07a</td>
<td>3.12</td>
<td>18.98a</td>
</tr>
<tr>
<td>20 July: 75 kg Hectare</td>
<td>491/67b</td>
<td>287/23bc</td>
<td>21.62 bc</td>
<td>62/73c.e</td>
<td>3.63</td>
<td>19.96a</td>
</tr>
<tr>
<td>20 July: 125 kg Hectare</td>
<td>411/11b</td>
<td>227/33bc</td>
<td>24.66 b</td>
<td>69/13ab</td>
<td>3.57</td>
<td>20/07a</td>
</tr>
<tr>
<td>20 July: 175 kg Hectare</td>
<td>438/89b</td>
<td>232/29bc</td>
<td>32.16 ab</td>
<td>68/27a.c</td>
<td>3.70</td>
<td>18.49a</td>
</tr>
<tr>
<td>30 July: 75 kg Hectare</td>
<td>272/22bc</td>
<td>103/24c</td>
<td>21.78 bc</td>
<td>56/67f</td>
<td>3.37</td>
<td>19.19a</td>
</tr>
<tr>
<td>30 July: 125 kg Hectare</td>
<td>72/22c</td>
<td>40/74cd</td>
<td>18.69 bc</td>
<td>58/93e.f</td>
<td>3.82</td>
<td>19.37a</td>
</tr>
<tr>
<td>30 July: 175 kg Hectare</td>
<td>83/33c</td>
<td>46/72cd</td>
<td>26.10 b</td>
<td>61/87d.f</td>
<td>2.97</td>
<td>18.09a</td>
</tr>
<tr>
<td>30 July: 225 kg Hectare</td>
<td>155/55c</td>
<td>87/83c</td>
<td>228.3 bc</td>
<td>62/40c.f</td>
<td>3.95</td>
<td>19.19a</td>
</tr>
</tbody>
</table>

Averages the include every column similar particles not have together signification difference.

The seed function was influenced by the different dates of planting and the mutual reaction of these two factors in the level 1%, 5% respectively (table 2)

However, the comparison of the average of the simple effect of the planting date and phosphorous on the seed function showed that the planting in 10 and 10th July accompanied with the increase in the phosphorous level can lead to increase the seed function (table 3), but the mutual reaction showed 9 the other results. The comparison of the average of mutual reaction of the planting date and phosphorous on the seed function (3) showed that the planting in 1st July was used in all levels of phosphorous, also 10th July with the consumption of 75 kg of triple superphosphate led to the increase in the seed function while the delay in the planting date (30th July) causes the decrease in the seed function in the all levels of triple superphosphate. Yan et al [18] also reported the decrease in the seed function of sesame. The function increase by using two- planted phosphorous in the suitable time can be a result of the these two factors on the increase in the sub branches and the number of capsules in the shrub also the number of seeds in the capsule/ the similar results were reported resulted from the positive effect of phosphorous on the sesame function by Ali & Saker [5] and Sheihoo et al. Also, the positive effect of phosphorous fertilizer on the seed function may be attributed to the role of phosphorous in increasing the root efficiency in absorbing the food items of soil [15].

The seed function was affected by the planting dates- phosphorous, and the mutual reaction of these two factors in the levels of 1, 5.5% respectively (table 2)
The comparison of the average of the simple effect of the planting date, phosphorous on the function of oil showed that the planting in 1st and 10th July accompanied with the increase in the phosphorous level can lead to increase in the oil function (table 3). Although, the mutual reaction of the planting date and phosphorous showed a similar effect to the effect two factors on the seed function, in such a way that the planting in 1st July was used in the all levels of phosphorous in addition to the planting in 10th July in the levels of 75, 125 kg of triple phosphate led to increase in the oil functions, the oil function whereas the delay in planting (20th and 30th July) in all levels of phosphorous causes the decrease in the oil function.

The average oil function in 1st July planting in all levels of phosphorous was 904.28 kg/hectare which decreased significantly to 69/63 kg/hectare in 30th July planting in all levels of phosphorous.

