



Final Project Report

March 2018 – June 2021

Submitted By:



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1. Introduction

1.1 Background

The Department of Biotechnology (DBT), Ministry of Science and Technology, is India's nodal organisation for promoting bioscience research and development in the country, and is mandated to promote large-scale use of biotechnology, support Research & Development (R&D) and manufacturing in biology, support autonomous institutions, promote university-industry interaction, and identify and set up Centres of Excellence for R&D. Understanding the need for innovation in the agriculture sector to promote sustainable practices and enhance farmer livelihoods, DBT initiated FarmerZone, a cloud-based service that offers curated data solutions leading to improved farm productivity and market connectivity. The project worked in sentinel across geographies in India to demonstrate rigorous tools of data collation, analysis and delivery to smallholder farmers. The first sentinel crop in FarmerZone was potato and the project worked with smallholder farmers in Uttar Pradesh (UP), Himachal Pradesh (HP) and Punjab. The key implementing partners for the first sentinel were Central Potato Research Institute (CPRI), an Indian Council of Agricultural Research (ICAR) institute established for potato research, Indian Institute of Technology (IIT) Mandi, one of India's leaders in science and technology education and research, and IORA Ecological Trust (IORA), a New Delhi based environmental advisory group with expertise in forestry, climate change mitigation and adaptation, and sustainable agriculture.

1.2 Scope of the Project

The FarmerZone project was launched to bridge the gap between farmers and the scientists by creating a cloud based single window service for dissemination of information on various aspects of crop cultivation, such as land preparation, seed treatments, weather information, pest management, water availability, seed quality and market linkages, among others. The project covered six work streams, with project partners working together across the following: Farmer Engagement, Expert Consultations, Data Procurement, Systems Development, Advisory Development, and Market Zone.

The main objectives of FarmerZone were:

- Collating agri-related data from national and international resources
- Creating agri-solutions with crop specific modelling and algorithm development
- Demonstrate models of Public Private Partnership for information delivery and information sharing
- Co-ordinating and assisting in farm-level data collection in developing farmer specific solutions
- Test and piloting near real-time market information delivery systems
- Developing a self-sustaining model for FarmerZone

Overall, FarmerZone aim was to provide farmers with the most relevant and sustainable technical advice to improve productivity and promote sustainable agriculture practices, along with creating links to reliable input suppliers to ease access, connecting them to machinery providers, providing market related information and developing links to profitable markets.

2. Project Implementation

2.1 Inception

The FarmerZone project was envisioned at the Smart Agriculture Conclave held by the DBT on 29th-31st August, 2017, under the leadership of then Secretary DBT, Prof K Vijay Raghavan, (presently the Principal Scientific Adviser, Government of India). This event brought together national and international experts from private, public and non-profit sectors to create the framework for the FarmerZone project and decide roles that each partner would play in its development.

The first partners meet for the project was held on 4th April, 2018 at the National Institute of Immunology, Delhi, and IORA develop the strategy for this meeting, along with preparing the concept note and agenda to discuss and build a common understanding on the objectives of FarmerZone. At this meeting three states viz., Himachal Pradesh, Punjab and Uttar Pradesh, were finalised as the sentinel states for the projects, owing to them being the three largest producers of potato in India. IORA also documented the meeting and prepared a proceedings document. The workshop laid down the FarmerZone Architecture and defined its near term and long term goals. Further, the roles of all the partners in the project were identified and defined. It was decided that IIT- Mandi would be the host organization, CPRI the facilitator for data collection and modelling, and IORA would be the overall management partner and will manage the project on behalf of DBT, along with creating the market connect for the project.

In order to provide relevant content to farmers through a cloud platform such as FarmerZoneTM, understanding farm practices, needs and behaviour of farmers and market dynamics through field visits, interactions with stakeholders etc. were imperative, and the first partners meeting was followed by an assessment of the ground realities of potato cultivation in the project states. A workshop, “Smart Agriculture” – a Farmer Needs Assessment Exercise, was organised at CPRI, Modipuram on 5th May 2018. The workshop consisted of scientific presentations by CPRI scientists and a Focus Group Discussion (FGD) with 18 farmers from different socio-economic backgrounds. The interaction with farmers was carried out over two sessions – the first session focussed on key issues faced by farmers, the current scenario on the project landscapes, data needs and current access of information. Some of the key issues that emerged from this were: lack of availability of good quality seeds, issues with early detection of crop diseases and pests, and absence of strong market linkages. With regards to pests and diseases, they particularly emphasised the need for an early warning system for late blight and early blight, which has become one of the integral offerings of FarmerZone.

