

RESPONSE OF DIRECTION AND METHODS OF SOWING WHEAT IN PURE AND INTERCROPPING

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ABSTRACT

An experiment was conducted during 1994-95 *rabi* season at C.S. Azad University of Agriculture & Technology, Kanpur, to evaluate the effect of direction and different methods of sowing sole and intercrop of wheat with oat and mustard. Border method of sowing wheat in North-South direction produced higher net return of Rs. 5629 compared to regular method of sowing wheat in North-South direction (Rs.4731) and East-West direction (Rs.4026). Wheat + Mustard (9:1) intercropping with North-South direction sowing produced highest wheat equivalent yield and minimum profit was obtained with wheat + oat (1:1) intercropping system.

KEY WORDS: Wheat intercropping, direction of sowing and economics

Suitable plant row arrangement and row direction helps in interception and utilization of available light and increase the productivity of crops. Intercropping also provides extra profit and subsistence-oriented requirements simultaneously from same piece of land. Therefore, this experiment was conducted to study the effect of different methods of sowing sole crop of wheat and intercropping with oat, mustard in relation to different direction of sowing.

MATERIALS AND METHODS

The experiment was carried out at C.S. Azad University of Agriculture and Technology, Kanpur during *rabi* season of 1994-95. The soil of experimental field was sandy-loam with pH 7.6 and available NPK of 180, 11.7 and 115 kg/ha, respectively. The experiment was laid out in a randomised block design with four cropping patterns viz., regular sowing of wheat, border sowing of wheat, intercropping of oat with wheat 1:1 row ratio, mustard with wheat in 9:1 row ratio and two direction of sowing viz., North-South and East-West with four replications. Regular sowing of wheat was done at 22.5 cm apart, while in border method 25% economy of fertiliser and seed is made by leaving every fourth row vacant after every three rows. In this technique border effect is provided to two sown rows in a group of every three rows. Fertiliser dose of 120:60:40 kg NPK/ha for wheat and mustard, 90:45:30 kg NPK/ha for wheat (border) and 60:30:20 kg NPK/ha for oat crop

was applied. Wheat cv. HD-2329, oat cv-Kent and mustard cv Vardan was sown on 30 Nov. 1994 and wheat and oat were harvested on 15th April 1995 and mustard on 5th April 1995. Observations on various growth and yield related traits were recorded, statistically analysed. economics was worked out and presented.

RESULTS AND DISCUSSION

Yield and Yield traits

Wheat seed yield of regular and border method of sowing was at par with each other. Regular method produced a little higher seed yield (Table-1) due to higher biomass production as a result of more number of plants per unit area. This result was supported by the findings of Dhillon *et al.* (1979).

The border method of sowing, if adopted, even though the yield difference is not there, there is 25 per cent reduction in seed and fertiliser rate for each ha, which can be used for further area. The results corroborated with the findings of Pandey and Singh (1991).

Among intercropping systems, wheat + mustard (9:1) produced higher wheat equivalent yield of 48.40 q/ha which was statistically superior over wheat + oat (1:1). This may be attributed to difference in root system between mustard and oat, mustard having tap root system takes moistures and nutrients from relatively deeper layer of soil

Table 1. Effect of cropping system and direction of sowing on yield and yield characters

Cropping Systems	Test Weight (g/1000 seeds)			Straw/Stover Yield (q/ha)			H.I. (%)			Seed Yield (q/ha)			Wheat Equivalent yield (q/ha)
	W	O	M	W	O	M	W	O	M	W	O	M	
Wheat (Regular)	42.18	-	-	189.74	-	-	32.40	-	-	43.41	-	-	43.41
Wheat (Border)	42.94	-	-	88.62	-	-	32.40	-	-	42.47	-	-	42.47
Wheat + Oat (1:1)	34.96	27.92	-	48.99	98.33	-	21.83	21.15	-	13.54	26.34	-	34.59
Wheat + Mustard (9:1)	42.92	-	3.51	80.07	-	7.93	34.06	-	25.16	41.31	-	2.56	48.40
C.D. (5%)	3.22	-	-	4.80	-	-	2.12	-	-	3.27	-	-	3.55
Row Direction	W	O	M	W	O	M	W	O	M	W	O	M	
North-South	41.30	30.43	3.53	75.50	100.20	8.19	31.18	21.80	25.33	36.01	27.80	2.57	43.88
East-West	40.30	25.40	3.48	78.48	96.45	7.67	29.25	20.50	24.99	34.35	24.88	2.55	41.65
C.D.	NS	NS	NS	NS	NS	NS	1.5	NS	NS	NS	NS	NS	NS

* W-Wheat, O-Oat, M-Mustard.

than the oat, the lower competition at above ground level for sunlight interception and adverse shooting effect also saved the wheat crop for better productivity in association with Mustard crop. Similar findings were also reported by Singh *et al.* (1995).

