Knowledge Enhancement and Pest Management among Farmers through Picture based advisories- Case study from Tamil Nadu

Picture Based Insurance bundled with
Picture Based Advisories for Sustainable and
Scalable Risk Management Services

Project Partners

International Food Policy Research Institute (IFPRI)
And
Centre for Agriculture and Bioscience International (CABI)

Along with CABI Plantwise Project Partner

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Prelude

Farmers particularly smallholder farmers in India are increasingly getting exposed to adverse impacts of climate change and extreme weather events. The increased vulnerability to different abiotic (weather) and biotic risks (pests, diseases, nutrient disorders, weeds etc.) and accompanying productivity and agricultural income losses discourage farming households from investing in both productivity enhancing innovations as well as human capital development. The new technological advancements in digital and computing fields provide new opportunities to improve agricultural risk assessment, develop management strategies and use it to reduce the negative effects of climate change through innovative tools.

One such tool is picture-based monitoring of crop phenology for insurance and advisory services. Farmers can communicate with these service providers 'eyes on the ground' by sending in pictures of their crops at regular time interval, augmenting the information set for insurance providers and allowing them to provide improved financial services at a lower cost. Vice versa, personalized advisories can help farmers manage production risks more effectively, reducing the risk of their crop failure, and improving the sustainability of insurance.

Funded by the CGIAR Platform for Big Data in Agriculture Inspire Challenge, IFPRI and CABI conducted a pilot study around this concept in Haryana for the wheat crop in Rabi (winter) 2017-18. The study found that remote mobile-based personalized advisories improved farmers' knowledge on productivity enhancing and risk reducing agronomic practices, and helped farmers reduce risk more than generic advisories. It was also found that in terms of content that was both transmitted via generic advisory and in response to pictures, farmers who received the picture-based advisory tended to retain the message more, perhaps due to better tangibility and engagement with the process.

The project leveraged CABI's existing **Plantwise** programme (a global flagship programme led by CABI in 34 countries) which targets pest and disease identification and advisory on prevention and management practices. The programme organizes 'plant clinics' where trained 'plant doctors' analyse the cause of crop damage and provide personalized advisories to help farmers manage their production risks more effectively. The picture-based advisory tool developed during the 2017-18 study by CABI and IFPRI could help plant doctors work with farmers remotely; without having to visit farmers in the fields, the plant doctors[1] could increase the reach of the advisory service. With that in mind, the study aimed to pilot the initiative with 1000 farmers in Tamil Nadu and Puducherry states linking with insurance services and aims to answer the following research questions.

- What is the effect of personalized remote advisory services on adopting integrated pest management and production risk exposure?

