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YES BANK

CLIMATE-SMART TECHNOLOGIES/INNOVATIONS

An End User's Perspective

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Foreword

Global Agri Connect (GAC) 2019, now in it's 8th edition with the theme "Accelerating Investments in Climate - Smart Agriculture" is extremely relevant that needs to be explored, researched, discussed and actioned.

Agriculture employs 40 per cent of global population and is a $7.8 Trillion Industry. It is also a source of significant global GHG emissions, estimates range from 19-29%. Agriculture requires Climate-resilient interventions and investments that are creative, large and long-term. Need of the hour is Climate Smart Technologies that are context specific, investment ready & profitable for the farmer. To contain the global temperatures below 2 deg C , world needs US$7 trillion / year investment between 2016 and 2030.

India is estimated to need US$ 200 billion in next 10 years to make agriculture climate-resilient. Given the necessity for allocating limited resources across competing priorities, there is an urgent need to understand the hierarchy of priorities in the task of building resilience in agricultural system. It is widely accepted that complex multi-dimensional challenges cannot be resolved through limited set of stakeholders. The successful models of multi-stakeholder partnerships need to be recognised and replicated with context specific Customizations for climate resilience. Business growth and consistency of positive outcomes are only feasible where there is a win-win for all the stakeholders involved in the value chain of any given commodity. Words like 'traceability', 'responsible sourcing', 'sustainable technologies and practices' have become the corner stone of several business models.

The day long deliberations at GAC 2019 will set the platform that can be leveraged by policy makers, researchers and businesses to build upon the frameworks and fine tune their response to the most pressing challenge confronting agriculture.

I wish the GAC 2019 success and thank everyone who joined hands with NSFI in this effort!!

Sanjeev Asthana
Chairman NSFI

Message

The Indian agriculture economy has undergone a structural change over the past few decades. Newer challenges like climate change have emerged, warranting an entirely new approach to old world solutions. The impact of climate change is exorbitant with its adverse effects reaching out not only to agriculture but also to the associated ecosystem- water resources, biodiversity, human health and infrastructure. Such diverse and far reaching impact requires a range of innovative solutions and strategies to be deployed for an effective response and for better preparedness.

A number of enterprises have come up with outstanding innovations ranging across the entire supply chain including production practices, post-harvest techniques, infrastructure, market access and market information, being driven by technology and disruptive ideas. Budding entrepreneurs have been developing solutions that are feasible, implementable, scalable and future ready and are marking their success stories in the food and agri domain. Many of such innovations have changed the dynamics of farming for countless farmers including smallholders and agripreneurs.

I am glad to present the YES BANK-NSFI Knowledge Report 'Climate-Smart Technologies/Innovations: An End-User's Perspective" which highlights the key innovations and its impact on the end user of the technology.

I am confident that the content of the Knowledge Report will provide important insights on innovations in the agri space and motivate all stakeholders to work further on conceptualizing and implementing innovative technologies for boosting growth of the sector.

Nitin Puri
Group President and Global Head
Food and Agri Strategic Advisory and Research (FASAR)
YES BANK Ltd.

About the Knowledge Report - "The End User's Perspective"

An end user is a person who ultimately engages or interacts with a technology / innovation in terms of extracting benefit from the same. The end user experience is a composite phenomenon of user needs, technology features, accessibility, benefit recognition, benefit realization and the recall of these features for a given technology or innovation. The phenomenon is not as straightforward as it may seem as it involves a chain of interconnected features at the user end.

More often than not in the agriculture sector, the end user does not possess the technical understanding or skill of a technology (also read as innovation) designer or promoter. This fact is easy for technology developers to forget or overlook, leading to features with which the end user is not aligned with. We believe that the perspective is clearly in contrast to those individual stakeholders who develop, adopt, or promote such technologies. The perspectives of technology adoption range from public interest, perception of end user benefits, to affordability.

It is time, we build information and evidence on the end user views for a given technology or innovation on the integrated value it offers to the end user. There is a need for end user stories from the field that can be fed back into the decision making processes of technology/innovation development and promotion. The views thus documented will help us all track the end user actions and correlate them with its performance and lead us to the aggregate estimates of a technology's adoption metrics.

This GAC onwards, we would like to bring you the testimonials of various technology users that will help us all build a knowledge base from the value envisioned and perceived from a technology to the value that is actually realised.

Wish you a happy reading. This is our first edition. We would like to bring you more in the coming years and call upon all of you to share more stories and insights from the field, especially those which bring out the 'end user perspective' on the technologies and innovations that you are promoting or adopting.