The second session consisted of two FGDs, allowing partners to delve deeper into issues of access to inputs and information, and market access and linkages. These farmer interactions helped develop the broad architecture of the FarmerZone app and determine the kind of data that needed to be delivered by it. Based on these interactions, the various heads under which the project would be divided was finalised and a discussion was initiated on the Delivery Mechanism for the project. IORA prepared the agenda for this meeting, including the structure and data collection tools for the FGDs.

Consequent to the farmers' needs assessment workshop, a Second Partners Meet was held on 21st-22nd May 2018 at IIT Mandi. IORA prepared the concept note for this meeting, outlining concrete short- and long-term deliverables for the project, along with preparing the proceedings document and a press release. At the meeting IORA presented an overview of the key issues identified in the potato cultivation value chain, including access to seeds, crop protection, soil testing, post-harvest processing, cold storage and market linkages were presented at this meeting. IORA also presented an analysis of research carried out of about 200 existing agriculture advisory mobile apps/web portals available in India and globally, with particular focus on those that gave advice on potato. They were reviewed based on a number of different parameters, which on the farmers end included reach and access, types of advisory provided i.e. Package of Practices (PoPs), geographies and crops covered, pest and disease detection, types of marketing support, etc. The analysis also analysed the design interface of the apps/ portals to get an understanding of the kind of User Interface/ User Experience designs that are most appealing and easy to use for farmers. An analysis of the business models of these apps/portals was also carried out to identify models that could bring self-sustainability to the FarmerZone app. Some key takeaways from this analysis, which were adopted in the FarmerZone app, included the need for location based personalized advisories; brining in interactivity in the app, letting users customise it to their requirements; creating linkages to various existing Government databases relevant to different aspects of the potato value chain; and, integrating a chat/ exchange platform, allowing users to ask questions and chat with fellow farmers.

A prototype of the FarmerZone app was prepared for testing on a pilot basis with a small number of farmers. IORA worked with partners to prepare the Farmer Registration and Soil Sample collection forms, and trained and co-ordinated with field officers for carrying out registrations and soil sample collection in Punjab and UP.

2.2 Research and Documentation

IORA supported project partners with both primary and secondary research throughout the project. We developed several data collection and other tools, and a Monitoring and Evaluation (M&E) framework, along with carrying out regular field visits and farmer interactions in the project landscapes. Some of the tools developed for the project are discussed below, followed by a brief overview of field visits carried out.

- We prepared the application forms for farmers for soil testing. The easy to use and lucid forms in different languages were shared with field teams, who were also trained by IORA on data collection. These forms collected details of the farmers and their land, to enable the app to provide them with the information on their soil health, and farm or region specific advice.
- IORA prepared the post-harvest data collection tool, gathering information such as access to machinery, productivity, profitability, storage practices, market linkages, etc. The tool was prepared after consultation with all project partners. Data was collected from more than 1000 farmers in the first phase. Consequently it was collected thrice every season during the course of the project to get a more detailed and comparative idea of post-harvest practices, and provide an assessment of app usage and its impacts.

