Technical Report

Wheat Business School

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Project Summary

Wheat Business School project conducted by Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut to make aware the wheat growers through transfer of technology for increasing the productivity, profitability and value addition in wheat cultivation etc. with the financial support of CCS National Institute of Agricultural Marketing, Jaipur (Rajasthan).

1. **Selection of Location:** Meerut is the main district of Western Uttar Pradesh and playing an important role in production of cereals, sugarcane, vegetables, mustard and orchard. Net cultivated area of Meerut is 198941 ha. Main crop rotation in the area is sugarcane and wheat. Sugarcane resulting the crop productivity and income of farmers are low. So that farmers are not getting appropriate income from the cultivation of sugarcane and wheat. There is need to adopt new production techniques and varieties to increase the productivity and income both in the existing crop rotation. Keeping the above facts in mind Wheat Business School concept introduced as a pilot study to increase the income of wheat growing farmers with the help of introduction of innovative techniques and tools as well as marketing strategy.

   On the basis of direction and guidance of supporting institute, for successful completion of project randomly village Kohla of block Mawana district Meerut was selected.

2. **Selection of Farmers:** 25 farmers cultivating wheat and other crops selected from the village Kohla for the purpose of study under Wheat Business School. All the selected farmers were examined and studied in terms of cultivation of wheat and other crops, method of cultivation, practices used in cultivation in wheat, marketing methods and other socio economic parameters of the farmers. Farmers were selected through interview among the 150 farmers on the basis of wheat area sown by them in last year. Beneficiary based on data, were collected. The bench mark data collected from all 25 selected farmers from the village Kohla district Meerut.

3. **Benchmark Survey:** The benchmark survey carried out for last 3 years to observe the wheat sown by the farmers, variety grown, package of practices used, economic condition of the farmers, per hectare yield obtained, price of wheat sold out during last 3 years, method of selling wheat, rate of selling wheat, net return from one hectare and other parameters.

Selected farmers possess total land area of 70.70 ha. Out of which wheat was cultivated in 27.45 ha. area that different varieties grown by the farmers in the village which shows that they are frequent to opt the variety as per their own and not influenced by the others. The major varieties grown in village are HD-3765, 2285, DVW-17 and PBW-343. The variation in sowing time also observed that the sowing time ranging from 28th November to 15th December. The time of sowing had significant effect in the yield of crop.

Most of the farmers were sown wheat during 25th November to 05th January and they were not select wheat varieties on the bases of recommended sown time. Majority of farmers was sown early wheat varieties in the month of December resulting they were not getting good yield and return and not adopted the recommended practices of wheat production. They were not using the base fertilizers, most of the farmers used only DAP fertilizer as basal doses and not using potash and zinc sulphate and sown as broadcast and also most of the farmers were sown old varieties of wheat. Keeping in the view resulting yield and quality both were deteriorated.

First of all wheat production technology training were provided to the selected farmers in their village with the support of experts. Soil sample of all fields were collected and analyzed with the support of Department of Agriculture and fertilizers provided as per recommendation on the basis of soil testing parameter. At the sowing time, it was also focused to introduce new varieties like HD-2967, HD-3086, WH-1130, PBW-88 and PBW-17. Crop sown with the help of seed cum fertidrill on the basis of sowing time recommended for the region. At the sowing time fertilizers applied on the soil testing basis as balanced fertilizer. Before the wheat sowing, seed treatment done with the fungicide. After sowing the wheat crop production training like irrigation management, wheat management and management of insect and pest provided time to time to the selected farmers. In the every year month of March threshing and harvesting training were provided so that grading and packing done completely. To get the maximum price of wheat, MSP provided to the all farmers and make them aware about the marketing so that farmers can get maximum price of their products.

4. **Area of wheat cultivated since last three years:** Selected farmers of the village possess 70.70 ha land out of which 27.45 ha. land covered under cultivation of wheat i.e. 38.82% of land possessed by the farmers under wheat cultivation. The details of all parameters of for the year 2015-16, 2016-17 and 2017-18 are given in respond.

The yield of wheat before the project was 43 to 48 q. per Hectare and the average yield was 42.56 q. per Hectare, with the support of this project the wheat yield is increased up to 52 to 61 q. per Hectare and the average yield was 55.84 q. per Hectare. With this project 31.20 % average yield increased of wheat. The wheat yield was significant higher in comparison to before the project. With this project following changes were seen in the wheat growers.

i. Farmers became aware about the scientific production technology of wheat.
ii. Farmers benefited with the newly released variety of wheat.
iii. Farmers get the average higher wheat yield up to 31.20% which was significantly higher in comparison to before the project.
iv. Farmers also benefited perfectly on management of weeds, insects and pests.
v. Farmers also aware for post harvest management with proper grading and packaging.
vi. Farmers also aware about wheat MSP price of government and local Mandi etc.
vii. With this project cost of cultivation also reduced due to application of inputs on the basis of soil testing parameter.
viii. With the support of this project farmers can reduced two irrigation on the scientific way with about 15-18% water saving.

In the month of May one training program also conducted on the value addition to keeping in view higher returns. Now farmers are working as Farmer Business Group and they are ready to start value addition like Dalia, Maida and Bread etc. Hence we can say that with the support of this project farmers are moving forward towards value addition and earlier they will work as FPO (Farmer Producers Organization) and will success to market of their product.

Technical Report- Wheat Business School

1. Introduction of Wheat Business School

Wheat Business School (WBS) aims at transforming Agriculture to Agribusiness by inculcating Agribusiness traits among farmers through capacity building and constant mentoring by expert institutions such as Agricultural Universities, KVKs, Agribusiness Companies under the guidance on critical interventions and marketing input by CCS NIAM. The ultimate aim of WBS is to enhance the income of the farmers by adopting recommended scientific practices and making full use of developmental programs and schemes of Government to increase the income of the farmers. Important steps in operationalization of Wheat Business School followed during the study are as under:

(i) **Identification of Expert Institution:** As it is aware that wheat is a major crop of the Western Uttar Pradesh and large area is under cultivation in this region. Accordingly, CCS NIAM has selected Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut as a partner Institution to carry out the study in Uttar Pradesh. Latest technologies are available in the University and it is updated about developmental programs of government well versed with cultivation practices of wheat and other crops. A class of research activities are undertaken by the University in different discipline like Horticulture, Bio-Technology, Skill Development, Food Technology, poly Hose technology and many more.

(ii) **Identification of commodity:** Since, wheat is a major commodity/ enterprise and is predominant in the area are selected for the purpose of study which covers maximum number of farmers engaged in the cultivation of wheat. Meerut falls under western part of Uttar Pradesh and this region is known for wheat, sugarcane, maize, rice, mango, and various vegetable crops. Land and other resources are quite conducive for the cultivation of different kind of crops in this region. Due to Ganga River, the water table is sufficient in this area to address the need of irrigation of farmers. However, there is another sources of irrigation like tube well, canal, miner and pump sets. Being a staple food farmers are more inclined to grow the wheat crop in this region. Due to this reason wheat crop is selected for the purpose of study. Wheat is dominating other crops in this area and very old pattern of crop rotation is followed by the farmers. The total number of marginal and small farmers, area under wheat cultivation and productivity comparison of Meerut, Uttar Pradesh and India is given as under:

(iii) **Selection of farmers:** A true representative village where maximum number of farmers engaged in the cultivation of wheat are selected for the purpose of study. Total 25 farmers were randomly selected for the purpose of study representing different socioeconomic strata to implement Kisan Business School in the village.

(iv) **Conducting of Bench Mark Survey:** The bench mark survey status of all the 25 farmers was carried out to collect data based on ex-post facto mode covering previous three years pertaining to wheat. It was done to find out the income of farmers from wheat and to study the conditions under which wheat crop was grown. During the Bench Mark Survey net incomes of the farmers are also examined to compare the economic gain after execution of Kisan Business School.

(v) **Extension and marketing interventions at critical stages by expert institutions:** The technical input from the experts were given to the farmers at identified critical stage. All the critical stages of production and post-production, which influences production, productivity and profitability of farmers were identified by experts of the University for the selected commodity i.e. wheat. Capacity building programs such as group meeting demonstration, training etc. were conducted in advance to each critical stage and farmers are prepared to adopt latest technologies and interventions required for cultivation and marketing of wheat. Special attention were given on harvest and post-harvest interventions including marketing knowledge like selection of market, grading, packaging, assaying, storage, selection of time of sale, to maximize the profit under wheat crop per unit area.

