Weed Management Through Seeding Rates and Seeding Methods in Rainfed Rapeseed/Mustard.

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ABSTRACT

Studies to evaluate the effect of different seeding methods and seeding rates on the weeds and crop yield of rainfed rapeseed/mustard were conducted in the year 1985-86 and 1986-87 at the National Agricultural Research Centre, Islamabad, Pakistan. The data revealed that weed densities and biomass were less in mechanical line seeding as compared to broadcast seeding method. Weed densities and biomass decreased with an increase in the seed rate. Generally, the highest seed yield was received with 6 kg seed rate/ha seeded either by broadcast or mechanically in lines.

INTRODUCTION

Rapeseed/mustard contribute about 30% to the total edible oil production and are grown over an area of about 0.35 million hectares (Anonymous, 1986). With the increasing demand of oil, the area under this crop is increasing at a rapid rate. The unit yield of these crops, however is very low as compared to other countries. Under irrigated conditions yield of *Brassica* ranges from 1000 to 2000 kg/ha and in barani (rainfed) areas the yields from a pure stand of rapeseed and mustard range from 75 to 400 kg/ha. These yields are much less than the 800 to 1200 kg/ha routinely obtained on research plots (Morrison 1986). One of the major contributing factor for this low yield being the increased weed population in this crop.

The losses due to weeds in different oilseed crops have been reported to vary from 18 to 76% under dry land condition (Rao, 1987). Similarly an increase of 25 to 60% in the yield of sunflower has been reported through weed control (Khan *et al*, 1987). This shows that yield of oil seed crops can be significantly enhanced by proper crop management practices particularly weed management.

Increased population has been used as a tool in weed management in many crops. The use of dense crop population, narrow row width and delayed planting are some of the known management practices which can reduce weed infestation and growth (Oilver 1978, Miller *et al*, 1983, Teasdale and Frank 1983). Many growers in Ontario and United States have been gradually increasing crop populations by reducing soybean row widths over the past few years to reduce the weed infestation and achieve higher yields (Ablett *et al*, 1984). In maize higher crop population has been found to effectively reduce the above ground biomass, tuber number, tuber weight and height of yellow nutsedge and in-

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crease the corn yield (Ghafar and Watson, 1983). Soybean also often yields more when grown in narrow rows. Recent research has indicated that there is a potential 10-29% yield advantage from planting soybean in 18 cm rows, as compared with 50-75 cm rows (Cooper, 1974). Manual weeding is the best technique for weed control but shortage of labour being caused due to several reasons is the main obstacle. The present study has been undertaken to find out a most appropriate seeding method and an optimum seed rate for rapeseed crop in the light of weed management.

MATERIALS AND METHODS

The experiments were conducted at the National Agricultural Research Centre (NARC) during Rabi 1985-86 and 1986-87 under rainfed conditions. Two seeding methods i.e. mechanical row seeding and broadcast seeding and four seeding rates i.e. 4, 6, 8 and 10 kg/ha, were evaluated for their effect on weed infestation and seed yield. The experiment was laid-out in split plot design with seeding rates in main and planting methods in the sub-plots. Each treatment was replicated 4 times with a plot size of 3.6 x 5 m^2. Each sub-plot was further divided into two halves with one half kept as unweeded and the second one as hand-weeded once at 4 to 6 leaf stage. Phosphate fertilizer at the rate of 60 kg/ha P_2O_5 as DAP, 90 kg/ha of nitrogen fertilizer as urea were applied prior to planting. Data on weed density and weed biomass were recorded at harvest. Seed yield data were recorded on the middle 4 rows measuring an area of 6 m^2. Data so collected were statistically analysed.

RESULTS AND DISCUSSION

Effect of Seeding Methods

In the year 1985-86 weed density and weed biomass recorded in the broadcast method were much higher as compared to mechanical seeding but in the following year i.e. 1986-87 this difference was not that prominent. Similarly, increase in seed yield due to mechanical seeding was 92.1% in 1985-86 and only 19.2% in 1986-87. (Table 1).

The data indicate a significant increase in the seed yield due to mechanical seeding. This increase could be due

Table 1. Weed density, weed biomass, seed yield and percentage increae due to weeding in rapeseed/mustard with different methods of seeding. NARC,1985-87.

Seeding Method	Weed density (no/m^2)		Weed biomass (gm/m^2)		Seed yield (kg/ha)		%increase in seed yield due to weeding	
	85-86	86-87	85-86	86-87	85-86	86-87	85-86	86-87
Broadcast Seeding	117	145	39.1	79	828	851	49	15
Mechanical Seeding	35	134	2.8	77.31	1591	1015	31	26

Table 2. Weed density, weed biomass, seed yield and percent increae in seed yield due to weeding in rapeseed/mustard with different seeding rates. NARC, 1985-87.

