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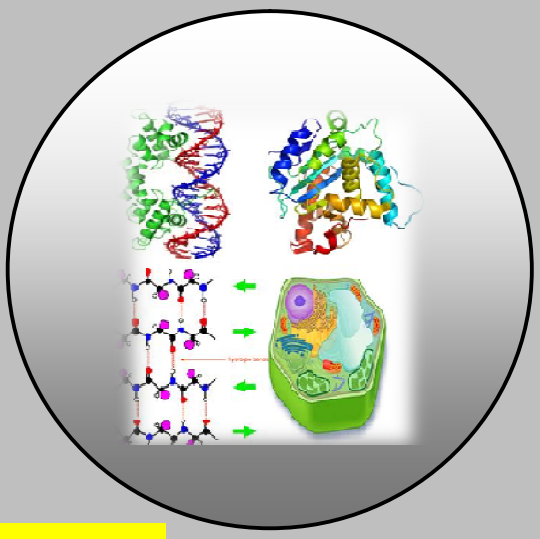

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Effect of Seeding Methods and Tillage Practices on Wheat under Rainfed-Condition

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ABSTRACT

An experiment on tillage practices (mouldboard plough, discplough, cultivator, rotavator and desi hall) and seeding methods (drill, lister and pora) was conducting during 1996-97 at Malakandher Research farm of KPK Agricultural University, Peshawar in RCB design with three replications using 12×5m net plot size. Different seeding methods significantly affected days to emergence, tillering capacity $(m^2)^{-1}$, number of grain spike^{-1}, harvest index and grain yield kg ha^{-1}. Maximum of 586.2 tiller, 39.77 harvest index and 1722.66 kg ha^{-1} of grain yield was obtained in drilled seeded plots while pora method of seeding had the lowest values for these variables. Various tillage practices significantly affected tillering capacity per $(m^2)^{-1}$ and number of grain spike^{-1}. Interaction between seeding methods and tillage practices had affected all the variable maximum of 672 tillers $(m^2)^{-1}$ were recorded from the rotavator tilled plots and seeded with drill. Highest harvest index of 40.50 and maximum grain yield of 1885kg ha^{-1}. were recorded from plots prepare by rotavator and seeded with drill. In conclusion the combination of rotavator and drill was found suitable for the maximum wheat production and dry land sown wheat in KPK.
Key words: Seeding Methods, Tillage Practices, Wheat, Dry Land.

INTRODUCTION

Wheat is technically known as *(Triticum aestivum.L.)* belongs to the family *Poaceae* tribe *Hordeae* and genus *Triticum.* Wheat is an annual, self pollinated, long day and winter cereal. Wheat is an important crop of the world. About half of the world cultivated land is used to produce cereal grains and about two fifth of that total grows wheat.

Not in the world only, in Pakistan also, wheat is the most important single crop. Wheat is mainly used for the manufacturing of flour. For making bread, pastry and biscuits, Industrial uses of wheat include the production of starch for laundry. In rural areas of the countries farmer are not aware of the innovative agricultural technology and even now they follow old cultural practices due to this reason they cannot obtain higher yield. So it is very important to practice improved cultural practices for obtaining maximum yield per unit area.

Schmidt and Bedford (1993) carried out an experiment that the effect of tillage-sowing method and 2 sowing dates on yields of wheat were examined on the sand-plain soil in the N, wheat belt of Western Australia. Four method were compared, sowing after cultivation, sowing followed by deep ripping, direct drilling (i.e single-pass sowing with tined drill), sowing with a new cultivation depth modified drill (CDM) modified to cultivate up to 14 cm deep while sowing at 4 cm 4 cm. crops direct-drilled with the CDM produced more grain than crops established with conventional direct drilling or crops sown later using the cultivate-sow method and had similar yields to late-sown deep-ripped crops, where appropriate cultivators were used.

