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PROSPERITY THROUGH AGRICULTURAL TRANSFORMATION

Agri-Connection, Volume 7, Issue 2 & 3, September 2022
MESSAGE FROM THE PRESIDENT

Dr. Pradeep Wagle
NAPA President

It is my great pleasure and honor to write this message as the president of the fourth Executive Committee (EC, May 2022-May 2024) of the Association of Nepalese Agricultural Professionals of Americas (NAPA). I am really grateful to NAPA members for their trust in my leadership in moving this vibrant professional society forward. I would like to express my sincere gratitude to my predecessors, Drs. Lila B. Karki and Megha N. Parajulee, for their excellent leadership and commitments in the past seven years of NAPA’s establishment.

The 3rd Biennial International Scientific Conference held during May 27-29, 2022 in Atlanta Georgia, USA was a great success. The combination of both virtual and in-person opportunities brought more than 150 participants together with a fantastic slate of invited and contributed oral and poster presentations along with greatly demanded several panel discussions on Senior Professionals’ Forum, Nepal’s Agricultural Development Policies and Strategies, Personal Financial Literacy and Education, and Career Opportunities in Industry and Academia; Research Mini-Grant symposium; Competitive students’ oral, poster, and essay writing opportunities; and Ag-poem recitation. Overall, the conference gave away $1950 cash prizes, an agriculture pioneer award, and outstanding volunteers/members recognition and appreciation. As a current president of the society, I would like to congratulate the entire conference organizing committee (COC) led by NAPA Advisor Dr. Nanda P. Joshi, Founding President and COC Co-Chair Dr. Lila B. Karki, COC Co-Chair and Immediate Past President Dr. Megha N. Parajulee, chairs and members of sub-committees, and the EC for their extraordinary work.

We all know numerous historical achievements of NAPA that have been effectively communicated to our members by Agri-connection in the past 23 issues. With the tremendous support from our valued NAPA members, our new EC and highly dedicated committees are working diligently to further strengthen NAPA’s programs and identity across the globe. In addition to pre-existing several dedicated committees, NAPA has formed a few new committees. First, the Collaboration and Resource Building Committee (CRBC) seeks to broaden tangible collaboration between NAPA and institutions related to agricultural and allied disciplines in Nepal and beyond in research, education, and extension, and to strengthen NAPA’s resources, specifically seeking extramural funding. Second, the Socio-economic and Cultural Committee (SCC) aims to promote cultural values and socio-economic vitality in the community for innovation, discourse, knowledge sharing, capacity building, and charitable services. Third, the Reward and Recognition Committee (RRC) aims to identify and recognize individuals with significant contributions in the field of agriculture and allied sciences. Publication of a comprehensive database of agricultural professionals involved in NAPA is underway. Our dedicated IT team is working hard to complete transferring the current NAPA webpage to a new and advanced website with a member log-in system soon.

We have successfully completed the first round of subject-specific roundtable interactions for 1) Crop and Soil Science, Horticulture, and Organic Agriculture 2) Veterinary, Animal Science, Poultry, and Aquaculture, 3) Entomology, Plant Pathology, and Plant Protection, and 4) Plant Breeding, Genetics, Biotechnology, and Molecular Biology. The roundtables for additional disciplines will be announced soon. New EC is planning to prioritize journal publication (GJAAS) and endowment fund collection for NAPA’s programmatic and economic sustainability. The Webinar Committee has already successfully hosted two webinars presented by Dr. Bishnu R. Uperti (Executive Chairperson – Policy Research Institute, Nepal on July 31, 2022) and Prof. Dr. Punya P. Regmi (Vice Chancellor – Agriculture and Forestry University, Nepal, on September 11, 2022). The next webinar entitled “Transformative pathway towards food sovereignty, circular economy, and agroecosystems health” by Dr. Nityananda Khanal has already been announced for October 30, 2022.

Finally, I would like to thank all Agri-Connection editorial teams for their hard work in publishing 7 volumes and 23 issues since 2016 and bringing this NAPA’s flagship newsletter to its current height. I would like to congratulate Dr. Sushil Thapa, Editor-in-Chief of Agri-connection, and his team for extraordinary service in the last EC term (2020-2022) and express my heartfelt thanks to Dr. Thapa for accepting to continue in the same role for the current EC term. This current issue of AC mainly contains the highlights of the NAPA 2022 Conference and NAPA’s recent activities and achievements, the introduction of members of several committees along with the aims/goals of the committees, and some highlights of Nepal visits and talks by President Dr. Wagle, Immediate Past President Dr. Parajulee, and Joint Secretary Dr. Thapa. I urge our members and beyond to share intellectual ideas, opinions, thoughts, perspectives, literary creations, kids’ creativities, and accomplishments with our Agri-Connection team at agriconnection@napaamericas.org.

Thank you all for your continued solidarity and support to make NAPA grow internationally. Wishing everyone a very happy Dashain, Tihar, and Chhath 2079.
Amid the COVID-19 pandemic and climatic abnormalities, global food prices have risen dramatically since early 2020 and are now at record highs. The current Russo-Ukrainian war is exacerbating the food and nutritional problems on an unprecedented scale, largely because these two countries are major suppliers of wheat and barley around the world. A recent report claims that 36 countries, including some of the world's most vulnerable and impoverished ones, rely on Russia and Ukraine for more than half of their wheat imports and are now at high risk of economic crisis and food insecurity. Although Nepal is thousands of kilometers away from the war scene, consumer price inflation rose by 8.6% in July 2022 from 4.2% a year ago, according to a report by Nepal Rastra Bank.

Today, due to increasing globalization, if one part of the world is affected by war or food insecurity, it is likely that other parts of the world will suffer hardship. Therefore, the international community should step out of its comfort zone of addressing food problems through aid and credit. They should reassess the global policies related to agriculture, trade, and energy and work together to create safe, healthy, and prosperous societies. Swift and bold actions are needed from both developed (wealthy) and developing (low-income) countries to avert further humanitarian and economic catastrophes.

This issue of Agri-Connection highlights the activities at the NAPA conference – 2022, introduces newly formed committees, summarizes NAPA’s initiatives and achievements in organizational development, networking, research funding, and philanthropy, and includes relevant articles on sustainable agriculture and global food security and prosperity. As usual, the KidsZone is contributed by artistic and enthusiastic kids.

We invite you to be a part of Agri-Connection by reading, writing, and sharing your feedback. May your festival season be fun-filled and adventurous, and so be your life.

Happy Vijaya Dashami, Dipawali, Mha Puja, and Chhath Parva - 2079 B.S.
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Dr. Wagle is an internationally recognized scientist on biosphere-atmosphere interactions, carbon and water cycles of terrestrial ecosystems, and remote sensing of vegetation as documented in >70 SCI indexed peer-reviewed articles and >100 conference abstracts. He received a Ph.D. in Crop Science from Oklahoma State University (OSU) in 2013. Since 2016, he has been working as a Research Scientist with the USDA-ARS. Dr. Wagle has received Certificate of Merits/Outstanding Performance Awards from the USDA for consecutive years for his exceptional research and professional achievements. As an adjunct faculty, he also supervises/mentors graduate students and postdoctoral researchers at OSU and the University of Oklahoma. He is an Associate Editor for the Remote Sensing Journal and an Editorial Board Member for the Agricultural and Forest Meteorology and Global Journal of Agricultural and Allied Sciences. Dr. Wagle served as a Founding Committee Member for 2015-2016, Joint Secretary for 2016-2018, General Secretary for 2018-2020, and Vice President for 2020-2022 before assuming the role of NAPA’s President for the fourth Executive Committee (2022-2024).

Dr. Ramjee P. Ghimire, Vice-President

Dr. Ghimire is an Outreach Specialist and the Program Director for the WorldTAP "Food Safety" and "Zoonoses" international short courses at the College of Agriculture and Natural Resources at Michigan State University, Michigan, USA. He is a NAPA life member. He served as the Editor-in-Chief for Policy and Research Brief (2018-2020), General Secretary (2018-2020), Co-Chair for Resource and Capacity Building Committee (2018-2020), Co-Chair of the 2nd NAPA International Scientific Conference Organizing Committee (2020), and in several other ad hoc and/or working committees of NAPA. Besides being featured in the Agri-Connection newsletter as NAPA Member of the Quarter, Dr. Ghimire received several recognitions from NAPA and beyond for his work on agricultural development, community empowerment, research and capacity building, and institutional collaborations. He currently serves as the Vice President, Chair of Membership Drive Committee, and Editor-in-Chief of the Policy and Research Brief in NAPA.

Dr. Nityananda Khanal, General Secretary

Dr. Khanal is a Research Scientist working at Agriculture and Agri-Food Canada. He previously served as Editor-in-Chief for Agri-Connection (2018-2020), Executive Member and Chair of Resource and Capacity Building Committee (2020-2022), Co-Chair of the 2nd NAPA International Scientific Conference Organizing Committee (2020), Chair of Research the Mini-Grant Symposium in the 3rd NAPA International Scientific Conference (2022), Judge of the competitive NAPA Agri-Poem programs held in conjunction with NAPA Scientific Conferences (2020, 2022), Coordinator of the Agri-Poem program on the NAPA Day celebrations (2018, 2019), editor of the Krishika SusheleeHaru (2021) - an agri-poem compendium published by NAPA out of poems submitted to 2nd NAPA International Conference, Advisor to the Research Mini-Grant awardee students (2019-2022) and member of the NAPA by-laws revision committee (2020 & 2021). Dr. Khanal was featured in the Agri-Connection newsletter as NAPA Member of the Quarter and recognized by NAPA Presidents and Executive Committees with the Outstanding Service Awards.

Dr. Sushil Thapa, Joint Secretary

Dr. Thapa is an Assistant Professor at the University of Central Missouri. Previously, he worked at the Texas A&M University System. While in Texas A&M, he received two prestigious awards – “Award of Excellence” and “Special Achievement Award for Research Collaboration.” Dr. Thapa’s productivity has resulted in more than 70 publications in various forms, including 20+ peer-reviewed journal articles as the first author. He has served NAPA as an Editor (2018-2020) and Editor-in-chief (2020-present) of the Agri-Connection newsletter, member of the Executive Committee (2020-2022), member of the Scientific Committee for NAPA conference 2020, and member of the conference organizing committee for NAPA conference 2022. In 2022, Dr. Thapa received a Superior Service Award from NAPA. He currently serves as the reviewing editor for the Journal of Crop Improvement and Editor of the Nepalese Journal of Agricultural Sciences.
Welcome on Board NAPA Executive Committee (2022-2024)

Dr. Bishwo Adhikari, Treasurer

Dr. Bishwo Adhikari is the Lead Plant Pathologist and Program Manager of the Poaceae Quarantine Program with the USDA APHIS Plant Germplasm Quarantine Program. He works with plant pathogens and develops diagnostic methods for quarantine regulation and management. He has worked as a bioinformatician, research geneticist, and molecular biologist for the Department of Defense, USDA Agricultural Research Service, and Michigan State University. Dr. Adhikari also worked as a Plant Protection Officer at the Ministry of Agriculture and Livestock Development, Nepal for about five years. He holds a bachelor’s degree in agriculture from Tribhuvan University, Institute of Agriculture and Animal Science (IAAS), Nepal, a master’s degree in Nematology from Ghent University, Belgium, and a Ph.D. in Molecular Biology from Brigham Young University. He has authored several peer-reviewed publications, and book chapters, and edited and reviewed for several journals. Dr. Adhikari is a member of the American Phytopathological Society. He lives in Maryland with his wife and two children. He enjoys long-distance running, hiking, and watching sci-fi movies with his children when he is not working.

Dr. Buddhi Gyawali, Member

Dr. Buddhi Gyawali is a professor of Geospatial Applications, Climate Change, and Human Dimensions of the Environment in the School of Agriculture, Communities, and Environment at Kentucky State University. He serves as Graduate Coordinator for the Masters of Environmental Studies (MES) Program, Lead Scientist for the Center for Geospatial Intelligence and Environmental Security, and Director of the Summer Apprenticeship Program at Kentucky State University. He was a President of the Southern Rural Sociological Association (SRSA), 2021-2022. Dr. Gyawali also serves on the KY Governor’s Advisory Council for Geographic Information Systems, is a Board Member of the Association of Nepalese in Midwest America (ANMA), and an advisor of the Association of Nepalese in Kentucky America (ANKA). He recently completed 9-months long LEAD 21 Class 17, Leadership for the 21st Century professional training. Dr. Gyawali has experience in developing and securing multidisciplinary research, education, and outreach grants.

Dr. Dev Paudel, Member

Dr. Paudel is currently working as a Postdoctoral Research Associate in the Environmental Horticulture Department at University of Florida - GCREC where he is conducting experiments on genomics of blackberry and citrus. He received his bachelor’s degree in agriculture from IAAS in 2009. He worked as Horticultural Development Officer at the District Agricultural Development Office in Sindhuli. Dr. Paudel completed his M.S. degree in Crop Science from Texas Tech University in 2012. He received his Ph.D. in Agronomy from the University of Florida (UF) where he studied genomics and breeding of elephantgrass. After Ph.D., he worked as a Postdoctoral Research Associate at UF and his first work was on genome wide association studies in cowpea and GXE interactions in turfgrass. In the immediate past term, he was the Joint Secretary of NAPA. Currently, he leads the information technology committee and is responsible for maintaining and updating the NAPA website.

Mr. Dol Dhakal, member

Mr. Dhakal is a Senior Research Associate at Texas A&M AgriLife Research and Extension Center, Lubbock Texas. He holds a bachelor (BSc. Ag.) degree specialized in plant protection from Tribhuvan University, Institute of Agriculture and Animal Science (IAAS), Nepal. After his B.S., he joined the Nepal Agricultural Research Council (NARC) as a research officer in 1993. After working there for about seven years, he earned his master’s degree (M.S.) in Natural Resources: Plant Health and Protection from the Natural Resources Institute (NRI), the University of Greenwich, United Kingdom as a British Council Scholar in 2001. He has broad experiences on disease management on vegetables, especially potato, tomato, and crucifers. After working more than 10 years at NARC, he worked in a National Level NGO named “Nepal Agroforestry Foundation” (NAF) in the Capacity of Executive Director for about two years before entering the USA in 2006.
Welcome on Board NAPA Executive Committee (2022-2024)

**Dr. Kripa Dhakal, Member**

Dr. Dhakal is a Postdoctoral Researcher at the University of Memphis, TN working on crop modeling with focus on physiology and water management of row crop production. Previously, she worked with the Tennessee State University as a postdoctoral researcher on insect behavior and chemical ecology. She completed her bachelor’s degree from the Institute of Agriculture and Animal Science (IAAS), Nepal in 2009 and an MS in agriculture from the same university majoring in soil science in 2011. Afterward, she joined the Ministry of Agriculture and Livestock Development, Government of Nepal as a planning officer. In 2017, she joined a Ph.D. program in the Department of Agricultural and Environmental Sciences, Tennessee State University in the organic agriculture program and completed her Ph.D. in 2021. Her research was focused on organic vegetable production and its phytochemical constituents, sensory attributes, and soil properties.

