Performance of spring type canola (*Brassica napus* L.) varieties in semi cold midwest region of Iran

Sayyed Saeid Pourdad, Akhtar Beg

Dryland Agricultural Research Station Sararood Kermanshah, Email: akhtarbeg37@yahoo.com

Abstract

Trials were conducted at a Dry Land Agricultural Research Station located in mid-west semi cold region of Iran to assess potential/performance of spring type canola rapeseed in this winter rain region where these crops are totally new. Thirteen varieties of different origin were evaluated by planting on dry land near to average effective-rain fall date which is end of October most of the years based on long term climatic data. Result showed that rapeseed can produce economical yields in the prevailing climate ranging above one t/ha. Some varieties produced more than 1.5 t/ha, which are promising yields comparable to world average and equal to yield of the countries where these crops are grown on a large commercial area under similar climate. These results further show that rapeseed crop can be cultivated on the annual fallow land after cereals. Some effective weed control methods are needed to control wheat volunteers on first year fallow land.

Key words: Spring type canola, semi-cold Iran, seed yield and other characters.

Introduction

Current production of edible oils in Iran is seriously inadequate. Local production of edible oil from olives, cotton seed, soybean, sunflower as well as animal fats supplies only about 15-20 % of the demand, which is around one million ton per annum. The annual country demand for consumption is met through imports, which stands at about 850,000 ton per annum costing nearly a billion Us $. The agro-climate of the country is suitable for most of the edible oil crops especially spring and winter sown rapeseed and mustard as winter crop. In 1998 there was no commercial cultivation of these crops in Iran while by 2004-05 almost 150,000 ha were cultivated in irrigated and rain-fed warm and semi-cold areas. The trials reported in this article were conducted to evaluate performance of spring type exotic origin canola varieties in the semi-cold mid west rain-fed area of Iran. The main objective was to assess the potential of these crops for commercial growing and select suitable varieties for such areas. More than 60 % of the cultivated area in Iran is rain fed, 40- 50 % cultivated rain-fed area remains fallow annually in rotation. Some of the fallow can be replaced with these new crops to help alleviate the edible oil deficiency to some extent. The varieties used in these experiments are from several countries. Hypothesis was that rapeseed are drought- and cold-tolerant and produce economic yields under low to medium rains, provided the crop do not get hit by lower temperatures early on in seedling stage.

Weather: In 2000-01 effective rain came on 14th October amounting to more than 40 mm, first rain about 6 mm was on 6th of October, total rain was 420 mm. Absolute minimum temperature of -11.2 ºC. occurred in January when crop was in rosette stage. There were 84 frost days in the winter. Rain in 2002-03 was 413.5 mm. First effective rain 40.4mm was the first rain of the season came on 30-31 Oct and 1st Nov. Rain was well spread from start to end of April. May was rain free, when most needed as *Brassica* was in full pod stage. There were 82 frost days, absolute low temperature –13 ºC occurred on 13 December, two weeks around this date had frequent minus temperatures, winter was relatively long, snowfall was frequent, snow cover was for longer period compared to the past three seasons. Effective rain came 3 days earlier than the 25 years average.

Dates of Sowing. Keeping in view the historic aspect of climate and last few years planting experience, planting was done in the 3rd week of October on rain moisture saturated land the first year and on dry land the second year with the hope that rain will come in time according to an average season. Past 25 years rainfall data show first effective rain comes 80 % of the time by end of October. Planting of Colza can safely be done on dry land, 7-10 days earlier so crop is ready to receive effective rain.

Materials and methods

The experiments were conducted at Agricultural Research Station Sararood, Kermanshah, Iran during two years 2000-01 and 2002-03 under rain fed condition. Station is situated in a valley of the Northern Zagross mountain range at an elevation of 1351 meters (34º 20′ N, 47º 19′ E). The soil has a pH between 7.2 to 7.8.

Dates of Sowing. Keeping in view the historic aspect of climate and last few years planting experience, planting was done in the 3rd week of October on rain moisture saturate land the first year and on dry land he second year hope that rain will come in time according to an average season. Past 25 years rainfall data show first effective rain comes 80 % of the time by end of October. Planting of colza can safely be done on dry land, 7-10 days earlier so crop is ready to receive effective rain, crop germinated and emerged after 12 days of sowing the first year and second year 12 days after first rain.

There are 13 varieties in the experiment, two are from Canada, two from Australia, 8 from Denmark and one from

Germany. Trials both the years were sown on wheat fallow land.

Trials were applied fertilizer at the rate of 60 kg N+60 kg p2o5 before sowing. Trial was laid in a randomized block system, plot size first year was 12 m x 6 rows, second year plot size was 6 m x 5 rows, rows were 30 cm apart. There were four replications first year and three the second year. Sowing was with small plot planter first year, second year sowing was done by hand. Harvesting was done both the years manually, threshing was done by small plot cereal combine. Observations were recorded on yield, pods/plant, seed per pod, 1000-grain-weight and plant height.

Results and discussion

Name of varieties with origin, yield, yield range and two years average yield are given in Table 1. Other agronomic characters of the varieties are reported in Table 2. Highest yields both the years have been produced by three varieties Magent, Alexandra and Elect, though there is no significant difference between the yields statistically.

Table 1. Varieties, origin, yields and yield range at Sararood in 2000-01 and 2001-02.

