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Seed Replacement Rate and Management of Wheat Seed in Amritsar District of Punjab

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ABSTRACT

Background: Seed is the starting point of agriculture and dictates ultimate productivity of other inputs. Quality seed of improved varieties is an important basic unit for enhancing productivity of any crop species. As the quality deteriorates during subsequent generations, the old must be replaced with fresh lots of quality seeds. The present study was an attempt to analyze the source, SRR and management of wheat seed in Amritsar district of Punjab.

Methods: The current study was conducted on primary data collected from 120 farmers during the agricultural year 2019-20. The data was analyzed using simple tabular analysis and other suitable statistical techniques.

Result: The study found that the most preferred source of seed was institutional sources from which 45.83 per cent of the seed was procured from these agencies. The second most preferred source was self-retained by the farmers as 43.70 per cent farmer's preferred self-retained seeds. Only small farmers and medium farmers procured wheat seed from fellow farmers, relatives and friends. This source was preferred by small and medium farmers as seed is available free of cost and no immediate cash payment was charged by fellow farmers or relatives. Seed replacement rate was found to be 49.94 per cent for wheat crop in Amritsar district of Punjab. The study found that minimum attention was paid at post storage of wheat seed (2.50 per cent) whereas maximum attention was paid in the field (48.83 per cent) during wheat seed production. The main determinants of purity and quality of wheat seed were past experience of the farmer, repute of the institution, tag of certification agency and advice of known person. Seed replacement rate (SSR) for wheat was less for small farmers in the study area which can be increased by giving incentives to farmers for using certified seeds. These incentives can be in the form of higher price of produce to the small farmers. Maximum farmers used self-retained seed foe the next season and they paid minimum attention to the storage of seed which lead to deterioration in the quality of seed. Farmers should be educated to use scientific methods in the storage of seeds.

Key words: Crop, Farm category, Seed replacement rate, Source, Wheat.

INTRODUCTION

Wheat is one of the principal crops which form a staple diet of the majority of the population in the country. It is most important crop, in respect of area and production in Punjab. The area under wheat crop was 3.52 m ha and production was 18.26 m tons with average yield of 5188 kg per hectare during the year 2018-19 (GoP, 2019). Wheat seed production has important share in expenditure on seed, which indicates that the economics of seed production has impacted both the seed producers and consumers. Quality seed production is a specialized activity and making seed available at the right place, in the right quantity and at the right price assume great significance in building up of a healthy seed industry in India. Despite the high gains that a farmer can accrue by using high quality seeds, most Indian farmers still continue to use sub-standard seeds. This fact comes into evidence by observing the low replacement rate of quality seeds. Seed replacement rate is a important factor in deciding the agricultural production of the country. The deterioration in the quality seed results in loss in productivity per unit area. Therefore the need for seed replacement necessarily arises from its economics that is the net incremental returns from the decision. It may be mentioned here that seed replacement rates (SRRS) of wheat and paddy, the two major crops of Punjab, were only 10.00 and 15.00 per cent respectively in 2004 against the recommendation of 25.00 per cent for these two crops. Hybrid seeds need to be replaced each year and open pollinated crop seed, every four years or sooner.

However, in practice this is not done and many times seed is not replaced for too long periods, thus affecting yields. Farmers are still more dependent on the local seeds and private companies have low market penetration compared to public enterprises but public enterprises have no mechanism to induce farmers for seed replacement. One reason for low replacement with certified seeds could be its high price and non-availability at proper places in time.

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Further, seed being a product which has derived demand suffers from many considerations at the farmer level like other inputs. Therefore, for any meaningful understanding of the seed market environment, it is important to look at seed purchase, adoption and use behaviour of farmers so that adequate utility can be provided to the farmers/seed users through an appropriately designed market mix (Kapoor, 2006).

Lack of timely availability of good quality seeds of high-yielding varieties is one of the major constraints contributing to stagnant yields of major crops. More than 80 per cent of crops in developing countries are sown from seed stocks selected and saved by farmers (Hodgkin *et al*., 2007). Seed is the carrier technology and the medium for translating scientific achievements to the field. Often Indian farmers do not distinguish between grain and seed (Chand, 2007). The quality seed acts as a prime mover to realize the potential of all other inputs. However non-availability of quality seeds remains as one of the greatest impediments in improving productivity (Singh and Pratap, 2015). It is estimated that the direct contribution of quality seed alone to the total production is about 15-20 per cent, depending upon the crop and it can be further raised up to 40-50 per cent with effective management using other inputs (Singh, 2013). In the present paper attempt is made to examine the existing use pattern of quality seeds of wheat by the selected farmers, to compare the cost and price structure of wheat seed under various distribution channels in the selected area, to find out seed replacement rate of selected wheat growers (SRR) and to study the management of wheat seed by the selected farmers in Amritsar district of Punjab.

