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HIGHLIGHTS

- *Demonstration with improved varieties resulted in a 60% yield improvement over traditional varieties.*
- *Significant yield increase highlighted the potential of the improved varieties to meet and exceed the local production standards.*
- *Farmers motivated to expand the area under new varieties in the upcoming season.*
- *Farmers shared the seeds with fellow farmers, encouof mustard raging wider adoption and interest in the improved variety within the community.*

ICAR-DRMR INTERVENTION IN MUSTARD VALUE CHAIN UNDER APART

-ICAR-DRMR –APART TEAM

Overview

The ICAR-Directorate of Rapeseed-Mustard Research (DRMR) as a technical knowledge partner for mustard value chain under APART conducted a number of crop demonstrations with improved varieties viz. *DRMR-150-35, PM-28, NRCHB-101* of Indian mustard and *TS-38* of Toria along with other technological interventions in different districts of Assam during 2020-21 to 2023-24. This activity aimed to introduce and evaluate high-yielding, resilient varieties of mustard and toria to increase the productivity of local farmers' fields. The project focused on promoting improved varieties as a viable option for farmers looking to enhance their yield potential compared to traditional varieties.

Successes

The demonstration with improved varieties led to remarkable results, achieving about 60% yield improvement over the farmer’s traditional varieties. This notable increase in yield showcased the variety's potential to meet and exceed local production standards, positively influencing the farmer to expand his area under new varieties in the upcoming season. Additionally, the farmer shared seeds with fellow farmers, inspiring broader community adoption and interest in the improved variety.

Challenges Overcome

Some initial challenges included reluctance from the farmer to replace his trusted local variety, as well as limited familiarity with the new variety among the surrounding community. Additionally, ensuring the variety's performance under local soil and climatic conditions was a key concern. Through effective communication, continuous guidance, and showcasing the visible yield improvements, ICAR-DRMR successfully addressed these challenges and built farmer confidence in the new variety.

Lessons Learned:

This project underscored the importance of community engagement and demonstration-based learning to increase adoption rates for improved crop varieties. Moreover, it highlighted the need for ongoing support and field visits to assist farmers in maximizing yield potential. These insights will guide the planning of future demonstrations and help streamline implementation strategies to better address initial farmer hesitations and encourage wider adoption.

Future Opportunities

The success of this project opens doors for wider promotion and distribution of improved varieties along with technological interventions in other districts and regions with similar climatic conditions. It presents an opportunity to develop seed distribution networks through collaborative farmer clusters, enhancing the local seed bank system. Further, there is potential to introduce complementary agricultural practices and resources, such as improved fertilizers and pest management solutions, to support the long-term sustainability of high-yielding mustard production across the region.

Farmer Biplab Gogoi from Namgaon village in the Pachim Kaliabor block of Nagaon district benefited from the. Transitioning from conventional farming, he adopted the enhanced agricultural techniques with support from the DRMR and the Department of Agriculture.

Under the ICAR-DRMR-OPIU (Agri.)-APART program, he cultivated Indian Mustard (Variety: DRMR-150-35) on a 2 bigha plot. He got trained on technological interventions and benefited from regular monitoring and timely advisories from the ICAR-DRMR and the Department of Agriculture.

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The crop growth was excellent, attracting nearby farmers to his demonstration plot, where they appreciated the showcased variety and technologies used. Gogoi harvested 202 kg from a 0.25-hectare plot, resulting in a yield of 1,515 kg per hectare, which was 53.98% higher than the local variety's yield of 790 kg per hectare. He earned Rs. 98,475 at a selling price of Rs. 65 per kg, with a cultivation cost of Rs. 24200 per hectare, yielding a profit of Rs. 74,275 per hectare. With a good return during the season, Gogoi expanded his mustard cultivation to 0.45 hectares using the same variety (DRMR-150-35) from the saved seeds. He harvested 810 kg with a yield of 1,732 kg per hectare and achieved a gross market return of Rs. 94,394 at Rs. 54.50 per kg, with a cultivation cost of Rs. 25000 per hectare. His profit increased by Rs. 69394 per hectare. Encouraged by these results, he is promoting the adoption of improved rapeseed-mustard varieties and technologies, aiming for the state's self-sufficiency in oilseed production.