N Sai Krishna
Chief Executive Office, NSFI

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TECHNOLOGY / INNOVATION	
Name	Croplytics®
Beneficiaries	Small, Medium and Large Farmers
HOW DOES THE TECHNOLOGY WORK?	
Croplytics – Crop analytics integrates sensor data and satellite imagery to translate data into actionable information for agribusinesses. It helps to track and estimate yield beforehand using Advanced AI system. Crop recommendations are made keeping in mind that can maximise the profitability. The smart irrigation technology helps the farmers to control the irrigation system via a mobile application. It is and artificial intelligence based technique, which collects data from various sources and technologies such as Internet-of-things, multi spectral remote sensing, Evapotranspiration, vegetation indices, water depth, cropping pattern and micro weather data to arrive at accurate irrigation scheduling.	
END USERS' TESTIMONIALS	
Name of the farmer	**Deepak Kumar**
Location	Hoshiarpur, Punjab
Before I started using this technology, I had to be around the farm all day during irrigation and we had to run in order to close the motor in case the water starts overflowing. The technology has brought about a big relief because with the help of the application I now can easily turn on and turn off the motor as and when I wish to do so. Though it has provided us with a relief, I think the technology can be made better if we also start receiving a message for power outage because we do not really get to know when the irrigation system stops. If the above stated improvement is allotted, I will most definitely use the technology in long term because it takes away a lot of our time and stress which can be used on other important work.	
Name of the farmer	**Jagdish Singh**
Location	Hoshiarpur, Punjab
Earlier, we manually had to go and turn on the system which was tiring and then we also had to stay until the farm is irrigated so that the water does not overflow and the motor is switched off in time. There was also uncertainty regarding the water requirement for every crop. Due to the advent of the technology, now we are saving a lot of water and electricity because we are able to turn on and turn off the motor as and when we want to using the mobile application. This has resulted into lower electricity bills and has helped us on cutting down our cost of inputs too. The electricity in our village goes frequently and hence, it becomes important that we also get notified when power outages go so that we can schedule the irrigation accordingly. Even if the power outage notifications are not inculcated, I am still willing to continue using this technology.	

Name of the farmer	**Roop Singh**
Location	Hoshiarpur, Punjab
The main challenge was to be around the motor and the irrigation system always which used to take up most of our time and we were not able to extend our revenues due to lack of time. The technology has finally aimed at saving our time by helping us access our motors via our mobile phones. This has helped us in saving our time, water as well as electricity. There are 2 improvements that I believe can be inculcated. Firstly, we should be notified whether 3 phase electricity is available or not. Secondly, the exact water requirement of the field so that we can turn off the irrigation system when the requirement gets fulfilled. Though the technology can be improved I believe it still provides and helps us with the pump motors and hence, I would like to use it further.	
Name of the farmer	**Jagdev Singh**
Location	Hoshiarpur, Punjab
Throughout the day, we wasted our time, water and electricity which started getting on our nerves and we wanted some change desperately. The main benefits that we have been able to get are that the technology helps us to save all the elements we were wasting before. We can now save our time by having easy pump access on our mobile phones. Also, save water and electricity by using the pump only when required. The main improvement needed is that we should also know how much water or for how much time should the pump stay on. This would in return help us save water and electricity even further. Currently we are impressed by this and hence, we surely would like to use this in the future.	

Avant Garde Innovations Pvt. Ltd.

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TECHNOLOGY / INNOVATION	
Name	AVATAR™ Small Wind Turbine
Beneficiaries	Farmers/ Households/ MSME

HOW DOES THE TECHNOLOGY WORK?

AVATAR™ Small Wind Turbine works —like a fan—wind turbines use wind to make electricity. Wind turns the propeller-like blades of a turbine around a rotor, which spins a generator, which creates electricity. Unlike the polluting power generated from diesel generators or grid, this indigenously developed small wind turbine uses the clean and natural resource of wind which is freely available in the environment and enables the farmers to use it for their electrification needs at the farm, and thereby contributes to zero/low carbon farming.

Unlike solar energy, AVATAR™ wind turbines generate energy irrespective of the time of the day or night, cloudy skies or even during rainy seasons (which are actually advantageous due to the good winds during rains). This enables farmers to meet their electricity requirement for lighting and water pumping even after sunset when there is no solar generation.

Solar panel takes up the agricultural space for its installation and reduces the land use for agricultural purpose whereas the wind turbines use only a fraction of the land as wind turbines erected vertically on a single pole enables farmers for parallel land use with both harvesting wind energy and harvesting crop.

Solar panel requires water for cleaning it whereas AVATAR™ small wind turbines do not require any water cleaning thereby helping farmers to save precious water.

END USERS' TESTIMONIALS	
Name of the farmer	**Jagu Rabari & Francoise Bouderlique**
Location	Sanosara, Kutch, Gujarat

Before installing the AVATAR™ Small Wind Turbine, the power supply was not frequent to support the people staying at the farmhouse. Hence, it used to pose a lot of problems.

The electricity comes to our home from this Small Wind Turbine. We have installed this in our farming land for our daily power requirement. This is completely Renewable Energy and very cheap for such rural areas. The turbine has helped me generate electricity at a really cheap cost.

However, the battery costs need to be lower and subsidies required so that higher capacity wind turbines can be used for higher power generation. Also, I believe net metering should be allowed for small wind turbines also so that we can easily check the usage regularly.

This is their pilot project which is in testing phase but I think it has the potential to run really efficiently and hence, I would like to adopt it once the testing is done with.

