

**DECODING IMPACT PRESENTS**  
**DECODING BIOFORTIFICATION**  
**WITH RAVINDER GROVER**

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# Acknowledgements

## Contributors

This podcast was arranged by the **Agriculture Team** in Sattva Knowledge Institute and was hosted by **Rathish Balakrishnan**.

We would like to thank **Mr. Ravinder Grover**, the Programme Lead at Harvest Plus, for participating in this podcast and for contributing his valuable expertise, insights and time.

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## About Sattva Knowledge Institute

**Sattva Knowledge Institute (SKI)**, established in 2022, is our official knowledge platform at **Sattva**. The **SKI** platform aims to guide investment decisions for impact, shedding light on urgent problems and high potential solutions, so that stakeholders can build greater awareness and a bias towards concerted action. Our focus is on offering solutions over symptoms, carefully curating strong evidence-based research, and engaging decision-makers actively with our insights. Overall, SKI aims to shift intent and action toward greater impact by influencing leaders with knowledge. All of our content proactively leverages the capabilities, experience and proprietary data from across **Sattva**.

**Introduction:** From Sattva Knowledge Institute. This is Decoding Impact, the podcast where we apply systems thinking in conversation with extraordinary experts to understand what it truly takes to scale solutions in the social sector. Decoding Impact is hosted by Rathish Balakrishnan, a co-founder and managing partner at Sattva. Welcome to today's episode.

**Rathish Balakrishnan (RB):** [00:00:37] Of all the problems we are solving in the social impact space, if we had to pick some of the top problems to be solved in any list- improving nutrition and improving farmer income are both going to be part of that list. Improving nutrition across all age groups is a very critical challenge for us to improve life outcomes. Today, lack of iron alone actually impacts a significant chunk of the population across children, pregnant women and non-pregnant women.

Similarly, India is a land of small landholding farmers and improving their income has a direct impact on their educational attainment, their health status and their livelihood. Biofortification holds the promise of improving the nutritional outcomes of the food we consume every day, including staples while allowing for that value to be accrued by the farmers as improved livelihood outcomes. It provides us with a way to ensure that we can, at a population scale, achieve improvements in our health outcomes, ensuring value to the farmers at large.

Today we want to speak about what is biofortification. How do we make biofortification work in India? And what does it mean in terms of value for the farmers, for the population and for consumers at large? Mr Ravinder joins us for this conversation today. He is a programme lead for Harvest Plus with more than 15 years of experience as a practitioner and advisor for the leading industry and consulting firms in the agriculture and food domain. He's led many large-scale engagements with the public, private and development sectors in the area of supply chain optimisation, route to market policy, advocacy and digital transformation. And more importantly, he brings an understanding across the policy space and the implementation space of what works and equally importantly, what doesn't. Mr Ravinder, thank you so much for joining us in the conversation today.

**Ravinder Grover (RG):** [00:02:19] Thank you Rathish for inviting me to this important session. I can't agree more, nutrition and farm income are two pressing issues that we need to have more and more conversations around, and I'm glad that we are putting our heads together to address these important issues.

**RB:** [00:02:46] So that means that biofortification is not a topic that a lot of people know about. I was just walking in today to this room and I told somebody that the topic is biofortification and they said, 'Biofortification' what? Maybe you want to start with an introduction to what biofortification means for our audience.

**RG:** [00:03:02] That would be a good starting point. We have been working on biofortification for nearly now one and a half-decade, and more and more people are getting to know about it but they sometimes end up confusing it with fortification or they don't have a very accurate understanding of what it is. So let me start with a very basic definition. Simply put, it's a process of increasing the density of vital micronutrients like zinc, iron and

vitamin A in widely consumed staple crops, so when eaten regularly, these crops and foods then can provide 40% to 100% of the daily needs for a given micronutrient. Biofortification is intended to benefit populations which are most vulnerable to deficiencies in micronutrients like young children, adolescent girls and women of childbearing age. This approach primarily focuses on staple food crops like rice, wheat, corn, beans, cassava, sweet potato and millet, which are widely consumed in low and middle-income countries, particularly by rural farming households and low-income urban consumers. As of now, nearly 38 million people worldwide are benefiting from the production and consumption of biofortified crops and food.

