



Eric Tielkes (Herausgeber)

Tropentag 2021 - International Research on Food Security, Natural Resource Management and Rural Development

Towards shifting paradigms in agriculture for a healthy and sustainable future



<https://cuvillier.de/de/shop/publications/8597>

Copyright:
Cuvillier Verlag, Inhaberin Annette Jentzsch-Cuvillier, Nonnenstieg 8, 37075 Göttingen, Germany

Telefon: +49 (0)551 54724-0, E-Mail: info@cuvillier.de, Website: <https://cuvillier.de>

Transforming Food Agriculture to Feed the People and Save the Planet

JIMMY SMITH

International Livestock Research Institute, Kenya

The theme of Tropentag 2021 is 'Towards shifting paradigms in agriculture for a healthy and sustainable future'. I have taken the liberty of interpreting agriculture as 'food agriculture' and I will confine my remarks on 'the future' to developing countries where both opportunities and challenges for agricultural transformation are significant.

Demand for food is driven by three main drivers – human population size, income and demographics. Robust modelling of population growth, incomes and demographics show that demand for food will likely plateau in the 2050s, but by then between 60–70 % more food will be needed than is currently produced. However, food supply is less predictable, as it is influenced by many more variables such as crop, livestock and fish productivity, increasing resource constraints (land and water in particular), climate change and variability, and global as well as local economic and political conditions. Our quest must be about both food and nutritional security – along with addressing the current and future food demand sustainably – environmentally, socially and economically.

To respond to this challenge in developing countries three paradigm shifts are proposed: (a) Agriculture must become a growth pole with equity, including for women and youth; (b) Research and innovation must respond to the needs of the agricultural population who are mostly small and medium scale farmers and entrepreneurs; (c) shorten and professionalise agriculture supply chains to reflect a focus on local and regional markets instead of export orientation.

Should these paradigm shifts take place, the food agriculture sector would respond to meeting future food and nutritional needs sustainably, contribute to gainful and equitable employment, as well as to growth and development in developing countries.

Enabling Farmers to Exploit Genetic Gains for Sustainable Crop Production Systems

CHIKELU MBA

Food and Agriculture Organization (FAO), Italy

Global efforts to accomplish the onerous task of a 50 percent increase, over the 2012 figures, in the production of food and other agricultural products sustainably by 2050 are confounded by the impacts of climate change and other drivers. To underscore the enormity of the constraints to attaining universal food security and nutrition by 2030, a commitment of the Sustainable Development Goals, one in every 10 persons globally or one out of every five persons in sub-Saharan Africa did not have enough nutritious food to eat in 2019. Still more worrisome, the number of the food insecure and malnourished has been increasing steadily over the last six years. With 80 % of our food being plant-based, a significant component of the solutions to these untenable conditions must be sourced from crop production systems – which produce more with fewer inputs. Towards this end, the case is made that farmers' access to the quality seeds and planting materials of the well-adapted, productive and nutritious crop varieties which are resistant to myriad biotic and abiotic stressors must be enhanced. This requires the safeguarding of the widest spectrum of plant genetic resources for food and agriculture, the use of their inherent variations in breeding progressively superior crop varieties and the agency of responsive seed systems that cater especially to resource-poor farmers of food security crops in vulnerable parts of the world. The normative and operational work of the Food and Agriculture Organisation of the United Nations and its partners in this regard is reviewed and future perspectives shared.

Contact Address: Chikelu Mba, Food and Agriculture Organization (FAO), Rome, Italy,
e-mail:

Reconciling Agricultural Production with Biodiversity Conservation through Ecological Intensification and Diversification

INGO GRASS

University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Germany

More than seventy percent of the land surface is transformed by humans, and 1 million species of animals and plants are threatened with extinction. Intensification of agriculture is a major driver of this dramatic biodiversity decline. Modern-industrial agriculture has spurred considerable yield increases in the second half of the 20th century, however, the current agrichemical model of agriculture undermines itself and much else besides. Hence, a paradigm change in agriculture is urgently needed. Ways forward include the (re)diversification of agriculture from field, farm to landscape scales. In addition, ecological intensification, that is, the replacement of conventional intensification practices through ecological processes to increase crop production, has been proposed. Taking examples from Colombia, South Africa and Indonesia, I illustrate potentials of agricultural diversification and ecological intensification in modern-industrial farms to promote environmental and economic sustainability. While individual methods hold great potential to reduce negative impacts, combining multiple methods of ecological intensification and diversification can create truly regenerative agricultural systems that have great potential to sustainably enhance food production and biodiversity

