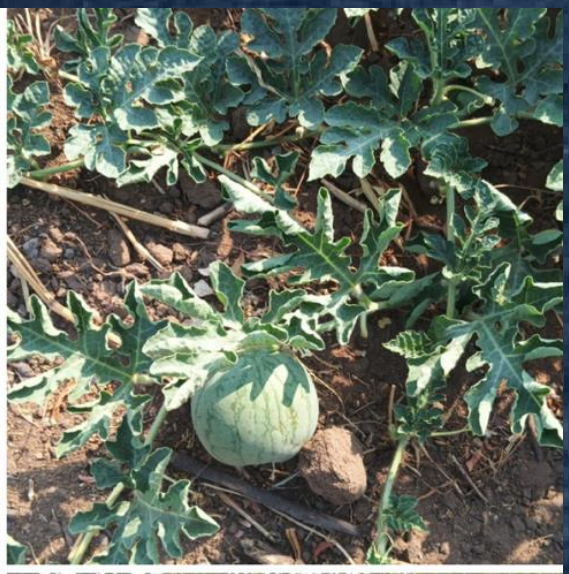
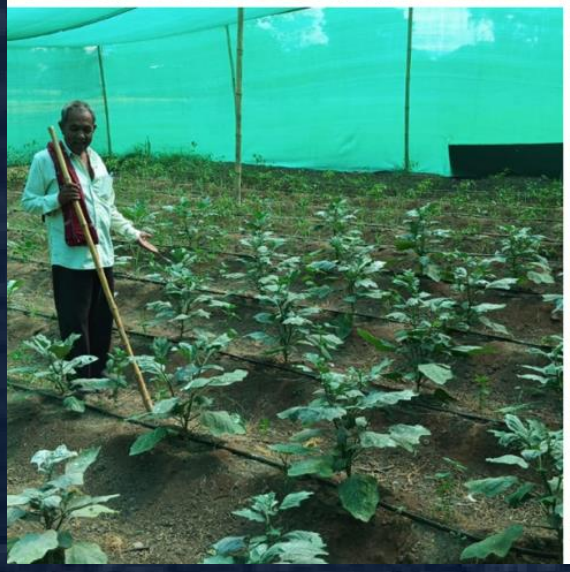
Summer Crop Impact Report on Smart Farming at Zamp, Sanand block, Gujarat (India)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Introduction

Adopting innovative technology enables the farmer to optimize crop management, leading to increased food production per unit of land. By harnessing renewable energy sources such as solar power, installed systems significantly reduce carbon emissions associated with farming operations, contributing to environmental sustainability. Additionally, precision irrigation and real-time monitoring ensure efficient water usage, conserving up to 80% of water typically used in food production. Automation and optimized growth conditions further expedite the time from planting to harvest, enhancing overall productivity. Moreover, by reducing the time spent for manual labour through precision irrigation, it not only improves productivity but also enhances working conditions for agricultural workers. This, in turn, leads to improved livelihoods for farmers, as higher yields and reduced manual labour translate into increased incomes and better quality of life. Furthermore, Smart Farming systems create entrepreneurship opportunities in the agriculture sector by providing access to advanced technologies and data-driven insights, enabling aspiring farmers to start ventures and drive innovation, thus fostering economic growth and rural development.

Last year in December, Spowdi along with Hand in Hand India installed 10 Spowdi Smart Farming systems across 10 farmers' fields in Zamp, Sanand block, Gujarat. During the winter season, these farmers adopted new crops such as Castor and Radish, using the Spowdi Smart Farming system instead of the traditional flood irrigation methods they used for Paddy and Wheat. This change not only reduced their production costs—such as labour, electricity, and diesel—but also led to a more efficient and profitable farming process.

After the first season with Spowdi, the farmers were highly satisfied with the results. In the subsequent summer, farmers who had previously left their land barren began cultivating vegetable crops like Brinjal (Eggplant), Cucumber, Watermelon, and Okra. This shift allowed them to lower production costs, benefit from improved yields and crop quality, and use the produce for their households. Additionally, they experienced significant financial gains.