Kushwaha and Foster (1993) evaluated that six different seed drill furrow openers were evaluated on three soil types in relation to spring wheat emergence, seeding depth, and final yield under conventional and conservation tillage. The experiment was conducted over 3 growing seasons. Results showed a significant difference in seeding depth and plant populations at emergence for 2 of the 6 furrow openers tested. No significant difference in grain yield occurred among the openers.

Campbell and Akhtar (1990) concluded that initial results of a long term study on tillage practices in the rain fed areas of Pakistan. Deep mould board tillage increased yields by decreasing soil strength allowing greater soil moisture recharge during heavy rainfall. Greater evapotranspiration led to increased biomass production and crop yield.

Allen (1988) described that three types of seed drill were evaluated for sowing wheat in varying amounts of residue on the Southern Great Plains, USA. The drills, a no-till double-disc opener, seed placement and seedling emergence under no-till, sweep cultivation and disc cultivation conditions. All drills operated successfully through 3500 kg hac^{-1} of stubble. The hoe-press drill produced significantly greater seedling emergence on most treatments because the narrow seed trench and weighted press wheels caused favorable seed –oil contact.

Suskevic and Zilk (1981) carried out an experiment to study the effect of different tillage intensities on the yield of wheat. They applied traditional ploughing to the depth of 22 cm. minimum tillage 12-15 cm and zero tillage to soil and found that maximum tillage gave (5.11 t ha^{-1}). Significant results id compared with traditional and zero-tillage which yielded 4.89 and 4.94t ha^{-1} respectively.

MATERIAL AND METHODS

An experiment, "Effect of seeding methods tillage practices on wheat under rainfed condition" was carried out in Randomized Complete Block Design with three replications on net-plot dimension of 12×5 m^2 during fall 1995 at agricultural research farm KPK Agricultural University, Peshawar.

The tillage practices were: (1) Mould-bold plough (2) Disc plough (3) Cultivator (4) Rotavator (5) Desi hall

The seeding methods employed were: (1) Drill method (2) Lister method (3) Pora method Fertilizer at the rate of 120:60 NP kg ha^{-1} was applied before seeding a basal dressing. All other cultural practices were uniformly applied during the growth period and the crop was totally dependent on rain. The same wheat variety Barani-93 was seeded in each sub-plot at the rate of 100 kg ha^{-1}.

The observations recorded during the course of study were: (1) Days to emergence (2) Tillering capacity $(m^2)^{-1}$ (3) Number of grain $spike^{-1}$ (4) Harvest index (5) Grain yield kg ha^{-1}

Data on days to emergence was recorded when more than 50% plants showed emergence in each sub plot. Number of tillers/ $(m^2)^{-1}$ was recorded by placing randomly the meter square ring on the harvested stumps and counted the culms. Five spikes were randomly taken in unit area in each sub plot, their grains were threshed out and average was recorded. Grain yield of each sub plot was recorded after threshing. Harvest index was calculated by the following formula:

$$H.I = \frac{\text{Grain yield} \times 100}{\text{Bio mass}}$$

Grain yield (kg ha^{-1}) was calculated from the grain weight of each sub plot.

The data recorded was statistically analyzed appropriate to RCB design to determine treatment effect on production of wheat.

RESULTS AND DISCUSSION

In an experiment, "effect of different seeding methods and tillage practices on wheat under rainfed condition", data were collected on days to emergence, tillering capacity/ $(m^2)^{-1}$ number of grain $spike^{-1}$, harvest index and grain yield kg ha these data are reported in table 1-5 with the elaborate description of the results in the following pages.

Days to Emergence

The data in the Table 1 showed that maximum of 14.53 days to emergence were taken by the plots where sowing was done with Pora, followed by drill with 8.4 days and minimum days of 6.53 were taken by the lister method. The effect of tillage practices revealed that maximum of 10.066 days to emergence were taken by plots prepared with the desi plough while minimum number of 9.44 days were taken by plots prepared by disc plough.

