Association of Nepalese Agricultural Professionals of Americas (NAPA)

Quarterly Newsletter

AGRI-CONNECTION

September 2022 | Volume 7, Issue 2 & 3

Inside:

"जननी जन्मभूमिश्च स्वर्गादपि गरीयसी"

PROSPERITY THROUGH AGRICULTURAL TRANSFORMATION

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 than150 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 Literary 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. Upreti (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.**

Editorial

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.

AGRI-CONNECTION
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Dr. Sushil Thapa
Editor-in-Chief

Dr. Sanjok Poudel
Editor

Dr. Sita Thapa
Editor

Mr. Tikaram Wagle
Nepali Editing

AGRI-CONNECTION
September 2022 | Volume 7, Issue 2 & 3

TABLE OF CONTENTS

Welcome on Board NAPA Executive Committee (2022-2024)

Dr. Pradeep Wagle, President

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)

EVENTS / PRIZE (USD)	FIRST	SECOND	THIRD	TOTAL
Student Oral Presentation	250	150	100	500
Student Poster Presentation	250	150	100	500
Student Essay Writing Contest	250	150	100	500
Agri-poem Recitation	200	150	100	450

Student Oral Competition

Rank	Name	Affiliation
First	**Uddhav Bhattarai**	Washington State University, USA
Second	**Kabita Poudel**	Kentucky State University, USA
	Sadikshya Poudel	Mississippi State University, USA
Third	**Madhav Parajuli**	Tennessee State University, USA
	Rudra Baral	Kansas State University, USA

Student Poster Competition

Rank	Name	Affiliation
First	**Bipin Neupane**	North Dakota State University, USA
Second	**Santoshi Chaudhary**	Tuskegee University, AL, USA
Third	**Sandesh Thapa**	Gokuleshwor College, Baitadi, Nepal
	Santosh Pathak	Louisiana State University, USA

Student Essay Writing Competition

Rank	Name	Affiliation
First	**Amrit Sharma**	Agriculture and Forestry University, Nepal
Second	**Sagar Bhandari**	Agriculture and Forestry University, Nepal
Third	**Aadesh Subedi**	University of Georgia, USA

Agri-poem Competition

Rank	Name	Title
First	**Rojina Pandey**	मेरो देश र मेरो खेती
Second	**Roshan Pun**	मझधारको जिन्दगी
Third	**Ramesh Ranabhat**	मानो रोपेर खेतमा

Student Oral Competition - First Place

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.

Student Oral Competition - Second Place

Spatio-Temporal Monitoring of Urban Expansion and its Impact on Agriculture Land Availability using Remote Sensing: A Case Study of Bharatpur, Nepal

Kabita Paudel[1], Suraj KC[1], Whitney Maynard[1], Jeremy Sandifer[1], Demetrio Zourarakis[2], and Buddhi Gyawali[1]
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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 outskirt of this major city in Nepal. This study helps study urbanization in Bharatpur, Nepal, and assists the policymakers in improving urban planning activities.

Student Oral Competition - Second Place

Combined Heat and Drought Stress on Soybean Physiology, Pollen Germination, and Yield

Sadikshya Poudel, Raju Bheemanahalli Rangappa, K. Raja Reddy, and Ranadheer Reddy Vennam
Mississippi State University, Starkville, Mississippi, USA
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The combination of heat and drought stress often occurs simultaneously in the field condition impacting the physiological, reproductive, yield, and quality components of soybean. However, the combined effect of these stressors has not been well explored. In this study, ten soybean varieties were subjected to four different treatments (32°C daytime with soil moisture content, replacing 100% of evapotranspiration (ET), control), heat (38°C daytime+100% ET), drought (50% ET+32°C daytime), and heat and drought (38°C+50% ET) during early pod filling stage from May to October 2021 at Mississippi State University. Treatment impacts on pollen germination, soybean physiology, and yield components were quantified. Significant variation was observed among treatment, varieties, and treatment-varieties interaction for all the parameters studied. The average of all measured parameters was lower in the combined stress treatment relative to the control treatment. Maximum reduction in pollen germination was observed under interactive stress (25%) followed by drought (17%) compared with control. The chlorophyll content of soybean lines decreased (24%) under combined stress conditions compared with the control. Drought stress alone or in combination with heat stress decreased stomatal conductance (95% or 98%) and transpiration (82% or 91%). The pod weight was reduced by 48%, the pod number by 35%, the number of seeds by 42%, and pod weight by 43% under combined stress compared to control. The drought resulted in more damage than heat stress. On the other hand, combined heat and drought stress negatively affected pollen germination and yield components.

Student Oral Competition - Third Place

Cover Crop Usage for the Sustainable Management of Soilborne Diseases in a Woody Ornamental Nursery Production System

Madhav Parajuli[1], Milan Panth[2], and Fulya Baysal-Gurel[1]
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[2]Clemson University, Edisto Research and Education Center, Blackville, SC, USA
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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, Phytopythium 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.

Student Oral Competition - Third Place

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.

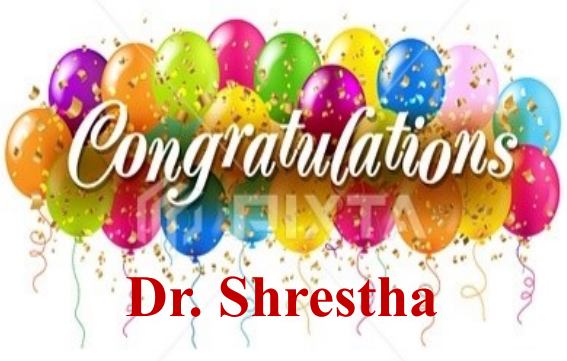
NAPA Presents Agriculture Pioneer Award

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."



Student Poster Competition - First Place

Characterization of d-Tritipyrum Germplasm for Salt Stress Tolerance

Bipin Neupane and Francois Marais
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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-tritipyrums 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.

Student Poster Competition - Second Place

Cost of Feeding and Performance of Small Ruminants During the Lean Period of Forage Production

Santoshi Chaudhary[1], Bhuwan Shrestha[1], Lila B. Karki[2], Anand Tiwari[1], and Uma Karki[1]
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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 feedstuff 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.