The positive impact of the previous season was documented in an Impact Report from Spowdi, which highlighted the farmers' financial improvements and feedback. This success story not only encouraged other farmers in the village but also created a demand for extending the drip irrigation systems to cover the entire cultivable land of these 10 farmers. Despite the small size of their holdings, with each farmer owning a maximum of 2 acres, the results have been compelling.

After an additional season of harvesting vegetable crops, data collection and feedback from the six participating farmers were conducted on July 28, 2024. Due to heavy rainfall and natural disturbances, the farmers' lands were severely flooded. Despite these challenges, Spowdi's drip irrigation system significantly aided them in harvesting their previous crops and supported their livelihoods during this difficult period.

Field Instances

All the feedback, comments and data are shared by the farmers during the Impact data collection visit, who have been using the Spowdi Smart Farming systems for the past two seasons.

Crop Health, Yield and Uniform Germination:

Among the 10 farmers, six grew vegetables this summer season, resulting in an increase yield from their 500 square meter plots. The use of Spowdi Smart Irrigation significantly enhanced crop health and yield:

- **Increased Yield:** Farmers observed maximum yield per plant.
- **Improved Crop Health:** The system's precision irrigation promoted excellent vegetative and reproductive growth, leading to high-quality crops with minimal damage and reduced pest and disease incidence.
- **Uniform Germination:** By providing only the necessary amount of water, the Spowdi Smart Farming system minimized nutrient leaching and maintained soil structure and texture. This resulted in uniform and healthy germination.

Picture 1: Falji bhai showing his okra crop growth.

Irrigation Time Saved:

- **Efficient and precise Operation:** Farmers carry the system and just need to switch on the system, which automates water distribution through emitters. In contrast, traditional flood irrigation requires physical labour for up to six hours continuously.
- **Time Efficiency:** With Spowdi, farmers irrigated their fields every second day for two hours, illustrating a significant timesaving compared to the tradition (flood irrigation).

System Usage and Cost Reduction:

- **Cost Savings:** The reduced electricity usage and water consumption lowered production costs compared to traditional irrigation methods.
- **Free Seeds:** Farmers received complimentary seeds of Eggplant, Okra, and Cucumber from Hand in Hand India, which were well-suited to the Spowdi system, enhancing their productivity and efficiency.

Faster, Extra and Diverse Harvest:

- **Faster Harvest:** The precision irrigation system helped farmers harvest their crops earlier than with flood irrigation. This was due to the efficient water delivery that supported better growth and development.

Table 1: Comparison of crop period from the time of sowing to harvest in flood irrigation and Spowdi Smart Farming.

Crops grown	Flood Irrigation	Spowdi Smart Farming
Eggplant	80 days	55 - 60 days
Cucumber	65 days	50 days
Okra	60 days	45 – 50 days
Watermelon	85 – 90 days	70 – 75 days

- **Extra Harvest:** Farmers in Zamp, Sanand block, Gujarat, have traditionally left their fields fallow during the summer, awaiting the rainy season to plant paddy or wheat. However, for the first time, they successfully cultivated vegetables this season. This was made possible by the Spowdi Smart Farming system, which enabled them to grow crops using minimal water, and by the provision of seeds from Hand in Hand India. The farmers were able to manage cultivation during the dry season solely due to the water-efficient technology of the Spowdi system.

- **Diversified Income Streams:** Farmers who adopt multi cropping practices are often able to secure higher and more stable incomes compared to those who grow only a single crop. ¨*Multi-cropping, which involves growing multiple types of crops on the same land during a single growing season, offers several financial advantages*¨.

  By cultivating a variety of crops, farmers can generate multiple income streams. If one crop faces market price drops or lower yields, the farmer can still rely on the other crops for income. This reduces financial risk and ensures a more consistent revenue flow throughout the year. For example: Falji Bhai received more money than Govind Bhai because of adopting multi-cropping. In contrast, farmers who focus solely on a single crop are more vulnerable to market fluctuations. If the price of their crop drops due to overproduction, reduced demand, or other factors, they may be forced to sell their harvest at a lower price, significantly reducing their income. Additionally, single-crop farmers are more at risk of losing their entire income if that crop fails due to disease, pests, or poor weather conditions. This lack of diversification makes single-crop farming a riskier and often less profitable venture.

