



**Food and Agriculture Organization
of the United Nations**



Sustainable black soil management: A case study from China

Online webinar, 6 February 2024

SUSTAINABLE BLACK SOIL MANAGEMENT: A CASE STUDY FROM CHINA

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Contents

1. Introduction..... 5

2. Objectives of the webinar 6

3. Opening remarks 7

4. Keynote presentations..... 7

5. Discussion 12

6. Conclusion..... 15

Annex 1: Agenda of the webinar 17

Annex 2: List of participants 18

1. Introduction

Black soils are often referred to as the world's food basket due to their high fertility, productivity, water retention capacity and ability to support a wide range of crops and livestock production. They are also characterized by high organic matter content, which further enhances their agricultural potential. As a result, black soils contribute significantly to food security, biodiversity conservation and climate change adaptation and mitigation. Issues such as erosion, unsustainable management practices, and the excessive use of agrochemicals pose significant risks to the long-term health and productivity of black soils. Combined with the impacts of climate change, these threats lead to the loss of organic matter, nutrient imbalances, acidification, compaction, and a decline in soil biodiversity. According to the Status of the World's Soil Resources report, the majority of the world's soil resources, including black soils, are in fair, poor or very poor condition. Therefore, addressing the challenges that soils face is imperative to safeguarding soil resources and ensure the sustainability and resilience of agricultural and food systems.

Preserving black soils and promoting their sustainable use is central to the role of the Food and Agriculture Organization of the United Nations (FAO) as a custodian or contributing agency to the Sustainable Development Goals (SDGs), and its mandate to eliminate hunger, food insecurity and malnutrition. Indeed, sustainable use management (SSM) practices are increasingly needed by farmers and land managers to ensure the health of soils and promote ecosystem resilience. Although not specifically focused on black soils, a comprehensive set of guidelines on SSM has been consolidated in FAO's Voluntary Guidelines for Sustainable Soil Management (VGSSM). This document offers guidance and recommendations on SSM needed to address various soil threats, including those that apply to black soils.

In terms of black soils, FAO, and its Global Soil Partnership (GSP) established the International Network of Black Soils (INBS) in March 2017. This network has been at the forefront of research, knowledge exchange, and capacity building related to black soils issues. The INBS is a global platform that brings together experts, stakeholders, and practitioners from all over the world to share experiences, best practices, and innovative approaches in the sustainable use of black soils. Through webinars, conferences, collaborative initiatives, and technical guidelines, INBS aims to raise awareness, build capacity, and facilitate the adoption of SSM for black soils. For instance, the Global Status of Black Soils report provides strategic information about the distribution, state and management of black soils and can guide decision-making regarding the sustainable management and conservation of black soils.

In line with this objective, INBS organized a webinar focused on the sustainable use of black soils, with a specific case study from China. Notably, one of the world's three largest areas of black soils is located in Northeast China, playing a crucial role in supporting a significant portion of the country's production of rice, soybeans, and maize. China has been stepping up efforts to protect black soils against erosion and agricultural overexploitation. Therefore, this webinar focused on exploring successful approaches and strategies for the sustainable use of black soils, drawing from the experience and expertise of China in the matter and highlights the role of international collaboration in addressing these issues. By sharing experiences and lessons learned, the webinar sought to

inspire participants to implement sustainable black soil management practices in their respective regions and contribute to the preservation of black soils worldwide.

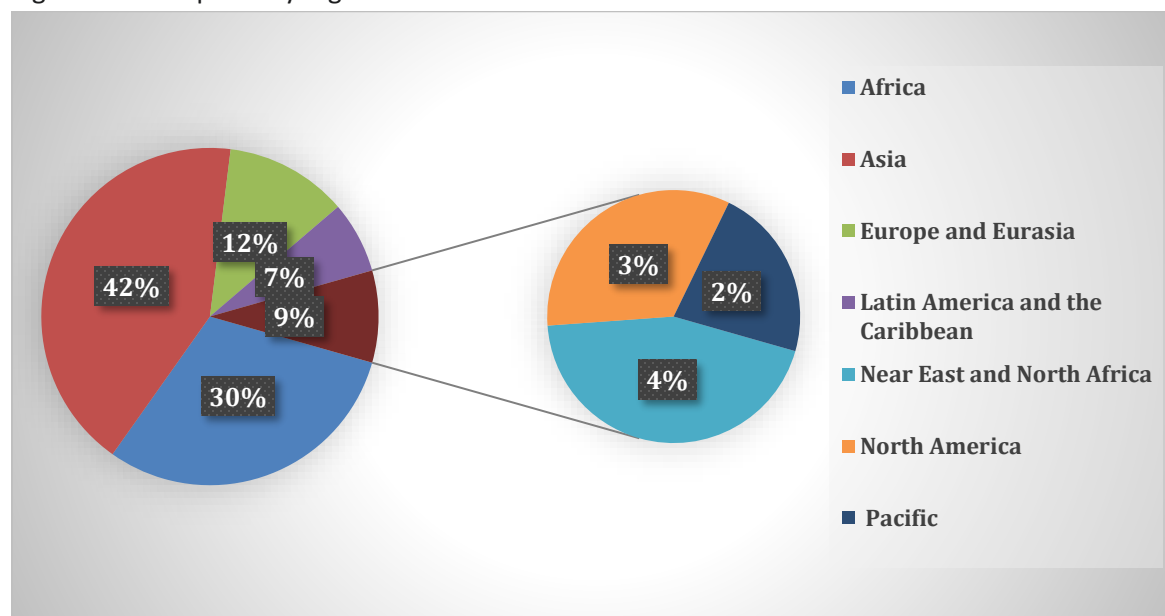
The webinar, held virtually on January 30, 2023, had 779 participants (Figure 1) from 157 countries. This event was part of a series of webinars organized by INBS across a spectrum of pertinent subjects related to sustainable use of black soils, and drawing on the experience of many countries, such as Argentina, in the matter. The webinar was moderated by Yuxin Tong, INBS co-coordinator and member of the GSP. Anticipating continued engagement, the relevant audience was encouraged to stay informed and await forthcoming announcements regarding subsequent webinars within this enlightening series.

2. Objectives of the webinar

The objectives of the webinar were:

- introducing good practices on sustainable black soil management from China;
- discussing the gaps and challenges on black soil management; and
- exchanging knowledge and technology among black soil countries.

Figure 1: Participants by region



The webinar agenda and presentations recordings are available for consultation [HERE](#).

3. Opening remarks

Lifeng Li, Director of the Land and Water Division (NSL), FAO

After extending a warm welcome to the webinar participants, Lifeng Li first introduced INBS to the audience. The INBS, which was established by FAO's GSP, provides countries worldwide with a platform to share knowledge and foster collaborative efforts in the field of sustainable management of black soils. This is of utmost importance due to the critical role of black soils in supporting crop production and livestock, underscoring their status as the world's most fertile soils.

Li then referenced FAO's Global Status of Black Soils report, an important milestone in understanding the global status and challenges of black soils. The report highlights that these soils are widely distributed across many regions of the globe and cover approximately 17 percent of global cropland. However, despite their relatively small coverage, black soils make a significant contribution to global agricultural production, driving intensive cultivation practices and earning them the title of the world's food basket.

The webinar aimed to promote a crucial dialogue on the sustainable use of black soils, leveraging insights and experiences from China. Li emphasized China's pioneering efforts in sustainably managing this resource, underscoring the importance of understanding what innovative technologies and practices are implemented in that regard. China's unique legislation dedicated to the protection, conservation, and sustainable utilization of black soils sets it apart as a leader in this field. This legislative model not only benefits crop yields but also plays a pivotal role in mitigating climate change.

With that, Li opened the webinar and set the stage for a fruitful exchange of knowledge and experiences among the audience on sustainable use of black soils.

