COMPARATIVE PERFORMANCE OF ETHIOPIAN MUSTARD (Brassica carinata A.BRAUN) AND ARGENTINE RAPESEED (Brassica napus L.) UNDER IMPROVED AND TRADITIONAL FARMING PRACTICES

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ABSTRACT

The on-station research work in the past several years has identified improved Ethiopian mustard and Argentine rapeseed varieties. The basic agronomic information was made available at the same time as the new cultivars were released. This package testing was undertaken to acquaint the users with new innovations and appreciate their preference.

The performance of Brassica carinata and Brassica napus varieties was tested for two seasons at four sites under both improved management practices developed on the research centers, and traditional farming practices. The late B.carinata entries were able to use the longer growing season in the highland Ethiopia and yielded much better than the earlier maturing B.napus types. The researchers' package resulted in substantial seed yield increase. Variety and fertilizer were the two most important factors for higher seed yields. Among the varieties tested, S-67 performed best across site under both management practices. B.napus was more responsive to better management.

INTRODUCTION

Ethiopian mustard is the primarily cultivated oilseed Brassica in Ethiopia. The species is grown in the mid and high altitudes (1650 to 2650m) on more fertile well drained soils often close to houses (3). Argentine rapeseed was introduced into the country about 15 years ago(1).

Evaluation of genotype of Ethiopian and exotic oilseed Brassica lines under different environmental conditions resulted in the release of five Brassica carinata and three Brassica napus varieties (2). The production technologies appropriate for the different regions and growing conditions was made available at the same time as the new cultivars were released. Expression of seed yield was very much dependent on planting date, fertility of the soil and frequency of weeding. With recommended dose of fertilizer (46/69 kg/ha of N and P_2O_5) two weeding, early planting (late may to late June) and optimum seeding rate (10 kg/ha) seed yield could be increased substantially (2).

Concerted effort, however, are needed to expand oilseed Brassica cultivation away from homestead so that more production can be easily achieved. This requires step by step evolution away from existing systems followed by farmers. This package testing was undertaken to acquaint the farmers with the appropriate innovations which, if accepted, will have the biggest effect in improving productivity by fitting well

in the cropping system of the highlands.

MATERIALS AND METHODS

The performance of two B.carinata (S-67 and local checks) and two B.napus (Tower and Pura) was tested for two seasons (1985 and 1986) under both improved management practices developed on research centers, and traditional farming practices. The trial was conducted at Misrak Sholla, Illala Gojo, Wolmera Goro and Holetta. Farmers' associations selected for the study were located near to dense population area and were representative of the target group. Both researchers and extension workers along with the cooperating farmers were involved directly in this on-farm testing activities.

The researchers packages included a combination of early and mid season weeding; seed rate of 12 kg/ha and a fertilizer level of 46/69 kg/ha of N and P_2O_5. Farmers' own judgment of fertilizer level (0 or 23/35 kg/ha of N anf P_2O_5) seed rate (8-10 kg/ha) and weeding (one mid-season weeding) were considered for the farmers' method. The land preparation was done with local plough. The improved package was executed by the farmers' as per the instructions given by the researchers using their own facilities while the farmers were entirly responsible to apply their own practices for the traditional method. The varieties were planted between 25 June and 1 July in blocks with two replications. Plot size was 200m^2 per treatment. In both method, seeding was done by broadcasting. The agronomic and yield data were recorded for all the treatments. Seed oil percentage was determined by Nuclear Magnetic Resonance (NMR) on a 40 ml dry sample from each plot.

RESULTS AND DISCUSSION

On-station multilocation replicated trials showed that Brassica carinata varieties had higher seed yield than B.napus (Table 1). The data also revealed that the Carinata types were late in maturity and were able to use fully the longer growing season in the highland Ethiopia. In general, fertilizer and weeding played major roles in yield expression. B.napus appeared to be more responsive to better management as compared to B.carinata (Table 2).

As can be seen from Table 3, the differences in seed yield between species and level of management were remarkably high. The lower yield obtained from the traditional practice as compared the researchers' package can be attributed partly to the poor establishment in the former case caused by lower fertility and weed competition (Table 4). The Carinata types performed well under traditional practice although it did respond to better management.

