



**National Conference on  
Regenerative Agriculture in Cotton Farming Systems  
Empowering Small Farmers  
Nov 15-16, 2023 (IESE-NUST)**

## Acknowledgements

I take immense pleasure to acknowledge the efforts of the people, who helped me to make this report a reality and i express my gratitude for their suggestions, guidance and intellectual input. I extend my sincere and special thanks to Dr. Shahid Zia, CEO of Rural Business Development Centre (RBDC), to organize this conference for the apparel and textile industry in Pakistan and providing opportunity for the stakeholders to effort together for the coming challenges in agriculture and specially the cotton sector.

I am also thankful to all the participants for their endeavors to make this conference a success. And, my all acclamation to Almighty ALLAH, who enabled me to accomplish this task.

With Sincere Thanks

## Message from the CEO

Today, I am thankful to the cotton farming communities of Pakistan, who are struggling hard to go through the whole process to provide us with this essential natural fibre of cotton. Because these communities are facing many of the social and environmental challenges not only at the grass root levels but also at the national and regional levels. Therefore, the issues that these communities are facing, are more urgent for us to address through this platform, where two of these challenges — climate change and gender equality — stand to be the key issues of the current time.

The bottom line here is, that transforming the cotton sector is not the work of one organisation alone but we all need to take this time to listen and learn from each other, reflecting on the importance and the role of cotton sector around the world. For this purpose, i would like to encourage the brands and textile industry to participate with us together and leverage our resources and networks in this struggle. So together, we can make the change and a smooth transformation to a sustainable cotton sector — and world — a reality, because when, we look at climate change, we see the scale of the task ahead. Here the good thing is, that we already plan this conference and many other endeavours through the year to implement the regen-practices to address the issues for putting them in place.

The issues of climate change and gender equality serve as powerful lenses with which to view the current state of the cotton sector, which shows us that our vision of a sustainable cotton world is still within reach, where cotton farmers and workers would know how to cope with the environmental threats, low productivity and limiting societal norms,. This also ensures us that a new generation of cotton farming communities will be able to make a decent living, will have a strong voice in the supply chain and meet growing consumer demand for more sustainable supply chain. Now we, the RBDC has a clear direction, to create value for our stakeholders, maintain our focus of sustainability and keep our activities transparent through the whole supply chain. In addition to supporting national economies through successful business results, we also stand by our cotton communities during difficult times as we believe that sustainable operation is closely linked to maintaining the sustainability of the communities and natural resources in our areas. We also aim to minimize our impact on the environment through projects and processes for recycling water and preventing carbon emissions in our all project areas and wish to set an example through our sustainability initiatives to turn these efforts into tangible gains for all the stakeholders. In this regard, looking back on the last few years, we see a tremendous success with a lot of lessons learned and experiences gained, to be proudly shared and celebrated with our stakeholders.

Finally, i would like to take this chance to thank all the speakers, resource persons, participants and the RBDC team, who made it possible to attain the results you will find in this

report. I sincerely hope you will enjoy reading the report on Regen-Agriculture and the way we can implement it together.

With warm regards,

Dr. Shahid Zia  
CEO, RBDC

## Executive-Summary

The two days conference was organized by RBDC, (Rural Business Development Centre) with the hope that, mapping the current ecosystems and providing guidance on the topic of Regen-Agriculture will enable the apparel industry and brands to understand the stages of engagement in this system for the support of ongoing processes in this effort. It will help partners to gain clarity of the efforts in mitigating climate change impacts, enhancing biodiversity, social justice, and the sustainability targets at the grass root levels. With this context, Dr Shahid Zia, CEO of the RBDC, in the augural session set the stage for discussions on climate action and sustainable livelihoods strategies, especially for the cotton farming systems and the communities engaged in it.

The overall conference agenda intended to provide a clear understanding of the tools, initiatives, guidance, best practices and programs of regen-agriculture to the apparel, textile, and footwear industry with some concrete pathways to deepen their engagement for supporting the initiative, relevant to all major apparel and textile crops, including cotton, hemp, leather, wool, alpaca, mohair, and cashmere from grazing systems, where crop residues is a major source for the biosynthetic fibers.

This is important that, the apparel, textile, and footwear industry's interest in the potential of regen-agriculture is increasing with a fast momentum. For the companies having disruptions to fiber production due to climate change impacts and biodiversity loss, now has realized the need for transition to regen-agriculture. Which is fundamental strategy for the long-term health of the sector, as it can play a key role in helping farmers to develop more resilient systems, bringing immense social and environmental benefits. But what the brands lack here, however, is a shared framework to understand, contextualize, measure, and describe work in this area. With this in mind, the conference findings may help design the Regen-Agriculture to have a deeper understanding of tools, programs, initiatives, and guidance on the subject issue.

The report is intended to provide the apparel, textile, and footwear industry with a clear understanding of the new programs and initiatives that are necessary to be taken within the regen-agriculture. It suggests concrete pathways for brands to deepen their engagement, because the companies across the sector are keen to understand the regen-agriculture opportunities. This will, therefore offer a common framework to the industries to credibly implement and avail the benefits of regen-programs by understanding its stages, projects and partnership. It will provide clarity on how they can support climate changes, biodiversity, social justice, and other sustainability targets.

Further this report is a call to action for companies to start investing in pilot projects that are developed in full financial partnership with farmers, indigenous communities, and for the researchers to generate more data on regen-agriculture as they go for more research. Making this investment can benefit soil, nature, and communities, as well as maximize time for learning and adaptation in the eight short years remaining before 2030. A regen-way of

thinking also aligns with a new economic model for the apparel industry, including more just and non-extractive supply chains and an emerging emphasis on the growth and ultimately, this will be an opportunity for the brand to make investment in a different system.

### **Key Takeaways**

1. A transition to regen-agriculture is fundamental for the fashion and textile industry.
2. The long-term health of the cotton sector will depend on how it is able to work with farmers to develop more resilient systems, and offer immense social and environmental benefits.
3. Programs need be rooted in justice, equity, and livelihoods.
4. To implement the regen-agriculture, apparel, textile, and footwear companies need to increase information-sharing with the food and beverage sector, ensuring that apparel brands influence the latest policy developments, financing models, and research initiatives.

**Future” initiative:** If all the stakeholders in cotton sector get serious about regen-agriculture, then we will not start with what happens on the land, but how the land is still being treated, that starts with who owns, governs, and controls the systems because, today’s ownership, governance, and control is the main reason we have the global crisis we collectively confront.”

## Introduction

There are 3.4 billion people living in rural areas of the world today and despite the rapid urbanization, this number will likely remain constant through 2030 due to population growth. Therefore, to end extreme poverty and hunger by 2030 will not be possible without inclusive sustainable rural and agri development goals, that may benefit the poor rural communities in the coming time.

In most countries, rural development is equated with support for large farmers, means that only large farms can take advantage of scale up economies and modern production techniques, although numerically, smallholders dominate rural economies. Two thirds of rural inhabitants depend on roughly 500 million small and family farms for their livelihood. They face significant constraints in accessing resources, technologists, transport, information and financial barriers that limit their participation in market products. As a result, smallholders have very low crop yields and much of their diet is limited to what they produce themselves, resulting in food insecurity to cause under and malnourishment.

Further these smallholders have their area specific problems, which presents a challenge for their support from the governments, businesses or non-profits institutions. Whereas a true rural transformation will require efforts that are sufficiently coordinated and scaled to reach hundreds of millions of farmers across diverse geographies to address multiple objectives at the same time – ending hunger for providing a diverse diet to end malnutrition and fostering a cultural change of entrepreneurship by providing access to modern finance and global markets by introducing climate-smart technologies. But the gap in smallholder financing is not surprising as their credit demands fall between microfinance and commercial loans and their needs are too large for microfinance to provide a solution. Hence, they are out of commercial lending due to high administrative costs per dollar lent, high risk (climate, seeds, markets and new farming techniques), low collateral and significant seasonality in earnings. Then, there is little evidence of policy improvements in developing countries on average, as measured by indicators of rural sector performance assessments.

Therefore, keeping in view, the problems of small farmers along with climate change impacts, the global agri-food system need to deliver on multiple fronts to feed the world, adapt to climate change, and drastically reduce its greenhouse gases emissions. In response to these challenges, the concept of Regen-Agriculture (RA) has emerged as a holistic approach to end food insecurity, promote sustainable development and address climate change issues. This is because, although regen-agriculture is built on existing agricultural knowledge, technologies, and sustainability principles, but it has an explicit focus to address climate change, and the tradeoffs that exist between productivity, adaptation, and mitigation because it has the capacity to simultaneously boost productivity, enhance resilience and reduce GHG emissions. It also promotes specific agro-ecological conditions like, the adoption of climate-resilient crop

varieties, conservation agriculture techniques, agroforestry, water management strategies, and livestock management improvement to triple win the results as following,

1. It Produces more and higher quality food without putting an additional strain on natural resources, improves nutrition security and boost incomes, especially for 75 percent of the world's poor small holders for their livelihoods.
2. Reduces vulnerability to droughts, pests diseases, climate-related risks and improve the adaptation capacity in the face of long-term stresses for crops.
3. Reduces greenhouse gases emissions, deforestation due to cropland expansion, land degradation, soil erosion and improves on-farm biodiversity and water retention in the soil.

### Conference Objectives

1. To acknowledge the Indigenous roots of regen-agriculture for policy initiatives.
2. To address the financial and other risks faced by farmers in the transition to regen-agriculture.
3. To provide an overview of the opportunities for textile, apparel, and footwear brands to engage them in regen-agriculture.
4. Produce crops with sufficient yield and nutritional quality to meet existing and future needs, while keeping the impact of resource inputs as low as possible.

### The scope of Conference

To achieve the conference objectives, the Rural Business Development Centre (RBDC) invited the leading experts and change-makers to explore the potential of regen-agriculture, a revolutionary approach that goes beyond sustainability. Because, by leveraging regen-practices, we can rebuild degraded land, combat climate change, produce nutritious food and protect the natural resources.

