Studying the Effects of Different Planting Dates on Biological Yield, Harvest Index and Some Morphological Features of Soybean Cultivars in Cold Region of Ardabil

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ABSTRACT

In order to study the effects of different planting dates on biological yield, harvest index and some morphological features of Soybean, an experiment was done as factorial form in completely randomized blocks with three frequencies in research farm of Ardabil Islamic Azad University in 2009. In this experiment the first factor, planting date with four levels (27th of May, 5th of June, 15th of June, 26th of June) and second factor included Williams and line L17. The results showed that there is not any meaningful difference between evaluated cultivars in all features. There was meaningful difference between different planting dates in all studied features, except dry weight of leaves. Also the comparative effect of planting date with cultivares was not meaningful for all studied features. Lanting dates of 27th of May, and 5th of June were placed in one group and view of dry weight of leaves, biological yield, harvest index and the weight of one hundred grains. The mentioned features had the most amounts in mentioned planting dates. From dry weight of grainless leaves of 27th of May had the highest amount. The obtained results show that delay in planting soybean in Ardabil region the plant does not reach to potential capacity because of unsuitable conditions and the performance decreases. So 27th of May and 5th of June planting dates are recommended for planting soybean in cold climate of Ardabil.

Key words: soybean, planting date, harvest index and biological yield.

Introduction

Soybean is the most important resource of providing and oil in the world. Soybean is one of limited plants that provide complete protein which has eight necessary amino acid for human being health.

Its waste material which has much suitable protein is used in farms [1].

Obtaining maximum yield in each farming product depends on exact selection of planting date. The purpose of determining suitable planting date is the determination of the most suitable time for matching phonological phase of the plant with effective environmental factors on them [2]. Delay in planting decreases the production dry material, grain yield its quality [6].

Ozer [9] declared that decrease in harvest index is the main factor in yield decrease on grain in late planting date. Purcell et al [11] indicated that late time planting decreases the life cycle between 13-25 days in comparison with early planting and cause the collection of dry material and PAR to be decreased.

Soybean with much advantages can be placed in alternation. In some areas of Iran which corns are
frequent, it is possible to make a farming alternation with developing this plant. In Ardabil region which wheat is planted, Soybean can be planted in alternative with wheat. Therefore, this research with the aim of studying the best planting date and cultivares in the region was done to be placed in alternative sycle as it was possible.

**Materials and methods**

This experiment was done in research farm of Ardabil Islamic Azad University in 2009. The height of the region from the sea level is 1350 m. The climate of the region is semidried and cold and average annual raining is 310.9 mm. Soil of experimental place is of alluvial, its acidity varies between 7.8-8.2. The experiment was carried out as factorial form in complete randomized blocks in 3 repARATION which the first factor, planting date in four levels 27th of May, 5th of June, 15th of June and 26th of June and second factor, included Williams & line L17 providing bed operations included plowing, leveling, and providing streams and mounds. In providing bed based on soil examination or test urea fertilizer 30 kg per ha was distributed in farm. Cultivares were provided from Moghan research center and planted after disinfection fecundation with bacteria *Rizobium Japonicum* and in determined dates. There was six row and each was 4m and distance from each other 50 centimeter and distance of bushes was eight centimeter. During the growth duration, the farm was irrigated one time per 10 days. During this period, the weeds weed out 3 times. While cropping, ten bushes cropped randomly form effective level of each experimental unit. Then all cropped bushes including straw, grain placed in paper pockets and kept in oven by 70°C for 48h in order to be dried. After this period the dry weight of grain, dry weight of foliage, dry weight of leaves, dry weight of seedless sheathes were determined and biological yield in each level unit was determined.

Harvest index was calculated by following formula

\[
\text{Harvest index} = \frac{\text{Economical yield (g/m²)}}{\text{Biological yield (g/m²)}} \times 100
\]

statistical calculation and average comparison were carried out by using SPSS software Multidimensional test of Duncan (5%) was used for comparison of averages. Drawing the cultivares was carried out by EXCEL software.

**Results and discussion**

Biological yield: biological yield and economical yield are two useful features for allocating dry material in plant. Biological yield is used to show the collection of dry material in plant system. Plant yield can be increased by increasing all produced dry material in farm or yield coefficient and/or both of them. Biological yield is affected by weather condition factors of soil and plant [10].

Table 1 shows that there was a meaningful difference between different planting dates in probable level 1% from biological point of view comparison of averages showed that there was not meaningful deference between two planting dates (27th of May, 5th of June) from this feature point of view and these planting dates dedicated the highest values and there was not meaningful difference values and there was not meaningful difference between planting dates, 15th of June and 26th of June (Table 2). There was not meaningful difference between values and mutual effect with planning dates, so the trend of yield variations of grain is similar to variations of dry material rate. Therefore it seems that high yield. Late planting date decreases life cycle of product between 13-25 days in comparison with early planting date and it causes the collection of dry material and active photo centesis radiations to be decreased [11]. In the end of growth season which unsuitable condition of temperature prevents the production of enough assimilate, dry material plays an important role in increasing weight of graine [3].

**Harvest index:**

the effect of planting date in 5% was meaningful form harvest index point of view, but the other effects were meaningless. The results of comparison of averages showed that there was not meaningful difference between planting dates, 27th of may, 5th of June, 15th of June, and the least value dedicated to 26th of June planting date from this feature point of view.