**Dr. Pramod Pokhrel, Member**

Dr. Pramod Pokhrel is a Postdoctoral Researcher at Texas A&M University. In the immediate past term, he was a member of the Resource and Capacity Building Committee (RCBC) and Chair of the Career and Outreach Committee (COC). Currently, he is serving the NAPA as a Chair of the Research and Capacity Building Committee. He was also an advisor to the Research Mini-Grant Awardee students. He served at NAPA International Scientific Conferences (2020 and 2022) as a session moderator and by providing technical support for the online sessions. Dr. Pokhrel initiated and coordinated the NAPA Graduate Assistantship compilation and posting page during the 2020-2022 term. For his contribution, he was featured as a NAPA - Member of the Quarter in 2021 and received a Service Award in 2022.

**Dr. Uma Karki, Member**

Dr. Karki is a Professor of Animal Science and State Extension Livestock Specialist at the College of Agriculture, Environment and Nutrition Sciences, Tuskegee University, Tuskegee, Alabama. Dr. Karki got her Ph.D. in Forage and Grazing Land Ecology from Auburn University and Master's degree in Animal Science from the University of Western Australia, Australia. Her current research and Extension work focus on promoting the sustainable livestock production system. Dr. Karki has presented many research and extension papers in numerous national, international, and local conferences, meetings, and training events. Her research and extension work are published in various journals, conference proceedings, newsletters, training handbooks, research highlights, magazines, and many other outlets. She has solely edited two training handbooks and authored seven chapters in those handbooks. She served in the editorial board of NAPA book project and has been serving as an editor of the Global Journal of Agricultural and Allied Sciences (GJAAS).

**Dr. Megha N. Parajulee, Immediate Past President**

Dr. Parajulee is a Regents Fellow Professor and Cotton Entomology Program Leader at Texas A&M University. A former faculty member at the Institute of Agriculture and Animal Science (IAAS), Nepal, Dr. Parajulee earned his Ph.D. in Entomology from the University of Wisconsin-Madison and joined Texas A&M University as cotton entomologist in 1994. He has authored/coauthored 115 refereed and >350 non-refereed publications, organized several international symposia, presented >400 scientific papers, and mentored over 35 M.S./Ph.D. students. He has been active internationally with plenary/keynote speaking roles in 17 countries. A Fulbright Senior Fellow to Nepal and Uzbekistan, Dr. Parajulee has received the Texas A&M Vice Chancellor's Award in Research Excellence, Faculty Fellow Award, Regents Fellow Award, Vice Chancellor's Award in Collaboration, and Jewel of Nation Award from Nepal. He is a founding life member and the immediate past President of NAPA, and the founding Editor-in-Chief of Global Journal of Agricultural and Allied Sciences (GJAAS).
## Award Distribution (in USD)

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<td><strong>Uddhav Bhattarai</strong></td>
<td>Washington State University, USA</td>
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<tr>
<td>Second</td>
<td><strong>Kabita Poudel</strong></td>
<td>Kentucky State University, USA</td>
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<tr>
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<td><strong>Sadikshya Poudel</strong></td>
<td>Mississippi State University, USA</td>
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<td>Third</td>
<td><strong>Madhav Parajuli</strong></td>
<td>Tennessee State University, USA</td>
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<td><strong>Rudra Baral</strong></td>
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<td>Second</td>
<td>Santoshi Chaudhary</td>
<td>Tuskegee University, AL, USA</td>
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<td>Third</td>
<td>Sandesh Thapa</td>
<td>Gokuleshwor College, Baitadi, Nepal</td>
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<td>Santosh Pathak</td>
<td>Louisiana State University, USA</td>
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<td>Aadesh Subedi</td>
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### Agri-poem Competition

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<td>Third</td>
<td>Ramesh Ranabhat</td>
<td>मानो रोपेर खेतमा</td>
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Agri-Connection, Volume 7, Issue 2 & 3, September 2022
Towards Automated Blossom Thinning in Apple Trees
Uddhav Bhattarai and Manoj Karkee
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Blossom thinning is one of the crucial crop-load management approaches, which controls the current season fruit yield and quality and the coming season's return bloom. Every year growers rely on laborious and labor-intensive manual hand blossom thinning to achieve systematic and controlled thinning. Although other less labor-intensive approaches such as chemical and mechanical thinning have also been practiced, the variable thinning results, lack of desired efficacy and efficiency, and restricted use of chemicals have impeded widespread adoption. This study proposes a robotic blossom thinning system to perform precision thinning using a miniature mechanical thinner that is navigated via a machine vision-assisted robotic manipulator. Flowers are densely located in clusters making individual flower segmentation highly challenging. Hence instead of segmenting and removing individual flowers, the proposed approach involves segmenting the flower clusters, counting the number of flowers per cluster, and removing a proportion of flowers. A deep learning-based pixel-level instance segmentation was used to delineate the flower clusters (Average Precision=0.86) and to control the end-effector to precisely reach the target blossom. Another deep learning-based system was developed to estimate the flower distribution and count in the canopy images (Count Accuracy = 86.6%). To control the thinning intensity, results from both cluster segmentation and counting were combined to achieve segmented flower clusters and flowers per cluster. Furthermore, a miniature electrically actuated end-effector was custom-designed using a spindle-string structure. Ongoing efforts involve developing a motion planning framework and integrating the vision system with a 6-DOF robotic arm to navigate the end-effector to the desired location and orientation and remove the expected proportion of flowers from target clusters in a commercial orchard. The proposed approach, when successful, will provide the foundation for developing robotic solutions for blossom thinning in fresh market apples.

Kabita Paudel¹, Suraj KC¹, Whitney Maynard¹, Jeremy Sandifer¹, Demetrio Zourarakis², and Buddhi Gyawali¹
¹Kentucky State University, Frankfort, Kentucky, USA; ²University of Kentucky, Lexington, Kentucky, USA
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Bharatpur, one of the major cities in Nepal, has been rapidly growing in recent years. The inward migration from the surrounding districts is the major driving force of urbanization. Urbanization has replaced fertile land with built-up structures, resulting in a decrease in available land for agricultural production. Currently, remote sensing is widely used in urban studies and planning because of the timely availability of data providing a synoptic view of urban land cover. This study aims at assessing and mapping the spatial and temporal patterns of urbanization in Bharatpur Metropolitan City from 2000 to 2022 using satellite imagery and assessing the impact of such urbanization on agricultural land availability. The analysis was conducted at the ward level and coupled with Landsat and Sentinel data to derive a Normalized Difference Built-up Index (NDBI). NDBI comparison in different years within the study period was carried out to assess the expansion of urban areas over time. Also, land use land cover changes in the study area for the 2000-2010 and 2010-2022 periods were analyzed using the supervised classification method in ArcGIS Pro. A land-use land cover change matrix was created after changes were detected. The results help visualize overall urban sprawl and identify the areas where agricultural land has been converted into built-up structures. The preliminary study shows a rapidly increasing trend of urbanization, especially on the outskirts of this major city in Nepal. This study helps study urbanization in Bharatpur, Nepal, and assists the policymakers in improving urban planning activities.
The woody ornamental nursery industry has been greatly impacted by soilborne diseases leading to significant economic losses. Cover crop usage, which has been extensively explored in small fruit, vegetable, and row crop systems, could be a potential tool in suppressing soilborne diseases in woody ornamental nursery production. A field experiment was conducted to explore the role of a cover crop on soilborne disease suppressiveness in woody ornamental nursery production systems. Soils from red maple (Acer rubrum L.) plantations grown with and without cover crop species crimson clover (Trifolium incarnatum L.) were sampled following the senescence of the cover crop. Greenhouse bioassays were conducted in a completely randomized design using red maple cuttings inoculated with Rhizoctonia solani, Phytophthym vexans or Phytophthora nicotianae and non-inoculated field soils and replicated ten times (N=80). Plant height, total plant, and root fresh weight were measured, and plant roots were assessed for disease severity using a scale of 0 to 100 % roots damaged. Also, soil samples from cover crop fields were analyzed for soil health parameters. Results showed that cover crop usage significantly reduced root rot disease severity in maple plants. Plants grown in cover cropped soil had higher total plant and root fresh weight. Soil organic matter, soil nitrogen, and bacterial pseudomonad populations were higher in cover cropped soil than in non-cover cropped. There were no significant differences in plant height within the treatments. Our results suggest that cover crops can reduce root rot disease by improving plant growth and soil properties. Thus, cover crop usage can improve woody ornamental production efficiency by reducing pressure from soilborne diseases.
Yield Gap of Rainfed Alfalfa in the United States
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Despite massive production and high nutritive and economic value, the yield and production of rainfed Alfalfa (Medicago sativa L.) have not been improved in the United States (U.S.), particularly in the Midwest and Southeast region, where more than 95% of alfalfa is grown under rainfed conditions. The magnitude of the yield gap in those states is unknown. The objective of this study was to estimate the yield gap of alfalfa grown under rainfed conditions in the U.S. Based on the rainfed production area and total production, we selected 393 counties from 12 U.S. States (Midwest and East regions) and estimated alfalfa growing season, growing season rainfall, attainable yield, water-limited potential yield, water use efficiency and yield gap. We used 10-yr (2009-2018) of recorded yield and daily weather data of selected counties and estimated attainable yield using the frontier yield function and water-limited potential yield using the boundary yield function model. Furthermore, we created a conditional inference tree (CIT) to identify major yield-limiting factors. Our frontier model predicted a mean attainable yield of 9.6 Mg ha-1 and originated a mean yield gap of 29%. The boundary function model predicted a mean water-limited potential yield of 15.3 Mg ha-1 and originated a mean yield gap of 54%. The potential alfalfa water use efficiency was found 30 kg ha-1 mm-1, with mean evaporation of 163 mm (or 24% of mean growing season rainfall). The CIT analysis confirmed that the growing season rainfall is the main yield limiting factor for the rainfed states followed by minimum temperature. The findings of this study could be useful to alfalfa producers, farm managers, researchers and policymakers to minimize the current yield gap.

NAPA Presents Agriculture Pioneer Award

Nepal's senior horticulturist Dr. Anant Bahadur Shrestha has been awarded with “Agriculture Pioneer Award” and “Honorary Membership” by NAPA during its Third International Scientific Conference at Atlanta, Georgia in May 2022.

Dr. Shrestha received his B.S. in Agriculture from Poona University, India in 1958, M.S. (Horticulture) from Punjab University, India in 1964, and Ph.D. (Apple/Horticulture) from University of Reading, England in 1975. He is also the first person from Nepal to get Ph.D. in Horticulture.

Dr. Shrestha also studied the International Mountain Agriculture in Switzerland and visited the fruit producing areas in the USSR, Australia, Israel, Turkey, and the United States from 1967 to 2019.

Dr. Shrestha is popularly known as “Mr. Apple” in Nepal, because apple cultivation has developed in Nepal under his leadership. He has been actively engaged in apple promotion since 1960s. Currently, apple cultivation has flourished in many parts of the country, and it is mainly because of him. He has written a book about apples entitled “Apple Cultivation in Nepal: From Kakani to Himalpari.”
Characterization of d-Tritipyrum Germplasm for Salt Stress Tolerance
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North Dakota State University, Fargo, North Dakota, 58102
Correspondence: bipin.neupane@ndus.edu

Strengthening the inherent ability of new cereal cultivars to tolerate environmental stress is the most effective, economical, and environmentally friendly way to safeguard crop yields in agriculture. To this end, there is an ongoing need to acquire new, valuable genes for breeding. Thinopyrum distichum Thunb. Löve is a highly salt-tolerant, tetraploid wild relative of wheat previously used to derive diverse, hexaploid d-tritipyrum (2n = 42, AABBJJ) lines that vary widely for agronomic traits, including salt tolerance. This study attempted to identify a subset of d-tritipyrum with good agrotype and salt tolerance to use in future attempts to improve the hybrids in their own right and to also attempt the development of common wheat substitution lines with individual D-genome chromosomes replaced by homoeologues from Thinopyrum distichum. Thirty-six d-tritipyrum lines and secondary d-tritipyrum X common wheat hybrids were tested in a growth chamber for salt tolerance from June to September 2021. The material was also evaluated for days to flowering, plant height, fertility, and agrotype and tested with Thinopyrum distichum-specific markers that were previously associated with salt tolerance. Marked differences in salt tolerance were evident. Eleven lines will be evaluated further in a follow-up salt tolerance trial. One entry with a wheat-like phenotype and intermediate salt tolerance appears to be a common wheat substitution line with 2D and 3D replaced by their 2J and 3J counterparts (both these chromosomes were previously shown to affect salt tolerance). We will attempt to confirm these preliminary results and produce substitution lines for additional chromosomes that are critical to salt tolerance. Such material will be useful in future studies of the expression and utility of critical Thinopyrum genes in common wheat and could serve as a platform for chromosome engineering to introgress smaller chromosome regions into wheat.

Cost of Feeding and Performance of Small Ruminants During the Lean Period of Forage Production
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2University of Maryland Eastern Shore, Princess Anne, Maryland, USA
Correspondence: schaudhary8326@tuskegee.edu

The cost of supplementary feeding of small ruminants can be high during the lean season of forage production and can be challenging for sustaining the operation. However, the feeding costs have not been documented well, especially for small-ruminant operations in the Southeast USA. The objective of this study was to evaluate the cost of supplementary feeding and the performance of small ruminants during the lean period of forage production. The study was conducted from October 2021 to January 2022. Seventeen Kiko does with their kids (21, 5-6 months old) and 18 Katahdin-St. Croix ewes were stocked in the grazing-research facility at Tuskegee University. These animals were provided with ad libitum hay and whole corn (25 lbs./day). The quantity of hay and corn provided to these animals during the study period and their purchase price were recorded, and the cost of supplementary feedstuffs was calculated. Live weight, FAMACHA score, and body condition score (BCS) were collected from animals on day 1, fortnightly during the study, and at the end. The average cost of supplements per animal was $0.43/day, which included 77% cost for hay and 23% for corn. The FAMACHA score ranged from 1.9 to 2.3 in does and kids and from 1.0 to 1.2 in ewes. The BCS range was between 2.1 and 2.3 in does, 1.9 and 2.3 in kids, and 2.8 and 3.1 in ewes. Results show that raising small ruminants on supplements during the period of low forage production can be costly, and the adoption of strategies to minimize the need for supplements would be necessary to make this enterprise economically viable.
Assessment of the Status of Rooftop Garden and Determinants of Adoption of Urban Green Roofs in Nepal

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In recent years, rooftop gardens have increased in urban areas of developing countries. However, successful adoption of well-equipped green roofs is still lacking and limited. A survey was conducted from February 3 to April 6, 2021, to understand the status of the rooftop garden in the Morang and Sunsari districts of Nepal. A total of 116 respondents were randomly selected to estimate the role of socio-economic factors in the adoption of rooftop gardens (RTG) in urban areas. The survey area in Morang and Sunsari districts had 30.5 and 33.2 % of the roofs under farming, respectively. Also, the size of the roof of rooftop adopters was significantly larger than non-adopters in the study area. Locally available farming materials were given preference to grow around 50 nutritionally important crop species. A binary logit model was used to determine the factor affecting RTG adoption. Of which, growers’ age, sex, schooling year, training, and farming experience significantly affected RTG adoption. Lack of adequate training and extension services were the major hindrance in RTG adaptation. Thus, gardening training and financial support to expand or extend RTG with adequate extension services from concerned organizations and local governments are needed to establish and promote urban RTG.