Student Poster Competition - Third Place

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.

Student Poster Competition - Third Place

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.

Photographs in Action - NAPA Conference 2022

Committee Highlights

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.

Membership Type	Fees	Eligibility
Regular Member	USD 50 (for two years)	Individuals who hold at least an undergraduate or bachelor or equivalent degree in agriculture or allied areas
Student Member	USD 25 (for two years)	Current students of agricultural and allied areas of studies who are in good standing student status.
Life Member	USD 200 (one time)	Individuals having met regular/general member's category and pay defined dues at a time.
Life Member (eligible spouse)	USD 100 (one time)	Eligible spouse of Life members
Family (Joint) Member	USD 15 (for two years) or USD 50 (one time for Life Membership)	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.
Associate Membership (Outside Nepal)	USD 25 (for two years) or USD 100 (one time for Life Membership)	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.
Associate Life Membership from Nepal	NPR 5,000 (one time)	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.
Associate Student Membership from Nepal	NPR 1,000 (one time)	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.

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.

Committee Highlights

Reward and Recognition Committee (RRC)

The Reward and Recognition Committee (RRC) consists of three members, Drs. Uma Karki, Nanda Joshi, and Aditya Khanal. The purpose of this committee is to identify and recognize the individuals, who have significant contributions in the field of agriculture and allied sciences. The committee will prepare nomination guidelines, work with NAPA Executive Committee and the entire family in the nomination process, select the highly qualified individual(s) from the nominated pool, and confer the reward in recognition of the exemplary contribution of the deserving individual(s) at the biennial NAPA conference.

Research and Capacity Building Committee (RCBC)

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.

Appeal to Support NAPA Initiatives

- **Research Mini-Grant: https://www.napaamericas.org/donate.php**
- **Scholarship Fund: http://napaamericas.org/napa-scholarships-sponsors.php**
- **Endowment Fund: http://napaamericas.org/endowment-fund-announcement.php**

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.

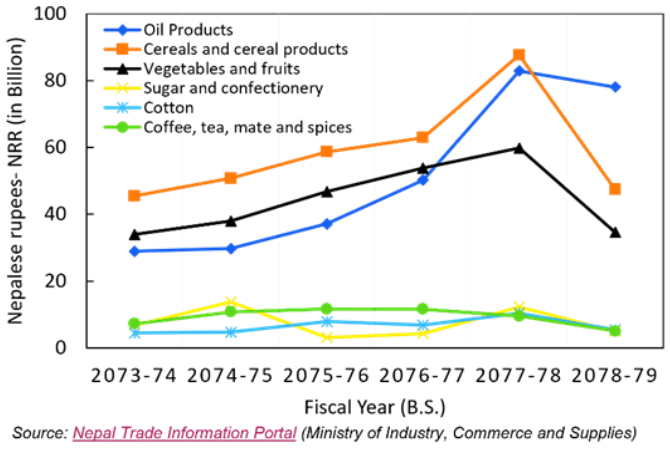


Figure 1: Imports of top agriculture products by Nepal.

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 agriculture 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.

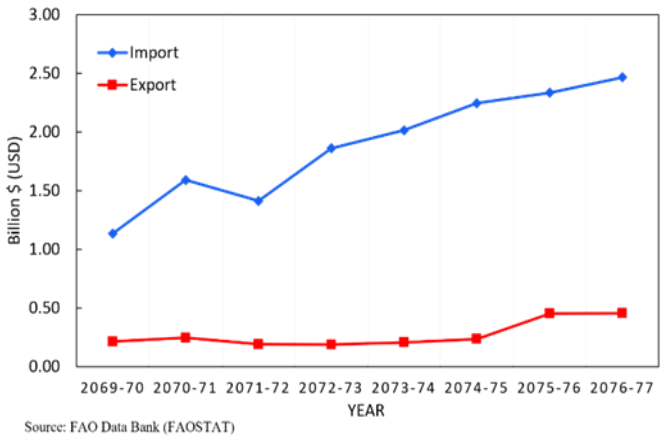


Figure 2: Import and export balance of agricultural trade- Nepal.

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.

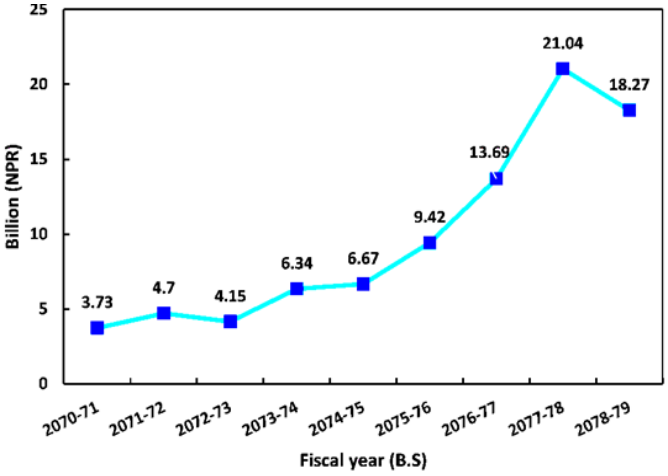


Figure 3: Data showing value of total agricultural tools.

Research, education, and extension is another critical aspect, that plays a pivotal role in the policy/program implementation and achieving targets and desired outcomes. But a weak linkage between these three key components stands as a bottleneck in the development of the agriculture sector. A realization of research importance and impacts should be made, and research institutions should be acknowledged and strengthened with research autonomy. The leading driver in agricultural research, Nepal Agricultural Research Council (NARC), should be restructured and lined up with the newly established federal governing system. A func-

tional collaboration must be placed between existing key institutions involved in the field of research-education-extension, including private research and service-oriented sectors.