Blooom

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TECHNOLOGY / INNOVATION	
Name	Blooom App
Beneficiaries	Farmers
HOW DOES THE TECHNOLOGY WORK?	
On the surface, Blooom is an elegantly simple, lightweight smartphone app — at its core, it is a series of algorithms on the cutting edge of agricultural technology, powered by the cloud. Blooom gives smallholder farmers access to information, finance, sustainable inputs, services and markets — in short: everything that can help them thrive as independent agro-entrepreneurs. Blooom algorithms operate at an unprecedented depth, enabling smallholders to do precision agriculture on the smallest plot of land, anywhere in the world.	
END USERS' TESTIMONIALS	
Name of the farmer	**Krishna giri**
Location	Mayurbhanj, Odisha
Earlier, we had limited usage of soil testing and we did not receive food recommendations on our farm planning. With the use of Blooom services and real time recommendations now we can prepare comprehensive farm planning that yields higher produce. Blooom App helps us with soil testing results and we explored opportunities to avail public institution services and benefits from government offices. We understood blooom as an ecosystem integrator making the agricultural market inclusive by creating the conditions that enable every stakeholder to produce value for each other. We need more help from Blooom to tell us the specific season's cost-benefit analysis so that we can decide our household level investments. We would really like to use this technology extensively in the future. In our basic understanding, Blooom is a fully integrated, soil to shelf tech platform for sustainable food supply chains.	
Name of the farmer	**Nirojini Patro**
Location	Mayurbhanj, Odisha
Earlier we had no knowledge source for learning digital technology. Our discussion with blooom entrepreneurs gave us comprehensive understanding as to how this digital technology can help in farming. The Blooom model essentially takes the task of marketing to and transacting with smallholders and creates good benefits. By aggregating demand and supply, Blooom also inclusive markets and food security in its core value. With the Blooom we are motivated to take up organic farming and foresee an opportunity to remain in contact with Fair trade buyers. We need more help from blooom to tell us the specific season's cost-benefit analysis so that we can decide our household level investments and ensure more community participation. This is an elegantly simple, lightweight, smartphone app – at its core and offered us farm level inputs and appropriate planning. All of these should be used properly and therefore, I am willing to adopt this technology.	

Cropin

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TECHNOLOGY / INNOVATION	
Name	Smart risk TM
Beneficiaries	Large, medium and small scale farmers

HOW DOES THE TECHNOLOGY WORK?

Smartrisk is a predictive and prescriptive solution for Risk monitoring, mitigation and forecasting intelligence. The AI and Machine-learning based platform detects cropping patterns and predicts the future of the crop, thus highlighting the associated risk and opportunity for agri-stakeholders.

The businesses can achieve farm level crop detection and yield prediction through the SmartRisk capabilities that can also establish historical performance of every pixel at farm/postcode/state/country level by utilising easy to use Connector API-s.

END USERS' TESTIMONIALS

Name of the farmer	**Kusum Devi**
Location	Khajauli Block, Madhubani, Bihar

Earlier, we were not aware of the exact measurement of our farms and we would just assume certain numbers. We had no clue about the weather forecasts and were completely at the discretion of the climate.

But now, using mobile phone as a medium to measure, we are able to get accurate results. After joining hands with Cropin, we women get an opportunity to do something other than the household chores and step outside of our house. We are updated with the required information from time to time. Information regarding crop diseases, its treatment, regarding the climate and forecasts, about the diseases regarding the livestock, its treatment and vaccinations which are to be given to the livestock is also told to us via messages and also updated on the village board by the VRPs. We did not know how to use mobile phones but the Cropin team helped us with that too.

We can't imagine our lives without Cropin now. The kind of impact it has made in our lives is extremely remarkable and hence, we are more than willing to use it in future.

eEco Solutions Pvt. Ltd., ESPL

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TECHNOLOGY / INNOVATION	
Name	• Biological Seed Treatment with Trichodermaviridi @4gm/kg seed used, and Beejamrit @20L/100kg • On Farm nutrient Management: - Different Composting techniques (NADEP 5Mt /ha + vermicompost 1 Mt/ha + CPP5Mt/ha) - Cow Urine and Jeevamrit • Off farm means for Nutrition Management - Neem cake @125 kg/ha - PSB 5-10 kg/ha • Mulching with Green Waste • Use of Botanical/ Plant waste Inputs for Disease- Pest Management
Beneficiaries	Farmers

HOW DOES THE TECHNOLOGY WORK?

ESPL trained the farmers in the project area regarding principles of Organic farming and motivated them to adopt various techniques & technologies to get good crop and better yield under Organic cultivation practices.

Biological Seed treatment helped in increasing the seed germination percentage of. Application of compost during field preparation enhanced the soil fertility. This techniques help in balancing both Micro & Macro nutrients and maintain the pH of the soil at the desirable limit. By using compost, the organic matter in the soil gets available to the plants in a usable form. Organic matter in the soil promotes plant growth by helping in breaking of heavy clay soils into better texture, by adding essential nutrients to any soil, and increasing water and nutrient-holding capacity of sandy soils.Use of Green waste like leaves, barks, wood chips, grass clippings for mulching in the field helped in controlling weed infestation, water conservation, and maintaining the soil temperature (not becoming too hot or too cold). GreenMulch also protected sloping areas from soil erosion and stops compaction caused by driving rain or foot traffic. In addition, mulch provided favorable conditions for earthworms and other soil organisms, those are necessary for healthy soil and plants. When mulches break down, they become humus that feeds the soil. All this help in increasing the infiltration of water into the soil and improve the water table in the region. Prophylactic use of Various Botanical extracts and microorganism based organic insecticides helped in controlling the disease-pest without using poisonous chemicals.