Contact Address: Ingo Grass, University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Stuttgart, Germany, e-mail: ingo.grass@uni-hohenheim.de

Crops

1) Crops and cropping systems	15
2) Agro-ecology	51
3) Agro-ecosociology - implications for sustainability	71
4) Trees for people	107

Crops and cropping systems

Oral Presentations

DAVID BAUTZE, GURBIR BHULLAR, NOAH ADAMTEY, LAURA ARMENGOT, EVA GOLDMANN, AMRITBIR RIAR, JOHANNA RÜEGG, MONIKA SCHNEIDER, BEATE HUBER:
A Synthesis of Twelve Years of the “Long-Term Farming Systems Comparisons in the Tropics (SysCom)” 19

AKSANA ZAKIROVA:
Crop Diversification as a Coping Strategy to Changing Environment 20

EBENEZER BOATENG, BENJAMIN KOFI NYARKO, CHRISTINE FÜRST, MARTIN SCHULTZE, FIFII AMOAKO JOHNSON, SIMON MARIWAH, ISHMAEL MENSAH:
Smallholder Farmers’ Perspective on Sustainable Agriculture Intensification in the Guinea Savannah Agro-Ecological Zone of Ghana 21

NANCY PIERINA BENITES ALFARO:
Quality Seeds in Traditional Systems: Evidence in Household Consumption of Indigenous Crops in Peru 22

CHARLES IKENNA NWANKWO, HANNATOU MOUSSA OUMAROU, ALI MAMAN AMINOU, LUDGER HERRMANN:
Seedball Technology Development and its Application for Pearl Millet Production in West African Sahel 23

Posters

HELMUTH E. NIEVES-ORDUÑA, MARKUS MÜLLER, KONSTANTIN KRUTOVSKY, OLIVER GAILING:
High Chloroplast Diversity of Cacao (*Theobroma cacao* L.) in Western Amazonia 24

RAYMUNDO VENTO TIELVES, VICTOR JORGE DÍAZ GARCÍA, EDUARDO CABRERA CARCEDO, EVELYN PÉREZ RODRÍGUEZ, BETTINA EICHLER-LÖBERMANN:
Twenty Years of Agroecological Practices on a Family Farm in Pinar del Río, Cuba 25

- HANNES WILMS, NATALIA FANEGA SLEZIAK, MAARTEN VAN DER AUWERAER, EDWIGE ANDRE, BART PANIS:
From Top to Bottom, How Meristem Position Affects the Regeneration Capacity of Sweet Potato after Cryopreservation 26
- ASHENAFI DUGUMA FEYISA, YANN DE MEY, MIET MAERTENS:
Forgotten Crops and the Vulnerability of Rural Livelihoods: The Case of Enset in Ethiopia 27
- JAFARI LEILA, SARA ASADI, ASGARI ASHKAN:
Investigating the Change in the Pattern of Crop Dominance in Iranian Agricultural Ecosystems 28
- MEKI SHEHABU MUKTAR, TADELECH BIZUNEH, BESUFEKAD WOLDE, YILIKAL ASEFA, CHRIS S. JONES:
Genetic Diversity in Napier Grass (*Cenchrus purpureus*) Collections and Progeny Plants: Potential-Duplicates and Unique Genotypes 29
- KHONDOKAR HUMAYUN KABIR, MOHAMMED NASIR UDDIN, SOURAV SARKER:
Rationale and Motivation of Rural Farmers in Adopting Floating Agriculture in the Haor Region, Bangladesh 30
- DOROTHY BIRUNGI NAMUYIGA, TILL STELLMACHER:
Smallholder Typologies in Pigeon Pea-Based Farming Systems: An Application to Rural Uganda 31
- CHARLES IKENNA NWANKWO, HANNATOU MOUSSA OUMAROU, ALI MAMAN AMINOU, LUDGER HERRMANN:
The Seedball Technology also Enhances the Panicle Yield of Sorghum in the Sahel 32
- YAMEN HOMAIDAN SHMEIT, PAVEL NOVY, ROHIT BHARATI, KATERINA HAMOUZOVÁ, JANA ŽIAROVSKÁ, INGRID MELNIKOVOVÁ, ELOY FERNÁNDEZ CUSIMAMANI:
Genetic and Morphological Stability of Autopolyploid *Thymus vulgaris* L. and Changes in its Anatomy and Physiology 33
- HELENA WEHMEYER, MELANIE CONNOR:
Adoption of Sustainable Rice Farming Technologies: Perceptions of “One Must Do, Five Reductions” Technologies 34
- NACER ADERDOUR, THANH THI NGUYEN, HASSANE RHINANE, ANDREAS BUERKERT:
Temporal Dynamics of Vegetation Cover and Agricultural Development in the High-Atlas and Anti-Atlas of Morocco from 1990 to 2020 Using Landsat 5-7 MSS and 8 OLI/TIRS Data 35

