Original Research Article

Competitive behaviour of new cultivars of Indian mustard on weeds in lower Siwaliks of North-West Himalayas

ABSTRACT

Aims: To study the competitive ability of new varieties of Indian mustard with weeds during ~~rabi~~ *rabi* season in Jammu

Study design: Split Plot Design

Place and Duration of Study: Oilseed Experimental Area, Research Farm, SKUAST-Jammu, Chatha, Jammu & Kashmir (UT)

Methodology: A field experiment was conducted at the Research farm, Chatha, Jammu during the *rabi* season of 2010-11 and 2011-12 to study the effect of various cultivars of Indian Mustard on weed density and weed dry weight in Indian mustard (***Brassica juncea L.***) under weedy check and weed free conditions. Among the different treatments arranged in split plot design the cultivars of Indian mustard were kept in main plots and two treatments *viz*. ~~W~~ weed free and weedy check plots were kept in sub-plots.

Results: The varieties NRCDR 2 and Navgold were found to the most competitive cultivars of Indian mustard crop in suppressing the weeds at different crop growth stage at 60 DAS and exhibited lowest weed Index during both the years of experimentation.

Conclusion: Based on two years of experimentation, it may be concluded that maximum B:C ratio was observed with cultivar NRCDR 2 (1.51 and 1.03) during both the years of experimentation and was found to the most competitive cultivar of Indian mustard in suppression of weeds during the early stages of crop growth.

Key Words: Weeds, Weed population, Competitive cultivars, Indian mustard

1. INTRODUCTION

Mustard is an important *Rabi* oilseed crop of India and is grown on an area of 6.12 million hectares (approx.) with an average productivity of 1511 kg/ha during the year 2018-19 [1]. India ranks third among the major rapeseed mustard growing countries of the world with 9.98 % of the world's area under Rapeseed mustard cultivation. Among the nine oilseed crops grown in the country, it occupies about 24.70 per cent of area and 48.28 percent of production of the total oilseed production in India. Rapeseed and mustard are the major group of oilseed crops grown in Jammu region on a sizeable acreage in Jammu and Kashmir on an area of more than 55000 hectares with an average productivity of 1149 kg/ha which is far below the national average. Weeds are one of the major biotic stress which cause considerable reduction in the yield of Indian mustard which ranges to an extent of 30-45 per cent and more and weed management

during the critical crop weed competition period result in minimum economic losses [2]. Under irrigated conditions Indian mustard is infested predominantly with broad leaved as well as grassy weeds. The critical period of crop weed competition in Indian mustard is between 30-45 days after sowing [3]. Different weed management strategies *viz*. herbicides, cultural and biological *etc.* are used to manage the weeds below economic threshold level [4]. Recently some mustard genotypes have been found to have vigorous growth during the initial crop growth period up to 45 days after sowing thereby suppressing the weeds thus benefiting the crop during initial days of crop-weed competition period. Therefore, growing of recently developed competitive cultivars of Indian mustard for managing weeds holds promise. Therefore, the present study was undertaken with an objective to study the competitive behaviour of newly released varieties of Indian mustard against diverse weed~~s~~ flora under Jammu conditions.

2. MATERIALS AND METHODS

A two year experiment to study the effect of different cultivars of Indian Mustard on weeds and its suppression was laid out in RBD with 3 replications under AICRP (Rapeseed Mustard) programme ~~at~~ during the *rabi* season of 2010-11 and 2011-12 at the Research Farm, Chatha of the Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Jammu and Kashmir, India, which is situated at 32^0 40' N latitude and 74^0 58' E longitude with an altitude of 332 m above mean sea level. The soil of the experimental field was low in organic carbon (0.37%) and nitrogen (208 kg/ha), medium in available phosphorus (15.3 kg/ha) and potassium (128 kg/ha) and ~~slightly alkaline~~ neutral in pH (7.1). Indian Mustard crop was sown in second fortnight of October in rows 30 cm apart and 10±15 cm plant to plant distance using 5 kg seeds/ha during both the years of experimentation. Recommended dose of 60:30:15:20 kg/ha of $N:P_2O_5:K_2O:S$ was uniformly applied to all the treatments using urea, DAP , MOP and Gypsum as fertilizers. Full dose of P, K and S besides half dose of N were applied as basal dose at the time of sowing whereas rest of the N was given as 2 split doses during both the years of experimentation. Crop was raised as per standard package and practices during both the years of experimentation and was harvested during the last week of March during both the years of experimentation. The experiment consisted of twelve treatments which were laid down in factorial RBD with 3 replications and comprised of two factors namely six Indian mustard (*Brassica juncea* L.) varieties (kranti, RL 1359, Navgold, NRCDR 2, CS-56/NRCDR 601 and RSPR 01.) as Factor A and two levels of weed management as Factor B (weed free and weedy check). In the weed free plots 3 hand weeding at 25-30 days interval were done to kept the field weed free throughout the crop season. The variety CS-56 was taken in experiment in the first year of