Scaling Drip Irrigation Success:

- Encouraged by the positive results, all six farmers have decided to buy an extension of the driplines to cover their entire one-acre plot for the next season. This move aligns with the goal of Spowdi and Hand In Hand to impact the lives of small-hold farmers in India.

Data Collection from the Impact Generators

Impact Generator: **Falji Bhai**

Data points	Smart Farming	Scale up scenario
Land size	500 sq. m	1 acre
Crop grown	Watermelon, Eggplant and Cucumber	
Crop Yield in kgs	800 kgs	6,400 kgs
Earning from harvest	₹14,700	₹1,17,600
Cost of Production	₹1100	₹8,800
Net earnings	₹13,600	₹1,08,800

Falji Bhai, a resident of Zamp Village in Sanand Block, is a small-hold farmer managing a total land area of 2 acres. Employing traditional flooding methods for irrigation has yielded an average crop production and income. The farmer in this region has traditionally grown only paddy and wheat, often skipped the summer season and left his land barren due to environmental factors. The required high financial investment has been a constraint for small-hold farmers. In the previous season, with flood irrigation, the farmer used to earn only 3,350 rupees, as this method produced only half the yield per 500 square meters compared to what could be achieved with Smart Farming.

With the new technology, Falji Bhai was able to grow crops during the summer season, a feat he previously thought impossible. He invested a modest 500 rupees in seeds and incurred only minimal costs for pumping water from the ground into the tank where the Spowdi pump was installed. He cultivated watermelon, cucumber, eggplant, and okra (multi-cropping) in 500 square meters divided into two zones. This diverse crop selection proved highly profitable.

Impact Generator: **Pratab Bhai**

Data Comparison	Smart Farming	Scale up scenario
Land size	500 sq. m	1 acre
Crop grown	Eggplant	
Crop Yield in kgs	300 kgs	2,400 kgs
Earning from harvest	₹12,000	₹96,000
Cost of Production	₹600	₹4,800
Net earnings	₹11,400	₹91,200

Prathab Bhai, traditionally cultivated paddy and orchard crops on his 2-acre land using age-old techniques such as flood and channel irrigation. Despite his efforts, these methods yielded average results in both crop production and income. However, challenges persist, particularly with water consumption and prolonged pump operation during flood irrigation, demanding substantial time and effort. Thus, the necessity for exploring alternative, more efficient farming methods became evident.

Prathab Bhai successfully harvested 300 kilograms of eggplant and observed luxurious growth of Napier grass in the 500 square meters he irrigated. He noted that the quality of the crops improved significantly, with enhanced vegetative and reproductive growth, abundant flowering and fruiting, and a reduction in pest and disease attacks.

Impact Generator**: Shamji Bhai**

Samji Bhai, a farmer from Zamp village, previously experienced significant improvements in his castor crop yields using the Spowdi Smart Farming system. Historically, farmers in the region, including Samji Bhai, refrained from cultivating their land during the summer due to environmental constraints and other challenges. However, with the adoption of Spowdi technology, Samji Bhai ventured into growing new crops during the summer season.

Data Comparison	**Smart Farming**	**Scale up scenario**
Land size	500 sq. m	**1 acre**
Crop grown	Okra, Eggplant and Cucumber	
Crop Yield in kgs	600 kgs	4,800
Earning from harvest	₹18,000	1,44,000
Cost of Production	₹650	5,200
Net earnings	₹17,350	1,38,800

In the summer, Samji Bhai cultivated okra, eggplant, and cucumber (multi-cropping) in an area of 500 square meters. These crops were new experiments for him during this season. The use of Spowdi's drip irrigation system resulted in a total yield of 600 kilograms from these crops, setting a notable example for small-hold farmers in Zamp and surrounding villages.

