

Investigation of sowing date on six fall varieties of rapeseed in Mashhad

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Abstract:

Mashhad with moderate cold climate located in northeastern of Iran. In this area, rapeseed is becoming very important because of daily increasing need to oil seeds. To leave an impression on suitable genotype and sowing date on yield and total production, a field experiment was conducted in Mashhad agricultural research center. The treatments were six fall varieties of rapeseed (Colvert, Fornax, Okapi, Orient, SLM046 and Talayeh) combined by four sowing dates (Sep. 6th, Sep. 21st and Oct. 6th, Oct. 21st) as a factorial form. The experiment was in Split Plot Design based on Randomized Block with three replications. During the experiment many characteristic features of the crop such as physiological specialties, dry matter, grain yield and yield components, harvest index, were measured and analyzed. Results showed that the most quantitative and qualitative characteristics of rapeseed were improved by early sowing dates and the most suitable varieties were Fornax and Colvert respectively.

Keywords : Yield component, physiological specialties, grain yield, dry matter

Introduction

Although Iran is located in an area that acquires sufficient sources of soil and water to produce vegetable oils to be independent and even be able to export to other countries, it is importing approximately 90% of its demands (1). There are distinct methods to increase the yield, however, the best approach is applying of the varieties rich in oil and substituting them with previous poor varieties. Amongst the oily crops, rapeseed is considered as the best option for oil production, since there is nearly 40% oil in the seeds, more of it very effective cultural characteristics for farmers. For instance the ability to compete with weeds, low water request, yield stability, resistant against the environmental stresses and rotation flexibility because it has spring and fall varieties (7). Apart from the stated cultural features, the plant is steeped in protein which makes it a good forage for animals. Since rapeseed planting has been very common in Khorasan province, it is important to study different varieties to select the suitable ones for this region (2&6). According to the importance of the growth period in this plant, it is necessary to evaluate the distinct planting dates. Hence some experiments have been conducted in this field by (3&5) in which they insisted on early planting. Furthermore other scientists such as Jenkins, P.D. and M.N. Leich, (4), Walton, G., P. Si, and B. Bowden (8), emphasized on the importance of the planting dates. Although numerous studies have been handled on the sowing dates, any location requires its special planting dates because of having distinct climatic features.

Material and Methods

This experiment was carried out at Mashhad Agricultural research center (Torogh) located in (36° 13', 12"N) and (54° 48', 14"E). The texture of soil at the experimental site was silt loam and free from salinity and sodium stresses and the amount of organic matter and nutrient elements were moderate. The experiment was laid out in a split plot design with four replication. The plant varieties (Colvert, Fornax, Okapi, SLM046, Orient, Talayeh) applied in main-plots and four sowing dates (Sep. 6th, Sep. 21st and Oct. 6th, Oct. 21st) were in sub-plots. The evaluated features were, leaf area, growth rate, plant height, seed yield components, harvest index. Data analysis was done by SAS and Excel program.

Results

Total drymatter

The delay on the postponement in planting reduced TDM in almost all six varieties significantly. The highest amount of TDM was obtained by Colvert (1006 gr/m²) which was planted first time and the lowest TDM obtained by SLM046 (255 gr/m²) which was planted in last time.

Leaf Area Index(LAI)

The planting date did not have significant effect on LAI of six varieties. The effect of sowing dates was not noticeable before the rosette stage. Nevertheless after the rosette stage by changing the environmental conditions and increasing the temperature the LAI growth is almost obvious. This condition continuous until flowering stage and two weeks later. The LAI was different among distinct varieties, which Fornax and Colvert had highest LAI.

Crop growth rate (CGR)

The CGR was very slow at early stages of growth like roset and before this stage. It is slow because neither the plant canopy was completed, nor environmental conditions were good. Nevertheless, after the roset stage by increasing the temperature and sunny days the plant growth increased, significantly. Hence, the growth parameters such as leaf area, dry matter, increased meaning fully. As result CGR increased to this condition maintained until the flowering stage. At the flowering stage the CGR was maximum. Delay in planting reduced the CGR. The amount of CGR on Sep.6th was 3.2 and on Oct.21st was 1.4 gr m⁻²day⁻¹. The CGR was different among distinct varieties, so it was 3.8 on Okapi, since Fornax for the first planting date had the lowest CGR among the varieties.

