

The effect of planting date and seed rate on yield and components yield on oilseed rape cultivars in Sistan

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Abstract

In order to determine the best of sowing date and seed rate, on oilseed rape cultivars an experiment with using split plot-factorial design with three replication was conducted in zahak Agriculture Research station of zabol, during two seasons (2003- 2004 and 2004-2005). This site located in Southern East Iran country. The main factor was sowing date in Four levels started from 6th of October continued in a 15 days intervals include (15 October, 21 October, 5 November and 20 November) and was subplots combination from cultivars at two levels (Hyloa401 and RGS003) and seed rate at three levels (6, 8 and 10 kg/ha). Results achieved from combination analysis showed that planting date had significant differences at the 1% level on number of silique in plant, number seed in silique, 1000 grain weight, height, oil percent, oil yield and seed yield. With delay in sowing date seed yield and other traits had decreased. The highest seed yield with mean (3943 and 3830 kg/ha) in sowing date 21 October and 15 October and least seed yield with mean 1830 kg/ha in sowing date 20 November was obtained. The effect cultivars exception number seed in silique, height and oil percent on the other traits had not significant differences. Cultivar, RGS003 With mean 3249 kg/ha in comparison with Hyloa 401 with mean 3062 kg/ha was the best. The effect seed rate only on 1000 grain weight, height and number plant in square (m²) had significant differences. Despite of no significant difference the highest seed yield with mean 3282 kg/ha at seed rate high (10 kg/ ha) was obtained. Interaction effects study of factors exception, number of silique in plant, 1000 grain weight and height on others traits had not significant difference. With considering of results, highest productivity and least environment losses, sowing date (21 October), seed rate 10 kg/ha and cultivars Hyloa401 and RGS003 were recommended for Sistan province in Iran.

Key words: Rapeseed, planting date, cultivar. Grain yield

Introduction

The objective of determine date planting is finding of the best planting date for better use of environment factors for germination, establishment and seedling survival and each stages for plant growth became favorite (khajehpour. 1993).

Rabertson et al. 1999 reported With delay in suitable planting from 15 April until 15 July for each weeks delay mean yield 3/6 percent namely from 1686 to 1030 kg/ha for grain yield decreased and grain oil percent from 42/6 percent in first date planting to 35/6 percent in final date planting decreased.

Si and Walton 2004 reported for each two weeks delay for planting 309 kg/ha grain yield in oilseed decreased and this researchers with base of finding relation early planting with a early flowering cultivar recommended in low rainy locals for more produce of grain and oil.

Potter and et al. (1999) reported grain yield between 30-130 plant /m² had no significant difference and in less density (20 plant/ m²), yield decreased near to 12- 16 percent. The aim of the study was to obtain the best sowing date, seed rate and cultivar in particular condition of sistan region

Materials and methods

In order to determining of the best sowing date and seed rate, on oilseed rape cultivars an experiment with using split plot-factorial design with three replication was conducted in zahak agriculture research station of zabol, during two seasons (2003- 2004 and 2004-2005). This site located in Southern East Iran country. The main factor was sowing date in Four levels started from 6th of October continued in a 15 days intervals include (15 October, 21 October, 5 November and 20 November) and was subplots combination from cultivars at two levels (Hyloa401 and RGS003) and seed rate at three levels (6, 8 and 10 kg/ha). Each subplot include 6 planting rows with 6 m length and 20 cm space. On basis soil of test in pre planting used 150 kg/ha super phosphate triple, 170 kg/ha K₂SO₄ and 380 kg/ha urea. One third from urea in pre planting, one third in out of roset stage and other used in initiation flowering stage. Ten samples plant from each plot evaluated for determine components of yield and other traits studied. Analysis of variance performed by Mstat-c software. and for compare mean used from Duncan test in 5% probability level.

Results

Grain yield

Results analysis of variance showed significant difference date planting on seed yield at 1% probability

level.(Table.1).Results showed in two years the most yield with mean 3943 kg/ ha was get in second date planting 21 October and the least grain yield was get in fourth date planting 20 November with mean 1829 kg/ha (Table.2). While cultivar and seed rate had not significant difference on grain yield. (Table.1)

Number siliqua in plant

Results analysis of variance showed significant difference date planting on number siliqua in plant at 1% probability level(Table.1).Results showed the most siliqua number in plant were in second date planting with 254 siliqua and the least was 179 siliqua in fourth date planting. While cultivar and seed rate had not significant difference on number siliqua in plant.

number seed in siliqua

Results analysis of variance showed significant difference date planting on number seed in siliqua at 1% probability level.(Table.1).Result showed the most number seed per siliqua was in second date planting with 25 seed and the least with 18 seed per siliqua was in fourth date planting. Cultivar effect and cultivar and year interaction had significant difference in %5 level.