4. Keynote presentations

Ganlin Zhang, Institute of Soil Science, Chinese Academy of Sciences | Understanding the formation time of black soils

Ganlin Zhang started his presentation by providing an overview of black soils. These soils are referred to differently in different classification systems (such as Mollisols in Soil Taxonomy¹, or Chernozems in the World Reference Base²), but their fundamental characteristics remain the same. The most important distinguishing feature is the presence of a mollic epipedon, which refers to a thick, well-structured, dark-coloured surface horizon. This layer exhibits high base saturation and organic matter content. Zhang emphasized that the sustainability of black soils depends on the balance between the rates of soil formation and soil loss.

¹ Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Second edition. U.S. Department of Agriculture Handbook No. 436. Natural Resources Conservation Service.

² IUSS Working Group WRB. 2006. World Reference Base. World reference base for soil resources. Available at: <https://www.fao.org/soils-portal/data-hub/soilclassification/world-reference-base/en/>

Box 1: Key processes of formation and loss of black soils**Key processes of black soils formation:**

- accumulation of soil organic matter (SOM);
- erosion-deposition;
- carbonate leaching and clay migration;
- pedoturbation (or more specifically bioturbation); and
- parent material formation.

Key processes of black soil loss:

- erosion;
- soil organic matter loss;
- soil compaction;
- soil pollution;
- soil waterlogging; and
- biodiversity decline.

Therefore, Zhang's research focuses on investigating the formation time of black soils in China, considering the wide range and inaccuracy of reported values found in literature. However, dating soil is challenging because soil comprises a continuum of ages, reflecting the dynamic nature of soil processes where new and old soil organic matter coexists. This is a similar situation for mineral grains in soils.

To capture this complexity and construct a model for black soil formation, Zhang presented two distinct protocols using cutting edge technologies. The first protocol involves dating close or semi-closed systems such as charcoal or buried soils, that are unaffected by soil processes. The second protocol focuses on identifying signals of primary age or pedoturbation using fine grained soil dating such as single grain optically stimulated luminescence (OSL) and Carbon-14 dating at molecule level. Using these protocols, Zhang's research revealed that black soils in Northeast China started to form between 16.9 and 12.6 thousand years (ka) before present (BP), following the last deglaciation and the significant expansion of grasslands amidst rising temperatures (around 18 ka BP and 20 ka BP, respectively). During this period, there was a simultaneous onset of organic matter and dust (loess) accumulation, which serves as a significant parent material source for black soil formation. Bioturbation, which also started to intensify around 16.4 ka BP, played a significant role in black soil formation by mixing and displacing soil organic matter across soil profile. Currently, modern bioturbation occurs up to 80 cm before gradually declining exponentially with soil depth. In conclusion, Zhang emphasized that black soils formed before the Holocene age, as supported by OSL and Carbon-14 dating, and exhibited a formation rate of 6 cm/ka. This rate highlighted the gradual and time-intensive (slow) process involved in the formation of black soils.

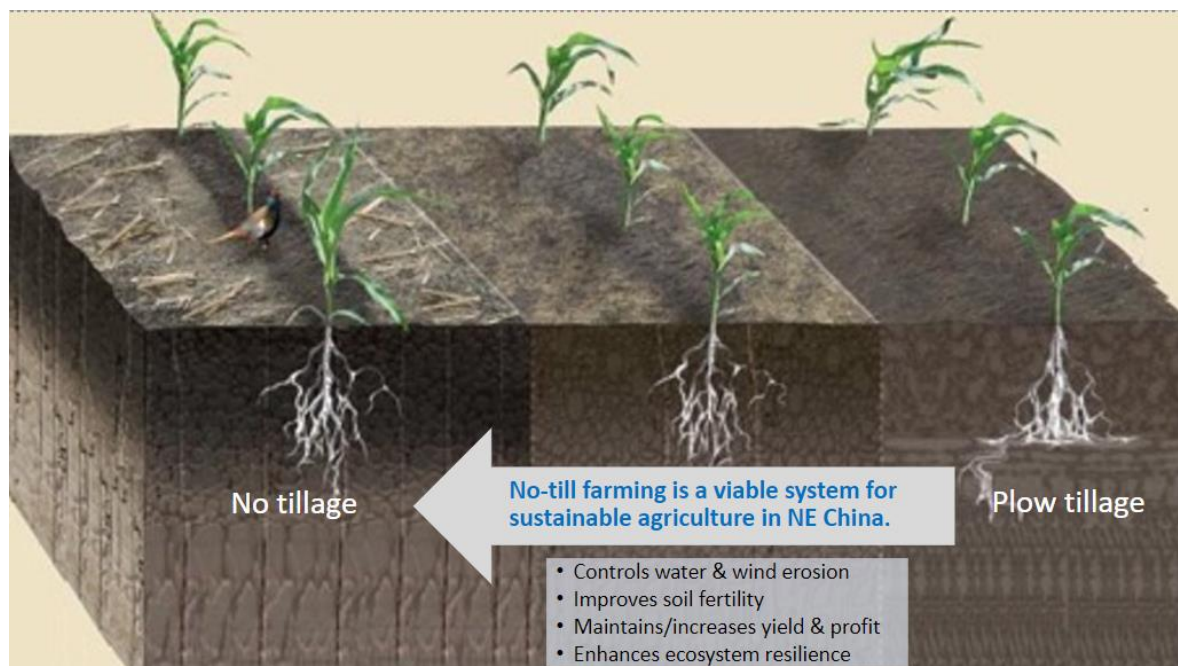
Tusheng Ren, China Agricultural University | No-till farming: A viable option for sustainable agriculture in the black soil region of Northeast China

In his presentation, Tusheng Ren addressed the potential of no-till farming as a viable solution to mitigate black soil degradation and its acceptance by policymakers and farmers. He started his talk by emphasizing the pivotal role of black soils in China's agricultural landscape, citing statistics from 2018 where black soils contributed to over 25 percent of the country's grain production, including soybean, rice, and maize.

Soil degradation poses a significant threat to agricultural sustainability in Northeast China, exacerbated by intensive cultivation practices that deplete soil nutrients and disrupt soil structure through extensive tillage. Chemical fertilizers have increasingly replaced traditional manure usage, further compounding the issue.

Ren's investigation into the comparative benefits of no-till farming versus conventional ploughing in long-term field experiments revealed compelling advantages for black soils. No-till farming effectively mitigates water and wind erosion, reduces soil loss, and enhances soil fertility. It promotes water retention, improves soil infiltration, and fosters the development of soil structure. Notably, practicing no-till farming enhances the resilience of farmed black soils to extreme climatic conditions, including drought and waterlogging, while offering potential long-term yield enhancement even during dry periods (Figure 2). This results in reduced expenses and increased profitability for the farmers.

Figure 2: Advantages of no-till farming in black soil management



Source: Presentation by Tusheng Ren

Ren then underscored various initiatives aimed at promoting the adoption and acceptance of no-till farming among policymakers and farmers. The establishment of the Black Soil Conservation and Management Union is an example of these initiatives, which advocates for the adoption of no-till practices in Northeast China through field demonstrations, farmers training sessions and technical advice. Currently, over 40 000 sets of no-till seeders are in operation within this region, with strip-tillage methods being embraced in colder areas to address concerns regarding low soil temperatures encountered under no-till practices.

Another example of these initiatives is the establishment of national programmes to promote conservation tillage, such as the Conservation Tillage Action Plan for the Black Soil Region of Northeast China.

In conclusion, no-till farming emerges as a critical strategy in safeguarding and preserving the integrity of black soils amidst the challenges of modern agricultural practices. This is of utmost importance considering that black soils are akin to China's giant panda in cultivated lands, emphasizing their ecological, agricultural, and economical significance.

Xueli Chen, Heilongjiang Academy of Agricultural Sciences | Manure and straw returning benefit for stability of soil microbial ecosystem

Xueli Chen's presentation explored the benefits of manure application and straw returning for the stability of soil microbial ecosystem in black soils. Following an overview of black soils and the specific challenges they face in China, Chen articulated the pivotal role of soil biodiversity and community composition in affecting ecosystem stability and functionality. However, the long-term use of chemical fertilizers has significantly compromised these aspects. To address these concerns, Chen explored the potential of organic fertilizers to enhance the stability of microbial ecosystems in black soils. Her presentation was structured around the following fundamental research questions:

- How do organic materials affect the diversity of soil microbial community in black soils?
- How do organic materials affect the ecological functions of soil microbial community in black soils?