END USERS' TESTIMONIALS	
Name of the farmer	**Mr. Himanshu Shekhar Samantaray**
Location	Olasing Village, Khurda District, Orissa

Background: I am a victim of conventional chemical based farming. I lost my mother to Kidney disease at a young age. During the treatment of my mother in the Cuttack hospital, I saw other patients dying of deadly diseases like cancer, kidney failure and others even at very early age. There I learnt from the doctors that consumption of unsafe food, contact with poisonous agro-chemicals are the major cause of such deadly diseases. There was indiscriminant use of chemical fertilizers and pesticides for crop production i.e. high-yielding rice and vegetables in particular, in my village and nearby villages. Seven people of my village passed away within a span of eight years suffering from cancer. My mother was the last victim which stopped my father from doing cultivation. After a gap of two years, I decided to resume farming and opted for organic method. After continuing with organic farming for two years, with motivation of eEco Solutions Pvt.Ltd., I myself along with 72 nearby farmers joined the PKVY scheme which covered more than 100 acres land.

Before adoption of organic farming, farmers in our area used to bear high cost of cultivation because of costly chemical inputs and on every occasion they were dependent on market. The soil in most part of the state is highly alkaline and during rain most of the nutrient used to wash away during floods as surface runoff and it becomes very difficult to grow crops. Before scientific technological interventions, the farmers while doing organic farming were not getting good yield and they were getting disheartened.

After following the organic crop production practices the farmers could increasing the quality of produce as well as the yield. Now we all are happy with the yield and production quality. Now no input is being purchased, we are mostly preparing all inputs (soil nutrients and organic pesticides) at their farm point. The rice and vegetables produced by us tastes very different. Mainly pakhala (water rice) the most lovable Odiya cuisine and principal diet of the rural people in our state, tastes great now.

I have very small land of only 3.75 acres. Now I am concentrating on cultivation of scented rice and black rice. As there is good demand of organic scented rice and organic vegetables, now all farmers practicing organic farming have started experimenting with crop and introducing varieties of traditional scented rice of our area. I am extremely pleased by the kind of harvest I have been able to produce using organic farming and hence, would like to adopt it.

Farm Hand Limited

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Website	www.farm-hand.in
TECHNOLOGY / INNOVATION	
Name	'Water-Hand' – A Smart, Affordable & Reliable Precision Irrigation System with Localized Weather Forecasting Technology and Farmer Mobile App with Farmer Feedback Mechanism.
Beneficiaries	• Small-holder farmers • Small-medium sized farmers • Farmer Producer Organisations • Farmer Cooperatives • Farm Aggregators
HOW DOES THE TECHNOLOGY WORK?	
• A Localised Irrigation Schedule Platform – smart/AI enabled cloud platform using market leading, latitude-longitude specific, weather forecasting and crop data. • Field Controller – IoT enabled low-cost sensor-connected hardware and • Farmer Mobile Interface – farmer centric app allows continual system learning and • Aggregator dashboard – for data visualisation and advice.	
END USERS' TESTIMONIALS	
Name of the farmer	**Mr. Saleem**
Location	Ozhakkur FPO, Tindivanam
In my village, there is a huge water shortage. In summers, the demand for water reaches at its peak. But, due to lack of availability of water people are left thirsty or are forced to resort to use unfit water. Where the condition is so worsened, we can't even think to have water for agricultural purposes. Hence, it is extremely essential to save every drop of water and adopt water conservation practices. The kind of irrigation system provided by Farm Hand limited helps us conserve water. The system provides us with a medium to turn on and turn off the irrigation system on our will even when we are not around the farm. This has reduced a lot of workload and has also helped in saving a lot of water too. Honestly, I am pleased with my experience of using this kind of irrigation system. I am more than willing to adopt this system provided by Farm Hand limited.	

Name of the farmer	**Mr. Aadhimmolam**
Location	Ozhakkur FPO, Tindivanam

I wish by using this system, the current water scarcity problem can be managed. There is no proper water availability and proper irrigation practices could help conserve water.

The 'Water-Hand' technology has helped in water conservation. When I'm outstation, the system helps me manage and automate the irrigation in my farm and optimise water usage.

If the timer could also be inculcated in the irrigation system to help us put a timer on the number of hours for irrigation, the system would have been best suited for farming in India.

Farm-Hand irrigation system is very useful to us farmers. I can switch ON/OFF the pump and gate valves using the mobile phone app. This considerably reduces my workload. I am hoping that the timer system will be installed soon.

Farms and Farmers Foundation

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TECHNOLOGY / INNOVATION	
Name	DeHaat
Beneficiaries	Farmers

HOW DOES THE TECHNOLOGY WORK?