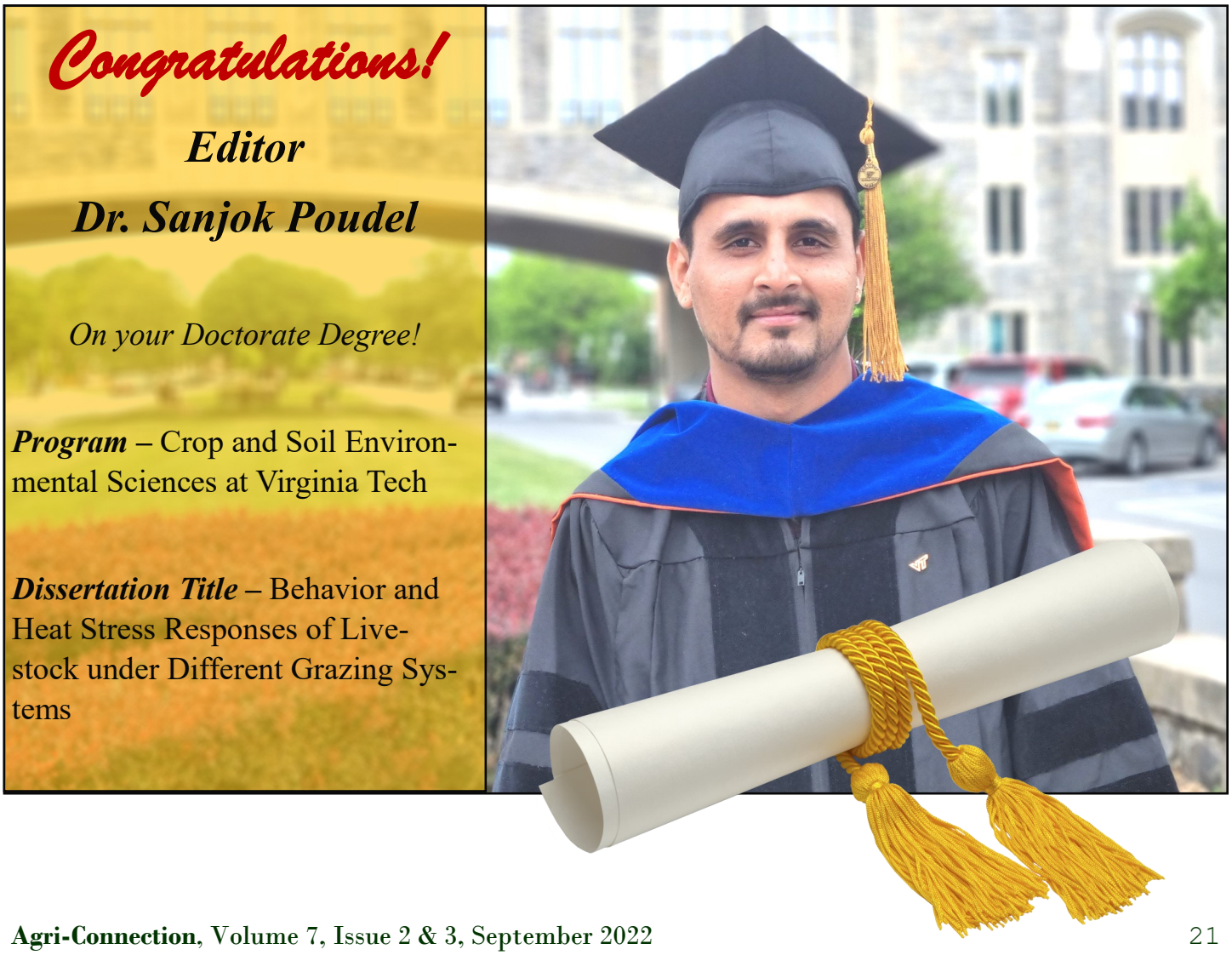
Government subsidies or other aids should be fairly disbursed on a basis of production outcomes, followed by monitoring and evaluation. Also, a public hearing and auditing system should be practiced effectively. Thus, the elites' capture of resources and government support can be put to an end. Moreover, 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. Agro-biodiversity 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).



Webinar Series-31: Current Status and Future Directions Towards Transforming Agricultural Education, Research, & Development in Nepal

The Webinar Committee (WC) hosted the 31st Webinar from Dr. Punya P. Regmi, Vice Chancellor – Agriculture and Forestry University, Nepal, on September 11, 2022 (USA Time). Here, we briefly summarize the key highlights from Dr. Regmi's presentation.

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.

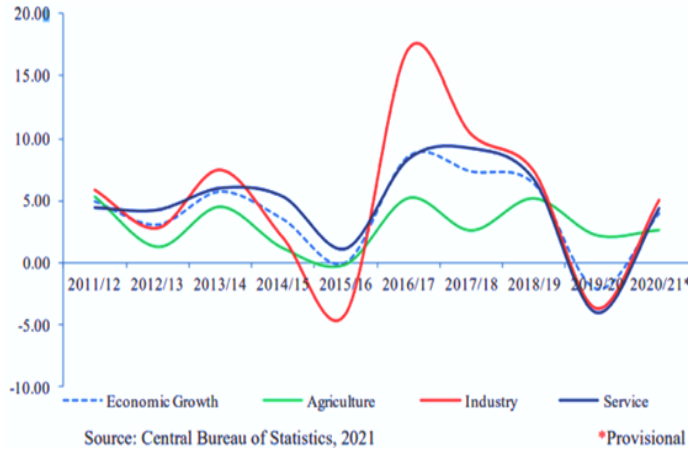


Figure 1. Trend in the economic and GDP growth rate of Nepal

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.

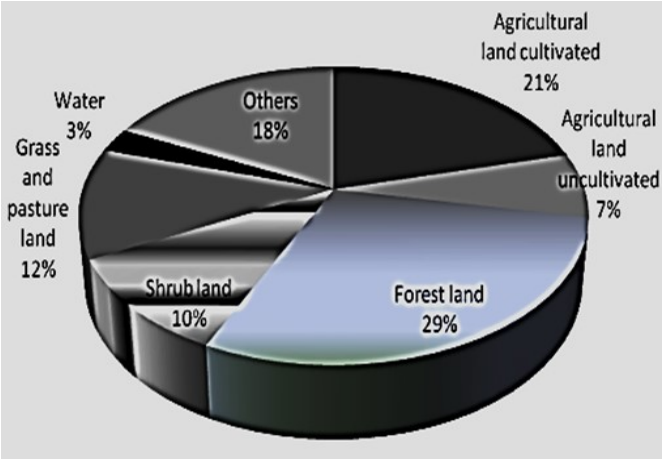


Figure 2. Land-use distribution by different sectors in Nepal.

