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Investigating and Comparing the 24 Cultivars and Genotypes of Rapeseed

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ABSTRACT

One of the most important factors affecting the quality and quantity of agricultural crops during their vegetative and generative phases is the climate. To investigate the consistency and identifying the appropriate cultivar to cultivate in the autumn, the cold and modest regions in Kermanshah province as trial with 22 new cultivars received from international institutes with the cultivar SLM 046 as the control and Iranian hybrid, totally 24 cultivars in the random complete block design and four replications during two agricultural years was evaluated regarding the consistency with the cold climate condition of Kermanshah, yield potential and yield components, lipid percentage and other agricultural characteristics in the agricultural research station. Analysis of the twice yearly combined data showed that regarding the seed yield, not observed any significant difference among the treatments. Most yields of the cultivars Parade and Alice respectively by 4774 and 4691 kg in each hectare and minimum yield in the cultivars Syn-1 by 3165 kg in each hectare was achieved. The minimum interval between the beginning and ending of flowering related to the cultivar Regent * Cobra was 26 days. Whatever the rate length of flowering period to be shorter, regarding it, the pod filling period is shorter and resulted the concurrent matureness of pod and greenfly damage on the yield less and seed loss percentage during harvest is reduced. Brassica napus is the crop of temperate zones.

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INTRODUCTION

Brassica napus is an oily seed that its cultivation in recent years has been developed. Brassica napus is of the mustard family or Cross-overs, or the genus Brassica. Four types of this genus are cultivated as an oily plant across the world, as follow: Brassica napus, oily turnip, Indian mustard, Ethiopian mustard. This plant in France and England respectively is called Rapeseed and Rapseed. This oil plant often is cultivated in Canada, Europe, former Soviet Union, Pacific, States of North America, china, India and some Asian countries [1]. Rapeseed due to having positive agricultural traits such as tolerance to cold and high alternative value, indifference to the soil tissue, weedy herbs, having spring and autumn genotype, accordance of rapeseed growth duration with raining and water cheapness, easiness of cultivation operations, cultivation, withdrawals, symmetry of rapeseed withdrawal time with the work time of oil extractor factories by having more than 42 percent of oil seed is a high advantage for cultivation of this crop compared to other oil seed crops accounted [2]. To develop Rapeseed cultivation and recognize this plant in recent years, the external bred cultivars of Rapeseed were checked due to the consistency in the different regions of the city that it was caused to introduce the Global cultivars for temperate-winter regions and Cobra for winter and temperate winter regions. Pourdad [7] estimated and compared 14 cultivars superior line in Magidasht region during 2004- 2007 in the period of three years and presented the superiority of the cultivar Jeteuf with 2312 kg of seed and 974 kg of oil per each hectare. 12 cultivars of bred winter Rapeseed were estimated in the agricultural year 2005-2006 in the research station of Mahidasht and superiority of Cobra and SLMO46 cultivars respectively, 3982 and 3541 kg/ha were presented. In this experiment, 24 cultivars of Rapeseed have been received from international institution to cultivate in the temperate and cold regions of the country were investigated [3]. New autumn cultivar with 4 new autumn cultivars of advanced rapeseed was studied in a three years research. In this study Sodo and JR.002 were superior to control cultivar, Blind. But aforementioned three cultivars besides matador, Hercules, Jetnuf, ww559, Quinta, J.R.1 and ww.557 in the group C and the rest of cultivars i.e., Elvira, Olympia and Leonissa in the group E were placed [5], 9 cultivars of the developed winter rapeseed in a three-year study were