(vi) **Organizing Field Demonstration:** Demonstration at different critical stage were organized in the village to provide the technological interventions to the farmers about wheat crops. Major interventions at different critical stage during the field demonstration viz., selection of variety, irrigation, weed management, fertilizer management, plant protection management, time of harvest discussed and demonstrate before the group of farmers. It was also decided during the Demonstration that when interventions are required by the scientist and induced expert opinion at appropriate time so that production of crop could be enhanced per unit area. During the Demonstration the farmers other than KBS farmers were also benefited about the technological and marketing interventions. During the project implementation, efforts were made by the scientist to make aware the farmers not only the KBS but also the various scheme of Government of India like Pradhan Mantri Fasal Beema Yojana, Soil Health Card, Pradhan Mantri Krishi Sichayee Yojana, e-NAM, Parampragat Krishi Vikas Yojana, National Mission for Sustainable Agriculture and

Agriculture Marketing Infrastructure Scheme were elaborate among farmers just to increase their knowledge. Now, the farmers are taking benefit out of these schemes and maximizing the profit from the agriculture. To popularize these Government of India Schemes sincere efforts were made by the Scientists.

(vii) **Impact evaluation:** At the last, impact evaluation of interventions of Kisan Business School in terms of production, productivity and profitability were examined at the end of the season. The bench mark data of previous three years were compared with the data obtained during the execution of Kisan Business School to find out the outcome of the study.

2. Selection of Locale

Meerut is the main district of Western Uttar Pradesh and playing an important role in production of cereals, sugarcane, vegetable, mustard, and orchard. Net cultivated area of Meerut is 1, 98,941 ha. Main crop rotation is sugarcane and wheat. Sugarcane resulting the crop productivity and income of farmers are low. So that farmers are not getting appropriate income from the cultivation of sugarcane and wheat. There is need to adopt the new production techniques and varieties to increase the productivity and income both. Keeping the above facts in mind Kisan Business School concept introduced as pilot study to increase the income of farmers.

Table-1: The total number of marginal and small farmers, area under wheat and productivity comparison of Meerut, Uttar Pradesh and India

S.N.	Particulars	No. of farmers (Millions)		Wheat	
		Marginal (<1 ha)	Small (1-2 ha)	Area (m ha)	Productivity (q/ha)
1	Meerut	-	-	0.9	46.7
2	Uttar Pradesh	18.5	3.0	9.8	36.6
3	India	92.8	24.8	29.6	31.0

3. Selection of crop and reasons thereof

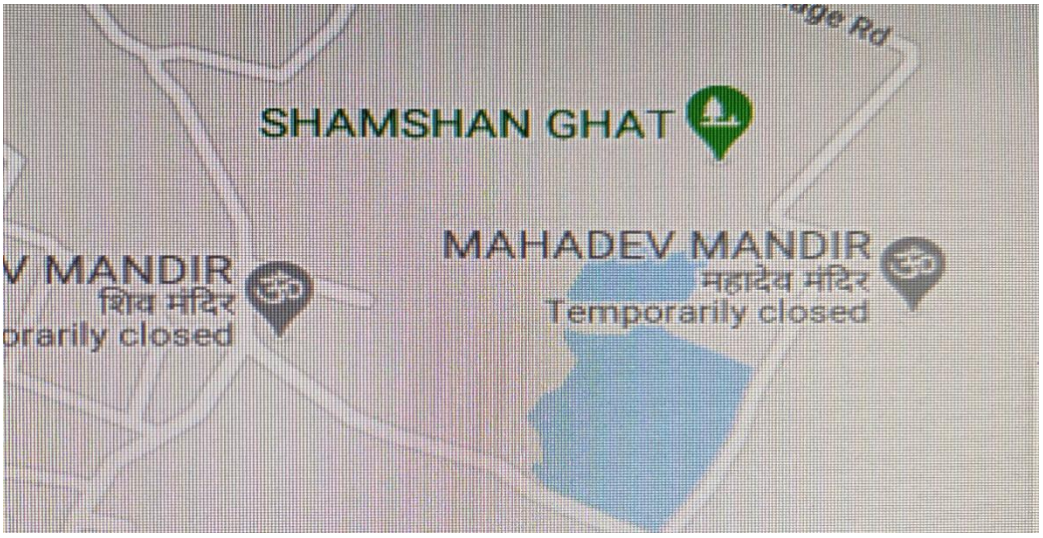
In district Meerut, wheat is the main crop occupied maximum area of cultivation followed by sugarcane. It is evident that wheat crop is sown by every farmer in the district but due to unawareness of latest technology of cultivation and market interventions, farmers sown old varieties and not used fertilizers as per scientific recommendations. Most of the farmers using DAP at the time of sowing and urea use as top dressing but Potash is not used by most of

the farmers. Keeping in mind to increase the income wheat yield is needed by adopting the new technological interventions.

First of all survey of all blocks of district after that maximum protocol was found in block Mawana. There was average productivity 42.56 Q/Ha very low in comparison to district productivity. To keeping in view of the above survey was completed of Block Mawana and selected village Kohla. A different activity like awareness programs, technical trainings, demonstration field days were conducted for the selected farmers of the said village and time given the technology for other technical activities like irrigation, weeding, protection and harvesting techniques etc.

4. Selection of village (Geographical location)

The village Kohla is selected for the purpose of study and execution of Kisan Business School for the benefit of farmers and to increases their income from wheat cultivation. Village Kohla is located in Mawana Tehsil of Meerut. This Tehsil is known for extensive wheat cultivation in the area. However, sugarcane is also a major crop grown by the farmers in this area. Farmers of this village are progressive and ready to adopt the new technology and schemes provided by the Government. Village Kohla is around 8 Km. from Mawana Headquarter by road and easy to approach through various small local roads network. Due these reasons, village Kohla was selected purposely for the study and execution of Kisan Business School. It is around 35 km. from Meerut district Headquarter and well connected with road network. The map of village Kohla is also given as under to know the actual location of the village. According to Census 2011 information the location code or village code of Kohla is 118732. Kohla village is located in Mawana Tehsil of Meerut district in Uttar Pradesh. Meerut and Mawana are the district & sub-district headquarters of Kohla village respectively. As per 2009 statistics Kohla village is also a Gram Panchayat. The total geographical area of village is 201.82 hectares. Kohla has a total population of 1,513 peoples. There are about 259 houses in Kohla village. Kohla villages comes under Sardhana assembly and Muzaffarnagar parliamentary constituency. Mawana is nearest town to Kohla.



(Map of village Kohla)

5. Agro-ecological situation of Mawana Block

The Kohla village falls under the Mawana block and situated in the Agro-ecological Situations–I as per census. The soil of the village is loamy in nature and suitable for cultivation of sugarcane, wheat, paddy, potato, sorghum, vegetables and other fruit plants. Commonly, sugarcane- rationing-wheat- agro forestry- sorghum-livestock farming system is prevalent and popular among the farmers of the area. The Blocks like Mawana, Pariksheetgarh, Machhara, Kharkhoda, Rajpura, Meerut, Daurala, Sardhana, Saroorpur and Rhta comers under this ecological situation. The details are given a sunder:

Table-2: Agro-ecological parameters of Mawana Block

Agro-ecological situations	Soil Type	PH of soil	Farming system	Major crops	Live Stock
AES-I	Loam	7.5-8.5	Sugarcane- Ratoon-Wheat, Agro forestry and/or Sorghum-wheat (2-3 Graded buffalo/1 Cross bread cow)	Sugarcane, Wheat, Paddy, Potato, Vegetable, Sorghum	Buffalo, Cow, Poultry, Sheep & Goat

6. Selection of farmers

25 farmers cultivating wheat and other crops selected from the village Kohla for the purpose of study under Kisan Business School. All the selected farmers were examined and studied in terms of cultivation of wheat and other crops, method of cultivation, practices used in cultivation in wheat and other socioeconomic parameters of the farmers. The parameter followed

by the researchers in selection of farmers were considered like: economic conditions of farmers, ready and inclined to adopt the KBS and other scheme launch by the Government of India and State, available resources, irrigation facility, ready to give the time for the KBS program, availability of implements required for farming and education. Before selection of farmers for the purpose, a small group discussion was arranged in the village to know the willingness of the farmers to adopt the KBS. No pressure given by the researchers on the farmers to adopt the KBS. Initially, a group of 40-45 farmers were discussed and 20 like minded farmers were finally selected for the purpose of study in Kohla village and it was also required to make the project successful. The details of farmers like name, land available and crop sown in the village are given as under:

Table-3: Details of farmers, land available and crop sown

S. No.	Name of farmers	Total land (ha.)	Crop Sown
1.	Bundi Singh	2.20	Paddy, Wheat, Mustard, Sugarcane
2.	Ram Singh	1.80	Paddy, Wheat, Mustard, Sugarcane
3.	Chetan Pal	2.40	Paddy, Wheat, Mustard, Sugarcane
4.	Jora Singh	2.60	Paddy, Wheat, Mustard, Sugarcane
5.	Vikram	2.80	Paddy, Wheat, Mustard, Sugarcane
6.	Satveer	3.40	Paddy, Wheat, Mustard, Sugarcane, Mango Orchard
7.	Boby	2.70	Paddy, Wheat, Mustard, Sugarcane, Mango Orchard
8.	Raj Kumar	2.90	Paddy, Wheat, Mustard, Sugarcane, Mango Orchard
9.	Sudhir	3.80	Paddy, Wheat, Mustard, Sugarcane, Mango Orchard
10.	Aadesh	3.10	Paddy, Wheat, Mustard, Sugarcane, Mango Orchard
11.	Karmi	2.25	Paddy, Wheat, Mustard, Sugarcane, Mango Orchard
12.	Sarmil	2.90	Paddy, Wheat, Mustard, Sugarcane, Mango Orchard
13.	Shiv Kumar	2.30	Paddy, Wheat, Vegetables, Sugarcane
14.	Bhuleram	2.60	Paddy, Wheat, Vegetables, Sugarcane
15.	Ompal	3.75	Paddy, Wheat, Mango Orchard, Sugarcane, Mustard
16.	Peetam	2.95	Paddy, Wheat, Mango Orchard, Sugarcane, Mustard
17.	Rajpal	3.15	Paddy, Wheat, Mango Orchard, Sugarcane, Mustard
18.	Krishanpal	2.55	Paddy, Wheat, Mango Orchard, Sugarcane, Mustard
19.	Sonveer	3.32	Paddy, Wheat, Mango Orchard, Sugarcane, Mustard
20.	Vedram	2.85	Paddy, Wheat, Guava Orchard
21.	Ajab Singh	1.97	Paddy, Wheat, Mustard, Sugarcane
22.	Rajendra	2.34	Paddy, Wheat, Mustard, Sugarcane
23.	Dharm Singh	3.05	Paddy, Wheat, Mustard, Sugarcane, Vegetables
24.	Rajpal	2.72	Paddy, Wheat, Mustard, Sugarcane, Vegetables
25.	Rishipal	4.30	Paddy, Wheat, Mustard, Sugarcane, Vegetables, Mango Orchard

It is evident from the Table-2 that average land available with each farmers is 2.82 ha. However, Sh. Ajab Singh from Kohla village having the minimum land holding i.e. 1.97 ha and Sh. Rishi Pal having the maximum land holding i.e. 4.30 ha. It is also observed that major crops sown by the farmers in the village are paddy, wheat, mango orchard, sugarcane, mustard, vegetables and guava orchard etc.

7. Assets available with the farmers

It is a fact that various agricultural implements are required for successful farming. The details of inventory of various agricultural implements possessed by the growers are given as under:

Table-4: Inventory of various agricultural implements

S. No.	Name of farmers	Tube Well	Tractor	Cultivators	Leveller	Others
1.	Bundi Singh	✓	✓	✓	–	–
2.	Ram Sigh	✓	–	–	–	✓
3.	Chetan Pal	✓		✓	✓	–
4.	Jora Singh	✓	✓	✓	✓	–
5.	Vikram	✓	–	–	–	✓
6.	Satveer	✓	–	–	–	✓
7.	Boby	✓	–	–	–	✓
8.	Raj Kumar	✓	–	–	–	–
9.	Sudhir	✓	✓	✓	✓	–
10.	Aadesh	✓	–	–	–	✓
11.	Karmi	✓	–	–	–	✓
12.	Sarmil	✓	–	–	–	✓
13.	Shiv Kumar	✓	–	–	–	✓
14.	Bhuleram	✓	✓	✓	✓	–
15.	Ompal	✓	–	–	–	✓
16.	Peetam	✓	–	–	–	✓
17.	Rajpal	✓	–	–	✓	–
18.	Krishanpal	✓	✓	✓	–	–
19.	Sonveer	✓	–	–	–	✓
20.	Vedram	✓	–	–	✓	–
21.	Ajab Singh	✓		✓	✓	–

22.	Rajendra	✓	✓	✓	✓	–
23.	Dharm Singh	✓	–	–	–	✓
24.	Rajpal	✓	✓	–	✓	–
25.	Rishipal	✓	–	–	–	✓

It is evident from the above table that all selected farmers having irrigation facility for irrigation of crop through tube well. It means that area is well irrigated and 100% irrigation facility is available with the selected farmers. Out of 25 farmers, only 7 selected farmers having the possession of Tractors. It means that 28% farmers having tractors required for ploughing and to carry out other agricultural activities. In addition, 32% and 36% farmers having cultivators and leveller used for the purpose of cultivation of crops and also used for other operations respectively. The other farmers they do not have tractor, they are using services of tractors by means of hiring from other farmers on payment basis. In observance of the inventory of the farmers it is evident that economic conditions of farmers are reasonably good and they also economically at the good level.

8. Benchmark survey

The benchmark survey carried out for last 3 years to observe the crop sown by the farmers, variety grown, package of practices used, economic condition of the farmers, per hectare yield obtained, price of wheat sold out during last 3 years, method of selling wheat, rate of selling wheat, net return from one hectare and other parameters. The parameters considered for the benchmark survey are: availability of land, variety sown by the farmers, time of sowing, seed rate per hectare applied by the farmers, production cost per hectare, total production per hectare, gross income, net income and method of sale and rate per quintal were captured during the bench mark survey. The details area as under:

a. **Crops cultivated since last three years:** During last 3 years crops cultivated by the selected farmers were paddy, wheat, mango orchard, sugarcane, mustard, vegetables and guava orchard. But, only data relating to wheat were captured by the researchers for the purpose of study.

b. **Area of wheat cultivated since last three years:** Selected farmers of the village possess 70.70 ha land, out of which 27.45 ha land covered under cultivation of wheat i.e. 38.82% of land possessed by the farmers under wheat cultivation. The details of all parameters for the year 2015-16, 2016-17 and 2017-18 is given in the following tables.

Table-5: Bench Mark Data for the year 2015-16

S. No	Name of the farmer	Total land (ha)	Land under wheat (ha)	Variety	Time of sowing	Seed rate (kg/ha)	Production cost (Rs/ha)	Total production (q/ha)	Gross income (Rs/ha)	Net income (Rs/ha)	Method of sale	Rate of wheat (Rs/q)
1	Bundi Singh	2.20	1.05	HD-3765	5 Dec	125	46000	42.00	83000	37000	Local Market	1500
2	Ram Sigh	1.80	1.10	HD-2285	9 Dec	125	47000	43.00	84000	37500	Local Market	1500
3	Chetan Pal	2.40	1.20	DBW-17	14 Dec	125	48000	41.00	81500	33500	Local Market	1500
4	Jora Singh	2.60	1.00	PBW -343	30 Nov.	125	49000	44.00	87000	37000	Local Market	1500
5	Vikram	2.80	1.10	HD-3765	9 Dec	125	47000	43.00	84000	37500	Local Market	1500
6	Satveer	3.40	1.20	DBW-17	14 Dec	130	48000	41.00	81500	33500	Local Market	1500
7	Boby	2.70	1.00	PBW -343	30 Nov.	125	49000	44.00	87000	37000	Local Market	1500
8	Raj Kumar	2.90	1.00	HD-2285	30 Nov.	125	49000	44.00	87000	37000	Local Market	1500
9	Sudhir	3.80	1.10	HD-3765	9 Dec	125	47000	43.00	84000	37500	Local Market	1500
10	Aadesh	3.10	1.20	DBW-17	14 Dec	130	48000	41.00	81500	33500	Local Market	1500
11	Karmi	2.25	1.05	HD-2285	5 Dec	125	46000	42.00	83000	37000	Local Market	1500
12	Sarmil	2.90	1.10	HD-2285	9 Dec	125	47000	43.00	84000	37500	Local Market	1500
13	Shiv Kumar	2.30	1.20	DBW-17	14 Dec	130	48000	41.00	81500	33500	Local Market	1500
14	Bhuleram	2.60	1.00	PBW -343	30 Nov.	125	49000	44.00	87000	37000	Local Market	1500
15	Ompal	3.75	1.10	HD-3765	9 Dec	125	47000	43.00	84000	37500	Local Market	1500
16	Peetam	2.95	1.20	DBW-17	14 Dec	130	48000	41.00	81500	33500	Local Market	1500
17	Rajpal	3.15	1.05	HD-2285	5 Dec	125	46000	42.00	83000	37000	Local Market	1500
18	Krishanpal	2.55	1.10	HD-3765	9 Dec	125	47000	43.00	84000	37500	Local Market	1500
19	Sonveer	3.32	1.20	DBW-17	14 Dec	130	48000	41.00	81500	33500	Local Market	1500
20	Vedram	2.85	1.00	PBW- 343	30 Nov.	125	49000	44.00	87000	37000	Local Market	1500
21	Ajab Singh	1.97	1.10	HD-3765	9 Dec	125	47000	43.00	86000	37000	Local Market	1500
22	Rajendra	2.34	1.10	PBW-343	9 Dec	125	47000	43.00	84000	37500	Local Market	1500
23	Dharm Singh	3.05	1.20	DBW-17	14 Dec	130	48000	41.00	81500	33500	Local Market	1500
24	Rajpal	2.72	1.00	PBW -343	30 Nov.	125	49000	44.00	87000	37000	Local Market	1500
25	Rishipal	4.30	1.10	HD-2285	9 Dec	125	47000	43.00	84000	37500	Local Market	1500
		70.7	**27.45**				**47640**	**42.56**	**83980**	**36180**		

The bench mark data collected from all 25 selected farmers from the village Kohla district Meerut. Selected farmers possess total land area of 70.70 ha. out of which wheat cultivated in 27.45 ha area. It is evident from the Table-4 that different varieties of wheat grown by the farmers in the village which shows that they are frequent to opt the variety as per their own and not influenced by the others. The major varieties grown in village were HD-3765, 2285, DVW-17 and PBW-343. The variation in sowing time also observed that the sowing time ranging from 30th November to 14th December. The time of sowing had significant effect in the yield of crop. Sowing after 14th December, the yield was significantly low, as informed by the farmers selected for the study and execution of Kisan Business School. It was found that during the bench mark survey that farmers were not used to adopt the critical activities like soil analysis, timing of irrigation, seed treatment, grading activities of wheat, maintenance of record of operations and timely application of fertilizers.