The effect of planting date and phosphorous on the oil function resulted from the effect of these two factors on the oil function and the percent amount of the oil. Bootani reported the decrease in the seed function and the percentage of sesame oil with the delay in the planting. It seems that the plant had more opportunity in the first planting day to increase the food storage and the amount of the seed oil by using the available phosphorous. Also, by the reason of the increase of the leaves in the first planting dates, there was a more photosynthesis with the phosphorous presence thus the storages of seed were increased including the oil. Increasing in the percent amount of the oil and the oil function in the planting date when phosphorous existed, was reported by Lazemi et al., Ali & Saker [5]. Marschener [9] mentioned the role of phosphorous in the metabolite of lipids. Patra et al [13] also Hafiz & Albarmavi [8] pointed out the increase in the oil function of sesame in the presence of 45, 95 kg/hectare of net phosphorous, respectively.

The number of capsules in the shrub is affected by the different planting dates in the level 1% and the mutual reaction of the planting date and phosphorous in the level 5% (table 2).

The comparison of the effect of planting date indicated that the delay in planting led to decrease in the capsules numbers in the shrub, in such a way that maximum number of capsules in the shrub correponds with 1st and 10th July planting date while the minimum ones related to the 20th and 30th July planting date (table 3).

On the other hand, the comparison of the average mutual reaction of two factors showed that the maximum amount of capsphorous and 10th July in the level of 75, 125 kg/hectare triple superphosphate, also 20th July and the level of 75 kg/hectare of triple phosphate (table 3) the increase in the capsule number in the shrub was reported by Lazemi et al.

Phosphorous causes the increase in the flowers in the shrub and the percentage of the formed capsules in the shrub, so it let to the increase in the capsules numbers thus to the shrub function [10]. The increase in the capsule numbers in the shrub by applying 30, 40, 60 kg/hectare indicated by Takor et al [17] and Patra [13].

The simple effect of the planting date on the seed numbers in the capsule showed that the delay until 30th July caused the decrease in the seed number in comparison with 1st, 10th, 20th July (table 3). Also the effect of phosphorous showed that the usage of triple superphosphate in amount of 125, 175, 225 kg/hectare which caused the increase in the seed number.

However, the mutual reaction showed that the planting in 1st July with the consumption of 125 kg triple superphosphate, the planting in 10th July with the consumption of 225 kg/hectare, the planting in 20th July with the consumption of 125, 175 and 225 kg/hectare of triple superphosphate lead to generate the maximum number of seeds. The delay in planting and the planting in 30th July in all levels of phosphorous caused the decrease in the seed numbers.

Maleki et al pointed out that the acceleration of growth leads to decrease the chance to florish and produce the leaf apprirate with enough photosynthesis and the necessary bases to form and to grow the function elements, finally reduces the function. Oviss & Lazemi et al reported the effect of planting date on the seed numbers. They mentioned that the delay in planting caused the decrease the seed numbers in capsules due to the time of seed formation with high temperatures and the seed destroy. Also, phosphorous caused to invoke photosynthesis, carbohydrate metabolism and protein photosynthesis. Marschener, [9] in addition to increase in transferring the synthesized metabolites in presence of Phosphorous.

Conclusion:

The results of this research showed that the planting in 1st July with the consumption all levels of the applied Phosphorous also 10th July planting and the consumption of 75 kg triple superphosphate let to increase the function and its ingredients. So, according to the mentioned above, it seems that the planting in 1st, 10th July with 75 kg/hectare of triple superphosphate let to significantly increase in the seed function and sesame oil type GL13 in Jiroft area.
The effect of planting date and Phosphorous on the sesame function.

Fig. 1: The effect of planting date and Phosphorous on the sesame function.

The mutual of planting date and Phosphorous on the sesame function.

Fig. 2: The mutual of planting date and Phosphorous on the sesame function.

The mutual reaction of planting date and Phosphorous on the capsule numbers in the sesame shrub.

Fig. 3: The mutual reaction of planting date and Phosphorous on the capsule numbers in the sesame shrub.
Fig. 4: x the mutual reaction of planting date and Phosphorous on the seed numbers in the sesame capsule.

REFERENCES