Table 1.Combined variance analysis on grain yield and components yield of canola

S.O.V	df	grain yield	Mean squares				
			siliqua number in plant	seed number in siliqua	W1000 grain	Oil percent	Oil yield
Year	1	787064.694ns	46620.007**	34.028ns	34.418**	450.112**	60090.350ns
Date plant	3	34212470.259**	33894.100**	292.824**	1.843**	64.339**	7151858.941**
Year*Date plant	3	12890951.583**	3935.859ns	214.120**	0.737ns	3.988ns	2161694.**869
Error	1	1081549.313	2637.014	11.076	0.315	7.953	222706.470
Cultivar	6	1260006.250ns	724.507ns	64*	1.941ns	64.816**	50865.285ns
Year* Cultivar	1	1114432.11ns	62.674ns	25*	0.706ns	7.512*	249300.488ns
Date plant* Cultivar	1	596846.694ns	4603.174**	5.648ns	0.235ns	1.098ns	98287.725ns
Year* Date plant* Cultivar	3	243098.519**	4910.414**	13.574	0.322ns	1.295ns	503549.263**
Seed rate	3	574642.924ns	273.813ns	10.583ns	2.174*	2.956ns	153188.537ns
Year* Seed rate	2	567268.465ns	2675.632*	10.028ns	0.278ns	4.803	122514.271ns
Seed rate* Date plant	2	305154.850ns	752.933ns	10.769ns	0.915ns	1.004ns	63635.360ns
Year* Date plant* Seed rate	6	324788.965ns	2348.067*	10.620ns	0.697ns	1.192ns	85758.344ns
Seed rate* Cultivar	6	392299.646ns	1507.090ns	4.333ns	1.170ns	2.814ns	89366.ns705
Year* Cultivar * Seed rate	2	213146.049ns	787.032ns	0.333ns	0.325ns	0.606ns	33380.63ns
Date plant* Cultivar * Seed rate	2	191449.868ns	435.951ns	1.704ns	1.222*	2.493ns	31501.51ns
Year *Date plant* Cultivar * Seed rate	6	742790.289ns	504.900ns	3.185ns	0.628ns	0/791ns	172823.238*
Erro	6	372536.638	835.306	6.510	0.549	1.162	76132.008
Coefficient Variation (CV%)	80	19.34	13.14	11.84	20.32	2.44	19.66

* and ** : Not Significant, Significan at the 5% and 1% levels respectively. ns,

Table 2.Comparison of means of grain yield and components yield of canola. in different treatments

Treatment	grain yield(kg/ha)	siliqua number in plant	seed number in siliqua	W1000grain(g)	Oil percent	Oil yield(kg/ha)
Date plant						
15 october	3830a	226b	21b	4a	45a	1701a
21 october	3943a	254a	25a	4a	45a	1766a
5 november	3019b	221b	22b	4a	45a	1353a
20 november	1830c	179c	18c	3a	42b	793a
Cultivar						
Hyola401	3062a	226a	21a	4a	45a	1384a
RGS003	3249a	254a	22a	4a	44b	1422a
Seed rate						
6 kg/ha	3093a	218a	21a	4a	44a	1373a
8kg/ha	3092a	219a	21a	4ab	44a	1368a
10kg/ha	3282a	223a	22a	3b	44a	1468

means with similar lrtters are not significantly different at the 5%level of probability(DMRT 5%) In each column

1000 seed weight

Results analysis of variance showed significant difference date planting on 1000 seed weight at 1% probability level(Table.1).The most 1000 seed weight was in second date planting with mean 3.8 gr and the least was the fourth date planting with mean 3.3 gr(Table.2). Analysis of variance showed among cultivars hadn't significant difference(Table.1).

Oil percent

Results analysis of variance showed significant difference date planting and cultivar on Oil percent at 1% probability level.(Table.1).In different planting date the most oil percent with 45 percent belong to first planting date and the least with 43 percent belong to fourth planting date. Hyola 401 Hybrid With mean 45 percent in comparsion with RGS003 with mean 44 percent was the best.(Tabel.2) Seed rate had not significant difference on Oil percent. (Table.1)

Oil yield

Results analysis of variance showed significant difference date planting on oil yield at 1% probability level.(Table.1).The most oil yield belong to second planting date with 1799 kg/ha and the least with mean 792kg/ha belong to fourth planting date.(Table 2). Cultivar and Seed rate had not significant difference on Oil yield. (Table.1)

Discussion

With delay in planting because of remove of suit dates for growth, component yield of plant can't reach to it potential and seed yield reduced. In final planting date because of growth limit, plants damaged for coldness and we have reduce of plant in unit of Area and in terminate of growth seed filling with high temperature is not good.This result according to (Robertson 2004. Johnson 1995) and approved delay in planting date is main factor for reduce of grain yield.The ability of high compensate in canola became cause of in seed rate different in unit of area number of plant in square establishment had no significant difference.This result is similar finding poter et al. 1999. In final planting date because of high temperatures reduced oil percent and that quality. And this is according to results of Rabertson etal 2004.

Conclusion

So with this results on time planting in preliminary of season and use of early growth cultivars as Hyola401 and use of high count seed rate (10 kg/ha) is good for planting in sistan region.

References

- 1-Johnson, B.L., K.R. Mckay, A.A. Schneiter, B.K. Hanson, and B.G. Schatz. 1995. Influence of planting date on canola and crambe production. *Jornal of Production Agriculture*. 8: 594-599.
- 2-Khajeh pour. M. R.1993. *Principals Of Agronomy Wsfahan university press*.
- 3-Potter, T.D, Kay, J. R and I.R. Ludwing. 1999. Effect of row spacing and sowing rate on canola cultivars with varying early vigour. south Australian Research and Development institute. Pobox 618 Naracoorte. SA5271, Australia
- 4-Robertson.,M.J,Holland,J.F and R. Bambach.2004.Response of canola and Indian Musterd to sowing date in the grain belt of north-eastern Australia. *Australia Journal of Experimental Agriculture*.44:43-52
- 5-Si, P and Walton,H.2004.Determinants of oil concentration and seed yield incanola and Indian mustard in the lower rainfall areas of Western Australia. *Australia Journal of Experimental Agriculture*.55:367-377