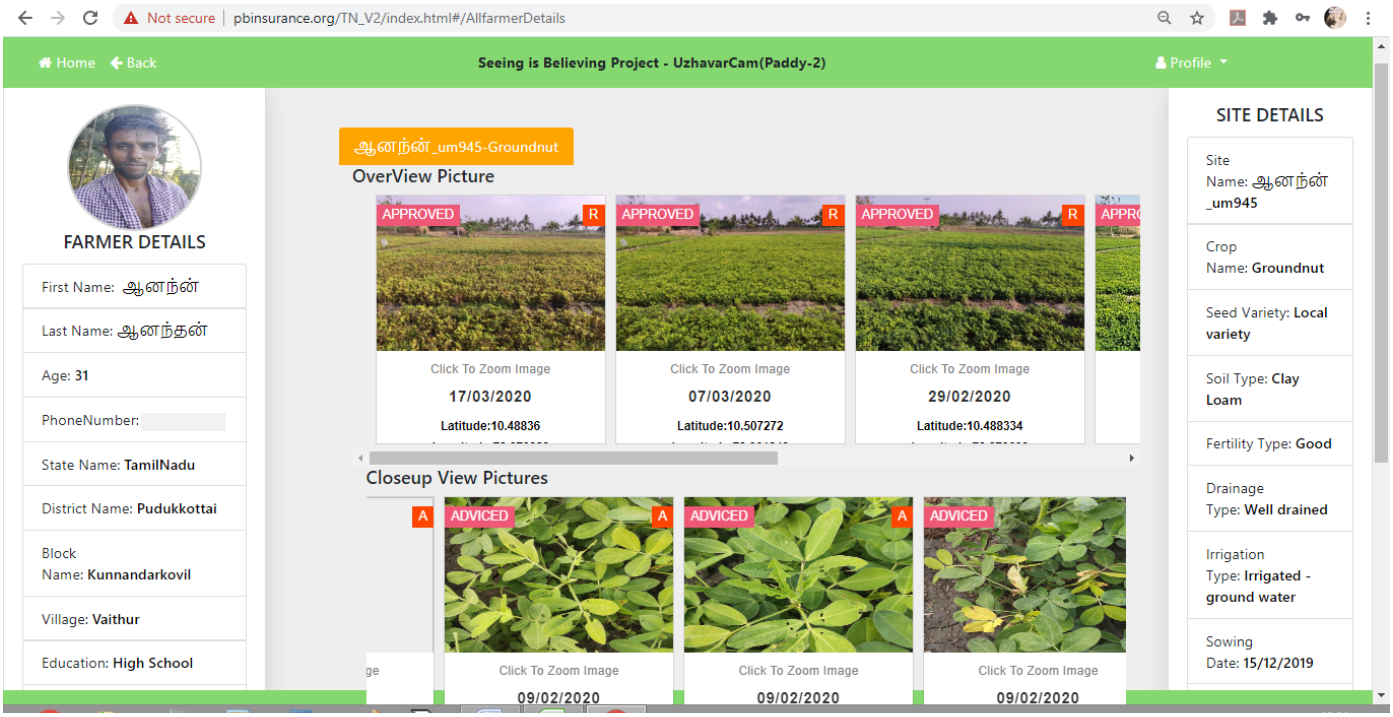
[1]

- What is the effect of increased insurance coverage on integrated pest management and the demand for advisory services?

During 2019-20, 150 paddy farmers and 250 groundnut farmers have enrolled in this project. During the village sessions conducted on creating awareness of this project the farmers were guided to observe the crop health and if they notice any damage symptoms or insects/diseases during their field visits, they have been told to take pictures immediately at different angles (using their mobile phones) providing overview of the damage and close up view of the specific problem and upload same in the Uzhavarcam App[2]. The concerned expert views the pictures displayed on the linked web portal and provides workable solutions. The following cases to some extent explain how the project activities supported farmers to enhance their knowledge and skill in identifying the pest /disease affecting their crops and were able to take appropriate actions and reduced the cost of production.

Case 1: Mr. Anandan, an energetic youth – Eager to learn and adopt new techniques in pest and disease management

Mr. Anandan S/o Ramachandran, aged 31 years is a self-motivated youth farmer from Vaithur village, Kunandarkovil block, Pudukottai district, Tamil Nadu. Anandan's family have been engaged in conventional farming for decades. They faced multiple issues in agriculture and spent a lot of money, labour and energy, yet, most of the time the profit margin was very minimum. If they found any pests and diseases in their field crops they used to get advisories from agro input dealers which in most of the cases did not solve the problem



