

# Smart Foods

Good for you  
Good for the Planet  
Crucial for fighting poverty and food insecurity



Photos: PS Rao, ICRISAT

## An Opportunity

Nutri-cereals, especially millets including sorghum, have very little funding and attention compared to other major crops. The 'big 3' crops (wheat, rice and maize) receive most attention and support for development and are increasingly dominant in the minds of government, industry and consumers.

We believe that nutri-cereals are under-recognized for their value and are important for diversification and complementing other foods. In particular they are critical for both farmers and consumers because of:

- high nutritional value
- resilience under extreme weather conditions – critical in future with climate change
- need for both diet and on-farm diversity
- multiple untapped uses
- large scope for further development
- appropriate for fighting poverty and food insecurity

## MILLETS are SMART FOODS

### GOOD FOR YOU

#### MULTIPLE HEALTH BENEFITS<sup>1</sup>

Their low glycemic index helps manage blood glucose levels and prevent diabetes.

#### MILLETS ARE HIGH IN ANTIOXIDANTS

Pearl millet has the highest folic acid content among cereals, which lowers heart disease and cancer risks and is recommended to pregnant women.



Highest Folic acid  
46 mcg/100g

Millets are Highly Digestible  
Gluten-free

Fight against Cancer, diabetes heart disease

#### NUTRIENT DENSE GRAINS

Millets are high in protein, vitamins and micronutrients

#### Finger millet<sup>2,3,4</sup>

340mg/100g Calcium  
3 times more than milk

#### Pearl millet<sup>5</sup>

iron 75mg/kg zinc 43mg/kg



"Mothers from Mali to Mumbai use finger millet as baby porridge due to its richness in calcium"

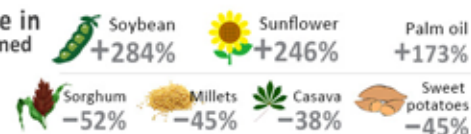
#### CRITICAL NEED FOR DIET DIVERSITY

Fewer crop species are feeding the world than 50 years ago, with a stark decline in millets and other traditional crops.<sup>6</sup>

This globalized non-diversified diet of energy dense crops fuels the rise in diabetes and heart disease. Millets are part of the answer to reverse this trend.<sup>7</sup>



Average change in the calories consumed from key crops worldwide (1961-2009)



### GOOD FOR THE PLANET

In drier and warmer climate, millets are more adapted.

#### HARDY AND DROUGHT-TOLERANT<sup>8,9,10,11</sup>

Millets are often the only cereal crops that can grow in arid lands

Only needs 350-400mm annual rain



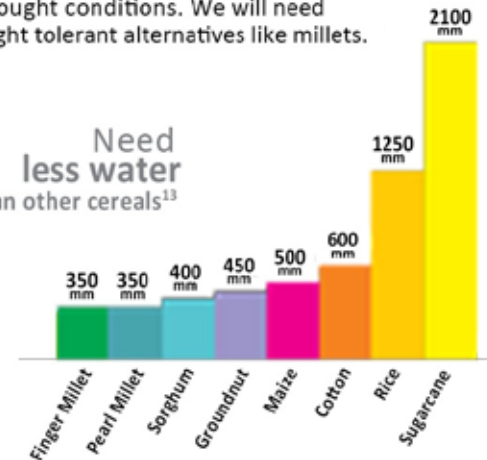
#### FOOD SOLUTION IN A CHANGING CLIMATE

With global warming, 40% of land where we grow maize in sub-Saharan Africa may not support that crop by 2030.<sup>12</sup>

Millet survives better than maize in drought conditions. We will need drought tolerant alternatives like millets.



Need less water than other cereals<sup>13</sup>



#### HEAT TOLERANT<sup>11</sup>

Some pearl millets survive at temperatures up to 64°C



#### GROW FASTER

Some millets need 60-65 days to mature against 100-140 days for wheat



Millets can grow with no or little fertilizers and pesticides

#### A CROP TO BRING DIVERSITY ON FARM FOR SUSTAINABLE AGRICULTURE

Easier to grow for poor farmers with difficult access to inputs.

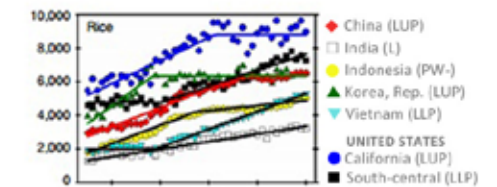
Greater crop diversity on farm reduces pests, climate risks, improving farmers' overall resilience



### CRUCIAL TO FIGHT POVERTY AND GROW FOOD SECURITY

#### NEW SOLUTIONS NEEDED TO FEED 9 BILLION BY 2050

A third of rice, maize, and wheat growing areas have experienced yield plateaus or decrease in yield gain in the last decade<sup>14</sup>



#### HUGE SCOPE FOR GROWTH IN MILLETS

Better seeds, better inputs and farm practices can boost millet production to significant levels, eg +55% in Niger, if using microdosing

microdosing can boost millet production



#### GREAT YIELD GAIN POTENTIAL FOR MILLETS

Average rainfed sorghum yield is as low as 600kg/ha, when realistic potential is three times higher. Significant impact is already proven



Traditional crop for 2.5 billion people living in the drylands

#### CRUCIAL STAPLE FOR MILLIONS IN THE DRYLANDS

Family nutrition: Millets are well-known traditional crops for most of the 2.5 billion people living in the drylands. 80% is eaten by the farmers' family



#### MULTI USES EXIST WITH UNTAPPED MARKETS

Fodder: Pearl millet straw, with up to 50% dry matter, is the main animal feed for dryland herders in the dry season



Biofuels & fermentation industries not fully developed

Consumer Product: Health foods, sanitizers and more are untapped markets





## Aim

We are working on **building a stronger scientific case** for more support to millets. We also would like to **promote the issues and value** that millets can add.

