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Agronomic practices followed by farmer in the villages of Kharar Division of (SAS Nagar) Punjab

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Abstract
This research paper provides a comprehensive review of agronomic practices in the state of Punjab, India. The study aims to assess the current state of agronomy in Punjab, highlight the types of crops grown by the farmers, farmer landholding, varieties of wheat and paddy, seed treatment, source of seed, weed management, fertilizers, irrigation facilities, sowing methods, insect pest management, yield and post-harvest management. The study conducted in Kharar Block SAS Nagar (Punjab). Five villages were selected randomly. A questionnaire was prepared to interview the farmers. After the collection of the data from respondent's data were classified and analyzed with the help of suitable statistical measures. As per the data collected overall 100%, of farmers grow wheat and about 98% of respondents grow paddy crop in their fields. Apart from these two crops around 68% of farmers grow fodder crop in their fields overall 28% of farmers cultivate the vegetable crops. The overall amount of fertilizers used by the respondents are more than the recommended dose. Phalaris minor is the major weed observed in wheat crop, apart from this about 92% of farmers face the problem of yellow rust in the wheat crop. The average yield of wheat, paddy, is 56.2, and 66.2 QTLs/acre respectively.

Keywords: Agriculture, seed, weed, fertilizers, yield

Introduction
Agriculture is a significant contributor to the economy of Punjab, India. To ensure sustainable agriculture, it is essential to adopt proper agronomic practices. The use of improved varieties, integrated disease management, and proper soil fertility management are some of the recommended practices to increase crop yield and meet the food demand of the world. In Punjab, usually, the wheat-rice cropping system is followed by farmers, but there is an urgent need to diversify agriculture in Punjab, emphasizing integrated farm principles, implementation of sustainable practices, organic farming, green farming, and environmentally friendly techniques. Crop rotation is one of the major agricultural practices in sustainable farming and a proper crop rotation can increase nutrient uptake and improve soil health along with the decrease in pest and weed infection (Sahu *et al*., 2019) [1]. Agriculture is essential to socioeconomic growth. About 58 percent of the population in India relies solely on agriculture for their livelihood and about 70 percent of rural households do the same (India Brand Equity Foundation [IBEF], 2021) [2]. Around 20% of the Gross Domestic Product (GDP) in India comes from the agriculture sector, which is a significant contributor to the economy (Ahmad *et al*., 2017; [DAC&FW], 2020-21) [3].

Agriculture was initially practised mainly for domestic needs, but as time went on, new agronomic practises and technologies were developed to increase crop yield, and people began to make money from agriculture as well. But in addition to environmental risks, a number of adversities also developed in the socioeconomic areas (Bhatt *et al*., 2019) [5]. A key component of a sustainable food system is agricultural technology. A good example of how scale-independent technology changed agricultural productivity is the Green Revolution. Increased yields, decreased poverty, improved infrastructure, more food was available, and lower food prices are just a few advantages of the Green Revolution (McCullough *et al*., 2012) [6]. All of the procedures that a farmer follows from seed to seed, from seed sowing through seed harvesting and storage, are referred to as agronomical practises. The crop's yield is directly correlated with agronomic practises. Farmers must adhere to the finest agronomic practises according to the season and agro climatic zone in order to produce a good harvest. These customs differ from one place to another. Punjab has 6 different agroclimatic zones. The Undulating Plain Zone, where SAS Nagar is located, has chilly, humid to sub humid and semi-arid to humid climates. Rainfall ranges between 165 to 1000 millimetres.

The soil in this region is ideal for growing crops like sorghum, wheat, maize, paddy, and vegetables (Chaba *et al*., 2021) [7].

Materials and Methods

The study was carried out in Punjab's SAS Nagar district's Kharar block. Shakrullapur, Rora, Bibipur, Batta and Fatehpur Therhi were the five villages that were arbitrarily chosen.

For the interview, a total of 150 farmers were chosen at random. A total of 36 responders were chosen from the Shakrullapur, 36 from Rora, 24 from Bibipur, 30 from Batta and 24 from Fatehpur Therhi. We had a lengthy conversation with the farmers regarding their socioeconomic status and the agronomic practises they follow year-round. The respondents were questioned both at their residences and in their fields. (Grain Pro, n.d.) In order to cover every aspect of the farmers' agronomical practises, a questionnaire was developed to interview the farmers and meticulously examine each parameter.