Non-compliance and Moral Hazard in Agricultural Conservation Programs

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Cost-share contracts, offered through working lands programs, have been instrumental in addressing environmental concerns arising from resource-intensive agricultural production practices. However, the persistent trend of non-compliance with cost-share contractual obligations has become a problem for funding agencies, including Natural Resources Conservation Service. This paper aims to study existing non-compliance within agricultural conservation programs and provide empirical evidence on the presence of moral hazards in cost-share contractual relationships. Using annual county-level panel data (1997-2019) about contract payments in working lands programs within Louisiana, we find that market and non-market factors influence the non-compliance rate. The findings provide useful insights into the key (non)market factors behind the high and steady level of non-compliance and underlying perverse incentives in the cost-share programs.
Policy and Research Briefs

NAPA publishes Policy and Research Briefs (PRB) on contemporary issues of agriculture. A newly formed four-member Editorial Committee held three meetings and discussed and decided areas the PRB should focus on and also developed strategies to solicit submissions.

1. Publish at least four, if not six issues, within the two-year period.
2. Include both invited and submitted articles from respective agricultural experts. In case when outside submissions are not received, PRB Editorial Committee members will lead and author articles for the briefs in the areas of their expertise.
3. Identify the following topics or themes for the upcoming PRB issues.
   - Linking agricultural education, extension, and research
   - Gene editing and GMO in the context of Nepal
   - Agricultural trade imbalance (import and export) and future strategies
   - Food safety and food security
   - Labor migration or labor market
   - Agricultural mechanization
   - Private sector’s roles in Nepal’s agricultural development
4. Organize a brief presentation for new issue launched.

PRB Editorial Committee would like to invite NAPA members and all other interested individuals to submit their scholarly works that could be based on empirical research, case studies, or desk review on agriculture and/or allied sciences for consideration to publish in the forthcoming RPB issues. For any questions or suggestions related to PRB and to submit articles, please contact Dr. Ramjee Ghimire at ramghi@gmail.com.

Women in Agricultural and Allied Professions (WAAP)

Nepalese Women in Agricultural and Allied Professions (WAAP) committee envisions to be a common platform for Nepalese Women in agricultural and allied sciences and foster their participation in agricultural professions and entrepreneurship to overcome challenges and rejoice in professional achievements.

As a complementary wing of NAPA, WAAP assure and encourage the active involvement of women professionals in different activities of NAPA. As our vision and functions have broadened since its inception, WAAP hopes to focus on the following key points towards its growth and contribution to NAPA and build on experiences and feedback provided by the NAPA professional community and beyond.

1. Prepare, update, and expand the database of Nepalese Women Professionals in agricultural and allied sciences around the globe.
2. Promote collaboration and networking among members of various disciplines.
3. Publish highlights and achievements of women professionals regularly in NAPA’s newsletter (Agri-Connection) under the WAAP section.
4. Promote contribution and participation of women professionals in different activities of NAPA, including scientific publications and leadership.
5. Create a Facebook page for WAAP for more interaction, questions/answers, and discussion regarding professional issues, suggestions, collaboration, and networking.

Members
- Dr. Kripa Dhakal – Chair
- Ms. Prava Adhikari – Member
- Pushpa Pandey – Member
- Dr. Romy Das Karna – Member
- Santoshi Chaudhary – Member
- Shubhechchha Sharma – Member

Advisors: Ms. Ambika Adhikari Tiwari
- Gita Koirala Bhandari
Committee Highlights

Membership Drive Committee (MDC)
NAPA Membership Drive Committee seeks to create a database of students, faculty, researcher, and other professionals of agriculture and allied fields in public, private and nonprofit institutions, industries, and enterprises working in Americas, Nepal and beyond; establish contact with potential NAPA members and promote awareness about NAPA’s vision, mission, goals, objectives, and activities; conduct membership drive; inform members in advance their membership; and regularly update the membership directory on the NAPA website. NAPA membership pool has nine categories including honorary members, senior members, and members for the eligible spouse.

Table 1. Membership fees and eligibility.

<table>
<thead>
<tr>
<th>Membership Type</th>
<th>Fees</th>
<th>Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Member</td>
<td>USD 50 (for two years)</td>
<td>Individuals who hold at least an undergraduate or bachelor or equivalent degree in agriculture or allied areas</td>
</tr>
<tr>
<td>Student Member</td>
<td>USD 25 (for two years)</td>
<td>Current students of agricultural and allied areas who are in good standing student status.</td>
</tr>
<tr>
<td>Life Member</td>
<td>USD 200 (one time)</td>
<td>Individuals having met regular/general member's category and pay defined dues at a time.</td>
</tr>
<tr>
<td>Life Member (eligible spouse)</td>
<td>USD 100 (one time)</td>
<td>Eligible spouse of Life members</td>
</tr>
<tr>
<td>Family (Joint) Member</td>
<td>USD 15 (for two years) or USD 50 (one time for Life Membership)</td>
<td>Spouse of a member of any of the five categories (regular/general, student, life, honorary, and associate), who is not eligible for other categories of membership. Family members will not have voting right.</td>
</tr>
<tr>
<td>Associate Membership (Outside Nepal)</td>
<td>USD 25 (for two years) or USD 100 (one time for Life Membership)</td>
<td>Interested individuals who do not qualify for membership types above. Associate members shall not have a voting right and shall not be eligible for the candidate of the Executive Committee. An Associate member may become Associate Life member with the payment of defined dues at a time.</td>
</tr>
<tr>
<td>Associate Life Membership from Nepal</td>
<td>NPR 5,000 (one time)</td>
<td>Interested individuals who do not qualify for membership types above. One-time membership fee of NRs. 5,000.00 (five thousand rupees) to become Associate Life Member.</td>
</tr>
<tr>
<td>Associate Student Membership from Nepal</td>
<td>NPR 1,000 (one time)</td>
<td>Undergraduate and graduate students in good standing in Nepal. One-time membership fee of NRs. 1,000.00 (one thousand rupees) to become Associate Student Member as long as they are a student in Nepal.</td>
</tr>
</tbody>
</table>

As of August 14, 2022, there were 314 good standing members (Page 28). NAPA is for and by members. Please join NAPA and request your friends and family to join too. We would like to request eligible and interested people to join the NAPA family and work together with other fellow members. You can access this link to join NAPA: https://napaamericas.org/join-napa.php.
The Research and Capacity Building Committee (RCBC), previously known as the Resource and Capacity Building Committee is dedicated to enhancing the capacity of its members and target beneficiaries by providing advisory and funding support for research projects, conducting educational and training sessions, and providing networking opportunities. The specific objectives of the committee are to: 1) Conduct Research Mini-grant (from the call for proposal to final reports/presentations), 2) Publish a comprehensive database of agricultural professionals involved in NAPA, 3) Organize subject matter roundtables for all disciplines to bring students and scientists of all phases together for meaningful interaction, networking, advice, and guidance, and 4) Organize training, workshops, and symposia for capacity building and professional development of its members (scientists, faculty, and students) in the Americas, Nepal, and beyond.

Research Mini-Grant (RMG) is one of the flagship programs of NAPA supporting students financially and by providing mentorship to undertake research. The RCBC committee has been administering this program for the last four years. The RCBC has successfully completed its two grant cycles supporting students and early career researchers through a total of 33 research projects initiated in 2017 and 2019. The RCBC worked closely with the research teams comprising the student researchers, local academic advisors, and NAPA advisors to boost the research skills of the students enabling them to excel in higher education professional careers.

Students who accomplished their research projects through the Mini-Grant award mentioned that the program helped enhance their skills and abilities in proposal writing, literature review, conducting research, data analysis, and research communications through presentations in scientific forums and report writing. The past awardee students felt confident to write proposals to submit to other agencies, and are encouraging juniors to tap the NAPA Mini-Grant research opportunity. Students have equally excelled in professional growth. They are dealing more confidentially with college administration, local bodies, NARC, and stakeholders for collaboration.

The awardee students felt inspired by the direct mentorship of NAPA and local advisors, which is an exceptional privilege, not available from any other funding agencies. Encouraged by the event, some students planned to continue their studies in Nepal but will seek advice from NAPA professionals. We have observed students were optimistic about disseminating their results to the stakeholders (e.g., farmers, cooperatives, and nurseries) and some of them already have published their study findings in peer-reviewed journals.

The RCBC also pools together advertised graduate study and research opportunities for the benefit of prospective students. The majority of our RMG awardees are also aware of additional resources, including webinar series and member-only events organized by NAPA.
Webinar Series-30: Perspectives on Nepal’s Agricultural Development Policy: Potential for Collaboration between NAPA, PRI, & other Institutions

The Webinar Committee (WC) hosted the 30th Webinar from Dr. Bishnu Raj Upreti, Executive Chairperson – Policy Research Institute (PRI), which is popularly known as a think tank of Government of Nepal, on July 31, 2022 (US Time). Here, this report presents the key highlights from Dr. Upreti’s presentation.

Overview of Nepalese agriculture

In recent decades, a general overview of the Nepalese agriculture sector shows import dependency for several major crops, including other agricultural commodities to meet the national food demand (Figure 1). This alarming issue, however, unfolded not long ago, as the country was in a net food surplus until the late 1980-early 1990s. The trend in trade deficit in agriculture continues to increase with an ever-widening gap between total import and export value year after year (Figure 2). For instance, rice alone worth ~50 billion Nepali Rupees was imported in the 2076-2077 B.S. fiscal year. Interestingly, FAOSTAT revealed imports of agricultural tools in the past few years have also increased substantially.

Figure 1: Imports of top agriculture products by Nepal.

Highlights on policy problems

Nepalese agriculture suffers at the system and/or policy level to a greater extent, despite conceived efforts on national development plans and policies. A major highlight related to agricultural policy failure at a system level is an intricate network of 36 policies on or related to agriculture, 11 institutions including ministries, and 33 laws in the country. Poor governance is another challenge, which happens to be even more concerning presently, despite the country’s shift into a 3-tier federalist political system with empowered local government units. Lack of effective linkage mechanisms among and within the governance system including policy sectors continues to be a challenge, despite an outlined constitutional principle of 3Cs: Coordination, Cooperation, and Coexistence across the 3-tiers of the governing system. This gap extends along among other related institutions, stakeholders, and research agencies. Furthermore, a non-functional linkage is widespread between education-research-extension and beneficiaries. Also, the distribution of government resources including funding and subsidies, access to credits, and the policy formulation process is crippled by the capture of elite groups.

Dissecting the policy failures

The interpretation and definition of ‘food’ in the Nepalese context, by and large, is linear and incomplete. A rice-based food system is a widespread falsely perceived food security sense among the common people, hindering food diversification and distribution. Other reasons include lack of need-based and applied research and failure of research in generating solutions, inefficient administrative logistics including political influences. The Nepalese food system has been subject to control by Indian interests, failing to compete with Indian products and poorly regulated cross-border agricultural trade and market. There are added policy challenges to meeting national food requirements relating to indigenous and exogenous factors, including global climate change, migration, political conflicts, and displacements.

Ineffectiveness underlying the past and existing agricultural policy was linked to 12 interrelated causes, identified by the PRI. The policy failures were associated with the policy-making process that lacked practices of informed and research-based actions, meaningful participation of key stakeholders, and poor functional coordination and operational relations between concerned agencies and ministries. There is a none or little involvement of public and political leadership in policy-making, resulting in poor public ownership and political commitments that are non-translated to policy forms. These underlying conditions have resulted in vague, unmeasurable, and sweeping policy statements with no clear targets and unrealistic timelines. More so, there are no complementary relations between policy and law-making, resulting in a lack of accountability provisions and strong commitment relating to policy implementation.
Poor governance systems can be associated with the poor realization in the exercise of constitutionally outlined power, with conflicts in rights on resources and power sharing. There is no internalization of the constitutional principle of 3Cs defining authoritative and operational relations among federal units. Also, the realization of the 3Cs principle is generally lingered by the vested interests among the concerned agencies, politicization of bureaucracy, bureaucratization of the agriculture sector, and existing overlapping and/or segregated structures.

Likewise, a problem of non-functional linkages is attributed to inappropriate policy provisions between key stakeholders and agencies in the agriculture sector; procedural and administrative barriers; poor understanding of the importance of agricultural research among administrative and planning authorities; and lack of a result-oriented evaluation and recognition system.

Elites’ capture of resources and policymaking stands as a barrier to agricultural progress at a grass-root level to general farmers and stakeholders. The smallholder farmers including women, the poor, and marginalized groups have not received institutional attention and priority resulting in limited access to production resources and policy benefits. Moreover, the cases of emerging pseudo-farmers and arbitrary elites in the agriculture sector have escalated the capture of resources, obstructing equitable and justifiable access to legitimate producers.

Potential solutions

The PRI-Public Policy guidelines on possible ways of addressing problems underscored key policy-level aspects, including the right policy formulation mechanism and structure; relevant and applicable policy content with measurable targets; and sincere implementation of policies with strong commitments on time. The PRI has developed an 11-sequential steps guide, recommended for the public policymaking process with details on structures, processes, and methodologies. Additionally, a model of public policy structure consisting of five parts and 29 components provides a framework structure guide in drafting public policy.

The issues related to weak governance need to be unfolded via measures like a realization of the 3Cs principle and other coordination mechanisms across the 3-tier government system; redefining institutional arrangements of ministries; and restructuring of bureaucracy driven by a performance-based contractual system. Furthermore, a robust system of transparency and accountability must be ensured among the authorities, implementing agencies, and stakeholders/beneficiaries. This aspect must be reinforced by the strong and meaningful participation of concerned key partners and others. Importantly, endorsing a fair practice with a reward and punishment system can be a crucial and effective step in addressing poor governance.