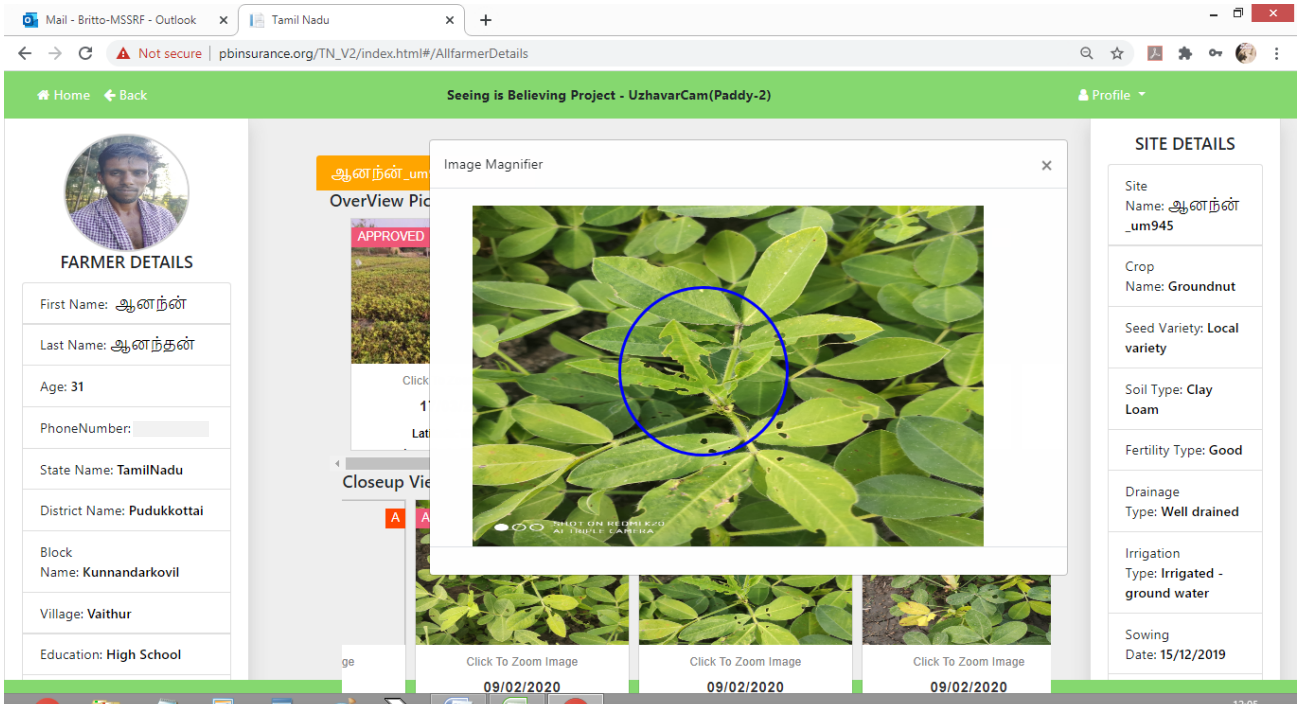
[1] Plant Doctor is a trained expert by CABI who diagnose, identify and recommend suitable recommendations to all the problems related to the crops.

[2] Uzhavarcam is an user friendly mobile app which enables the farmer to capture images of pests and diseases, send to the experts and receive timely advisories.

and rather resulted in higher cost and unnecessary spraying of inputs. As Anandan says “We were not aware as to what actually caused pest/disease and various other problems on the crops until we came into contact with plant clinic services. Earlier, we depended on the input dealer for guidance to handle the crop problem; mostly, the advisories provided by the input dealer was not so effective and still we incurred losses to an extent. I had to travel to Kunandarkovil (17 Km away from the village) or Pudukkottai (20 Km away) to get the inputs and spent approximately Rs 200 towards conveyance cost”. It used to cost him approximately Rs 1000 per acre per spray. Normally in a crop they spray 2 to 3 times based on the incidence of the pest and diseases. Anand made use of the plant clinic sessions held in the village and got advisories for various problems affecting his crops. He is no longer depended on the input dealer for getting crop advisories.

Anand began to feel more positive and confident in doing agriculture after he got himself registered in the pilot project of Picture based Insurance during December 2019. It has given him opportunity to know about pest/disease attack and other issues affecting the crops. He cultivated local variety of groundnut (Gujarat) in one acre and he took initial picture followed by repeat pictures at weekly intervals. He also uploaded the close up images of pests and diseases, nutrient deficiencies in the Uzhavarcam App and received advisories from the plant doctor for the close up images within 48 hours.

The farmer expressed that he had attended the plant clinics sessions and received practical advisories by showing the affected samples; in case he is delayed to reach the plant clinic there are chances for the infected plant getting dried up making it difficult to diagnose and assess the pest /disease attack. He had also found it difficult to explain the symptoms on few occasions. So, he felt that this project is one step ahead as he does not need to wait for the plant clinic sessions, nor visit physically to the plant clinics by carrying the infected sample. The farmer is able to capture live the pest /disease problem immediately when he observes in the field and able to send the same to the portal for expert’s advice.