Table-6: Bench Mark Data for the year 2016-17

S. No	Name of the farmer	Total land (ha)	Area under wheat (ha)	Variety	Time of sowing	Seed rate (kg/ha)	Production cost (Rs/ha)	Total production (q/ha)	Gross income (Rs/ha)	Net income (Rs/ha)	Method of Sale	Rate (Rs/q)	Source of irrigation
1	Bundi Singh	2.20	1.05	HD2285	3 Dec	120	44000	46.00	82000	38000	Local Market	1600	Tube well
2	Ram Sigh	1.80	1.10	HD3765	7 Dec	120	45000	47.00	86000	39000	Local Market	1600	Tube well
3	Chetan Pal	2.40	1.20	DBW-17	12 Dec	125	46000	45.00	80000	35000	Local Market	1600	Tube well
4	Jora Singh	2.60	1.00	PBW 343	28 No.	120	47000	48.00	87000	40,000	Local Market	1600	Tube well
5	Vikram	2.80	1.10	HD3765	7 Dec	120	45000	47.00	86000	39000	Local Market	1600	Tube well
6	Satveer	3.40	1.20	DBW-17	12 Dec	125	46000	45.00	80000	35000	Local Market	1600	Tube well
7	Boby	2.70	1.00	PBW 343	28 No.	120	47000	48.00	87000	40,000	Local Market	1600	Tube well
8	Raj Kumar	2.90	1.00	PBW 343	28 No.	120	47000	48.00	87000	40,000	Local Market	1600	Tube well
9	Sudhir	3.80	1.10	HD3765	7 Dec	120	45000	47.00	86000	39000	Local Market	1600	Tube well
10	Aadesh	3.10	1.20	DBW-17	12 Dec	125	46000	45.00	80000	35000	Local Market	1600	Tube well
11	Karmi	2.25	1.05	HD2285	3 Dec	120	44000	46.00	82000	38000	Local Market	1600	Tube well
12	Sarmil	2.90	1.10	HD3765	7 Dec	120	45000	47.00	86000	39000	Local Market	1600	Tube well
13	Shiv Kumar	2.30	1.20	DBW-17	12 Dec	125	46000	45.00	80000	35000	Local Market	1600	Tube well
14	Bhuleram	2.60	1.00	PBW 343	28 No.	120	47000	48.00	87000	40,000	Local Market	1600	Tube well
15	Ompal	3.75	1.10	HD3765	7 Dec	120	45000	47.00	86000	39000	Local Market	1600	Tube well
16	Peetam	2.95	1.20	DBW-17	12 Dec	125	46000	45.00	80000	35000	Local Market	1600	Tube well
17	Rajpal	3.15	1.05	HD2285	3 Dec	120	44000	46.00	82000	38000	Local Market	1600	Tube well
18	Krishanpal	2.55	1.10	HD3765	7 Dec	120	45000	47.00	86000	39000	Local Market	1600	Tube well
19	Sonveer	3.32	1.20	DBW-17	12 Dec	125	46000	45.00	80000	35000	Local Market	1600	Tube well
20	Vedram	2.85	1.00	PBW 343	28 No.	120	47000	48.00	87000	40,000	Local Market	1600	Tube well
21	Ajab Singh	1.97	1.10	HD3765	7 Dec	120	45000	47.00	86000	39000	Local Market	1600	Tube well
22	Rajendra	2.34	1.10	HD3765	7 Dec	120	45000	47.00	86000	39000	Local Market	1600	Tube well
23	Dharm Singh	3.05	1.20	DBW-17	12 Dec	125	46000	45.00	80000	35000	Local Market	1600	Tube well
24	Rajpal	2.72	1.00	PBW 343	28 No.	120	47000	48.00	87000	40,000	Local Market	1600	Tube well
25	Rishipal	4.30	1.10	HD3765	7 Dec	120	45000	47.00	86000	39000	Local Market	1600	Tube well
		70.7	**27.45**				**45640**	**46.56**	**84080**	**38000**			

Table-7: Bench Mark Data for the year 2017-18

S. No	Name of the farmer	Total land (ha)	Area under wheat (ha)	Variety	Time of sowing	Seed rate (kg/ha)	Production cost (Rs/ha)	Total production (q/ha)	Gross income (Rs/ha)	Net income (Rs/ha)	Method of sale	Rate (Rs/q)	Source of irrigation
1	Bundi Singh	2.20	1.05	DBW-17	1 Dec	122	45000	44.00	90400	45400	Local Market	1600	Tube well
2	Ram Sigh	1.80	1.10	HD-2285	5 Dec	122	46000	45.00	92000	46000	Local Market	1600	Tube well
3	Chetan Pal	2.40	1.20	DBW-17	10 Dec	127	47000	43.00	88800	41800	Local Market	1600	Tube well
4	Jora Singh	2.60	1.00	PBW-343	26 Nov.	122	48000	46.00	93600	45600	Local Market	1600	Tube well
5	Vikram	2.80	1.10	DBW-17	5 Dec	122	46000	45.00	92000	46000	Local Market	1600	Tube well
6	Satveer	3.40	1.20	HD-2285	10 Dec	127	47000	43.00	88800	41800	Local Market	1600	Tube well
7	Boby	2.70	1.00	DBW-17	26 Nov.	122	48000	46.00	93600	45600	Local Market	1600	Tube well
8	Raj Kumar	2.90	1.00	PBW-343	26 Nov.	122	48000	46.00	93600	45600	Local Market	1600	Tube well
9	Sudhir	3.80	1.10	HD-3765	5 Dec	122	46000	45.00	92000	46000	Local Market	1600	Tube well
10	Aadesh	3.10	1.20	DBW-17	10 Dec	127	47000	43.00	88800	41800	Local Market	1600	Tube well
11	Karmi	2.25	1.05	HD-2285	1 Dec	122	45000	44.00	90400	45500	Local Market	1600	Tube well
12	Sarmil	2.90	1.10	HD-3765	5 Dec	122	46000	45.00	92000	46000	Local Market	1600	Tube well
13	Shiv Kumar	2.30	1.20	DBW-17	10 Dec	127	47000	43.00	88800	41800	Local Market	1600	Tube well
14	Bhuleram	2.60	1.00	PBW-2285	26 Nov.	122	48000	46.00	93600	45600	Local Market	1600	Tube well
15	Ompal	3.75	1.10	HD-3765	5 Dec	122	46000	45.00	90400	45500	Local Market	1600	Tube well
16	Peetam	2.95	1.20	DBW-17	10 Dec	127	47000	43.00	88800	41800	Local Market	1600	Tube well
17	Rajpal	3.15	1.05	PBW-343	1 Dec	122	45000	44.00	90400	45500	Local Market	1600	Tube well
18	Krishanpal	2.55	1.10	HD-3765	5 Dec	122	46000	45.00	92000	46000	Local Market	1600	Tube well
19	Sonveer	3.32	1.20	PBW-343	10 Dec	127	47000	43.00	88800	41800	Local Market	1600	Tube well
20	Vedram	2.85	1.00	DBW-17	26 Nov.	122	48000	46.00	93600	45600	Local Market	1600	Tube well
21	Ajab Singh	1.97	1.10	PBW-343	5 Dec	122	46000	45.00	92000	46000	Local Market	1600	Tube well
22	Rajendra	2.34	1.10	HD-3765	5 Dec	122	46000	45.00	92000	46000	Local Market	1600	Tube well
23	Dharm Singh	3.05	1.20	HD-3765	10 Dec	127	47000	43.00	88800	41800	Local Market	1600	Tube well
24	Rajpal	2.72	1.00	PBW-343	26 Nov.	122	48000	46.00	93600	45600	Local Market	1600	Tube well
25	Rishipal	4.30	1.10	DBW-17	5 Dec	122	46000	45.00	92000	46000	Local Market	1600	Tube well
		70.7	**27.45**				**46640**	**44.56**	**91232**	**44644**			