During the two days conference, different sessions highlighted the impact of climate change on cotton farming communities and explored collaborative solutions. The Parallel and break-out sessions analysed the local data and carbon financing projects to drive farm-level improvements. The topic of sustainable livelihoods was an engaging conversation on the farmer s' income facilitated by the cotton value chain stakeholder. The sessions explored the concepts of "wellbeing" and "sustainable livelihoods," with experiences shared by the experts, researchers and field teams.

This conference intended to provide links between science, agriculture, food/nutrition and health industry to provide information by engaging academics, students researchers, stakeholders, agricultural consultant, food manufacturers, product developers, nutrition,

health consultants, marketing professionals, retailers; policy-makers, consumers and public, who are seeking evidence-based information around regen-farming. The conference also provided opportunity to advance policy dialogue to identify future opportunities for new programs, raising public awareness and support for regen-agriculture. The conference substantially supported the, consumer markets, interested corporate parties, and farmers to understand the missing link between early concept of regen-agriculture and current regen-performance with indicators that has increased appreciation of this system to make a shift in the academic opinion.

The conference remained a resounding success as the experts throughout fashion supply chains, from valued cotton farmers, brands and retailers, who always source their products, they remained interested in the discussion. These discussions resulted for the urgent action required to tackle the climate crisis, but with a clear consensus around the need to deliver a profound impact at farm level. Therefore, with this group of changemakers, there is now an ample opportunity to push for social and environmental transformation through the regen-approach.

### **Challenges in Conventional Cotton farming**

Conventional cotton farming relies heavily on monoculture practices, extensive chemical use and irrigation, which have far-reaching negative consequences for both the environment and local communities. These practices degrade soil quality, deplete water resources, and harm biodiversity, all of which increase climate vulnerability for the cotton farmers. The excessive use of pesticides and synthetic fertilizers also poses health risks to farmers and nearby communities through greenhouse gases emissions.

As climate change intensifies and land degradation accelerates, there is a need to look again at how cotton is cultivated because conventional cotton farming practices have taken a heavy toll on the environment and the communities dependent on this crop. Regen-farming therefore, especially in combination with landscape approaches, offers a promising solution. It has the potential to provide resilience in the face of environmental challenges, social pressures, and economic uncertainties through strategic collaborations in various regions.

### **Regen-Farming: A path to resilience**

In Pakistan, due to the lack of farmer 's trainings, who are using too much water and applying excessive agro-chemicals like, fertiliser and pesticides has resulted in complete soils depletion, reduced organic matter, biodiversity loss and disappearing of butterflies, birds and reptiles. As of now eight species of honeybee have been lost from Pakistan in the last 25 years.

Whereas Regenerative Agriculture is a system of farming principles and practices that increase biodiversity, enrich soils, restore watersheds, and enhance ecosystem services. The regen-agriculture as a business case, is very sustainable both for farmers

and companies along with the supply chain. Its principles provide a sustainable alternative to conventional cotton farming as it focuses on nurturing the soil, enhancing biodiversity, conserving water and work towards eliminating chemical inputs.

But the research shows that there are a number of other factors that are inhibiting its large-scale adoption as it can take up to 5-10 years to convert the conventional practices in to the regen-agriculture, where farmers may see a drop in income from the main cash crop. It also can take a few more years for soil health to improve and incomes to increase, mainly through reduced costs associated with reduced synthetic fertilizer use. Regen-agriculture, therefore requires a different way of strategic and proactive thinking, , as it doesn't use the same quick fixes that conventional agriculture relies on.

Hence, in this context the partnership of different stakeholders, government, private sector, civil society, farmers, investors and financial sector, may help to build and implement a long-term sustainable development plan in the regions, which are suffering from degraded ecosystems and climate change impacts, as it will restore and protect the natural resource base, enhance livelihoods and community prosperity. For the landscape approaches, there is need to show the impacts that are created on issues ranging from female empowerment, smallholder livelihoods, carbon emission reductions, biodiversity, sustainable soil and water management. This all needs, rethinking relationships with farmers, value chain actors, understanding local context and collaboration with all the stakeholders.

Most importantly, the soil is the only foundation of farming that provides an estimated 95 percent of global food production, and it has to play a fighting role to combat climate change. In this regard, as the cotton farmers, who are most vulnerable to climate change, they can benefit more from the regen-practices that improve yields and resilience and they can give back to, rather than take from the soil and society. This may include reducing tilling (no-till or low-till), using cover crops and agroforestry systems, rotating livestock with crops, avoiding or minimizing the use of synthetic fertilizers, and maximizing crop diversity through practices such as crop rotation and intercropping.

### **Regen-Agriculture for Cotton Crop**

The cotton industry is an important contributor to the global economy, providing a key raw material for textiles, clothing, and numerous other products. Grown in around 100 countries, cotton is also a vital source of income and employment for more than 250 million people all over the world.

Brands and consumers are putting increased pressure on cotton producers to continuously improve environmental outcomes and stewardship at the farm level for which, only the

Regen-agricultural can help meet this demand. Over time, regen-practices can increase cotton production and naturally reduce the need for crop inputs (fertilization, irrigation, etc). Implementing regen-practices successfully can improve agriculture ecosystem health and farmers' economic stability. So, it is the basic step for the textile industry to play a key role in helping farmers to develop more resilient systems, bringing immense social and environmental benefits by using the helpful knowledge of professionals throughout the cotton supply chain including the growers and the broader cotton community. Therefore, RBDC potentially aims to make the case for the transition to regen-farming practices, especially towards the private and public sectors and without reaching them, critical scale will not be possible.

## Apparel industry and Regen-agriculture

A recent report finds that "climate change could leave half of the planet's cotton-growing hubs highly vulnerable to temperature increases, changes to rainfall patterns and extreme weather events by 2040. Therefore, the regen-agriculture matters because it aligns with a new economic paradigm for the apparel industry and enable the industry to move beyond the business. Regene-agriculture holds immense promise for a range of co-benefits, including overall soil health, biodiversity, water availability and quality, animal welfare, community resilience and livelihoods. Companies seeking to set and meet ambitious targets therefore have many reasons to learn from and support Indigenous communities' understanding of how ecosystems can be fully regenerative and resilient. The regen-agriculture therefore, is fundamental to the long-term health of the apparel and textile industry as it will support the companies' long-term efforts to meet emerging industry issues and targets.

Then considering the contributions of indigenous communities in regen-agriculture is not only critical from a justice perspective but also it is of great economic importance for companies that indigenous communities make up only 6.2% of the global population while they are the stewards of 80% of the remaining biodiversity. Companies, therefore need to learn from Indigenous communities' and support them to understand the ecosystems that can be fully regenerative and resilient in the current situation. Examples of desired outcomes for regen-systems in cropping, grazing, and agroforestry include, carbon sequestration, more biodiversity, soil health, water quality and availability with other environmental impacts, like the animal welfare, social justice, gender equality and resilience of farming communities. This is because over the time, regen-practices can actually increase productivity, naturally reduce the need for external inputs, and improve economic stability for producers. In summary,

- The textile businesses need to focus on, soil health and resource conservation for long-term productivity.
- There is need to protect the natural resources by managing sustainability and agricultural innovations that support value for investors and the environment.

Also, it is of great economic importance for the companies to consider the current climates, Covid and economic related disruptions for adoption of regen-agriculture as its benefits have been documented in hundreds of scientific journal and popular publications. Which is an evidence that regen-approaches can help build soil carbon, that in turn can have positive effects on soil nutrient availability, water holding capacity, system biodiversity, resilience to extreme weather, disease resistance, and community livelihoods. However, a shifting scientific consensus on the mechanism of long-term soil carbon storage indicates that the industry must proceed with due diligence around claims related to greenhouse gas impact reduction from soil carbon sequestration as well as around carbon credits and markets.

Then regen-agriculture in the supply chain does not stop at the farm gate as the values and concepts behind this approach must be carried through the supply system for textile and apparel goods. Building relationships, long-term purchasing contracts and supply shed approaches appear to be an important short-term tool, with an understanding that the goals of regen-agriculture, are driving towards farm-level traceability. Here, RBDC believes that pilot projects are a key strategy for building new supply chains and developing a better understanding of regen-outcomes in different crops and geographies. For this purpose, to advance the field of regen-agriculture overall, apparel, textiles, and footwear sector companies need increase information-sharing in the food and beverage sector.

## What is Needed

The investments for agriculture and rural development mainly come from farmer's sources or from remittances from abroad or from, who have migrated to urban areas. Therefore, there is a need to consider these investments through better public policies to make investments for the improvement of soil quality, finance modern seeds, fertilizer, reduce food losses, better storage and improve market information, that needs a continuous monitoring to step further in future.

There is a need to focus on the institutional and policy framework that best serves rural transformations like, off-farm employment opportunities and better education system for rural communities. Because, without improving the policy environment and signalling long-term political commitment, private investments will always be smaller than needed to allocate in the most effective way.

Models can be replicated from the initiatives that are already being undertaken at the global or regional level to promote rural transformations, that include to set the norms/standards, mobilize finance, share knowledge, exchange policy experiences, innovative technologies, business practices and partnerships. Many of these have a specific orientation towards smallholders while others benefit smallholders indirectly by addressing the agricultural sector in a broader way.

## **Rural Business Development Centre (RBDC)**

The RBDC was founded in 2010 to pursue and promote the conservation, development, and use of agricultural resources for the betterment of rural communities. Purpose of RBDC is to provide small farmers a platform from where they can be skilled to earn their livelihood as per the requirements of diversified market demands. The organization is doing efforts to build capacity of small holders, particularly the women farmers and landless to diversify their economic activities

Now in the cotton sector, RBDC is working with a global community of brands, manufacturers, and growers towards more purposeful production from the very start of the textile supply chain. In this regard, RBDC is in contact with a broad range of governmental and non-governmental actors with the goals to implement climate change combating strategies to help reduce the GHG emissions that come from producing fibers and raw materials by 2030. For meeting this goal, it requires a combination of deep emissions cuts, nature-based mitigation options, adaptation strategies, and financial investments to back all these critical shifts. RBDC, believes that as a part of this approach, regen-agriculture holds immense promise for a range of social and environmental benefits, from overall soil health to community resilience and livelihood strategies.