For example, he uploaded an image of a pest on groundnut at vegetative stage and it was confirmed by the plant doctor/expert as tobacco cutworm (locally known as *Pugayilai puzhu*). The expert suggested to install 5 pheromone traps per acre to attract the male adults. In addition requested the farmer to chemical spray either Emamectin benzoate 100 g or Spinosad 80 ml or Profenofos 500 ml per acre. The expert gave the advisory in Tamil, which was easy to understand and the inputs suggested was locally available. By adopting the suitable chemical method (Spinosad @ 80 ml) at the right time he observed reduction as well as reoccurrence of the insect population and was able to save Rs 750 per acre on input cost.

Through this, he gained new practical knowledge and skills on pest and disease management practices and techniques of taking quality pictures of infested plants and upload it in the app using his smart phone. He also understood the principles behind each of the practices and how different pest management practices worked in the field. In addition, he expanded his institutional linkages for accessing plant health information beyond input dealers and changed his behaviour to take informed decisions in pest management.

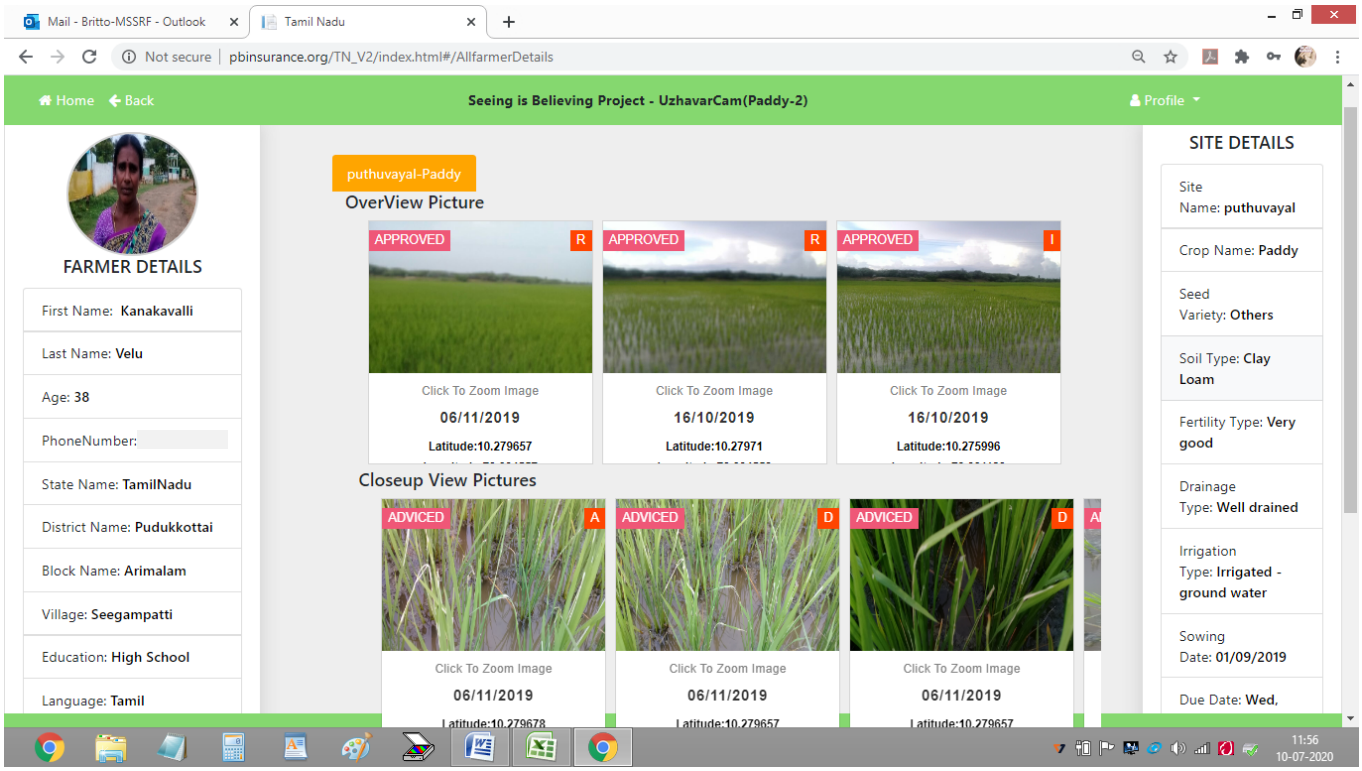
The farmer expressed that activities of MSSRF along with CABI and IFPRI is more supportive to him and fellow farmers of his village. He thanked MSSRF and its staff for guiding the farmers to do farming in a scientific manner.