**RB:** [00:04:17] What has been your personal journey Ravinder? How did you end up with biofortification and what have been the life experiences that have taken you there? Maybe before we go into the actual content, we'd love to hear your story a little bit and how you ended up being here working on this issue of biofortification.

**RG:** [00:04:32] Glad you asked me this. In addition to being a foodie, I started my career with plant nutrition. I was in the industry for nearly a decade before I decided to move on to consulting where I was there for nearly five years; helping corporates and startups with cost optimisation, profit maximisation and digital transformation projects. And then I moved to the development sector, and one of the reasons I moved here was that this subject is very close to my heart and I believe that we should be doing more about the current nutrition status and the problem of farm income that we are facing in India. I'm here with the harvest plus for nearly one and a half years now and these have been some of the happiest days of my career.

**RB:** [00:05:20] And one of the points you made Mr Ravinder, was this difference between fortification and biofortification. And I'd love to sort of get a little more detail on that. How are these two different? And what is different in both the process and the outcome of fortification and biofortification?

**RG:** [00:05:33] Let me take a step back and try to address a larger issue that we are trying to resolve through the various approaches of fortification, biofortification, supplementation or dietary diversification - that issue is 'Malnutrition'. More than 3 billion people around the world, and that's mostly in Africa, Asia and Latin America simply can't afford a nourishing and diverse diet, which means they don't have enough essential vitamins and minerals in their diet, and they suffer from something called 'hidden hunger. Now, this is an important problem. It's not only a health issue, but it's also an economic problem because the impact on GDP for many countries is as high as 11%. For example, in India, we have near \$12 billion which is spent to combat malnutrition, this number is \$3 billion for Pakistan and probably one and a half billion for Nigeria. There are many possible responses to malnutrition, and that includes primarily the four approaches that I mentioned earlier. The easiest way is to diversify our diet where we consume more fruits and vegetables and add more millets and other elements in addition to the staples that we are consuming. The other approach is through additives like we do for edible oils and milk in the factories to enrich that food. That technique is called fortification. And then the third one is supplementation, which we all know COVID has taught us about zinc supplements and other supplements which we are

consuming today. But then there's another solution to this problem, which is biofortification. Biofortification is actually a practical, proven, demand-led response to hidden hunger. It's complementary to all other approaches that we have mentioned, but it stands out in certain aspects which we can discuss when we go further in our conversation.

**RB:** [00:07:30] I want to come back to the four things that you mentioned and talk about that in terms of the relevance of some of those ideas for different parts of the population. Some of those things that you mentioned about additives and, you know, things like adding more value to the food we eat seem acceptable and possible for a more affluent and middle-class population. I'm not sure if all of those solutions are relevant for the poor who are at the receiving end of some of these nutritional challenges. So when you talked about biofortification, is the affordability of the solution one of the differentiators of biofortification? Are there other advantages of the biofortification approach?

**RG:** [00:08:09] Yes. So biofortification stands out for primarily three reasons. It solves multiple problems. We talked about the nutrition aspects, it's cost-effective and it's time tested. But then there are three more important problems that biofortification is helping us solve. One of the important problems that we are facing is the climate. The rising CO2 levels will decrease the iron, zinc and protein content of edible portions of the plants, which will roughly mean that 3 to 17% yield and a drop in nutritive value for some of the common staples that we are consuming. Now, that's a huge risk, particularly for countries in the warmer part of the globe, like India. Biofortification is helping offset this by increasing the level of micronutrients in the crops. The other important parameter here is that most of the biofortified varieties are climate resilient, so they respond better to climate changes. Most of the time they are also stress tested for various climatic conditions and are future-ready.

The other aspect that we talked about is gender. In lower and middle-income countries, despite doing 2.6 times more domestic work than men, women often eat less and last, sacrificing for their families all the time. Of the nearly 800 million people who are food insecure in the world right now, nearly 60% are women and girls. So in the case of biofortification, differential food allocation, which is generally a problem when we talk about diversification and other measures, doesn't usually happen at the household level, everyone in the household consumes staple crops as their primary everyday source of food get to benefit from.