### **Main Objectives**

To contribute in increase of income for small farmers through enhancing the business-enabling environment by strengthening small Producers organizations to grow more, improve their production, processing and marketing, where rural women will be the equal partners.

### **Total Paid Staff: 350**

RBDC is providing rural population with agriculture business skills at their places to enable them in the adoption of agriculture based business strategies, to secure their family and community livelihood. The strategy needs to put in place the best of delivery mechanisms including trainings and learning practices to facilitate the process.

With this, RBDC is a potential hope to involve smallholders in agricultural diversification leading towards high-value commodities by providing a favourable environment that strengthens farm-firm linkages, and integrates domestic and global markets through appropriate strategies. RBDC is providing appropriate structural support that is critical to address the issue as the demand for high-value and processed commodities will increase at a fast pace, as high-value commodities are more labour-intensive and generate more employment and income opportunities, which eventually ensure household food security and alleviate poverty.

RBDC aims to enhance the skills and capacities of the small farming communities to grow and process high value food crops, so they could efficiently and effectively manage and use

natural resources in a sustainable way to earn their livelihood and make their communities' livelihood secure.

## **Implementation Strategy**

Building on the considerable experience that already exists with RBDC leadership, the small farmers producer 's organization (SPOs) at the village level are the main actors to implement the whole program. These SPOs are motivated and introduced to business interventions, value chains, trainings and market options. They are motivated to adapt the practices for growing more, upgrading the produce and link it to value chains. The Program also seeks to understand local knowledge and business perceptions of the local communities and how it is compatible with new business tactics.

The particular emphasis is on, marketing strategies, (on-farm selling, direct selling, local market vs. distant), price policy (quick and cheap vs. higher price and time consuming), added-value (packaging, transformation, sorting and grading).

An important part of marketing support is in the market information (where to find information; what are the market requirements; and advice to negotiation of contract conditions). In this regard RBDC take the responsibility to apply its knowledge in advisory and training activities –particularly through farmer business school and farmer field schools sessions. The Program is using participatory and community based approaches to deliver needed information and promote community uplift adaptation process. The RBDC also arranges training workshops for farmers, teachers and young professionals to develop local business, based on the ecological farming.

### **The Beneficiaries**

The beneficiaries are the small and marginalized farmers (50% females) having small landholdings.

#### **Direct Beneficiaries**

The direct target beneficiaries are the lead-farmers, who are selected on a basis of entrepreneurship skills and their ability to transfer knowledge to other farmers with 50% women farmers. The lead farmers are selected using both social and economic variables like entrepreneurship skills, level of vulnerability, number of household members, female-headed households, age, access to production resources, employment opportunities and ability to transfer knowledge to the local and other farmer organizations.

#### **In-Direct Beneficiaries**

The indirect beneficiaries are linked through the lead-farmers in groups at village level and they participate in all training and demonstration activities organized by RBDC.

## **Conference Theme**

### **National Conference on Regen-Agriculture in Cotton Farming Systems**

The two days conference (15th-16th November 2023) was organized by the Rural Business Development Centre (RBDC), in collaboration with the National University of Science and

Technology (NUST), Islamabad. RBDC, is committed to support and engage with Textile industry for the Regen-Agriculture analysis as it has the full commend/ knowledge over the roots of regen-agriculture and the financial risks faced by producers in their process of transition to regen-agriculture. Therefore, the conference theme and program was set by the RBDC as per need of the cotton farmers for regen-agriculture practices.

### The participants

In this conference more than 200 persons (male, Female) from various organizations representing Government, academia, policy makers, research institutes, private sectors, ginners, textile industry, whole sellers, retailers, trade companies, field worker, students and farmers from all the four provinces of Pakistan participated.

### Thematic Sessions of the Conference

The major themes of the conference were,

1. Sustainable Cotton Production
2. Farmer Perspectives in Promoting Regen-Agriculture
3. Essentials of Regen-Agriculture
4. Private Sector engagement in Regen-Agriculture
5. Market Dynamics, and way forward for Regen-Agriculture

Based on these themes, ten parallel sessions were held in two days conference and a total of 24 presentations were made in various sessions by different stakeholders.

### Inaugural Session

The inaugural session started with welcome address by Dr. Shahid Zia, CEO, on behalf of the RBDC to formally start the conference program. Conference started with recitation of Holy Quran and then, distinguished guests introduced themselves with each other to shared the information about their respective organizations and their field of expertise. **Dr. Shahid Zia** then, gave an overview of the conference and explained why Regen-Agriculture is needed for the future agriculture and farming communities. He added that cotton sector is a biggest source of income and employment in Pakistan and from this platform, we hope that it will open up some new avenues for cooperation between different stakeholders that reform the intellectual capital for shaping the sector needs as a way forward. After this, Dr. Imran Hashmi (Dean of environmental sciences, NUST) was handed over the stage to lead the conference.

Dr. Imran presented a brief of the research activities on regen-agriculture taken up by NUST University to highlighte the problems and challenges faced by the cotton farming community in Pakistan like, the unavailability of certified cotton seeds, good quality of pesticides,

fertilizers, insect pest infestations and problems associated with the impact of climatic changes on cotton crop production. He further added that although the cotton farmers are connected to the global value chain but only a few have benefitted from it, which is a root cause of the social injustice, that need us to raise our voices against it.

Dr. Shahid Zia, intervened here that, with population increase in Pakistan, although the green revolution helped address the shortage of food and agricultural products but still the demand for food and agriculture is rising at a fast speed. Also green revolution has led to the excessive use of fertilizers and pesticides by farmers to maximize their production, which is very unhealthy in many ways due to the overuse of inputs that negatively affects the soil, environment and human health. He emphasized the need for new farming practices to overcome these issues through regen-agriculture practices. Dr. Zia also highlighted some issue about cotton sector like,

- a. Income of the cotton farmers is declining mainly due to climate change impacts where supply is more than demands.
- b. Women are losing their jobs in this sector.
- c. Farmers are getting inclined to replace cotton with other competing crops.

After this, a progressive Farmer from Cotton Connect, was invited on the stage to share his experience about the Sustainable cotton production and how they are promoting it for the larger community of cotton farmers.

At the end of inaugural session, Dr. Zia, explained the conference objectives, program, parallel sessions and the expected outcome. He also explained the conference organization for the next two days, that how RBDC has planned different parallel sessions to get the maximum output from the resource persons and the cotton experts. After this, the participants were requested to join different sessions as per their expertise and interests to formally start the academic sessions of the conference as following.

## **Session-1 Sustainable Cotton**

### **Topic: Local practices in Regen-Cotton and its impact**

**Session Chair-- Dr Ghulam Ali (Air University Multan)**  
**Presenters,**

1. Dr. yousf Ali
2. Hafiz Muhammad Buksh

Dr. Yousaf Ali (Senior Manager Soorty Enterprises) discussed the collaboration of Soorty with WWF-P in Balochistan, where they have started working on Organic Cotton to fulfill market demands. Soorty provides non-GMO seeds to its project beneficiaries and conducts capacity-building training on every aspect/component of organic cotton production to streamline the whole production process. He added that the cotton is grown without the use of synthetic pesticides, fertilizers, and genetically modified organisms (GMOs) as the focus is on promoting ecological balance, soil health, and biodiversity.

He said that the collaboration between Soorty and WWF-P in Balochistan reflects a commitment to sustainable and organic cotton production and in addition to organic farming practices, they are also focusing on the implementation of a digital traceability system that enhances transparency and accountability throughout the crop production process.

Dr. Yousuf Ali summarized the presentation by emphasizing to ensure traceability of organic cotton from farm to gining by using an app that establishes a link between farmers and ginners. He also highlighted the challenges faced in the Khuzdar project, particularly the digitalization of farmers in Baluchistan, where cotton farmers are spread across different geographic zones and have limited internet coverage. He further explained that to address this problem, a mobile app has been developed for farmer s' registration that operates without internet connectivity. The app captures data on land use, farm inputs, carbon data, and production. Middlemen are trained to use this app, and they provide digital sales receipts to the farmers. The app generates a unique code for each farmer, where end consumers can verify traceability information using their specific QR codes. This digitalization has facilitated the maintenance of records on soil health, organic carbon, crop areas, allowed for pre- and post-analysis based on collected data. The system use the technology such as QR codes or barcodes on each bale of cotton and these codes are scanned at various stages of the supply chain, allowing stakeholders to trace the cotton back to its origin, verifying its organic status and the specific practices employed during cultivation.

Here, Head of Soorty, Mr. Asad, emphasized that to compete with the world, we need to change our thinking, working styles, and adopt new technologies without wasting further time.

The next presentation was delivered by Mr. Hafiz Muhammad Buksh on the SOCI Project from WWF Pakistan. Mr. Buksh explained that WWF-Pak has been working on sustainable agriculture since 1990, with leading projects such as Better Cotton and Organic Cotton. OCA and Soorty are working on the following issues,

- Farm Commitment Agreement
- Capacity Building Programs
- OCA Validation (GM Testing, Data Validation, Payment Validation, Case Studies)
- Data Collection and Impact Report

He said that currently, we are collaborating with Soorty on the SOCI project, initiated in 2020, for which Mr. Buksh shared the key performance indicators of the project. He said that sustainability is not a new concept but it has been a concern for the future of the resources throughout human history, where food and water sources have always been critical considerations, especially during lean times as a potential threats to essential plants and animals. He added that we are actively engaging with 1500 farmers across 10,000 acres, by providing them with free non-GMO seeds and farm consultation for organic cotton cultivation. Farmers in the SOCI project utilize organic matter as fertilizer and bio-pesticides for pest control in cotton crops.