Case 2: Ms Kanakavalli, an inspiration to fellow farmers to register their fields in the picture based advisory programme

Kanakavalli w/o Mr. Vadivel, aged 38 years from Seegampatti village, Arimalam Block, Pudukottai District, Tamil Nadu comes from a traditional agrarian family. She faced many issues in carrying out her agriculture

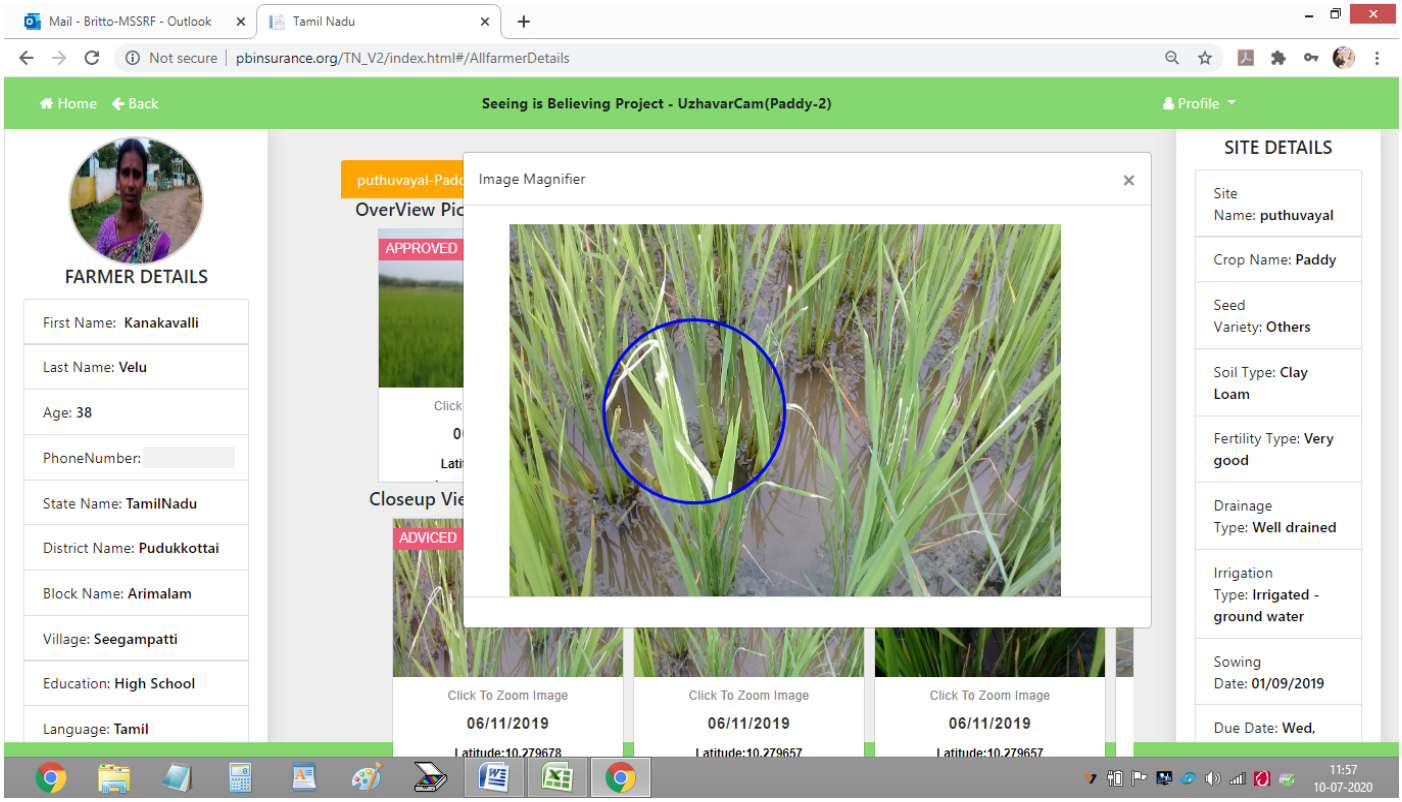
activities as she suffered from want of proper guidance; she was unable to choose the right crop and variety to cultivate in a particular season, could not identify the pest/disease affecting her crop every now and then and its management; she was not aware of the inputs that should be applied for handling various problems affecting the crop.