The third problem that we've you right as you rightly mentioned, was around farm income. Biofortification enhances the income of the farmers through higher yields, various improved production rates and overall climate adaptiveness. Now, just to give you a data point, non-farming consumers are willing to pay more for biofortified foods. As per some studies, the acceptance rate is nearly 98% and the average premium amounted to around 27%. And this can even go higher when more health-related information is provided to consumers.

**RB:** [00:10:31] When you look at fortification as an approach on the one side and biofortification as an approach on the other side, what would be stand out benefits of a biofortification approach over a fortification approach?

**RG:** [00:10:42] In addition to solving multiple problems, biofortification is a cost-effective approach in the way that every dollar spent on biofortification leads to around \$17 worth of benefits. Biofortification stands out as a cost-effective strategy, and it's particularly relevant for farming households who are eating what they are growing and who really can't afford the dietary diversification many times. Additionally, the food is readily available near a key vulnerable group that's rural households. In a way, it minimises the logistics cost involved in moving the food to vulnerable groups. The rather important thing is it's a path of least resistance. With minimal changes to the seed and food distribution system, these nutrient-enriched crops can be very well part of the current food system.

**RB:** [00:11:37] Unlike fortification, which brings in this idea of enriching the nutrients later in the process, let's say in a factory and so on, what you're saying is that in biofortification it takes it much closer to the source, which essentially means that there are efficiency gains in terms of cost, there is improved value to the farmer, because the consuming population and the producing population is fairly close by in this particular case, and it allows for other, less disruptive changes in the value chain. But would that be a fair summary?

**RG:** [00:12:07] Yes, Rathish. I would say as you rightly pointed out, these approaches are complementary. But, biofortification makes more sense to certain segments of the population, particularly the rural small-holder farmers who are consuming what they are growing, plus, because the food stays closer to the source, it's easier for us to deliver the result.

**RB:** [00:12:37] And you've worked with the farmers today and what has been their response? Has biofortification changed both their production habits and their consumption habits when they realised the value of biofortification in terms of nutrition?

**RG:** [00:12:51] There are nearly 400 varieties of biofortified crops today, which are available in around 40 countries to date. 24 countries have biofortification in their national agriculture, nutrition or health policies and plans. More and more farmers are adopting biofortification. If we talk about India's scenario zinc, and wheat was grown by nearly 450,000 farmers and farming households and iron pearl millet was grown by around 250,000 households in 2019. And it was consumed by nearly 2.2 million people and iron pearl millet was consumed by around 1.2 million people in the same year respectively. So, farmers are very happy with the iron pearl millet most of the time. More than 75% of the farmers who grew iron pearl millet, were willing to grow it next year. And they realised it's very effective. It's helping their families and it's also helping them get better yields for their crops in addition to the other benefits they are getting. As far as consumers are concerned. There is a very good response to the sensory attributes, the taste and appearance and consumers like I mentioned earlier, are willing to pay a premium for these products, even the non-farming consumers.

**RB:** [00:14:18] During this conversation, though, you made a very important point that I want to move to next, which is the entire aspect of climate change and climate crisis. I think anyone aware of the challenge ahead of us from a climate change perspective is clear that the extent of the impact it's going to have on every aspect of our lives is significant. I've heard about how diamond merchants are changing the way they work on diamonds because of climate change. Migration patterns are affected because of climate change and

agriculture, given its reliance on natural resources we know are going to be impacted significantly. And you made a very important point about how the nutritional value of crops is going to change and, you know, talked about being future-ready. I think that's a very, very important conversation. So it'll be great for you to give us a little bit more context both on in the absence of biofortification, what are the changes we are expecting in agriculture, nutrition, value, etc., because of climate change? Maybe we start with that and then I'd love to move on to what are some of the solutions to solve that problem.

**RG:** [00:15:19] Climate change is for real and we have realised now that it's going to affect our lives in ways more than we had originally thought. One of the important areas that it's going to affect is the food systems, which will start with the yields. Particularly the warmer countries will have a drop in the yields for the common crops that they are growing. More importantly, we will also face, a decrease in the nutritional value of the key staples. These staples being the primary source of nutrition for low and middle-income countries can have a devastating effect on the already deteriorating malnutrition scenario that's there in these countries, so it's important for farmers to take a more comprehensive approach. Not only farmers but the nations as well, where they start looking at the convergence of agriculture, climate and nutrition, because that's the only sustainable way of being nutrition secure.