A part of biological yield which constitutes economical performance is called harvest index which indicates the transmission of dry material in to a part of plant which is harvested. Early planting date results ion higher of grains, number of sheath and harvest index [10]. Decrease in yield of grain is related to decrease in biomass in time of ripe and variations in oil percentage are related to harvest index and temperature during flowering [12]. Since high harvest index rate can be resulted from decrease in biomass of plant to grain yield or increase of grain yield to biomass and increase in biomass of plant to grain yield to biomass and increase in biomass of plant in level unit requires using food resources and consuming more of them. So, where there is a water loss probable in growth steps. It is better to use with high yield high yield genotypes.

Heydari zadeh & Khajepour [4] indicated that
harvest index is affected by planting date effect and late spring planting dates. In [8] study, harvest index decreased with late planning. Increase in harvest index can result from relative decrease in biomass rate or increase in grain yield Biological yield is dependent on bush height.

One Hundred Grain Weight:

Grain weight is one of the main elements of grain yield which its increase in plant results in final grain yield.

The result showed that the planting date effects in probable level 1% on this feature is meaningful, other studied effects on this feature had not meaningful difference (Table 1). Comparison of average of data on hundred grain weight feature showed that the most in weight of on hundred grains is related to 27th of May, 5th of June planting dates which the least value related to 26th of June planting date (Table 2). The results of this experiment on weight of one hundred grain agrees with findings of [14] which indicated that the weight of one thousand grains of soybean with delay in planting shows decrease. The reason of being more weight in the first planting date related to more growth speed and the filling duration length of grain. Khadem hamzeh et al., [7] also reported that the weight of one hundred grains affected by planting date meaning fully which a falling trend was observed with delay in planting. Heydari zadeh et al., [4] reported that weight of grain in bush decreased with delay in planting form the first planting to the fourth planting date. Decrease in temperature in flowering step caused disorder in filling of grain and decrease in weight of grain [13].

Dry Weight of Stems:

According to obtained results form variance analysis of data on dry weight of stems, it was observed that the value effects with planting date were meaningless, but planting date effects and reparation in probable levels of 5% and 1% were meaningful (Table 1).

The comparison of averages of data showed that the most values related to first planting date and the least values related to fourth planting date and there was not meaningful difference between first and second planting dates and second and third planting dates and also between third and fourth planting dates (Table 2).

Porcell et al., [11]; Pedersen and lauer, [10] indicated that soybean plant with early planting produces more DM rate than late planting soybean plant. Delay in planting decreases produced dry material, grain yield and its quality, [6].

Dry Weight of Leaves:

The results showed probable level 1% and 5% between different planning dates and reparation on this feature meaningful (Table 1).

Dry Weight of Seedless Pods:

The results showed probable level 1% and 5% between different planning dates and reparation on this feature meaningful (Table 1).

Table 1: results of variance analysis for evaluated features in different planting dates.

<table>
<thead>
<tr>
<th>Source of Variations</th>
<th>df</th>
<th>Mean Square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Dry Weight of Stem</td>
</tr>
<tr>
<td>Reputation</td>
<td>2</td>
<td>5053.65**</td>
</tr>
<tr>
<td>Planting Date</td>
<td>3</td>
<td>3125.95*</td>
</tr>
<tr>
<td>Cultivares</td>
<td>1</td>
<td>2.87 ns</td>
</tr>
<tr>
<td>Cultivare × Date</td>
<td>3</td>
<td>954.46**</td>
</tr>
<tr>
<td>Error</td>
<td>14</td>
<td>23.76</td>
</tr>
<tr>
<td>CV (%)</td>
<td></td>
<td>23.76</td>
</tr>
</tbody>
</table>

* & ** show meaningful in probable level 1% and 5%

Table 2: comparison of averages of studied features in studied planning date

<table>
<thead>
<tr>
<th>Planting Date</th>
<th>Dry Weight of Stem (g/m²)</th>
<th>Dry Weight of Seedless Pods (g/m²)</th>
<th>Weight of on Hundred Grains (gr)</th>
<th>Harvest Index (%)</th>
<th>Biological Yield (g/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27th of May</td>
<td>129.8a</td>
<td>197.2a</td>
<td>13.5a</td>
<td>33.33a</td>
<td>634.7a</td>
</tr>
<tr>
<td>5th of June</td>
<td>119.6ab</td>
<td>142.7b</td>
<td>12.36a</td>
<td>27.88a</td>
<td>543.4a</td>
</tr>
<tr>
<td>15th of June</td>
<td>92.82bc</td>
<td>107.1bc</td>
<td>10.92b</td>
<td>28a</td>
<td>365.6b</td>
</tr>
<tr>
<td>26th of June</td>
<td>80.72c</td>
<td>89.42c</td>
<td>9.4c</td>
<td>19.90b</td>
<td>368.6b</td>
</tr>
</tbody>
</table>

By comparison of averages of data on above feature, it was observed that the most values related to 25th of May and there was not meaningful difference between 5th of June and 15th of June planting dates and also between 15th of June and 26th of June (Table2). Temperature decrease in flowering
step cause difference in filling of grain and decrease in grain weight. Shortness of growth season was affected by delay in planting which results in decrease in received radiation in growing duration and results in decrease in produced dry material and decrease in grain yield [13].

References