



Effective dissemination of SSM practices to enhance soil health & nutritional food value

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Global Symposium on Soils for Nutrition | 26-29 July 2022



Soils4Nutrition Project: Main outputs

- Soils4Nutrition: state of the art
- Demonstration sites: field trials
- National policy briefs
- Technical guidelines
- Farmers training

Sustainable soil management
for nutrition-sensitive agriculture
in Sub-Saharan Africa and
South East Asia



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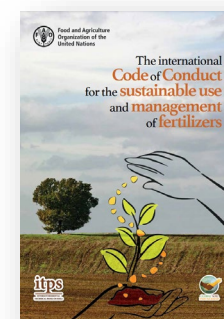
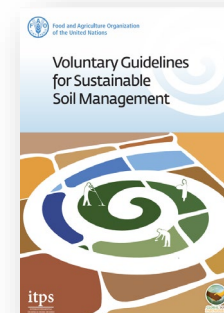
Soils for nutrition: state of the art



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- Available information & Knowledge gaps
 - Status and trends of nutrients needs and efficiency
 - Role of soils on nutrient assimilation
 - Impacts on misuse and overuse on environmental pollution and climate change
- Information to disseminate
 - Enhance soil health
 - Enhance nutritional food value
 - Ensure food safety and inocuity



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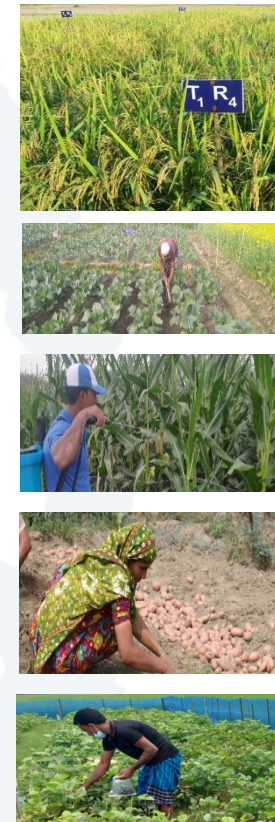


SSM practices implemented in field trials

Micronutrient fertilizers



Crop rotation / Pulses



Soil organic matter application



Crop association / Pulses



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National Policy briefs

National Policy Brief

Sustainable soil management as keystone of nutrition sensitive agriculture in Bangladesh

Key messages

In Bangladesh, more than half the population suffers from malnutrition. Severe acute malnutrition affects 450,000 children, while close to 2 million children suffering moderate acute malnutrition.

Nutrient deficiencies are due to the majoritarian consumption of nutrient poor staple crops, grown on nutrient depleted soils. In particular, deficiencies of zinc and boron are widespread in Bangladesh.

Intensification of agriculture using nutrient-rich high-yielding varieties can lead to the decline of soil fertility due to mining of nutrients and soil organic matter depletion, thus jeopardizing longer term food security.

Soil health is important for a long term nutrient supply capacity and must be considered in nutrition sensitive agriculture.

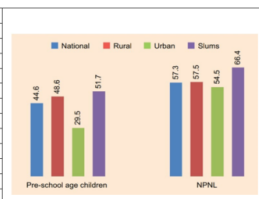
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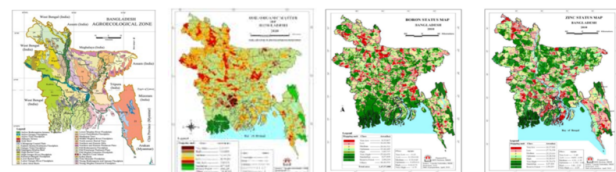
Table 1. Prevalence of Micronutrient and Nutritional Status of Bangladesh (Source: National Micronutrient Survey 2011-2012)

	Rural	Urban	Slum
(%)			
Subclinical vitamin A deficiency			
Preschool Children	19.4	21.2	38.1
School-age children	20.2	22.1	27.1
NPWL women	5.4	4.9	6.9
Zinc deficiency			
Preschool children	48.6	29.5	51.7
NPWL women	57.5	54.5	66.4
Nutritional status of preschool children			
Stunting	31.4	31.3	51.1
Wasting	21.1	12.9	20.3
Underweight	29.6	28.1	47.4



On the other hand, agricultural intensification has put a tremendous pressure on arable land, mining soil nutrients and producing a decrease of soil organic matter, with the consequent decreased soil fertility, as well as other related degradation processes such as soil erosion, pollution, increased soil salinity, compaction and pan formation, acidification and deforestation, that impair agricultural yields and ultimately decrease the crop nutrient content.

In order to maintain soil production, increasing amounts of chemical fertilizers have been required. The Government has issued a Fertilizer Recommendation Guide (2018) that includes recommendations on the dose and time of application of fertilizers based on AEZ, and including macro and micronutrients.