- As data collection from the field during the pandemic Covid-19 wasn't possible, an online form for carrying out impact assessment was prepared, which enable field officers to collect information remotely.
- Based on the content shared by CPRI on post-harvest PoPs and information collated from government websites such as Agmarknet, etc., a consolidated and informative list of Dos & Don'ts was developed for storage and other post-harvest activities.
- Outline of an M&E framework for FarmerZone™ was developed to monitor and measure impacts of the app on farmers and other stakeholders.
- A draft data policy was prepared in discussion with legal firm on use of data generated in the project.
- We revised and reworked the Memorandum of Agreement through co-ordination and follow up with project partners and DBT
- IORA researched and provided a detailed document on 16 Central Govt. agri schemes relevant for potato farmers, shortlisted from 118 schemes available for the agriculture sector. The document included information on scheme objectives, main beneficiaries (farmers, FPOs, agri-business, etc.), benefits received, application process and nodal agencies involved, along with their contact details in the three project states.
- A document containing FAQ's and scheme details for the Pradhan Mantri Fasal Bima Yojna (PMFBY) and Weather Based Crop Insurance Scheme (WBCIS) was prepared, which was subsequently revised to account for the changes brought in by the government in the two schemes in the 2020 kharif season.
- We carried out a mapping of Department of Agriculture, Cooperation and Farmer Welfare (DoACFW) to identify and understand the functions of each agency in the department, and help with the identification of key stakeholder in the governments, and sources of data for FarmerZone.
- Carried out an analysis of government portals that are working on creating market linkages – Agmarknet and eNam. This was carried to gain an understanding of the types of data currently available for farmers and identify gaps that exist in market related information. Based on this the final parameters that should be included on the FarmerZone app was decided, along with exploring the option of developing real time market information system and a revenue prediction model.
- To help understand the major reasons for the lack of farmers' access to high quality seeds, an analysis of the different seed development and procurement policies & regulations was carried out.
- We developed a matrix of different applications of Remote Sensing/ Geographic Information System (RS/GIS) in the agriculture sector, outlining the types of activities that could be carried out, spatial and temporal scale of data availability for each of these components, and the potential scale of application in FarmerZone.
- IORA also built the FarmerZone website, working on the design, content and regular updation. We co-ordinated with project partners to ensure all ongoing activities and plans are incorporated on the website.

Field Visits

- Several field visits were carried out to map the post-harvest value chain of potato. We conducted interactions with key stakeholders, including small and medium potato farmer, middlemen, wholesalers, cold storage owners, Government Officials, Meerut

APMC Secretary, Joint Director, State Agriculture Department, and Deputy Director (Horticulture) Meerut Division.

- At one of the first field visits, we met with Dr Arun Kumar, Assistant Director, Soil Testing, Soil Testing Laboratory, Meerut, where it was agreed upon that the lab would support the project in carrying out soil analysis on samples collected from 200 farmers from Uttar Pradesh.
- These visits also helped identify existing data sources relevant for MarketZone i.e., Mandi Prices, Seed Supplier Data, Fertilizer, Pesticides, Farm Equipment, and Crop Insurance.
- Further, they helped discuss and understand issues faced by farmers and other key stakeholders in the potato value chain, and gather feedback on MarketZone features.
- Interactions with cold storage owners and managers also helped in understanding the complexities in this segment of the value chain, and develop solutions that would be beneficial for both farmers and cold storage owners.
- We also attended the Global Potato Conclave 2019. Participation helped in understanding of the opportunities in potato farming and keep abreast with developments in the potato research with regards to new varieties, climate change adaptation, post-harvest management and the use of Artificial Intelligence (AI) for improving cultivation. The conclave also helped establish contacts with relevant stakeholders including seed suppliers, fertilizer suppliers, and farm equipment companies to enhance our knowledge and understanding of the market and obtain data for MarketZone. We prepared a report of our key insights and learnings from the conclave and shared with all partners.

2.3 Partnerships

FarmerZone through the course of three years developed numerous partnerships with several national and international organisations, including India Meteorological Department (IMD), Global Open Data for Agriculture and Nutrition (GODAN), NIAB, Microsoft, etc. IORA played a leading role in building these relationships and with the coordination and planning of partner visits, and we discuss some of these in brief below. Data use and privacy policies were also developed for FarmerZone in consultation with project partners and legal advisors.