She was unable to tackle the issues and did not have an idea of whom to be contacted. As the neighbouring farmers was her only option, she followed the same principle of getting the suggestion from



the nearby local agro input dealers. Neither she was able to explain clearly about the problem, nor she got suitable plant protection inputs. She was not aware of the pesticide name, category and method of spraying . Whatever, package of material was given (insecticide + fungicide + growth regulator on many cases anticipating any one of the problem) she sprayed indiscriminately investing approximately Rs 1500 per acre per spray. The crop yield was below average resulting in loss. Realizing no improvement in the pest reduction, she wanted to take the help of agricultural experts. At this stage she got an opportunity to participate in a village level programme conducted by MSSRF along with IFPRI on a new concept called Seeing is Believing Project. She understood the concept and how it would be helpful to do her farming activities by getting involved in the project. Soon she also got convinced about the utility and effectiveness of the picture based advisories.

She cultivated Deluxe BPT 1039 variety of Paddy during Dec 2019 to Feb 2020 and the crop growth was normal. Suddenly, she found folded leaves in some of the plants and gave a papery structure appearance from a distance. She found that the contents of the leaf is completely eaten away. She immediately understood that



this may be due to pests or disease. She recalled the picture based advisory program and took close up views of the images of the affected plant using her android mobile phone and uploaded the same in the Uzhavarcam App. To her surprise and relief, she received the notification in her app and found the description of the problem and control measures within a short span of time. She was asked to spray any one of the following chemicals -Chlorpyriphos 4 ml per litre or Profenofos 4 ml or Flubendiamide 0.25 ml in one litre of water as per the availability of the chemical in the local agro dealer shop. She sprayed Chlorpyrifos @ 400 ml per acre and observed very good reduction in the pest. This advisory helped her to solve the problem without affecting her routine work. She realized the benefit of such technology and shared the information to fellow farmers. Inspired by this, five more farmers registered their fields for getting advisory in the upcoming seasons.

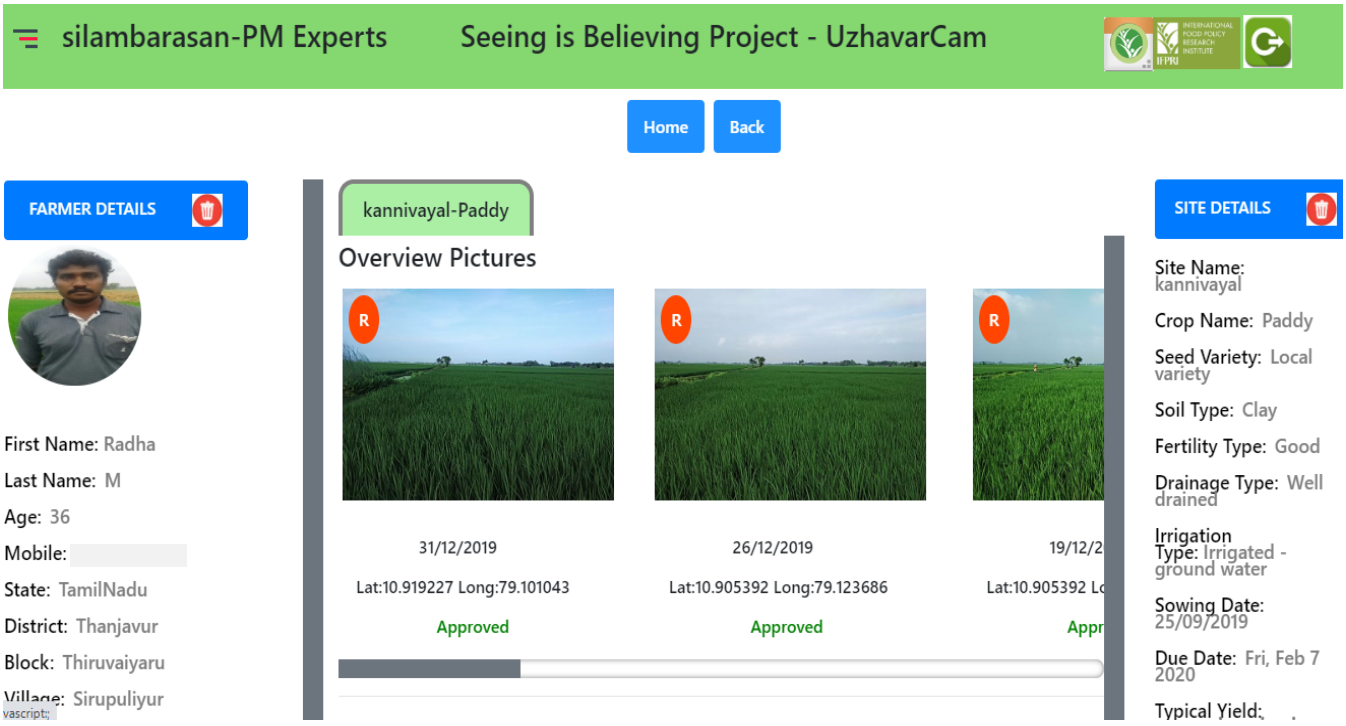
Ms. Kanakavalli was happy to share that MSSRF along with CABI and IFPRI empowered the farmers in a systematic way, by educating them on diagnosing and confirming the problem and create confidence to handle the situation. This skill set was absent previously, where they were forced to approach pesticide dealers, who most of the times were unable to give suitable solutions.