Healthy crop soils: the gear for better nutrition in Malawi

The first results of the field trials showed that crops produced under low soil fertility conditions are lowly productive and that improving soil nutritional status through fertilization has a positive effect in yields. The yield increases are higher in the case of organic additions compared to mineral fertilizers (figure 1). The calculated land equivalent ratio also supports this observation.

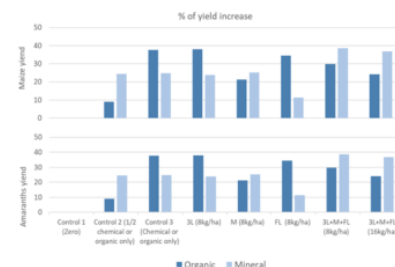


Figure 1

The improvements in soil health, however, could not be quantified through these field essays, since the duration of the trials (1 year) is too short for the detection of trends in slow-changing variables, such as SOM content. In fact, organic manure and maize-legume intercropping may take more than two-three seasons to build soil organic matter. These delayed benefits of the technologies applied must be thus tracked, communicated and considered in policy design, as otherwise the risk of dis-adoption of the technologies after one or two seasons of use may increase (Jew et al 2020).

The right rate, time, place, and source for micronutrient fertilizers

Foliar application of micronutrients to crops showed also notable increases in maize, soybean and amaranth yield (figure 1), and in nutrient content in edible parts of crops (figure 2).

The effect was higher in intercropping than in mono-cropping systems, and when multi micronutrient dressing was applied compared with single element foliar contributions. For example, around a 20-25 % increase yield was obtained with the separate foliar application of Cu and Zn to maize (figure 3), compared to almost 40% increase when multi micronutrient dressing was applied in the intercropping trial together with organic soil additions.

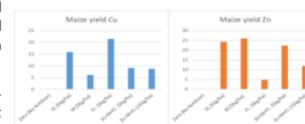


Figure 3

Recommendations and way forward

The evaluation trials have shown that use of integrated fertility management including intercropping, organic and mineral fertilizer additions to the soil, and application of foliar multi micronutrient dressings

Document d'orientation

La gestion durable des sols comme clé de voûte de l'agriculture sensible à la nutrition au Burkina Faso

Messages clés :

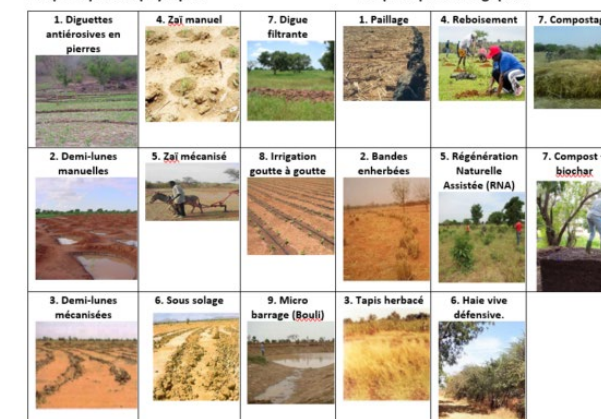
- *Données sur la nutrition dans le pays* : au Burkina Faso, malgré les importants efforts déployés, l'évolution de la malnutrition aiguë, de l'insuffisance pondérale et de la malnutrition chronique est demeurée très faiblement décroissante de 2009 à 2021.

- *Productivité des cultures dans le pays* : au regard de l'état de dégradation avancée des terres et du niveau relativement faible des interventions sur les sols, la productivité des cultures reste encore assez faible.

L'Institut de l'Environnement et de Recherches Agricoles (INERA) a répertorié un total non exhaustif de bonnes pratiques dont certaines pratiques biophysiques et d'autres biologiques (BAMBARA, 2022).

Les pratiques biophysiques

Les pratiques biologiques



Des sols agricoles sains : le puits d'une meilleure nutrition

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Technical guidelines



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Case studies

Key messages and recommendations

Technical Guidelines on Soils4Nutrition

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Soils4Nutrition: a project to tackle soil and crop nutrient deficiencies

Through the project on "Sustainable soil management for nutrition-sensitive agriculture in Sub-Saharan Africa and South East Asia", the Global Soil Partnership supports FAO member countries to apply sustainable soil management practices, in an effort to improve the nutritional quality of locally-produced food to address human micronutrient deficiencies. The project was set up with funding from Germany's Federal Ministry of Food and Agriculture (BMEL) in Bangladesh, Burkina Faso and Malawi where governments highlighted the need to address human nutrient deficiencies, particularly in poor rural communities. The three main outcomes of the project included a review of existing knowledge, demonstration of best management practices, and country-specific and global soil management recommendations to combat crop nutrient deficiencies.



Figure 2. Demonstration site in rotation of rice-cowpea and mungbean in the Salsandighi district (Bangladesh).
<https://www.flickr.com/photos/foodthru/50289633072/in/album-743774378894672/>

The results of the field trials indicate that by following the basic principles of sustainable nutrient management, farmers can produce higher quality food and transform their diets. The field trials provided important information on the right time, the right form and the right place to apply micronutrient fertilizers, along with the benefits of associated micronutrients use with sustainable soil management practices. Also, given the low level of knowledge rural actors on the role of soils, the project focuses much of its efforts on training farmers and extension services at each of the demonstration sites.