Chen's outlined findings from multiple research studies regarding the advantages of applying manure and returning straw on black soil's microbial diversity and ecological functions.

Soil microbial diversity. Compared to unfertilized control, the long-term application of manure, either alone or in combination with chemical fertilizers, was found to increase both the diversity and abundance of the soil bacterial community, as indicated by the Shannon index. Long-term manure inputs also positively influenced copiotroph taxa, inhibited oligotrophs, and increased soil microbial biomass carbon compared to unfertilized control conditions. Furthermore, manure application led to elevated soil nutrient levels, including Olsen phosphorus content, and stimulated the release of root exudates, which serve as significant sources of labile carbon for microbes. Additionally, manure application fostered an increase in the diversity and abundance of the fungal community, resulting

in higher fungal biomass and gene abundance, along with the development of a complex fungal network. Conversely, straw returning exhibited minimal impact on the diversity of the soil bacterial community.

Carbon sequestration. Chen emphasized in her presentation that long-term manure applications improved carbon sequestration, both in the topsoil and in the deep layers. In addition, manure changed the chemical composition of soil carbon, driving it to be more aliphatic in nature and of younger age. She also emphasized the importance of increasing carbon sources, such as straw and manure, together with appropriate tillage, to improve carbon sequestration in the black soil region of Northeast China.

Functional gene diversity and connection with nutrient cycling processes. Compared to an unfertilized control, Chen presented evidence that manure, either applied alone or with chemical fertilization, significantly increased the abundance of genes involved in carbon fixation and cellulose degradation, as well as bacterial phyla that carry carbon and nitrogen genes. Similarly, organic fertilizers enhanced the abundance and the diversity of nirS-type denitrifiers. Manure also affected carbon and nitrogen cycling profiles, and the abundance of functional genes and microbial taxa through enhancing the phosphorus content of black soils. Conversely, straw returning enhanced nitrogen fixation, and increased the relative gene abundance of nitrite and glutamine synthase compared to chemically fertilized treatments.

Zhongjun Jia, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences | The Query for High Fertility of Black Soils and Grand Challenges in China

Zhangjun Jia's presentation was structured around three points:

1. The origins of black soils' high fertility.
2. The mysterious turnover of soil organic nitrogen.
3. Grand challenges and opportunities in managing black soils.

The origins of black soils' high fertility. In his presentation, Jia emphasized that black soils in Northeast China had an extraordinarily high organic nitrogen content compared to other soils, attributing this phenomenon to the influence of climatic drivers. Because of the region's cold temperatures throughout much of the year, plant residues could not be fully decomposed due to limited microbial activity and microbial dormancy, allowing the formation of dark-coloured humic substances. The ratio of black soil carbon to nitrogen was also high (around 12) in this region indicating a high content of carbon compared to nitrogen content, and that most of black soil's organic matter originated from dead microbes as confirmed by his isotope research investigation.

Jia also highlighted an intriguing characteristic of black soils as a slow-release fertilizer. According to his research, nitrification in a black soil amended with 100 ppm of ammonium proceeded at relatively slower rates compared to those in other soils. This suggested that black soils possessed a unique property of being able to gradually release nutrients, which could have implications for nutrient management and crop productivity, as well as having important environmental

considerations. Black soils were also carbon neutral and climate friendly, in that they could fix a large amount of atmospheric carbon following nitrogen fertilization, without emitting nitrous oxide.

The mysterious turnover of soil organic nitrogen. Jia also shared results from another remarkable isotopic investigation of gross nitrogen transformations to investigate the fate of labelled nitrogen added to black soil. This research showed that added nitrogen was immobilized into microbial biomass. After the death of microbes and cell lysis, nitrogen could then be released into soil solution in the form of mineral nitrogen and assimilated by plants.

Grand challenges and opportunities. Food security is a top concern in China due to having only 7 percent of global cropland to feed 22 percent of the world's population. Northeast China is crucial in this regard, producing 60 percent of the country's soybeans. Despite this, China still imports significant amounts of soybeans, which totalled USD 40 billion in 2020, highlighting the ongoing and increasing need for imports to meet domestic demand. However, intensive chemical fertilizer use has led to soil degradation, with imbalances in nutrient input and declining soil health. In the light of these issues, Jia emphasized that the research priority should focus on integrating soil health into the context of pedogenesis. This is because the current understanding of the relationship between soil health and inherent soil properties remains incomplete, lacking reliable indices for soil health assessment. Addressing this gap presents an opportunity to design soil health strategies to counteract soil degradation, particularly against issues like soil thinning and organic matter loss.

In conclusion, Jia shared another aspect of his research, focusing on whether a cold-loving straw decomposer existed. This inquiry stems from the belief that plant degradation significantly contributes to soil organic nitrogen, even in cold climates. Jia's study revealed that black soil tended to have higher straw decomposition rates in low-temperature environments compared to tropical soils. However, under high-temperature conditions, tropical soils exhibited greater decomposition rates than black soils. These findings highlight the complex relationship between temperature and soil organic matter decomposition in black soils developed in cold regions. Jia concluded his talk by announcing the upcoming fourth international conference on Black Soil Conservation and Utilization, emphasizing the importance of continued dialogue and research in this field.

5. Discussion

Following the presentations, a discussion ensued among the audience, guided by questions from participants through the Q&A chat box. Summarized below in the boxes are the main questions and the corresponding answers provided by the speakers.

Box 2: Q&A regarding the presentation of Ganlin Zhang | Understanding the formation time of black soils

Question: In what way would climate change affect black soils? And what potential strategies needed to face these impacts?
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The formation of black soils is intricately linked to climate conditions (for example, facilitated by temperature increases during glacial and deglacial periods). However, current, and projected
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shifts in temperature and rainfall patterns, as well as the occurrence of more extreme weather events, are expected to have detrimental impacts on soils. Black soils are highly susceptible to erosion and organic matter loss, with extreme rainfall and temperature rises exacerbating these processes. Nonetheless, climate change (particularly temperature increases), may also bring about some positive effects, such as facilitating seed germination. Overall, the effects of climate change on black soils are complex and warrant thorough consideration.

Question: Is there a difference between black soils and vertisols?

Vertisols and black soils are very different. On one hand, black soils are dark because of their high content of organic matter. They are well structured, developed on a homogenous parent material and have a loamy texture. Black soils also have low to medium calcium carbonate content. On the other hand, vertisols are also black, but their content of organic matter isn't high. These soils are instead rich in 2:1 clay or aluminosilicates with shrinking and swelling capabilities. They are often difficult to manage because they have a very narrow suitable water content. For instance, tillage becomes arduous when soils are excessively wet or dry.

Box 3: Q&A regarding the presentation of Tusheng Ren | No-till farming: A viable option for sustainable agriculture in the black soil region of Northeast China

Question: what are the traditional practices of black soil management in China?

The traditional system of managing black soils in China relies heavily on tillage, with operations taking place five or six times before planting. In some areas, farmers create ridges and plant them. In recent years, reduced till systems like rotary till have been adopted.

Question: What's the role of crop rotation and organic amendment in this system?

Crop rotation. Despite implementing no-till practices for several years, the persistent issue of weeds still requires the application of pesticides. Although crop rotation has shown some effectiveness in managing weeds, it has not fully resolved the problem. Therefore, ongoing studies – such as the introduction of cover crops – are being conducted to explore more effective strategies for weed control in rice and other cropping systems.

Organic amendments. Historically, organic amendments have played a significant role in soil management practices in China, contributing to the sustainability of traditional farming systems. However, with the widespread adoption of chemical fertilizers, the importance of organic amendments has been overshadowed, leading to a decline in their usage. Currently, less than 5 percent of farmers utilize manure in their fields. To address this issue, efforts are underway to

promote the benefits of organic amendments and to explore new technologies and equipment that facilitate their application for improved soil health.