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considered. In this study, the cultivars such as Ceres, Jetnuf, Falcon, Quinta, Cobra, Olympia, Jupiter and Diadem were superior to the control cultivar i.e., Belinda, but, except the cultivar of Ceres that was located in the group B, other 9 cultivar with the Control Cultivar located in the group C. Three remained cultivars ie, Yantar, Per/5275 and Rex also were occurred in the group E. Rudi 2003 concluded that in the economic study and investigating the effect of Rapeseed cultivation on the wheat yield in the agricultural frequency of Rapeseed-Wheat in the warm regions, the yield of wheat in the frequency of Wheat-Rapeseed-Wheat compared with the single generation of Wheat-Wheat-Wheat in Darab was 13.4 percent, and in Dezful 4.6 increased. According to the investigation of the cultivation date effect on the yield and agricultural characteristics of Rapeseed cultivars was reported that the cultivation date of Mehr 9 with the average of 5010 kg/ha assigned the maximum yield value to themselves. Loof [6] reported that timely cultivation is an important factor to produce the seed yield and high oil in the autumn Rapeseed. The main problem of Rapeseed cultivation is lack of proper management in the farm and being not familiar of cultivators with this crop. Amiri [4] showed that the Rapeseed cultivation in three stages of planting and harvesting is much more sensitive than the grains and special care is needed. The equipment used in each stage requires the setting of its own and requires the use of new and modern equipment. In this regard, the use of trained and experienced manpower is an essential case in the optimal exploitation. Increasing the knowledge of rapeseed farmers in improving production rate per unit area is the primary requirements of development in this important and strategic agriculture for the country. The necessary attentions have been paid in purchasing products and paying the related subsidies. But continuing this process and opening the new ways to facilitate the product delivery process and reducing the costs of transport can be an incentive of farmers in developing the under cultivation area (or acreage) [8]. Instruments currently used in the rapeseed cultivation, are the same machines and instruments in cereal cultivation that in most of the cereal production stages is faced with many problems and although in the rapeseed cultivation and harvesting, these problems apparently will be expressed, so the rate of production per unit area has a significant reduction and production of this important crop will be faced with many challenges. Because of this, injecting new modern machinery to the body of agricultural section is one of the necessities that in cultivation of Canola are a really important issue [9]. Nonetheless, providing inattention and lack of special cares in the different phases especially important points that were addressed to them. The rate of yield will decrease significantly, and finally all the cultivators will not support of its development.

MATERIALS AND METHODS

The 23 best -known cultivar of rapeseed from the previous years with the cultivar SLM046 as the control in a randomized block design in four replications at Agricultural Research Station was cultivated and investigated. Each plot includes 4 rows of 5 m in a distance of 30 cm from each other. After plowing, disk and trowel were used and according to the results of soil experiment analysis, fertilizing and monotonous distribution of terflan herbicide throughout the farm have been performed and by soft disk fertilizer and herbicide were mixed with soil. To fight with the narrow leaf weed, we used of focus herbicide in one liter per hectare and to control the broad-leaved weeds of hand weeding. In time of harvesting, we took notes from the important agronomic traits. The Data, through analysis of variance in MSTATC software were achieved and to compare the means m we used of Duncan methods. The name of cultivars is shown in the table. (From planting to greening, flowering date, end date of flowering, flowering period, lodging resistance, the number of branches per plant, pods per plant, seeds per pod, plant height, fruit ripening date, length of growing period, grain yield, each seed weight).

RESULTS AND DISCUSSION

Analysis of biennial combined variance showed that between the cultivars in terms of length of growing period, plant height, 1000-seed weight, number of pods per plant and seeds per pod, there are significant differences at level of 1%. Comparison of the averages for measured traits in the method of Danken was performed. In the table 3 is seen that maximum and minimum interval between beginning and ending of the flowering respectively in the cultivars Cobra * Regent with 26.5 days and Ayn-1 with 36 days are seen. The more flowering period is shorter, the more pod filling period will be shorter to follow it and will be coincided with the pod ripening and the damage of louse on the yield is less. Although the flowering period may be associated with higher yield, But by increasing the difference between the first and last pod formation caused to non- uniformity in the period of seed ripening and leads to loss at harvest time. According the period of growth length, minimum duration was belonged to the cultivar PF.7045/91 with 253 days and maximum duration to the cultivar VDH8003-98. The prematurity trait for the regions where summer heat and drought comes early, as a desirable trait to escape from heat and save the water of irrigation, is important. The plant height was variable from 159.8 cm in the cultivar Symbol to 119 cm in the cultivar L-.1, regarding the number of pods in each bush, maximum and minimum number of pods respectively was seen in the cultivars Orient with 141 pods and VDH8003-98 with 113 pods per push. That is caused by increasing the proportion of