Prahlad Sarkar, a farmer from Naherbari village, Borigog-Banbhag block of Nalbari district, Assam, used to grow local toria crops on 1 hectare of his 2 hectares of cultivable land, yielding only 3-5 quintals per hectare with conventional methods.

During the 2021-22 mustard season, he participated in the ICAR-DRMR-APART initiative, which involved a demonstration on 0.25 hectares using the improved PM-28 variety. The demonstrations included practices, such as seed treatment, proper soil preparation, recommended seed rates, and effective plant protection measures. Sarkar received training to enhance his skills before sowing and during the crop development period.

With regular monitoring from ICAR-DRMR and the Department of Agriculture, the crop thrived, and neighboring farmers appreciated the results. He harvested around 1,755 kg per hectare, a 48.71% increase compared to his local variety, which yielded 900 kg per hectare. He achieved a Gross Margin Ratio (GMR) of Rs 97500 at a selling price of Rs. 65/kg, with a total cultivation cost of Rs. 33667 per hectare, resulting in a profit of Rs. 63833 per hectare from the improved practices.

After witnessing the successful performance of the new mustard variety and recommended technology, Mr. Prahlad Sarkar decided to adopt the PM-28 variety on a larger scale. Several neighboring farmers were impressed and also took seeds from him for the next season.

In the 2022-23 season, he expanded his mustard cultivation to 1 hectare, following the suggested practices. He achieved a yield of 223 kg per bigha (1670 kg per hectare), marking a 47.6% increase over the local practices. His gross margin was Rs 81250 at a selling price of Rs 60 per kg, with overall cultivation costs at Rs 30705 per hectare. This investment led to an increased profit of Rs 50545 per hectare.

Mr. Sarkar is enthusiastic about his results and is encouraging other farmers to adopt improved varieties and technologies to boost oilseed production in the state.

ZERO TILLAGE MAIZE CULTIVATION UNDER APART

IIMR –APART TEAM

Overview

Maize is a crucial crop grown after paddy in Assam, located in Northeast India. The region benefits from fertile soil and a favorable climate for agriculture. Currently, maize is utilized for various purposes, including food, animal feed, starch, and industrial applications. However, Assam produces only 150,000 to 200,000 tonnes of maize, while the demand exceeds 1 million tonnes for feed and bioethanol.

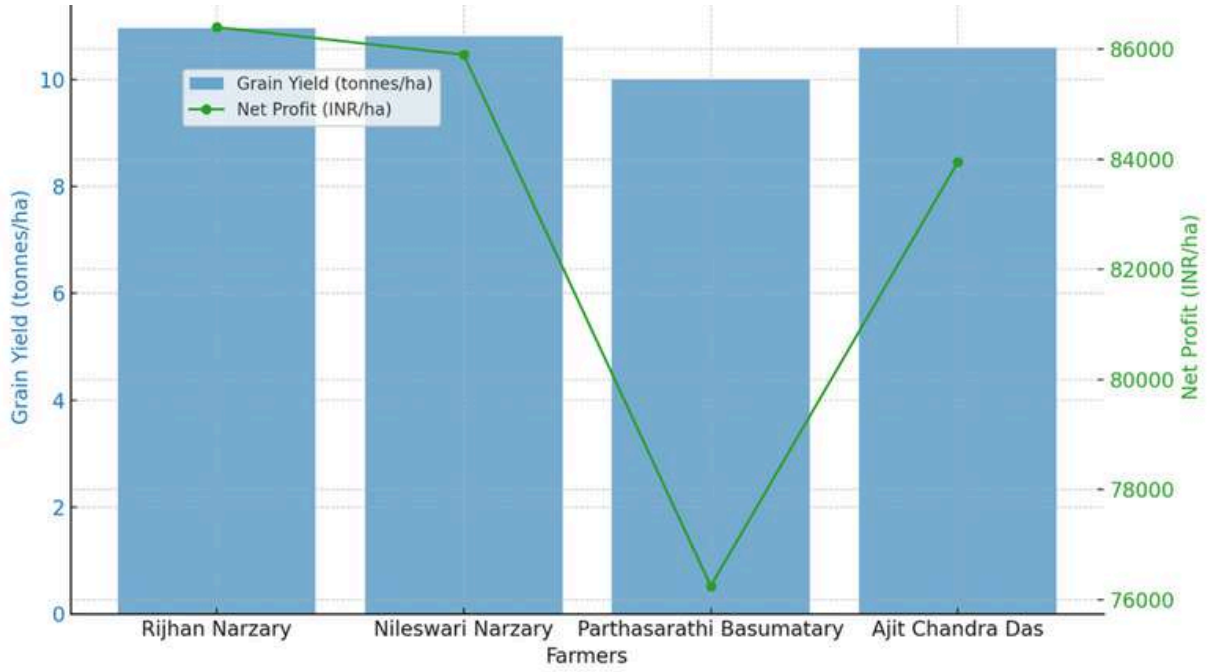
Therefore, increasing maize cultivation in Assam would significantly enhance food and feed security, provide nutritional benefits, and contribute to economic growth for both Assam and the broader North-Eastern Himalayan (NEH) region. To support these objectives, the Government of Assam (GoA) has launched the Assam Agribusiness and Rural Transformation Project (APART) in collaboration with the ICAR-Indian Institute of Maize Research (IIMR) in Ludhiana, Punjab. This initiative is being implemented across twelve districts in Assam, aiming to boost maize production through best management practices (BMPs). The focus is on improving farm productivity to benefit livestock feed and agribusiness industries, ultimately supporting sustainable livelihoods in the region.