North-South direction of sowing recorded higher yield traits and seed yield than East-West

direction with wheat, mustard and oat crop owing to better utilization of sunlight and moisture by the difference was non significant. Similar results were also reported by Perekalzakii (1952). However, Sekhawat *et al.* (1966) and Sims (1963) reported significant increase in crop yield when sown in North-South direction in comparison to East-West direction.

Table 2. Economics of various treatments

Treatments	Wheat Equivalent yield (q/ha)	Gross return (Rs/ha)	Cost of cultivation (Rs/ha)	Net return (Rs/ha)	Return / Rupee invested
Wheat regular (N-S)*	44.35	16631	11900	4731	1.40
Wheat regular (E-W)**	42.47	15926	11900	4026	1.36
Wheat border (N-S)	43.81	16429	10800	5629	1.52
Wheat border (E-W)	41.13	15424	10800	4624	1.43
Wheat + Oat (N-S) (1:1)	37.50	14063	11100	2963	1.27
Wheat + Oat (E-W) (1:1)	35.68	13380	11100	2280	1.21
Wheat + Mustard (N-S) (9:1)	49.67	18626	11800	6826	1.58
Wheat + Mustard (E-W) (9:1)	47.13	17674	11800	5874	1.50

* N-S : North-South

** E-W : East-West

Economics

Among various treatments, wheat + mustard (9:1) system with North-South direction of sowing gave highest net return of Rs. 6826 and highest return per rupee invested (1.58) (Table-2). This was followed by wheat + mustard (9:1) in East - West direction of sowing and wheat border method of sowing, respectively. Though, wheat equivalent yield was lower with border method of sowing than regular method of sowing along with any direction, the net profit and return per rupee invested was highest owing to decrease in cost of cultivation through 25% save in inputs i.e. seed and fertiliser. All other treatments proved less profitable.

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(Received : May 1998 Revised : August 1999)

INVESTIGATION ON EMS AND DES INDUCED MEIOTIC ABERRATIONS IN CHILLI (*Capsicum annum L.*)

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ABSTRACT

EMS and DES were found to be very potent chemical mutagens to induce the meiotic abnormalities in the chromosomes of Chilli (*Capsicum annum L.*) var. G4. The meiotic abnormalities induced by mutagen were multivalent association, lagging chromosomes, stickiness of chromosomes, precocious movement of chromosomes, bridges, fragments and micronuclei etc. Multivalent association of chromosomes is due to reciprocal translocation in the chromosomes while bridges, laggards and precocious movement are attributed to the paracentric inversion, failure of chiasmata formation in the pairs and discrepancies is the spindle formation respectively. Chromosomal breakage is due to change in molecular constitutes of chromosomes whereas stickiness is result of depolymerisation of nucleic acid caused by mutagen.

KEY WORDS: EMS, DES, Meiotic aberration, Chilli

Mutagenesis is the best method for making alteration in the genotype and to enlarge the genetic variability in a short period of time. Chemical mutagens are widely used to induce the variability in the crop with a view to develop desirable variants. (Bora et. al 1961). Various mutants have been developed by using diethyl sulphate (DES) and ethyl methane sulphonate (EMS) but its effects on meiosis of chilli have not been studied comprehensively. Present investigation was undertaken to study the effect of EMS and DES on

chromosomes during meiosis in Chilli (*Capsicum annum L.*)

MATERIALS AND METHODS

One hundred dry seeds of chilli var. G4 in three replicates were presoaked in double distilled water (DDW) for 24 hours at room temperature and then treated with 0.5, 1.0 and 1.5 percent DES and EMS aqueous solution separately for period of 8 hours. After completion of treatment, seeds were washed thoroughly with running tap water. A total number