experimentation and was replaced by NRCDR 601 during the second year of experimentation. All the standard package and practices were followed for raising the crop. The data was analyzed and presented using standard formulas and statistical tools. All the standard package and practices were followed and data was analysed using standard statistical procedures.

3. RESULTS AND DISCUSSION

The experimental field was infested mainly with broad leaved weeds (*Trachyspermum sp., Anagallis arvensis, Euphorbia helioscopia, Medicago denticulata, Vicia sativa, Chenopodium album, Rumex maritimus, Fumaria parviflora and Cirsium arvense*), grassy weeds (*Poa annua, Phalaris minor* and *Avena ludoviciana*) and sedges (*Cyperus rotundus*) during both the years of experimentation. Weedy check caused an average reduction in seed yield of Indian mustard (27.84%) which was significantly lower than weed free situation in comparison. Maximum weed population and dry weed biomass was recorded in weedy check (control) plots, whereas no weed population and dry weight was recorded in weed free plots.

Among the different Indian mustard cultivars NRCDR 2 (1398 kg/ha) though at par with Nov gold (1316 kg/ha) resulted in significant increase in the seed yield and other yield attributes viz. Siliquae per plant, Seeds per Siliquae, 1000- seed weight and of Indian mustard than other cultivars in comparison during the second year of experiment. However, during the second year of experimentation Indian mustard cultivar NRCDR 601(1298 kg/ha) proved to be equally competitive along with cultivars NRCDR 2 (1368 kg/ha) and Navgold (1274 kg/ha) in increasing the seed yield of Indian mustard than other cultivars in comparison (Table 2). Also, lowest weed density and weed dry weight was recorded in plots planted with Indian Mustard cultivars viz. NRCDR 2 and Navgold during both the years of experimentation. However, variety NRCDR 601 proved to be equally effective in suppressing the grassy and broad leaved weeds during the second year of experimentation (Table 1). This suppression of weeds during the initial period of crop growth may have been resulted due to better utilization of nutrients, moisture, space and light thereby resulting in higher LAI of the said genotypes thereby increasing their ability over other genotypes in comparison [5,6]. The lowest weed Index was recorded with cultivar NRCDR 2 (4.77 and 7.88 % respectively) during both the years of experimentation. Among the sub plots lowest weed population was recorded in weed free plots in comparison to weedy check plots.

CONCLUSION

Based on average of two years of experimentation in 2010-11 and 2011-12 on competitive behavior of Indian mustard (*Brassica juncea* L.) varieties against weeds *vis-à-vis* weed smothering potential of various newly developed genotypes at SKUAST-J, Chatha centre it was concluded that new high

yielding variety NRCDR 2 gave highest seed yield of mustard and was found to be most competitive cultivars of Indian mustard for suppression of weeds in Indian mustard crop in the Jammu region.