We need to do a little bit of introspection here and see if there is a time to change the goal post from simply changing food security to looking at sustainable nutrition security, where we are looking at solutions, which, as I mentioned, help in marrying agriculture with nutrition and climate. Biofortification in this regard is a very good solution for the reasons that I mentioned earlier. That it's on the farming end, making farming more sustainable by increasing farm income, giving them climate adaptive solutions and making them feel more future-ready at the same time.

**RB:** [00:17:05] If you can maybe talk a little bit more about how biofortification makes these crops and staples future-ready and resilient to climate change?

**RG:** [00:17:17] With the growing carbon dioxide level, there will be a drop in nutritive value, particularly for zinc and iron. Now, one of the areas that we work on is let's take the example of iron pearl millet. We use conventional breeding to enhance the, say, iron level in pearl millet, so the iron pearl millet varieties will have 33% higher iron content compared to the conventional varieties which we are growing, which in a way minimises, and offsets some of the impacts that climate will bring on these crops.

Also, for most of the varieties that we work on, we are conscious that these varieties should be early maturing, so lesser time is spent in the field and lesser impact on climate is created by these crops. Most of these crops are pest resilient, they are resistant to drought, so they are adapted to handle varied kinds of climatic scenarios that can emerge in future, making these crops more future ready.

**RB:** [00:18:27] We talked about nutrition. We talked about climate resilience. Underlying both of these has been the conversation on farmer income, saying that this approach can impact

farmer income better. Why don't we set that up for the listeners? How does biofortification improve farmer income overall?

**RG:** [00:18:45] There are few elements of farmer income. One is how much produce they can get from their farms, which is essentially high because most of the biofortified varieties are comparable in yield to the common varieties which are being grown by the farmers and in addition to that, they have additional traits like best resistant climate resilience, so the farmers end up getting better yield outputs for these crops.

The other aspect of farmer income is what price realisation they have for these crops. After consuming bio-fortified crops, the surplus generally walks through the food system and reaches consumers in peri-urban and urban areas, where there is a higher willingness to pay for these crops. The demand for these crops is increasing. If you look at some of the trends which are shaping up, in the food sector globally, demand for clean label products is increasing. People are asking for more naturally nutritious foods. Covid has made us ask for immunity foods which are naturally rich in vitamins and minerals. These are some of the demand drivers which are resulting in higher demand for plant-based, biofortified foods, which can be a solution to some of the problems that are being faced currently by both urban and rural consumers.

**RB:** [00:20:05] You make a very important point, and I think we are all able to see this across that on one hand, there has been a significant economic impact on the poor, but on the other hand, the middle class and above customers have become significantly more health conscious. Eating patterns, workout patterns in general, and focus on well-being have significantly grown, which means that the demand for health-conscious food is increasing. And which is a great point. Often, the challenge is some of the increased value does not reach the farmer but is shaved off either by brands in the value chains. Are there ways in which we can move the money back to the farmers here and make sure that the farmers truly benefit from some of these increased demands for health-conscious and nutritious food?

**RG:** [00:20:50] Not only us but everyone who belongs to the agriculture space is trying to answer this, but how does a farmer get a larger share of the value that's being created in the value chain? Yes, there are solutions. Like we are talking more and more about the digitalisation of the value chain, where there's more visibility of the entry point, where value is being created and there's information symmetry across the value chain so that we know how much the total value generated and there's more equitable distribution of value eventually. We are also looking at the solutions which enable farmers to realise higher value, which is directly reaching out direct procurements from these farmers, looking at e-commerce platforms which work on disintermediation to a certain extent so that the value loss across the value chain is minimised. These are some of the solutions that we are looking at.

There is a lot of work that needs to be done to ensure that the value is distributed equitably across the value chain. The more important point issue that we are focusing on at this stage



is how we create more value and how we increase the size of the cake. That's the point that we are working on and we are looking at solutions which help farmers and other stakeholders, be it, processors and millers, realise higher value for biofortified crops and that's only possible when there is a high level of consumer awareness and they fully know the benefits that they can derive from these crops and foods.