Ms. Kanakavalli expressed her deep felt gratitude to CABI MSSRF and IFPRI for their joint initiative in helping the resource farmers to access appropriate and effective solutions without delay. She also said that the methodology was simple to adopt and user friendly. She was happy to share that the insect population was controlled and noticed the progress in the plants within next three days at an affordable cost. She also observed 15-20% increase in yield after adopting the management practices suggested by the experts.

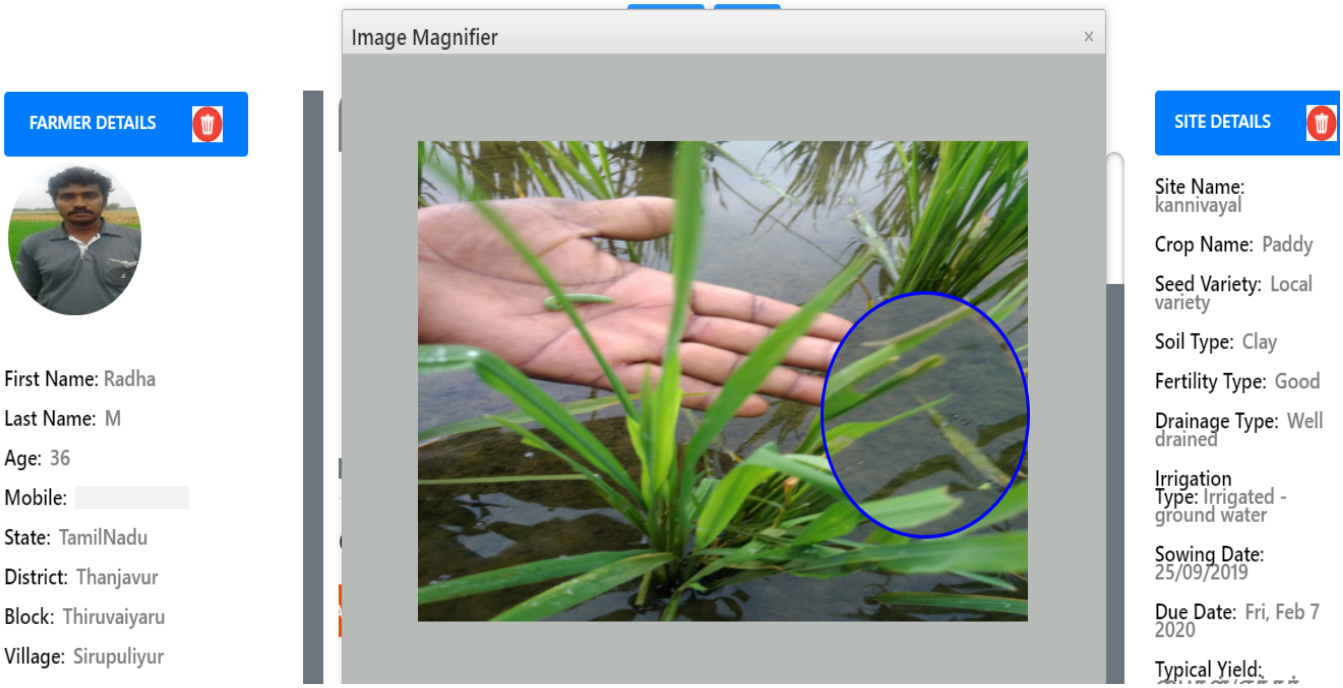
Case 3: Mr Radha, a resource poor farmer learns to use mobile app technology to combat biotic problems