DeHaat as model:

DeHaat is a technology based platform that provides 360 degree solution to farmers. It caters to the end to end needs of the farmers through its "from seed to market" approach. The services of DeHaat begin well before sowing of the crops in the form of advisory for field preparation, and are continued as input supply, and right market linkage. Advisory is provided 3-4 times in one farming season, catering to various needs and stages of the crop.

The model is implemented through DeHaat centers which are a one-stop center for the farmers in their village. A DeHaat center is run by a local rural young micro-entrepreneur who is known as a DeHaat coordinator and works as a channel between the organization and the farmers.

Technology intervention in DeHaat:

We have developed an in-house app called DeHaat which has two versions-farmer and DeHaat coordinator. The app enables any farmer who has a smartphone to register with us and avail all the services- advisory, input, weather information, soil test report and market linkage with the click of a button.

END USERS' TESTIMONIALS	
Name of the farmer	**Birendar Prasad**
Location	West Champaran, Bihar

The two of the major challenges that I faced before I became a part of DeHaat were input supply and adequate advisory. I had to travel 3-4 kilometers to buy any input. I have often been fooled by the retailer due to absence of proper information. Thankfully, I came across DeHaat later.

I have been associated with DeHaat for a year now and I am fully satisfied with the services of DeHaat. My first exposure to the services was through market linkage for maize. I received Rs. 300 more per quintal than what I would have received by selling it to the local trader. The benefit was not only in terms of income but there was also convenience in selling the product as I could sell the maize in a DeHaat center located in my village. This was the point of building trust with the DeHaat coordinator and I have been regularly availing services of DeHaat since then. The DeHaat team keeps in regular touch with me through their toll free advisory system.

One thing that I would like to receive is weather information on my phone which will help me plan for any adversities. I have become comfortable with the model and technology of DeHaat and it has reaped benefits to me. I would like to encourage other farmers also to be a part of DeHaat.

Indian Institute of Millets Research - IIMR

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TECHNOLOGY / INNOVATION	
Name	Millets processing machinery
Beneficiaries	Farmers
HOW DOES THE TECHNOLOGY WORK?	
Primary processing at the farm gate level helps farmers in realizing more value for their produce. Primary processing machinery helps the farmers in cleaning their produce, de-hulling, de-husking and also can be used for polishing of the grains too. This produce is given as input to the Ragi cookies.	
END USERS' TESTIMONIALS	
Name of the farmer	**Paramjeet Singh**
Location	Katahri, Ludhiana, Punjab
I hail from Punjab and am always inclined towards millets cultivation. I have noticed that the middlemen, present in between farmer and consumer are hindering the profits of the farmers. Hence, I have started building up both processing machineries; primary and secondary at the farm level itself. I have started FIG farmers group and am distributing seeds to the local farmers and encouraging them to cultivate millets especially ragi and barnyard by giving assurance of buy-back. They have started a millet primary processing unit, which can be used by farmers who want to process their grains. They also connect farmers to the consumer directly, so that farmers get a better price for their produce. They have set up ragi cookies facility also, through which the average revenue they earn is 50 lakhs per annum. Due to these millet processing machineries, farmers are now getting better produce and revenues which have helped them overcome a lot of problems in their families. I am currently satisfied with the technology and would like to keep using it. Though, if the technology can be updated to simplify the processing machinery of small millets, the technology won't have any flaw as such.	
Name of the farmer	**Arun kumar Vajjal**
Location	Gudihal Taluk, Madde bihal, Karnataka
I am from a farming background. Being an educated person I am aware of the millets and their health benefits. Slowly and gradually, realizing their ever increasing importance, I started cultivating millet crops in my own land. However, because of lack of good market and technology, the produce used to generate very less profit on sales of millet grains. I attended a training at IIMR and got acquainted with primary processing machinery and started using this machinery in the village, through the support of IIMR. Now, I have a flourishing business, with employment generating capacity for 7 persons. We are all marketing our produce to the entire North Karnataka, with a revenue potential of 15 lakhs per annum. The machinery has fared extremely well so far and has brought about immense profits. Hence, I would be willing to use this technology more.	

National Skills Foundation of India

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TECHNOLOGY / INNOVATION 1	
Name	Plastic Mulching
Beneficiaries	Farmers

HOW DOES THE TECHNOLOGY WORK?

Plastic mulches prevent sunlight from reaching the soil which can inhibit most annual and perennial weeds. Clear plastics prevent weed growth. They keep ripening fruits off of the soil. This reduced contact with the soil decreases fruit rot as well as keeps the fruit and vegetables clean. The plastic mulch covers the soil decreasing the crusting effect of rain and sunlight. The use of it creates a practically weed free area around the plant, removing the need for cultivation except between the rows of plastic. Root damage associated with cultivation is therefore eliminated.

END USERS' TESTIMONIALS	
Name of the farmer	**Sanjay**
Location	Bharech village, Junga District, Himachal Pradesh

Before the use of plastic mulching, weed management, trimming of excess leaves and spraying pesticides used to take a lot of time. I felt like a lot of my time was being wasted. And not just this, water used to accumulate around the crops leading to crop degradation, thereby becoming extremely inconvenient for me leading to losses.