Question: What's the difference between conservation agriculture and no-tillage?

No-tillage involves planting crops directly into untilled soil, without any prior mechanical soil disturbance such as ploughing, and with at least 30 percent of soil surface area being covered. Conservation tillage, on the other hand, may involve minimal soil disturbance such as shallow tillage. So, no-tillage is an extreme case of conservation tillage.

Conservation agriculture is a larger concept. It involves a combination of techniques such as crop rotation, passive control of weeds, conservation, or no-till, optimizing fertilizer use and applying organic matter, and other beneficial techniques.

Question: how do you reach farmers to promote the adoption of sustainable management practices?

This task presents significant challenges. As previously mentioned in the presentation, we initiated a network of farmers focused on black soil cultivation in Northeast China. Through field visits, demonstrations, and training sessions, farmers have witnessed the benefits of adopting no-till practices for managing black soils. The training curriculum also encompasses topics such as effective weed management, optimized fertilization techniques, and proper planting methods. Local government support has been instrumental, providing farmers with subsidies to facilitate adoption. Furthermore, the network incentivizes farmers to implement successful and sustainable practices in soil management. Additionally, the growing involvement of large organizations in our initiative is promising, as it may lead to reduced costs for fertilizers and seeds in the future, making our practices more accessible and appealing to small-scale farmers.

Box 4: Q&A regarding the presentation of Xueli Chen| Manure and straw returning benefit for stability of soil microbial ecosystem.

Question: What quantity of organic fertilizers is essential for increasing soil organic matter?

According to our research finding, we can determine the quantity of manure needed to increase soil organic matter by calculating the nitrogen content of the chemical fertilizer input and then assessing the corresponding amount of manure input.

Question: What is your opinion about biofertilizers and how can we use them in the field?

Biofertilizers play a crucial role in enhancing soil quality, yet their quality can vary significantly. The challenge lies in ensuring the survival of added fungi or bacteria within the soil environment and providing them with suitable conditions to function effectively. In my opinion, conducting research

on the combined use of biofertilizers and organic fertilizers is essential to determine if microbes can potentially thrive in such conditions. Additionally, I believe that setting more standards for biofertilizer production is necessary to ensure consistency and effectiveness.

Box 5: Q&A regarding the presentation of Zhongjun Jia| The Query for High Fertility of Black Soils and Grand Challenges in China

Question: Can the parent material determine the colour of black soil?

The colour of black soil is not determined by its parent material. Dust, such as the yellow dust carried from central China to the northeast region, contributes to the formation of black soil as it decomposes over time, particularly in the deeper layers of the soil profile.

Question: Is it appropriate to apply black soils to other soils as an amendment material? Or to sell black soils?

Practically speaking, applying black soils as an amendment to other soils is extremely challenging. In addition, selling black soil to other countries is strictly forbidden. China is the only country with legislation specifically protecting black soil. This legislation, enacted by the Chinese National Congress, strictly prohibits the transfer of black soil from the northeast region to other regions.

Question: what is the situation in Northeast China in terms of black soil acidification? Especially for paddy soils?

Soil acidification has become a significant issue in Northeast China recently, largely due to the extensive use of chemical fertilizers, primarily in the form of ammonium. When ammonium is oxidized to nitrate, it releases protons, leading to soil acidification. Historically, the pH of black soil in this region ranged from 6.5 to 7, but in many areas, it now falls between 5.5 and 6.5 due to high agricultural activity. As plants absorb nitrate or ammonium, protons are released into the soil to maintain calcium balance, further contributing to soil acidification. This presents a serious concern for soil health and agricultural productivity. Additionally, the Chinese Academy of Engineering recently initiated a soil restoration program, focusing on soil acidification in Northeast China.

6. Conclusion

The webinar was concluded by Miguel Taboada, chair of the INBS. Huerta first expressed his gratitude for the excellent presentations provided by the speakers, and for the high level of interest and engagement from the audience regarding the topic of black soil management in China.

Taboada acknowledged the benefits and limitations of practicing no-till farming in China. He recognized that no-till had the potential to curb soil erosion, improve water retention, promote soil

health by reducing disturbance and preserving soil structure and improve farmer's income. He also acknowledged that the successful adoption of no-till farming depended on various factors such as soil type, climate conditions, and the availability of appropriate machinery and resources. So even if both Argentina and China adopted no-till farming for managing their black soils, it was still crucial to consider the specific contextual factors and adapt the practices accordingly to maximize their effectiveness and sustainability in each region.

Taboada expressed his appreciation for the informative discussions on increasing soil biodiversity through the application of different organic amendments such as manure and straw. He also found the explanations regarding the high levels of soil nitrogen and organic carbon in black soils of China to be particularly enlightening. In addition, the webinar successfully identified gaps and challenges in understanding black soil formation, particularly regarding the time it took for black soils to form, which appeared to be longer than previously thought. The analysis provided valuable insights into the influence of various factors on soil formation processes, including climate, parent material, and bioturbation. In addition, it showed that soil formation was an intensive and slow process while soil degradation processes were proceeding at faster rates.

Tong said that overall, this webinar, along with the previous one held in November 2023 to discuss the case study of black soils in Argentina, had proven to be exceptionally successful. The comparison of different conditions leading to similar soil threats in both countries had been particularly intriguing. It was also noteworthy to consider that Argentina, a significant exporter of grain produced on black soils, supplied a substantial portion of its harvest to China. This connection highlighted the relevance and significance of understanding and addressing soil challenges in both nations.

Lastly, Tong encouraged the audience to stay informed and await forthcoming announcements regarding subsequent webinars on black soil management. He stressed that one of the primary responsibilities of the INBS was to support member countries in safeguarding black soils through various development initiatives. This task, alongside others, underscored FAO's commitment to preserving and enhancing the health and sustainability of black soils worldwide.

The INBS is open to everyone! Please join us at:

<https://www.fao.org/global-soil-partnership/inbs/en/#:~:text=How%20can%20I%20join%20the,%2DSecretariat%40fao.org>.

Annex 1: Agenda of the webinar

13:00–13:10 | Opening remarks. Lifeng Li, Director, Land and Water Division, FAO.

13:10–13:30 | Understanding the formation time of black soils. Ganlin Zhang, Institute of Soil Science, Chinese Academy of Sciences.

13:30–13:50 | No-till farming: A viable option for sustainable agriculture in the black soil region of Northeast China. Tusheng Ren, China Agricultural University.

13:50–14:10 | The Query for High Fertility of Black Soils and Grand Challenges in China. Zhongjun Jia, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences.

14:10–14:30 | Manure and straw returning benefit for stability of soil microbial ecosystem. Xueli Chen, Heilongjiang Academy of Agricultural Sciences.

14:30–14:50 | Open discussion with audience.

14:50–15:00 | Closing remarks. Miguel Angel Taboada, Chair of International Network of Black Soils.