Varieties	Origin	Yield in Kg per ha		2000-01 Yield range Kg/ha	2002-03 Yield range Kg/ha	Two yrs Av.Yield Kg/ha
		2000-01	2002-03			
1. Global	Canada	1042	876	413-1334	494-1389	959
2. Elect	Canada	1042	1223	699-1302	376-1356	1133
3. Taparoo	Australia	933	1099	815-1051	634-1529	1016
4. Shiralee	Australia	733	958	667- 762	752-1173	846
5.Haydn	Denmark	748	1147	381- 953	533-1709	948
6.Mozart	Denmark	910	1062	635-1130	363-2167	986
7.Marinka	Denmark	858	867	699- 899	163-1768	863
8.Magent	Denmark	1117	1510	667-1460	507-2732	1314
9.Alexandra	Denmark	1017	1414	616-1715	677-2078	1216
10.Dakini	Denmark	-	1212	-	438-2101	1212
11. Goliath	Denmark	758	1225	318- 984	1098-1337	992
12. Option 500	Denmark	1013	1202	617-1421	804-1860	1108
13. PF	Germany	567	448	191- 890	180-549	508
Average		895	1096			1008
LSD 5 %		457.2				N.A
LSD 1 %		603.8				

Yield: Average yield of 12 varieties the first year was 895 kg/ha, and second year for 13 varieties was 1096 kg/ha. The two years average yield was 1008 Kg/ha, yield range was 508 (PF) to 1314 Kg/ha (Magent). Varieties that produced more than a t/ha yield are Aexandra (1216 kg/ha), Elect (1133 kg/ha) and Option 500 (1108 Kg/ha). There is no significant difference between the yield of varieties producing more than 800 kg/ha. The world average yield is around 1.45 kg (FAO 1997), average yield of these crops the same year in Europe was 2.651 Kg/ha, in France the yield was 3.528, in Europe it takes almost 11 months to mature and high yielding winter types are planted, while the crop at Sararood matured in 204 to 209 days. The largest area is that of India (6.813 m ha) under these crop where the average yield was 1022 Kg/ha and mostly spring type varieties of *B. juncea* and *B.rapa* are sown. Yield in China (1450 Kg/ha) with the second largest area (6.790 m ha) in the world is comparable to the yield of some varieties obtained in our trials. China mostly grow *B. napus* species, some of the individual varieties yield in semi cold area of Sararood is comparable with yields obtained in China under similar climate, our yield is little better than yield obtained in warmer area of south Asia.

Agronomic Characters: The rain during the second year was late by 15 days. This resulted in lower values of some of the characters as pointed out below.

•Pods/plant were 64 the first year and 55 the second year. First year the range was 49
(Shiralee) to 84 (Magent). Second year range was 30 (Goliath) to 65 (Magent).

•1000-seed-weight on the average was greater the first year being 3.8 gram, for the second year it reduced to 2.9 g. Range the first year was 2.6 g (PF) to 4.9 g (Haydn) second year range was 1.9 g (Taparoo) to 4.2 g (Goliath).

•Plant height on the average reduced from 111 cm for the first year to 97 cm for the second year. Range the first year was 95 cm (Goliath) to 122 cm (Alexandra). Second year the range was 82 (PF) to 113 (Taparoo). However the increased values of these three characters for first year did not help increase the yield.

•Seeds /pod on average increased from 16 for the first year to 19 for the second, this is the only character which increased the second year. Range first year was 14 (Goliath) to 20 (Alexandra), second year the range was 14 (Mozart) to 23 (Taparoo). The increase in value of this character the second year increased the yield to some extent.

Conclusions

Results provide enough evidence that these crops can be grown in semi-cold region of Iran, under rain-fed conditions, where climate is like that of Sararood. Yield of several varieties is more than a ton per ha, which is economical and remunerative for rain-fed farmers especially on fallow land, yield is also comparable to and better than south Asian countries (FAO 1997). Also the varieties under trial can be used for commercial purpose. There are indications, based on results

obtained, that annual fallow cultivated areas, to some extent, can be utilized beneficially for the production of these crops, which will increase the income of rain fed areas farmers, and increase edible oil production in the country, reducing expenditure on its import, considerably.

Table 2. gronomic characters of canola varieties at Sararood in 2000-01, 2002-03.

Variety	Pod/plant		Seed/pod		1000-sd-wt		Plant Height	Plant Height
	00-01	02-03	00-01	02-03	00-01	02-03	00-01	02-03
1. Global	63	57	18	21	3.5	2.5	121	105
2. Elect	66	59	17	20	3.2	3.2	111	100
3. Taparoo	58	63	19	23	3.5	1.9	116	113
4. Shiralee	49	50	19	18	4.2	2.9	111	95
5.Haydn	64	60	16	19	4.9	2.2	113	95
6.Mozart	72	36	17	14	4.1	2.3	109	87
7.Marinka	59	61	19	20	3.4	2.8	120	87
8.Magent	84	65	16	19	4.6	3.0	115	96
9.Alexandra	76	52	20	18	3.8	2.8	122	102
10.Dakini	-	58	-	18	-	2.8	-	101
11. Goliath	67	30	14	19	4.6	4.2	94	101
12.Option 500	54	62	17	17	3.6	2.6	100	99
13. PF	50	56	18	15	2.6	2.6	95	82
Average	64	55	16	19	3.8	2.9	111	97
L.S.D 5 %	4.85		2.03		0.108		20.99	
L.S.D 1 %	6.40		4.25		0.142		27.71	

References

1. FAO. 1997. Production Year Book Vol. 51.