**RB:** [00:22:32] Outside of biofortification, are there some systemic ecosystem-level initiatives that will help us create better, equitable value for farmers when combined with the idea of biofortification?

**RG:** [00:22:44] Collectivisation is one of the most empowering solutions which is being which is delivering results not only in India but across the globe, be the form of cooperatives, farmer-producer organisations, farm-produce companies or whatever we want to call it. But then this is something which has enabled farmers to unlock value and it's enabling disintermediation, it is enabling economies of scale, it's enabling people to look at bulk procurement of inputs and then reaching out to some of the processors and then creating better linkages.

The other solution that is helping is digitalisation and there are various possible areas in which work is happening. That's in terms of the online advisory systems, building traceability in the value chain, which is again a very important step for enhancing the overall premium that a product like this can charge to the consumer. Because consumers are valuing your traceability more and more. And so it's important that we have the track and we can trace the produce back to the farmer who has grown it.

**RB:** [00:24:20] On the farmer income piece. I think you laid out a very clear formula at the beginning, which is that the net income of the farmer is essentially total throughput into the price of throughput minus the cost of input. The total throughput goes higher because these are pest resilient, the overall quantity can go up. Price per throughput goes up because there is increased value and that value then gets accrued by the farmers. Is there any change in the cost of the input itself if these are pest resilient or I mean even just procurement of seeds, etc.? What does the cost of input mean? And in the case of biofortification for the farmers?

**RG:** [00:24:59] We don't need any change in agronomic practices for growing biofortified crops. Farmers just need to do whatever they were doing earlier with the regular varieties and get the additional benefit. There's no increase in the cost of agricultural inputs for the farmers or any additional labour or service is not needed for growing biofortified crops and adding to it if these varieties are more pest resilient, helps them in reducing some of their costs on agricultural inputs.

**RB:** [00:25:36] And I think that's a very important point you're making because that's than taking care of all the three variables in improving net income - It improves throughput, improves pricing per throughput and reduces the cost of input, or at least does not increase it significantly, which is an important one. Is there evidence today, of this playing out where farmers can get better incomes in the pilots that you've run? Any stories from the ground that you can share with us?

**RG:** [00:26:01] Biofortification is a completely evidence-based approach. We have been working with farmers in Maharashtra and in other places where particularly for iron pearl millet, where we were able to demonstrate some of the impacts of biofortification. A farmer feedback study was conducted a few years back on IPMC purchasers in rural Maharashtra. It showed that 83% of the pearl millet growers had replaced their traditional varieties with biofortified ones. All of the farmers like the yield input use and the production processing and consumption attributes. And nearly 84% of the IPM harvest was consumed by the households themselves because they found that it was good for their family. A majority of the farmers were willing to plant IPM again next season, and we're ready to plant it in more acreage. And this is not only happening in Maharashtra and wherever we are growing iron pearl millets in Rajasthan, Karnataka, but we are also getting similar results. So that's primarily on the farmer front that's currently coming out.

**RB:** [00:27:13] What are some of the challenges that we are facing in taking biofortification to scale? What would those be?

**RG:** [00:27:19] There are challenges. It's not an easy journey. Some of the challenges that we are facing currently are, one: there is a slow behavioural change at five levels and that's primarily due to the knowledge gaps. It is not easy bringing in new practice and presenting it to the farmers since adoption in India is generally slow. So that's one of the key challenges that we are facing. And so we are working more and more with partners like government bodies and private sector players to reach out to farmers, and make them aware of biofortification and how it could be beneficial to them.

The other challenge on the other end of the spectrum is in terms of consumer awareness. Sometimes consumers are not aware of biofortification, sometimes they confuse it with something else. They're not fully aware of what are the benefits that they get by consuming buy fortified foods. So there's a lot of work that's happening on the demand creation side. Genetically increase consumer awareness about biofortified crops. The fragmented landholding is one of the challenges which is universal to any agriculture value chain and it's all the more important in the case of biofortified because it's leading to a lack of traceability for grain aggregation and segregation. So that's one of the key challenges again.