With use of the plastic mulching, my time gets saved. Weed management takes around 8-9 days and due to these mulching sheets, my 8-9 days get saved and I am able to use these days in taking care or sowing of other crops. The plastic mulching also helps in removing grass easily and has resulted in higher productivity of crops.

Though the technology has brought various benefits to me and has helped increase my revenues, it restricts drip irrigation system. If the plastic mulching can be inculcated along with drip irrigation, the combination would suit me best.

I have used the trial part and hence, had used plastic mulching only for some crops. But, due to numerous benefits I'm planning to use this technology for all my crops.

Name of the farmer	**Jeetram**
Location	Bharech village, Junga District, Himachal Pradesh

Before I started using these plastic mulching sheets, I used to devote a lot of time for hoeing, weeding and spraying around the crops from all sides. Water used to log around the crops leading to destruction of the harvest.

By using these plastic mulching sheets, a lot of my time gets saved. There is no water logging around the plants and none of my crops get destroyed. Also, due to these sheets, weeding becomes very simple and grass is pulled out quite easily. This saved time is then used for putting in more efforts on the other crops. The rate of production is also better than before.

I am satisfied by the kind of results I have received so far on application of these plastic mulching sheets and hence, don't really see any need for improvement. I clearly see the difference between the traditional plots and the plastic mulching plots. Most certainly I would like to adopt these. This was a trial in my field, but I have already planned to use these plastic mulching sheets for the whole of my farm in the future.

TECHNOLOGY / INNOVATION 2

Name of the farmer	**Seedling Planters**
Location	Farmers

HOW DOES THE TECHNOLOGY WORK?

- There is no need to bend down to seed anymore, you have this brand new automatic planter when helps you to dig hole, transplant and cover soil. Avoid digging in dry or overly saturated soil.
- After loosening the whole ground, stuck the seedling planter in to the soil and drop a seedling into the planter, pull the handle like a brake, and hold up the planter, it will finish seeding.
- It can plant 3,000 square meters a day [Size: Height: 92cm(36"); Inner Diameter: 8cm (3"); Funnel Diameter: 11cm (4.3")(For Easy Filling)
- Applies to all kinds of seeding and beans, like Tomato, Onion, corn, watermelon, potato, flowers, cucumber, tobacco, peanut, cabbage, chili, carrot, squash, and other vegetables and herbs.

END USERS' TESTIMONIALS

Name of the farmer	**Vinod**
Location	Bharech village, Junga District, Himachal Pradesh

Earlier, I used to get extremely tired of bending down again and again in order to sow the seedlings. My legs used to get tired real quick and the efficiency rate thus was quite low.

Where before the implementation of seedling partners I was able to sow 20-25 plants in 10-15 minutes, now I am able to sow 30-35 plants and that too without any labour. It is quite convenient now to sow the plants and the energy saved can be used for doing some other work.

At first, I was not able to use the seedling planter and worried if the seedling would get destroyed on application of too much pressure. Other than that, I do not find any scope for improvement.

It is a nice technology and I am extremely pleased with the kind of results. Therefore, I really want to use it further.

S M Sehgal Foundation

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TECHNOLOGY / INNOVATION	
Name	High value vegetable cultivation in salt affected soil using saline water for irrigation
Beneficiaries	Farmers

HOW DOES THE TECHNOLOGY WORK?

Agriculture is the mainstay of livelihoods of Nuh district. About 78% of the district's total area has saline groundwater therefore majority of the farmers depends on monsoon rain for agriculture. Sehgal Foundation introduce salt tolerant vegetable Broccoli and beetroot wherein farmer can use saline water for irrigation. Crop grown on raised bad using mulch sheet and drip irrigation to minimize salt deposition in to the soil. The use of drip and mulch reduces the water demand and evaporation losses, weed growth and risk of diseases and pests. The broccoli has high market value thus farmers better returns compared to traditional millet and wheat crop.

END USERS' TESTIMONIALS

Name of the farmer	**Gulab Singh**
Location	Village Mundaka, block Firozour Zirka, District Nuh, Haryana

Due to limited fresh water our Kheti (farming) is depend on monsoon rain. I grow millet and mustard which gives me very low income. I never thought to growing vegetables on my field and also use of Kharapani (saline water) in agriculture. In rain fed farming, I used very small quantity of Urea only that is why productivity is very low. In the beginning, I was very reluctant for making new investment in agriculture. The EC of water used for irrigation is 4.138 which is not suitable for agriculture crops.

I grew Broccoli in one acre on raised bad, fix drip irrigation and used mulch sheet to minimize water application and salt deposition in to the soil which occur due to high evaporation. I followed all agronomic practices advised. As a result I successfully harvested 37 quintal broccoli form one acre and sold in metro city with average market price of Rs 23 /kg. I got INR 86,020 from one acre which is more than double from mustard and millet.

The cultivation of broccoli gives me good profit and this year I am increasing area under this crop. I also started growing beetroot which is also a salt tolerant vegetable. I fixed drip irrigation in one more acre. I am getting returns much better than the crop I used to grow earlier. Now I am selling seedling of broccoli to other farmers and buying seed directly from company with the help of SM Sehgal Foundation and hence would like to use this technology in the future.