Plant height

The rapeseed varieties were different by plant height, in which, Fornax was the longest and Okapi was the shortest (tab.1). The sowing date had significant effect on plant height. As the maximum plant height was achieved by sowing on Sep.21st, whereas the minimum plant height was gained on Oct.21st (tab.2). The correspondent effects of planting date and varieties were significant; Fornax and Colvert varieties were very sensitive to the early planting.

Grain yield components

Late planting reduced all of grain yield components such as number of sheaths and seeds per plant and seed test weight significantly (tab.1). The differences among the varieties were noticeable (tab.2). Also, the interactions between variety × planting dates were significant, so that, Colvert had the most sensitivity to late planting, However Orient and Talayeh had the least.

Seed yield:

The results of studies depicted that late planting reduced the seed yield noticeably. As result the yield reduced nearly 50 % at planting date on Oct.21st (tab.2). The seed yield was completely different among the varieties. The Fornax produced the highest seed yield among the other varieties. However, early planting of Colvert could increase the yield even more than Fornax.

Harvest Index(H.I.):

Harvest index is regarded as a parameter which is able to display the capacity of transforming of photosynthetic matter from sink to source. The result of analysis demonstrated that late planting reduced the H.I. significantly (tab.2). Considering this parameter in the varieties showed huge difference among them. Fornax had the highest H.I. The correspondent effect of variety and planting date was significant on this parameter. So that, late planting reduced the H.I. in SLM046 and Okapi, while other varieties were not very sensitive.

Conclusion

The planting date is considered as significant parameter which approximately stimulates all of the growth stages from emergence to physiological ripening. As result, delay in planting shortened the distinct growth levels therefore the yield is reduced significantly. The growth indices like LAI, CGR, and TDM were

influenced by early planting .The early planting on generally intimeplanting increases the quantity and quality of yield simultaneously .The flowing parameters were also influenced by planting date;furthermore,likely, the in time planting also increased the plant height, number of secondary fertile branches .The yield components like number of sheath per planet , number of seed per sheath and 1000 seeds weight were also affected by early planting any were increased on dates like Sep.6th , 21st more than October planting dates .Finally, the studies demonstrated that the two varieties (Fornax and Colvert)were suitable for planting in Mashhad region .Additively, according to the table the best varieties.

Table 1 **The mean of Agronomical features of six varieties of rapeseed Mashhad - Torogh**

variety	Plant height cm	No. of secondary branches	No.of sheaths per plant	No. of seed per sheath	sheath length cm	1000 seed weight gr	seed yield kg ha ⁻¹	harvest Index %
<i>Colvert</i>	102.4 ^{abc}	1.44 ^a	32 ^a	13.3 ^b	5.9 ^e	3.5 ^a	2305 ^b	33 ^c
<i>Fornax</i>	104.4 ^a	1.00 ^b	29 ^b	19.2 ^a	7.3 ^{bc}	3.1 ^b	2471 ^a	37 ^a
<i>Okapi</i>	95.1 ^d	0.75 ^{bc}	21 ^{cd}	19.7 ^a	6.7 ^d	3.0 ^c	1526 ^d	30 ^d
<i>Orient</i>	103.2 ^{ab}	0.38 ^d	22 ^{cd}	20.3 ^a	7.9 ^a	3.1 ^b	1953 ^d	36 ^b
<i>Slmo46</i>	100.2 ^c	0.44 ^{cd}	20 ^d	20.7 ^a	7.0 ^c	3.2 ^b	1902 ^e	36 ^b
<i>Talayeh</i>	101.8 ^{bc}	0.64 ^{bcd}	24 ^c	21.4 ^a	7.4 ^b	3.1 ^b	2085 ^c	36 ^b

Table 2 **Effect of planting date on rapeseed characteristics Mashhad -Torogh**

Planting date	Plant height cm	No. of secondary branches	No .of sheaths per plant	No. of seed per sheath	sheath length cm	1000 seed weight gr	seed yield kg ha ⁻¹	harvest Index %
Sep.6 th	101.7 ^b	1.25 ^a	31 ^a	19.7 ^a	7.2 ^{ab}	3.5 ^a	2850 ^a	37 ^a
Sep.21 st	107.4 ^a	1.17 ^a	28 ^b	19.1 ^a	7.4 ^a	3.2 ^b	2498 ^b	34 ^b
Oct.6 th	97.9 ^c	0.33 ^b	22 ^c	18.9 ^a	6.9 ^{bc}	2.9 ^c	1346 ^d	33 ^c
Oct.21 st	97.7 ^c	0.38 ^b	21 ^c	18.5 ^a	6.6 ^c	2.9 ^c	1467 ^c	32 ^d

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