Likewise, inter-sectoral coordination, collaboration, and cooperation issues should be tackled with effective implementation of Constitutional provisions (outlined 3Cs principle) and manifesting coordination mechanisms envisioned in the Constitutional Acts. This should be backed up with clear outlines relating to coordination, monitoring, and evaluation mechanisms embedded in making steps of policies and laws. The functional mechanism of a public feedback system is another crucial tool for strengthening the 3Cs across government and other stakeholder agencies.
tional collaboration must be placed between existing key institutions involved in the field of research-education-extension, including private research and service-oriented sectors.

Government subsidies or other aids should be fairly disbursed on a basis of production outcomes, followed by monitoring and evaluation. Also, a public hearing and auditing system should be practiced effectively. Thus, the elites’ capture of resources and government support can be put to an end. Moreover, the authorities should monitor and blacklist any pseudo-farmers and falsified claims with provisions of fines.

Conservation efforts and programs towards agro-biodiversity, indigenous knowledge, research, and intellectual property rights are other key approaches to uplifting agriculture. Information on genetic resources and indigenous knowledge should be well-studied and documented at a local level of the government system. The sustainability and utilization of agro-biodiversity should be encouraged and supported by technology transfer and infrastructural development. Meanwhile, exogenous exploitation of the bio-genetic resources should be carried out with informed local communities, their consent, and participation ensuring the benefit sharing. Agrobiodiversity research and innovations, entrepreneurship, and industrialization should be encouraged with a national vision, program, and investments.

**Scope for NAPA’s engagement**

The pool of diverse expertise, qualifications, and global competency accomplished and demonstrated by the NAPA members worldwide is an invaluable asset and can be a highly rich skill-based intellectual resource bank for Nepal. This could be utilized for contributions towards improving Nepal’s agriculture sector through several components and/or roles like research, capacity enhancement, advising policy community, academic and research exchanges, joint venture events, resource generations, philanthropy services, and critical reflector among others.

(This report is prepared by Webinar Committee Members Dr. Rajan Shrestha and Ms. Sujata Bogati and edited by Drs. Pradeep Wagle, Ramjee Ghimire, Nityananda Khanal, Khusi Ram Tiwari, and Dilip Panthee. Dr. Shrestha is a Post-doctoral Research Associate at Texas A&M AgriLife Research and Ms. Bogati is a Ph.D. Student at Purdue University).
Current Nepalese agriculture and history

The economy of Nepal predominantly involves agricultural activities, employing nearly two-thirds [64%] of the economically active population from >70% of households, and contributing one-fourth of GDP. Even though agriculture is a key economic activity, environmentally friendly, economically viable, and socially acceptable agriculture has been the core issue to the present date. The overall food balance is slightly surplus at present, but still, a significant majority of households [60%] suffer from food deficit, not having self-sufficiency from their farm production. The current agricultural scenario is the genesis of the political, social, economic, and ecological impacts since the ancient historical timelines. Today, agriculture is still characterized by a traditional approach, largely featured by smallholders and/or marginalized farmers. The gross value additions by the agriculture sector in the country’s economic growth have seen little improvement over the years (Figure 1). This warrants a re-modeled approach guided by climate-resilient smart and sustainable agricultural practices.

Agriculture from the perspective of agro-ecosystem

Several agro-ecosystems are characterized by their own sets of agricultural products within distinguished agro-climatic geographic zones. For example, [1.] Terai accounts for 64% of total cultivable land and is considered as “breadbasket” or “granary” of Nepal and includes major crops such as rice, maize, wheat, mustard, sugarcane, jute, cotton, tobacco, and potato. [2.] Terai Siwalik Middle Mountain is a blooming agriculturally productive economic zone with 17% of cultivable land with rice, maize, millet, wheat, potato, mango, papaya, and banana as major crops. [3.] Middle Mountain contributes 43% of cultivable land and includes rice, maize, wheat, millet, mango, papaya, banana, orange, and lemon as major crops. [4.] High Mountain shares 13% of cultivable land with major crops such as maize, millet, potato, wheat, barley, rice, buckwheat, apple, walnut, chestnut, peach, apricot, and plum. [5.] High Himalaya contributes the least with 1% cultivable land share and is suitable for monsoon livestock grazing and a few crops; mainly potatoes and walnuts. Thus, from the agro-ecosystem perspective, Nepal is greatly rich in terms of crop diversity.

Figure 1. Trend in the economic and GDP growth rate of Nepal

Figure 2. Land-use distribution by different sectors in Nepal.

There are several resources to boost agriculture in Nepal. However, the important resource is land, and it is still underutilized. In a nutshell, agriculture is practiced in 21% of the land, expandable to an additional 7% of the land. While pastures and grasslands span over 12% of the land (Figure 2). Farmers have limited access to improved seeds, new technologies, farm credits, and market opportunities. Additionally, the bloom in non-agricultural sectors had led to a considerable decline in agricultural production and its share in the national GDP (Figure 3).
The key aspects of food security include availability, accessibility, and stability of affordable quality (nutritious) food. About 23% of Nepal’s population is undernourished, while roughly 40% of the population is deprived of daily minimum calorie intake. According to the UN reports, 39 of Nepal’s 77 districts are food-deficient, with serious constraints to food access, particularly in many mountain districts. The climate-induced instability in agricultural production is one of the main causes of food insecurity in Nepal.

Several problems are identified to affect the food security status of Nepal. The major problems are natural obstacles: fragile and sloppy hills and mountains are more prone to soil erosion; technical obstacles: irrigation, fertilizer, seed, tools, and implements; structural and institutional obstacles: landholding size, land fragmentation; administrative and bureaucratic obstacles: implementation problem; socio-cultural obstacles: a conservative outlook of the farmers; and economic obstacles: lack of labor force due to youth migration, inadequate credit, undeveloped agricultural markets, lack of basic transportation, price fluctuation, lack of processing plants and warehouses, and production risk and uncertainty.

**Transformation in agriculture through education, research, and extension**

Even though there are several above-mentioned problems, transformation in agriculture is possible through education, research, and extension.

**Agriculture and Forestry University (AFU) – Teaching, research, & extension perspectives**

The AFU is the first State-owned and the technical university of Nepal established following the Agriculture and Forestry University (AFU) Bill enacted by the Parliament in 2010. It bears a mandate of teaching, research, and extension in the field of agriculture and forestry. AFU envisions being a pre-eminent university for transforming Nepal into a food-secure, economically vibrant, environmentally sustainable, and socially equitable nation. AFU is committed to improving the quality of people’s lives through education, research, and extension in agriculture, including livestock, fisheries, and forestry. Several national and international projects with external funding have been completed and many are ongoing. Besides, many internally funded projects are laid out for short-term and long-term faculty research, students' research support, and internship programs. AFU has taken leadership in establishing Agriculture Science Centers with one of the objectives of conducting multi-location research in diverse agro-climatic conditions at several locations.

**Major extension activities by AFU**

Several extension activities are performed by AFU. AFU conducts IPM-FFS (Integrated Pest Management – Farmer’s Field School) training at Agriculture Science Centers and participates in farmers- and industrial fairs. The university has contributed as a technical source in various radio and television programs, including print media. The University system demonstrates and disseminates research findings in-house (like annual fairs) to the farmers and via other means. For instance, the Agriculture Science Center also conducts training on the latest agricultural innovations and dissemination of research findings via demonstrations, campaigns, and other activities. Furthermore, the AFU acts through camps on animal health, plant clinic, soil test, IPM, and Kisan (Farmers) Call Center. In addition, AFU is committed to publishing research findings via journals, policy briefs, annual reports, proceedings, technical papers, farmers' manuals, lab manuals, brochures, and pamphlets.

**Constraints and opportunities**

Several constraints that AFU is still dealing with include physical facilities, human resources, inadequate digitization, and a limited budget for research and development. While there could be several opportunities for AFU; a specialized technical university with a Land Grant model, such as networking, collaboration, and exchange program in the national and international arena, where NAPA can be one of the exemplary collaborating organizations.

(This report is prepared by Webinar Committee Members Dr. Rajan Shrestha and Ms. Sujata Bogati and edited by Drs. Pradeep Wagle, Ramjee Ghimire, Nitayananda Khanal, Khusi Ram Tiwari, and Dilip Panthee. Dr. Shrestha is a Post-doctoral Research Associate at Texas A&M AgriLife Research and Ms. Bogati is a Ph.D. Student at Purdue University).
Dear Sir/Madam:

The Endowment Fund Advisory Board (EFAB) of the Association of Nepalese Agricultural Professionals of Americas (NAPA) sincerely requests you to consider a donation to its Endowment Fund. Your donations to the endowment fund would help NAPA achieve its overarching goal, “Global Food Security through Agricultural Transformation.” NAPA is a non-profit, non-governmental, non-religious, and non-political professional organization dedicated to serving humanity through scientific research, teaching, outreach, and charitable initiatives in agricultural and allied disciplines. Since its inception in 2016, NAPA has implemented outstanding programs such as international scientific conferences, scholarships, research mini-grants, webinars, seminars and workshops, peer-reviewed Global Journal of Agriculture and Allied Sciences (GJAAS), a seminal book on food security, Research and Policy Briefs, and Agri-Connection – an online quarterly newsletter.

To facilitate and expand its endowment fund, originally initiated in 2017, envisioning the economic and programmatic sustainability of this emerging organization, the NAPA Executive Committee established an EFAB in January 2021. The EFAB envisions utilizing the endowment revenue to sponsor NAPA’s flagship programs, prioritizing donor-specified activities while allowing the principal to grow through its productive investment strategies.

You can contribute to this noble cause by establishing the fund in your name or your beloved one’s. As a contributor, you can also express your activity of interest to NAPA, consistent with NAPA’s mission and vision. It is an incredible opportunity for you to contribute to this cause through an upfront donation or any amount on a monthly or annual basis for any number of years, based on your interest and willingness. Donations to NAPA endowment funds are tax-deductible. Our Endowment Fund Donation Recognitions/Tiers are:

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The endowment fund’s beauty is that a sponsor may customize the donation as a single or multiple installment(s) over the years. The tiered recognition level may scale up anytime your support reaches the designated tier, as mentioned above. The EFAB assures you that every donation to this fund will be maintained, managed, and utilized transparently.

As a EFAB chair, I, Megha Parajulee would like to thank all generous donors and EFAB Board members for their exceptional solidarity in the past. Please support NAPA with your kind donations!

Thank you everyone!

Endowment Fund Advisory Board

Within a short period of time, the Endowment Fund Advisory Board has already received a pledge commitment of Over $108,000.
Association of Nepalese Agricultural Professionals of Americas (NAPA)

NAPA has published a book entitled:


Please save your copy today!

Contact NAPA if you need further information.
napa@napaamericas.org

“Prosperity through Agricultural Transformation”

Please find the information about NAPA conferences:


Please Mark Your Calendar

Association of Nepalese Agricultural Professionals of Americas (NAPA) presents

NAPA Webinar Series: 32
Transformative pathway towards food sovereignty, circular economy, and agroecosystems health

Nityananda Khanal, Ph.D.
Research Scientist
Agriculture and Agri-Food Canada, Alberta, Canada

USA Time: 
October 30, 2022 (Sunday)
8:00 PM CST

Nepal Time: 
October 31, 2022 (Monday)
6:45 AM

कार्तिक १४, २०७९ सोमवार 
लुम्बिनी: ६:४५ स.ब. 

Agri-Connection, Volume 7, Issue 2 & 3, September 2022
Dr. Sushil Paudyal, Assistant Professor at the Department of Animal Science in the College of Agriculture and Life Sciences, Texas A&M University, College Station, Texas, is an active life member of NAPA. He has been actively involved with NAPA and volunteered in numerous NAPA activities. Notably, he served as a conference secretary for the NAPA Third Biennial International Scientific Conference 2022. He was crucial in coordinating various planning activities leading to the conference (including various committee formations, abstract solicitation, abstract evaluations, and proceeding publication), and executing a successful hybrid meeting amidst the COVID-19 pandemic. He has served as a member of the judging team for NAPA student research competitions for the second and third Biennial Meetings. Previously serving as a mentor to a research mini-grant student in Nepal, he is now engaged as a member of the NAPA Research and Capacity Building Committee.

Dr. Paudyal earned his B.V.Sc. & A.H. from the Institute of Agriculture and Animal Science in Chitwan, Nepal; M.S. (Animal Health) from the West Texas A&M University in Canyon, Texas; and Ph.D. (Dairy Herd Health) from the Colorado State University in Fort Collins, Colorado. He joined Texas A&M University in 2019 as an instructional faculty and recently transitioned to Assistant Professor of Dairy Science. He has published over two dozen peer-reviewed journal articles in the areas of early detection of dairy cattle diseases using precision monitoring technologies.

Dr. Paudyal was the recipient of “2022 NACTA Educator Award” by the North American Colleges and Teachers of Agriculture and “2022 Innovative Teaching Award” by the Association of Public and Land Grant Universities. Congratulations, Dr. Paudyal. We appreciate your contribution to the organization!
# NAPA Committees

### Executive Committee (2020-2022)
- **President**
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- **Vice President**
  - Dr. Ramjee Ghimire
- **General Secretary**
  - Dr. Nityananda Khanal
- **Joint Secretary**
  - Dr. Sushil Thapa
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  - Dr. Aditya Khanal

### Nepal Liaison: Mr. Kiran Ojha

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- **Managing Editors**
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  - Dr. Pradeep Wagle
- **Editors**
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  - Dr. Krishna P. Paudel
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  - Dr. Shyam Kandel
  - Dr. Sushil Paudyal

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- **Chair**
  - Dr. Khusi Ram Tiwari
- **Members**
  - Dr. Dilip Panthee
  - Dr. Rajan Shrestha
  - Ms. Sujata Bogati

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*Agri-Connection, Volume 7, Issue 2 & 3, September 2022*
## NAPA Membership Update

### Member Category (merged) | Members
---|---
Life member | 157
Student member | 104
Associate member | 42
Regular member | 17

### Welcome New NAPA Members on Board!

#### Student members
- Mr. Bipin Bastakoti, University of Louisiana at Lafayette
- Ms. Parbati Thapa, Auburn University
- Mr. Purushottam Dhungana, Tennessee State University
- Mr. Raju Thada Magar, Michigan State University
- Ms. Rambika Thapa, Michigan State University
- Ms. Santosh Sanjel, University of Florida
- Ms. Suraj Gurung, University of Florida
- Mr. Uddhav Bhattarai, Tennessee Technological University

#### Associate life members (Nepal)
- Dr. Pramod Dhakal
- Ms. Jyoti Dhungana
- Ms. Pushpa Pandey
- Mr. Umanath Sharma

#### Associate life members
- Dr. Saroj Parajuli, Indiana

#### General/regular members
- Ms. Rojee Chipalu Pradhan, North Dakota
- Dr. Avay Risal, Texas

#### Associate life members
- Mr. Amrit Sharma, AFU, Nepal
Association of Nepalese Agricultural Professionals of Americas (NAPA)

Appeal to Join/Renew NAPA Membership

We would like to request potential members to join NAPA - a common professional platform for all of us. Meanwhile, we request all members who are not currently in good standing to renew their memberships. Members’ contributions thus far to bring NAPA to the current level is greatly appreciated. We request our dedicated members and well-wishers to promote NAPA to the next level by recruiting eligible friends/colleagues/students in your network. New NAPA members must write the recruiter's name in the “referred by” row in the membership form. The highest recruiter(s) will be recognized at our Biennial Scientific Conference.

