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Package of Practices Followed by Farmers and its Effect on Wheat Yield in District Kapurthala

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ABSTRACT

A survey based study was carried out to observe the effect of different package of practices followed by farmers for wheat cultivation in district Kapurthala. The study revealed that 96 per cent farmers opted for HD 2967 variety of wheat and used seed cum fertilizer drill, zero till drill and broadcasting method of sowing. More than 80 per cent farmers used recommended seed rate of 100 kg/ha whereas plant protection measures such as application of tilt fungicide @500ml/ha and seed treatment was followed by 27 and 15 per cent farmers, respectively. Similarly, adoption of other practices such as application of fertilizers as per soil test report, urea application at the time of sowing and recommended dose of di-ammonium phosphate fertilizer was 2.6, 19.0 and 38.4 per cent, respectively. Due to occurrence of untimely rainfall, a decline in wheat yield up to 36 per cent was recorded as compared to the last year (2013-14).

Key Words : Diammonium Phosphate, Seed Rate, Sowing Method, Urea, Wheat

INTRODUCTION

Rice-Wheat cropping sequence is the most prevalent crop rotation in Punjab. Wheat crop is grown on an area of about 1.0 lac hectare in the district Kapurthala with an average productivity of about 47.5 q/ha during the last 2-3 years.

It is a known fact that the grain yield of wheat crop depends upon a number of package of practices followed like variety sown, seed treatment, type of soil, seed rate, method of sowing etc. Different farmers follow different growing practices to raise a crop. The yield of a particular crop also depends on the prevailing weather conditions during the growing season. Hence, the grain yield varies from farmer to farmer. The net profit from crops is shrinking day by day owing to the rising cost of required inputs; therefore, it is imperative to study the grain yield as well as cost of production incurred by the farmers in the area Keeping in view this fact, KVK's team conducted a survey of the grain markets at the time of wheat harvesting to note down the exact grain yield obtained and inputs used along with the cultivation practices followed by the farmers of Kapurthala district during the *Rabi* season of the year 2014-15.

MATERIALS AND METHODS

The survey was conducted during *Rabi* 2014-15 in the district Kapurthala. Four blocks in the district Kapurthala namely Sultanpur, Kapurthala, Dhilwan and Nadala were taken for study. The grain market of different blocks was visited by the scientists of Krishi Vigyan Kendra to collect the information. A total of 200 farmers cultivating wheat on an area of 452 ha were interviewed (Table 1).

A questionnaire was designed to collect the information. The information was collected from the farmers, who visited the local grain markets to sell wheat produce. The information was collected after the produce had been weighed and sold in the market in the month of April, 2015. The farmers were also asked about the different growing practices followed by them to raise the wheat crop.

Table1. Block wise farmers and area covered in the district.

Block	No. of farmers surveyed	Area covered (ha)
Nadala	30	73
Dhilwan	60	98
Sultanpur	50	130
Kapurthala	60	151
Total	200	452

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Table 2. Diversity in wheat cultivation.

Block	Wheat varieties prominent in the area (per cent)			Average Yield (q/ha)		
	HD 2967	WH 1105	PBW 621	HD 2967	WH 1105	PBW 621
Nadala	100.0	0.0	0.0	30.0	—	—
Dhilwan	96.3	0.0	3.7	33.3	—	37.5
Sultanpur	97.6	2.4	0.0	34.2	25.0	—
Kapurthala	92.5	5.7	1.8	37.8	40.0	40.0
Overall	96.0	2.6	1.4	34.3	35.0	38.8

The data regarding variety sown, seed rate, seed treatment, method of sowing, soil testing, amount of fertilizer applied, pesticide sprayed, selling rate and grain yield obtained were collected. The data thus collected were analyzed and compiled block wise to study the variation in growing practices followed by the farmers. *Rabi* 2014-15 season was badly affected by untimely rains particularly at the time of harvesting and marketing. A comparison of the wheat yield of 2014-15 with that of 2013-14 was also done to ascertain the damage caused due to the weather conditions.

RESULTS AND DISCUSSION

Diversity in wheat cultivation:

The results indicated that the farmers preferred to cultivate variety HD 2967 which was grown on maximum area (96%) in the district followed by WH 1105 (2.6%) and PBW 621 (1.4%) (Table 2).

Brar (2014) also reported 87 per cent area under HD 2967 as due to good wheat and free from main diseases than old variety PBW 343. The variety PBW 621 performed best in the district as was evident from the grain yield (38.8 q/ha). Grain yield of HD 2967 and WH 1105 was 34.3 and 35.0 q/ha, respectively. From the results it can be said that farmer to farmer led extension plays a vital role in the adoption of a particular technology because this year farmers in the district selected HD 2967 over PBW 621 and obtained 11.6 per cent less yield than the PBW 621 just by enquiring from the fellow farmers without keeping confidence in his own performance during previous year. Therefore, extension agencies must give more thrust in educating the farmers regarding cultivation of field crops. The newly released variety WH 1105 yielded 35.0 q/ha and farmers were found to be satisfied with the performance of the variety but it could not be grown on large area as being new variety, the farmers could not get its seed.