Stakeholder Mapping

IORA carried out a mapping of key private sector players in the potato value chain, and developed a comprehensive list of companies and start-ups who could be engaged with for developing different aspects of the project, and expanding the services offered on the FarmerZone app. The stakeholders were grouped by the type of service they could provide to FarmerZone and based on this a detailed action plan with potential partnerships models was developed for each type of stakeholder. We also prepared concept notes for each stakeholder type which outlined the project, potential for mutual benefits, and scope for developing a partnership. A total of 141 companies and start-ups were identified, and a breakdown of these based on stakeholder type is shown below:

- Agri-tech and data providers: 23
- Food distributors and retailers: 25
- Agribusiness and seed suppliers: 14
- Contract farming companies: 23

- Plant protection and nutrition providers: 20
- Farm machinery developers and providers: 36

Contacts were established with several seed suppliers and contract farming companies, and agri-tech start-ups, to begin the process of developing partnerships. Consultations with machine rental start-up “Khetigaadi” were also held regarding the same, however, due to the Covid-19 pandemic, the partnership could not be developed further.

India Meteorological Department: Weather Data

FarmerZone collaborated with IMD for procurement of real time weather data to provide farmers with localised weather information. IORA facilitated the meeting with Dr K.K. Singh, Scientist G, IMD, to introduce the project and discuss the data requirements from IMD. It was agreed upon that IMD would provide data to FarmerZone for several parameters such as historical weather data, and real time weather information, amongst others, with the frequency of data required being decided by the project.

NIAB: Yield Model

FarmerZone collaborated with NIAB, a plant science organisation in the UK that carries out research on various aspects of the Potato crop such as seed development and quality, plant physiology, plant pathology, soil science, and water and nutrient management, along with working with industrial partners on yield and variety evaluation. Dr Simon Smart from NIAB visited CPRI Jalandhar, on 31st October-1st Nov, 2018, to train field workers on the NIAB Potato Yield Model, that could be adapted to Indian conditions to help predict yield of FarmerZone project farmers. Among the several yield prediction models available for potato, the NIAB model was considered most suitable for the project due to its ease of use, with relatively few input and data requirements. This model uses canopy development to derive yield information, using interception radiation as a parameter to calculate canopy cover and yield, predicting crop yields two months before harvest.

In order to adapt this model for India, NIAB developed a work plan for FarmerZone partner farmers that included monitoring of 50 farmer fields with input information of farmer name, location and field boundary, planting date, variety sown, row width and emergence date. IORA facilitated the knowledge transfer and interactions held at CPRI over two days, with participation of project field staff and ICAR scientists. They were trained on the NIAB model protocol that includes crop monitoring at every stage post emergence, with field visits at least once a week, requiring the canopy to be photographed at a minimum of three locations, with the most appropriate time to take these photos being the morning.

Expression of Interest: Technology Partner

IORA managed the process of selecting a technology partner who could support the development of the FarmerZone app. For this activity, we prepared a detailed Expression of Interest (EOI) document inviting proposals for engaging a ‘Turnkey Solution Provider for Creation & Management of FarmerZone™ Platform.’ We carried out the process of advertising this EOI, from drafting the newspaper advertisement to coordinating with the newspaper personnel to ensure that it was put out in a timely manner. All proposals received were reviewed by IORA to ensure they fulfilled the eligibility criteria. The seven proposals shortlisted were reviewed by an evaluation committee, and the companies invited to present to the committee. IORA was responsible for the communication and co-ordination with evaluation committee

members and the companies, and ensuring the confidentiality and impartiality of the evaluation process.

2.4 MarketZone

A key finding from farmers' needs assessment carried out at project inception was the unavailability of reliable information related to markets, and of input suppliers/ dealers, and MarketZone was developed a part of FarmerZone™ to help fill this gap. While data for each of the prioritised areas was available from several government sources, both at the national and state level, these data sources are not regularly updated. Whilst our aim was to provide farmers with the maximum information to strengthen their decision-making process, it was also important we provide only relevant and reliable information. To ensure this, for each of the areas, we first collated a database from all available sources, in several instance requiring translation from regional languages and manually entering and digitising details from printed or scanned sources. These were then verified by telephoning each to crosscheck all of the details provided, including storage capacity in case of cold storage database, and availability of valid licences for seed suppliers. Additionally, in certain cases, especially relating to market prices, finding adequate sources of information was extremely difficult. Websites such as Agmarknet and eNAM provide a wealth of information regarding historical price trends, however, the Mandi prices provided are not updated on a regular basis. We also translated the information in each database into Hindi.

