First millet-meals scientific study in schools shows millets boost child growth by 50%

New Delhi, 18 December: Findings from a recently published three-month feeding study with 1,500 children in Karnataka suggest that millet-based mid-day meals can increase relative growth by 50%. Children rated the meals, which were designed by scientists and chefs and included little millet as a rice substitute, over 4.5 on 5 for taste.

The findings of the study were released jointly by Prof Ramesh Chand, Member, NITI Aayog, and Dr Ashok Dalwai, Chair, Empowered Body, Doubling Farmers’ Income, Government of India, in New Delhi on Wednesday. The results were presented at the Tasting India Symposium later in the day.

“This is an example of not only a science-backed nutrition solution, but also a link between agriculture and nutrition. It is important now that we achieve mainstream consumption of millets and that they are not just for the elite,” said Prof Ramesh Chand.

Dr Ashok Dalwai emphasized, “Making it profitable for farmers to grow nutritious foods like millet has to be a key part of the Doubling Farmers’ Income vision and millets are important in the rainfed areas for farmers to cope with climate change and water scarcity.”
This Smart Food study, ‘Acceptance and impact of millet based mid-day meal on nutritional status of adolescent school going children in a peri-urban region of Karnataka state in India,’ published in the journal *Nutrients*, was undertaken by The Akshaya Patra Foundation and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Early adolescent school children in four villages—Thathaguni, Kagallipura, Allahali and Chensandra which are located around Bengaluru—participated in the study. Growth was assessed using anthropometry measurements—height and weight, along with age, while sensory evaluations were made to determine acceptability.

The researchers found that children fed millets had a 1.5% increase in height on average in three months while children in the control group registered a one percent increase in height during the same period. In effect, the study group children grew 50% taller than the height increase of control group children. Similarly, the study group children registered a five percent increase in weight on average, while three percent average weight increase was registered in the control group during the study period. Thus, the weight increase of the study group children was over 50 percent higher than that of the control group.

“It is not good enough just to say we are going to add millets into the meal,” said Dr S Anitha, a nutritionist at ICRISAT and the study’s corresponding author. “The type of millet, its variety, how it is cooked and the foods it is combined with are some of the key elements that can make a difference in nutrition. For instance, the amount of iron available in a meal can be doubled by selecting the right variety of millet. This is the first known scientific study of millet based meals in a school feeding program.”

The researchers gave the study group children meals including *idli*, *khichdi*, *upma* and *bisibella bath* in which rice was replaced by pearl millet (bajra), ragi (finger millet) or little millet (kutki). The anthropometric measurements at the end of the feeding program were compared with that of control group children who consumed fortified rice with *sambar*. 

*School children eating millet meals during the study in Karnataka*
“Akshaya Patra is always looking for ways to improve nutrition in mid-day meals. The millet meals were exceptionally successful and were really liked by the children. We appreciate the Karnataka state government’s support, and with this positive result, we now hope this will garner the support needed to make nutritious millet based meals available to our future generations,” added Ajay Kavishwar, Head of Research at The Akshaya Patra Foundation.

“This initiative also included developing guidelines on how to introduce millets into menus to maximize the nutrition benefits and likability. This is pertinent now given the renewed interest in millets,” said Ashok Jalagam, Smart Food Coordinator for Asia Pacific and one of the study’s authors.

**Call to policy makers**

The study’s authors have called for policies that (1) Follow the lessons learnt on how to include millets into meals; (2) Create a level playing field for the pricing and availability of millets (through Minimum Support Price (MSP), Public Distribution Scheme (PDS) and feeding programs (MDMs, ICDS) that will benefit from not only including millets, but also from the approach taken to introduce them; (3) Go one step further and select millets by varieties in programs, ensuring maximum nutritional value and impact and (4) Promote millets in positive fun ways.

This is highly relevant now as millets have gained attention for their nutritional value and resilience in the face of water scarcity and climate change, making them a viable option for struggling farmers if markets can be further developed. The Government of India and various states like Karnataka and Odisha have led the cause to make millets a popular food choice. The Government of India designated 2018 as ‘National Year of Millets’ and initiated a millet mission. NITI Aayog recently announced a pilot to include millets in the Integrated Child Development Services (ICDS) and MDM schemes.