After the respondents' data were collected, the information was categorised and analysed with the aid of appropriate statistical tools like percentages, graphical representation, bar graphs and pie charts.

Results and Discussion

Types of crops grown by the farmers

According to the data gathered altogether represented in table no 1, 100% of respondent's plant paddy and wheat in their fields, while 68% of farmers grow fodder crops like berseem and Sorghum. In addition to these crops, 28% of farmers also plant vegetables like cauliflower, potato and onion in their fields. The following data is represented in fig no 1.

Table 1: Types of Crops grown

S. No.	Parameter	Shakrullapur n=36	Batta n=30	Bibipur n=24	Rora n=36	Fatehpur Therhi n=24	Overall N=150
1.	Wheat	36	30	24	36	24	150(100%)
2.	Rice	36	30	24	36	24	150(100%)
3.	Fodder	24	18	18	24	18	17 (68%)
4.	Vegetables	12	12	6	6	6	7(28%)

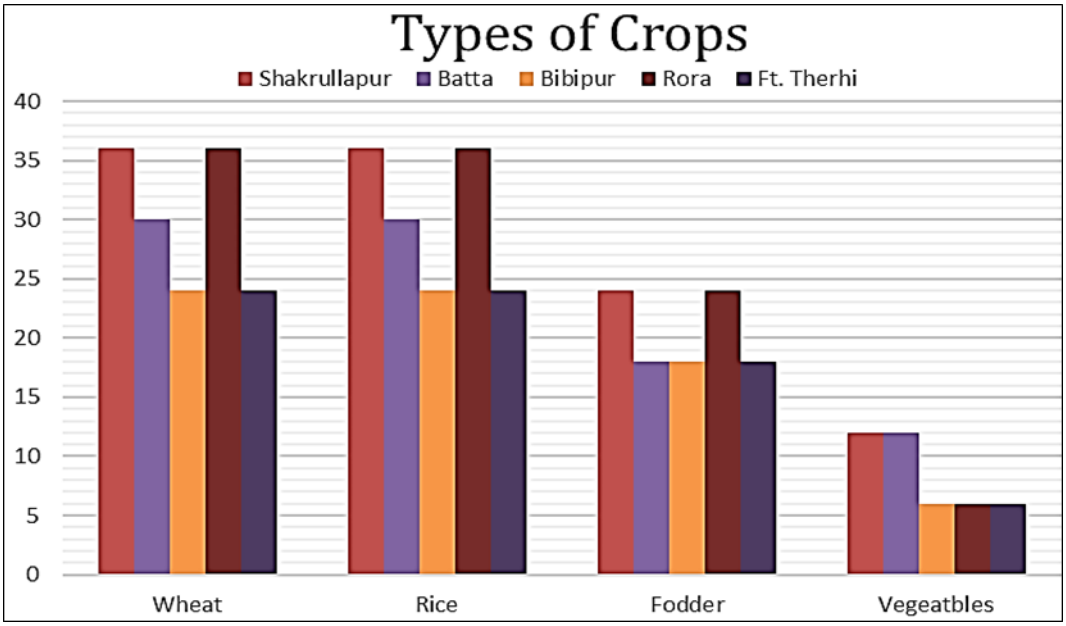

Fig 1: Types of crops

Land Holding (in hectares)

According to the data represented in table no 2, 42% of the respondent are medium farmers, 39% of respondent are small farmer while 11% of the respondent are marginal farmer whereas 8% of the farmers are large farmers. The following data is represented in fig no 2.