Following are the databases developed:

- **Cold Storage:** A database of 246 cold storage facilities was collated from various sources such as NHB, CPRI, etc. This list was validated to verify storage capacities and contact details, and a list of 133 operational cold storages across the pilot geographies developed.
- **Seed Supplier:** A database of 356 seed suppliers was collated from government websites and state horticulture departments at national and state level.
- **Custom Hiring Centres (CHC):** A total of 115 CHCs across the three states was collated, however none of these rent machines, as is their mandate, but sell them. Due to this, no information regarding CHCs could be included on the app.
- **Fertiliser & Pesticide Dealers:** The dealers list was collated from Farmer Portal, and verified to check for presence of relevant licences and products stocked by them, along with their contact details. Below we present a district wise break-up of the number of dealers that were included in MarketZone after validation:

Fertiliser Dealers Database -

- Mandi: 89 (out of 283)
- Hoshiarpur: 71 (out of 272)
- Lahaul and Spiti: 7 verified (out of 26)
- Jalandhar: 55 (out of 262)
- Shimla: 38 (out of 270)
- Agra : 136 (out of 298)

- Meerut: 82 (out of 499)
- Baghpat: (out of 275)
- Hapur: (out of 202)
- Ludhiana: (out of 654).

Pesticide Dealers Database -

- Baghpat: 16 (out of 499)
 - Hapur: 42 (out of 499)
 - Meerut: 39 (out of 499)
 - Shimla: 56 (out of 499)
 - Mandi: 46 (out of 499)
 - Jalandhar: 40 (out of 499)
 - Hoshiarpur: 48 (out of 499)
 - Agra: 78 (out of 499)
 - Lahaul: 4 (out of 499)
 - Kapurthala: 54 (out of 499)
 - Moga: 55 (out of 499)
 - Mohali: 28 (out of 499)
- **Market Prices:** Meetings were been held with Director, eNam & Deputy Agricultural Marketing Adviser, Agmark to explore the possibility of incorporating their portals/apps or the information provided by them into FarmerZone, and both traditional and electronic system (eNam) were used to provide market price data.

1. Annexure

1.1 Smart Agriculture Conclave: Farmers Need Assessment

Date: _____ Page: _____				
S.No.	Name of Participant	Address	Contact No.	Signature
1	गुजरा राम मनी	काली, काली	9927723435	[Signature]
2	श्रीमती देवी माधव	गो.गो. काली	9411820221	[Signature]
3	सुनील सिंह	काली (मन)	9690478556	[Signature]
4	सोनी लाल देवी	काली, काली	9927026939	[Signature]
5	सुनील देवी	काली, काली	9837068670	[Signature]
6	सुनील देवी	काली, काली	9837069211	[Signature]
7	सुनील देवी	काली, काली	9412202413	[Signature]
8	Ganesh Chandra Singh	Salakpur	9411694888	[Signature]
9	सुनील देवी	काली, काली	9012130945	[Signature]
10	Regina Singh	Salakpur	9552055115	[Signature]
11	Amar Pal	Phallu	9719684860	[Signature]
12	Shubham Chaudhary	Ganga Nagar	9411117771	[Signature]
13	Nathu Singh	" "	9412315083	[Signature]
14	Dr. V. S. Ch.	Amar pur	9412620142	[Signature]
15	सुनील देवी	काली, काली		[Signature]
16	सुनील देवी	काली, काली		[Signature]
17	सुनील देवी	काली, काली	7351565656	[Signature]
18	सुनील देवी	काली, काली	9898679711	[Signature]
19	सुनील देवी	काली, काली	9927188351	[Signature]

Date: _____
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Farmers- Project associates interface workshop "Smart Agriculture : Farmer Zone" held on 05 May, 2018.