received photosynthetic materials and more likely being appropriated of pollination, In such circumstances due to increase of sink, share of each seed per source productions was increased and then the yield to be increased that the seed oil percent from 6.51 for the Regent * Cobra to 46.04 percent varied for Fornax. It is possible to be due to the coincidence of filling duration with high temperatures. According to the seed yield , there was not observed a significant difference among treatments and maximum yield, related to the cultivars Parade and Alice respectively with 4774 and 4691 kg/ha and minimum seed yield related to the cultivar Syn-1 with 3165 kg/ha was seen. The existence of different responses in the different cultivars includes the important aims introduced to the race makers (breeders) regarding the internal or external bred cultivars and also recognizing the superior cultivars regarding the certain trait yield to proliferate and widely promote. Therefore, since aforementioned results during the agricultural year were achieved and somewhat genotype and environment interactions were considered, it can be concluded that the cultivars parade and Alice are recommended in the region of Kermanshah, because as was mentioned, the relative reduction of genotype interaction in the environment can reduce the difficulty of superior varieties recognition (Tables 4, 5 and 6).

Table 1: Analysis of variance for different agronomic traits in Rapeseed at first year.

S.O.V	df	Flowering period (days)	Length of growing (days)	Plant Height (cm)	No. of Pod per plant	No. of Seed per pod	1000 Seed weight (gr)	Oil content %	Seed yield (kg/ha)
Replication	3	0. 014 ^{ns}	3. 528*	40. 333*	88. 00 ^{ns}	290. 02^{ns}	0.36^{ns}	7. 792 ^{ns}	96092. 125**
Variety	23	12. 810 ^{ns}	14. 667**	369. 609**	719. 558**	4. 819**	0. 103 ^{ns}	2. 121**	724277. 433**
Error	69	%14	3.731	108. 203	99.761	3. 484	%71	2250	66820. 024
CV%		0. 47	0.74	7. 29	7. 38	8	7. 33	3. 10	6. 81
ns, * and ** are no significant and significant at 5 and 1 % probability levels, respectively									

Table 2: Analysis of variance for different agronomic traits in Rapeseed at second year.

S.O.V	df	Flowering period (days)	Length of growing (days)	Plant Height (cm)	No. of Pod per plant	No. of Seed per pod	1000 Seed weight (gr)	Oil content %	Seed yield (kg/ha)
Replication	3	73.955 ^{ns}	11. 038 ^{ns}	^{ns}177. 53	89. 844 ^{ns}	3. 233 ^{ns}	0.165 ^{ns}	7. 546 ^{ns}	3094687. 872 ^{ns}
Variety	23	27.152**	36. 543**	501. 637**	691. 619**	8. 891 ^{ns}	0.101 ^{ns}	434. 049 ^{ns}	1766050. 652**
Error	69	43. 817	4. 053	62. 135	73.576	1. 211	0. 063	132. 275	751616. 024
CV%		12. 48	0.77	5. 41	6. 20	5. 38	6. 70	2. 94	19. 56
ns, * and ** are no significant and significant at 5 and 1 % probability levels, respectively									

Table 3: Analysis of variance for different agronomic traits Rapeseed.

S.O.V	df	Flowering period (days)	Length of growing (days)	Plant height (cm)	No. of Pod per plant	No. of Seed per pod	1000 Seed weight (gr)	Oil content %	Seed yield (kg/h)
Year	1	37. 630 ^{ns}	18. 130 ^{ns}	441. 047 ^{ns}	405. 422 ^{ns}	399.630 ^{ns}	0. 713 ^{ns}	67. 048 ^{ns}	19417716. 047*
Variety*Y	6	36. 984	7. 283	108. 936	88. 922	146. 630	0. 263	8. 240	1595369. 991
Variety	23	21. 386 ^{ns}	56. 808**	737. 677**	1263. 212**	10. 938**	0. 178**	11. 227**	197570. 136 ^{ns}
Variety*Y	23	18. 576 ^{ns}	4. 402 ^{ns}	133. 569 ^{ns}	147. 965 ^{ns}	2. 772 ^{ns}	0. 026 ^{ns}	9. 765 ^{ns}	913807. 949**
Y* Variety*Rep	138	21.916	3. 892	85. 233	86. 668	2. 348	0. 067	2. 083	409218. 024
CV%		16. 14	0. 76	6. 40	6. 81	7. 00	7. 01	3. 02	15. 55
ns, * and ** are no significant and significant at 5 and 1 % probability levels, respectively									

Table 4: Mean comparison for different agronomic traits Rapeseed (Dancan%5).