Annex 2: List of participants

First name	Last name	Country
Yeslem	Hamoud	Mauritania
He	Li	Thailand
Bella	Anis	Malaysia
Maryna	Zakharova	Ukraine
Chunsheng	Yao	China
Samuel	Tetsopgang	Cameroon
Ludmila	Vorotyntseva	Ukraine
Syed Turab	Raza	China
Benginur	Baştabak	Türkiye
Anand	Arya	India
Win	Thein	Myanmar
Edunuri	Srinivas	India
Abdul	Halim	Bangladesh
Nopmanee	Suvannang	Thailand
Chiranjeev	Kumawat	India
Shafiq Ur Rehman	Memon	Pakistan
Pradeep	Mohapatra	India
Urikkhimbam	Himmatkumar	India

Md. Mahbub	Alam	Bangladesh
Kader	Abdul	Bangladesh
Parimal	Biswas	Bangladesh
Pitayakon	Limtong	Thailand
Rajsree Das	Tuli	Bangladesh
Alireza	Esmaili Falak	Islamic Republic of Iran
Rapolu	Mahender Kumar	India
Abolfazl	Dehghani	Islamic Republic of Iran
Shafighe	Eskandari	Islamic Republic of Iran
Bhanudas	Pendkar	India
Harsha	Kadupitiya	Sri Lanka
Sayyed Mohammad	Hossini Khorsandi	Islamic Republic of Iran
Thinley	Dorji	Bhutan
Dhaval	Pandya	India
Rengalakshmi	Raj	India
Celestino	Moreira	Timor-Leste
Yeshey	Chedup	Bhutan
Nesa	Ahadi	Islamic Republic of Iran
Serveh	Sedri	Islamic Republic of Iran
Jigme	Tshering	Bhutan

Azamat	Yershbulov	Kazakhstan
Prabavathy	Ramalingam	India
Danilo	Lucchesini	Italy
Fozia Naz	Memon	Pakistan
Shabir	Bangroo	India
Munazza	Yousra	Pakistan
Nivong	Sipaseuth	Lao People's Democratic Republic
Maria Cristna	Corporal	Philippines
Bella	Noceda	Philippines
Glenn Raymund	Serrano	Philippines
Sandy	Abiad	Philippines
Ronald Allan A.	Dimaano	Philippines
Marcelo	Dayo	Philippines
Muhammad	Saleem	Pakistan
Enkhtuya	Bazarradnaa	Mongolia
Oksana	Bihun	Ukraine
Ivan	Vasenev	Russian Federation
Jorge	Ivelic	Chile
Vitalii	Lebed	Ukraine
Evheniia	Hladkikh	Ukraine

Valentina	Samokhvalova	Ukraine
Rupa	Dasgupta	India
Matshwene E.	Moshia	South Africa
Eloisa	Santiago	Philippines
Rouhollah	Azizi	Islamic Republic of Iran
Shree Prasad	Vista	Nepal
Svitlana	Krylach	Ukraine
Alina	Revte-Uvarova	Ukraine
Roza	Orozakunova	Kyrgyzstan
Kien	Nguyen Van	Viet Nam
Jiubo	Pei	China
Jiahui	Shi	China
Pimporn	Pornprommin	Thailand
Sidi	Wang	China
Toma	Shishkov	Bulgaria
Maryam	Kashisaz	Islamic Republic of Iran
Gulala	Behrad	Islamic Republic of Iran
Samrat	Sinha	India
Samrat	Sinha	India
Daniel Natael	Gago Marquez	Peru

Marcela	Rodríguez	Colombia
Jacques	Tavares	Cabo Verde
Ebrima	Touray	Gambia
Amos Edem	Agbenyo	Ghana
Trenchard	Ibia	Nigeria
Natthapol	Chittamart	Thailand
Victor	Chude	Nigeria
Adedoyin	Adepoju	Nigeria
Azizeh	Alizadeh	Islamic Republic of Iran
Eneje	Rosets	Nigeria
Sadiq	Fatih	Nigeria
Afiya Kabir	Lamido	Nigeria
Solange Dzekewong	Ndzeshala	Cameroon
Taiwo Michael	Agbede	Nigeria
Chiemela Caleb	Friday	Nigeria
Sunday	Oni	South Africa
Rabiu Wada	Aliyu	Nigeria
Maria Ivana Kay	Abrigo	Philippines
Yurii	Zalavskiy	Ukraine
Damian	Asawalam	Nigeria

Muhammad	Ali Aminu	Nigeria
Maurice	Savadogo	Burkina Faso
Babangida	Joseph	Nigeria
Ayuba	Johnson	Nigeria
Terngu Kenneth	Moji	Nigeria
Magnus	Ibigweh	Nigeria
Abdul	Rahman	Sierra Leone
Fernando	Fontes	Uruguay
Abraham Mulu	Oljira	Ethiopia
Fuat	Kaya	Türkiye
Ariuntsetseg	Dugar	Mongolia
Jay Ar	Bagarinao	Philippines
Murphy Opoku	Acheampong	Ghana
Florjana	Cela	Albania
Dalel	Melki	Tunisia
Uwimana	Clement	Rwanda
Gabriele	Buttafuoco	Italy
Firizky	Ramadhani	Indonesia
Olfa	Frikha-Gargouri	Tunisia
Kamran Ali	Chandio	Pakistan

Evariste	Nsabimana	Rwanda
Armie	Ahmed	Somalia
Muhammad	Baashil Aftar	Indonesia
Abid	Ouadja	Algeria
Mujahid	Farid	Pakistan
Jamilu	Garba	Nigeria
Durlave	Roy	Bangladesh
Giorgia	Santini	Italia
Owusu	Amos	Ghana
Muhammad	Irfn	Pakistan
Vivek	M.S.	India
Obaid U.R.	Rehman	Pakistan
Saroj	Sanyal	India
Souheil	Awad	Lebanon
Suleman	Idoko	Nigeria
Mohamed	Elaissi	Morocco
Abdelmadjid	Boulassel	Algeria
Hoolande	Nziendolo	Congo
Matteo	Marzagalli	Switzerland
Prudence	Mhlophe	The United Kingdom

Fatma	Béjaoui	Tunisia
Valeria	Sergi	Italy
Oluwaseun	Olatunde	Nigeria
Hristina	Poposka	North Macedonia
Moses	Ogunlade	Nigeria
Massamba	Diop	Morocco
Abdourhimou	Amadou	Niger
Murali	S.	India
Nkole	Mwamba	Zambia
Yevhenii	Ulko	Ukraine
Umar	Isa	Nigeria
Shiveshwar	Pratap	India
Radhika	Sharma	India
Laode Muhammad Harjoni	Kilowasid	Indonesia
Dante	Serbise	Saudi Arabia
Doreen	Mukoobwa	Rwanda
Sheshu	Mutyalu	India
Moustapha Maman	Mounirou	Niger
Ilaz	Rexhepi	Kosovo
Nnenna	Taiwo	Nigeria

Joseph	Kanyangalazi	Malawi
Masango	Sone	Cameroon
Abdul Sattar J.	Zaben	Iraq
Nasradeen Adam	Gadallah	Sudan
Roukaya	Chibani	Tunisia
Idir	El Konty	Morocco
Khin	Mu	Myanmar
Adewale	Sedara	United States
Joko	Purbopuspito	Indonesia
Wanja	Kinuthia	Kenya
Papita	Gourkhede	India
Nuriddin	Samatov	Uzbekistan
Christopher	Mugambe	Uganda
Rizki Saddik	Ismail	Indonesia
Miriam	Makungwe	Zambia
Zoya	Soomro	Pakistan
Saeed	Akhter	Pakistan
Mahesh Appasaheb	Ajabe	India
Okosodo	Ehi Francis	Nigeria
Joko	Al Rido	Indonesia

Hadija	Sukri	Indonesia
Mogammed	Yimam	Ethiopia
Daisy	Myint	Myanmar
Ahmed	Afifi	Egypt
Bhupendra	Singh	India
Emmanuel	Njadvara	United States
Muhumed Ahmed	Mohamed	Somalia
Jimoh	Ibrahim	Nigeria
Walieh	Mohamed Egueh	Djibouti
Mohammed	Saleh	Nigeria
Limei	Zhang	China
Ibrahim	Mosaad	Egypt
Richard	Erecu	Uganda
Yanling	Wang	China
Thorunn M.J.H.	Ólafsdóttir	Iceland
Gunel	Asgarova	Azerbaijan
Turkan	Hasanova	Azerbaijan
Elnur	Nasirov	Azerbaijan
Achimota	Dickson	Nigeria
Muhammad Mohsin	Abrar	China

Mulugeta	Aytenew	Ethiopia
Willy	Ngoy	Congo
Muhammad Mazhar	Iqbal	Pakistan
Saba	Iqbal	Pakistan
Sunil	Manandhar	Nepal
Godwin	Sabah	Ghana
Elenga	Gaius	Democratic Republic of the Congo
Eric	Mata	Philippines
Valerie Ifeyinwa Ofili	Edosa	Nigeria
Gunsham	Seeborun	Mauritius
Nihad	Mahrof	China, Macao SAR
Mohammed	Alothmani	Yemen
Pelagie	Mushimiyimana	Rwanda
Atinafu Tunebo	Lafebo	Ethiopia
Oyeoussi Charles	Balogoun	Benin
Rania	Alrasheed	Canada
Issah	Arafat	Ghana
Sohaib	UI Asad	Pakistan
Fikrinda	Fikrinda	Indonesia
Omnia	Wassif	Egypt