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Table 1. Effect of different cultivars on weed count and weed dry weight in Indian mustard at 60 days after sowing of Indian mustard

Treatments	Weed Population (no./m^2)						Weed dry weight (g/m^2)					
	2010-11			2011-12			2010-11			2011-12		
	Broad leaved	Grasses	Total	BLW	Grasses	Total	BLW	Grasses	Total	BLW	Grasses	Total
Varieties												
Kranti	33.64 (5.80)	9.67 (3.11)	43.31 (6.58)	42.33 (6.51)	38.00 (6.16)	80.33 (8.96)	23.61 (4.86)	7.40 (2.72)	31.01 (5.57)	39.77 (6.31)	23.98 (4.90)	63.75 (7.98)
RL 1359	35.88 (5.99)	13.69 (3.70)	49.57 (7.05)	42.67 (6.53)	40.00 (6.32)	82.67 (9.09)	24.90 (4.99)	8.29 (2.88)	33.19 (5.76)	40.19 (6.34)	24.26 (4.93)	64.45 (8.03)
NRCDR 2	29.60 (5.44)	9.12 (3.02)	38.72 (6.22)	36.67 (6.06)	33.33 (5.77)	70.0 (8.37)	22.84 (4.78)	6.96 (2.64)	29.8 (5.46)	36.48 (6.04)	21.67 (4.66)	58.15 (7.63)
Novgold	33.99 (5.83)	11.56 (3.40)	45.55 (6.75)	39.33 (6.27)	36.67 (6.06)	76.0 (8.72)	23.42 (4.84)	7.95 (2.82)	31.37 (5.60)	39.85 (5.69)	22.55 (4.75)	62.40 (10.08)
NRCDR 601	32.72 (5.72)	12.74 (3.57)	45.46 (6.64)	40.33 (6.35)	35.33 (5.94)	75.66 (8.69)	24.20 (4.92)	8.53 (2.92)	32.73 (5.72)	37.50 (6.31)	22.09 (4.70)	59.59 (7.89)
RSPR 01	39.56 (6.29)	14.51 (3.81)	54.07 (7.35)	43.33 (6.58)	41.33 (6.43)	84.66 (9.20)	24.41 (4.94)	8.64 (2.94)	33.05 (5.75)	40.92 (6.40)	24.87 (4.99)	65.79 (8.11)
CD (p=0.05)	NS	NS		NS	NS		NS	NS		NS	NS	
Weed Management												
Weedy check	85.56 (9.25)	23.23 (4.82)	108.80 (10.43)	72.95 (8.54)	63.81 (7.99)	136.76 (11.69)	64.96 (8.06)	17.55 (4.19)	82.51 (9.08)	71.04 (8.43)	42.27 (6.50)	113.31 (10.64)
Weed free	5.80 (2.41)	4.20 (2.05)	10.00 (3.16)	8.95 (2.99)	11.81 (3.44)	20.76 (4.56)	2.92 (1.71)	2.13 (1.46)	5.05 (2.25)	7.33 (2.71)	4.65 (2.16)	11.98 (3.46)
CD (p=0.05)	0.32	0.35	0.68	0.29	0.36	0.65	0.12	0.06	0.09	0.20	0.23	0.22

Table 2. Effect of different cultivars on yield, yield attributes, net returns and economics of Indian Mustard

Treatments	Seed yield (q/ha)		Siliquae/plant		Seed/Siliquae		1000-seed weight		Net Returns (Rs./ ha)		B:C ratio	
	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
Varieties												
Kranti	12.84	12.52	397.16	424.83	15.16	12.83	3.70	3.59	13283	10741	1.26	0.85
RL 1359	12.66	12.09	376.13	409.17	15.10	12.53	3.63	3.55	12954	9936	1.23	0.78
NRCDR 2	13.98	13.68	414.53	443.33	15.90	14.93	3.8	3.79	15912	12893	1.51	1.03
Novgold	13.18	12.74	412	433.67	15.36	14.33	3.74	3.68	13907	11148	1.32	0.88
CS 56/NRCDR 601	12.97	12.97	408.06	439.33	16.20	14.67	3.82	3.77	13500	11579	1.28	0.91
RSPR 01	11.99	11.74	365.43	397.33	14.26	12.07	3.46	3.38	11705	9289	1.11	0.73
CD (p=0.05)	0.82	1.09	26.64	11.78	NS	0.83	0.16	0.13	-	-	-	-
Weed Management												
Weedy check	11.17	10.18	346.78	389.24	14.70	12.00	3.39	3.42	11436	7668	1.20	0.69
Weed free	14.68	14.85	444.83	453.62	15.96	14.82	3.76	3.79	15652	13973	1.36	1.01
CD (p=0.05)	NS	0.58	15.38	6.30	1.0	0.45	0.09	0.07	-	-	-	-