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).

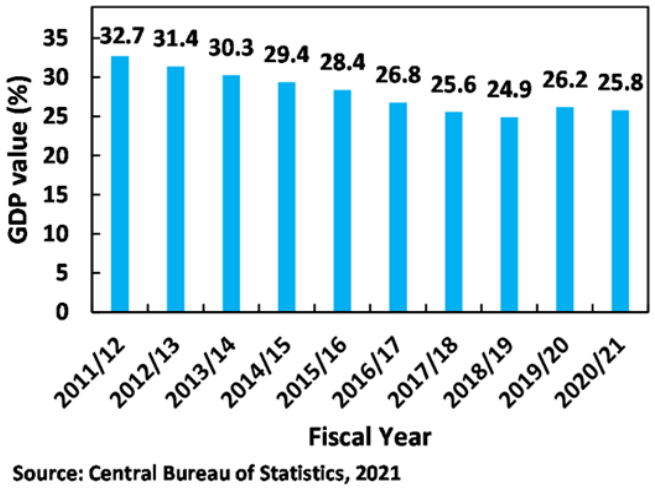


Figure 3. Agriculture sector's share in added GDP value .

Food security status and major problems

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, 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).

Appeal for Contribution to NAPA Endowment Fund

ENDOWMENT FUND ADVISORY BOARD

~ESTD. 2020~

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Dr. Aditya R. Khanal

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 envisages 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.

Within a short period of time, the Endowment Fund Advisory Board has already received a pledge commitment of Over $108,000.

You can contribute to this noble cause by establishing the fund in your name or your beloved ones'. 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:

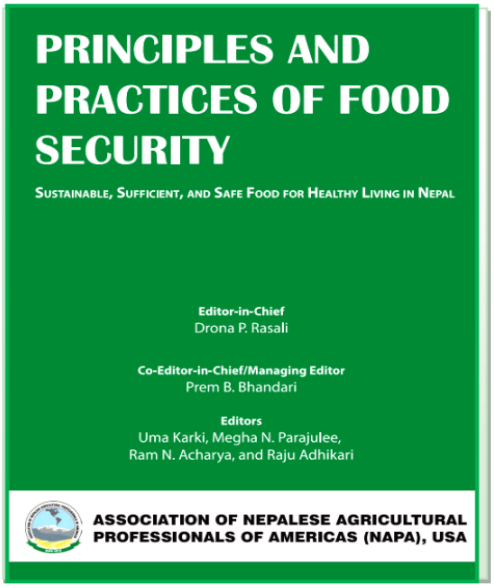
Platinum Sponsor ≥$10,000	Diamond Sponsor ≥$7,000
Gold Sponsor ≥$5,000	Silver Sponsor ≥$3,000
Bronze Sponsor ≥$1,000	Green Sponsor ≥$500
Valued Sponsor or Supporter <$500 (allocated to common/pool fund)	

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



NAPA has published a book entitled:

"Principles and Practices of Food Security: Sustainable, Sufficient, and Safe Food for Healthy Living in Nepal.

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:

The Third Conference (2022) : https://napaamericas.org/conference2022/NAPA2022_programs_outline.pdf

The Second Conference (2020): https://napaamericas.org/conference-2020.php

The First Conference (2018): https://napaamericas.org/conference2018/index.php

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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 सोमबार
विहान: ६:४५ बजे

zoom 829 0346 5507 LIVE www.facebook.com/NepaleseAgriculturistAmericas

Member of the Quarter (July - September, 2022)

Congratulations!

Dr. Sushil Paudyal

NAPA is delighted to recognize Dr. Sushil Paudyal as a Featured Member of the Quarter for his valuable contribution to the organization.

NAPA

MEMBER OF THE QUARTER

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!

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Ms. Sujata Bogati

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

General/regular members

Ms. Rojee Chipalu Pradhan, North Dakota
Dr. Avay Risal, Texas

Associate life members (Nepal)

Dr. Pramod Dhakal

Ms. Jyoti Dhungana

Ms. Pushpa Pandey

Mr. Umanath Sharma

Associate life members

Dr. Saroj Parajuli, Indiana

Associate life members

Mr. Amrit Sharma, AFU, Nepal

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

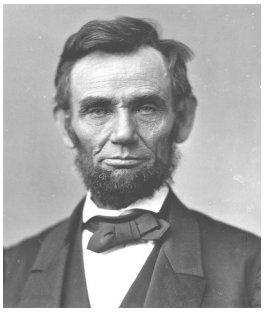
Email: ramghi@gmail.com

Please join or renew your membership. Become a life member if possible!

KidsZone

Abraham Lincoln

Aayush Bhandari
Grade: 67, Dallas, Texas



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, Tennessee, 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 WarOve
- Simplified Civil War Part 1
- Wikipedia Civil War (plus photo)

Please Encourage Your Kids to Participate

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)

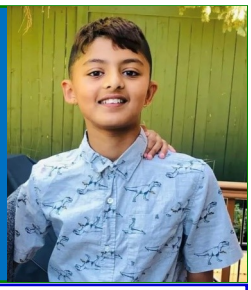
KIDS TODAY, SCIENTISTS TOMORROW!

KidsZone

Gautam Buddha

Rushil Gautam Burlakoti

Grade 8, British Columbia, Canada



"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.