Mr. Radha S/o Manikkam, aged 38 years is a self-motivated youth farmer residing in Sirupuliyur village, Thiruvaiyaru block, Thanjavur district, Tamil Nadu. He registered his fields in the picture based insurance programme during September 2019 - February 2020.

Mr Radha hails from a traditional agricultural family. He owns two acres and cultivate paddy, pulses and sesame. Pest/disease attack has been one of the great problems he used to face in agriculture and used to spend at least Rs. 4000/ per year for plant protection alone. He is familiar in the management of major insect pests namely stem borer, leaf folder and earhead bug which he came to identify and manage them by participating in the plant clinics held in the village. But during Rabi 2019-20, he witnessed a new insect pest on his paddy crop during tillering stage. Using the Uzhavarcam App, he sent a close up view of the insect.



The expert on receiving the image in the portal confirmed it as rice horned caterpillar (locally known as nell *kombu puzhu*). The expert recommended the farmer to chemical spray either Quinalphos 3 ml or Chlorpyrifos 4 ml or Chlorantraniliprole 0.6 ml per litre of water. Radha chose to spray Chlorantraniliprole and found substantial reduction in the pest: As crop advisories are given in the local language he finds it easy to understand and adopt the same with confidence; he finds the advisories are timely and useful in reducing the



cost and mental stress. By adopting the suitable chemical method, he was able to save Rs 750/- per acre and got Rs 6000/- additional income due to timely advisory and adoption.

The farmer expressed his sincere thanks to MSSRF, CABI and IFPRI for the innovative step in reducing the insect pests as well as input cost. He is happy to mention that he has started learning to identify new pests. He hopes that if he continues to use this app he will be able to gain more confidence and take informed decisions in pest management. He also told that he is regularly attending plant clinics in person or through online and feels that picture based advisories is an additional support to him.

The above case studies and interaction with other farmer participants in this project (based on one season's experience) suggest that the project facilitates well in building the capacities of the farmers to take immediate action to identify, prevent and manage pest/disease and recover the losses if any due to pest/disease through insurance. Getting a high quality picture is the base for the whole process of diagnosis and providing advisories. The pictures taken by the farmers at different angles at various stages of the crop growth is a proof for them to claim the insurance amount for the losses if and when they faced. The pictures enable the crop experts to diagnose the problem properly and send appropriate advisories to the concerned farmers. The advisories are in the local language and the inputs suggested are mostly available in the local market. This makes things simpler and easier for the farmers.

It is felt that fine tuning the Uzhavarcam App to make it simpler and user friendly and accommodate the mechanism to work off line mode will enable and encourage the farmers to adopt the tool to improve their capacity and thereby their livelihood.

In order to enhance the efficiency in extending the plant health information services, there is a need to strengthen the link between plant clinic activities with picture based services, which in turn will help to improve the knowledge management among farmers in addressing the biotic stress especially due to pests.

Future Plan

1. Keeping the view of the success of PBA approach adopting field agent model, it is planned to build the capacity of the farmers in adopting picture based digital approach to seek access to plant health information as well as insurance services in future.
2. Evolving site specific strategies in bringing the synergy between plant clinic initiatives and picture-based advisories and insurance services.