Table 2: Land holding

S. N	Parameter	Shakrullapur n=36	Batta n=30	Bibipur n=24	Rora n=36	Fatehpur Therhi n=24	Overall N=150
1.	Marginal Farmer	4	2	6	2	3	17 (11%)
2.	Small Farmer	19	12	7	11	8	57 (39%)
3.	Medium Farmer	11	15	9	17	12	64 (42%)
4.	Large Farmer	2	1	2	6	1	12 (8%)

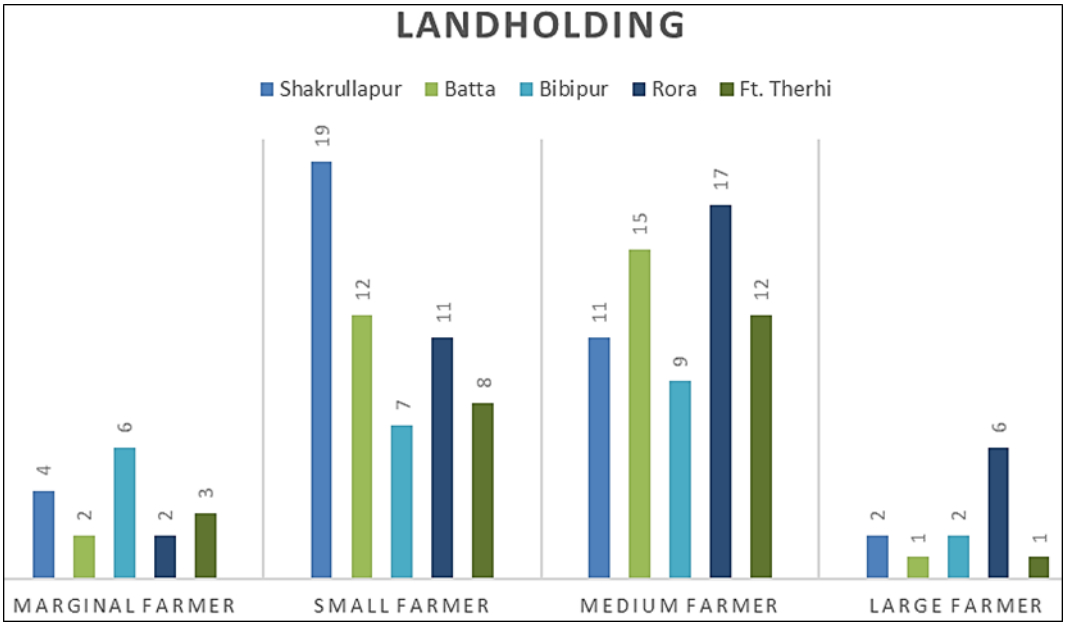

Fig 2: Land holding

The source of seed

Majority of the respondent farmers bought the seeds for cultivation from input dealers at Kharar, Morinda or from cooperative societies. According to the observed data represented in the table no 3, 54% of the farmer purchase the seeds from private shop while 32% from government agencies and 12% make their own seed.

Table 3: Source of seed

S. No.	Parameter	Shakrullapur n=36	Batta n=30	Bibipur n=24	Rora n=36	Fatehpur Therhi n=24	Overall N=150
1.	Private	21	14	13	20	14	82 (54%)
2.	Government Agencies	10	12	8	12	7	49 (32%)
3.	Own Seed	5	4	3	4	3	19 (12%)

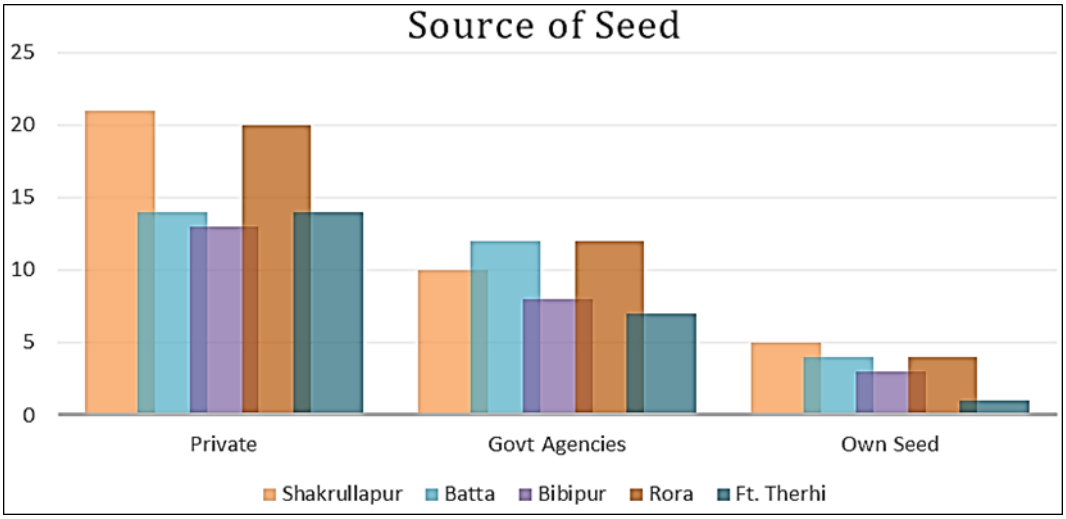

Fig 3: Source of seed

Seed treatment

From the observed data 75% of the farmer use already treated seeds while 25% of the farmer use not treated seeds.