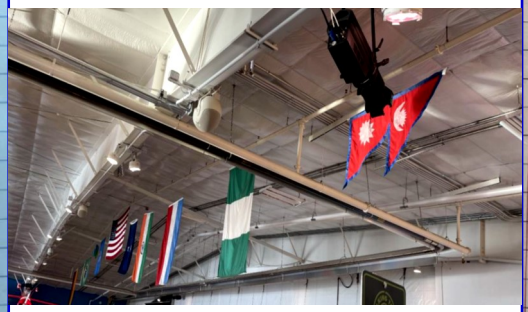
After a long time, Buddha decided to travel back to his family. News spread quickly of him coming back home. The happiest of them all was King Śuddhodana. When Buddha arrived, he went to houses to beg for food instead of enjoying the royalty. This shocked the king. When he asked Buddha why he was doing this, Buddha decided to teach his father his teachings. After listening to Buddha, King Śuddhodana 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.

KidsZone

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.



In the winter of 2021, 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.

Aarin Kandel, Grade: 2

Honey Island Elementary School, Slidell, Louisiana

Aavin Kandel, Grade: 2

Honey Island Elementary School, Slidell, Louisiana

Sushan Thapa

Grade: 4, Missouri

President Dr. Wagle Visits Nepal

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 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 implement tation 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.

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 Agronomy Research Centre (NAgRC), NPPRC and Senior Scientists, Scientists, and Technical officers, Retireds Principle Scientists from NARC; Executive committee members from SAS-Nepal, and students from HIC AST. 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. Thapa received a Token of Love from SAS-Nepal.

(Dr. Shova Shrestha, NARC, helped to prepare this report)

A Tribute to James Lovelock (1919-2022): The Father of the Earth Science

Prof. Gopi Upreti

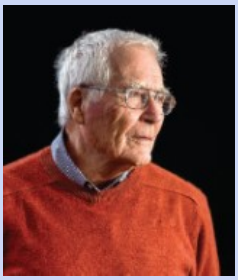
Email: goupreti@gmail.com

Gaia Theory that changed our perception and understanding of Planet Earth

hen 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 and 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 was the original Earth system scientist who first 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



"We are the intelligent elite among animal life on the Earth and whatever our mistakes, Earth needs us. This may seem an odd statement after all that I have said about the way 20th-century humans became almost a planetary disease organism. But it has taken earth 2.5 billion years to evolve an animal that can think and communicate its thoughts. If we become extinct, she has little chance of evolving another."

James Lovelock from The Vanishing Face of Gaia: A Final Warning

A Tribute to James ….

"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' s* 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.

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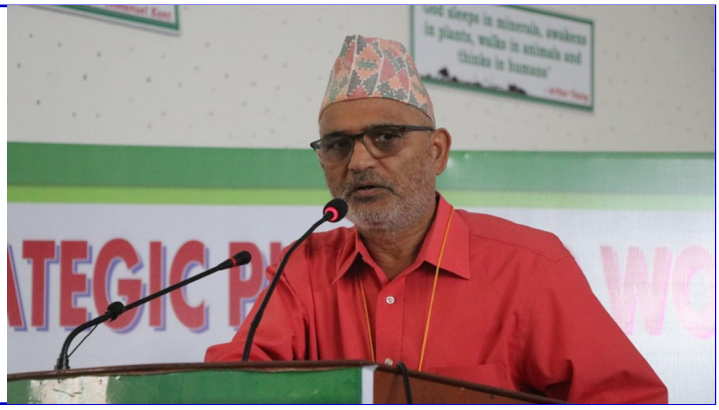
Dr. Prajulee Attends a Meeting in Nepal

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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Advancing Agriculture for Global Food Security and Prosperity

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1. Introduction

The question of food security arises almost instantly when one talks about major world issues, such 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 CO_2 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 C_4 pathway for photosynthesis (in C_3 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.) Adaption 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.

Advancing Agriculture for….

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 transdisciplinary 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.

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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!

अबको उन्नत कृषिको रुपरेखा: एक अभिमत

डा. नित्यानन्द खनाल

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हाम्रा थुप्रै सामाजिक परम्पराहरू प्राकृतिक परिवेशको बुझाइ अनुसार प्रचलित हुदै आएको पाइन्छ। परम्परागत ज्ञानमा समग्र प्रकृतिसङ्गको अन्तक्रियात्मक निचोड र जीवन प्रक्रियाका ब्यवहारिक प्रयोजनहरू भेटिन्छन्। यस्तो ज्ञान प्रणालीमा कृषिकर्म, पारिवारिक जिम्मेवारी, सामाजिक सद्भाव, स्रोतसाधनको ब्यवस्थापन, औषधि उपचार, आरोग्यता, मनोवैज्ञानिक स्वास्थ, तनाव ब्यवस्थापन, मनोरन्जन र दीगो समृद्धी लगायत जीवन र जगतका सबै पक्षहरूको समग्रता पाइन्छ। त्यसैले परम्परागत ज्ञानले नयाँ खोज, अन्वेषण तथा परिवेश सुहाउँदो प्रविधिहरूको विकासको लागि महत्वपूर्ण आधार प्रदान गर्दछ। तिनै समग्रमूखी ज्ञानको आधारमा दुर्गमता, बिपन्नता, प्राकृतिक प्रकोप, रोगब्याधी, सामुदायिक कचिङ्गल, युद्ध आदि प्रतिकूलताहरूको सामना गर्दै मानव सभ्यता आजको आधुनिक युगसम्म आइपुगेको छ।