The seed yields of Pura and Tower were very poor when they were grown without fertilizer. On the other hand S-67 out yielded the other varieties under both management practices. Hence S-67 is by far the best variety available for general cultivation away from homestead. Average yield of this variety under farmers' conditions was 1095 kg/ha.

Table 1. Summary of seed yield, seed oil content and seed oil yield of varieties in Rapeseed and Mustard National and Extension Yield Trials grown at eleven sites (1984 & 1985)

Species	Variety	Seed yield(kg/ha)		Oil content(%)		Oil yield(kg/ha)		Erucic acid %
		F_1	F_0	F_1	F_0	F_1	F_0	
Brassica napus	Improved	1690	683	46.7	46.2	789	316	0-2
Brassica carinata	Improved	2401	1273	43.3	42.5	1040	541	49.1-53.4
Brassica carinata	Local	2015	1009	42.7	41.7	860	421	-
Mean		2035	988	44.2	43.5	896	426	

Table 2. Seed yield increase due to optimum cultural practices as compared to the checks (farmers methods)

Species	PERCENT INCREASE DUE TO :-				
	Fertilizer (Nil/recom.)	Weeding		Sowing date (15 June-15 July)	Seed rate 6-12 kg/ha
		Once	twice		
Brassica carinata	93.5	-	-	20.5	5.6
Brassica napus	147.4	79.1	83.7	26.0	8.6

Table 3. Mean seed yield, seed oil content and oil yield of four rapeseed/mustard varieties in the on-farm trials grown in 1985 and 1986 using researchers' package (RP) and farmers' method(FM)

Variety	Species	Seed Yield (kg/ha)			Oil Content (%)			Oil Yield (Kg/ha)		
		RP	FM	Mean	RP	FM	Mean	RP	FM	Mean
Pura	B.napus	770	258	514	46.8	46.8	46.8	360	121	241
Tower	" "	719	225	472	47.0	47.3	47.2	338	106	222
S-67	B.carinata	1882	1095	1489	42.6	42.2	42.4	802	462	632
Local	" "	1529	935	1232	43.9	43.8	43.9	671	410	541
Mean		1225	628	927	45.1	45.0	45.1	543	275	409

Table 4. Mean across sites for different agronomic characters of four rapeseed/mustard varieties in the on-farm trials grown in 1985 and 1986 using researchers' package (RP) and farmers method (FM)

Variety	Species	Days to Mature			Plant Height (cm)			Stand (%)		
		RP	FM	Mean	RP	FM	Mean	RP	FM	Mean
Pura	B.napus	135	140	138	125	101	113	84	51	68
Tower	" "	137	141	139	124	100	112	83	52	68
S-67	B.carinata	167	171	169	142	126	134	88	63	76
Local	" "	172	176	174	153	145	149	89	66	78
Mean		153	157	155	136	118	127	86	58	72

With recommended dose of fertilizer, two weedings and optimum plant density the variety gave a yield of 1882 kg/ha. Hybridization programme is in progress to improve the oil and meal quality of Brassica carinata varieties including S-67.

The napus types were shorter (Table 4) and more determinate irrespective of location and possessed higher seed weight. These characters were stable under different environments. The large seeded napus species had more oil in the seed (Table 3) which may be related to larger proportion of embryo and less seed coat.

CONCLUSION AND RECOMMENDATION

Good plant establishment and higher seed yields were maintained with combination of recommended dose of fertilizer, two weeding and optimum plant density. The difference in yield between varieties and level of management were remarkably high. S-67 showed comparatively stable yield at high production levels. It, therefore appears that the cultivation of S-67 has greater promise in the cropping system followed by samll farmers for crops grown away from homestead.

The next problem of the existing system followed by oilseed farmers is the poor seed bed preparation. Good land preparation will deliver additional improvement in productivity. Hence, future trials should consider tillage practices intercropping, etc., in the efforts towards maximizing farmers returns. This approach is consistant with the step by step evolution away from existing systems.

REFERENCES

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