Genotype	Seed yield kg/h) (		Oil content %		1000 Seed weight (gr)		No. of Seed per pod		No. of Pod per plant		Plant Height (cm)		Length of growing (days)		Flowering period (days)	
DP.948	4941	abc	47.7	Bcde	4.o	a	20.7	bcde	144	cdef	151	abcde	257.5	tg	28.5	a
Symbol	4038	abc	44.2	hi	3.7	abc	20.5	bcdef	159.5	a	4163	abg	261.5	abcde	261.5	a
Eurol	4472	abc	49.4	bc	3.3	c	21.2	abcd	143.7	bcd	147.5	cdefg	255	gh	255	a
Orient	4970	abc	49.7	b	3.6	abc	21.2	abcd	168.2	a	146.7	cdefg	255	gh	255	a
Hansen	3709	bc	46.7	defg	3.6	abc	22	ab	132	cdefg	141.5	defgh	263.2	ab	263.2	a
Colver	3846	abc	45.4	fghi	3.7	abc	19.2	efgh	134.2	cdefg	139	efghi	260	bcdef	260	a
Mobican	4258	abc	45.9	efgh	3.4	be	19	fgh	134.5	cdefg	133.5	bi	260	bcdef	260	a
Coctall	5355	a	45.1	fghi	3.7	abc	20.7	bcdef	162.7	a	163.2	a	262	abcd	262	a
Orcan	3970	abc	47.7	bcde	3.6	abc	21.2	abcd	155.5	ab	147.5	cdefg	261.7	abcde	261.7	a
PF.7045/91	4555	abc	46.3	defg	3.7	abc	19	fgh	130	defg	127.5	hi	253.5	h	253.5	a
Cwc	4755	abc	44.8	ghi	3.6	abc	18.5	bi	145.7	bc	147.5	cdefg	259.7	cdef	259.7	a
Fornax	4435	abc	43.4	i	3.9	a	21.5	abc	128.5	efg	150.2	abcdef	262.5	abc	262.5	a
Licord	3661	C	44.1	hi	3.8	ab	23	a	142.2	bcde	158	abc	262	abcd	262	a
ALice	5349	a	48.5	bcd	3.7	abc	21.2	abcd	132.5	cdefg	154.5	abcd	258.5	ef	258.5	a
Parade	5216	Ab	48	bcde	3.7	abc	23	a	124.5	gh	154.2	abcdefghi	259	def	259	a
Syn-1	2315	abc	47.4	bcdef	3.7	abc	20.7	bcdef	124.5	gh	150	bcdef	261.5	abcde	261	a
VDH8003-98	4459	abc	47.3	cdef	3.8	ab	21.7	abc	143.7	h	154.5	abcd	262.5	abc	262.5	a
Akamar	4476	abc	46.6	dfgh	3.8	ab	19.5	defgh	134.2	cdefg	137.2	fghi	260.5	abcdef	260.5	a
Consul	4557	Abc	48.6	bcd	3.9	a	20	cdefgh	128.2	efg	159.7	abc	262.2	abcd	262.2	a
Okapi	4454	Abc	48.4	bcd	3.8	ab	21.2	abcd	143	bcd	133.2	hi	263.7	a	263.7	a
L-1	4091	Abc	48.5	bcdf	3.9	a	18.5	bi	135.2	cdefg	120	i	259	def	259	a
Olara	5216	Ab	47.4	bcdef	3.8	a	17	i	131	defg	134.7	ghi	261	abcde	261	a
Regent* Cobra	4603	Abc	43.5	a	3.7	abc	21	bcde	145.5	bc	137.2	fghi	253	h	253	a
SLM 046	4668	abc	46.2	defgh	3.8	a	18.7	gh	127.2	fg	147	cdefg	260.5	abcdef	260	a
Means in each column ,followed by similar letter are not significantly different using Duncan's Multiple Range Test at P≤0.01																

Table 5: Mean comparison for different agronomic traits Rapeseed (Dancan%5).