“These results and guidelines developed from the study are equally important for any scheme addressing malnutrition or general health diets—whether that of governments, NGOs or private sector processors or caterers,” noted Joanna Kane-Potaka, Executive Director of Smart Food and Assistant Director General of ICRISAT. Ms Kane-Potaka outlined plans for clinical testing to determine bioavailability of millets and the role of gut-microbiome, besides research to see how different forms of processing and cooking can affect nutritional composition of millet meals.

“ICRISAT holds the world’s largest collections of millet genetic material and works closely with Indian Institute of Millets Research and other partners to improve millets by developing varieties having higher nutrient levels as well as the more conventional traits like yield and resilience,” commented Dr Peter Carberry, Director General, ICRISAT.
BACKGROUND INFORMATION

Nutrition composition of the typical school meal of fortified rice and sambar compared to millet based meals

Comments from experts

Millets are indeed superior cereals in terms of nutrition and also in terms of sustainability. They are ideally suited to address child undernutrition and fits very well in nature friendly production. Use of millets in various nutrition intervention programs and in PDS will be of great help to address malnutrition and improve health.

Prof Ramesh Chand, Member, NITI Aayog, Government of India

Making it profitable for farmers to grow nutritious foods like millet has to be a key part of the Doubling Farmer’s Income mission. As part of the mission, I emphasize the need for harmonious consideration of three principal stakeholders: farmers, consumers, and ecology. We need a wholesome ecosystem system approach for long term sustainability.
Dr Ashok Dalwai, Chair, Committee on Doubling Farmer’s Income

We have this very elaborate arrangement and network of processes to ensure cooked food is given to children in thousands of schools all over the country. It is only logical to introduce millets by making a few policy changes by the Government of India and the states. We can take millet-based preparations to a hundred million children. If we can introduce millets in the Mid-Day Meal program and make it delicious and memorable, it is then very good for children, very good for the planet and for the farmer.

Chanchalapati Dasa, Vice-Chair, Akshaya Patra Foundation

Extracted from the upcoming coffee table book “Against the Grain in India”

It is very important to recognize the wide difference in all the millets from nutritional value to cooking and processing suitability and taste. Indian Institute of Millets Research works on all the millets and across the whole value chain from breeding improved varieties to undertaking research on product development to operating an incubator for SMEs.

Dr Vilas Tonapi, Director, Indian Institute of Millets Research

The study and its results are hugely valuable for how we move forward with designing meals for children. We knew millets were nutritious and were advocating for their inclusion in government programs. This study provides more guidance on how to do this.

Dr Raj Bhandari, Medical doctor and government advisor

Scientific research is essential to ensure the best solutions. This study has highlighted the need for research ranging from high end genomics that can halve the time needed for breeding the most nutritious millets through to social economics and marketing research that can test the best methods for achieving behavior change towards more nutritious diets.

Dr Peter Carberry, Director General, ICRISAT

This initiative also included developing guidelines on how to introduce millets into menus to maximize the nutrition benefits and likeability. This is pertinent now given the renewed interest in millets.

Ashok Jalagam, Smart Food Coordinator for Asia Pacific, ICRISAT

It is not good enough just to say we are going to add millets into the meal. The type of millet, its variety, how it is cooked and the foods it is combined with are some of the key elements that can make a difference in nutrition. For instance, the amount of iron available in a meal can be doubled by selecting the right variety of millet. This is the first known scientific study of millet based meals in a school feeding program.

Dr S Anitha, Senior Scientist - Nutrition, ICRISAT

Akshaya Patra is always looking for ways to improve nutrition in mid-day meals. The millet meals were exceptionally successful and were really liked by the children. We appreciate the Karnataka state government’s support, and with this positive result, we now hope this will garner the support needed to make nutritious millet based meals available to our future generations.