Small Millet Foundation

A division of DHAN Foundation

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TECHNOLOGY / INNOVATION	
Name	Small Millet Portable Impact Huller
Beneficiaries	Direct beneficiaries are - • Small and marginal millet farmers living in the backward rainfed pockets in 278 districts in 17 states of India, who are to a significant extent are Scheduled Tribe families, and • Small-scale enterprises, including women Self Help Groups and Farmers Producer Organizations. The indirect beneficiaries are, • consumers looking for healthy alternatives to improve dietary diversity to address various life style diseases and improve nutrition and • Various stakeholders in the small millet value chain namely food processors involved in secondary processing small millets, wholesalers and retailers.

HOW DOES THE TECHNOLOGY WORK?

It is a centrifugal small millet huller functioning on 'impact' principle.

Its uniqueness include, i) ability to process all small millets with husk, ii) capacity to hull smaller quantities (even 2kgs), iii) ability to run on household single-phase electricity, iv) higher energy efficiency – can hull 200 to 400 kg per hour with one hp power, iv) less weight and footprint, v) plug-and-play type and need not be fixed in a place, vi) require less maintenance and vii) easy to operate by women in terms of height, portability and inbuilt safety features.

The technology is suitable for small to medium scale processors.

END USERS' TESTIMONIALS	
Name of the farmer	**Mr. Jayaraman**
Location	Thoppur, Tamil Nadu
The earlier used small millet huller resulted in more share of broken rice, and outcome was also less while the consumption rate was high which meant I required more manpower. Plus, to operate it at least two persons were required. It made my work extremely tiring and I was really in need of alternatives for the same. In the DHAN portable huller, processing is very easy. Share of broken rice in out is negligible and outturn (hulling percentage) is also more. Current consumption is very less with only 1HP motor. Now, due to getting better outturn of rice, I was able to give small millet rice at lower rate than other mills. While the earlier used huller required at least two persons and still it is very difficult to operate.	
DHAN huller can be operated even by a small girl. After filling the hopper, which is bigger than the other huller and can accommodate 25kg, we can do some other work until that quantity is hulled. It is about one year since installation of this machine and it has been running without any problem. There is only one single belt in this machine, but in the earlier huller five belts are there. So, maintenance cost is more with the earlier huller. The rubber in the earlier huller has to be changed after 500 kg and it costs Rs. 750 per piece; but in this huller I could hull 25,000 kg using one rubber liner. However, rice outlet pipe wears out regularly due to which rice start coming out of the holes. This thing needs to be addressed, otherwise I am quite happy with DHAN huller and really interested in adopting higher capacity huller of similar type. For an hour we are presently getting 100 kg processed rice. If it is increased by 150 to 200 kg/hr then it will be very good and I will surely use it more.	
Name of the farmer	**Mr. Janakan**
Location	Rasipuram, Tamil Nadu
The small millet huller I used previously was very inefficient and resulted in broken rice which lead to huge losses for me. This would lead to lower output and lower revenues for me which had adverse impacts on me and my family. Now, after using this DHAN portable huller there has been increase in hulling efficiency. In hulling percentage also there has been a marked change. Foxtail and little millets can now be hulled in a single pass, while in the earlier huller more than one pass was needed. So, I could save on hulling time and because of that I could get more quantity of output per unit time and could supply to my clients in time. So, this huller is very useful to me. Operating this huller is also very easy as the height and weight is less and anybody can operate it. The output per unit time is more, which makes working with this huller easy with less drudgery. This huller is very useful for small scale processing unit and village level processing unit run by FPOs and other agencies. The maintenance expenditure is less I have not changed bearings and spares. So far, I have not faced any major problems with this huller and hence, do not have any important changes that I would want in this huller. Though there has not been any significant problem as such, the output produced was on the lower side. If the rate of production can be increased, I am absolutely willing to use this huller in the future also.	

Suchet Agro LLP

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TECHNOLOGY / INNOVATION	
Name	"Pruthviraj Slurry Filter" –a Labor Saving Innovation
Beneficiaries	Any farmer intending to use cattle waste as a form of input to improve the soil health and save on cost of chemical inputs.

HOW DOES THE TECHNOLOGY WORK?

- Filters Cattle Slurry (Dung) to get clear liquid which can be fed through micro irrigation systems.
- Irrigation pipes and nozzles don't choke as the dung particles have been filtered.
- Automates the application of Cattle Dung based slurry.
- Saves on labor cost & time (of manual application).
- Adds to precision & quantity increasing the soil quality and yield.

END USERS' TESTIMONIALS

Name of the farmer	**Mahesh Patil**
Location	At. Post. Jamkhandi, Dist. Bagalkot, Karnataka, Phone: 9986147161

I have almost sugarcane plantation our chemical fertilizer expense was very high; this was a cause of concern. I knew that I can reduce my chemical fertilizer usage by Jeevamrutham (cattle dung slurry) application, however doing it manually will add huge labor cost.

We have been able to reduce our chemical fertilizer expense by 25-30% in first two years of installation of Pruthviraj Slurry Filter. Our labor cost has been saved 100% from day 1 of the installation.