Sowing of maize crop with zero tillage machine under non-residue and residue management practices.

In the Kokrajhar district, farmers are making a transition from traditional farming methods to modern techniques through zero tillage (ZT) for maize cultivation. The ICAR-IIMR team, in collaboration with APART, conducted a total of 160 on-farm trials for maize during the Rabi season of 2023-24. These trials focused on advanced best management practices (BMPs), including four variations of zero tillage with and without residue management.

With the support of KVK Kokrajhar, the IIMR team provided ZT machines to the farmers, enabling them to sow maize using zero tillage practices. As a result, the farmers have achieved yields 50-55% higher and also have increased their farm income from 176 to 215%, with net profits ranging from INR 76,000 to 86,000 per hectare compared to traditional methods.

This approach not only reduced the time and energy required for maize cultivation but also lowered the necessary doses of NPK fertilizers. Previously, excessive use of herbicides and high fertilizer applications had negatively impacted crop yields and profitability. However, the adoption of zero tillage practices has helped to address these challenges. Furthermore, farmers have gained knowledge and skills in zero tillage methods for maize farming, promoting more sustainable and profitable agricultural practices.



Grain yield (tonnes/ha) and Net profit (INR/ha) of four farmers under Zero tillage maize cultivation with and without residue management in Assam

Impact

The implementation of zero tillage (ZT) practices has had a significant impact on maize farming in Kokrajhar District. Thanks to the interventions of the IIMR team and APART, farmers who adopted ZT have experienced notable improvements in productivity, profitability, and soil health. The profound impact of ZT practices is summarized in **Table 1.**

Table 1*. Impact of zero tillage on different aspects during maize cultivation.*

Impact Area	Output	Key Finding
Productivity	Increase maize yield by 10-30% then conventional tillage methods.	Improves maize yields by reducing soil compaction, enhancing root growth, and conserving moisture.
Profitability	Reduced input costs including 15-40% higher profitability along with higher yields	Reduces input costs (fuel, labor, water) and increases profitability.
Water Use Efficiency	Reduction in water use 15-30%, depending on local climate conditions.	Reduces water evaporation and improves soil moisture retention.
Soil Health	Increased soil organic matter (SOC) over several seasons including soil aggregation while reduced erosion.	Improves soil structure, organic matter, and microbial activity.
Community Collaboration	Adoption by some neighboring farmers during upcoming rabi season, with a ripple effect in surrounding areas.	Adoption leads to collective action and knowledge sharing among farmers.

Overcoming Challenges

- **Skepticism:** Initial resistance from farmers towards new methods was addressed through persistent training and successful demonstrations. This approach helped build trust and encouraged the adoption of innovative practices.
- **Logistics:** The farming practices required adjustments to suit the specific climatic and soil conditions of Assam. Key challenges included managing residual moisture in flooded areas and tackling perennial weeds in rice fields.
- **Knowledge Gaps:** Many farmers had limited knowledge of modern farming techniques. Extensive training sessions and hands-on workshops were conducted to equip them with the necessary skills to effectively implement zero tillage practices.