Table-8: Data for the KBS year 2018-19

S. No	Name of the farmer	Total land (ha)	Area under wheat (ha)	Variety	Time of sowing	Seed rate (kg/ha)	Production cost (Rs/ha)	Total production (q/ha)	Gross income (Rs/ha)	Net income (Rs/ha)	Method of Sale	Rate (Rs/q)	Source of irrigation
1	Bundi Singh	2.20	1.20	HD-3086	15 Nov.	120	51500	54.00	1,09000	57500	Govt. Centre	1850	Tube well
2	Ram Sigh	1.80	1.15	WH-1121	25 Nov.	120	56500	53.00	1,08000	51500	Govt. Centre	1850	Tube well
3	Chetan Pal	2.40	1.30	PBW-88	18 Nov.	125	58000	55.00	1,12000	54000	Govt. Centre	1850	Tube well
4	Jora Singh	2.60	1.20	HD-2967	28 Nov.	120	58500	56.00	1,13000	53500	Govt. Centre	1850	Tube well
5	Vikram	2.80	1.25	WH-1121	25 Nov.	120	56500	53.00	1,08000	51500	Govt. Centre	1850	Tube well
6	Satveer	3.40	1.30	HD-3086	22 Nov.	125	57320	54.00	1,10000	52680	Govt. Centre	1850	Tube well
7	Boby	2.70	1.20	WH-1121	29 Nov.	120	59380	58.00	1,17000	57620	Govt. Centre	1850	Tube well
8	Raj Kumar	2.90	1.25	PBW-88	17 Nov.	120	58690	54.00	1,10000	51310	Govt. Centre	1850	Tube well
9	Sudhir	3.80	1.30	HD-2967	24 Nov.	120	59700	57.00	1,15000	55300	Govt. Centre	1850	Tube well
10	Aadesh	3.10	1.50	PBW-88	19 Nov.	125	57990	59.00	1,19000	61010	Govt. Centre	1850	Tube well
11	Karmi	2.25	1.30	HD-2967	21 Nov.	120	56470	53.00	1,08000	51530	Govt. Centre	1850	Tube well
12	Sarmil	2.90	1.25	WH-1121	26 Nov.	120	59840	55.00	1,12000	52160	Govt. Centre	1850	Tube well
13	Shiv Kumar	2.30	1.20	HD-2967	20 Nov.	125	57644	52.00	1,07000	49356	Govt. Centre	1850	Tube well
14	Bhuleram	2.60	1.30	WH-1121	19 Nov.	120	59550	58.00	1,17000	57450	Govt. Centre	1850	Tube well
15	Ompal	3.75	1.30	HD-3086	22 Nov.	120	58650	61.00	1,24000	65350	Govt. Centre	1850	Tube well
16	Peetam	2.95	1.25	WH-1121	25 Nov.	125	56430	58.00	1,17000	60570	Govt. Centre	1850	Tube well
17	Rajpal	3.15	1.20	PBW-88	18 Nov.	120	57530	57.00	1,15000	57470	Govt. Centre	1850	Tube well
18	Krishanpal	2.55	1.85	HD-2967	16 Nov.	120	58890	55.00	1,12000	53110	Govt. Centre	1850	Tube well
19	Sonveer	3.32	2.20	WH-1121	15 Nov.	125	56970	54.00	1,10000	53510	Govt. Centre	1850	Tube well
20	Vedram	2.85	2.50	HD-3086	27 Nov.	120	58620	58.00	1,17000	58380	Govt. Centre	1850	Tube well
21	Ajab Singh	1.97	1.30	WH-1121	17 Nov.	120	56410	56.00	1,13000	56590	Govt. Centre	1850	Tube well
22	Rajendra	2.34	1.35	PBW-88	23 Nov.	120	59350	54.00	1,10000	50650	Govt. Centre	1850	Tube well
23	Dharm Singh	3.05	2.50	HD-2967	19 Nov.	125	58490	56.00	1,13000	54510	Govt. Centre	1850	Tube well
24	Rajpal	2.72	1.45	WH-1121	29 Nov.	120	57860	57.00	1,15000	57140	Govt. Centre	1850	Tube well
25	Rishipal	4.30	2.40	HD-3086	21 Nov.	120	57655	59.00	1,19000	61345	Govt. Centre	1850	Tube well
			37.00				**57777.56**	**55.84**	**113,200**	**55401.64**			

9. Intervention of Kisan Business School–Wheat

a. **Pr-sowing field activities:** Generally, sowing of wheat is done during the months of November to December. However, late sowing of wheat is also observed among those farmers who were taking sugarcane crop in the crop rotation. An interaction meeting in the village was organized before sowing of wheat with the farmers to inculcate scientific knowledge of cultivation of wheat and to create awareness among the selected farmers on different improved agronomical activities like soil testing, treatment of soil before sowing, application of nutrients in the soil as per its requirements, selection of variety, treatment of variety before sowing, appropriate time for sowing, method of sowing (manual or by tractor, seed drill). These all activities were carried out and farmers make aware about the scientific package of practices required for wheat cultivation. For preparation of wheat sowing one meeting was arranged with the selected farmers prior to sowing of wheat and described all above activities in details with the help of scientist of the University.

b. **Mobilization of farmers:** Before intervention of Kisan Business School for wheat in the village Kohla, Mawana, District Meerut, it was pertinent to choose the appropriate farmers those are interested in the project. For mobilization of farmers 2 round of meeting with the farmers were arranged by the University scientist to expose them about Kisan Business School concept and to convince for adoption of Kisan Business School project in the village. This process was initiated with the help of Gram Pradhan, who is also a good farmer of the village and also took part actively in the whole process of Kisan Business School.

c. **Awareness campaign about Kisan Business School:** A team of two scientists headed by Dean, Horticulture constituted by the University to create awareness among selected farmers of the village so that they could understand the concept of the Kisan Business School. The farmers were appraised by the hypothesis, methodology and process of Kisan Business School which could help to upgrade the knowledge of the selected group about the project. Complete process were explained by the scientists of University among the farmers so that they would be ready to adopt the project in the village. The importance of Kisan Business School were also explained that how it is beneficial to the farmers and how they can increase their profit from wheat cultivation.

Table-9: Dates of campaigning of various activities during KBS.

S.N.	Date of Campaign	Activity carried out
1	10th Nov, 2018	Mobilization and formation of group of farmers
2	8th Dec, 2018	Monitoring the sowing activities and other operations

3	4th Feb, 2018	Monitoring of operations
4	20th March, 2019	Knowledge grading, cleaning, packaging and marketing,

d. **Formation of group of like minded farmers:** Among the village it was very important to choose at least 25 like minded farmers those are having little bit innovative mind and ready to bear the changes happening in agriculture. After deep discussion with the group, 25 farmers were prepared for the adoption of the project. However, other farmers were also interested to adopt the project i.e. Kisan Business School for wheat. Due to limitation of number of farmers, only 25 farmers were selected and a group were framed and exposed about Kisan Business School in detail by the scientists of the University time to time.

Table-10: Kohla village at a Glance

S.N.	Socioeconomic Parameter	Input Data
1	Total Population	1513
2	Total No of Houses	259
3	Female Population %	45.7 % (691)
4	Total Literacy rate %	67.3 % (1019)
5	Female Literacy rate	25.2 % (382)
6	Scheduled Tribes Population %	0.0 % (0)
7	Scheduled Caste Population %	32.0 % (484)
8	Working Population %	35.4 %
9	Child(0 -6) Population by 2011	182
10	Girl Child(0 -6) Population % by 2011	40.1% (73)

e. **Make them ready to adopt Kisan Business School:** Consensus were develop among the growers and sensitized them for adoption of Kisan Business School as a project of maximization of profit through the project. Scientist were continuously in touch with the farmers during the whole process of Kisan Business School.

10. Soil parameters of Mawana Block as per soil health card

The soil of the village was low in organic carbon, medium in available nitrogen, Phosphorous and potassium with slightly alkaline in reaction. The details characteristics of soil of Kohla village is given as under:

Table-11: Mechanical analysis of soil of Mawana block (for wheat crop)

Location	Sand (%)		Silt (%)		Clay (%)		Textural classes
	Range	Mean	Range	Mean	Range	Mean	
Mawana	50-76.3	63.7	9.2-32	24.4	7.5-18	11.9	* SL

* Sandy Loam

Table-12: Physico-chemical properties of soil of Mawana block (for wheat crop)

Location	pH		EC (mmhos/cm)		Organic Carbon (%)		Textural classes
	Range	Mean	Range	Mean	Range	Mean	
Mawana	7.1-9.2	8.0	0.18-0.48	0.33	0.29-0.68	0.55	* SL

* Sandy Loam

11. Preparation of soil

- **Pre-irrigation**

  After harvesting of kharif crops, a pre-sowing irrigation applied in the field up to depth of 8 cm to retain the adequate moisture level uniformly at the time of seed sowing of wheat. After irrigation of field, one deep ploughing is required flowed by the planking to intact the upper surface of soil.