He also highlighted that eight major organic projects in Pakistan are operating with support from different textile funding but the concern is that, soil productivity is decreasing day by day due to the adverse effects of fertilizers and pesticides on soil health to make the lands, barren at a large scale. Therefore, as a solution, the Regene-agriculture is the need of the time; otherwise, there will be no land for cultivation worldwide. Then also food scarcity for the farming communities, is a major global issue that can be minimized through proper adoption of regen-agriculture. In the end, he extended gratitude to Dr. Shahid Zia for organizing the conference on this issue to address the major problems both at regional and global levels. The session presenters and participants then, prioritize the implementation challenges and session recommendation as following.

### Implementation Challenges

- Restoration of soil health and Weeds management
- biodiversity loss and lack of specialized knowledge
- Marketing challenges and rigorous certification process
- More expensive than commercial farming
- Lack of policies and limited resources

### Session-Recommendation

- Crops, plants, and animals diversity is needed to create resilient and self-sustaining ecosystems.
- Need the practices that enhance soil health, cover cropping, crop rotation, reduced tillage, and increased organic matter.
- Water efficient strategies are needed to minimize irrigation needs.
- Need to Minimize reliance on external inputs and emphasizing natural resource use.
- Need non-GMO seeds to ensure genetic integrity of the cotton.
- The digital traceability system is needed to fosters trust between producers and consumers in the supply chain.
- Weed control and integrated pest management techniques are needed to control pests and diseases without using synthetic chemicals.
- Animal Integration is needed to improve productivity and naturally reduce the need for crop inputs (fertilization, irrigation, etc.).

And if the recommendation are taken in practice, then it can give the following benefits.

- Increased yields and resilience
- Premium prices with Reduced costs
- Additional and diversified income
- Training opportunities
- Soil health and Crop protection
- Nutrient cycling

## Session- 2 Sustainable Cotton

**Topic: Local practices in cotton production and its impact**

**Session Chair-- Dr. Shahid Javed Butt**

**Presentors,**

1. Mr. Abu Bakar (Cotton Connect),
2. Mr. Asif Mahmood (OCA),

The session chair, Dr. Shahid Javed Butt, extended a warm welcome to all the participants and through his opening remarks, he created an atmosphere of participants engagement by appreciating for their collective efforts to make this conference a success. The participants were introduced one by one, which helped participants to understand each other with their area of expertise and it laid the foundation for a dynamic and inclusive discussion on the subject topic.

The first presentation was by Mr. Abu Bakar from Cotton Connect and he shared the organization's journey in the context of future for supply chains and emerging of cotton connect as a distinctive organization to collaborate between C&A and Textile Exchange (formerly Organic Exchange) in 2009. He said that their struggle aimed at reshaping the landscape of Sustainable Cotton Supply Chain to obtain a significant business benefits for retailers and brands as they are playing a pivotal role in creating economic opportunities for more than 560,000 cotton farmers across India, China, Pakistan, Bangladesh, Egypt, Turkey, and South America, which influences the livelihoods of approximately 2.5 million individuals. Mr Abu Bakar, explained that the organization, in collaboration with Haelixa, introduced a pilot project on a physical DNA-based marker in the lint linked to the supply chain, enhancing traceability. Additionally, partnerships with Assimila and the European Space Agency (ESA) were forged to address climate change challenges through the C5 project (Combat against Climate Change on Cotton Communities, which used the Cool Farm tool to measure green house gas emissions for a comprehensive assessment at various data points. For this purpose the organization has designed an application for farm-level data collection and an analytical dashboard, offering a centralized platform to streamlined information management, —a three-year modular initiative with sustainable agricultural practices at its core. The program emphasized on water efficiency, crop rotation practices, reduction in chemical use, soil health, and biodiversity conservation. While their CRS played a crucial role to focus on trainings on human rights, elimination of child labor and gender inclusion. To implement these approaches, the organization is using, Farmer Business School, Gender Intervention, and SMS Technology to enhance the sustainability of agricultural practices.

A significant highlight of Cotton Connect's efforts, is the REEL Cotton Training Program and the Gender Empowerment Program. Recognizing gender equality as a UN priority, the organization tackled the gender gap in agriculture, aiming to empower women by involving them directly in the cultivation and harvesting of crops. This approach has helped to create a more secure and stable workforce in the sector.

Then by using Trace Bale, a proprietary software tool, the organization provided visibility into the last mile of transactions, offering a chain of custody of cotton from farms to finished goods and manufacturers. The QR Code System has also been integrated into the program, that allow the consumers to trace the origin of materials used in finished goods, reinforcing transparency and accountability in the whole supply chain. The presentation remained very inspiring for the global supply chain process and for the participants to potentially get involved in the discussion.

The second Presentation was by Mr. Asif Mahmood (OCA) who, passionately presented the vision of the organization to overcome the challenges faced in managing landscapes, making effective claims, and securing financing for organic cotton initiatives. Mainly his presentation stimulated a discussion among the participants to highlight opportunities for collaboration and innovative solutions for the cotton value chain process and struggle.

Mr. Asif, explained that OCA is running a Farm Program, on capacity Building, including the development of an Organic Cotton Training Curriculum, online and on-site trainings of Trainers, that includes the Cascading Model using Knowledge Partners, along with a built-in evaluation system of the program. The program further addresses the Farm Commitment and Procurement Agreements based on Open Costing Sheets, the OCA Validation Program, Data Management, Monitoring, Evaluation, Accountability, and Learning (MEAL) processes. The organization work with independent third-Party who verifies the data credibility and the guidelines and tools for farm-impact monitoring ensure alignment and transparency of the system to streamline the whole process.

Further, he shared the OCA s' Seed Program that focuses on non-GMO seeds, covering breeding, trials, capacity building, guidelines, replication, and performance indicators. Also a Standard Operating Procedure for GMO sampling practices is developed to incorporate detail farm-level sampling.

He then added that the Performance Improvement Report (PIR) serve as the spotlight tool to continue the improvement which is shared among brands and implementing partners, for corrective actions and higher standards. The Corrective Action Plan (CAP) is an integral part of the PIR, that provides a roadmap to address the issues in routine implementation program and this system then provides project-based updates throughout the season. The OCA also develop the need based curriculum to run online and in-person trainings that aims to extend knowledge on regen-agriculture practices, certification, and record-keeping.

## Session Summary

After these presentations, the participants shared their experiences to produce regenerative cotton, which added an interesting dimension to the conversation, prompting to further exploration into the intersection of genetic modification and regen-agriculture.

The participants raised the concern of urbanization that is putting a lot of pressure on the agricultural land which extended the discussion to the conversion of non-agricultural land into agricultural land to increase pastoral areas.

Finally the session chair, Dr. Shahid Javed concluded the session by acknowledging the simplicity and potential of adopting regen-practices. He emphasized the value of using the farm's input and reducing reliance on external inputs to acknowledged the dynamic nature of agricultural practices and the need for adaptability in the face of climate change.

He concluded the session on a positive note by expressing gratitude for the thoughtful contributions of the participants. He underscored the importance of ongoing discussions to navigate the complexities of agriculture, and encouraged everyone to carry the spirit of collaboration and innovation forward. Session ended with a sense of optimism, armed with insights and perspectives that would undoubtedly shape the trajectory of their agricultural endeavors. He and participants then expressed a commitment to address these challenges, where and when ever required by stakeholders involved in it.

### **Session-3 Farmers Voices**

**Topic: Farmer Perspectives in Promoting Regen-Agriculture**

**Session Chair— Soorty Representative  
Presentors,**

Case studies from,

1. Bahawalnagar Case study waleed Mumtaz
2. Cotton Connect Ghulam Fareed

Mr. Waleed by giving his presentation shared that our farmers are diligently adhering to a comprehensive and traceable Data Management system, ensuring transparency and accountability throughout the agricultural process for which the following key documents and processes contribute to our traceability systems.

- Farmers are providing accurate BT-Test Reports, offering insights into the genetic makeup of Bt and non-Bt cotton.
- A detailed Farmer Receipt system is in place, documenting transactions and creating a transparent record of each farmer's involvement in the process.
- Collection Centers have been developed to maintain meticulous records, tracking the inflow and outflow of produce and ensuring accountability at every step.
- Ginner Gate Passes have been developed to monitor the movement of cotton from farmers to the ginning stage, enhancing traceability and quality control, loop trace uploading and dispatching which create a digital trail to facilitates easy tracking.
- BT-Strip Tests are conducted to assess the presence of specific Bt contamination, adding an additional layer of traceability after processing.
- Online portal entries document ensure the consignment dispatching procedures, all movements, recording and monitoring.
- Transparent processes for premium and seed distribution are in place, providing farmers with a clear understanding of the benefits associated with their efforts.

He further explained that this commitment to traceable Data Management reflects our dedication to accountability, quality assurance, and the overall success of our agricultural initiatives. This type of meticulous documentation enhances not only the efficiency of the

operations but also the trust and confidence of all stakeholders involved in cotton production and processing.

He then shared that, Interloop Free Mobile Health Clinic (MHC) in Bahawalnagar has played a pivotal role in providing essential healthcare services to the cotton farming communities by addressing the medical needs of the residents with a total attendance of 38,258 patients in each session. The breakdown of services and patient attendance reflects the significant impact that the clinic has had on the local population. This on-the-go approach allows healthcare professionals to navigate through different areas, ensuring that medical assistance is accessible to those who might face geographical or transportation challenges in accessing health facilities. The second fixed location health services attend 18,466 patients, that offers a consistent point of contact for individuals seeking medical attention. The combined efforts of the Mobile Health Clinic and the fixed Clinic showcase a comprehensive approach to healthcare delivery systems and accommodating diverse health needs within the farming community in cotton areas.