Mean values for interaction between two factors i.e seeding methods and tillage practices showed that maximum number of 15.33 days to emergence was taken by plots prepared by desi plough and seeded with Pora. While minimum of 6.31 days to emergence were taken by plots prepared with mould bold plough, disc plough, cultivator and rotavator respectively and seeded by lister planter.

Tillering Capacity $(m^2)^{-1}$

The data recorded on tillering capacity $(m^2)^{-1}$ of the different treatment are presented in Table 2. The statistical analysis of the data showed that different seeding methods, tillage practices and their interactions had significantly affected the number of tiller(m^2) $^{-1}$ at 55 level of probability. Mean values for seeding methods revealed that drilled seeding had maximum of 586.26 tiller/ m^2 while lowest number 211.46 tillers $(m^2)^{-1}$ was observed with Pora sowing method. Among the different methods of tillage practices, the highest number 429.22 tiller/ $(m^2)^{-1}$ was noted in plot tilled with rotavator, while the lowest number of 352.66 tillers $(m^2)^{-1}$ was noted in plots prepared by desi plough. Mean values for interaction between seeding methods and tillage practices exhibited that maximum number of 672 tiller $(m^2)^{-1}$ was observed in plots prepared by rotavator and seeded with power drawn drill while the minimum number of 189.33 tiller $(m^2)^{-1}$ was recorded in plots ploughed with desi plough and Pora sown method.

Table 1.Days to emergence as effected by tillage practices and seeding methods on wheat under rainfed condition.

	Seeding methods			
Tillage practices	Drill	Lister	Pora	Means
Mouldboard plough	8.33D	6.33F	14.33B	9.66
Disc plough	7.66DE	6.33F	14.33B	9.44
Cultivator	8.33D	6.33F	14.33B	9.66
Rotovator	8.33D	6.33F	14.33B	9.66
Desi plough	9.33C	7.33E	15.33A	10.66
Means	8.394C	6.58B	14.53A	

Means followed by different letters are significantly different using LSD test at 5% level of probability.

Number of Grains/ Spike^{-1}

Data on average number of grain per spike are presented in Table 3. According to the statistical analyses of the data, different seeding methods, tillage practices and their interaction had significantly affected number of grain per spike at 5% level of probability. Mean values for the different seeding methods showed that maximum number of 44.22 grain spike^{-1} was recorded in drilled plots while minimum number of 35.32 grain spike^{-1} was noted with Pora sown plots.

In case of different tillage practices, maximum number of 44.66 grain spike^{-1} was counted in plots tilled with rotavator while the lowest number of 35.03 grain per spike was recorded in plots tilled with desi hall. Mean values for interaction between two factors i.e seeding methods and tillage practices revealed that the highest number of 52.1 grain spike^{-1} was recorded in plots, where the land was prepared by rotavator and sowing was done with the drill, while lowest number of 30.77 grain spike^{-1} was brought into record in plots, tilled with desi plough and seed with Pora method.

Harvest Index

The data regarding harvest index are presented in Table 10. Statistical analysis of the data revealed that harvest index was significantly affected by different seeding methods and interaction of seeding methods and tillage practices at 5% level of probability, while tillage practices had no significant effect on harvest index.

Mean values for seeding methods showed that maximum harvest index of 39.77 was recorded for plots seeded with drill, on the other hand minimum harvest index of 31.35 was noted where seeding was done with Pora. In case of different tillage practices maximum harvest index of 35.72 was recorded in plots tilled with desi hall, while minimum harvest index of 35.52 was brought into record where rotavator was used. Mean values for interaction between seeding methods and tillage practices showed that highest harvest index of 40.5 was recorded in plots prepared with the rotavator and seeded by drill. On the other hand lowest harvest index of 30.54 was noted in plots tilled with desi hall and seeded with Pora.