Dilafruz	Makhkamova	Uzbekistan
Yassir	Abbas Idriss Malik	South Sudan
Cioroianu	Traian Mihai	Romania
Irfan	Hakim	Indonesia
Yau	Musa	Nigeria
Nirmala	Liyanage	Australia
Anne	Muriuki	Kenya
Inayat	Ullah	Pakistan
Victoria	Musa	Nigeria
Grace Glend	Gabisay	Philippines
Shunhua	Yang	China
Pathawit	Chongsermsirisakul	Thailand
Alhassan	Gabasawa	Nigeria
Ahmed Allassane	Naroua	Niger
Rambabu	Panthangi	India
Youcef	Benkhedda	Algeria
Guoqi	Wen	Canada
Umar Saleh	Anka	Nigeria
Samuel	Kwasi Benefo	Ghana
Liana	Badrun	Indonesia

Janine Ivy	Pontecilla	Philippines
Gita Bina	Nugraha	indonesia
Mohammed	Osama	India
Andrea	Mesa	Colombia
Ida	Wakabak	Kenya
Thembinkosi	Mbedzi	Zimbabwe
Melba	Salazar-Gutierrez	United States
Neil-Yohan	Musadji	Gabon
Jose-Luis	Machado	United States
jean	Moreira	Senegal
Muhammad	Hassan	Nigeria
Felix	Atamba	Kenya
Nazeer	Ahmed	Pakistan
Syed Waqar Ali	Shah	Pakistan
Yvonne	Maffei	United States
Edison	Rodriguez	Costa Rica
Donatus	Azu	Nigeria
Graeme	Spiers	Canada
Knowledge	Mushonga	Zimbabwe
Paul	Melsom	China, Hong Kong SAR

Noreen	Zahra	Pakistan
Muhammad Bilal	Hafeez	China
Sofia	Mora	Colombia
Nicholas	Medina	United States
Atif	Ayub	China
Jegan	Sekar	India
Justin Zrango	Loga	Netherlands (Kingdom of the)
Fahd	Rasul	Pakistan
Joel Jordan	Dzokou Kontchou	Cameroon
Muhammad	Safdar	Pakistan
Festus	Adelana	Nigeria
Abubakar Umar	Yuguda	Nigeria
Carlos Andrés	Zelaya	Honduras
Patrick	Dlamini	Eswatini
Olubunmi	Fatureoti	Nigeria
Aneesh	Sharma	India
Martin	Solis	Mexico
Asit	Mandal	India
Shuku	Nicolas Onemba	Democratic Republic of the Congo
Myrian Elisabeth	Barrionuevo	Argentina

Roger Kogge	Enang	Cameroon
Carmen	Sirbu	Romania
Mare	Ndiaye	Senegal
Antoinette	Kouadio	Côte d'Ivoire
Bukar	Bababe	Nigeria
Fatima-Zahraa	El Balghiti	Morocco
Fatima-Zahraa	El Balghiti	Morocco
Syamsu	Alam	Indonesia
Ishaku	Amapu	Nigeria
Sachie	Horii	Japan
Erdenee	Batzorig	Mongolia
Milagros	Vaña	Panama
James	Kabesiime	Uganda
Arsalan	Ahmed	Pakistan
Charlysse	Mahusay	Philippines
Primitiva	Mboyerwa	Tanzania
Sumudu	Senanayake	Sri Lanka
Ahmad	Mahdavi	Islamic Republic of Iran
Zhangliu	Du	China
GF	H	China

Alias Francisco da Costa	Soares	Timor-Leste
Zulfiqar Ali	Mari	Pakistan
Lili	Han	China
Muhammad Awais	Haider	China
Xinyu	Wang	China
Hammad		Pakistan
Antónia	Neto	Sao Tome and Principe
Md	Isalm	Bangladesh
Adrienne Mae	Zabate	Philippines
Ravikumar	D.	India
Matanat	Asgarova	Azerbaijan
Michelle	Shah	Trinidad and Tobago
Saminu	Ibrahim	Nigeria
Abdullahi	Ali Geidam	Nigeria
Edgar	Raeben George	Singapore
Nontokoza	Mkhonza	South Africa
Fatma	Kamai	Libya
Hassan	Abdilahi	Somalia
Jean	Fong	Fiji
Cho	Htwe	Myanmar

Ketherine	Cardoso	France
Mahlon	Kyomuhendo	Rwanda
Abdul	Qudoos	Pakistan
Billy	Tang	Malaysia
Kammayani	Kandari	India
Seif Eddine	Youcef Khodja	Algeria
Mathew	Sani Amana	Nigeria
Kainat	Halepoto	Pakistan
Muhammad	Ibrar	Pakistan
Alamgir	Khan	Pakistan
Marjorie jean	Tao	Philippines
Nasir Ahmad	Qazizadah	Afghanistan
Emosi	Cagi	Fiji
Rosalee	Leander	Philippines
Abdou Rakib	Mama Kouandé	Benin
Yahya	Alyasiri	Iraq
Hèctor	Moreno	Spain
Nurul	Fajeriana	Indonesia
Vadym	Gorban	Ukraine
Antony	Oduor	Kenya

Robert	Mulebeke	Uganda
Danesh	Kumar	Pakistan
Mukhtar	Ahmed	Pakistan
Perumal	K.	India
Gerald June	Cabangil	Philippines
Osama	Shaikh	Pakistan
Muhammad	Qasim	Pakistan
Tayyaba	Naz	Pakistan
Raheela	Naz	Pakistan
Muhammad Mazhar	Iqbal	Pakistan
Faisal	Mukhtiar	Pakistan
Mohamed	Moussa	United Arab Emirates
Antonio	Andrade-Torres	Mexico
Edwin	Grisales	Colombia
Saurabh Raj	Pandey	India
Sudheesh	Ravi	India
Afrina	Momotaj	Bangladesh
Filippo	Taglietti	Italy
Maria Cristina	Loreño	Philippines
Nelson	Mbawala	Tanzania

Asad	KhaNd	Pakistan
Je-ar	Colipano	Philippines
Kjeevanrao	Jeevanrao	India
Hamidou	Bah	Guinea
Maqsood	Ahmad Jatt	Pakistan
Elsa	Céspedes Dios	Peru
Ibrahim	Osman	Sudan
Mary Joy	Gumangan	Philippines
Anas	Abubakar Dogo	Nigeria
Rose Théophine Derricka	Moutamal Djem	Cameroon
Maham	Naeem	Pakistan
Darwin	Sánchez	Ecuador
Dianne	Peralta	Philippines
Juan Carlos	Montoya Salazar	Colombia
Nawab	Khan	Pakistan
Arunima	Chakraborty	India
Rakesh	Rohta	India
Ali	Raza	Pakistan
Mustapha	Kanagie	Gambia
Emad	Yasin	Sudan

Natalia	Lugay	Dominica
Bibiána	Kotzianová	Czechia
Harriet	Oppong Akosah	Ghana
Kiltar	Gul	Pakistan
Freddy Gino	Guidi	Benin
Yadenevro	de la Cruz Elizondo	Mexico
Mudassir	Abdul	Pakistan
Khan	Imran	Pakistan
Rabia	Dars	China
Dung	Vo Ngoc	Viet Nam
Muhammad	Rizwan	Pakistan
Wasim	Abbas	Pakistan
Noorjehan	Dars	Pakistan
Besma	Zarai	Tunisia
Frederick Eyram	Apana	Ghana
Kwame Yaw-kan	Kojo	Ghana
Pinar	Topcu	Türkiye
Sanam	Sipio	Pakistan
Ayesha	Malik	Pakistan
Mariana	Contreras	United States