We also see a need to **build a new image** around what have been the traditional crops and foods in many areas. A globalized diet now exists and the trend in developing countries is that more nutritious foods like millets are not preferred as they are seen as 'food for the poor' and not as status foods or crops by consumers and farmers.

## Join the Smart Foods campaign

The campaign is expected to include:

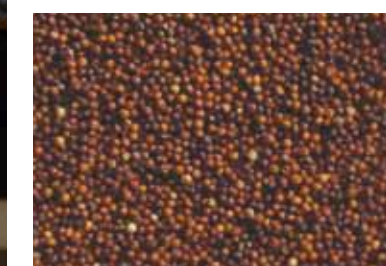
- Creation of an overall campaign branding, messaging, scientific backing and key creative material to highlight the messages.
- Consumer campaigns in India, selected African countries and Western countries to change the image and promote the advantages of millets.
- Involvement of food processing companies, local groups as well as multinationals, to develop modern millet-based products.
- Targeted promotion to development donors and organizations about the value and potential of millets.
- New innovative ways to grab attention of all target audiences.



Sorghum



Pearl millet



Finger millet

### LEGACY

One of the earliest domesticated plants. Cultivated by the Chinese before rice. Millet's legacy persists in the Chinese language.

和 millet+mouth  
harmony

## References

1. Saleh Ahmed SM, Zhang Qing, Chen Jing and Shen Qun. 2013. Millet Grains: Nutritional Quality, Processing, and Potential Health Benefits. Pages 281-295 in Comprehensive Reviews in Food Science and Food Safety 12(3):281-295. <http://millets.wordpress.com/health/calcium/>
2. Upadhyaya. 2011. <http://oar.icrisat.org/22/1/HDU1.pdf>
3. Kannan S. 2010. Finger millet in nutrition transition: an infant weaning food ingredient with chronic disease preventive potential. British Journal of Nutrition, 104:1733-1734. doi:10.1017/S0007114510002989.
4. Nambiar VS, Dhaduk JJ, Sareen N, Shahu T and Desai R. 2011. Potential Functional Implications of Pearl millet (*Pennisetum glaucum*) in Health and Disease. Journal of Applied Pharmaceutical Science 01 (10):62-67. <http://www.bbc.com/news/science-environment-26382067>
5. Khoury CK, Bjorkman AD, Dempewolf H, Ramirez-Villegas J, Guarino L, Jarvis A, Rieseberg LH and Struik PC. 2014. Increasing homogeneity in global food supplies and the implications for food security. Proceedings of the National Academy of Sciences of the United States of America 18 March 2014, Vol 111 no.11:4001-4006. [http://shodhganga.inflibnet.ac.in/bitstream/10603/11053/11/11\\_chapter%202.pdf](http://shodhganga.inflibnet.ac.in/bitstream/10603/11053/11/11_chapter%202.pdf)
6. Vadez V, Hash T, Bidinger FR and Kholova J. 2012. Phenotyping pearl millet for adaptation to drought. Frontiers in Physiology 3:386.
7. Schill SR. 2012. Sorghum acres to grow due to drought tolerance, new varieties. Ethanol Producer Magazine, 27 December 2012. Available at <http://ethanolproducer.com/articles/9408/sorghum-acres-to-grow-due-to-drought-tolerance-new-varieties>
8. Rai KN, Reddy BVS, Saxena KB and Gowda CLL. 2004. Prospects of breeding sorghum, pearl millet and pigeonpea for high forage yield and quality. Paper presented at the 4<sup>th</sup> International Crop Science Congress, 26 September-1 October 2004.
9. The World Bank. 2013. Turn Down the Heat: Climate Extremes, Regional Impacts, and the Case for Resilience. A Report for the World Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics. Washington DC: World Bank.
10. Millet Network of India, Deccan Development Society, FIAN India. Millets: Future of Food and Farming. Available at <http://www.swaraj.org/shikshantar/millets.pdf>
11. Grassini P, Eskridge KM and Cassman KG. 2013. Distinguishing between yield advances and yield plateaus in historical crop production trends. Nature Communications 4, Article number: 2918.

## Photo credits

- 1 <http://www.weightwatchers.com/food/rcp/RecipePage.aspx?recipeid=217431>
- 2 PS Rao, ICRISAT
- 3 <http://www.archanaskitchen.com/recipes/desserts/tea-time-cake-recipes/1358-eggless-ragi-banana-bread-finger-millet-and-whole-wheat-banana-cake>
- 4 Vidyasagar, ICRISAT
- 5 ICRISAT
- 6 <http://www.applecrumbles.com/2013/09/10/millet-casserole-with-fresh-tuna-morsels/>
- 7 PS Rao, ICRISAT
- 8 PS Rao, ICRISAT
- 9 PS Rao, ICRISAT
- 10 PS Rao, ICRISAT
- 11 <http://aconsciouskitchen.wordpress.com/2012/11/12/millet-sushi-as-healthy-as-sushi-comes/>
- 12 A Paul-Bossuet, ICRISAT
- 13 [http://www.tarladalal.com/Jowar-and-Ragi-Porridge-\(Baby-and-Toddler-Recipe\)-38841r](http://www.tarladalal.com/Jowar-and-Ragi-Porridge-(Baby-and-Toddler-Recipe)-38841r)
- 14 ICRISAT
- 15 PS Rao, ICRISAT
- 16 A Paul-Bossuet, ICRISAT

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