So, this Free Mobile Health Clinic facility by Interloop has not only addressed immediate medical concerns but has also contributed to the overall well-being and health awareness of the community, reflects the organization's dedication to corporate social responsibility and community development. The clinic's success is measured not only in patient attendance but in the positive impact it has on the lives of individuals and families in Bahawalnagar project areas.

Second Presentation was by By Mr. Ghulam Fareed, explaining about the Better Cotton Initiative (BCI), which focuses on promoting sustainable and responsible cotton production through a set of specified principles and criteria. He said that farmers have been motivated to participate in the Better Cotton programs for adopting several good management practices based on these principles. Here are some key practices of BCI principles:

- Integrated Pest management (IPM)
- Safe handling of agro-chemicals
- Water Stewardship
- Efficient irrigation practices:
- Monitoring, Evaluation and Learning
- SCrop Rotation and Cover Crops
- Organic Matter Management
- Natural Habitat Conservation
- Fair Labor Practices, which includes, fair wages, safe working conditions, and respecting workers' rights.
- Engaging with local communities, understanding their needs, and contributing to community development projects.
- Ensuring Fiber Quality:
- Harvesting cotton at the right time to ensure optimal fiber quality.
- Proper Storage and Handling to maintain the quality of harvested cotton fibers.

- Implementing traceability systems to track the flow of Better Cotton through the supply chain and ensuring the integrity of the mass balance system.

He then shared that, the farmers participating in the Better Cotton program are encouraged to adopt all above mentioned good management practices, so to align with BCI's principles for the promotion of sustainable and responsible cotton production. These practices not only benefit the environment but also contribute to the well-being of farming communities and the overall quality of the cotton production systems.

## **Session-4 Regen-Agriculture and Soil Health**

### **Topic: Enhancing Soil Health for Sustainable Conservation**

**Session Chair-- Dr Abdul Majeed**

**Presentors,**

1. Dr Abid Subhani, RBDC
2. Dr Tariq Sultan Director LRRI-NARC

Mr. Subhani, briefly shared his presentation with following points,

#### **A. Zero Tillage and Mulching**

1. Less tillage do less damage to soil but increase the diversity of soil microbes that contribute to better soil structure for the growth of plant roots and it further improve the ecological benefits, resilience to crop stressors, crop quality and final yields.
2. It reduces the wind and water erosion of soils, agricultural run-off into watersheds, and aid in soil carbon sequestration.
3. It increases water penetration, soil organic matter, soil nutrient retention for crops, and less soil crusting over time, that reduces cost for fertilizers, tilling soils and use of water resources.
  - Save water from evaporation
  - Increase microbes and earthworms
  - Prevents pathogens from splashing on to leaves
  - Maintain soil temperature

#### **B. Maintaining living plant roots**

Maintaining the living plant roots in the soil is a key principle of regen- agriculture, which help improve soil structure, increase organic matter, and promote soil biology. Because living roots radiate sugars and other substances to feed soil microbes, which in turn help to break down organic matter and make nutrients available to plants. It contributes to the mulching benefits at large scale.

#### **C. Crop Diversity**

For regen-agriculture, a diverse cropping system can provide numerous benefits like, improved soil health, increased beneficial insects, reduced pest pressure, and enhanced resilience to climate change. It also increases the crop yield, crop quality, reduce reliance on synthetic fertilizers and pesticides.

#### **D. Crop-livestock Interface**

The integration of livestock into cropping systems is another key component of regen-agriculture, that may help to cycle nutrients, manage plant residue, increase soil organic matter and increased crop yield and quality.

Then, second Presentation was by Dr. Tariq Sultan, in which he discussed about Improving soil fertility and soil health for sustainable crop production. For this he explained the major issues which effects the soil fertility and cause major problem for sustainability of soil health as following,

1. Imbalanced use of fertilizers
2. Low Farm waste utilization
3. Issues in crop residue and animal waste management
4. Issues of salt affected soils
5. Use of brackish water
6. Industrial and municipal solid waste waste issues
7. Sewerage water management

He shared that, according to a survey, in Pakistan the soil has less organic matter even below to 1 percent, which is a major cause of low fertility of the soil. Therefore, to overcome this problem the use of waste material is very beneficial for the soil because it increases the availability of nutrients for the plants along with the water holding capacity as well. And microorganisms play a vital role as decomposer of organic matter by oxidation reduction process which leads the nutrient cycling in the soil.

#### **Integrated Plant Nutrient Management (IPNM)**

Dr. Sultan then explained the concept of integrated plant nutrient management, which is an essential component for regen-agriculture as it refers to maintain the soil fertility and plant nutrient by supplying at an optimum level of the desired productivity through optimization of all possible sources of organic, inorganic and biological components in an integrated manner. This aims to optimize the condition of the soil, with regard to its physical, chemical, biological and hydrological properties, for the purpose of enhancing farm productivity, while minimizing the land degradation. He further added that now, there is greater awareness that IPNM can, not only provide tangible benefits in terms of higher yields, but also conserve the soil resources itself. For this purpose, the field level management practices include the use of farmyard manures, natural and mineral fertilizers, soil amendments, crop residues, farm wastes, agroforestry, zero tillage practices, green manuring, cover crops, intercropping, crop rotations, irrigation, drainage, plus a variety of other agronomic, vegetative and structural measures that are designed to conserve both water and soil.

He shared that the main sources of nutrients are synthetic fertilizer, bio fertilizer and organic matter but unfortunately the farmers of Pakistan used the synthetic fertilizer in heavy quantity while bio fertilizer and organic matter ignored by almost all of them. Whereas the split doses

of nitrogen is more effective for organic matter, soil fertility, soil structure and to provide habitat to organisms living in the soil to improve the water holding capacity of soil.

### **Crop Residue Management for Sustainable Rice-Wheat Cropping System**

Here Dr. Sultan described the crop residues management for sustainable rice-wheat cropping system. He said that in Pakistan more than 2.2 mha area is covered by rice- wheat system and this system produces 10-15 Mg ha<sup>-1</sup> of crop residues per annum. The use of Combine harvester for wheat is 55% and for Rice is more than 81 %. This combine harvesting produces a large quantity of crop residues in field which creates hurdles in seedbed preparation, while the time between the rice harvesting and wheat sowing is short having maximum gap of 15 to 20 days. Hence for timely sowing of wheat, rice crop residues are burned that not only causes health and environmental hazards but also causes low soil organic matter and low soil biodiversity. (All C, 80% N and S, 25% P and 21% K), 2. environmental (Smog and GHGs - 70%, 7%, 0.66% of C and 2.09% of N evolved as CO<sub>2</sub>, CO, CH<sub>4</sub> and N<sub>2</sub>O), 3. health problems (Ophthalmic and pulmonary).

### **Bio fertilizers**

He further explained about the bio fertilizer which refers to prepare the live microbes to enhance the soil fertility either by fixing atmospheric nitrogen, solubilization of phosphorus or decomposing organic wastes by augmenting plant growth and producing growth hormones with their biological activities. The bio fertilizer is necessary for the soil, because in our soil the population of microbes decreased due to farm practices for which the main reasons are,

1. Harsh climatic conditions
2. Temperatures variation
3. Moisture variation
4. Unavailability of energy resources

He then explained that the soil can be replenished by microbial population (number) through inoculation and through Efficient strains/ species of microbes

### **Biozote-P**

The 80% bench marked soils of Pakistan is phosphorus deficient and the Biozote-P is the bio fertilizer which Phosphate Solubilizing Bacteria and can use for all crops. Whatever, phosphorus fertilizer adding into the soil is get fixed with free calcium because soils are highly calcareous in nature. Develop and registered product namely Biozote-P to increase bioavailability of P from fixed pool and also increase the efficiency of added. This Biozote-p product have following benefits

1. Utilized Fixed-P pool from soil
2. Saving of 25% phosphatic fertilizers
3. Yield increases up to 10-15%
4. Environment friendly

## Session- 5 Water Stewardship

Topic: Regenerative Agriculture

Session Chair-- Dr Shahid Zia

Presentors,

1. Dr. Sher Jamal. Waste Water Treatment in RA
2. Dr. Faheem. Impact of Solar Pumping and water Recharge

Dr. Jammal shared that, in Pakistan only one percent of waste water is being treated by industries while these industries play a major role in polluting the fresh water. The industries waste water contains organic matter, dyes and many other harmful chemicals. Which is continuously polluting the fresh water in Pakistan. He shared; 150-200 L of fresh water is used only for one kg of end product in textile. So there is need to treat the waste water and reuse it again in industries to conserved water for future uses. He shared the different model for reclamation of waste water as following,

1. Biological treatment Method
2. Membrane Technology Method
3. Absorption Method
4. Chemical precipitation Method

He then, presented the result of his research conducted by a NUST student that how Woven-fiber Microfiltration technique is used to remove the salinity from waste water. For this research, the water sample was taken from Kohinoor textile industry Rawalpindi and was reclaimed by this technique to again use it for textile industry, while the residue which is rich source of fertilizer, can be used for agriculture purposes. He concluded on the research that, 91% salt can be remove from by WFMF setup from waste water, waste water can be reused again and minimize decency on fresh water and filtered salt are used as a rich source of fertilizer.

The second presentation was by Dr. Muhammad Fahim Khokar on **“Exploring the impact of CFC and atmospheric oxidant on crop production in Pakistan”**. He told that, human activities continuously effect the atmosphere that result in climatic change. The largest known contribution comes from burning of fossil fuel and consequent emission of four principal GHGs: Co<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and CFC gases into atmosphere. He added that this change on climate has resulted in,

- Melting of glacier in Hindukush, Himalayas
- Flooding due to Pre and post monsoon season
- Droughts in semi and arid zone of west, central and south Asia
- Heat wave across the Asia

He further explained that this climate change effect the ecosystem by massive wild fire due to heat waves, that leads to the loss of habitat of flora and fauna. There are longer and hotter summer which result in increased demand of energy for cooling purpose and pumping out the more fresh water from aquifers for cooling purpose, which is an alarming condition. There

are more floods and droughts in world that leads to shortage of food, change the rain fall pattern and water scarcity in world. He shared that 1.03C temperature has raise in Pakistan during 1978 to 2016 which has resulted in less frequency or intense rains especially in post monsoon season. Which is severely affecting the agriculture, irrigation system hydroelectric power and livestock in Pakistan. He then shared the graph of Monsoon rainfall, its intensity and different model to monitor this climate change as following,

1. There is an increase in temperature which is affecting the pattern of precipitation and result in shortage of water for irrigation and human consumption
2. Production in all crops is significantly impacted by frequent temperature variation.
3. The duration of rainfall is short but the intensity is high.
4. The increase of temperature results in low crop production with infestation of new pest in agriculture.
5. The Cotton and Rice are highly affected crops by climate change impacts.