Genotype	Seed yield kg/h) (		Oil content %		1000 Seed weight (gr)		No. of Seed per pod		No. of Pod per plant		Plant Height (cm)		Length of growing (days)		Flowerin period (days)	
DP.948	4268	abc	48.7	ab	3.8	ab	24.7	a	168.5	a	147.2	ab	259.7	bc	32	a
Symbol	3401	hik	47.8	ab	3.5	abcd	23.2	abc	156.7	ab	1147.2	a	262	ab	28	c
Eurol	3847	cdefg	48.4	ab	3.3	bcd	24.5	a	146.2	bcd	156.5	ab	258	c	31	b
Orient	4078	abcd	47.3	ab	3.6	abcd	24	abc	158	ab	144.2	b	258	c	30	c
Hansen	3283	ik	48.5	ab	3.7	abcd	24.7	a	127	efghi	137.5	ab	262.5	ab	28	c
Colver	3312	ik	48.1	ab	3.6	abcd	23.7	abc	132	efghi	147.7	ab	261	abc	28	c
Mobican	4195	abc	49.4	a	3.2	cd	22.5	abc	120.7	ghi	140	ab	260.5	abc	30	c

Coctall	4017	abcdef	48.6	a	3.2	d	21.2	bc	140.5	cdef	151.2	ab	262	ab	27	f
Orcan	3732	defg	49.2	ab	3.5	abcd	25	a	150.7	bc	150	ab	260.5	abc	29	d
PF.7045/91	2545	I	47.9	ab	3.7	abcd	22.2	abc	132.5	defgh	151	ab	252.7	d	25	b
Cwc	4291	ab	47.3	ab	3.5	abcd	24	c	142.5	bcde	116.7	c	264.2	abc	28	c
Fornax	3537	ghik	48.6	ab	3.7	ab	23	abc	127.5	efghi	143.2	ab	263.5	a	32	a
Licord	3183	h	48.7	ab	3.7	abc	24.5	a	132.2	defgh	148	ab	262.2	ab	28	c
ALice	4033	abcde	48.8	ab	3.6	abcd	23	abc	129.5	defgh	147.2	ab	264.2	abc	27	f
Parade	4332	a	48.4	ab	3.5	abcd	23.7	abc	123.5	fghi	146.2	ab	260.5	abc	27	f
Syn-1	4015	abcdef	49.0	a	3.5	abcd	22.7	abc	118.5	hi	133.7	b	261	abc	29	d
VDH8003-98	4092	abcde	48.5	ab	3.7	abcd	24	abc	112.2	i	137	b	263.5	a	30	c
Akamar	3636	efghik	48.2	ab	3.7	ab	23	abc	133.2	defgh	141.7	ab	260.7	abc	28.5	de
Consul	3992	abcdef	46.3	b	3.8	a	23.5	abc	126.7	efghi	155.5	a	261.5	ab	26	g
Okapi	4110	abcd	48.1	ab	3.8	a	24.2	ab	136.5	cdefghi	138.7	ab	261.5	ab	29	d
L-1	3882	bcdef	47.6	ab	3.5	abcd	23.5	abc	128.7	cdefghi	118.5	c	261.5	ab	30	c
Olara	3600	fghik	48.2	ab	3.7	ab	22	abc	136	cdefg	140	ab	259.2	bc	28	c
Regent * Cobra	3710	defghi	49.6	a	3.6	abcd	23.7	abc	142.3	bcde	140.5	ab	254.7	d	26	g
SLM 046	4010	abcdef	47.9	ab	3.7	ab	22	abc	125.5	efghi	146.5	ab	260.5	abc	29	d
Means in each column ,followed by similar letter are not significantly different using Duncan's Multiple Range Test at P≤0.01																

Table 6: Mean comparison for different agronomic traits Rapeseed.