Impact Generator: **Govind Bhai**

Like the other farmers, Govind Bhai is also a small-hold farmer from Zamp village in the Sanand block of Gujarat and has traditionally cultivated paddy on his 2-acre land during the rainy and winter seasons. Utilizing conventional flood and channel irrigation methods, he maintained average crop yields and income. In a bid to enhance his farming practices and explore new opportunities, Govind Bhai adopted Spowdi Smart Farming technology.

Data Comparison	**Smart Farming**	**Scale up scenario**
Land size	500 sq. m	1 acre
Crop grown	Eggplant	
Crop Yield in kgs	500 kgs	4,000
Earning from harvest	₹7,500	60,000
Cost of Production	₹500	4,000
Net earnings	₹7,000	56,000

Utilizing the Spowdi system, Govind Bhai successfully cultivated eggplant over 500 square meters. He achieved a notable yield of 500 kilograms of eggplant. This enhanced productivity resulted in a substantial increase in his income, with earnings from the eggplant harvest reaching 7,500 INR. After accounting for expenses, Govind Bhai realized an impressive profit of 7,000 INR. The shift to solar-powered irrigation not only reduced operational costs but also eliminated reliance on electricity.

Impact Generator**: Vinu Bhai**

Vinu Bhai, a farmer from Zamp village in the Sanand block of Gujarat, had traditionally relied on flood irrigation for cultivating paddy. His experience with this conventional method led to average results and high costs.

The drip irrigation system allowed Vinu Bhai to irrigate his crops every other day for just 2 hours, ensuring optimal moisture levels and maintaining excellent plant quality. This efficiency not only improved crop development but also significantly reduced his time and labour requirements.

Data Comparison	Smart Farming	Scale up scenario
Land size	500 sq. m	1 acre
Crops	Eggplant and Okra	
Crop Yield in kgs	400 kgs	3,200
Earning from harvest	₹10,000	80,000
Cost of Production	₹1,500	12,000
Net earnings	₹8,500	68,000

The financial benefits of adopting Spowdi were substantial. Vinu Bhai experienced increase in profit, achieving 10,000 INR from the 500 square meter area of new crops. In contrast, his previous reliance on flood irrigation for paddy and leaving fields barren in the summer had yielded no income during that period. This newfound profitability demonstrates the significant advantage of adopting Spowdi's technology.

Impact Generator: **Veer Singh Bhai**

Veer Singh Bhai, a farmer from Zamp village in the Sanand block of Gujarat, has traditionally grown castor throughout the year using flood irrigation. Faced with the high costs and limitations of this conventional method, he decided to explore new possibilities by adopting the Spowdi Smart Farming system.

In a notable shift from his traditional practices, Veer Singh Bhai utilized the Spowdi system to cultivate a mix of okra and eggplant over an area of 500 square meters during the summer—a season that most farmers in the region typically leave unused due to environmental challenges. His decision to experiment with these new crops in the summer yielded impressive results.

Data Comparison	Smart Farming	Scale up scenario
Land size	500 sq. m	1 acre
Crop	Eggplant and Okra	
Crop Yield in kgs	600 kgs	4,800
Earning from harvest	₹12,000	96,000
Cost of Production	₹1,500	12,000
Net earnings	₹10,500	84,000

In terms of yield, Veer Singh Bhai recorded a total harvest of 600 kilograms from the combined crops of eggplant and okra. This result demonstrates a successful adaptation to summer cultivation, setting a precedent for other small-hold farmers in Zamp and neighbouring villages.

Conclusion

The implementation of Spowdi Smart Farming practices in Zamp, Sanand Block of Gujarat has yielded remarkable success, revolutionizing irrigation methods. Not only has there been a substantial increase in crop productivity and net earnings for farmers, but the reliance on fossil fuels or electricity-intensive water pumps has also been diminished. Through the adoption of precision irrigation techniques, water consumption has been slashed by up to 80%, marking a significant stride towards sustainable resource management. Moreover, the implementation of systems has eliminated the need for manual labour in ensuring timely and efficient water distribution across farms, further streamlining agricultural operations.

Building upon the initial success in Sanand, the Smart Farming concept is poised for widespread adoption and scalability across diverse regions benefiting small-hold farmers.