MATERIALS AND METHODS

The study was confined to Amritsar district of Punjab. The sample of the study was based on multistage random sampling technique with district, blocks villages and farmers as the respective sampling units. Two blocks *i.e*. Attari and Verk were selected randomly from Amritsar district and further two villages were selected from these two selected blocks. From selected villages 120 farmers were further selected on the basis of probability proportional to the total number of farmers in each farm category. Farmers were categorized using cumulative cube root frequency method. (Table 1).

Primary data was collected from the selected farmers through personal interview method on specially structured and pre tested schedule. Secondary data was collected through various reputed published sources. Simple averages and percentages were used for analysis of data.

Seed replacement rate (SRR) was calculated by the formula:

$$SRR = \frac{C \times 100}{C \times K}$$

Where,

SRR = Seed replacement rate for particular crop.

C = Certified seeds used by the farmers.

A = Area under the crop.

K = Seed rate per unit of area.

RESULTS AND DISCUSSION

Use pattern of quality seeds of wheat by the respondents

Regarding the source of wheat seeds of selected farmers in Amritsar district, the main source of wheat seed was self-retained seeds by the farmers which accounted for about 43.70 per cent of total seeds in the study area (Table 2). This may be due to the low cost of seed as compared to other sources. Aggarwal *et al*. (2018) also reported in their study that farmers used the maximum quantity (31.65 per cent) of farm saved seed. It was found that different institutional seed agencies together contributed about 45.83 per cent of wheat seed requirements of the farmers. Among them, the most of the farmers preferred authorized seed dealer who provided maximum quantity *i.e.* about 29.88 percent of the seed required, followed by PAU (10.94 percent), State Department of Agriculture (3.40 per cent) and PUNSEED with only 1.61 per cent. PAU has emerged as a major source of seed in few previous years. This may be due to the awareness of the farmers and their education. The study further revealed that overall farmers obtained 2.15 per cent of wheat seed from the commission agent and 5.84 per cent of seed was purchased from private seed dealers. The selected farmers purchased 0.34 per cent of the wheat seed from relatives and friends, 0.62 per cent from fellow farmers and 0.26 per cent from the village shop keepers in Amritsar district of Punjab. The selected farmers did not prefer to use seed obtained at cheaper rates or free of cost from fellow farmers and relatives. Also, village shopkeepers did not appear to be a preferred seed source for wheat, as the farmers purchased only 0.26 per cent of the total wheat seed from them.

From farm wise category analysis, it was found that net total seed used by the selected small farmers (2.68 per cent) was procured from fellow farmers and relatives and friends, which is highest among all farm categories in the study area.

Table 1: Selection of respondents in Amritsar district of Punjab.

District	Selected blocks	Selected villages	Farm category			Total
			Small farmers	Medium farmers	Large farmers	
Amritsar	Attari	Chicha	20	20	20	60
	Verka	Wadali	20	20	20	60
Total number of farmers			40	40	40	120

Source: Field survey.

Table 2: Sources of wheat seed of selected farmers in Amritsar of Punjab.

Farm category/ Source of seed	Self-retained	Fellow farmers	Relatives and friends	PAU	PUN seed	State Dept of agriculture	Authorized seed dealer	Private seed dealer	Village shop keeper	Commission agent	Total
Small	26.05(48.28)	0.65(1.20)	0.80(1.48)	3.80(7.04)	0.60(1.11)	3.00(5.56)	13.30(24.65)	2.80(5.19)	1.20(2.25)	1.75(3.24)	53.95(100)
Medium	61.05(42.16)	2.20(1.52)	3.60(2.49)	16.20(11.18)	2.40(1.65)	5.40(3.73)	41.08(28.37)	8.58(5.93)	-	4.30(2.97)	144.81(100)
Large	113.40(43.61)	–	2.90(1.11)	30.20(11.61)	4.40(1.70)	7.20(2.78)	82.71(31.81)	15.40(5.92)	-	3.80(1.46)	260.02(100)
Sub-total	200.5(43.70)	2.85(0.62)	7.30(1.60)	50.20(10.94)	7.40(1.61)	15.60(3.40)	137.09(29.88)	26.78(5.84)	1.20(0.26)	9.85(2.15)	458.78(100)

Source: Field survey.

Table 3: Seed replacement rate of wheat by farmers in Amritsar district of Punjab.

Farm category	Seed replacement rate (%)
Small	42.93
Medium	51.36
Large	55.54
Average	49.94

Source: Field survey.

This source was preferred by selected small farmer as seed is available free of cost and no immediate cash payment charged is by the fellow farmers or relatives in all categories. The significant reason expressed by the selected farmers for using farm seeds was high price of seed, non-significant difference in yield and quality of seed, practice of self-retained seed was followed from generations, no degeneration in the seed of self-pollination crop.

Seed replacement rate in Amritsar district of Punjab

Seed replacement rate (SSR) or seed replacement ratio is a measure of how much of the total cropped area was sown with certified seeds in comparison to farm saved seeds (Chand, 2007).