The other challenge that we were facing earlier and which we have been able to resolve to some extent was that there were no trade guidelines and specifications specific to biofortified grains. There was no yardstick, there were no common vocabularies for traders to talk to the farmers when they were procuring biofortified grains. With the help of the British Standards Institute, we have launched the standards for zinc and iron for biofortified crops. The work on Vitamin A is on. This issue has been resolved to an extent. Now we have a defined set of standards for traders that they can use to purchase or procure biofortified crops. Lastly, the important thing is this there's inadequate policy support to increase demand. When I say inadequate, I also like the caveat that there's a lot of support, particularly in countries like India. Prime Minister himself is very supportive of biofortification. In fact, in the last few events, he had dedicated 17 biofortified varieties to the nation, with ICR leading the efforts for the development and release of biofortified varieties. There's a lot of policy-level support that's there, but I guess there's more that

needs to be done in mainstreaming biofortification in the national breeding programs as well as in some of the subsidies, the safety net schemes particularly mid-day meals and public distribution systems. These are some of the key challenges that we are facing at this point.

**RB:** [00:30:34] Now, this is very helpful and it's very holistic. You've kind of covered the consumer view, the policy view and also the market view. And there is also always this challenge in there about shifting orbits. You work at a certain scale and it seems to work. But then for you to be able to shift to the next scale of impact or in the next orbit of scale, requires you to significantly increase production and significantly increase demand at the same time. And it's always a chicken and egg problem. Is that something we are facing in the biofortification case as well?

**RG:** [00:31:06] That's a problem that we discuss every day at Harvest. Plus, it's more of a starting point problem. Whether we start with going to the consumer and creating more demand or we start with the farmer strengthening our supply chain first. This is a typical scaling-up issue that we are currently facing. As we scale up private sector participation is vital for ensuring that this technology scales up. It's nearly impossible for us to scale up without private sector participation. They play a larger role in popularising the concepts and technologies and distributing the food to the masses. They adopt this as a social enterprise initiative, and this is a good opportunity for corporates actually to take it and make some profits with a purpose.

The other important thing is the demand can as well be generated through safety net schemes like PDS, ICDs, and mid-day meals, so that it increases the adoption of biofortified crops. This is a huge amount of consumption that's happening in these safety net schemes. More and more governments are adopting biofortified foods in these safety net programs. They're endorsing biofortified crops. These two could be important drivers while we scale up biofortification.

**RB:** [00:32:46] I think you've touched upon two very important levers, which are, of course, the industry buying and the government adoption. You touched upon consumer awareness. I want to touch upon that a little bit more because it is ultimately the biggest lever that's going to push both the demand and hence this whole flywheel model of achieving scale. Biofortification is a mouthful. You know, as an idea, it does sound very scientific. How was your current thinking on communicating this to a consumer? What is the whole value of articulation? Are there any thoughts on how we take this idea of biofortification to consumers and make them aware? I would love to hear your thoughts. How do we make this story relevant for the consumer so that the eventual significant hockey stick demand kicks off through consumer demand as well?

**RG:** [00:33:41] That's one of the problems that we have been facing is the consumer doesn't understand biofortification the term itself is could be confusing for an average consumer. So we are working at repositioning these as nutrient-enriched crops. Let's say it's high iron beans or iron pearl millet, something which consumer understands and it's not very scary for them. We are educating consumers that to date all the varieties developed by Harvest

Plus are through conventional breeding. There is work going on in creating the right positioning which is more understandable and appealing to the consumers.

**RB:** [00:34:46] We've talked about what industry can do; what government can do. We talked about consumer awareness. You touched upon an earlier point about digitisation, which I thought was a very important point around the issue of traceability, but it's also around the innovation ecosystem that we need. On the issue of biofortification, multiple different stakeholders can come together to solve this problem. We might need technology companies to build traceability solutions, maybe we need financing organisations, maybe we need other players adding value to this issue where they're able to bring in diverse capabilities to solve specific issues we might face. I'm curious to know your thoughts on whether are there opportunities for the innovation ecosystem to come in and digital is one of them, but would love to hear from you on other types of innovation that you think can push this forward and solve some of these challenges and problems.