The innovation has for sure relieved us and brought down our cost of inputs drastically. Hence, I am willing to continue with this technology.

Name of the farmer	**Ganesh Satav & Gangadhar Gadhave**
Location	Takli Bhima, Tal. Shirur, Dist. Pune, Maharashtra; Phone: 8888093311

We used to use chemical fertilizers regularly which had degraded our soil quality very much. We then found out that cattle slurry application can be a good alternative to the chemical fertilizers and also it will improve the soil health. However, we could not conduct the application as face extreme shortage of manpower being in the close vicinity of Pune city.

We have been able to reduce our chemical fertilizer expense by 25-30% in first two years of installation of Pruthviraj Slurry Filter. Our labor cost has been saved substantially from day 1 of the installation. This filtration technology is crucial for increasing farmers' income.

We are getting benefits since we started using this technology and it has simplified menial tasks. So, I would want to continue using this technology in future and would also suggest it to other fellow farmers too.

Name of the farmer	**Praveenbhai Desai**
Location	Kadodara, Surat, Gujarat; Phone: 9978111911

I used to regularly use cattle dung in the liquid form which has shown very good results in the past. However this was a very tedious and time consuming exercise. Also, labour cost makes it non-feasible to sustain.

With the help of Pruthviraj slurry Filter we were able to automate such a difficult process. The filtered liquid can easily pass through the Drip Irrigation without causing any choke-up to the lines or nozzles. I was able to save at least Rs. 3,000/month using this technology.

The technology has brought about amazing changes to my farm and has helped me increase my farm's production. Hence, I will definitely adopt this.

Name of the farmer	**Nanabhai Patil**
Location	Burhanpur, Madhya Pradesh – 450331, Phone: 9407316938

I used to regularly use cattle dung in the liquid form which has shown very good results in the past. However this was a very tedious and time consuming exercise. Also, labour cost makes it non-feasible to sustain.

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TATA Consultancy Services Ltd.

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TECHNOLOGY / INNOVATION	
Name	PRIDE Model powered by mKRISHI® Platform
Beneficiaries	Member farmers of the SFPCL Farmer Producer Company

HOW DOES THE TECHNOLOGY WORK?

TCS PRIDE model is an integrated platform where farmers can attain all their agricultural needs by interactions with the stakeholders in the agricultural sector such as buying agriculture input, procurement of harvested produce etc. It plays a vital role in capturing each transaction at individual, group, village and company level that also helps in generating traceability certificate. The platform through farmer mobile App, IVR and SMS provides personalized information to each registered farmer about integrated pest management, integrated nutrient management, scientific farming practices. Not only this, TCS PRIDE model has been very useful in managing day-to-day operations at Farmers Facility Center (FFC).

END USERS' TESTIMONIALS	
Name of the farmer	**Mahesh, Saptasrungi Farmers Producer Company Limited**
Location	Genda Park, Ksabe Wani, Tal: Dindori, District Nashik, 422215

i. Challenges

Before the TCS intervention agriculture supply chain was plagued with number of challenges that were faced by us, like

- Weak forward linkages – getting competitive remuneration in the market
- Opaqueness in weighing and market rate
- Majority of time was spent in loading, transporting and selling the produce in market.
- Poor access to Institutional Credit
- Unavailability of quality inputs in time
- Poor access to scientific farming practices, crop management & technology
- Limited knowledge on weather based cropping

Farmers of our area were encouraged to form Saptashrungi Farmer Producer Company Limited with the mission of enabling us to realize higher returns for our produce by enhancing productivity through efficient, cost effective and sustainable resources use with the vision of building a prosperous and sustainable organization by promoting and supporting the members.

After adopting the technology, we were able to avail a lot many benefits and it helped in easing a lot of stress from us and our families. Some of them are better access to agricultural inputs and reduction in usage of pesticides and fertilizers, Improved soil fertility, availability of inputs at competitive cost in comparison to the market, Reduction in risks and associated losses, reduction in farming costs through judicious use of crop protection material and increased input use efficiency, better access to agricultural experts and the market, and improved net profits.

We think the technology is extremely unique but it sure can be made better. Following are some of the changes we believe could make the technology even better!

- Increased tomato productivity from 16 MT/Acre to 24 MT/ Acre and in few cases 32 and 35 MT/Acre.
- SFPCL started with Tomato crop and gradually moved to grapes, onion, capsicum and other vegetables over the last five years. This indicates the potential of SFPCL to handle more number of crops and farmers and provide services to them.
- Company shipped 400 MT grapes to Faridabad Market wherein farmers got additional income of Rs 4-5 more per kg than the local market.
- Steady increase in the revenue generated from the sale of Agri-inputs.
- In February 2019, SFPCL sent couple of containers of onion to a buyer in Italy on an experimental basis & the buyer was satisfied with overall quality of onions and appreciated for providing traceability certificate.
- Company set up couple of pack house cum farmer facility Centers and mobile soil testing lab.

The technology is extremely good and hence is worthy of being adopted. The technology has brought about a new revolution for all of us and should be incorporated by as many farmers as possible.

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