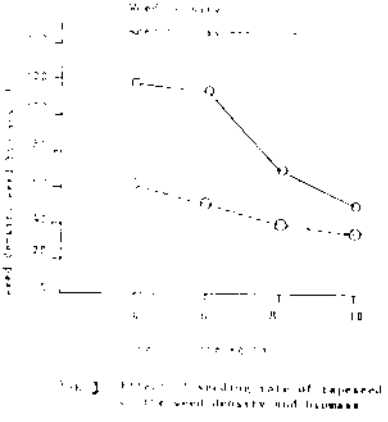
Seeding rates (Kg/ha)	Weed density (no/m^2)		Weed biomass (gm/m^2)		Seed yield (kg/ha)		% increase in seed yield due to weeding	
	85-85	86-87	85-86	86-87	85-86	86-87	85-86	86-87
4	104	169	35.3	90.7	1151	937	40	22
6	97	171	24.9	78.7	1292	1017	46	20
8	60	119	12.8	68.6	1261	899	36	24
10	42	98	11.0	59.8	1227	877	28	20

to weed suppression (Table 1) by proper plant stand and seeding depth obtained through mechanical seeding method or both. However, on the basis of these data contribution made by each factor can not be quantified. Weed suppression observed due to mechanical seeding in 1985-86, could be due to the reason that mechanical seeder uprooted the germinating seedlings during seeding operation. Secondly it could also be possible that due to better crop stand and growth attained in the early period because of proper seeding, weeds were suppressed.

Effect of Seeding Rates

With the increase in the seeding rates there was a gradual decreases in the weed density and biomass during both the years (Fig. 1) except that weed density during 1986-87 was almost similar with 4 and 6 kg/ha of seeding rates (Table 2). Evidently the increase in the population of crop plants reduced the available light, moisture and nutrients for the weed species which in this case emerged later than the crop plants. Brassica plants having a deep tap root system might be more efficient in absorbing moisture and nutrients as compared to the weed plants. Possibly because of similar reasons brassica plants have been seen surviving best under drought conditions as compared to other plants.

During both the years highest seed yield was recorded from seeding at the rate of 6 kg/ha which obviously should be the optimum seed rate. (Fig. 2). In case of other seeding rates i.e. 8 and 10 kg/ha although the weed density and biomass was less but increased intra specific competition caused by higher



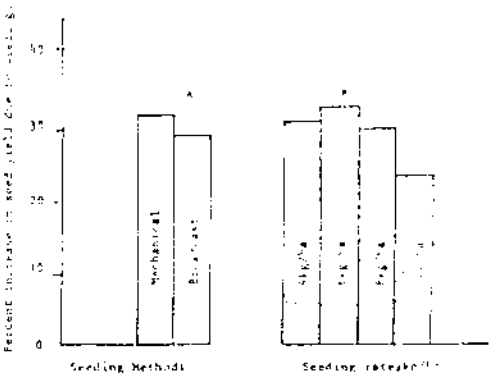


Fig. 2 Percent increase in seed yield due to weeding of rapeseed as affected by seeding method (A) and seeding rate (B).

plant populations in case of higher seed rates resulted in lower crop yields.

From the data in table 2 it can also be observed that increase in seed yield due to weeding was the highest in the treatment where 6 kg seed rate was used during 1985-86. In the year 1986-87 the differences in the increase due to various seed rates were not much sharp and this is mainly because the weed biomass was not reduced much due to increase in seed rates.

These data conclude that 6 kg/ha is the optimum seed rate which gave the highest seed yield. This yield can further be increased by 46% if weeding is done.

Seeding Method X Seeding Rate Interaction

Data in table 3 reveal that in 1985-86 weed densities and biomass decreased gradually with increasing seed rates either mechanically or broad-

Table 3. Weed density (no/ m^2), weed biomass (gm/ m^2) in rapeseed/ mustard under different seeding rates and methods. NARC, 1985-87.

Seeding rates (kg/ha)	1985-86				1986-87			
	Broadcast seeding		Mechanical seeding		Broadcast seeding		Mechanical seeding	
	Weed density	Weed biomass	Weed density	Weed biomass	Weed density	Weed biomass	Weed density	Weed biomass
4	149a	66.5a	58a	4.0a	159a	98.9a	178a	82.4b
6	144a	45.5b	49b	4.3a	153a	71.1bc	189a	86.2a
8	106b	24.0c	14cd	1.5b	154a	75.8b	84cd	61.3bc
10	70c	20.5c	14cd	1.5b	113b	70.1bc	83a	49.4bc

Table 4. Seed yield (kg/ha) of rapeseed/ mustard with different seeding rates and methods. NARC, 1985-87.

Seeding rates (kg/ha)	1985-86				1986-87			
	Broadcast seeding		Mechanical seeding		Broadcast seeding		Mechanical seeding	
	Weeded	Unweeded	Weeded	Unweeded	Weeded	Unweeded	Weeded	Unweeded
4	1002d	620e	2212a	1682d	988b	814ef	1288ab	1060c
6	1561a	979d	2218a	1604de	1101a	937bc	1348a	1097c
8	1369b	938c	2064b	1583de	1002cd	891cde	1221b	907d
10	1293c	958b	1843c	1496e	838def	760f	1264b	994cd

cast seeded. Same was almost true in case of broadcast seeding in 1986-87 but in case of mechanical seeding in this year highest weed density and biomass was recorded with 6 kg seed rate/ha followed by 4, 8 and 10 kg/ha.

It can be concluded from these data that increased plant population can play a great role in weed management. However, there is an optimum seed rate where weed problem is reduced without any loss in the seed yield. Table 4 indicates that during both the years highest seed yield with both the methods of seeding, was obtained with 6 kg seed rate/ha.

These studies conclude that seeding mechanically in rows does not contribute significantly towards weed management or seed yield and 6 kg seed rate is the optimum seeded either by broadcast or mechanically in lines.

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