**RG:** [00:35:38] Yes, the innovation ecosystem is very important when we scale up the technologies like this. There are opportunities in the digital arena, but otherwise, also there are a lot of opportunities for the development organisations to look at biofortification as an opportunity and to combine it with their ongoing initiatives, say, for the development sector organisations who are working on gender, they can look at biofortification as a means of empowering women farmers both from a health and farming perspective. There are a lot of innovative models that could be evolved by piggybacking on some of the ongoing government programs, integrating them with ongoing development initiatives, and working with start-ups who are coming up with more and more innovative solutions.

**RB:** [00:36:36] Do you see a lot of supply-side innovation happening? Has it been very lonely being harvest plus talking about biofortification overall?

**RG:** [00:36:45] Harvest Plus has been working on the biofortification with the help of partners. And we have several partners who are helping us with various layers of the value chain, starting from seed production, seed multiplication, aggregation, segregation, some of the digital solutions to solve for these steps, and then to processing distribution and then finally retailing to the consumer. Honestly, I see a lot of innovation happening in these areas starting from the seed distribution or the seed multiplication. In seed distribution, we have been working with digital platforms to take the seed directly to the farmers, wherein we are in a better position to communicate some of the benefits that biofortification, which would have not been maybe possible through a traditional distribution system.

Likewise, many startups are working with innovative food products or concept products which can be taken to the consumers and can help the health-conscious consumer segments. Also on the retail side, as I mentioned about e-commerce solutions, digital platforms are taking these foods to the consumers and creating awareness. A lot of innovation happening across the value chain. All of the players which are involved in biofortification are coming up with something new.

**RB:** [00:38:19] So if today there is an organisation, let's say a philanthropic fund or a non-profit organisation or any sort of development-focused organisation that has access to farmers and is looking to improve their incomes or their climate resilience, etc., What should they do?

**RG:** [00:38:36] To start with, they should reach out to us. We will be happy to provide them with all the resources, tools and knowledge that they need for understanding biofortification and how they can integrate it into their ongoing programs. We will also support them if they need for, you know, giving them early generation seed if they want to get into seed multiplication and other things. And we can share our knowledge base and our resources, and we can also provide them opportunities to collaborate with some of the existing partners who are already onboarded for this biofortification journey. There is a complete ecosystem, a resource hub that's available with the harvest plus which enables the organisation who are interested in adopting biofortification, which helps them in their journey throughout.

**RB:** [00:39:31] Excellent. I want to close with one question which is we've looked at it from a very Indian lens today, which is very important for us because that's the audience we'll be talking to. But I know biofortification is a global movement. When you look at what we are doing in India today in biofortification. So there are the lessons from global landscapes that we can learn and are the things that we are doing in India and that we're setting out to do that you think will be relevant to a global audience as well?

**RG:** [00:39:58] There are a lot of learning opportunities that exist for India as well as for other countries. Countries have a lot to learn from each other when it comes to developing the relevant policies, so I think India can learn probably from countries like Tanzania where school feeding is gaining popularity and there are clearly defined guidelines for the inclusion of biofortified foods in the school feeding programs. Likewise, there are a lot of good policies support in Bangladesh. I would like to mention this example - there's a place in northern Bangladesh where nearly 40 to 50% of the consumption of rice is now by 45 rice. When you walk into the agriculture markets, you will find around 15 to 16 brands, which are both local and national units, which are dealing with biofortified zinc rice, so there's a lot that has been achieved in other countries which can be learnt. And I think some of the areas that countries can learn from each other are, developing an enabling ecosystem and creating a more favourable policy environment for integrating biofortification into their national program.

**RB:** [00:41:21] This has been fascinating. The promise is clear, the challenges are evident and I think there are very clear recommendations on where potentially philanthropy and the developing ecosystem can play out as well. I hope our listeners enjoyed this conversation as much as I did. I had a lot of fun and a lot of learning talking to you today. Thank you so much for your time.

**RG:** [00:41:39] Thank you for inviting me here. I hope that next time we meet and I hope we meet soon, let's enjoy some zinc biofortified cookies with a cup of tea.

***Outro:*** You have been listening to *Decoding Impact*. To learn more about Sattva and Sattva Knowledge Institute, please explore [sattva.co.in](http://sattva.co.in). We invite you to like share and subscribe to *Decoding Impact*, so you never miss out on new episodes. Thank you for joining us.