Therefore we need to do,

- Use of advance technology to monitor the change in climate
- Take effective action against climatic change and develop new production technology
- Better risk awareness campaigns
- Improve the system of weather forecasting
- Regional partnerships and learning to over come climatic changes.

## **Session-6 Multi stakeholders Panel**

**Topic: Engaging the Private Sector in Advancing RA**

**Session Chair-- Mr. Gohar Ijaz (M/O industry & commerce)**

**Presentors,**

1. Mr Maqbol Baig Inter Loop,
2. Brig.Zaheer- Udin Babar,

Mr. Maqbool Baig from interloop,started with a formal introduction of the participants, so they know each other s expertise to further carry on the discussion. Then, Mr. Maqbool gave a good introduction of the Interloop and its projects by sharing that Interloop Limited was established in 1992 and has grown into one of the world's largest manufacturers of hosiery products. The company is headquartered in Lahore, Pakistan, and it has expanded its operations globally, with a significant presence in the key international markets of cotton.

He explained that Interloop's core business revolves around the production of socks and other hosiery products. The company is known for its vertically integrated operations, encompassing yarn spinning, knitting, processing, and finishing. This integrated approach allows Interloop to maintain control over various stages of production, ensuring product quality and efficiency.

He further added that the Interloop has strategically positioned itself as a major player in the global hosiery market. The company has a strong presence in key regions, including North

America, Europe, and Asia. Its products are distributed and well-received internationally, contributing to its status as a leading exporter of hosiery goods.

He explained, that the company places a strong emphasis on innovation and technology in its manufacturing processes. This commitment to technological advancement allows Interloop to stay at the forefront of industry trends and deliver high-quality, cutting-edge products to its customers. Now the Interloop has demonstrated a commitment to sustainability and corporate social responsibility and has implemented various initiatives to reduce its environmental impact, promote ethical labor practices, and contribute to the well-being of the working communities at the grass root level.

He further explained that while hosiery remains the primary focus, Interloop has also diversified its product portfolio over the years that includes ventures into apparel manufacturing, reinforcing its position as a versatile player in the textile industry.

Here, Dr. Shafiq also participated in the discussion on regen-practices, emphasizing the need for technology and advocating for a claim in favor of regen-agriculture and highlighted the importance of adopting a phased strategy rather than making sudden and abrupt changes. He suggested effective communication and stakeholder involvement during the follow-up process, emphasizing the need for proper planning. Mr. Maqbool added that sharing success stories collectively and issuing a joint statement are crucial for establishing the credibility of the work but he also acknowledged the challenges in achieving organic and regenerative cotton production.

Mr. Asif shared the concept of "do and learn," stressing the involvement of academia, institutes, and stakeholders by observing system implementation. He highlighted the need for revised mechanization and working principles, adjusting parameters in processing, and identifying committee roles. Setting result-oriented targets and sensitizing priorities at academic and research centers were also emphasized.

In the second presentation, Brig. Babar, shared a remarkable story of Pakistan's largest exporter of denim jeans, boasting an impressive annual revenue of 500 million dollars. He said that every 20th pair of jeans worldwide is crafted by Soorty, demonstrating the colossal impact of their operations. The company's production capacity is just wonderful to produced four million jeans per month but more important is that organization is supporting the small farmers in Pakistan. For this the company is providing free non-GMO seeds, aligning with its status as a vertically integrated entity. From producing its own seeds to self-ginning, Soorty controlled every stage of the denim production process, culminating in the creation of the final product.

He further added that beyond their business, Soorty is also committed to its corporate social responsibility and by using this fund the company has developed a hospital in Nal city, contributing to the welfare of the cotton producing communities. The company also has constructed a 200-bed Psychiatric and Neuro Sciences Hospital in Karachi, showcasing a commitment to healthcare and community well-being. Soorty also had adopted 23

government schools, extending support in various forms to enhance the learning environment for rural youth.

Soorty is giving equal importance to women's empowerment by rebranding handmade products through collaborations with prominent brands like Zara, to uplift the economic opportunities for artisan communities. Therefore, Soorty has developed a very clear approach to cotton production, drawing a distinction between organic and regene-practices. Mr. Babar highlighted that Soorty is now producing organic cotton by using their own non-GMO seeds, organic pesticides, compost, and employing yellow traps for insect control. He emphasized that Soorty was actively engaged in three out of the four components of regen-practices: soil health, biodiversity, and community development. At the end, the participants appreciated, Soorty's multifaceted contributions to both the business world and the community, weaving together a narrative of success, responsibility and innovation.

## **Session-7.**

### **Topic: Use of Nano Technology in RA**

**Session Chair-- Dr. Imran Hashmi**

**Presentors,**

1. Dr. Arshad. Use of Nano Technology in RA
2. Dr. Ali Tahir, SCEE (IGIS), NUST

This presentation was, by Dr. Muhammad Arshad on the Management of Rice and Wheat Stubble through Application of Bio-decomposer. The management of residues or stubbles of wheat and rice is a major issue because the farmer community burn it due to unawareness and easy/inexpensive method to remove the residues from the field. Extensive burning of crop residues produces air pollution and also threatening the survival of healthy organisms. The major consequences of residues burning are following,

- produce GHG emissions which lead to global warming
- Loss of biodiversity
- Loss of nutrients
- Deterioration of soil fertility
- Health hazardous to humans, birds and animals

He described the reasons of Crop Residue Burning by farmers, which are following

Resource Constraints

Labor Scarcity

Financial Constraints

Limited period between paddy harvest and wheat sowing

Farm Mechanization

Lack of expertise for state-of-art technologies

Then he suggested some of the possible solution for management of crop residues. For example, we can rotavate the stubbles but it takes 15-25 days for proper decomposition and due to shortage of time farmers prefer burning. The other best method is the use of bio

fertilizers for timely decomposition of crop residues. He described the complete phenomenon from selection of microbes to consortia preparation in the lab and its expected outcomes as following,

- Rapid degradation stubble through application of bio-decomposer.
- Replenishment of essential soil nutrients
- Improvement of soil health
- Decrease in air pollution

The second presentation was given by Dr. Muhammad Ali Tahir on “**Pakistan agriculture Geospatial Data Portal**”. Dr. Tahir shared that, he gathered the information on previous weather, cropping pattern, rainfall trends and average temperature of Pakistan to develop an online portal, where all information are updated regularly. He shared the link of portal with audience for their easy access and concluded that

- With the help of portal, the information of previous season was collected to be helpful in agriculture
- The pattern of rainfall can be observed through this portal
- Cropping and forest area can be identified
- This can help in developing the new production technology.

## Session-8 Other Initiatives

### Topic: Other livelihood Initiatives

Session Chair-- **Dr. Mohsin Iqbal**

Presenters,

1. **Mr. Hafiz Buksh (LSF, BWN)**
2. **BCI**
3. **Rai sb**

Mr. Hafiz started his presentation on seed Initiatives and shared that in Pakistan, sustainable agriculture initiatives were planned in 90s, in which WWF-Pakistan was the first to be a part of this struggle by launching a pilot program on sustainable cotton production. In continuation of this program, WWF-Pakistan piloted organic cotton cultivation in Balochistan during 2015-16 with the financial support of C&A Foundation (now Laudes Foundation). He said that through the exclusive commitments of WWF-Pakistan and Department of Agriculture Extension, Balochistan, this project led to production of Pakistan's 1<sup>st</sup> certified organic cotton bale in 2018-19 that created hopes and inspirations within the local textile groups. As a result, they showed keen interest to grab the potential of organic cotton production in Pakistan and the Soorty Enterprises was among the top three local textile groups who started sourcing organic cotton from Pakistan. Later in 2021, Soorty, joined hands with WWF-Pakistan and launched an independent project “Soorty Organic Cotton Initiative” in Naal, Balochistan. Despite many problems and challenges, the partners; Soorty, WWF-Pakistan and Department of Agriculture Balochistan, together made a success to produce certified organic cotton in 2022. The Soorty's initiative not only helped its own sustainable cotton supply chain but also inspired other local textile groups to be part of this organic cotton production journey in Pakistan. Therefore, now we strongly feel that the Regen- agriculture is a need of the time to

rehabilitate our degraded soils and the environment, to combat climate change and food security challenges. Mr. Hafiz appreciated RBDC for organizing such a needed forum to bring in the relevant stakeholders for future implications for Regen-Agriculture.

He then talked about the Sustainable Seed Network and added that in Pakistan around 20% of the seed comes from the formal sector, which indicates that 80% wheat growers are deprived of the benefits of new seeds suitable for them that result in food crises & malnutrition issues among children and women especially, whereas seed is an essential input to enhance the livelihood of the farming communities.

He further explained that the specific objective of the Sustainable Seed Network is to ensure food security, improve nutritional status and reduce the poverty of marginal and small farming communities through boosting agricultural production and improving income generating opportunities at the household and village levels. Therefore the objectives are to,

- Increase the accessibility of improved wheat seed to poor and the marginal farmers by developing seed wealth centers at village level.
- Enhanced the capacity of farmers on management practices, harvesting and post harvesting seed storage strategies.