Seed replacement rate of wheat was found to be 49.94 per cent in Amritsar district of Punjab (Table 3). The study observed a relation between farm category and seed replacement rate in the study area. It was 42.93 per cent for small farmers, 51.36 per cent for medium farmers and 55.54 per cent for large farmers in the study area. Seed replacement rate was higher among large farmers due to better economic condition of large farmers to buy seed from institutional sources and their higher awareness about the quality of seed. The results were in line with the study of Verma and Sidhu (2009), where relation was observed with farm category and seed replacement rate.

Overall metal bins were the most widely used storage structure used by farmers as 90.83 per cent farmers used it for storage of wheat seed in the study area (Table 4). None of farmers stored wheat seed in gunny bags due to attack of storage grain pest and increased moisture content if stored in gunny bags which decreases the seed quality. The number of farmers under the metal bin category increased due to increase in farm size. Large farmers had huge quantity of seed which required large structures to store seeds.

Stages of attention at which the farmers adopt to select the crop to be used as seed have important bearing on quality of seed to be used in next year. It was found that about 41 per cent farmers paid attention to the crop in the field itself, about 24 per cent at the time of pre-harvesting, 22.50 per cent at the time of pre-storage stage, 12 per cent at the time of harvesting and only 2.50 per cent at post-storage stage in the study area (Table 5).

It was observed in the study area that maximum attention was paid to the crop in the field where as minimum attention was paid at the threshing and post-storage stage.

Table 4: Storage structure used for wheat seeds by selected farmers in Amritsar district of Punjab.

Structure used	Small farmers	Medium farmers	Large farmers	Total
Gunny bag	0(0)	0(0)	0(0)	0(0)
Metal bin	34(85.00)	36(90.00)	39(97.75)	109(90.83)
Gunny bag and metal bin	0(0)	0(0)	0(0)	0(0)

Source: Field survey.

Table 5: Stage of attention for selection of wheat crop to be used as seed in Amritsar district of Punjab.

Farm category/Stage of crop	Small	Medium	Large	Total
In field	15(37.50)	16(40.00)	18(45.00)	49(40.83)
Pre-harvesting	8(20.00)	11(27.50)	10(25.00)	29(24.17)
Pre-storage	12(30.00)	8(20)	7(17.50)	27(22.50)
Threshing	4(10.00)	3(7.5)	5(12.50)	12(12.00)
Post-storage	1(2.50)	2(5.00)	-	3(2.50)
Total	40(100)	40(100)	40(100)	120(100)

Source: Field survey.

Table 6: Determinants of purity and quality of wheat seed purchased by sample farmers in Amritsar district of Punjab.

Factor/Farm category	Small	Medium	Large	Total
Past experience	25(62.5)	33(82.5)	37(92.5)	95(89.17)
Repute of institution	13(32.5)	19(47.5)	22(55)	54(45)
Tag of certification agency	5(17.5)	13(32.5)	15(37.5)	33(27.5)
Advice of known person	17(42.5)	14(35)	11(27.5)	42(35)
Testing by seed testing agency	-	-	1(2.5)	1(0.83)
Total	40(100)	40(100)	40(100)	120(100)

Source: Field survey.

Pre-store and post-storage management of the seed is the most important stage in the management of wheat seed. The amount of the moisture in the seed is the most important factor influencing seed viability during storage. For every decrease of 1 per cent seed moisture content, the life of seed doubles. As the maximum farmer (44 per cent) used self-retained wheat seed and minimum attention was paid at threshing and post storage by sample farmers. As this negligence can affect the quality of seed by the sampled farmers.

The study on identification of determinants of purity and quality of seed revealed that overall past experience of the farmers was the main determinant (89.17 per cent of the farmers), followed by other factors like reputation of the institute (45 per cent), advice of known person (35 per cent), tag of Seed Certification Authority (27.5 per cent). Testing of the quality of seed by seed testing agency was the last determinant of purity and quality of paddy seed purchased by sample farmers (Table 6).

SUMMARY AND CONCLUSION

The study found that the most preferred source of seed was institutional sources from which 45.83 per cent of the seed was procured from these agencies. The second most preferred source was self-retained by the farmers as 43.70 per cent farmer's preferred self-retained seeds. Only small farmers and medium farmers procured wheat seed from fellow farmers, relatives and friends. This source was preferred by small and medium farmers as seed is available free of cost and no immediate cash payment was charged by fellow farmers or relatives. Seed replacement rate was found to be 49.94 per cent for wheat crop in Amritsar district of Punjab. The study found that minimum attention was paid at post storage of wheat seed (2.50 per cent) whereas maximum attention was paid in the field (48.83 per cent) during wheat seed production. The main determinants of purity and quality of wheat seed were past experience of the farmer, repute of the institution, tag of certification agency and advice of known person.

Seed replacement rate (SSR) for wheat was less for small farmers in the study area which can be increased by giving incentives to farmers for using certified seeds. These incentives can be in the form of higher price of produce to the small farmers. Maximum farmers used self-retained seed foe the next season and they paid minimum attention to the storage of seed which lead to deterioration in the quality of seed. Farmers should be educated to use scientific methods in the storage of seeds.

Conflict of interest

All authors declare that they have no conflicts of interest.

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