RUTEGA DAMAS BIRINDWA, WIVINE MUNYAHALI, PIETERJAN DE BAUW, GERD DERCON, ROEL MERCKX: Effects of Staggered Planting Periods and Potassium Fertilisation on the Performances of Cassava Cultivars in South-Kivu, Democratic Republic of Congo	36
NURUDEEN ABDUL RAHMAN, ASAMOAH LARBI, BEKELE HUNDIE KOTU, IRMGARD HOESCHLE-ZELEDON: Evaluating the Sustainability of Maize-Legume Strip Cropping Technology in the Context of Smallholder Farmers in Northern Ghana	37
TEDI YUNANTO, ADANG SAPUTRA, SUPARNO, WAHID SUGIMAN, FARISATUL AMANAH, JASIN NUGRAHA, RATU ALAMANDA, FIRZA FARID: Compost in Growing Vegetables: An Effort in Reducing Organic Waste Disposal into the River	38
DUY HOANG VU, SABINE STÜRZ, FOLKARD ASCH: Nitrogen Source Affecting the Competitiveness between Lowland Rice and Weeds under Low and High Vapour Pressure Deficit	39
SOUKAINA ANOUGMAR, JEAN-MICHEL SALLES, NICOLA GALLAI, STEFANIE CHRISTMANN: Impact of the Increase in Aridity Levels on the Value of Insect-Pollination in Drylands: Farmers' Perspective	40
NAGHMEH MOBARGHAE, HOUMAN LIAGHATI, MOSTAFA KESHTKAR: Land Use Planning with Agro-Ecosystem Paradigm Approach in Rural Areas of Arid Regions of Iran	41
FIRMIN ANAGO, BRICE OUSSOU, GUSTAVE DAGBENONBAKIN, LUCIEN AMADJI: Cultivation of Cowpea Challenges in West Africa for Food Security: Analysis of Factors Driving Yield Gap in Benin	42
ALEMAYEHU TERESSA NEGAWO, ERMIAS HABTE, MEKI SHEHABU MUKTAR, ALIEU SARTIE, CHRIS S. JONES: Molecular Characterisation of Apomixis in <i>Cenchrus ciliaris</i> and its Implication for Improvement	43
JOHANNA REGER, IRENE HOLM SØRENSEN, ANDREAS BUERKERT, EVA SCHLECHT: Socio-Economic and Ecological Changes in Farming Systems of Targa N'Touchka (Anti-Atlas, Morocco)	44

- MADINA DIANCOUMBA, OMONLOLA NADINE WOROU, BALOUA NEBIE, ABDOULAYE TANGARA, MAMOUROU SIDIBE, ALY TOGO, MBAIRASSEM BENDIGNGAR, BIRHANU ZEMADIM:
Response of Dual-Purpose Sorghum Varieties to Fertiliser and Sowing Dates in Mali's Sudanian Zone 45
- ELVIRA SARI DEWI, ISSAKA ABDULAI, GENNADY BRACHO-MUJICA, REIMUND P. RÖTTER:
Salinity Constraints and their Implications for Smallholder Farming in North-aceh, Indonesia 46
- ADEMOLA ADEBIYI, PHILIP ADETILOYE, OLUSEGUN ADEYEMI, OLUSEGUN ODUWAYE:
Maize-Jackbean Intercrop as Influenced by Different Mixture Proportions and Planting Patterns 47
- MD. AMIRUL ISLAM, SHYAM PARIYAR, TIMOTHY J. KRUPNIK, MATHIAS BECKER:
Shift in Cropping System: Is a Sustainable Means of Improving Crop Production and Maintaining Soil Health? 48
- ABIUD GAMBA, KELVIN MTEI, TODD ROSENSTOCK, ANTHONY KIMARO:
Resilience and Economic Benefits of Water Harvesting and Changing Planting Date in Maize Systems of Semi-Arid Tanzania 49
-