Table 4: Seed treatment

S. N	Parameter	Shakrullapur n=36	Batta n=30	Bibipur n=24	Rora n=36	Fatehpur Therhi n=24	Overall N=150
1.	Already Treated	27	23	18	29	16	113 (75%)
2.	Not Treated	9	7	6	7	8	37 (25%)

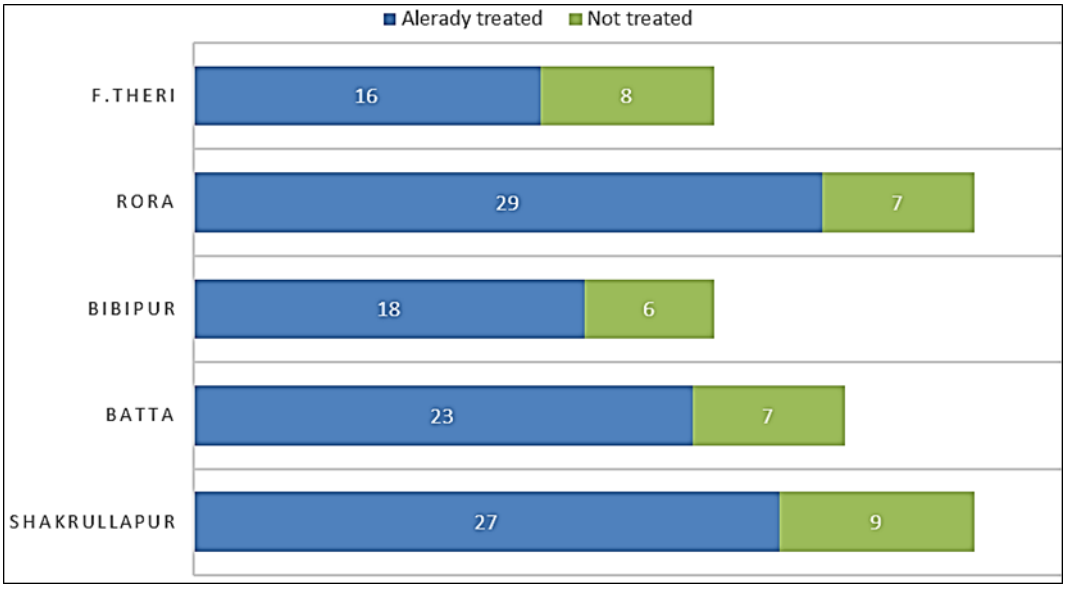

Fig 4: Seed treatment

Weed management

Early weeds are best controlled up to around 21 days after crop establishment, as this is the time when weeds are important in terms of yield losses. In the gathered data 12% of the farmers Manage weed by manual method while 17% by chemical only and 70% of farmer use both the methods.

Table 5: Weed management

Particulars	Shakrullapur n=36	Rora n=36	Bibipur n=24	Batta n=30	Fathepur Therhi n=24	Total N=150
Only Manual	4	2	2	6	4	18(12%)
Only Chemical	6	6	2	7	5	26(17%)
Both	26	28	20	17	15	106(70%)