Method of sowing opted by farmers:

Mechanization has played a great role in choosing the method of sowing. Sowing of wheat with rotavator resulted in 37.9 q/ha yield of wheat which was highest as compared to all other methods of sowing. Sowing of wheat crop with Zero till drill resulted in lowest grain yield (32.3 q/ha) compared to other methods. Kahloon *et al* (2012) also reported that out of different methods of wheat sowing namely zero tillage, broadcasting, rotavator and seed cum fertilizer drill, crop sown with the help of rotavator gave maximum yield due to the fact that timely sowing of wheat is a major problem in rice-wheat cropping pattern and rotavator not only ensures timely sowing, maximum yield but also saves fuel and energy. Singh *et al* (2013) revealed that zero

Table 3. Effect of method of sowing on grain yield of wheat.

Block	Method of planting used in area (Per cent)				Average Yield (q/ha)			
	Seed drill	Broadcast-ing	Rotavator	Zero till drill	Seed drill	Broadcast-ing	Rotavator	Zero till drill
Nadala	48.8	30.2	9.3	11.7	31.5	35.0	36.3	20.0
Dhilwan	24.9	30.4	5.5	39.2	35.0	32.5	35.8	33.0
Sultanpur	17.1	20.6	0.0	62.3	30.0	41.7	—	34.1
Kapurthala	62.6	16.4	11.4	9.6	37.2	40.5	39.4	36.9
Overall	39.1	22.9	6.5	31.5	34.2	36.0	37.9	32.3

Package of Practices Followed by Farmers

Table 4. Effect of Seed rate on grain yield of wheat.

Block	Seed rate (kg/ha) used by farmers (Per cent)			Average Yield (q/ha)		
	< 95	95-105	> 105	< 95	95-105	> 105
Nadala	0.0	93.6	6.4	—	29.7	35.0
Dhilwan	6.7	79.9	13.4	37.5	34.0	29.4
Sultanpur	0.0	100.0	0.0	—	33.8	—
Kapurthala	0.0	57.0	43.0	—	37.5	39.0
Overall	2.1	80.2	17.7	37.5	33.8	36.6

tillage and rotavator were efficient methods for *in-situ* management of paddy straw and control of weed population. It was revealed that 39.1 per cent area was sown with the help of seed cum fertilizer drill followed by zero till drill (31.5%) and broadcasting (22.9%) (Table 3).

In the district, two blocks namely Nadala and Dhilwan prefer to go for broadcasting method due to the reason that soil type in these blocks is heavy in texture and alkaline and thus farmers face difficulty in preparation of fine seed bed and hence go for broadcasting method. Similarly, owing to type of soil in both these blocks, the average yield obtained was also less as compared to other blocks of the district namely Sultanpur (34.2 q/ha) and Kapurthala (37.8 q/ha).

In Kapurthala block, maximum (62.6 %) area was sown with the help of seed cum fertilizer drill and minimum (17.1 %) in Sultanpur block whereas zero till drill was found to be more popular (62.3%) in Sultanpur block. This may be due to the fact that being vegetable growing area, there is requirement of paddy straw which is collected manually and later on standing stubbles are burnt out, thus running of zero till drill becomes convenient.

Seed rate used by farmers:

It was found that 80 per cent farmers used recommended seed rate i.e. 95-105 kg/ha. Very less farmers (2.1%) were using less seed rate than recommended. Higher seed rate (more than 105 kg/ha) was used by only 17.7 per cent farmers. During the survey, it was noticed that higher seed rate was used by only those farmers who opted broadcasting method of sowing. As far as effect of seed rate on wheat yield was concerned, no significant effect on grain yield of wheat was observed (Table 4). In Sultanpur block, farmers usually go for recommended seed rate, whereas, in Kapurthala block, 43 per cent farmers were using higher seed rate than recommended. They reported that due to sandy texture of the soil, germination percentage is less and in order to compensate that, more than 100 kg seed/ha was used.

Plant protection measures followed:

The data revealed that only 22.9 per cent farmers covering 28.3 per cent area opted for Tilt (Propiconazole 20 EC) application @ 500 ml/ha whereas, 79.2 per cent farmers covering 85.1 per cent area followed proper seed treatment with the use of Vitavax power (Carboxin 37.5 % +Thiram 37.5% WS) @ 3.0 g/kg seed. Higher grain yield was reported by farmers who followed both these plant protection measures (Table 5).

The increase in yield with Tilt application and seed treatment were 2.3 and 3.1 per cent, respectively. The differences in yield obtained were found to be non significant. Similar results were recorded by Harris *et al* (2001) who obtained 13 per cent grain yield advantage in wheat yield after seed treatment. Goel *et al* (2000) also reported increase in grain yield of wheat by 10-20 per cent with the spray of tilt fungicide used for the control of karnal bunt. It was revealed that farmers used 288 litre of water for spraying the

Table 5. Effect of plant protection measures on grain yield of wheat.