परम्परागत कृषि प्रणालीहरू पर्यावरणीय अनुकूलता, जैविक विविधता तथा स्थानीय साधनशक्तीमा आधारित र स्थानीय खाद्यसम्पन्नता तथा आधारभूत आवश्यकता पूर्ति प्रति लक्षित थिए। हरेक परिवारले आवश्यकता र चाहना अनुसार दर्जनौं बालीनाली उब्जाउने र अन्य सयौं वनस्पतिहरूको ब्यवस्थापन र प्रयोग गर्थे। भू-धरातल अनुसार बारीका पाटा र खेतका गह्राहरू निर्माण गरिएका हुन्थे। खेतबारीका डिलकान्लाहरूलाई टिकाउ बनाउदै थप उब्जनी लिन थरिथरिका बनस्पतिजन्य संरचनाहरू बनाइएका हुन्थे। यसरी हरेक समुदायमा सयौं बालीनाली र अन्य वनस्पतिहरू स्थानीय रुपमा सबैजसो आवश्यकता पूर्तिका माध्यम थिए। सम्भाब्य ठाउँमा सिंचाइको ब्यवस्था, विविध धरातलीय तथा वनस्पतिमय बिरङ्गी ढाँचामा बालीनाली, वस्तुभाउ र परिवारकोलागी सुहाउँदो सूक्ष्मजलवायु सिर्जना भएका बस्ती हुन्थे। खेती गरिएका, व्यवस्थित गरिएका र बिना हेरचाह पैदा भएका वनस्पतिहरूबाट प्राप्त अन्नादी, तरकारी, फलफूल, कन्दमूल जस्ता विविध खाद्यवस्तुहरूको उपभोगद्वारा आवश्यक पोषण र आरोग्यता हासिल हुन्थ्यो। थप पौष्टिक आहारको आपूर्ति, वाहन-शक्ति (जोत्ने, भारि बोक्ने, गाडा तान्ने काम) को उपयोगिता, वालीउपपदार्थहरूको सदुपयोग तथा माटोलाई उर्वर बनाउने मलको प्रयोजनका लागि पशुपंक्षीपालन खेति प्रणालीको अभिन्न पक्ष थियो। त्यस्ता परम्परागत कृषि प्रणालीहरू प्राकृतिक प्रक्रियालाई न्यूनतम असर पुर्याउने र अधिकतम सन्तुलनमूखी थिए। तर त्यस्ता ब्यवहारिक ज्ञानहरूको अभिलेख राख्न र शिक्षाको रुपमा विकास र प्रवर्धन गर्न सरकारी र गैह्रसरकारी दुवै तर्फबाट ध्यान दिइएको पाइदैन।

आजको आधुनिक बैज्ञानिक प्रणाली सरलीकृत न्यूनतावाद (simplified reductionism) को पद्धति अनुसार बिकास हुँदै आयो। भौतिक, सामाजिक र जैविक पक्षहरूमा गहन अनुसन्धान, अन्वेषण र प्रविधिहरूको द्रुततर बिकास हुँदै आयो। समाज बिकासको क्रमसंगै कृषि लगायत सबै पक्षहरूमा त्यस्ता प्रविधिहरूको प्रयोग हुन थाल्यो। खुल्ला बजारमुखी अर्थतन्त्र अनुरूप त्यस्ता प्रविधिहरूको स्वामित्व सम्पन्न राष्ट्रका ठूला कम्पनीहरूमा निहित हुदै तिनीहरूको बहुराष्ट्रिय प्रभूत्व बढ्दै गयो। यस्तो ब्यापारमुखी बिकास प्रणालीमा आर्थिक वृद्धिलाई सर्बोपरि ठानियो र त्यसका सामाजिक र वातावरणीय दुष्प्रभावलाई प्रवाह गरिएन। परम्परागत ज्ञान, सिप, प्रविधि र उद्यमहरू बिस्थापित हुदै गए। सामाजिक पूँजीको ह्राश, प्राकृतिक श्रोतसाधनको बिनाश र वातावरणीय असन्तुलनका नतिजाहरू छताछुल्ल हुदै गए। आज भन्दा ७० बर्ष अगावै बैज्ञानिक तथा चिन्तकहरूले भनेका थिए "यस्तो आर्थिक वृद्धिलाई सर्बोपरि ठान्ने र सामाजिक र वातावरणीय दुष्प्रभावलाई प्रवाह नगर्ने विकासको नमूना विनाशकारी छ र यो संसारले त्यसको बोझ १०० बर्षसम्म मात्र थेग्न सक्छ।"

अबको उन्नत कृषिको....

सरलीकृत अवधारणाबाट निर्देशित, कृत्रिम उत्पादन सामग्रीमा निर्भर, र आर्थिक बृद्धिमूखी कृषिले आधुनिकीकरणबाट उत्पादन वृद्धि गर्न सफल भयो। सरलीकृत दृष्टिकोण अनुसार हरेक समस्याको तात्कालिक प्रभावकारी समाधान खोजियो। रासायनिक बिषादिको प्रयोगले बालीनालीका रोग, कीरा र झार निर्मूलीकरण, ठूला यन्त्रको प्रयोगले बृहत् कृषिकर्ममा सहजता, रासायनिक मलको प्रयोगद्वारा बाली पोषण, र सम्भाब्य ठाउँमा ठूला नहर तथा जमिनमुनिको पानीबाट सिंचाई गरी सघन एकलबाली प्रणालीको विकास गरियो। यस्तो आधुनिक खेती प्रणालीमा खेती तथा पशुपालनलाई अलगअलग र हरेक बालीलाई अलगअलग व्यवसायको रुपमा अपनाई उत्पादन प्रभावकारिता बढाउने उपाय अवलम्बन गरियो। तर त्यस्तो सघनीकरण प्रणालीमा माटो, वनस्पती, जनावर, सूक्ष्मजीव, जलवायु र मानव गतिबिधीको अन्तरक्रियात्मक उद्गमन (emergent property) बारे जानकारी र ख्याल हुन सकेन। माटो क्षयहुदै र रुखोहुँदै गयो; रोग, कीरा, झारहरूमा रसायन बिरुद्ध प्रतिरोधक क्षमता विकास हुदै गयो; सिंचाईको माध्यमबाट माटोमा नुनिलोपन र गरुङ्गा खनिज तत्वको सन्चिती हुँदै गयो; कृषिजन्य बिषादी र रासायनिक मलहरूबाट नदीनाला, जलासय र वायुमन्डल प्रदूषित हुन पुगे; माटोमा सन्चित प्राङ्गारिक तत्व (कार्वन) घट्दै र वायुमण्डलमा हरितगृह ग्यास बढ्दै जानाले जलवायु परिवर्तन र दैविक प्रकोप बढ्दै जान थाले। हाल खाद्यवस्तुको पारवहनबाट मात्र झन्डै २० प्रतिशत हरितगृह ग्यासहरू उत्सर्जन हुन्छन्।