Ajay Kavishwar, Head of Research, The Akshaya Patra Foundation

We worked closely with the schools’ principals and teachers in undertaking this study. They played a key role in advising us on the children’s preferences and how best to communicate with to educated them about millets.

Deepi Tripathi, Social Development Professional, The Akshaya Patra Foundation

Our nutrition students were thrilled to be able to undertake the BMI (height, weight, arm length and arm circumference) measurements of the children. Our chefs and students alike have been inspired by the potential for millets and are creating new recipes and testing their nutrition values and undertaking sensory evaluations. So far the results are very positive.

Priya Arjun, Head Food and Beverage, Head Nutrition Center, M S Ramaiah University of Applied Sciences

Product development based on understanding of consumer preferred traits, especially organoleptic properties, linked to scientifically validated health claims is key to sustainable promotion of millets. The Agribusiness and Innovation Platform (AIP) of ICRISAT is working on sustainable millet value chains through innovative product development and its scientific validation.
Dr Saikat Datta Mazumdar, Chief Operating Officer, NutriPlus Knowledge (NPK) Program, Agribusiness and Innovation Platform (AIP), ICRISAT

Government policy that creates a level playing field for millets versus rice or wheat is a critical need. It has to be cost effective for more nutritious meals to be served to those who are most in need.

Dr S Nedumaran, Senior Scientist - Economics, ICRISAT

Our rigorous primary data collection and analysis have delivered evidence of the capability of these climate-smart crops to effectively mitigate the extent of undernutrition in infants and youth, while catering to the palate of diverse consumers. This suggests immense potential of millets and sorghum in contributing to multiple goals under the SDG 2030 agenda.

Dr Takuji W Tsusaka, Natural Resource Economist, Organization for Advanced and Integrated Research, Kobe University

Gut health (microbiomes) is an emerging science and critical for the absorption of nutrients. Millets have pre- and probiotic properties and therefore they can naturally help in improving gut health. However, little is known about this area, and given that it can influence the final nutritional value of our food, more research is urgently needed.

Dr Rajeev K Varshney, Research Program Director - Genetic gains, ICRISAT

The study adds a strong dimension that these neglected and underutilized foods can play a strategic role in improving nutritional status. It gives us a very good idea to utilize millets in traditional recipes, adding interest and variety to the plate at household level. A lot has to be done to popularize millets as a low cost solution in the fight against malnutrition. The current effort is commendable and scalable with region specific modifications.

Dr Shweta Upadhyay, International Consultant, UNICEF, Malawi

These results and guidelines developed from the study are equally important for any scheme addressing malnutrition or general health diets—whether that of governments, NGOs or private sector processors or caterers.

Joanna Kane-Potaka, Assistant Director General – External Relations, ICRISAT 
Executive Director - Smart Food

About

Smart Food is a global initiative to bring foods that fulfil all criteria of being good for you, the planet and the farmer into mainstream. The key objective of Smart Food is to diversify staples with Smart Foods, starting with millets and sorghum. Given that staples often constitute 70% of a meal and typically comprise of refined carbohydrate, hence little nutrition, Smart Foods can have a big impact. www.smartfood.org

The International Crops Research Institute for the Semi-Arid-Tropics (ICRISAT) is an international non-profit organization that conducts agricultural research to bring prosperity to small holder farmers in the drylands of Asia and Africa. ICRISAT has a specialty in millets, sorghum, pigeonpea, chickpea and groundnuts. ICRISAT’s global headquartered is in Hyderabad, India, and it has offices in eight countries in Africa. It is a research center of the CGIAR (a global agriculture research partnership for a food secure future). See: www.icrisat.org

The Akshaya Patra Foundation runs the world’s largest non-profit run mid-day meal program serving wholesome food to 1.66 million children in 13,839 schools across 12 states in India. The organization strives to fight hunger and malnutrition. By implementing the Mid-Day Meal Scheme in Government schools and Government aided schools, The Akshaya Patra Foundation aims not only to tackle hunger but to also bring children to school. It is headquartered in Bengaluru, India. See: www.akshayapatra.org