Recommendation	Application	Per cent Farmers	Per cent Area covered	Yield (q/ha)
Tilt application @ 500g/ha	Not applied	77.1	71.7	33.8
	Applied	22.9	28.3	34.6
Seed treatment with Vitavax	Followed	79.2	85.1	34.4
power @ 3.0 g/kg seed	Not followed	20.8	14.9	33.3

Table 6. Effect of fertilizer application on wheat grain yield.

Recommendation	Adoption	% Farmers	% Area covered	Yield (q/ha)
Fertilizer applied after soil testing	Not applied	95.8	97.4	34.1
	Applied	4.2	2.6	35.4
Basal application of urea	Not applied	83.3	81.0	34.9
	Applied	16.7	19.0	35.0
Quantity of DAP applied	< 137.5 kg/ha	67.7	61.6	33.8
	>137.5 kg/ha	32.3	38.4	35.0

fungicide (with a range of 150-500 l/ha) in place of recommended 500 l of water per hectare. Use of less quantity of water for Tilt fungicide application than recommended might have resulted in less efficacy of the fungicide and thus resulted in small increase in grain yield compared to those who did not use Tilt. Still a wide gap exists in the basic knowledge of plant protection measures recommended for the cultivation of crops.

Fertilizers used:

In the cost of cultivation of a crop, the major share is represented by the cost of fertilizers which are becoming costlier day by day and hence, farmers are advised to go for soil testing in order to know the fertility status of the field. This will help in application of chemical fertilizers judiciously. Contrary to this, it was found that only 4.2 per cent farmers got the soil tested thus a large technological gap exits (Table 6).

Further, it was revealed that those farmers who got their soil tested before sowing of the crop got higher grain yield (35.4 q/ha) than the other farmers (34.1 q/ha). On the similar lines, data also confirmed that only 16.7 per cent farmers applied basal dose of urea, although, the total quantity of urea applied remained same (100 kg). Basal application of urea did not result in any significant increase in grain yield of wheat crop. Regarding di-ammoniuam phosphate (DAP) 32.3 per cent farmers applied more than 137.5 kg/ha and the yield increase was found to be only 3.3 per cent as compared to farmers using less than 137.5 kg/ha.

Effect of weather on wheat yield:

A significant decrease in wheat grain yield was observed during the year 2014-15 compared to the 2013-14 mainly due the untimely rains that occurred during 2014-15. Due to El nino effect during spring 2015, the wheat yield was decreased to the tune of 36 per cent in Kapurthala district (Table 7). As per Japan meteorological agency, this year a strong El Nino could take a bigger toll and for India it would be double whammy. Result of El Nino was hail storm and rainfall of 21.5mm during first fortnight of April. Reduction in grain yield was observed in all the blocks in the present year compared to the previous year. Maximum decrease in yield (44.1%) was reported in Nadala block and minimum in Kapurthala block (28.3%).

As per farmer's reaction, it was found that overall, gross income and net returns were Rs. 49,801/- and Rs.18,552 /- ha , respectively with

Table 7. Effect of weather on wheat yield (q/ha) in comparison to last year.

Block	Grain yield (q/ha)		Per cent decrease in 2014-15
	2014-15	2013-14	
Nadala	30.0	53.7	44.1
Dhilwan	33.6	50.8	33.9
Sultanpur	33.8	58.6	42.3
Kapurthala	38.2	53.2	28.3
Overall	34.4	53.8	36.0

Economics

Table 8 : Economics of wheat per ha in the region.

Block	Gross income (Rs.)	Cost of cultivation (Rs.)	Net Returns (Rs.)	B:C ratio
Nadala	49,770.5	31,237.0	18,533.5	0.59
Dhilwan	50,878.4	31,271.9	19,606.6	0.63
Sultanpur	52,114.6	31,554.9	20,559.7	0.65
Kapurthala	55,064.7	31,656.4	23,408.3	0.74
Distt. overall	49,801.1	31,248.6	18,552.5	0.59

B: C ratio of 0.59. In comparison of blocks, maximum income was obtained by Kapurthala farmers (Rs. 23,408/- ha) with B: C ratio of 0.74 and minimum in Nadala block of Rs. 18,533/-ha with B:C ratio of 0.59 .

CONCLUSION

In Kapurthala district, farmers sown wheat variety HD 2967 either with seed cum fertilizer drill, zero till drill or broadcasting method. The pattern showed non-availability of labour for sowing purpose and increased farmers' interest for mechanization. The plant protection and fertilizer based recommendations were having their own advantage in terms of yield but farmer only adopt on need basis as was evident in case of seed treatment and DAP fertilizer application. Rest of the package of practices need more time to percolate among the farming community. As compared to 2013-14, the wheat grain yield was reduced by 36 per cent, which caused a great loss to the farmers economically. The calculated values showed that net return was decreased to Rs. 18,552/- ha with B:C ratio of 0.59. Hence, this year 2014-15 was one of the bad years for wheat production in Kapurthala district.

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