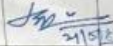
S.No.	Name of Participants	Address	Contact No.	Signature
1.	Dr. Jag Lal Singh	FARMER	9891292464	[Signature]
2.	Dr. Dineshendra Kumar	Principal Scientist	9412801979	[Signature]
3.	Dr. V.K. Gupta	Principal Scientist	9906314183	[Signature]
4.	Dr. Noma Singh	Principal Scientist	9410494656	[Signature]
5.	Dr. Sushil Kumar	ACTO	9418025485	[Signature]
6.	Dr. Prince Kumar	Scientist, CRR, Indore	097811-68599	[Signature]
7.	Dr. Babita Chaudhary	Principal Scientist	0979235650	[Signature]
8.	Dr. S.S. LUTHRA	Principal Scientist	9857033140	[Signature]
9.	Dr. ANUJ BHARNAL	Principal Scientist	9520471767	[Signature]
10.	Dr. Mehul	Scientist	955740682	[Signature]
11.	Dr. Yash Singh	Pr. Scientist	9412631720	[Signature]
12.	Dr. Dhruv Kumar	Pr. Scientist	9411017642	[Signature]
13.	DEBAPRIYACHANDHARY	WITH- VERTIER	9899379331	[Signature]
14.	BHAVYA SHARMA	WITH- IDRA	8800771441	[Signature]
15.	CHHAYA BHANTI	WITH- VERTIER	9971365113	[Signature]
16.	PORTIA D SINGH	WITH DR. SHYAM K. MANDI	9899379331	[Signature]
17.	VOGESH PANT	W. H. Dr. Shyam	9894004161	[Signature]
18.	Dr. Shyam K. Mandi	11T Mandi	862808885	[Signature]
19.	Dr. Shyam K. Mandi	Dr. Shyam K. Mandi	9639918990	[Signature]
20.	Dr. Manoj Kumar	CPRIL, Bhopal	949097790	[Signature]
21.	Dr. Shailys Kulkarni	Dept. of Genetics	9810166996	[Signature]
22.	Shravan Kumar	IOIRA, Mo. Sec. Tech.	9810166996	[Signature]
23.	Rajesh Kumar Singh	Dr. Mathur	9897205244	[Signature]





1.2 Second Partners Meet

Registration
Farmer Zone: Second Meeting @ Indian Institute of Technology Mandi
21-22nd May, 2018

Sr.No.	Name	Organization	Phone No.	Email ID	Signature
1	Prince Kumar	ICAR-CPRI	094188-76735	princegc@gmail.com	
2	Sanjay Rawal	ICAR-CPRI	9634418740	srawalcpri@gmail.com	
3	Jagdev Sharma	ICAR-CPRI	9816545875	jagdev.sharma@yahoo.com	
4	Sangeet Sharma	ICAR-CPRI	9418657678	sangeetsharma.apric@gmail.com	
5	Devendra Kumar	ICAR-CPRI Modipuram Meerut	9412801979	devkmalike@gmail.com	
6	SHASHI RAWAT	ICAR-CPRI SHIMLA	9418666929	shashi.rawat@icar.gov.in	
7	V.K Dua	—	94180-09887	Vkdua65@yahoo.co.in	
8	Chhaya Bharti	Vulture/IOIRA	9971365113	chhaya@vulture.com	
9	Shyam K Masakapalli	IIT-Mandi	8628085505	shyam@iitmandi.ac.in	
10	Rajender Kumar	LPS Manali	98160-22346	raj.kulsh@gmail.com	

Sn No.	NAME	Organization	Phone No.	Email Id.	Signature
11.	Soma Chakraborty	IIT, Mandi	9830481955	somachakraborty@gmail.com	
12.	DILIP A.D.	IIT Mandi	9459477409	adilip@iitmandi.ac.in	
13.	Renu MR	"	9734415774	renu@iitmandi.ac.in	
14.	Srikant Srinivasan	"		srikant@iitmandi.ac.in	
15.	Joe Johnson	IIT Mandi	9962937908	dl7024@students.iitmandi.ac.in	
16.	KRISHNA SANYAL	IIT Mandi	9674761747	sanyalkrishna@iitmandi.ac.in	
17.	Manish Bansal	IIT Mandi	9911076124	bansal21manish@gmail.com	
18.	Varun Dutt	IIT Mandi	8627974036	VARUN@IITMANDI.AC.IN	



1.3 IORA team field visit to CPRI Modipuram from 30-31st January 2019



Meeting with Mr Arun from Soil testing lab, Meerut



Field visits and interactions with farmers and other value chain stakeholders

1.4 Performa 1 for Post Harvest Data collection

Section I & II (Page 1) To be checked by Field Officer from available Database.