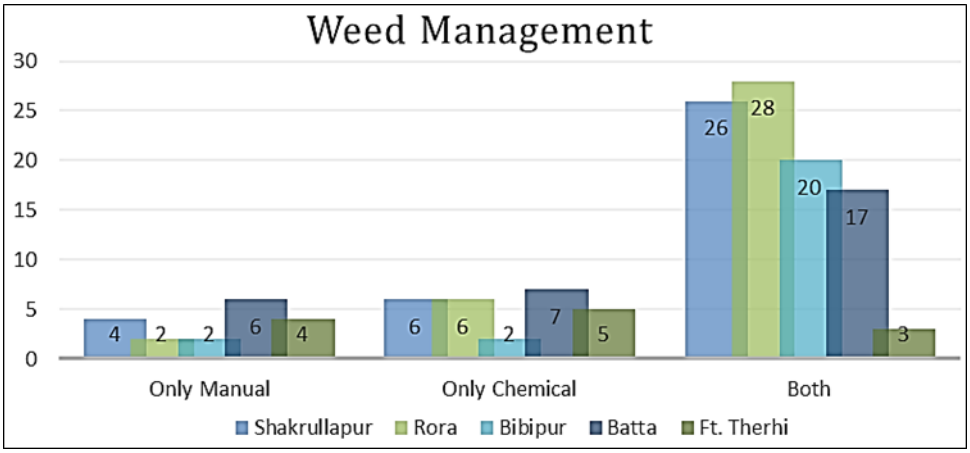

Fig 5: Weed management

Fertilizers

In the case of organic manure, most of the respondent farmers used cow dung cakes (gobar). Cow dung cakes is environment friendly, gives higher yield and contains high nutrient.

Inorganic practices: Urea is widely used inorganic chemical in field and least is NPK.

Table 6: Fertilizer

Particulars	Shakrullapur n=36	Rora n=36	Bibipur n=24	Batta n=30	Fathepur Therhi n=24	Total N=150
Manure	36	36	24	30	24	150(100%)
Urea	36	36	24	30	24	150(100%)
DAP	33	30	20	21	23	127(84%)
MOP	27	25	16	21	18	107(71%)
SSP	29	27	18	21	19	114(76%)

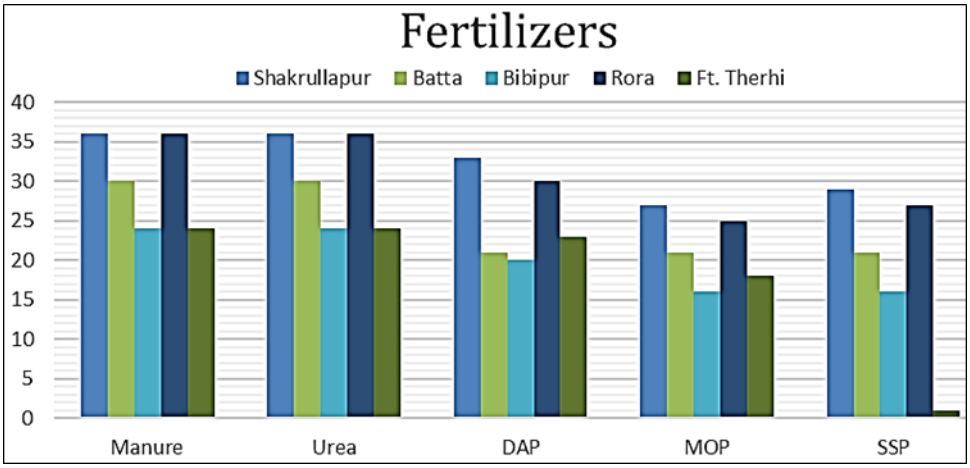

Fig 6: Fertilizers

Sowing methods

The methods by which seeds are sown in the field for cultivation of crops are called sowing methods. In the respective data 67% of the farmers use broadcasting method, 86% of the farmer use transplanting method, furrow type is used by 66% of the farmers while 54% of the farmers use other sowing methods.

Table 7: Sowing methods

Particulars	Shakrullapur	Rora	Bibipur	Batta	Therhi	Total
Broadcasting	22	25	17	19	18	101(67%)
Transplanting	33	30	21	24	21	129(86%)
Furrow	31	24	15	16	14	100(66%)
Others	27	21	13	10	11	82(54%)