Lessons Learned

- Continuous education and practical training were essential for successfully adopting new farming techniques.
- Strong partnerships among agricultural research institutions, local governments, and farming communities enhanced effectiveness.
- The implementation of modern mechanization, such as zero tillage practices, improved productivity by 20%, profitability by 200%, and resource efficiency while fostering community-driven knowledge sharing.

These lessons highlight the importance of sustained support, effective collaboration, and adaptability for future agricultural initiatives.

Future Opportunities

With continued government support, research, and community-driven efforts, ZT can be expanded across the region to meet the growing demand for maize while ensuring long-term soil and water health. This approach can significantly enhance food security, economic growth, and resilience to climate change, making it a key strategy for Assam's agricultural future. There are several more opportunities for future growth of ZT in Assam are given in **Table 2.**

Table 2. The key areas of future opportunities for zero tillage in Assam along with specific initiatives and their associated benefits.

Opportunity Area	Key Initiatives and Benefits
Scaling up Adoption	➢ Wider adoption in other districts ➢ Targeting smallholder farmers with financial incentives or subsidies
Advanced BMPs	➢ Integration of modern agricultural technologies ➢ Crop diversification with maize-legume intercropping
Climate Resilience	➢ Improved resilience to erratic rainfall and droughts ➢ Integration into climate-smart agriculture strategies
Economic Growth	➢ Strengthening maize value chains ➢ Promotion of feed and bio-ethanol production
Sustainability and Soil Health	➢ Long-term improvement in soil fertility ➢ Increased soil carbon sequestration
Capacity Building	➢ Continuous education and training programs ➢ Farmer field schools and hands-on workshops
Research and Innovation	➢ Adaptation of ZT practices to different soil types and climate zones ➢ Development of low-cost ZT machinery
Government Support	➢ Subsidies or financial incentives for ZT equipment and inputs ➢ Supportive policy framework

Conclusion

The adoption of zero tillage (ZT) practices for maize cultivation in Kokrajhar District, Assam, has transformed local agriculture. With support from the ICAR-IIMR team and the APART project, farmers have improved productivity and profitability while reducing input costs, labor, and the doses of NPK fertilizers. The benefits of these practices have extended to water use efficiency and soil health, leading to better moisture conservation, reduced erosion, and increased soil organic matter.

Overcoming initial skepticism, extensive training and community collaboration were essential for the successful adoption of ZT practices. Ongoing support and research will continue to expand these practices, enhancing food security, economic growth, and climate resilience in Assam. The success seen in Kokrajhar highlights the potential for sustainable and profitable agriculture through innovative practices.

EMPOWERING POTATO FARMERS THROUGH BETTER MARKET LINKAGES - APART'S INTERVENTION WITH MANIKPUR JOHA RICE PRODUCER COMPANY LIMITED (MJRPCL)

- APART TEAM

LOCATION : BONGAIGAON -ASSAM

VARIETY : CHIPSONA 3 (PROCESSING TYPE)

AREA COVERED : 3 HECTARES

SEASON : RABI OF 2023-24

In the 2023-24 rabi season, the Assam Agribusiness and Rural Transformation Project (APART) under the Potato area expansion initiative collaborated with Manikpur Joha Rice Producer Company Limited (MJRPCL), Bongaigaon to enhance potato productivity, focusing on better market linkages with Chipsona 3- a processing variety of potato.

Cluster Approach and Training

APART adopted a cluster-based approach and organized the local farmers of MJRPCL to cultivate Chipsona 3 variety of potato in 3 hectares of land. Intensive training on Best Management Practices (BMP), covering land preparation, seed selection, irrigation, pest management, and post-harvest handling etc, was provided to the farmers. This knowledge empowered farmers to maximize yields and produce high-quality potatoes.

APART also organized field day for farmers to learn from experts and see the potential of Chipsona 3.

Demonstration Plot of Chipsona 3 variety

Yield and Market Linkages

The initiative led to an impressive average yield of 16 metric tons (MT) per hectare of processing potato variety. With the established market linkages facilitated by APART, the farmers could connect directly with major food processing companies like PepsiCo and Haldiram, etc, ensuring good price realization, and a steady & profitable market for the harvested potatoes.