- **Treatment of soil**

  On deep ploughing (20-25 cm deep) followed by 2 to 3 shallow ploughing or harrowing were given in the field with the help of appropriate tillage implements with tractor. After each ploughing/ harrowing field was planked with the help of planker to conserve the soil moisture and to make the field leveled. For the purpose of soil treatment phosphetica culture 2.5 kg., azotobactor 2.5 kg, trycoderma powder 2.5 kg mix with 120 kg. Farm Yard manure and broadcast at the time of last planking for satisfactory growth of wheat. Soil treatment is necessary to remove any unwanted insect pest of the crop.

- **Application of farm yard manure**

  A well rotten farm yard manure @ 15 ton per ha applied about 10-15 days before sowing and it was thoroughly mixed into the upper most 15cm soil layer with the help of harrow or cultivator.

12. Critical Intervention– I

a. **Interventions through Demonstration**

By conducting the field demonstration farmers were educated for timely sowing, selection of suitable variety according to sowing time, seed treatment, appropriate sowing methods; timely agronomic management practices, marketing etc. to get the highest net returns from crop production .

b. **Selection of seed**

The seed of newly released high yielding varieties was purchased from reliable source i.e. form IARI, New Delhi and SVPUAT, Meerut depending on the optimum time of sowing by the farmers. Only high yielding varieties are allowed to grow by the farmers during project period. No local variety was grown by anyone associated with the project.

c. **Seed treatment**

The Seed purchased by farmers was already treated with suitable fungicide i.e. Agrosan GN @ 3g/kg of seed. Some of the selected farmers used their own seed particularly during 2nd year onwards and they have been treated their seeds with the fungicide carbendazim @ 3g / kg seed before sowing. This was well explained to the farmers before sowing of seed in field to avoid any disease infestation.

d. **Precaution during seed treatment**

Before treated seed lot was uniformly spread over the polythene sheet and the required quantity of chemical was dissolved in 10% sugar solution by using 1% gum acacia so that it was uniformly spread over all the seeds and easily stick and form a thin smear on the surface of all the seeds. The person performing the seed treatment by using the hand gloves to avoid any harm towards direct contact with the skin through cuts etc. Proper method for seed treatment were explained by the scientist among the farmers before seed treatment so as to do the activity effectively and to avoid the excess use of chemical. Before introduction of KBS very few farmers were using seed treatment practice before sowing of wheat. After understanding the importance of seed treatment farmers adopted this practice of treatment before sowing of wheat.

e. **Training of farmers and demonstration**

During the project period training and demonstration activities were arranged by the scientists for the benefit of farmers so that farmers could get the actual benefit of the Kisan Business School.

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f. **Sowing time**

The optimum sowing time was depends on climatic conditions, soil type and other available facilities e.g. irrigation etc. for timely sown irrigated condition the sowing time was in between 10th to 30th Nov in north western plain zone, between 10 to 30 November in north western plain zone, however it was from December 1st to 15th under late sown conditions. Habit of timely sowing of not only wheat but also crop was introduced among farmers during the period of Kisan Business School. Otherwise, farmers were not so punctual about the time of sowing of crop. They were very casual in approach about the time of sowing. This was the great learning introduced among farmers due to this project.

g. **Method of sowing**

The sowing of wheat performed with the help of seed cum fertidril by using a seed rate of 100 kg/ha and adjusted at a row to row distance of 20 cm. After sowing the field was planked with the help of planker to ensure better seed to soil contact for good germination the depth of seeding was kept at 5cm. However, it was also observed during the study that, before introduction of KBS, majority of farmers were using broadcasting method of sowing of wheat. But, after introduction of KBS project, farmers started wheat sowing with the help of fertiseed drill. Due to inclusion of KBS this new habit was introduced among the farmers. Other farmers were also keen and motivate to adopt this practice.

h. **Seed rate**

The Seed drill was adjusted at 100 and 120 kg/h under timely and late sown conditions, respectively. Before sowing of seed soaking in water overnight for quick and easy germination. Framers were advised to use little bit higher seed rate, closer spacing, and shallow sowing (2-3 cm.) for obtaining proper plant population. However dwarf wheat should be sown at 4-5 cm. depth.

i. **Rate of fertilizers**

The recommended dose of fertilizer i.e. 120 kg of nitrogen, 60 kg of phosphorus and 40 kg of potash/ha was applied under timely sown conditions and 150 kg Nitrogen, 80 Kg Phosphorus and 60 Kg Potash was applied. However, all farmers sown wheat at difference of 10-12 days duration on the basis of availability of land.

j. **Type of fertilizers**

The required quantity of phosphorous was applied through DAP, Nitrogen from DAP and urea and potassium by muriate of potash and was drilled below and away from the seed through seed cum ferti seed drill.

k. **Method of use of fertilizers**

Half dose of recommended nitrogen and full dose of phosphorus and potassium was applied at the time of sowing and rest amount of nitrogen was applied into two equal splits as top dressing at crown root initiation and often second irrigation. Besides, 0.5% of $ZnSO_4$ along with urea was also sprayed by using 600 l/ha of water at 40 days after sowing stage to overcome the Zn deficiency. The different methods of fertilizer application followed by the farmers are broadcasting, placement, starter solutions, foliar application, application through irrigation water (fertigation), injection into soil and aerial application. The habit of using neem coated urea introduced among farmers of village Kohla. This message was also spread in other farmers and among other farmers also. However, earlier farmers were not using

neem coated urea in the entire village. By using this practice, fertilizer use efficiency was increased in wheat crop and expenditure on fertilizers was also minimized.

13. Critical Intervention – II

a. **Observation of germination**

The germination was counted 15 days after sowing with the help of a quadrate of $1m^2$, randomly placed at 3 places/ ha, randomly. After that the average value was computed. To observe the germination in the field a visit made by the scientist on the field to know the progress of crop and a meeting of farmer called for discussion.

b. **Irrigation**

Under timely sown condition, the first irrigation was applied at 21 days after sowing and in December sown crop however, in late sown crop the irrigation applied 20 days after sowing at crown root initiation stage. Most critical stage of wheat growth are- Crown root initiation, tillering, jointing, booting, flowering, milk and dough stages. The proper time of irrigation of crop suggested by the scientist among the group of selected farmers during the meeting. Delay in giving this irrigation should be avoided as it would result in upsetting the synchronous tillering in these varieties, subnormal heads, and poor root system and finally poor grain yield. It is the most critical stage for irrigation. A tillering stage, within 40-45 days after sowing. Wheat growth can be broadly divided into several different stages: germination/ emergence, tillering, stem elongation, boot, heading/flowering, and grain-fill/ripening. These stages are- crown root initiation stage, this stage also known to promote the tillers in the wheat crop, this is the most critical stage for irrigation in wheat, because any shortage of moisture at this stage results in less tillering, formation of small eartheads and great reduction in yield. Farmers were advised to concentrate on the effective schedule of irrigation and to follow it strictly for better yield. Adequate soil moisture is required for normal development of the wheat plant at all the stage of growth. First Irrigation: The first irrigation to be standing crop could be given 20-25 days after sowing, i.e. at the crown root initiation stage. It is most critical irrigation stage. Second Irrigation: At tillering stage, 40-45 days after sowing. Third Irrigation: At late jointing stage within 60-65 days after sowing. Fourth Irrigation: At flowering stage, within 80-85 days after sowing. Irrigation at this stage is also important because during this period plant suffer most from soil moisture deficiency. The grain number and grain size are reduced considerably. Fifth Irrigation**:** At dough stage, within 100-105 days after sowing. The total number of irrigations required

will vary depending upon soil type, winter rainfall amount of water applied per irrigation. Create awareness among the farmers about the time and frequency of irrigation in wheat were explained during KBS project and advised farmers to adopt it effectively.

The schedule of irrigation is as under:

First at 20-25 days after sowing (Crown root initiation stage)

Second at 40-45 days after sowing (Tillering stage)

Third at 60-65 days after sowing (Late jointing stage)

Forth at 80-85 days after sowing (Flowering stage)

Fifth at 100-105 days after sowing (Milking stage)

Sixth at 115-120 days after sowing (Dough stage)

c. **Weed management and rouging**

Pre-emergence application of Pendimethalin @ 3.3 l/ha applied just after sowing i.e. within two days after sowing uniformly by dissolving the chemical in 500 l/ha of water with the help of knapshek sprayer to ensure the better and timely weed control. Besides, one hand weeding cum roughing done at 55 days after sowing. However, 2nd roughing was done after flowering stage to ensure the varietal purity before harvesting of the crop. Preventive measures such as use of clean seed and manures and cultural practices such as time and method of sowing, crop density and geometry, crop rotation, crop varieties, dose, method and time of fertilizer application, time and method of irrigation were introduced and farmers were exposed about the benefit of using this kind of practices. Following habits were introduced during execution of KBS among village farmers:

1- Use clean wheat seed free from weed seeds: Crop seed contaminated with weed seeds is a major factor responsible for the spreading of weeds. During the study, it was observed that majority of the farmer's wheat seeds contain weed seeds particularly P. minor. Farmers sensitized to use the cleaned seed or certified seed.