Figure caption

Capacity building focused on practical soil knowledge mechanisms through the application of the global S initiative. This program also provides the establishment sustainability of the actions undertaken.

A thorough review of the existing literature showed that there is a need for more structured macro-nutrient uptake value allow opposite experguara effort as per Condi fertili

Stakeholder consultation in Burkina Faso

In Burkina Faso, malnutrition continues to increase, despite the government's efforts to diversify diets and fortify foods. In fact, 92% of children aged 6 to 59 months have nutritional anaemia, 13% of which is severe. This situation is also of concern among pregnant women and nursing mothers, with prevalence rates of 68.3% and 52.5% respectively (INSD and ORC Macro, 2004). Data on other micronutrients such as zinc or copper are scarce, but estimates suggest that those deficiencies are also very high. These are based in a large part on the rate of soil degradation in Burkina Faso, which reaches 65% of the national territory, according to BUNASOLS, the national soil survey office.

During a national workshop held in Burkina Faso in April 2022 in the framework of the Soils4Nutrition project, the suitability of the most known and commonly used SSM practices regarding the country's social and economic context was evaluated. Participants included forty-one national experts from national and local institutions, NGOs and private sector. The active participation and fruitful discussions allowed to identify actions to prioritize in the country for the improvement of the micronutrient content of locally produced food.



Figure 5. M. Traore Mamadou, Director General of BUNASOLS in the national workshop in Burkina Faso.

Among the management options considered in the workshop, some practices widely known to be beneficial for soils, such as green manures and cover crops, were discarded as priorities because of cultural aspects that prevent farmers from appropriating them.

It became clear that soil health is not understood as a priority by itself and allocating resources to its improvement, instead of to obtaining products to be sold or consumed, is not considered to be advantageous. The key role of soil for improving the nutritional value of food needs to be further communicated.

In conclusion, efforts in sustainable soil management for nutrition-sensitive agriculture in Burkina Faso must be multiplied. These efforts should be directed primarily to the most promising sectors and practices in order to achieve an effective scaling up of results.

1 Aim for soil health and monitor soil change

Key messages:

Soil characteristics have to be assessed before interventions are designed

Soil organic matter increases soil health through the improvement of its physical, chemical and biological properties, including a higher capacity for storing nutrients.

An adequate pH ensures that the nutrients present in soils are readily available to crops.

Soil physical and biological characteristics are crucial for avoiding nutrient losses.

It is necessary to monitor soil health in order to ensure an adequate nutrient balance through fertilization, and to enable the choice of the most suited management practices.

By being more informed about the current state of the soil, we can plan for future use and ensure the most beneficial outcomes.

Promote crop diversification

Key messages:

Crop diversification can improve soil health and nutrient balance.

An adequate use of diversification strategies, in particular including legumes, can improve yields while diminishing the need of external inputs.

Using crop-diversified systems has proved to increase the nutrient content in crops.

Crop diversification has demonstrated to be a cost-effective management system.

Crop diversification, reflected in the diversification of diets, further enhances the nutritional benefit obtained.

Build grassroots capacities.

Key messages:

Farmers and non-farmer rural population lack knowledge on the links between soil and nutrition. Farmer-to-farmer extension can be a good complement to formal extension services for building capacities on soils, SSM, and combating micronutrient deficiencies.

Community-based approaches to extension are capable of reaching larger populations.

Adoption of SSM can be widened and disadoption reduced if the benefits of the S4N approach are conveniently communicated.

One of the barriers consistently observed for a wide adoption of the NSA approach is the lack or scarcity of grassroots knowledge on the links between soil health and nutrition. Although farmers are normally aware that soils are important for obtaining abundant crops and use fertilizers for improving yields, the effects of soil management on the nutritional value of foods are not that obvious, and soil health generally is not understood as a desirable outcome of agricultural management.

The facilitation of training to farmers' and building capacities among the rural population in these subjects is of paramount importance, and governments must strengthen the knowledge and capacities of their extension services to that end.


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Effective dissemination of SSM practices



Global Soil Doctors Programme Training module: Soils4Nutrition

Topic	Soil 4 Nutrition
Objective	Emphasize the role of soil nutrients and soil structural components for agricultural production, food security and nutrition. Identify the best soil conditions that optimize plant nutrients uptake
Posters	<p>What is soil?, How to enhance soil organic matter content? What is soil pH?, How to manage soil nutrients?</p> 
Field exercises	<p>Qualitative assessment of soil physical, chemical and biological properties.</p> <p>Soil educational toolkit →</p>  <p>Soil pH kit donated by the government of Thailand →</p> 
Evaluation	<p>Final evaluation of soil condition and recommendations on SSM practices</p> 



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Thank you !

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