A Sustainable Partnership with PepsiCo

With support from APART, MJRPCL signed a contract farming agreement with PepsiCo, ensuring a consistent linkage for buy back of the harvested potatoes. This partnership enabled MJRPCL to supply high-quality processing potato varieties to Pepsico, thus benefiting both in the long run. The farmers cultivate various potato varieties, including Kufri Pukhraj, Kufri Jyoti, Kufri Chipsona 3 and Lady Rosetta. The average market price for table varieties is approximately Rs 8-9 per kg, while processing varieties, such as Kufri Chipsona 3 and Lady Rosetta, are priced around Rs 10-11 per kg. With a steady market linkage with Pepsico, farmers can sell their produce at Rs 12 per kg. In addition to a better selling price, they also have a confirmed market.

Potato Harvesting

Field day

Impact on Farmers and Future Outlook

This initiative has significantly impacted participating farmers by providing access to high-value markets, training, and a reliable supply chain. The collaboration with brands like PepsiCo and Haldiram have boosted farmers' confidence and created opportunities for growth in potato farming across the region, benefiting farmers, and enhancing the local economy while contributing to the agro-processing sector in Assam.

Conclusion

The APART-MJRPCL collaboration demonstrates how strategic interventions and strong market connections can transform farmers' livelihoods, showcasing the potential of high-quality processing varieties like Chipsona 3 while establishing lasting partnerships with industry leaders for sustainable potato farming. The farmers of MJRPCL wish to continue potato contract farming for processing varieties year after year.

SUNSUMWI BASUMATARY'S JOURNEY TO SUCCESS

-OPIU Sericulture

Sunsumwi's journey started with minimum resources available at her capacity. She was able to conduct one or two Eri rearing due to limited number of host plant available.

PRIOR TO APART INTERVENTION

RESOURCES
30 Nos of Kesseru plant.

INCOME
Very limited income generated which is insufficient to invest for commercial rearing.

PRODUCTIVITY
She produced good quality cocoons of decent quantity from her minimum resources.

Connecting with APART: A New chapter

In the year 2019-20, through APART intervention, she was able to increase her host plant count to 330 plants, despite some mortality among the plants that were provided. Through APART, Sunsumwi also received training, resources, and support that gave her exposure and platform to enhance her productivity and income. Now, she is able to conduct four to five cycles of Eri rearing each year.

Through training, resources, and support, APART has significantly increased Sunsumwi's productivity. She was able to grow from rearing one to two cycles per year to four to five cycles. APART not only enhanced Sunsumwi's skills but also helped her increase her income and diversify her product offerings.

Building a sustainable livelihood

At present, she is actively engaged in the spinning sector in addition to her rearing activities, as her production has reached new heights. She has also begun weaving and manufacturing sericulture by-products such as Eri Mekhela Sador, shawls, stoles, coats, and ties. This diversification has significantly increased her income, enriching her livelihood and expanding her business.

Sources of her Income generation –

- Selling of cut cocoon
- Spinning of Eri yarn
- Selling of Eri Pupa
- Selling of weaving product.

A Symbol of Women Empowerment

Today, ***Sunsumwi*** serves as an example of an empowered woman who has built a livelihood through her skills and hard work.

Her journey, from being a marginal eri rearer to becoming a self-sustaining entrepreneur, reflects the potential of rural women to achieve economic independence.

Sunsumwi's story inspires her community and demonstrates the impactful role that proper support and determination can play in transforming rural lives.

Sunsumwi's Journey to financial independence

Sunsumwi Basumatary, from a small village of Dadhara in Lakhimpur District, was selected as a beneficiary of the APART project in 2019-20.

The project focused on cultivating Kesseru plants and diversifying her production efforts.

Kesseru Plantation: Sunsumwi sustained 330 Kesseru plants, which became productive after three years. Although a few plants faced mortality, she received support to plant an additional 450 Kesseru plants.

Eri Silk Production: Over the past two years, her production has averaged 200 cocoons, yielding approximately 18 kg of Eri pupae. This has resulted in an income of around Rs 61,100 (Rupees Sixty-One Thousand One Hundred) annually.

Through her hard work and the support of the APART project, Sunsumwi is on her way to achieving financial independence. Sunsumwi's success story highlights the potential for growth within the Eri silk industry in Lakhimpur District. Her journey from a small-scale rearer to a diversified artisan illustrates the opportunities available for rural women in this sector. As more individuals like Sunsumwi receive support and training, the Eri silk industry in Lakhimpur is set for significant expansion. This growth not only helps preserve traditional crafts but also fosters sustainable rural development and empowers women in the region.

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