A few reasons to join/renew NAPA membership:

NAPA is a member-driven voluntary organization. Members can benefit from the association to advance their career growth, develop organizational practices and leadership skills at all stages. Some of the membership benefits include:

- Peer-to-peer networking and research collaboration opportunities
- Professional development and advancement
- Serving on various committees
- Opportunity to publish scientific works in NAPA’s various outlets (Journal, Book, Research/Policy Brief, and Agri-Connection)
- Opportunity to sponsor scholarships and research mini-grants in preferred agricultural institutions and disciplines in Nepal through NAPA
- Eligibility for organizational awards, scholarships, and endowment funds
- Opportunity to share scientific works, experiences, and expertise via association’s Talk Sessions (Webinars) and Online Teaching/Learning Programs
- Joining global expert repository to contribute to Nepalese Agriculture and beyond
- Keeping up-to-date on association’s programs and activities
- Volunteering and charitable opportunities
- Discounted rates for registration and hotel reservation during scientific conferences organized by the association

The life membership fee is $200.00 ($300.00 for eligible couples). Please check for more details on Joining NAPA at http://napaamericas.org/join-napa.php and membership type and fees at http://napaamericas.org/membership.php. We look forward to welcoming you for a great cause. Please let us know if you have any questions and willingness to volunteer in various committees.

Thank you.

On behalf of NAPA Executive Committee,
Dr. Ramjee Ghimire
Vice President
Chair, Membership Drive Committee
Email: ramghi@gmail.com

Please join or renew your membership. Become a life member if possible!
Abraham Lincoln was born on February 12, 1809, in a log cabin in Hardin County, Kentucky. His parents were poor farmers and Abraham grew up in poverty. He was known as “Honest Abe” because he kept his word. He went to school and started a career as a lawyer. He married a woman named Mary Todd and had 4 sons. He was an Illinois senator for 4 terms from 1834 to 1842. He was in the House of Representatives for one term and also contributed in the foundation of the famous Republican Party in 1854. He had fiery debates about slavery extension in the US territories with Steven A Douglas in the famous 7 Lincoln-Douglas debates to get elected to the US Senate in 1858. Douglas won the Senate election; later both were running for president in 1860. This time, Lincoln won an important presidential election. Unfortunately, there was no time to celebrate because before he even took office, 7 states seceded to become the Confederate States of America (CSA). The Civil War started on April 16, 1861. States like South Carolina, Mississippi, Florida, Alabama, Georgia, Louisiana, Texas, Virginia, Arkansas, Tennes-see, and North Carolina joined the CSA on April 20, 1861. North Carolina was the last of the 11 states to join the CSA. Lincoln had an active part in the Civil War. Even though he was not fighting himself, he elected many generals to help win the war. In 1862, he issued the Emancipation Proclamation which freed slaves in Confederate-controlled territory. The proclamation also allowed black soldiers to fight in the war. The war was no longer about reunification, but about slavery. In 1863, after the bloody battle at Gettysburg, he delivered the famous Gettysburg Address for the fallen in the war. The Civil War officially ended on April 9, 1865. He drove the US during its hardest times and came out safely. But on April 15, 1865, a man named John Wilkes Booth shot Lincoln as he was watching a play in Ford’s Theater. He died the next day. He lived a good life and helped the US get out of hard times.

Reference:
- BrainPOP Abraham Lincoln
- BrainPOP Civil War
- Simplified Civil War Part 1
- Wikipedia Civil War (plus photo)

Dear NAPA members and AC readers,

Please inform and encourage your kids to contribute for KidsZone. Creations such as arts, drawings, and any forms of writings (short essay, poem, story, memories, etc.) related to agriculture and allied sciences are accepted. KidsZone also includes features on kids, animals, plants, life at school, and issues of particular interest to kids.

**Please include the following:**
- Name:
- School (optional):
- Grade:
- State/District:
- (And a photograph)

**Kids today, scientists tomorrow!**
“Conquer anger with non-anger. Conquer badness with goodness. Conquer meanness with generosity.”

- Gautam Buddha

Gautam Buddha (Birth name: Siddhartha Gautam) was born in 563 BC as a crown prince in the royal family of the ancient Kapilvastu kingdom of present-day Nepal. He was the first son of King Suddhodana and Queen Mayadevi. It is said that Siddhartha was born in an unusual way, as he left his mother’s womb after the birth, he took seven steps with a lotus flower coming out of the ground at every step. This astonished everyone. Asita, one of the top gurus, heard about this and went to the palace. He predicted, “If Siddhartha stays in the palace, he will be a great king. If not, he will be a great guru who many others will benefit from.” As Suddhodana didn’t want his son to be a guru, he kept Siddhartha in the palace. Unfortunately, Queen Maya passed away seven days after Siddhartha’s birth.

When Siddhartha was a kid, his father decided to get him wise and skilled teachers. But instead of them teaching Siddhartha, he taught the teachers! As years passed, King Suddhodana was scared that Siddhartha might not become a king. So, he decided to get Siddhartha married to Princess Yashodhara who was a princess of a neighboring kingdom.

After spending 29 years of his life in the royal palace with the family, Siddhartha was still curious about the world. So, he went outside with his horse, Kanthaka, and his charioteer, Channa. He saw people who were old, ill, and dead. He also saw a hermit, who looked very peaceful. He took the first three sightings as the sufferings of the world, and the last sighting as a way to stay calm.

Once his son Rahula was born, Siddhartha asked his father if he could go outdoors to meditate in a forest. With meditation, he gained calmness and realized that he was a hermit looking to end the problems of the world. After a few days, Siddhartha snuck out of the palace to travel to India. In India, he first met three wise men who taught him everything they knew. However, it didn’t answer his problem. He traveled further to Magadha, a province in India, where he met five wise men. They told Siddhartha that they barely ate and stood still for many hours a day to conquer the pain. They thought that if they conquered the pain, they would learn how to end all suffering. Siddhartha decided to join the group and follow the same practice. They were incredibly pleased with him and decided to look to him for guidance! After a long time, Siddhartha became so thin that he looked like a skeleton! He then realized, “To find the truth, one must follow the middle path which avoids both extreme pain and pleasure.” After not being able to sustain his hunger, he once ate a meal bought by a devotee to the forest. The five men saw him eat the meal and decided they could no longer follow him.

Siddhartha started to meditate alone beneath the “Tree of Enlightenment” until he found the cure for all suffering. He realized that greed and hatred are the reasons for suffering. Without these, we will have peace and joy. When he opened his eyes, his face lit up as Buddha, the enlightened one. He started teaching people his learnings. His teaching was called “Turning The Wheel of The Dharma”. Dharma is the reality he found out. He said, “There are Four Noble Truths. The Truth of suffering, the Truth of the cause of the suffering, the Truth of the end of suffering, and the Truth of the Path.”

One day, one of Buddha’s followers said that Buddha was the best teacher who will live forever. Buddha then asked him if he knew every teacher who lived in the past, present, and future. He replied no, so Buddha said that he couldn’t be the best since they didn’t know all the teachers from the past, present, and future. The best thing they could do is practice his teachings. He also said that his beliefs should be evaluated to prove if they were real. Buddha also said to never insult other religions because of their unique ways of teaching.

After a long time, Buddha decided to travel back to his family. News spread quickly of him coming back home. The happiest of them all was King Suddhodana. When Buddha arrived, he went to houses to beg for food instead of enjoying the royalty. This shocked the king. When he asked Buddha why he was doing this, Buddha decided to teach his father his teachings. After listening to Buddha, King Suddhodana knew Siddhartha was more than his son and therefore asked him if he could be one of his followers. Buddha said yes. Not only he, but many others from the palace became his followers.

Unfortunately, Gautam Buddha passed away at the age of 80 in Kushinagar, India in about 483 BC. Thankfully, he had many followers who taught the world about his teachings. Gautam Buddha is the founder of the religion Buddhism and today, there are about 535 million people that are Buddhists.
A diary of Fargo Air Museum, and North Dakota Heritage Center and State Museum Visit

We went to the Air Museum. First we saw a big rocket statue. Next we went in and saw a lot of planes. Then we went to the second room and looked around. We tried gadgets in planes and helicopters we bought nice toys and went home feeling happy.

Aarin Kandel, Grade: 2
Honey Island Elementary School, Slidell, Louisiana

In the winter of 2019, we visited North Dakota. We enjoyed playing with snow. We went to the Fargo Air Museum. There were many historic aircrafts in display. We were very excited to see a flag of Nepal among lots of flags of different countries.

Aavin Kandel, Grade: 2
Honey Island Elementary School, Slidell, Louisiana

Sushan Thapa
Grade: 4, Missouri
Presentations on Scientific Writing at Various Institutions

NAPA President Dr. Pradeep Wagle delivered a seminar on June 28 on “Scientific Writing and Publication” at the Institute of Agriculture and Animal Science (IAAS), Tribhuvan University at Kritipur Kathmandu. Around 40 graduate students, faculty, and IAAS leadership including Dean Dr. Bhargab Dhital and Assistant Deans Drs. Kishor C. Dahal and Hari Pant attended the program. Before the seminar, Dr. Wagle held a meeting with IAAS leadership to discuss collaboration opportunities between NAPA and IAAS.

Dr. Wagle delivered a seminar on July 12, 2022 on “Scientific Writing: Journey from Inception to Publication” at Agriculture and Forestry University, Rampur, Chitwan, Nepal. Around 40 early career faculty members attended the program. This event was organized by AFU’s Continuing Education Center (CEC) in collaboration with NAPA.

Dr. Wagle delivered a seminar on July 14, 2022 on “Scientific Publications: An Author’s, Reviewer’s, and Editor’s Perspective” at Nepal Agricultural Research Council (NARC), Khumaltar, Lalitpur, Nepal. 57 NARC Scientists and several virtual participants attended the program. This event was organized by the Society of Agricultural Scientists, Nepal (SAS-Nepal). After the seminar, Dr. Wagle had a meeting with NARC leadership and SAS-Nepal Executive Committee members to explore collaboration opportunities.

Radio Kantipur Interview

Dr. Wagle was interviewed by Radio Kantipur for their most watched “The Headliners” program. Here is the link for the interview: https://www.youtube.com/watch?v=1N8lyKxpRas

PRI Visit

Dr. Wagle held a collaborative meeting at the Policy Research Institute (PRI) with Chairperson Dr. Bishnu Raj Upreti, Head of the Research Department Dr. Hari Sharma Neupane, and Senior Research Fellow and Director Center for Economic and Infrastructure Development Dr. Kalpana Khanal. NAPA and PRI have agreed to collaborate in education, training, and research focusing on agricultural policy development and strengthening in Nepal.
Joint Secretary Dr. Thapa Delivers Talks in Nepal

Talk at NARC

While in Nepal, Dr. Sushil Thapa was invited by the Society of Agricultural Scientists, Nepal (SAS-Nepal) to share his work. Dr. Thapa presented his research findings to agricultural scientists at the Headquarters of Nepal Agricultural Research Council (NARC) in Kathmandu, Nepal on June 17, 2022. In the beginning, Dr. Ram P. Ghimire, President of SAS-Nepal, highlighted the vision and objectives of SAS-Nepal and the importance of such webinars to share knowledge and contribute to the growth of the agricultural sector in Nepal.

Subsequently, Dr. Thapa presented on how we can increase grain yield under limited water supply in dryland conditions. Dr. Thapa discussed the demand and availability of fresh water in agriculture and highlighted techniques for improving crop yields in the face of climatic abnormalities, such as drought. He argues that growing corn and sorghum in clumps and clusters improves microclimate, lowers the canopy temperature, and increases grain yield and harvest index under dryland conditions, and this idea can be translated to improve crop production, especially in Southern and Western Nepal.

The program was carried out on the hybrid model and a total of 75 participants including virtual participants from different agriculture sectors attended the program. Participants were attended by NARC research Centers, NARC planning division, Chief of the National Agriculture Research Centre (NAgRC), NPPRC and Senior Scientists, Scientists, and Technical officers, Retired Principle Scientists from NARC; Executive committee members from SAS-Nepal, and students from HICAST. The meeting was scheduled for 45 minutes, but lasted two hours, with the majority of the audience still waiting, asking questions, and listening to answers. "I have given several presentations at various national and international events, but none was as memorable as this one," says Dr. Thapa.

The program was moderated by Dr. Shova Shrestha, Soil Scientist at NARC, and experts' remarks were shared by Dr. Ananda K. Gautam, Retired Principal Scientist at NARC, and Dr. Yam K. Gaihre, Soil Scientist at International Fertilizer Development Center. The webinar was ended with a vote of thanks.

Dr. Shrestha, NARC, helped to prepare this report.

Talk at HICAST

At a special invitation from Himalayan College of Agricultural Sciences and Technology (HICAST) in Nepal, Dr. Sushil Thapa, physically presented his research findings on the occasion of HICAST Day (May 25, 2022). His presentation was focused on how to increase crop yields under drought and moisture stress conditions. Dr. Thapa highlighted the importance of canopy temperature and deep rooting systems in corn, winter wheat, and grain sorghum to maximize yield. He conveyed the message that grain yield and harvest index can be increased even under moisture stress conditions with best management practices such as manipulating plant geometry. "Over 820 million people today go to bed hungry each night and the global population is expected to increase by two billion in the next three decades," he says. Since most food-deficit people live in dry areas around the world including South Asia, Dr. Thapa emphasized the large-scale implementation of his research findings to improve food production. Faculty members and students from HICAST and other institutes attended the program. Dr. Thapa answered various questions asked by the audience. He also received a token of appreciation from HICAST.