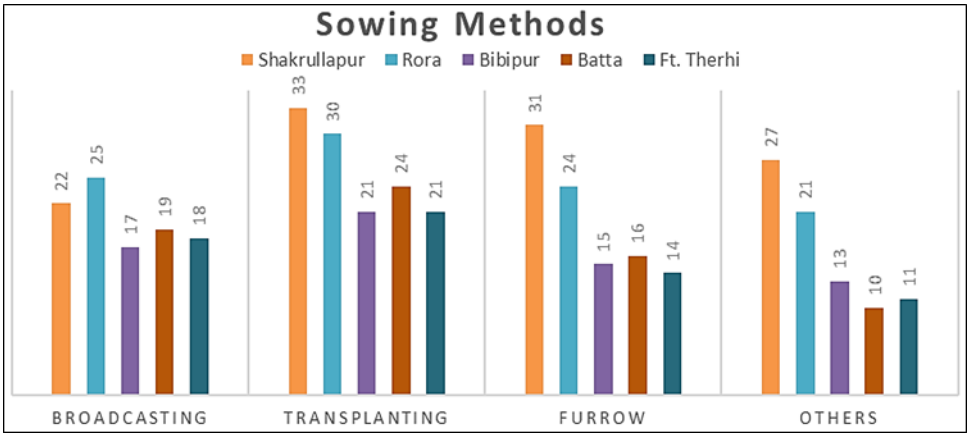

Fig 7: Sowing methods

Insect pest management in Wheat

As represented in the following data in table no 8, wheat crop grown by farmer of every village (100%) face a common pest problem i.e. aphid treatment followed by the people is Thiamethoxam.

Table 8: Insect pest management in wheat

S. No.	Village	Crop	Pest	Treatment	No of people using
1.	Shakrullapur	Wheat	Aphid	Thiamethoxam	36 (100%)
2.	Rora	Wheat	Aphid	Thiamethoxam	36(100%)
3.	Bibipur	Wheat	Aphid	Thiamethoxam	24(100%)
4.	Batta	Wheat	Aphid	Thiamethoxam	30(100%)
5.	Fathepur Theri	Wheat	Aphid	Thiamethoxam	24(100%)

Insect pest management in Paddy

As represented in the following data in table no 9, 50% of the farmer of Shakrullapur face the problem of plant hopper in paddy where as 50% of the farmer face leaf folder. In Rora village 66% of the farmer face leaf folder while 33% face plant hopper, In Bibipur 100% of the farmer face plant hopper while in Batta village 60% of the farmer face plant hopper while 40% face leaf folder. In Fathepur Their village 50 % of the farmer face leaf folder while 50% of the farmer face plant hopper.

Table 9: Insect pest management in paddy

S. No	Village	Crop	Pest	Treatment	No of people using
1.	Shakrullapur	Paddy	Plant hopper	Chess	18 (50%)
2.	Shakrullapur	Paddy	Leaf folder	Fame	18 (50%)
3.	Rora	Paddy	Leaf Folder	Fame	24 (66%)
4.	Rora	Paddy	Plant hopper	Chess	12 (33%)
5.	Bibipur	Paddy	Plant hopper	Chess	24 (100%)
6.	Batta	paddy	Plant hopper	Chess	18 (60%)
7.	Batta	Paddy	Leaf Floder	Fame	12 (40%)
8.	Fathepur Theri	Paddy	Plant hopper	Chess	12 (50%)
9.	Fathepur Theri	Paddy	Leaf Floder	fame	12 (50%)

Disease management

Disease management in agriculture refers to the practices and strategies employed to prevent, control, and mitigate the impact of diseases on crops, livestock, and other agricultural systems. Diseases can have a significant detrimental effect on agricultural productivity and can lead to economic losses for farmers and food shortages

Disease Management in Wheat

According to the data represented in table no 10, farmers of Shakrullapur village observed yellow rust disease in wheat crop and 33% use floucular in treatment while other 66% farmer use Tilt. In Bibipur, Batta and Fathepur Their 100% of the farmer use Tilt against yellow rust of wheat.

Table 10: Disease management in Wheat

S. No.	Village	Crop	Disease	Treatment	No of people using
1.	Shakrullapur	Wheat	Yellow Rust	Floucular	12 (33.3%)
2.	Shakrullapur	Wheat	Yellow Rust	Tilt	24 (66.6%)
3.	Bibipur	Wheat	Yellow Rust	Tilt	24 (100%)
4.	Batta	Wheat	Yellow Rust	Tilt	30 (100%)
5.	Fathepur Theri	Wheat	Yellow Rust	Tilt	24 (100%)

Disease management in paddy

According to the observed data in table no 11 farmers of all the villages found stem borer as a common problem in paddy. In Shakrullapur village 33% of the people use fame as treatment while 66% of the farmer use ferterra. In Bibipur village 100% of the people use Virtako while in Batta village 40% of the farmer use Coragen nad 60% use fame and in fathepur theri village 50% farmer use Virtako and 50% farmer use fame.