2- Sowing time: Date of sowing was also adjusted in such a manner that it is unfavorable for the weed seed germination without hampering the crop yield. Early sown wheat (Last week of October) reduces P. minor infestation compared to late sown. In early sown wheat temperature is not optimum for P. minor germination. Contrary to it, population of wild oat (Avena ludoviciana) is more in early sown wheat compared to late sown. Replacement of wheat by an alternative crop, or substituting short duration crops, such as potato and vegetable pea in between rice and wheat sequence was introduced among farmers which helps in suppressing the growth of weeds. Besides lower weed population, rice-pea/potato-wheat, cropping sequence provides higher

system productivity leading to greater profit. However, implementation of crop rotation on a large area is impossible due to certain constraints (marketing of produce, risk of crop failure or food security).

3- Row spacing and seeding rate: The increased competitive ability of wheat plant with weeds can be achieved by increasing plant population by increasing the seed rate or reducing the space for weeds by closer spacing and cross sowing. The higher density and closer spacing smother weeds due to better early canopy coverage. When moisture is not a limiting factor, narrow rows and increased crop density offer advantages for weed control. Narrow row spacing can improve weed control because weeds are smaller and more easily controlled with herbicides than they are in wide row spacing.

d. **Fertilizers management**

In the standing crop 30 kg each, of nitrogen was top dressed at crown root initiation and often 2nd irrigation through urea. Besides, 0.5% $ZnSO_4$ along with urea dissolve in 600 liter of water/ ha was also applied at 40 days after sowing of crop.

e. **Critical activities influence the yield**

- Timely soil treatment
- Seed treatment before sowing
- Use of ferti-seed drill for sowing
- Appropriate time of sowing
- Proper use of fertilizers, insecticides and pesticides
- Weed management
- Irrigation management
- Maintenance of record activity wise
- Cleaning, grading and storage practices

14. Critical Intervention – III

a. **Training and demonstration:** For successful cultivation of wheat crop, training and demonstration were organized time to time by scientists to make farmers aware about the operation carried out in the wheat crop.


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Project Investigator, Wheat Business School

b. **Observation of tillers formation**

The number of tillers / m^2 were observed by using a quadrate of $1m^2$ and the tillers from 3 places/ ha were counted randomly and they computed as tillers/$m^{2.}$ Tillering in wheat begins around 40 days after planting and can last up to 120 days. It is a physiological process of continuous underground branching of compact node joints of the primary shoot. Tillering gives the crop the necessary number of stalks required for a good production. Several factors, such as variety, light, temperature, soil humidity (irrigation), spacing and fertilization practices influence tillering. Light is the most important factor. Adequate lighting at the base of the plant during this period results in active basal vegetative buds. This scientific knowledge introduced among farmers of the KBS project that tillers formation is an important process and also responsible for good growth of wheat crop.

c. **Irrigation management**

Irrigation is an important operation in cultivation of any crop. Similarly, irrigation is very important to wheat during entire crop duration. Accordingly, farmers make aware about the application of irrigation on the actual stage and time of wheat crop. In timely sown wheat 6 irrigations were applied at crown root initiation, late tillering, late jointing, flowering and milking stage whereas, under late sown conditions only 4 irrigations were applied viz., crown root initiation, late tillering, flowering and milking stage. In each irrigation 7 cm water was applied with the help of tube well. However, the details of irrigation is described earlier.

d. **Precaution about frost**

For managing the frost the field was irrigated in night hours to overcome the ill effects or damage to the crop. This stage comes when wheat crop attain the age of about 35-40 days of planting. All farmers were advised to apply irrigation especially during the frost period to avoid the damage of crop. Frost damage in wheat occurs when air temperatures dropped to an average of about 16-18 degrees on at least two nights over the last few days. Freezing temperatures

between boot and flowering may cause leaf discoloration, spikes to be trapped in boot, floret sterility, and damage to the lower stems of wheat crop. Farmers sensitized to overcome this situation during KBS project by applying extra irrigation during this period.

e. **Fertilizers application**

Application of fertilizers in the crop is an important operation and the yield of crop is more depends on the quantity and time of application of fertilizers in the crop. This decision were taken by the farmers on the basis of advice given by the scientist after observation of soil health card report and analysis. The soil testing was compulsory to all farmers before sowing of wheat in the field. It was quite helpful in deciding the actual dose of fertilizers. Help of Zila Krishi Adhikari was taken to examine the soil testing and report. Soil health cards are made to all the farmers. On the basis of soil testing report, farmers were advised to use N.P.K. doses. 1/3 of Nitrogen and full doses of P_2O_5 and K_2O are apply as basal doses, 1/3 of Nitrogen were applied at tillering stage and 1/3 of Nitrogen were applied at yearning stage. In paddy wheat crop rotation, it was advised to the farmers to apply 25 Kg. Zinc sulphate per ha as top dressing to maintain the Zinc level in the soil.

f. **Weed management**

Training on "Wheat Production Techniques" conducted in initial of starting of the project just after selection of village. Farmers were not aware about losses of wheat yield through weeds during crop production. Some farmers were using Isoproturon but they do not know about quantity of such weedicide and spray technique. Through training focused on scientific weed management. Group of farmers were advised to adopt the scientific weed management suggested by the scientist. They are using 2, 4-D for broad leaf weed management and sulphosulfuron (Leader) @ 33 gm/ha for the narrow leaf weeds (*Phalaris Minor*) management.

15. Critical Intervention – IV

a. **Method of harvesting**

The crop was harvested when plants were dried enough and of yellow colored straw and grains become hard. The harvesting was done manually with the help of serrate edged sickles near to the ground level. Family members and with help of 8 labor harvesting operation was carried out and harvested crop collected at one place in the field in the form of bundles to make heap.

b. **Time of harvesting**

The crop was harvested when all the plants become dry having hard grains and straw color was yellow. Before harvesting the crop, a visit made by the scientist to examine the moisture level in the grain before harvest. The crop was harvested at moisture level of 18-20% in the grain.

Moisture level played an important role in deciding the time of harvesting of crop, if crop is harvested at high moisture level resulting the yield of withered grain.

c. **Collection of crop**

The harvested produce was left into the field for 4-5 days for complete drying. After that the produce was collected and heaped in the field for threshing. The threshing was done with the help of automatic machines frequently available in the area.

d. **Method of threshing**

Threshing is the process of loosening the edible part of grain (or other crop) from the chaff to which it is attached. It is the step in grain preparation after reaping. Threshing does not remove the bran from the grain. The threshing was performed by using power driven stationary Pullman thresher. In this process the grains were separated from the straw of wheat crop and collected in gunny bags for storage purpose. These threshers are more common in this area and farmers are using frequently this kind of machines for threshing purpose. With the help of this machines, threshing and winnowing is done simultaneously.

e. **Quantum of yield per hectare**

S. No.	Name of farmers	Total yield q/ ha	Total straw (q/ha)	Gross income from wheat (Rs./ha)	Gross income from straw (Rs/ ha)	Cost of cultivation (Rs./ha)	Net profit (Rs/ha)
1	Bundi Singh	54.00	54.00	1,09000	22,600	51500	57500
2	Ram Sigh	53.00	53.00	1,08000	23,200	56500	51500
3	Chetan Pal	55.00	55.00	1,12000	24,000	58000	54000
4	Jora Singh	56.00	56.00	1,13000	23,400	58500	53500
5	Vikram	53.00	53.00	1,08000	23,200	56500	51500
6	Satveer	54.00	54.00	1,10000	23,600	57320	52680
7	Boby	5800	58.00	1,17000	24,200	59380	57620
8	Raj Kumar	54.00	54.00	1,10000	23,600	58690	51310
9	Sudhir	57.00	57.00	1,15000	23,800	59700	55300
10	Aadesh	59.00	59.00	1,19000	24,600	57990	61010
11	Karmi	53.00	53.00	1,08000	23,200	56470	51530
12	Sarmil	55.00	55.00	1,12000	24,000	59840	52160
13	Shiv Kumar	52.00	52.00	1,07000	23,800	57644	49356
14	Bhuleram	58.00	58.00	1,17000	24,200	59550	57450
15	Ompal	61.00	61.00	1,24000	26,400	58650	65350