Dr. Shova Shrestha, NARC, helped to prepare this report.
Gaia Theory that changed our perception and understanding of Planet Earth

When physicist James Lovelock introduced his thought-provoking ‘Gaia hypothesis’, in the early 1980s, the contemporary scientific community was not ready to accept it. The prevailing concept was that life on the Earth is surrounded by the static environment and it must adapt to it, but his hypothesis challenged this concept and postulated that the life (living system) interacts with its environment and eventually becomes its own environment; that the atmosphere is an extension of the biosphere in a comparable sense as the human mind is an extension of human DNA. The implication of the ‘Gaia hypothesis’ was that life (living system) interacts with and controls the physical attributes of the Earth on a global scale (Margulis and Dorion, 1997). From the evolutionary history of life, we have come to know that life originated nearly three billion years ago on the planet. Despite countless external perturbations from the solar system in the last several eons (an eon is approximately a billion years), the surface of the Earth remained hospitable to many kinds of life (diversified living system). The Gaian concept states that life makes and remakes its own environment to a great extent. By reacting and dynamically responding to global and cosmic crises (such as increasing radiation from the sun and extreme temperature fluctuation or the appearance of oxygen in the atmosphere), life (living system) ensures its own preservation such that crises are endured or negated by adaptation to or modification of the environment (Margulis and Dorion, 1997).

James Lovelock (the British physicist) has been credited for the transformation of our view of the Earth. He conceptualized the role of living systems in regulating the composition of the atmosphere and climate (Lenton, 2022). He collaborated with the evolutionary biologist Lynn Margulis and developed this hypothesis into “Gaia Theory”. Gaia provoked strong reactions from the scientific community because it was a stunning idea implying natural selection with a teleological design. Evolutionary biologists and others criticized the Gaia theory arguing that global regulation of the atmosphere required a conscious effort (consciousness) which natural selection could never produce. In response to the criticism, Lovelock invented the famous “Daisyworld” model that demonstrated how feedback (negative and positive) involving life (living system) could give rise to automatic climate regulation at a planetary scale (Lenton, 2022). This Daisyworld experiment not only sparked the environmental movement across the globe but also directed the study of Earth system science under the framework of a new shifting paradigm. He helped to establish a new field of Earth system science, inspired generations of researchers, and was duly recognized as the ‘Companion of Honor’ for his services to global environmental science in 2003 (Lenton, 2022). James Lovelock’s Gaia theory views the entire Earth as a living meta-organism and has become one of the building blocks of modern climate science. It considers Earth comprising atmosphere, oceans, biosphere, and the terrestrial system as a single living super-organism regulating its internal environment similar to an animal regulating its body temperature and chemical balance. Lovelock’s this super-organism today is sick from a fever born of the combination of a sun’s radiation heat and an unbearable atmospheric greenhouse gas generated by anthropogenic activities. Lovelock warned that it is getting late to prevent the global climate from
"flipping" into an entirely new equilibrium state which will make the planet uninhabitable with catastrophic and devastating consequences on humanity and the living system as a ‘Revenge of Gaia’ for Homo sapiens’ greed and self-destructive behavior (Lovelock, 2006). It is evident today how human-caused destruction and degradation of the planetary ecosystem (that generates life-sustaining environmental goods and services) has undermined the security and survival of all life forms including human beings. Humanity cannot survive by destroying its own niche environment, the planet Earth. Therefore, a call for ‘Earth First Paradigm’ to save humanity and the rest of the living community gives humanity a safe operating space on the planet (Upreti, 2022).

James Lovelock died on July 26, 2022, at the age of 103 years. As humanity is confronted today by the complexity, volatility, and unpredictability of the global warming-induced climate change and its catastrophic impacts on the human social system and the living system as a whole. Therefore, a revisit to the “Gaia Theory”, which has become even more pertinent today than ever before, would be a true tribute to him and the Gaia.

References


Dr. Prajulee Attends a Meeting in Nepal

NAPA’s Immediate Past President (IPP) Dr. Megha N. Parajulee was invited to attend Agriculture and Forestry University (AFU) Strategic Planning (2023-2032) meeting on August 1-2, 2022.

Dr. Parajulee delivered a plenary speech on AFU’s long-term goals to achieve its vision through a collaborative approach, research-based teaching programs, and integrated research-teaching-extension.

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1. Introduction
The question of food security arises almost instantly when one talks about major world issues, such as population growth, migration, and conflict. Food insecurity is certainly a global problem that needs a great deal of efforts and skills to address. The world population is expected to exceed nine billion by 2050. It is not easy to feed the growing world population by maintaining the present production levels since the resources are constantly diminishing. The Food and Agriculture Organization of the United Nations (FAO) has predicted the agricultural demand to increase by over 50% by 2050 AD (FAO, 2017; 2018).

Food security is a condition in which all people, at all times, have physical, social, and economic access to safe, sufficient, and nutritious food which meets their dietary requirements and also their food preferences for active and healthy living (FAO, 2018). FAO has set four pillars for food security, availability, accessibility, utilization, and stability of food. In absence of food security, the condition of food insecurity prevails which could lead to malnourishment (deficiencies, excesses, or imbalances in a person's intake of food and nutrients). Since food comes from the agricultural sector, we cannot imagine food security without the advancement of agriculture.

2. Challenges to food security
Global food security is threatened by multiple factors in recent years. Climate change, overpopulation, limited water resources, degradation of soil/land, food waste, loss of biodiversity, pests and disease outbreaks, insufficient distribution channels, and policy constraints are the major factors responsible for food insecurity. The intensity of impact from these factors varies from region to region.

2.1 Climate change
The rise in the concentration of CO₂ along with the rise in temperature impacts several crops. The magnitude and nature of damage depend on the local agroecological situation and management strategies (Thomson et al., 2010). The outbreak of plant diseases can greatly deplete the production, leading to great famines, such as the Irish Famine of the 1840s (triggered by late blight of potato) or the Bengal famine of the 1940s (triggered by the brown spot of rice). These could be the lessons for our age, faced with threats of climate change, however, armored with the best technologies.

The water and temperature stresses on animals can greatly reduce the yield. Other impediments to agricultural production include associated challenges like land loss and degradation (due to salt stress, flood, and landslide) and irrigation challenges due to hydrological and meteorological droughts. Climate change can severely curb the biological productivity of soil and disturb its ecological integrity. It degrades the diversity of soil biota, making the soil less fertile.

2.2 Rapid population growth and poverty
The swift increment in global population has elevated the pressure on available resources such as land and water. These have led to the over-exploitation of such resources. For instance, fragmentation of cultivable land for settlement purposes has affected food production. Rapid population growth enhances poverty, making people susceptible to hunger.

2.3 Miscellaneous
The overuse of synthetic pesticides and unsystematic agricultural practices has increased the incidence of pesticide resistance in insects/pests and occasional disease outbreaks. These have posed a great threat to agriculture production and food security. On the contrary, the use of old cultivars and redundant farming practices are also constraints of agriculture production.

3. Solution measures
The effects of climate change (high temperature, erratic precipitation, flooding, and drought) could be tackled with technological measures (crop improvement, development of new cultivars, improving cropping system, use of digital applications) as well as non-technological approaches (market and land management, change in food consumption pattern) (Howden et al., 2007). Crop yields can be increased by adopting suitable cultivars as per the environment.
and following the principles of integrated pest and disease management. Sustainable land management and intensification are necessary for greater production. The principles of conservation agriculture and community-based adaptation are useful in the long run (Olsson et al., 2019). Conservation of soil resources (through conservation tillage, cover cropping, crop rotation, intercropping, and mixed cropping) is necessary for sustainable agriculture. Since climate change will continue affecting agricultural production, measures must be taken to minimize the impacts and maintain food production. In addition, issues of rapid population growth and poverty should be addressed sooner by the concerned authorities.

3.1 Soil and water management
Capturing and storing rainwater and avoiding excess evaporation from soil surface could minimize the effect of agricultural drought. Better weather forecasting and advanced hydrological modeling could be used to predict the soil moisture content and select the crop cultivar with maximum water use efficiency (Ravazzani et al., 2017). Smartphone apps, at present, can provide real-time data on crop fields such as soil moisture (using sensors) and advising farmers to irrigate their fields on time. These technologies have paved the path to precision agriculture (Migliaccio et al., 2015).

Remote sensing is assisting several agricultural operations like the controlled release of fertilizers, pest and weed management, soil amendment, weather forecasting, and crop variety recommendation. This technology will play a key role in modern agriculture by reducing yield gaps (Hochman et al., 2013). Satellite imaging and digital mapping are also widely used in recent times and have shown promising results in advancing agriculture.

3.2 Conservation of genetic resources and application of biotechnology
Conservation of genetic resources is essential since farmers, breeders, and researchers rely on these to improve the quality and quantity of food production. Any loss of genetic diversity is a threat to the general well-being of the entire world. Preservation of the genetic diversity of seeds, cultivated plants, domesticated animals, and their wild relatives is necessary for biotechnological intervention. Selective breeding, the use of hybrid seeds, and genetic modifications have shown some positive results. The need of chemical herbicides, pesticides, and antimicrobials has also been reduced as the newly developed crops are more tolerant to biotic and abiotic stresses.

Recent advancements in genome editing have made breeding more powerful. Now, it has become possible to improve the yield attributing characters of crops by altering the endogenous genes rapidly. CRISPR-Cas gene-editing tool has been used extensively with successful results in many crops like rice, wheat, maize, banana, cassava, etc. (Zaidi et al., 2019). The genome editing technologies will be beneficial in developing disease and pest resistance as well as salt and temperature-tolerant cultivars, which are necessary for combating climatic stresses.

Ambitious projects like the development of a highly efficient C4 pathway for photosynthesis (in C3 plants like rice and wheat) are some of the glimpses of future possibilities with biotechnology. Similarly, the biofortification of crops could be efficient in maintaining nutritional security.

3.3 Climate-smart agriculture
Climate-smart Agriculture aims to achieve increased productivity with enhanced resilience and reduced greenhouse emissions. Climate-resilient food systems are also showing promising results in some parts of the world (Mbow et al., 2014). One example of it is the direct seeding practice in rice i.e. DSR, which involves the direct sowing of seeds on dry or wet fields, without the necessity of nursery raising (which demands greater water supply.) Adoption of suitable cultivars, optimization of land management practices, and sustainable intensification could help in reducing the yield gaps. Management of rainwater (rainwater harvesting) and increasing water use efficiency is necessary to maintain stable production (Shukla et al., 2019). Maintaining the ecosystem is equally important along with implementing resilient agricultural productivity to safeguard the environment’s sustainability.

3.4 Miscellaneous
The diet of people can be adjusted with new sustainable sources of non-animal protein to increase food security. Algal biomass and other sea-borne products are currently under test to develop a viable substitute for animal-based protein (Henchion et al., 2017). In some parts of the world, even insects are used as a source of food and feed protein (van Huis & Oonincx, 2017). Preservation, modification, and promotion of indigenous technical knowledge i.e. traditional knowledge could be effective in uplifting food production.
Smallholder farmers are the most vulnerable to climate change since their livelihood depends primarily on agriculture. Efforts should be directed to protect them from the impacts of climate change through early warning systems and appropriate subsidies. Proper market management and policy reforms (economic, political, and agricultural policies) at the local and global levels are necessary for achieving food security. Care must be taken in the transportation, storage, trade, and processing of food to reduce food loss and wastage.

**Conclusion**

Ending global hunger, achieving food security, and improving nutrition is not an overnight project. However, it is plausible in the long run if valiant efforts are made by the concerned parties. Achieving nutritional and food security requires interdisciplinary as well as trans-disciplinary approaches. Agricultural science, food science, economics, and other social sciences should cooperate with new disciplines such as data science, and nanotechnology. Right technological intervention in farming practices could ensure food for all and achieve a hunger-free world. It is the right of every citizen to live a healthy, decent, and prosperous life with an abundant supply of nutritious food. Hopefully, the recent advancements in agriculture would be the centerpiece in actualizing these ambitions.

**References**


This is a concise version of the essay that won the First Place Award in the Student Writing Contest organized by NAPA during the Third Biennial International Scientific Conference, 2022.

**Congratulations Amrit Sharma!**
Association of Nepalese Agricultural Professionals of Americas (NAPA)

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अबको उन्नत कृषिको....

सरलीकृत अध्यायाहरू निर्देशित, कृषिमा उत्पादन सामग्रीमा निर्माण, र आधुनिक वृद्धिमध्ये कृषिले आधुनिकीकरणालाई उद्देश्य गर्न सफल भए।

सरलीकृत हक्टिकोण अनुसार हरेक समस्यामा तालाबकारी समाधान खोजियो। रासायनिक विश्लेषणको प्रयोग, बालीनलाई रोग, कीरा र झाँर नियोजितकरण, दुई नयन्त्रको प्रयोग, बृहत् कृषि क्षेतरमा सहजता, रासायनिक मलको प्रयोग, बालीनलाई रोग, समाधान ताउम्य दुई नहार तथा जनरालिको पानीबाट संविध परिवर्तन गरी सधन एकलाली प्राणीलोकी विवाह गरियो। यसैले आधुनिक खेती प्रणालीमा खेती तथा पशुपालनलाई अलगलग र हरेक बालीनलाई अलगलग व्यवसायको रुपमा अलग उत्पादन भावकारिता बढाउने उपयोग अवलंबन गरियो।

तर त्यस्तो साधनीकरण प्राणीलोकी माटो, वनस्पति, जनावर, जूडीजीव, जलवायु र बालीन गतिविधिको अन्तरक्रियात्मक उद्गम (emergent property) बारे जानकारी र खाना भनेर सक्नन। माटो लक्ष्यको र पछिहुने गर्न, रोग, कीरा, झाँर र बालीनलाई र विस्तेक्षण भनिलु स्त्रोतको प्रकषण क्षमता विकास हुन्छ। यसले जान्नुको साना उद्योगहरूको स्थापना गरिन। सिचाङ्को माध्यममा माटोमा नृनिःशुल्क र ग्रहण हटिने तत्त्वों निश्चित हुन्छ, छैन तथा कृषि दलित र रासायनिक मल्याबाट नदीमाला, जलसंयोग र वायुमल्य प्रदूषण हुन्छ, ग्रामीण बालीनको निर्माण र बालीनको उन्नत मध्यमको प्रदूषण हुन्छ जान भए। एकल सामाजिक गतिविधि बाँधे र समाजमा हरूलाई सहजता, रासायनिक प्राप्तता गरिन।

सघन रसायनकुक्त, सरलीकृत यानिक उपक्रमबाट श्रमसघन र अनुसारको उत्पादन श्रोतसाधन संरक्षणमा प्रभाव र ब्यापारी संरक्षणमा रुपान्तरण गरिन। यसैले आधुनिक बालीनलाई स्थानीय जैविक उपयोगी उत्पादन लाई विकास गर्न सक्नन। गनण्डै कृषि उत्पादन बढाउन पयाषिरणीय कृषि प्रणालीको दुरप्रभाव दुर्घटना गरेको रुपमा आधुनिकीकरण र विवाह गरेको हुने।

हाम्रो परम्परागत कृषि प्रणालीमा पर्यावरणीय कृषिको सबैभन्दा अधिकांश अलगलग स्थानीय प्रणालीमा प्रयोग गरिन। त्यसैले बालीनलाई रोग, झाँरहरू भनेर सुचालन गर्न सक्नन। कृषि प्रणालीको उपजाति उद्घाटन गरेको हुनु अवश्यक हो। स्थानीय मालकहरू जनरालिको पानीबाट संविध गर्न सक्नन। कृषि प्रणालीमा साना मालकहरूको सहभागी बन्न सक्नन। यसैले उनको सरस्वेत उन्नत मा ध्वनि गर्न सक्नन।
अबको उत्पतै कृषिको....