He shared that there are three types of seeds, **1.** Pre Basic Seed: Means seed of high genetic purity produced by breeder, **2.** Basic Seed: Means produced by an organization set up by provincial Govt for the purpose of productivity enhancement, **3.** Certified Seed: Means certified by Federal Seed Certification Authority. And the sources of seeds are, **1.** Govt Agri research institutions. **2.** Private seed companies. **3.** PSC (Punjab Seed Corporation)

He then explained the seed selection process in detail like the first thing is the site selection for the agro-environmental and socio-economic conditions. For guiding example, it should be the potential wheat area and the major source of household income for the farmers. And then second step is the variety selection, by conducting meetings with early adopter, farmers and AED through participatory approach, because Initial meetings are necessary with the farmers to ensure the representation of all villages and the major stake holders. The responsible organization need to share the TORS with the farmers about their capacity building trainings, demonstration of multi-cropping plots, mulching, crop rotation, composting and other required sustainable agriculture practices. Farmers then, should be linked with relevant line departments through exposure visits as a regular feature of the implementation plan, so they can benefit from these departments as per their requirement. Then next step is to select good seed growers through farmer selection and group formation, who are interested for co-operative, and willing to take some risk. This can be done in consultation with the farmers, local politician and development practitioners. Farmers, then can choose their group leader who can act as coordinate and lead the group. In case, the formal groups are not established, the field implementer should coordinate the activities of individual growers.

Further, group of 5-10 farmers is formed having their common interests and from them, the most motivated person is selected as group leader to contact the rest of group persons for providing necessary and required information related to seed production technology, seed saving and marketing. After this the next step is to provide training to the selected group members on seed production/saving technology and crop management practices. These training are conducted at least twice during the cropping season like, the land preparation, sowing methods, intercultural operations. Then at heading stage of crop, which should focus on rouging of off-types plants, diseased and other abnormal plants including post-harvest and storage techniques. As the seed is a living organism; therefore, care must be taken to guard against extremes of humidity and temperatures and protection from stored grain-pests. Also there is a need to collect data at the end of project to measure the impact and verify the success of the interventions. Mr. Hafiz then explain the role of RBDC on following issues,

- 1 How to raise revolving fund, to streamline the process of inputs like, seeds, fertilizers etc.
- 2 To coordinate with interested farmers and relevant stakeholders.
- 3 How to organize training and group meetings- at least twice in a cropping season.
- 4 Organize awareness campaigns.
- 5 Organize field and exposure visits.
- 6 Organize field days for the research and development teams and policy makers to initiate discussions on different issues related to seed production.
- 7 Develop doable strategies for seed production and marketing.
- 8 Seed production promotion strategies as per requirements of the climate change.
- 9 To enhance capacity of the farming community for quality seed production strategies.
- 10 Plan to use revolving fund for the Agri businesses and year seed procurement.
- 11 Develop next year plans based on results.

## **The Better Cotton approach**

As per the Principles and Criteria of Better Cotton, the Farmers in its project areas around the world adopt soil and biodiversity management plans, that help them improve the soil health, restore degraded areas, and the BCI is going further to integrate key components of regen-agriculture with its principles which stipulate requirements around core regen-practices such as maximizing crop diversity and soil cover while minimizing soil disturbance to enhance the connection between regen-agriculture and smallholder livelihoods. Better Cotton is also exploring other ways to support access to finance and information that will give farmers and workers more power to make choices that they think, are best for them and their families. Better Cotton's traceability system has also been launched in 2023, to enable retail companies to know who grew their Better Cotton, which motivate the companies to directly facilitate farmers.

Working with more than 3,000 farmers to pilot the Code, BCI has seen the first-hand benefits like, when farmers plant sorghum alongside their cotton, how does it attract birds back to the fields and how the birds eat many of the pests that cause farmers various headaches. For example, they eat the larvae of the bollworm from the cotton crop, which reduces the need to use pesticide and encourages the honeybees to return. And now, bees are building their hives in cotton crop fields and farmers after a long time can harvest honey as well as cotton, giving them extra income throughout the year, biodiversity is being enhanced and the natural environment is also restored and protected.

BCI, also is increasing agroforestry by engaging rural women and building their capacities in forest nursery raising and selling the saplings to local communities for growing trees, which is enhancing the livelihoods of farming communities. Also farmers have been encouraged to keep livestock (cattle or sheep), to use milk at home and the manure on their farms to improve soil health, that is also saving their input costs and enhancing soil health as well.

## Session-9 Policy Framework

**Topic: Policy, Networking and Market Dynamics,**

**Session Chair-- Captain M. Mehmood Secretary FS&R**

**Presenters,**

1. Dr Shahid Zia,
2. Dr.Yousaf Zafar ,Ex Chairman PARC
3. Mr.Mobeen Ahmed Chughtai Soorty

In this session the participants, put potential emphasis for policy, networking, market dynamics, and future outlook for regen-agriculture in Pakistan. The participants were agreed that there is a need to properly evaluate the existing agricultural policies to assess the level of support for regen-agriculture as the advocacy strategy is very important for policy changes that can promote incentive for sustainable and regen-practices. Policies are also needed to support research and extension services for the education and awareness of farmers about regen-agriculture practices. The other resolutions given in this session were as following,

**Financial Incentives:** Provision of financial incentives, subsidies, or grants for farmers may encourage them to adapt for regen-practices and it may facilitate the transition process to make it economically viable.

**Networking and collaboration of** Farmers' Associations need to be encouraged to promote regen-agriculture practices, that may serve as platforms for sharing knowledge, experiences, issues, and best practices.

**Public-Private Partnerships:** There is a dire need to encourage partnerships between the government, private sector and non-profit organizations to create a network that supports the adoption of regen-practices.

Exploring opportunities for national, regional and international collaboration to promote and replicate the successful regen-agriculture models to leverage expertise at a larger scale is needed.

**Market Dynamics:** Certification and Labeling is also required to promote regen-agriculture products to differentiate them in the market.

**Consumer Education:** Investment in consumer education may increase awareness about the benefits of regen-agriculture, that can then create a demand for products produced by using these methods.

**Market Access:** Need to facilitate market access for regen-Agri farmers by connecting them with retailers, processors, and export opportunities.

**Future Outlook:** Need to explore and identify innovative technologies to enhance the efficiency of regene-practices.

**Climate Resilience:** Considering the potential impacts of climate change on agriculture and assess how regen-practices can contribute to climate resilience.

**Education and Training:** Investment is needed in the education and training of farmers, extension workers, and agribusiness professionals to ensure a sustainable future for regen-agriculture.

It's important to engage with stakeholders, including government bodies, farmers, NGOs, and the private sector, to create a comprehensive strategy for the successful implementation and growth of regen-agriculture in Pakistan.

## Session Summary

There is a need for improving policies, and mobilizing and targeting resources, that will be critical to end poverty and hunger. Without a close focus on targets and the pace of improvement, governments and their partners will not be able to adjust the scale of their interventions appropriately. Without improving the policy environment and signalling long-term political commitment, private investments will be smaller than needed and will not be allocated in the most effective way. Without adequate investments, both public and private, there is little chance of achieving scaled-up impact.

Many important initiatives are already being undertaken at the global or regional level to promote rural transformations. They include activities that seek to set norms and standards, mobilize finance, share knowledge, exchange policy experiences, and innovate with new technologies, business practices and partnerships. Several have a specific orientation towards smallholders while others benefit smallholders indirectly by addressing the agricultural sector or rural development in a broader way. A sense of the scope of these initiatives and the breadth of issues they address can be gained by looking at the following examples:

- Gender and youth in Agricultural Partnership to bring equality to women farmers' earnings and Strengthening Rural Youth through Enterprise seek to support young farmer entrepreneurs.
- Value chains: New Vision for Agriculture, and Community of Practice on Food Loss Reduction look to promote and improve the functioning of markets.

Many of these initiatives have been started within the past decade and suggest that the global community is moving away from business as usual and is viewing partnerships between governments, business, civil society and academia as a fruitful endeavour.

There is a major ongoing risk that efforts aiming to support SDG 2 face considerable gaps in coverage, either of geographies or of topics. Like, there is little focus on the institutional and policy framework that best serves rural transformations, including the need to develop off-farm employment opportunities and better education in rural areas.

Dr. Yousaf Zaffar (Ex Chairman PARC) mentioned that the Bio pesticides Policy has been approved by the Ministry of Agriculture, and the Policy for regen-Agriculture is in the final stage for which, a multi-stakeholder panel has been organized to answer the audience's queries. But here Arif Hameed Makhdoom (Senior Advisor Cotton Connect) emphasized that when discussing agriculture issues, the main pillar (Small Holder Farmer) is often missing, because the policies are made for farmers, where the farmers are seldom aware of their roles. Mr. Mubeen Chughtai (Soorty Enterprises) shared, that if we export organic cotton from other developing countries, it should be very cheap as compared to organic cotton produced in Pakistan. The main difference in price is the charges of the laboratory. Therefore, if the government establishes a lab for organic cotton in Pakistan, then we can provide a premium to farmers for the production of organic cotton.

**Dr. Rai Niaz Ahmed presented the idea of Hydroponic, Aeroponic, & Aquaponic for maximizing benefits within a limited time period, where the cost is very low.**

The participants emphasized the importance of data and traceability in a sector facing increased regulation and discussed the organisation's traceability system as a potential solution. Breakout sessions covered the topics like traceability efforts, transparency benefits for farmers, greenwashing concerns, and impact measurement.

Implementing regen-solutions first, requires an experimental approach that builds up from the bottom and calls for a transformational relationship with the land, reducing inputs, integrating forestry, water retention strategy and applying mixed cropping. Although the payoff for these things is immense but measuring the outcomes can be expensive and time-consuming.

In the end, **Dr. Farzana Shahid** distributed shields among different stakeholders and distinguished guests.