Grain Yield (kg ha^{-1})

The data recorded on grain yield (kg ha^{-1}) are presented in Table 5. Statistical analysis of the data revealed that seeding methods and interaction between seeding methods and tillage practices had significantly affected grain yield kg ha^{-1}. While different tillage practices showed no significant effect on grain yield (kg ha^{-1}). Mean values for different seeding methods showed that maximum grain yield of 1722.66 (kg ha^{-1}) was produced by plot seeded with drill while minimum grain yield of 874.66 kg.ha^{-1} was recorded from plot sown with Pora. In case of different tillage practices maximum grain yield of 1374.44(kg/ ha^{-1}) was recorded from plots ploughed with rotavator while minimum grain yield of 1293.33 (kg/ ha^{-1}) was obtained from plots tilled with desi hall. The interaction between two variable i.e seeding methods and tillage practices showed that maximum grain yield of 1850 (kg ha^{-1}.) was recorded in plots prepared by rotavator and drilled with tractor, while minimum grain yield of 786 (kg ha^{-1}) was brought into record in plots where land was ploughed by desi hall and wheat was sown with Pora.

CONCLUSION

It is concluded that interaction between seeding methods and tillage practices had affected all the variable maximum of 672 tillers $(m^2)^{-1}$ were recorded from the rotavator tilled plots and seeded with drill. Highest harvest index of 40.50 and maximum grain yield of 1885kg ha^{-1} were recorded from plots prepare by rotavator and seeded with drill and the combination of rotavator and drill was found suitable for the maximum wheat production and dry land sown wheat in KPK.

Table. 2. Emergence/ m^2 as effected by tillage practices and seeding methods on wheat under rainfed condition.

	Seeding methods			
Tillage practices	Drill	Lister	Pora	Means
Mould board plough	580.66B	341.00D	216.33GH	379.33AB
Disc plough	556.66C	350.00F	209.33GH	372.00B
Cultivator	609.00B	360.33B	231.66G	400.33AB
Rotavator	672.00A	405.00E	210.66GH	429.22A
Desi plough	513.00D	355.66F	189.33H	352.66B
Means	586.26A	362.4B	211.46C	

Means followed by different letters are significantly different using LSD test at 5% level of probability.

Table. 3. Number of grain per spike as effected by tillage practices and seeding methods on wheat under rainfed condition.

	Seeding methods			
Tillage practices	Drill	Lister	Pora	Means
Mouldboard plough	40.11DEFG	47.55B	35.99GH	41,21A
Disc pough	44.88BC	42.55CDE	35.55H	49.99AB
Cultivator	45.11BC	41.88CDEF	36.75GH	41.25AB
Rotovator	52.10A	44.33BCD	37.55FGH	44.66AB
Desi plough	38.88EFGH	35.44H	30.77I	35.03B
Means	44.22A	42.35AB	35.32B	

Means followed by different letters are significantly different using LSD test at 5% level of probability.

Table. 4. Harvest index as effected by tillage practices and seeding methods on wheat under rainfed condition.

	Seeding methods			
Tillage practices	Drill	Lister	Pora	Means
Mouldboard plough	39.81A	35.91BC	31.05E	35.59
Disc pough	39.52A	36.29BC	31.34E	35.71
Cultivator	39.75A	34.97CD	31.98E	35.57
Rotovator	40.50A	34.2D	31.85E	35.52
Desi plough	39.26A	37.36B	30.54E	35.72
Means	39.77A	35.74B	31.35C	

Means followed by different letters are significantly different using LSD test at 5% level of probability.

Table. 5. Grain yield (kg ha^{-1}) as effected by tillage practices and seeding methods on wheat under rainfed condition.

	Seeding methods			
Tillage practices	Drill	Lister	Pora	Means
Mouldboard plough	1706.667B	1443.333CD	886.667EF	1345.556
Disc pough	1693.33B	1463.33C	870.00EF	1342.222
Cultivator	1713.333B	1376.666CD	906.667E	1332.22
Rotovator	1850.00A	1350.00D	923.33E	1374.444
Desi plough	1650.00B	1443.333CD	786.00F	1293.333
Means	1722.667A	1415.333.B	874.667C	

Means followed by different letters are significantly different using LSD test at 5% level of probability.

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