Khalida	Derradji	Algeria
Marco	Sánchez	Mexico
Gayanthi	Rahubaddhe	Sri Lanka
Jhomarie	Vallez	Philippines
Juan Carlos	Sandoval Aparicio	Mexico
Yulia	Kobirenko	Ukraine
Zakir Ali	Junejo	Pakistan
Foday	Sumah	Sierra Leone
Christopher	Katerere	Zimbabwe
Manoj	Kumar H.S.	India
Duze	Kamal	Nigeria
Ruby	Vega	United States
Vijay	Ghodekar	India
Vicky	Dimaano	Philippines
Umber	Ghafoor	Pakistan
Mahmoud	Aminu	Nigeria
Muhammad Umer	Tagar	Pakistan
Danúbia Magalhães	Soares	Brazil
Soraya	Alvarado	Ecuador
Merveil	Ebengo	France

Rahina	Kausar	Pakistan
Majid	Rahim	Pakistan
Muhammad	Ahmad	Pakistan
Zhongjun	Jia	China
Gilberto Morales	Guzmán	Mexico
Tijjani	Ali Lawal	Nigeria
Samira	Islas Valdez	United States
Roberto	Miranda	Bolivia
Anderson	Bartolo	Colombia
Kishaija	Noel	Hungary
Ina Iris	Sanchez	Belize
Gerhard	Nortje	South Africa
Emmanuel	Francis	Nigeria
Binish	Afzal	Pakistan
Richard	Uchrin	Hungary
Muhammad	Shair	Pakistan
Olaoye	John	Nigeria
Dorcas	Ojeade	Nigeria
Thierry	Notewo	Cameroon
Muhammad Usman	Mohsin	Pakistan

Barış	Gökoğlu	Türkiye
Friday	Ibrahim	Nigeria
Lakshmikantha	N.R.	India
Tseliso	Seboka	Lesotho
Thakane	Mapara	Lesotho
Elsayed	Ramadan	Egypt
Snežana	Andjelković	Serbia
Michael	Eyong	Nigeria
Iman	Sahib	Iraq
Nare	Khalanyane	Lesotho
Hegarty	Philip	Nigeria
Adebayo	Olowoake	Nigeria
Francesco Giuseppe	La Speme	Italy
Philip Tordue	Ikyaahemba	Nigeria
Abubakar	Kundiri	Nigeria
Okorie	Chikaramobi	Nigeria
Ingrid Gauslaa	Hårstad	Norway
Alinee	Moreno	Mexico
Danilo	Guinto	New Zealand
Nazeea	Bano	Fiji

Rupantri	Raju	Fiji
Allappa Ramappa	Patil	India
Arnulfo	Encina Rojas	Paraguay
Imelda	Felix	Ecuador
Astride Carole	Djeuani	Cameroon
Gabriel	Okoro	Nigeria
Maria	Gutierrez	Colombia
Muhammad	Oyereyi	Nigeria
Eloise	Thomas	Dominica
Anne Marie	Robert	Vanuatu
Carlos	Saavedra	Bolivia
Cristina	Montiel	Mexico
Weijin	Wang	Australia
Shafar Jefri	Mokhatar	Malaysia
Yiyi	Sulaeman	Indonesia
Erpina Delina	Manurung	Indonesia
Fathur	M.	Indonesia
Rosazlin	Abdullah	Malaysia
Abdul Aleem	Memon	Pakistan
Mauro Jr.	Miano	Philippines

Adugna	Bayata	Ethiopia
Brayan	Astudillo Morales	Mexico
Seema	Bhardwaj	India
Vinaysagar	Lakka	India
Hannah	Corpuz	Philippines
Muhammad	Yunas	Pakistan
Tolera Abera	Goshu	Ethiopia
Jonathan	Lopez	Mexico
Aaron	Nanok	Kenya
Julius	Orimoloye	Nigeria
Bekpolat	Tajimurtov	Uzbekistan
Prudhvi Raj	Pampana	India
Enkhbat	Jamsran	Mongolia
Suphakarn	Luanmanee	Thailand
Jauhar	Ali	Pakistan
Tulkin	Shamsiddinov	Uzbekistan
Muhammad Bilal	Khan	Pakistan
Olga	Myachina	Uzbekistan
Tolossa	Ameyu	Ethiopia
Pako	Dick	Botswana

Nadia	Romero	Ecuador
Justin	Shirima	Tanzania
Liudmila	Orlova	Russian Federation
Abrham	Mulu	Ethiopia
Michael	Crawford	Australia
Levis	Kavagi	Kenya
Cojocar	Olesea	Republic of Moldova
Usman	Faryad	Pakistan
Samina	Siddiqui	Pakistan
Amirthalingam	Kavinthini	Sri Lanka
Getachew	Mulatu	Ethiopia
Chenda	Lai	Cambodia
Ewnetu	Teshale	Ethiopia
Ahmad	Suriadi	Indonesia
Tiphaine	Lucas	Ukraine
Nikita	Pardeshi	India
Sarjiya	Antonius	Indonesia
Mariam	Merabishvili	Georgia
Nabil	Bouabid	Tunisia
Vijay Singh	Meena	India

Adedayo	Oyedele	Nigeria
Shibu	Rampedi	Gambia
Yuhao	Zhang	China
Oleg	Guchgeldiyev	Tajikistan
Mykola	Miroshnychenko	Ukraine
Ibraheem	Alhassan	Nigeria
Javier	Pery	Spain
Julius	Ojetade	Nigeria
Caroline	Agamala	Kenya
Jocell	Don	Philippines
Utkarsh	Ghate	India
Antonio	Conde	Spain
Gilrick	Joshua	Vanuatu
Francis	Olatoberu	Nigeria
Ni	Tint	Myanmar
Laid	Kradia	Algeria
Liudmyla	Usata	Ukraine
Salvador de Deus Soares	Amaral	Timor-Leste
Maduabuchi	Ukabiala	Nigeria
Laila	Tajeddine	Morocco

Precious	Chikezie	Nigeria
Regina	Menino	Portugal
Munawar Hussain	Samoon	Pakistan
Annie	Espiritu	Philippines
Mihaela	Lungu	Romania
Sevinc	Madenoglu	Türkiye
Georges	Kome	Cameroon
Nisha	Sahu	India
Carole	Mejane Ekane	Cameroon
Collins	Majengo	Kenya
Hussam	Hag Husein	Syrian Arab Republic
Sankalpa	Nepal	Nepal
Oksana	Sakal	Ukraine
Iulia Adriana	Grafu	Romania
Meresiana	Tikoisuva	Fiji
Kedir Abate	Fentaw	Türkiye
Viktorii	Zubkovska	Ukraine
Rene	Nazareno	Ecuador
Partha Pratim	Chakravorty	India
Zahidah	Ayob	Malaysia

Sara	Eliadini	Morocco
Gunsham	Seeborun	Mauritius
Yassine	Hidri	Tunisia
Yi	Peng	France
Miriane	Kizimini	Democratic Republic of the Congo
Arabela	Vega	Costa Rica
Henry Tamba	Nyuma	Kenya
Ajay Kumar	Mishra	India
Aline	Flor	Portugal
Sayaji	Mehetre	India
Roshidat	Oyinlola	Nigeria
Lasitha	Manathunga	Sri Lanka
Iryna	Khizhnyak	Ukraine
Marnus	Cherry	Saint Lucia
Jo-Anne Lynne Joy	Duque	Philippines
Olayinka	Olatunji	Nigeria
Francis	Ogwang	Uganda
Blessing	Chuke	Nigeria
Ajay	Harit	India
Estefania	Chaves	Colombia