Table 11: Disease management in Paddy

S. No	Village	Crop	Disease	Treatment	No of people using
1.	Shakrullapur	Paddy	Stem Borer	Fame	12 (33.3%)
2.	Shakrullapur	Paddy	Stem Borer	Ferterra	24 (66.6%)
3.	Bibipur	Paddy	Stem Borer	Virtako	24 (100%)
4.	Batta	Paddy	Stem Borer	Coragen	12 (40%)
5.	Batta	Paddy	Stem Borer	Fame	12 (60%)
5.	Fathepur Theri	Paddy	Stem Borer	Virtako	12 (50%)
6.	Fathepur Theri	paddy	Stem Borer	Fame	12 (50%)

Yield

Agricultural yield is the average net output of agricultural product (e.g. in kCal, grams protein, or net profit) per unit of farmland per year. The total amount of farmland includes all land that is required to generate the output (e.g. also land that is used to grow feeds or to produce manure). The average production of wheat crop is 56.2qtl/ha but in the paddy crop is 66.2 qtls per hectare.

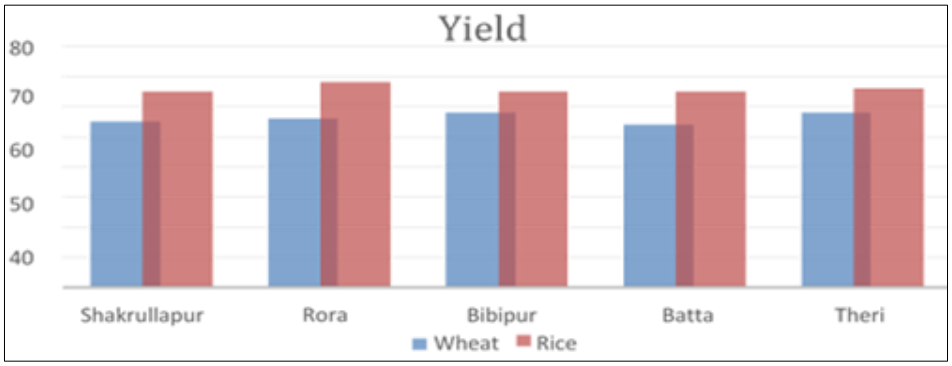

Fig 8: Yield

Table 12: Yield

Sr. No.	Crop	Shakrull apur (n-36)	Rora (n-36)	Bibipur (n-24)	Batta (n-30)	Theri (n-24)	Average production
1.	Wheat	55 qtls/ha	56 qtl/ha	58 qtls/ha	54 qtls/ha	58 qtls/ha	56.2 qtls/ha
2.	Paddy	65 qtls/ha	68 qtls/ha	65qtls/ha	65 qtls/ha	66 qtls/ha	66.2 qtls/ha

Conclusion

According to research findings and data gathered, a wide range of crops, including wheat, paddy, sugarcane, maize, mustard, sorghum, and berseem, are grown in this area. The two main cereal crops in this region are wheat and paddy, and other fodder crop and vegetable crop are farmed here. Generally speaking, farmers use 2% more seed than is advised. Farmers typically over-apply DAP and urea to their fields, whereas zinc, NPK and other potassium fertilisers give less attention. Farmers use flood irrigation on every crop, and tubewells are the main method of irrigation. Phalaris minor, also called "Gulli danda" in Punjabi, is the most prevalent weed seen in this area. This is primarily a result of farmers' failure to implement crop rotation techniques in their fields. Farmers have also noticed dwarf plant disease in the paddy crop by the result loss in the yield of paddy crop. For grain crops, combine harvesters account for 78% of harvesting, whereas manual harvesting is used for mustard and vegetable crops etc. In this region, the average output of Paddy is around 66 qtls per hectare, while the average yield of wheat crops is about 56 qtls/ha, showing that farmers follow correct agronomic procedures.

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