Genotype	Seed yield (kg/ h)		Oil content %		1000 Seed weight (gr)		No. of Seed per pod		No. of Pod per plant		Plant Height (cm)		Length of growing (days)		Flowering period (days)	
DP.948	4605	ab	48.2	bcd	3.9	a	22.7	abcd	154.8	ab	149.1	abcd	258	bc	30.2	a
Symbol	3720	abcd	46.0	d	3.6	ab	21.8	abcdef	158.1	ab	1;159.8	a	261	ab	27.3	a
Eurol	4160	abcd	48.9	b	3.3	b	22.8	abcd	145	bcde	145.9	abcd	256	cd	31	a
Orient	4525	abc	48.5	bc	3.6	ab	22.6	abcd	163.1	a	142.1	bcd	256	cd	30.8	a
Hansen	3496	abcd	47.6	bcd	3.6	ab	23.3	ab	129.5	efg	144.6	abcd	262	a	27.3	a
Colver	3580	abcd	46.7	bcd	3.7	ab	21.5	abcdef	133.1	efg	139.5	cd	260	ab	27.6	a
Mobican	4227	abcd	47.7	bcd	3.3	b	20.7	bcdef	122.6	fgh	142.4	bcd	260	ab	28.7	a
Coctall	4686	a	46.8	bcd	3.4	ab	21	bcdef	151.6	abcd	156.6	ab	262	a	27.6	a
Orcan	3851	abcd	48.4	bcd	3.5	ab	23.1	abc	153.1	abc	149.3	abcd	261	ab	28.2	a
PF.7045/91	3550	bcd	47.1	bcd	3.7	ab	20.6	cdef	131.3	efg	122.1	e	253	f	29	a
Cwc	4523	abc	46.1	cd	3.5	ab	19.7	ff	144.1	bcde	147.1	abcd	260	ab	27.3	a
Fornax	3987	abcd	46.0	d	3.8	a	22.2	abcde	128	fg	146.8	abcd	263	a	31.7	a
Licord	3422	cd	46.4	bcd	3.7	ab	23.7	a	137.3	defg	153	abc	262	a	29.1	a
ALice	4691	a	48.6	b	3.7	ab	22.4	abcde	131	efg	150.9	abcd	259	ab	30.3	a
Parade	4774	a	48.2	bcd	3.6	ab	23.3	ab	124	fgh	150.3	abcd	259	ab	28.1	a
Syn-1	3165	d	48.2	bcd	3.6	ab	24.7	abcdef	121.5	gh	141.9	bcd	261	ab	32.6	a
VDH8003-98	4276	abc	47.9	bcd	3.7	ab	22.8	abcd	143	h	145.8	abcd	263	a	29.8	a
Akamar	4057	abcd	47.4	bcd	3.7	ab	21.2	abcdef	133.8	efg	139.5	cd	260	ab	26.8	a
Consul	4275	abc	47.4	bcd	3.8	a	21.7	abcdef	127.5	fgh	157.6	ab	261	ab	26.8	a
Okapi	4282	abc	48.2	bcd	3.8	a	22.7	abcd	139.8	cdef	136	d	262	a	29.1	a
L-1	3987	abcd	48.0	bcd	3.7	ab	21	bcdef	132	efg	149.3	e	260	ab	28.5	a
Olara	4408	abc	47.8	bcd	3.8	a	19.5	f	133.5	efg	137.4	cd	260	ab	27.5	a
Regent * Cobra	4157	abcd	51.6	a	3.7	ab	22.3	abcd	143.9	bcde	138.9	cd	253	df	26.5	a
SLM 046	4339	abc	47.1	bcd	3.8	a	20.3	def	126.4	fgh	146.8	abcd	260	ab	30.3	a
Means in each column ,followed by similar letter are not significantly different using Duncan's Multiple Range Test at P≤0.01																

Conclusions:

Results show that during the agricultural year were achieved and somewhat genotype and environment interactions were considered, it can be concluded that the cultivars parade and Alice are recommended in the region of Kermanshah, because as was mentioned, the relative reduction of genotype interaction in the environment can reduce the difficulty of superior varieties recognition.

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