सघन रसायनयुक्त, सरलीकृत यान्त्रिक कृषिप्रणालीको दुष्परिणामहरू आधुनिक कृषि प्रविधिको प्रयोग हुन थालेको आधा सताव्दी नहुदै छताछुल्ल भए। त्यस्ता दुष्परिणामहरूको महसूस हुँदै गएपछि तीनलाई न्यूनीकरण गर्दै कृषि उत्पादन बढाउन पर्यावरणीय कृषि प्रणालीको अवधारणाको विकास र प्रयोग हुँदैछ। यस्तो अवधारणामा परिवेश अनुकूल जैविक विविधतायुक्त बालीप्रणाली, भूउपयोगितामा विविधीकरण, साधन र विधिहरूको एकिकृत प्रयोग, खेती र पशुपालन प्रणालीको एकिकरण र अधिकतम स्थानीय उत्पादनको उपभोगलाई जोड दिइन्छ। अब यहाँनेर आधुनिक विज्ञानको प्रवाहबाट विकास हुँदै गरेको पर्यावरणीय कृषि र पूर्वीय दर्शनमा आधारित परम्परागत कृषि प्रणाली बिच एकरुपता देखिन थालेको छ। यदि आधुनिक विज्ञानको अबलम्बन र बिस्तार हुने क्रममा पूर्वीय परम्परागत ज्ञानलाई उपेक्षा नगरी पारस्परिक परिपूरक विज्ञानको रुपमा संयोजन गर्दै अगाडि बढाइएको भए कृषि लगायत सबै पक्षहरूको विकास पर्यावरण मैत्री, दिगो र समतामूलक हुन सक्थ्यो; जलवायु परिवर्तन जस्ता विकराल समस्याहरूको बेलैमा सम्बोधन हुन सक्थ्यो।

हाम्रा परम्परागत कृषि प्रणालीमा पर्यावरणीय कृषिका सबैजसो अवधारणाहरू अन्तर्निहित थिए। तर अहिलेको बदलिदो विश्वब्यापी सामाजिक परिवेश, बैदेशिक रोजगार, बसाइसराइ, यातायात र प्रविधिको अन्तरक्रियात्मक विशिष्ठता अनुसार अन्धाधुन्ध प्रवर्धन गरिदै गरेको कथित आधुनिक कृषि प्रणालीलाई रुपान्तरण गर्नु जरुरी छ। त्यस्तो रुपान्तरण स्थानीय जैविक-भौतिक-पर्यावरणीय तथा गतिशील सामाजिक परिवेष सुहाउँदो, पर्यावरणमैत्री, श्रोतसाधन संरक्षणमूखी र ब्यावशायिक रुपमा अवलम्बन हुनु जरुरी छ। हाम्रो परम्परागत कृषिप्रणाली श्रमसघन र यन्त्रविरल छ। स्थानीय जैविक उर्जामा आधारित उपयुक्त यन्त्रहरूको विकास नहुनु हाम्रो कृषिप्रणालीको सबभन्दा दुर्बल पक्ष हो। त्यस पक्षमा अधिक अनुसन्धान र प्रविधि प्रबर्धनको ठूलो खाँचो छ। घट्दो मानवश्रमको उप्लब्धतामा खेतीजग्गाको बिखण्डीकरण रोकी श्रोत-प्रभावकारिता बढाउन एकलकित्ता भूस्वामित्वको नीति कार्यान्वयन गर्नु आवश्यक छ। स्थानीय स्तरमा उत्पादनको प्रशोधन गरी मूल्य अभिबृद्धी गर्न कृषिजन्य साना उद्योगहरूको स्थापना गर्नु पर्दछ। स्थानीय उपभोग्यवस्तुको पर्याप्तता प्रति लक्षित बाली तथा पशुपक्षी उत्पादन विविधिकरण, ब्यावशायिक उत्पादन, स्थानीय खाद्यस्वामित्व र छोटो बजार श्रींखलाको लागि समुदाय स्तरमा सहकारी माध्यमलाई संस्थागत गर्नु साना किसान समुदायका हरूलागि उपयुक्त अवसर हो। यस्तो सामुदायिक सहकारी उत्पादन तथा बजारीकरणले समुदायको व्यावशायिक पहिचान स्थापना गर्न र सरकारी तथा अन्य संस्थागत सेवा हासिल गर्न पनि बल पुग्दछ। यसैगरी आम्दानी विविधिकरणको लागि कृषि पर्यटन पनि सम्भाब्य पक्ष हो। यहाँ अवको कृषि उत्पादन प्रणालीको रुपरेखालाई देहाय बमोजिम समग्रतामा आठ सूत्र (8-S scheme) मा दृष्टिगत गरिएको छ :

अबको उन्नत कृषिको....