• **स्थान-विशेष जैविक-यान्त्रिक संचरना (Spatial bioengineering):** भौगोलिक परिवेश सुहाउँदै भू-उपयोग, धारात्मक स्पाइन्च र बृक्षशास्त्र परिवारहरूले जैविक विधित्ता व्यवस्थापन र सुसम-जलवायु युक्त (micro-climatic) लाभाधिक परिवेश सिद्धान्त गर्न सकिन्छ।

• **वाली-प्रजाती विविधकरण (Species diversification):** स्थान-विशेष जैविक-यान्त्रिक संचरना अन्तर्गत सुहाउँदै र त्यसैको एकीकृत हिस्साको रूपमा धारात्मक वाली-प्रजाती र जातहरू बढाउँछ र चाहिए धुमित्तत्त्व विधि अनुसार लगाउनले आयुर्मर्थितिकरण र पर्यावरणीय संरचना बदाउँछ र जीवन-विरोधी विज्ञान न्यूनकरण गर्न महत्त्व पुढौँछ।

• **बीच स्वाधीनता र सम्बन्ध (Seed sovereignty & enhancement):** स्थानीय बीच स्वाधीनता र सम्बन्धले कृषि प्रणालीमा सुहाउँदै जैविक विविधता विकास, त्यसको बाली प्रजननमा उत्पादन, गुणस्तरीय उत्पादन र उड़िनी स्थायित्व वृद्धि गर्नुहुन्छ।

• **मौसम सुहाउँदै बाली व्यवस्थापन र सिंचाई (Seasonal adaptation through agronomic measures & irrigation):** मौसमको प्रकृति अनुसार बाली व्यवस्थापनका विधिहरू अपनाउँछ र पानीको संरचना तथा उत्पादन सिंचाई विधिहरू उत्पादन परिवेशलाई लाभाधिक बनाउँछ र सकिन्छ।

• **माटोको स्वस्थतामा अभिवृद्धि (Soil health enhancement):** स्थानीय स्तरमा रोपल्दै परिवक्रम (nutrient recycling) प्रविधधि र भौगोलिक परिवेश सुहाउँदै भू-उपयोग विधि अपनाउँछ माटो र जलसंरचनाको हुँदै माटोको स्वस्थता र बाली उत्पादनमा अभिवृद्धि हुँदै हुन।

• **तनावी कारक-तत्त्वहरूको व्यवस्थापन (Stressors management):** माथि उल्लेखित विषाको एकीकृत प्रयोगले बाली सुहाउँदै सूक्ष्म-परिवेश पदा पुढौँछ, जसले चरम मौसमी प्रभावलाई तत्त्व बनाउँदै मध्ये बनाउँछ राख्नु सहयोगको श्रद्धाको र वातावरणीय प्रजननको जीव-जन्तुहरूलाई प्रकृति निर्भर नम्बलाई यस्तै उत्पादन खरे घटनुको साथै बाली उत्पादनमा वृद्धि हुँदै हुन।

• **प्रणालीमा अन्तर्रेखा (Systems integration):** कृषि-वन, वाली-प्राप्तिक, स्थानीय कृषि-प्रयोग, बैक्टरियल उर्जामा आधारित अन्तर्रेखा, कृषि-पर्यावरण र स्थानीय बजार संजाल-व्यवस्था पारस्परिक लाभको उत्पादन र व्यवस्थापनका धुमीलाई विभिन्न रुपमा समुदायिक संयोगले उपादन, मूल्य-अभिवृद्धि र आयुर्मपरिवर्तन र प्रणाली विविधकरणमा महत्त्व पुढौँछ।

• **आयुर्म-सामाजिक यौनिकीकरण (Socioeconomic rationalization):** प्रावस-रोजगारी र भेदिकारिक जस्तै विद्यमान जनसंख्यालाई प्रतिष्ठित कृषिमूलक व्यवसायको आधार दिलाउन एकीकृत कृषि प्रणाली अपनाउँदै उद्योगको अन्तर्रेखा एकलकलित भूविविधता र बैक्टरियलको कृषिमूलक रूपमा प्राप्तिक अनुभव र प्रकृति व्यवस्थाको सन्दर्भमा सहयोगको व्यवस्था हुन पर्दछ। अनुपातमा "सरकारी पैसा सामाजिक-पर्यावरणीय लाभ" को नीति अपनाउँदै पुढौँछ। स्थानीय निकाय देखि केन्द्र उन्मुख (bottom-up) नीति-निर्माण र जोनल प्रणाली अपनाउँदै पुढौँछ।

• **वातावरणिक र व्यवहारिक विविधता हुनुः**

जान, विज्ञान र प्रतिभा गतिशील विषयहरू दुई विकासक्रम समेत थिनीहरूको गहनतामा अभिवृद्धि तथा परिवर्तनको लागि जान्छ। वातावरण न्युनतावादी (reductionist) आधुनिक विज्ञान प्रणाली र समग्रतामूली (holistic) पर्यावरणको पूर्ण जान प्रणाली एकाएकसमान परिपूर्ण हुन सक्छ। त्यसको दुई लिनको जान प्रणालीहरूको संयोग गरी शिक्षा तथा व्यवहारिक प्रणालीको विकास गरीले सामग्री जीवनजगत पर्यावरणमैत्री र समृद्ध बन्न सक्छ।

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राष्ट्रिय कृषि जैविक विविधता वर्ष २०७९ : किन र के गर्न

डा. बालकृष्ण जोशी
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1. परिचय
कृषि जैविक विविधता दिगो कृषि, स्वस्थ पर्यावरण र सार्वजनिक वैश्विक वाणिज्य योजनाहरूको मुद्दा आधार हो।
हाल अन्तरराष्ट्रिय नीति नियमले गदा र जैविक विविधतामा आएको हालांकि आफ्नो विभिन्न जीवित सम्पर्क धारा र जैविक विविधताको संरक्षण र उपयोगमा बख्त दिनु पर्ने भएको छ। राष्ट्रिय तथा अन्तरराष्ट्रिय स्तरमा विभिन्न वर्षहरूलाई विभिन्न प्रसंगको रुपमा घोषणा गरी विविधताको संरक्षण र कार्यक्रमहरूलाई पहलु हुदै आएको छ (तालिका १)। नेपालमा राष्ट्रीय कृषि जैविक विविधता (बाली, धासे बाली, पशुपन्छी, जलीय कृषि आनुवंशिक सोतह) र धुस्क जीवाणू (हाँ ४०% लोप भएको र बाँकी विविधता पनि तिब्र गतिमा लोपन्मुख हुदै गएको छ। जैविक विविधताको महत्त्व सबै ठाउँहरूमा र सबै लोक र जनताको उपेक्षा बुझाउदै तयनीहरूको संरक्षण र टदगो उपयोगमा बबशेि जोड टदनु पने देखखन्छ। जैविक विविधताको संरक्षण कार्यमा कृषि जैविक विविधता छायाँमा परेको र राष्ट्रीय तथा स्थानीय कृषि आनुवंशिक सोतहको अनुसंधान, शिक्षा र विकासमा अति न्यून पहलु भएको छ। तसथै कृषि जैविक विविधताको संरक्षण र उपयोगमा बबशेि सामरेक योजना र कार्यक्रम तय गर्न वाज्ञानीय देखिएको छ। यसै परिवेशमा राष्ट्रीय जिन बैंकको पहला कृषि जैविक विविधता प्राधिक सनातनहरूको उपसमिति (ATA-SC) राष्ट्रीय कृषि जैविक विविधताको संरक्षण समिति (NABCC) मा कार्ययोजना पेश गरी २०७९ वर्षको राष्ट्रीय कृषि जैविक विविधता वर्षको रुपमा घोषणा गरी निर्णय भएको छ। उक्त निर्णयलाई राष्ट्रीय कृषि अनुसन्धान तथा विकास देखि बनाउने वर्ष २०७९/८० ओि बजेत वर्तमान पानि उलेख भएको छ।

तालिका १. अन्तरराष्ट्रिय र राष्ट्रिय विविधताको संरक्षण र उपयोग र राष्ट्रीय जैविक विविधता छायाँमा परेको र राष्ट्रीय जैविक विविधता छायाँमा परेको र राष्ट्रीय जैविक विविधता छायाँमा परेको र राष्ट्रीय जैविक विविधता छायाँमा परेको र राष्ट्रीय जैविक विविधता छायाँमा परेको र राष्ट्रीय जैविक विविधता छायाँमा परेको र राष्ट्रीय जैविक विविधता छायाँमा परेको र राष्ट्रीय जैविक विविधता छायाँमा परेको र राष्ट्रीय जैविक विविधता छायाँमा परेको र राष्ट्रीय जैविक विविधता छायाँमा परेको र राष्ट्रीय जैविक विविधता छायाँमा परेको ।

International days, weeks, years, and decades

- 2022: International Year of Artisanal Fisheries and Aquaculture
- 2023: International Year of Millets
- 2011–2020: United Nations Decade on Biodiversity
- 2016-2025: UN Decade of Action on Nutrition
- 2021–2030: United Nations Decade on Ecosystem Restoration
- 10 Feb: World Pulses Day
- 20 May: World Bee Day
- 21 May: International Tea Day
- 22 May: International Day for Biological Diversity
- 5 June: World Environment Day
- 7 June: World Food Safety Day
- 17 June: World Day to Combat Desertification and Drought
- 28 July: World Nature Conservation Day
- 7 Oct: World Cotton Day
- 16 Oct: World Food Day
- 9 Nov: International Week of Science and Peace
- 5 Dec: World Soil Day

राष्ट्रिय तहको विविधता दिन, सप्ताह

- १५ वैशाख: राष्ट्रिय वन्यजन्तु सप्ताह
- २५ वैशाख: नेपाल कृषि अनुसन्धान परिषद वार्षिकोत्सव
- १५ असार: राष्ट्रिय धान दिवस
- ७ असार: राष्ट्रिय संरक्षण दिवस
- २९ असार: जिन बैंक तथा कृषि जैविक विविधता दिवस
- २९ चैत: वनस्पति विभाग वार्षिकोत्सव, वनस्पति दिवस र राष्ट्रिय वनस्पति पुरस्कार
3.1 National & International Efforts

- Various national and international efforts have been undertaken to promote biodiversity conservation and protect agrobiodiversity.
- The National Biodiversity Strategy and Action Plan (NBSAP) was adopted in 2004, and the National Strategy for Agrobiodiversity Management (NSAM) was launched in 2009.
- The Global Plan of Action on Biodiversity (GPA) was endorsed in 2010, and the CBD Strategic Plan for Biodiversity 2011-2020 was adopted in 2010.
- The United Nations Decade of Family Farming (2014-2017) and the International Year of Pulses (2016) were also initiatives that contributed to biodiversity conservation.

3.2 Biodiversity Management in Agriculture

- The Department of Agriculture has implemented various programs to promote biodiversity conservation, including the National Seed Bank Program and the National Biodiversity Information System.
- The Department of Forestry has also initiated programs to protect forest biodiversity, including the National Forest Biodiversity Study.
- The Ministry of Agriculture has established the National Agrobiodiversity Conservation Program to promote biodiversity conservation in agriculture.

3.3 Biodiversity Education and Awareness

- Various educational programs have been launched to raise awareness about biodiversity conservation among farmers, students, and the general public.
- The Department of Environment has initiated programs to promote biodiversity education in schools and universities.
- The Ministry of Education has included biodiversity education in the national curriculum to raise awareness among students.

3.4 Policy and Legislation

- The Government has enacted various laws and policies to protect biodiversity, including the Forest Act, the Wildlife Conservation Act, and the Biodiversity Conservation Act.
- The Department of Agriculture has also developed guidelines and standards for biodiversity conservation in agriculture.
- The Department of Environment has also established regulations for biodiversity conservation in forests and other natural habitats.

3.5 Community Involvement

- Communities have been involved in biodiversity conservation through various participatory programs.
- Local communities have been empowered to manage and protect biodiversity in their local areas.
- The Department of Agriculture has also initiated programs to involve communities in biodiversity conservation through community-based organizations.

3.6 International Collaboration

- The Government has strengthened its international collaborations to promote biodiversity conservation.
- The Department of Agriculture has established partnerships with international organizations to support biodiversity conservation initiatives.
- The Ministry of Agriculture has also participated in various international forums and conferences to share best practices in biodiversity conservation.

3.7 Biodiversity Monitoring and Assessment

- Various monitoring and assessment programs have been initiated to track biodiversity conservation efforts and monitor biodiversity levels.
- The Department of Environment has established a national biodiversity monitoring program to assess biodiversity levels and track changes over time.
- The Ministry of Agriculture has also established a national agrobiodiversity monitoring program to track changes in agrobiodiversity levels.

3.8 Biodiversity Impacts of Climate Change

- The Government has recognized the impacts of climate change on biodiversity and has initiated programs to address these impacts.
- The Department of Environment has established a national program to address the impacts of climate change on biodiversity.
- The Ministry of Agriculture has also initiated programs to promote climate-smart agriculture practices to mitigate the impacts of climate change on biodiversity.

3.9 Biodiversity and Food Security

- The Government has recognized the importance of biodiversity for food security and has initiated programs to promote biodiversity conservation to support food security.
- The Department of Environment has established a national program to promote biodiversity conservation to support food security.
- The Ministry of Agriculture has also initiated programs to promote biodiversity conservation to support food security.

3.10 Biodiversity and Biodiversity Conservation

- The Government has recognized the importance of biodiversity conservation for biodiversity.
- The Department of Environment has established a national program to promote biodiversity conservation for biodiversity.
- The Ministry of Agriculture has also initiated programs to promote biodiversity conservation for biodiversity.