16	Peetam	58.00	58.00	1,17000	24,200	56430	60570
17	Rajpal	57.00	57.00	1,15000	23,800	57530	57470
18	Krishanpal	55.00	55.00	1,12000	24,000	58890	53110
19	Sonveer	54.00	54.00	1,10000	23,600	56970	53510
20	Vedram	58.00	58.00	1,17000	24,200	58620	58380
21	Ajab Singh	56.00	56.00	1,13000	23,400	56410	56590
22	Rajendra	54.00	54.00	1,10000	23,600	59350	50650
23	Dharm Singh	56.00	56.00	1,13000	23,400	58490	54510
24	Rajpal	57.00	57.00	1,15000	23,800	57860	57140
25	Rishipal	59.00	59.00	1,19000	24,600	57655	61345

f. **Cleaning, grading and packing:** Winnowing machines were used by the farmers for removal of dust, gravels and broken grain from the wheat. Sieving net is also used by the farmers to do the wheat clean and by manually. Grading of wheat was also done by the farmers by net winnower to separate the small grain from the healthy grain. Healthy grain fetches more price in comparison to the small and withered grain of wheat. Grading increase the value of wheat. Generally, packing of wheat is done in the gunny bags and steel bins in area and this practices is quite common among farmers.

g. **Transportation:** Transportation of wheat from field to home and home to market is done through tractors available with the farmers for which they have not paid extra money. Farmers of village Kohla sale their wheat in Mawana, Meerut, Ghaziabad and Hapur mandies. During the study it is observed that there is a 2-3% difference in price realisation of wheat by farmers. Hapur mandi provide higher price to the farmers followed by Ghaziabad mandi, it is because of existence of flour mill in the area. For a tractor load farmers paid Rs. 800/- to Meerut mandi, Rs. 1000/- to Mawana mandi and Rs. 1500/- to Hapur and Ghaziabad mandi. However, farmers are using their own tractor for this purpose.

h. **Storage of wheat:** The ideal wheat moisture content at harvest is between 18% and 20%. This is above the ideal wheat moisture content for stored wheat. The ideal moisture content bring down to 13.5% if plan to sell soon, selling of wheat at this moisture level provide the best price to the farmers. This habit inculcate among the farmers during the study so that they would be able to fetches higher price of wheat.Prior to storage at home, grain drying is a necessity for

wet grains. High-temperature dryers can speed up drying time for wet grain and are energy efficient. But in this area farmers using open sun drying method for drying the wheat grain.

After adopting KBS, farmers are aware about production of quality produce for fetching good prices in the market, proper grading, packaging etc. They also store the produce for some period of time when there and glut in the market and sell their produce when they get better prices in the market.

With this project following changes were seen in the wheat growers.

ix. Farmers became aware about the scientific production technology of wheat.

x. Farmers benefited with the newly released variety of wheat.

xi. Farmers get the average higher wheat yield up to 31.20% which was significantly higher in comparison to before the project.

xii. Farmers also benefited perfectly on management of weeds, insects and pests.

xiii. Farmers also aware for post-harvest management with proper grading and packing.

xiv. Farmers also aware about wheat MSP price of government and local Mandi etc.

xv. With this project cost of cultivation also reduced due to application of inputs on the soil testing based.

xvi. With the support of this project farmers can reduced two irrigation on the scientific way with about 15-18% water saving.

xvii. In the month of May one training programme was also conducted on the value addition keeping in view to get higher returns from the wheat. Now farmers are working as Farmer Business Group and they are ready to start value addition like Dalia, Maida and Bread etc. Hence, we can say that with the support of this project farmers are moving forward towards value addition and earlier they will work as FPO (Farmer Producing Organization) and will get the success in market of their product. During the whole period of project, the contribution of NIAM was always in place and start after the harvesting of crop. It was suggested by the Coordinator from NIAM that moisture content should not be more then 18-20 %. Higher moisture content effect the shape, size and colour of grain. Ultimately, it effect the marketing of wheat. With the help of NIAM farmers were in touch with 4-5 local markets in search of good price of wheat. An, it was also advised that farmers can install small-small intervention for making flour and dalia from the wheat. \

16. Minimum Support Price of wheat during 2018-19 and 2019-20

Minimum Support Price is price fixed by Government of India to protect the producer - farmers - against excessive fall in price during bumper production years. The minimum support prices are a guarantee price for their produce from the Government. MSP of wheat for 2018-19 was Rs.1735/- and Rs. 1,840/ per quintal for the year 2019-20.

17. Observation of rates in nearby mandies

S. No.	Name of Mandi	Rate (Rs/q)					
		February	**March**	**April**	**May**	**June**	**July**
1	Hapur	1919	1890	1895	1890	1923	1919
2	Modinagar	1890	1825	1789	1812	1919	1919
3	Meerut	1789	1812	1825	1812	1890	1915
4	Muzaffarnagar	1923	1815	1890	1895	1923	1919

18. Net profit

a. **Before KBS**

Average Wheat Yield = 42.56 Q/ha

Average Production Cost = Rs. 47640/ha

Average Income = Rs. 36180/Ha

b. **After KBS**

Average Wheat Yield = 55.84 Q/ha

Average Production Cost = Rs. 57778/ha

Average Net Return = Rs. 55404/Ha

19. Impact of KBS

Average Wheat Yield Increased= 13.28 Q/ha

Increase Yield Percentage = 31.20%

Average Net Return Increased = Rs. 19221/Ha

Profit Increased % = 53.12%

C.B. Ratio = 1.89 or 1:1.9

20. Result and discussion

Season 2015-16

1. The wheat variety HD 3765, HD 2285, DBW-17 and PBW 343 were grown on 27.45 ha out of 70.70 ha of total land. The sowing was done during 30th November to 15th December by using a seed rate of 125 kg/ha.
2. The average production cost was Rs. 47604/Ha.
3. The average production was 42.56 q/ha with a gross income of Rs 83980/ha and farmers get a net income of Rs 36180/ha.
4. Market selling price of wheat during 2015-16 was Rs. 1500/Q.

2016-17

1. The wheat variety HD 3765, HD 2285, DBW-17 and PBW 343 were grown on 27.47 ha out of 70.70 ha of total land. The sowing was done during 28th November to 12th December by using a seed rate of 120 kg/ha.
2. The average production cost was Rs. 45640/Ha.
3. The average production was 46.56 q/ha with a gross income of Rs 84080/ha and farmers get a net income of Rs 38000/ha.
4. Market selling price of wheat during 2016-17 was Rs. 1600/Q.

2017-18

1. The wheat variety HD 3765, HD 2285, DBW-17 and PBW 343 were grown on 27.45 ha out of 70.70 ha of total land. The sowing was done during 26th November to 10th December by using a seed rate of 120 kg/ha.
2. The average production cost was Rs. 46640/Ha.
3. The average production was 44.56 q/ha with a gross income of Rs 91232/ha and farmers get a net income of Rs 44644/ha.
4. Market selling price of wheat during 2017-18 was Rs. 1600/Q.

2018-19

1. The wheat variety HD 3086, WH 1121, PBW-88 and HD 2967 were grown on 37.00 ha out of 70.70 ha of total land. The sowing was done during 15th November to 29th November by using a seed rate of 100 kg/ha.
2. The average production cost was Rs. 57778/Ha.

3. The average production was 55.84 q/ha with a gross income of Rs 113200/ha and farmers get a net income of Rs 55404/ha.
4. Market selling price of wheat during 2018-19 was Rs. 1850/Q.

Outcome of the Project

1. **Before KBS** most of the farmers were sowing timely wheat sown variety during 30th November to 15th December while **After KBS** they started sowing from 15th November to 30th November.
2. **Before KBS** most of the farmers were sowing timely wheat sown variety HD 3765, HD 2285, DBW-17 and PBW 343 while **After KBS** they started sowing newly wheat variety HD 3086, WH 1121, PBW-88 and HD 2967.
3. **Before KBS** most of the farmers were using seed 125 kg/ha while **After KBS** they used seed 100kg/ha.
4. **Before KBS** Average Wheat Yield was 42.56 Q/ha **After KBS** Average Wheat Yield was 55.84 Q/ha with Increase Yield Percentage i.e. 31.20%
5. **Before KBS** farmers were getting gross income of Rs 83980/ha while **After KBS** gross income of Rs 113200/ha.
6. **Before KBS** farmers were getting Average Income of Rs. 36180/Ha **After KBS** farmers were getting Average Net Return of Rs. 55404/Ha with an average Increased Net Return of Rs. 19221/Ha and Percentage of farmers' Profit was 53.12%.
7. **Before KBS** farmers were growing wheat under 27.45 ha area while **After KBS** it became 37.00 ha due to KBS wheat area 34.41 % increased.
8. **Before KBS** Cost benefit ratio was 1:1.7 while **After KBS** it became 1:2.20.
9. With the support of this project farmers can reduced two irrigation on the scientific way with about 15-18% water saving.
10. Farmers also aware for post-harvest management with proper grading and packing.
11. Now farmers are making a group and they are trying to do value addition of wheat like suzi, maida, dalia etc.