Only missing data from the Database to be filled in

Section I – General Details

1.1.	Name of Farmer	
1.2.	Gender (Male/Female)	
1.3.	Age	
1.4.	Aadhar Card Number	
1.5	State	
1.6.	District	
1.7.	Tehsil	
1.8.	Block	
1.9.	Village	
1.10.	Mobile Contact Number	
1.11.	What kind of Mobile Phone do you have?	Android ☐ Non- Android ☐ Don't Have ☐

Section II – Land Holding

2.1	Survey number of the Farm	
2.2	Total Size of Land Holding (in hectares)	(to be sourced from Google Map in App)
2.3	Size of the land used for growing Potato (in hectares)	(to be sourced from Google Map in App)

Section III – Harvesting Details

	3.1	3.2	3.3	3.4
	What all varieties do you	When did you cut the haulm?	When did you collect the harvested crop?	What do you intend to do with the produce?

	grow ?												
		<80 days	81-90 days	91-100 days	>100 days	<80 days	81-90 days	91-100 days	101-120 days	>120 days	Sell as Table Crop	Sell as Seed	Send for Processing
Variety 1		1	2	3	4	1	2	3	4	5	1	2	3
Variety 2		1	2	3	4	1	2	3	4	5	1	2	3
Variety 3		1	2	3	4	1	2	3	4	5	1	2	3

5.	What are the criteria of haulm cutting?	Variety wise ☐	☐ Duration of crop (Days)	☐ Yellowness or greenness of the crop	☐ Others (Specify_____)
3.6	What means did you use to harvest your produce?	Manual ☐ Mechanical ☐ Partially Mechanical ☐			
3.6a	Do you own the machine or hire?	Own ☐ Hire ☐			
3.7	Is the equipment easily available?	Yes ☐ No ☐			
3.8	What is the rent of the equipment used? (Per Day Rent)	Rs. _____			
3.9	Is the manpower easily available?	Yes ☐ No ☐			

3.10	What is the labor wage rate?	
3.11	How many people do you engage for labor	Male- _____ Female- _____

Section IV – Produce

4.1	How much was the total produce this season?	_____ Qt			
4.2	What did you do with the produce?	Store ☐ Sell ☐			
	IF SELL				
4.2a	Quantity of produce sold as Table Crop?	_____ quintal			
4.2b	Quantity of produce sold as Seed?	_____ quintal			
	IF STORED				
4.2c	How much produce did you store?	_____ quintal			
4.2d	Where did you store the produce?	On-field ☐	At House ☐	Cold Storage ☐	Others ☐

4.3a	Quantity Stored in cold storage (Quintal)	
4.3b	Which cold storage do you store the produce in?	
4.3c	For how long do you store your produce?	
4.3d	What is the rent paid by you for cold storage? (Specify per bag/quintall)	

4.4	To whom did you sell the produce?	Village Level Aggregator ☐	Commission Agents /Wholesaler/Traders ☐	Consumer ☐	Direct to Company ☐	Others ☐ Specify _____
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4.5	What is the quantity sold? (Quintal)					
4.6	What is the price at which it is sold? (per Quintal)					
4.7	Commission % Mandi charges aggregator and middle men					

Section V – Price and Payments

5.1	How do you receive information on the market price	Through TV/Radio/Newspaper ☐	Through Fellow Farmers ☐	Through Middle Men ☐	Through Apps ☐	Through Website ☐	Others ☐
5.2	How do you receive payment post selling?	On exchange of goods ☐	Partially on spot and remaining after 15 days ☐	100% payment on delivery ☐	50% on delivery remaining after 7 days ☐	Others ☐	
5.3	Mode of payment	Cash ☐	Bank Transfer ☐	Others ☐			
5.4	Do you have a bank account?	Yes ☐ No ☐					

5.6.	Do you use the following?	PayTm	BHIM UPI	PhonePe	Mobikwik	Net Banking
		☐	☐	☐	☐	☐

6. What kind of problems do you face after harvesting? Please specify problems faced during selling or marketing your produce?

7. Any suggestions that you would like to share? What information/facility/linkage that can be provided to you to meet your requirements or as a solution to the problems faced?