## Recommendations

Agriculture, including smallholder farming, is dominated by private business and investments, that requires the rural investment in climate, agricultural pricing, trade distortions, research and extension services, along with institutional arrangements to understand and respond to the needs of smallholders. Political commitment at the grass root level is also important as the public policies matter, at all income levels but unfortunately, there is less understanding of the constraints to policymaking, priorities and sequencing of reforms. Perhaps for this reason, there is little evidence of policy improvements in developing countries on average especially in 2015 and 2016, as measured by indicators of rural sector performance assessments. The one exception is in the area of rural finance, where access has improved dramatically over the past few years, although the gap remains significant. Following were the recommendations of conference,

- **Investing in Research and Development:** The collaboration is required between the academic institutions, local NGOs, to create awareness about the regen-practices and promote it for farmers adoption.
- **Strengthening Capacity Building of Farmers:** The training and knowledge extension to farmers is required to adopt sustainable farming practices that may increase yields.
- **Developing Sustainable Supply Chains and Traceability is required to** help implement a strict supplier evaluation process to ensure that all partners in the supply chain are committed to sustainability and Non-GMO Seed Provision.
- **Engaging with Consumers:** Developing strategies for consumers awareness about the benefits of organic cotton and encourage them to choose products made from this sustainable material.
- **Promoting Crop Diversity:** The crop rotation can prevent pest pressure and enhance pollinator habitat. This needs intercropping to increase soil diversity and improve soil health.
- **Biodiversity Conservation:** Regen-agricultural practices can help conserve biodiversity by promoting the growth of diverse plant species and habitats, that will lead to the preservation of ecosystem services, such as pollination and nutrient cycling, which are essential for food security and environmental health.
- **Implementing Conservation This requires** use of no-till or minimal tillage methods to reduce soil erosion including cover cropping to improve soil structure and enhance biodiversity.
- **Enhancing Soil Organic Matter:** It can be increased by using inputs like, compost and green manure, that help in the decomposition of organic matter such as, crop residue retention and mulching.
- **Natural Resources Management:** Need to maintain ecosystem health for long-term productivity that facilitates and rehabilitate the degraded soils
- **Farmers Empowerment:** this will help farmers to make informed decisions about their farming practices and encourage them to adopt regen-agricultural practices, which can

lead to increased productivity, reduced environmental impact, and improved farmer well-being.

- **Sustainable Yields:** sustainable production can be maintained through Regen-agriculture, which in turn can lead to reduced reliance on chemical inputs, improved soil health, and increased resilience to climate change.
- **Economic Sustainability:** Regen-agricultural practices can help farmers to be more resilient to market fluctuations and environmental shocks, that will be helpful in economic stability and reduced reliance on external support.
- Agri-system need the sustainable and regen-practices, that include integrated pest management by reducing synthetic inputs and the costs through the practices of cover cropping, low tillage, orchard incorporation, that will help maintain and improve soil health, restoring biodiversity and enhancing carbon sequestration potential.
- The water management, needs to upgrad irrigation systems through moisture management sensors and direct monitoring by farm management person to reduce water use for farming cost. This include, the tail water recovery to recycle water while reducing runoff and erosion potential.
- The innovations are needed for land leveling and increasing on-farm storage capacity to reduce the rental costs, which will increas the income potential and long-term crop value.
- Need to minimize and eliminate external inputs but to maximize the on-farm inputs.
- Integrate livestock wherever possible that best match the crop-livestock interface
- Reduce tillage to preserve the soil health.
- Since arable land is finite but the needs of a growing population require to increase and maintain agricultural production at sustainable level.

## Solutions for the Companies

The companies present in the conference showed their interest to move into regen-agriculture and were very much motivated to reduce the negative environmental impacts for a positive impact on the landscapes to ensure the sustainability of their supply chains. They knew that M&S, Primark, BHS and Walmart have all made substantial commitments toward implementing regen-agriculture within their value chains. However, the concern was that there is not much guidance available for companies to follow it when they struggle to shift their current systems of agriculture to get the maximum impact. Therefore, they are still struggling to figure out the way to do it. The companies also wanted to know precisely that what intervention is needed, where, and when because adapting regene-agriculture will not mitigate the sourcing risks but will also improve their brand reputation. Companies are very aware of the fact that hurting the environment can harm a company's brand reputation, its production and procurement chains. Where as having a green brand image improves brand loyalty, trust, and customer satisfaction but they still have the concern that how they will market regen-agriculture to the consumers at a large scale.

Any way, they were committed to decrease greenhouse gas emissions through reforestation, that will make a shift in temperature, rainfall, and extreme weather events and can, in turn, have a big impact on agriculture. Because the cotton crop, in particular, is at high risk, with climate change impacts leading to lower yields, and a greater need for pesticides. Therefore, implementing regen-agriculture techniques, such as shade tree management and intercropping, can help create better climates for cotton crops and reduce sourcing risks.

Here the findings of the conference, provided a way forward to the companies for collective action so they can start investing in pilot projects that are developed in full financial partnership with farmers, Indigenous communities and researchers for generating more data on regen-agriculture as they move on. There is a hope that this investment can definitely benefit soil, nature and communities to adapt regen-agriculture in the short time before 2030, to develop a new economic model for the apparel industry for a more just and non-extractive supply chains.

Therefore, the companies and brands present in the conference have realized that a transition to regen-agriculture is fundamental for the fashion and textile industry and the long-term health of the sector depends on, how they are able to work with farmers to develop more resilient systems, with immense social and environmental benefits. Hence to advance the field of regen-agriculture, apparel, textile, and footwear companies need to increase information-sharing with the food and beverage sector, ensuring that apparel brands influence the latest policy developments, financing models, and research initiatives.

The Textile industry, the global community of brands, manufacturers, and growers need to adapt regen-agriculture for a deep emissions cuts, nature-based mitigation options, adaptation strategies, and financial investments to have more purposeful production from the very start of the textile supply chain. This may help to address Climate change challenges for 45% reduction in the emissions, which is coming from producing fibers and raw materials. Therefore, as a part of this approach, regen-agriculture is critical for a range of social and environmental benefits, from overall soil health to community resilience and livelihoods. The recent research shows that regen-approaches can help build soil carbon, and this in turn can have positive effects on soil nutrient availability, water holding capacity, biodiversity, resilience to extreme weather changes, disease control and community livelihoods.

Also, it is of great economic importance for the companies by considering the current climates, Covid-related, and economic disruptions as the benefits of regen-agriculture have been documented in hundreds of scientific journal and popular publications. Which is an evidence that regen-approaches can help build soil carbon, that in turn can have positive effects on soil nutrient availability, water holding capacity, system biodiversity, resilience to extreme weather, disease resistance, and community livelihoods. However, a shifting scientific consensus on the mechanism of long-term soil carbon storage indicates that the industry must proceed with due diligence around claims related to greenhouse gas impact

reduction from soil carbon sequestration as well as around carbon credits and markets. Then, Regen-agriculture in the supply chain does not stop at the farm gate— so its values and concepts must be carried through the supply system of textile and apparel goods. In this context, building relationships and establishing long-term purchasing contracts are vital for the success.

RBDC, therefore is suggesting a key strategy for building new supply chains system for apparel brands to speed up the process and shared learning. These things may equip brands to ask the right questions to identify and support initiatives that align with their values. And, to realize the full potential of regen-agriculture, apparel, textile and footwear companies should integrate innovative financial support models from the start where the brands must see regen-agriculture as part of a different approach to ensure that those who are the direct stewards of the land have an active decision-making role. This needs to involve Indigenous people, communities of different colors and farmers.

The strategy can rebuild sourcing models and align with an industry-wide push for direct connections and transparency down to the farm level to look into existing supply networks and identify areas of opportunity with interested producers who need investments in capacity-building of farmers and growers on the ground. Investing in farmers and growers means sharing the risk of transition to regen-practices.

In summary, to determine their best pathway for regen-projects, brands can begin by identifying the raw materials or products in their supply chain that hold the greatest promise for conversion to regen-practices. They also need to examine their sustainability targets in the context of global industry guidance frameworks. A major driver of brands' interest in regen-agriculture has been the hope that regen-agriculture can help meet existing targets under the climate-focused Science-Based Targets, which are underpinned by the Greenhouse Gas Protocol. But regardless of the specific guidance, brands have a critical opportunity to get ahead of these issues by starting now to implement regen-agriculture projects that generate multiple ecosystem co-benefits—maximizing time for learning and adaptation in the eight short years remaining before 2030.

### **Opportunities, and way forward**

Companies need to approach regen-agriculture as an investment in a different system that has multiple co-benefits and not a variation on the predominant extractive model. Because the regen-practices can make critical contributions to improving soil health, biodiversity, water availability, quality, and a different business approach that prioritizes community and ecosystem health. Brands must ensure that those who are the direct stewards of the land—including Indigenous people, communities of color, and farmers, or their chosen representatives, as appropriate for the project context— have an active decision-making role in any regen-agriculture project from the very beginning. And there is a need to protect the natural resources by managing sustainably and agricultural innovations that support value for investors and the environment.

### **Needed Support**

The process of transition from a high-input, high-soil disturbance agriculture toward regen-practices almost take over five years agronomic support that needs financing from companies as payment for ecosystem services. This financing includes, loans, grants, or preferential insurance rates to farmers to cover the initial transitional costs, which may enable them to pilot new techniques to increase quality and production. Therefore, the farmers, consumers, and corporate support for regen-agriculture offers a unique opportunity at this stage of the movement for regen-agriculture. The consumer markets may be used as a reward to farmers for practice change, while the corporate suppliers will be assisting farmers to put their practices in transition, that will be an incentive for the farmers to adapt regen-agriculture.

The digital agriculture can also play a major role in overcoming the limitations so far and collaborations between the farmers and academics for regen-agriculture is important to identify and refine indicators. In conclusion, to promote regen-agricultural practices is essential for achieving a sustainable future in the agricultural sector. Then by empowering farmers, achieving sustainable yields, conserving biodiversity, ensuring economic sustainability, and promoting social benefits, we can work towards a more resilient and equitable food system.