Arslan	Nazarat	Pakistan
Cédric	Nguemezi	Cameroon
Arijit	Barman	India
John Mark	Esquela	Philippines
Gabrielle	De Souza	Trinidad and Tobago
Toivo	Tougjas	Estonia
Munira	Ishaq	Nigeria
Munira	Otambekova	Tajikistan
Naomi	Adoma Fosu	Ghana
Reuben	Kuavedzi	Ghana
Raul	Carcamo	El Salvador
Imran	Rashid	Pakistan
Pamela	Mantle	Canada
Tolera	Goshu	Ethiopia
Abari	Yacoudima Mado	Niger
Franco Jose	Antonucci Rausseo	Venezuela (Bolivarian Republic of)
Niels	Batjes	Netherlands (Kingdom of the)
Meshack	Amai	Kenya
Luis Carlos	Grajales Guzmán	Colombia
Ricualdo	Alouidor	Haiti

Victoria L.	Rivera	Philippines
Carlos	Clerici	Uruguay
Samaila	Noma	Nigeria
Oksana	Haskevych	Ukraine
Uttam	Kumar	India
Lucia Helena	Anjos	Brazil
Malika	Slifi	Algeria
Adan	Velasco Osinaga	Bolivia
Ramón	Gutierrez	Colombia
Mohammed	Ahmed	Nigeria
Mercy	Kivuti	Kenya
Hlongwane	Maseeiso	Lesotho
Baidoo	Emmanuel	Ghana
Adam	Lawan Ngala	Nigeria
Pamela	Mlikota	Argentina
Marcel d'Aquin	Garba	Cameroon
Emmanuel	Nnabuihe	Nigeria
Tochukwu	Nwosu	Nigeria
Ndzana	Georges Martial	Cameroon
Gihan	De Silva	Hungary

Thierry	Abodo	Cameroon
Ali	Madi	Libya
Joseph Sadrac	Ondoua Oyono	Cameroon
Danielle	Mamba	Cameroon
Martin	Flores	Mexico
Kaamil	Fonfatawouo	Cameroon
Tarcisius Romain	Bitam Zambo	Cameroon
Kometa	Stephan Nsohseh	Cameroon
Gaetan	Pierre	Canada
Abraham B.	Barclay	Liberia
Lindah	Keremoui-Elton	Vanuatu
Anupam	Pandey	India
Dishan	Fonseka	New Zealand
Palamar	Nataliia	Ukraine
Ingrid	Hartmann	Germany
Alex	Espiritu	Philippines
Hermogene	Tangara	Philippines
Jeremy	Hale	United States
Kunghe	Genesis	Cameroon
Alexander	Santos	Philippines

Moba	Abdoulay	Cameroon
Susil	De Zoysa	Australia
Jhon Abrien	Soliza	Philippines
Maria Isabel	Oblitas Roselio	Bolivia
Bertolio	Arellano	Philippines
Kien	Đặng	Viet Nam
André	Beye	Burkina Faso
Nick	Rubio II	Philippines
Melody	Orogo	Philippines
Sisavath	Phimmasone	Lao People's Democratic Republic
Naihui	Wang	China
Jennifer	Atay	Philippines
Camilo	Shaw	Colombia
Jingbo	Wang	China
Novita Hidayatun	Nufus	Indonesia
Ximing	Liu	China
Sheikh	Ahaduzzaman	China
Raj	Rajak	India
Benjamin	Labo	Philippines
Zhenlin	Zhao	China

Sunsanee	Arunyawat	Thailand
Zahir	Zahir	Pakistan
James	Mwangi	Kenya
Aftab Ali Shah	Syed	Pakistan
Dilip	Kumar	India
Elena	Castañas	Philippines
Ebere Cynthia	Nnabuike	Nigeria
Ankit Kumar	Chauahan	India
Yuàn	Zhang	China
Ravindra	Jadhav	India
Abdul Ghaffar	Kalwar	Pakistan
Emmanuel	Chiemeka	Malaysia
Sadiq	Yakubu	Nigeria
Kelvin	Harrison	Kazakhstan
Prasada Rao	Kongala	India
Amanullah	Amanullah	Pakistan
Roshan	Latif	Pakistan
Asif	Iqbal	Pakistan
Keitumetse Veronica	Mosoeunyane	Lesotho
Noreen	Zahra	Pakistan

Anwar	Muhammad	Pakistan
Naeem	Ahmad	China
Aliyu	Mahmud	Nigeria
Joseph	Kabala Mubolo	Democratic Republic of the Congo
Adolph	Malatji	South Africa
Soghra	Hosseinzadeh	Islamic Republic of Iran
Kurotamunoye	Aamadi-Rapheal	Nigeria
Karim	Ghorbani	Islamic Republic of Iran
Muhammad	Humza	Pakistan
Nnaemeka	Ononiwu	Nigeria
Senzo	Ntshakala	Eswatini
Ibrahim	Fadason	Nigeria
Josephath	Kutuahupira	Namibia
Joseph	Bafei	Togo
Giorgi	Ghambashidze	Georgia
Maria	Godinho	Portugal
Yaya Olaitan	Olaniran	Nigeria
Woubshet	Deneke	Ethiopia
Futhi	Nkambule	Eswatini
Yu-Ling	Zheng	China

Nusrat	Yaqoob	Pakistan
Ben	Heinemann	Switzerland
Bimal Bahadur	Kunwar	Nepal
Liu	Feng	China
Ajah	Francis	Nigeria
Ei Shwe	Sin	Myanmar
Giada	Migliore	Italy
Chengying	Jiang	China
Marina	Sulp	Blogger
Varsha	Kampli	India
He	Li	China
Sayed Javad	Sobhani	Islamic Republic of Iran
Wen Qiu	Zhang	China
Artak	Khachatryan	Armenia
F.	Yang	China
Mwahija	Irika	Tanzania
Mikhail	Semenov	Russian Federation
Guilherme	Felisberto	Brazil
Chidozie	Ernest	Nigeria
Xiaotong	Song	China

Anatoly	Ladukhin	Russian Federation
Obed	Asiedu	Ghana
Swalehe	Mkuwili	Tanzania
Muhammad	Irfan	Pakistan
Zhiyuan	Tian	China
Hideo	Kubotera	Japan
Mohammad Iqbal	Bhat	India
Win	Myint	Myanmar
Schola	Mbalila	Tanzania
Lang	Zhang	China
Daniil	Kozlov	Russian Federation
Nikolay	Lozbenev	Russian Federation
Siyun	Huang	China
Pavel	Shilov	Russian Federation
Yaroslava	Bukhonska	Ukraine
Khurram Shehzag	Baig	Pakistan
Rosemarie	Umagat-Silongan	Philippines
Aqeela Jabeen	Aslam	Pakistan
Jose	Fontes	Portugal
Mihail	Melamed	Russian Federation

Andrey	Zhidkin	Russian Federation
Paul	Fil	Russian Federation
Ziming	Tong	China
Yaroslava	Bukhonska	Ukraine
Andrey	Chinilin	Russian Federation
Kyaw	Thetoo	Myanmar
Yasin	Awwal	Nigeria
Huanjun	Liu	China
Ekaterina	Nov	Russian Federation
Kerina	Bianda	Cameroon
Denis	Ahimbisibwe	Uganda
Emil	Dimitrov	Bulgaria
Mohammed	AbuShariah	Saudi Arabia
Kerina	MBianda	Cameroon
Nnaemeka	Ononiwu	Nigeria
Eji EJOR	Tangban	Nigeria
Yvana	Mengue	Cameroon
Xueru	Huang	China
Muhammad	Umair	Pakistan
Saba	Khalid	Pakistan

Meseret	Nigussie	Ethiopia
Hui Wen	Zhang	China
Golam Jalal	Ahammed	China
Steffen	Schulz	Ethiopia
Onaolapo	Mopelola	Nigeria
Oluwatosin	Oderinde	Nigeria
Saba	Khalid	Pakistan
Alla	Yurova	Russian Federation
Hottensiah	Mwangi	Kenya
Jesús	Caña	Mexico
Zicheng	Yu	China
Shahid	Ahmed	Pakistan
Ana	Sethabathaba	Lesotho
Jacques	Bazemon	Burkina Faso
Subash	Singh	India
Aqsa	Rashid	Pakistan
Celestine	Oluwagbemi	Nigeria
Chandrabhan	Patel	India