3.11 Biodiversity and Biodiversity Conservation

- The Government has recognized the importance of biodiversity conservation for biodiversity.
- The Department of Environment has established a national program to promote biodiversity conservation for biodiversity.
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3.12 Biodiversity and Biodiversity Conservation

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- The Ministry of Agriculture has also initiated programs to promote biodiversity conservation for biodiversity.

3.13 Biodiversity and Biodiversity Conservation

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- The Ministry of Agriculture has also initiated programs to promote biodiversity conservation for biodiversity.

3.14 Biodiversity and Biodiversity Conservation

- The Government has recognized the importance of biodiversity conservation for biodiversity.
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- The Ministry of Agriculture has also initiated programs to promote biodiversity conservation for biodiversity.

3.15 Biodiversity and Biodiversity Conservation

- The Government has recognized the importance of biodiversity conservation for biodiversity.
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- The Ministry of Agriculture has also initiated programs to promote biodiversity conservation for biodiversity.

3.16 Biodiversity and Biodiversity Conservation

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- The Ministry of Agriculture has also initiated programs to promote biodiversity conservation for biodiversity.

3.17 Biodiversity and Biodiversity Conservation

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- The Ministry of Agriculture has also initiated programs to promote biodiversity conservation for biodiversity.

3.18 Biodiversity and Biodiversity Conservation

- The Government has recognized the importance of biodiversity conservation for biodiversity.
- The Department of Environment has established a national program to promote biodiversity conservation for biodiversity.
- The Ministry of Agriculture has also initiated programs to promote biodiversity conservation for biodiversity.
आनुवंशिक सोत दिवसको रूपमा लिने। घरेलु कृषिजन्य बीजहरू बाहेक अन्य घरेलु पायपक्षी, माछा, कृषि कीरा, गोैँतेको तथा कृषि सूक्ष्म जीवाणुको धार्मिक स्थलहरू र अन्य सार्वजनिक स्थलहरूमा छन्ने र छाड्ने, र कृषि वंशावाण्य आर्थिक स्थल स्थापना गरन।

• सुन्तिािाई राष्ट्रिय फिको रुपमा घोणा गरन।

3.2 प्रचार प्रसार तथा अभिलेखीकरण कार्यहरू

• विभिन्न संचार माध्यमहरूले, कृषि जैविक विविधता संरक्षण एवं उपयोगका विविध पक्षहरूमा निर्मुख अन्तरराष्ट्रीय गर्न।

• Public Service Announcement (PSA) जिन्गल, टिकटक, आदि बनाउने।

• सामाजिक संजाि स्रोतहरूको संचार गरन।

• स्कूँ-हाजी जवाफ, विचलका प्रतियोगिता संचार गरन।

• सांस्कृतिक कार्यक्रम, दोहोरी प्रतियोगिता, सडक नारक जस्ता कार्यक्रमहरू गर्न।

• जैविक विविधता सदभावना दुर्ल घरन र परिचालन गर्न।

• राष्ट्रिय, प्रादेशिक र राष्ट्रिय संचार माध्यममा आम सन्यासका अन्य माध्यमको उपयोग गरी वर्षभर रेखासँग जारी राष्ट्रिय र अन्य कृषि जैविक विविधता संरक्षणको महत्त्वपूर्ण व हात्त्वयथरता र पाठ्य सामाजी प्रसारण एवं प्रकाशन गर्न।

• सार्वजनिक संचार माध्यमहरू बाट नियमित रूपमा कृषि जैविक विविधता सम्बन्धी सामाजी प्रकाशन तथा प्रसारण गर्नको लागि चिन्ता विविध र आवश्यक सहजीकरण गर्न।

• रेखासँग राष्ट्रिय आनुवंशिक सोतहरू परम्परागत जान र परिकारहरूको प्रचार प्रसार, संरक्षण, सम्बन्धन, प्रबंधन, बजारीकरण एवं अभिलेखीकरण गर्न।

• जजन बैंकले आगादि सारेको ५० वटा कृषि जैविक विविधताको संरक्षण र उपयोग सम्बन्धी कार्य तथा असल अभ्यासहरूलाई प्रकाशन गरी प्रचार प्रसार गर्न।
### राष्ट्रिय कृषि जैविक....

- सुरक्षित संचय संरचना (Svalbard Seed Vault) मा बिउहुर संरक्षण गर्न।
- कृषि जैविक विविधता मेलाहुर संचालन गर्न।
- रेखाने विभिन्न कृषि उपजहरू लाई भौगोलिक संकेत चिन्ह प्रदान गर्न।
- सम्बन्धित निकायहुर बाट लोपनमुख रेखाने जातहुर राष्ट्रिय जिज बैंकमा पठाउने व्यवस्था गर्न।
- सामुदायिक जिज बैंक, सामुदायिक बीउ बैंक, सामुदायिक फिल्ड जिजबैंक र सामुदायिक जलीय कुण्ड जिज बैंकहुर, घरायसी जिज बैंकहुर, कीरा फिल्ड जिज बैंक आदिको स्थापना तथा प्रबन्धनको साथै पुरानो सार्वजनिक बेटिया जस्तै आफ्नो बेटियालाई पुनर्गतित गरी संरक्षण र दिगो उपयोग गर्न र संचालनमा सहयोग गर्न।
- त्यस्तै पशुप्रकींची फाँम जिज बैंक, आलु पाक, खुपु पाक, कृषि वेषणु आर्थिक स्थल, कीराफिल्ड जिज बैंक, ख्यात पाक आदिको स्थापना गर्न।
- शैक्षणिक संस्थाह (स्कूल र कलेज) मा फिल्ड जिज बैंक, जलीय कुण्ड जिज बैंक र कीरा फिल्ड जिज बैंकहुर स्थापना गर्न।
- सुन्दरता माफङ्क्षन रैथाने फूलहुर संस्कृत र उपयोग गर्न साथै जिजडबुदी संरक्षण उद्यान स्थापना गर्न।
- फलफुल, पूल तथा जिजडबुदी संरक्षण उद्यान स्थापना तथा पुनर्गतित गर्न।
- कृषि कार्यलय, कृषि फाँम, अनुसन्धान क्षेत्र र शैक्षिक क्षेत्र कीरा, शुक्ल जीवाणु र चालौ मैरी बनाउन पहिल।

### ३.४ मूलय अंकला विकास एवं प्रबन्धनात्मक कार्यहुर
- स्थानीय परिकारहुरूलाई होमस्टे र बजार संग समन्वय गरी प्रबन्धन गर्न, स्थानीय खाद्य मेला गर्न।
- ठाउँ विशेष जात तथा परिकारको कार्यलाई विशेष जोड दिने।
- विधायलको दिवा खाजा कार्यक्रममा रेखाने खाना एवं परिकार समावेश गर्न।

- खाद्य मेला तथा खाद्य परिकार कार्यक्रममा संचालन गर्न।
- रेखाने जातका कृषि उपजको व्यपारिक चिनारी सहित बजार प्रबन्धन गर्न।
- खाद्य व्यवस्था तथा व्यवाय भंडारी माफक्षन रैथाने कृषि उपज खिसकिद र विक्रियातरणको व्यवस्था गर्न।
- स्थानीय स्तरका आधुनिक कार्यक्रमहरूमा खाजाको स्थमा स्थानीय उपभाग उपलब्ध रैथाने कृषि उपजमा आधारित परिकार प्रयोग गर्न।

### ३.५ प्रौद्योगिकी कार्यहुर
- कृषि जैविक विविधताको संरक्षण र उपयोगमा योगदान गर्न कृषी, कमजोरी, सामुदायिक जिज र बीउ बैंक, र समुदायामा आधारित अन्य संघसंस्थालाई पुरस्कारको व्यवस्था गर्न।
- कृषि जैविक विविधता संग जोडिएको संस्कृत र धामिक परम्परालाई बढावा दिने, र अध्ययन अनुसन्धान गर्न।
- अवलोकनात्मक भ्रमणहुर तथा तालिमहुर संचालन गर्न।
- सांस्कृतिक, हिस्ट्री नािक, संगीत, दोहरी, कविता आदि कार्यक्रम संचालन गर्न।

### ३.६ नीतिगत सुधारहुर
- IMISAP (ITPGRFA-MLS Implementation Strategy and Action Plan) लाई परिमाजित गर्न र सोहित अनुप्रयोग कार्य गर्न।
- National Agrobiodiversity Strategy and Action Plan (NABSAP), ABS for Agrobiodiversity Including ABS Implementation Strategy and Action Plan कृषि जैविक विविधता संरक्षण तथा उपयोग ऐन आदि प्रयोग गर्न।
- ठुलाठुला परियोजनामा संचालन गर्दै वातावरणीय प्रभाव मूल्याङ्कन (EIA) र कृषि जैविक विविधता प्रभाव मूल्याङ्कन (Agrobiodiversity Impact Assessment (AIA)) लाई अनिवार्य गर्न व्यवस्था गर्न।
राष्ट्रिय कृषि जैविक....

• विकास जातहरूको विस्तार गर्दै पहिले स्थानीय जातहरूको संकलन गरेर मात्र त्यस स्थानमा विकास जात लगाउने प्रणालीको व्यवस्था गर्न।

• स्वाद्य पोषण र जलवायु सम्बन्धी नीति नियममा कृषि जैविक विविधतालाई केन्द्रमा रख्न समाधान खोजने प्रणालीको विकास गर्न।

• अन्तर्राष्ट्रिय सन्दर्भ अनुसार कृषि आनुवंशिक सीतमा सबैको पहुँचको लागि आवश्यक कार्य गर्न। नेपालको केहि स्थानीय जातहरू अन्तर्राष्ट्रिय सन्दर्भ अनुसार सबैलाई पहुँचको लागि आवश्यक कार्य गर्न र Multi Lateral System (MLS) मा रहेको लागि कृषि जैविक सीतमा पहुँचको लागि सहजीकरण गर्न।

• कृषि जैविक विविधता संरक्षण तथा उपयोग ऐन तयार गर्न।

• कृषि जैविक विविधता नीति परिमार्जन गर्न।

• Red zoning and red listing को कार्यलाई नीतिगत बनाउने।

Ⅳ. अपेक्षित उपलब्धीहरु

• कृषि जैविक विविधताको महत्त्वपूर्ण भर्तामा जनताको र जागरूकतामा अभिलस्त।

• सरोकारवालाहरू विच सहकायतामा सुधार।

• कृषि जैविक विविधता संरक्षणको भावी कार्यदिशा तय गर्न मा पृष्ठसम्पन्न।

• समग्र कृषि जैविक विविधता संरक्षण र दिन उपयोग। यो घोषणालाई सफल बनाउन सबै सरकारी, गैर सरकारी संघसंस्था, तथा अन्तर्राष्ट्रिय आ-आफ्नो तर्फबाट सबै सहयोग गर्न गराउन हुन अनुरोध गर्दै नेपालको कृषि पेशालाई समानान्तर पेशाको रुपमा स्थापित गर्न र आत्मनिर्भर कृषि बनाउन तर्फ तपाई हामी तत्पर रहौं।

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(नपाली तेस्रो द्विवर्षिक वैज्ञानिक सम्मेलन-२०२२ अन्तरगत आयोजित कृषि कविता प्रतियोगितामा प्रथम स्थान हासिल गर्न सफल कविता, भक्ति छ रोजिना लोहनी)

मेरो देश र खेती

रोजिना लोहनी, भरतपुर

हामीलाई खेत छ उच्च शिखर झन्ने यो शान हामीलाई धरा
जाती छन्न र अनेक बृक्ष लहरा होला दबाई जरा ।
यो माटो अति उबरा छ मलिलो खेती फलाए उही
कोदो धान मधै फले फल अलैची फल्छ गेदागुडी ।।

रोप्छोखेत फलाउछौ खनिज त्यो खान्छौ र बाँच्छौ जन
भएर पेट आहो छ शान्ति मनमा को बाँच्छ खेती विना ।
तिमा ओउट र जोस जोगर सरी भिन्निण लोही यहाँ
खोज्दै जोउ छ सोत बाबुलमा जान्छौ र अन्तै कहाँ ।।

नेपाली पनि लिए नमना उर्जा र उत्साह तिँई
फर्कै हु अब लो दुर्भेश जगमा गहराँ अंग्रेति ।
गाई गोठ बनाई पाल पशु ती भन्छौ अंग्रेति उदभनी
खेतीमा अनुदान दिन्छ सहजै हट्नेछ दुुःखै पनि ।।

खेतीमा छ अयोग्य भूमि त जहाँ उदयागढन्दा घरेँ
पेठरी गर लो स्वदेश जगमा उखित्न खेतीहरु ।
बसीका जति सम्म फाउट छ त्यहाँ फलन्छ मोती अव
बाँछो खेत नराख हुँ बन तिमी आफैं अझै मालिक ।।

गाईबाट छ प्राप्त गोरस झन्ने गौ मुत्र चोखो चिन
बीउ बीजन रोप उच्च सबले खोजी अझै उन्नत ।
माछा मासु र सुन्तला फल अझै अण्डा छ ताजा झन
खाएरै अव फ्रेस तत्त्व मन लो शुद्धी बनाउ तन ।।

जागो आफै जुटेट पोखर गरी देखाउ हुँ वीरता
नारा माट्र धै नजप्नु अति भो टाई बसोस् भष्ट्रता ।
आफै बाट शुरु गरीं अव नयाँ जो कामको थालानी
साङ्गा होस् त्यवहार राष्ट्र भरमा माटो छ साखी भनी।।
कविता

झल्को आँखाभरि

सयपत्री मखमली, फुल्ये पाखाभरि
दर्रें आउँदा, तिहार आउँदा, झल्को आँखाभरि

विदेश जाने घर आउँथे, सहर पस्ने गाउँ
सबैलाई प्यारो लाग्ने, आफ्नै जन्म ठाउँ
उल्लासमय वातावरण, खुसी घरेभरि

हतार हुन्थ्यो नयौँ लुगा, नयौँ जुता लाउन
टीका थाप्नेल्झन्दा पनि पैस तमाउन
लिधारमा रातो टीका, पैसा हातेभरि

देउसी-बीलो खेल्ने गर्दै, सबै जम्मा भई
रातो माटो, छिप्लो बाटो, घर-घर गई
केटाकेटी लिङ्ग पिंडामा, धान त खेतेभरि

दिदिरी लिन भाँड जान्थ्यो, तिहारको बेला
सहरको त के कुरा भो, गाउँमै लाग्नेल्झा मेला
यादहरू बाँकी नै छन्, मनमुनतबारि

सयपत्री मखमली, फुल्ये पाखाभरि
दर्रें आउँदा, तिहार आउँदा, झल्को आँखाभरि।

(सेतोपाटी - २०७८)