- ***स्थान-विशेष जैविक-यान्त्रिक संरचना*** **(*Spatial bioengineering*)**: भौगोलिक परिवेश सुहाउँदो भू-उपयोग, धरातलीय रुपान्तरण र बृक्षारोपण गर्नाले जैविक बिबिधता व्यवस्थापन र सुक्ष्म-जलवायुयुक्त (micro-climatic) लाभदायक परिवेश सिर्जना गर्न सकिन्छ।
- ***वाली-प्रजाती विविधिकरण (Species diversification)***: स्थान-विशेष जैविक-यान्त्रिक संरचना अन्तर्गत सुहाउँदो र त्यसैको एकीकृत हिस्साको रुपमा थरिथरिका वाली-प्रजाती र जातहरू बहुवाली तथा घुम्तिवाली विधि अनुसार लगाउनाले आर्थिक विविधिकरण र पर्यावरणीय सन्तुलन बढाउनुको साथै ब्यवशायिक जोखिम न्यूनकरण गर्न मद्दत पुग्दछ।
- ***बीउ स्वायत्तता र सम्वर्धन*** **(*Seed sovereignty & enhancement)***: स्थानीय बीउ स्वायत्तता र सम्वर्धनले कृषि प्रणालीमा सुहाउँदो जैविक विविधताको विकास, त्यसको बाली प्रजननमा उपयोगिता, गुणस्तरीय उत्पादन र उब्जनी स्थायित्व वृद्धि गर्दछ।
- **मौसम सुहाउँदो वाली व्यवस्थापन र सिंचाई** **(*Seasonal adaptation through agronomic measures & irrigation)*:** मौसमको प्रकृति अनुसार बाली ब्यवस्थापनाका विधिहरू अपनाउने र पानीको संरक्षण तथा उपयुक्त सिंचाई विधिद्वारा उत्पादन परिवेशलाई लाभदायक बनाउन सकिन्छ।
- ***माटोको स्वस्थातामा अभिवृद्धि (Soil health enhancement)***: स्थानीय स्तरमा पोषकतत्व परिचक्रीय (nutrient recycling) प्रविधि र भौगोलिक परिवेश सुहाउँदो भू-उपयोग बिधि अपनाउनाले माटो र जलसंरक्षण हुँदै माटोको स्वस्थता र वाली उत्पादनमा अभिवृद्धि हुन्छ।
- ***तनावी कारक-तत्वहरूको व्यवस्थापन*** **(*Stressors management)***: माथि उल्लेखित विधिहरूको एकीकृत प्रयोगले वाली सुहाउँदो सूक्ष्म-परिवेश पैदा हुन्छ, जसले चरम मौसमी प्रभावलाई मत्थर बनाउनुको साथै बालीका शत्रुजीव-भक्षी तथा वाली-प्रजनक जीव-जन्तुहरूलाई प्रश्रय मिल्दछ। यसरी उत्पादन खर्च घट्नुको साथै वाली उत्पादनमा वृद्धि हुन्छ ।
- ***प्रणालीगत एकिकरण (Systems integration)***: कृषि-वन, वाली-पशुपालन, स्थानीय कृषि-प्रशोधन, बैकल्पिक उर्जामा आधारित यन्त्रीकरण, कृषि-पर्यटन र स्थानीय बजार संजालजस्ता पारस्परिक लाभका उत्पादन र व्यवस्थापनका इकाइहरूको सामुदायिक संयोजनले उत्पादन, मूल्य-अभिवृद्दि र आर्थिक विविधिकरणमा मद्दत पुग्दछ।
- **आर्थिक-सामाजिक यौक्तिकीकरण** **(*Socioeconomic rationalization)*:** प्रवास-रोजगारी वा बसाइसराइ जस्ता प्रवृत्तिले उत्पन्न श्रम-संकटको समाधान गर्न र विद्यमान जनशक्तिलाई प्रतिष्ठित कृषिमूलक व्यवशायको आभाष दिलाउन एकीकृत कृषि प्रणाली अपनाउने उद्यमीलाई एकलकित्ता भूस्वामित्व तथा बैकल्पिक उर्जामूखी यन्त्रिकरणको लागि अनुदान तथा प्राविधिक सहयोगको ब्यवस्था हुनु पर्दछ। अनुदानमा "सरकारी पैसा सामाजिक-पर्यावरणीय लाभ" को नीति अपनाइनु पर्दछ। स्थानीय निकाय देखि केन्द्र उन्मुख (bottom-up) नीति-निर्माण तथा योजना प्रणाली अपनाउनु पर्दछ। कृषि-शिक्षा पर्यावरण मैत्री र ब्यावहारिक हुनु पर्दछ।

ज्ञान, विज्ञान र प्रविधि गतिशील विषयहरू हुन्। विकासक्रम संगै यिनीहरूको गहनतामा अभिबृद्धी तथा परिमार्जन हुँदै जान्छ। वास्तवमा न्यूनतावादी (reductionist) आधुनिक विज्ञान प्रणाली र समग्रतामूखी (holistic) परम्परागत पूर्वीय ज्ञान प्रणाली एकआपसमा परिपूरक हुन सक्छन्। त्यसरी दुई भिन्न ज्ञानप्रणालीहरूको संयोजन गरी शिक्षा तथा व्यावशायिक प्रणालीको विकास गर्नाले समग्र जीवनजगत पर्यावरणमैत्री र समृद्ध बन्न सक्छ।

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राष्ट्रिय कृषि जैविक विविधता बर्ष २०७९ : किन र के गर्ने

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१. परिचय

कृषि जैविक विविधता दिगो कृषि, स्वस्थ पर्यावरण र सार्वभौमिक पौष्टिक खाद्य प्रणालीको मुख्य आधार हो। हाल अन्तरास्ट्रिय नीति नियमले गर्दा र जैविक विविधतामा आएको ह्रासले गर्दा आफ्नो देशमा भएको कृषि जैविक विविधताको संरक्षण र उपयोगमा बिशेष जोड दिनु पर्ने भएको छ। राष्ट्रिय तथा अन्तरास्ट्रिय स्तरमा विभिन्न बर्षहरूलाई विभिन्न प्रसंगको रुपमा घोषणा गरी बिशेष अभियान र कार्यक्रमहरूको पहल हुदै आएको छ (तालिका १)। नेपालमा रैथाने कृषि जैविक विविधता (बाली, घासे बाली, पशुपन्छी, जलीय कृषि आनुवंशिक स्रोत, कीरा र शुक्ष्म जीवाणु) हरू ४०% लोप भैसकेको र बाँकी विविधता पनि तिब्र गतिमा लोपोन्मुख हुँदै गएको छ। जैविक विविधताको महत्व सबै ठाउँहरूमा र सबै वर्ग र जनतालाई बुझाउदै यिनीहरूको संरक्षण र दिगो उपयोगमा बिशेष जोड दिनु पर्ने देखिन्छ। जैविक विविधताको संरक्षण कार्यमा कृषि जैविक विविधता छायाँमा परेको र रैथाने तथा स्थानीय कृषि आनुवंशिक स्रोतहरूको अनुसन्धान, शिक्षा र विकासमा अति न्यून पहल भएको छ। तसर्थ कृषि जैविक विविधताको संरक्षण र उपयोगमा बिशेष सामरिक योजना र कार्यक्रम तय गर्नु वाञ्छनीय देखिन्छ। यसै परिवेशमा राष्ट्रिय जिन बैंकको पहलमा कृषि जैविक विविधता प्राविधिक सल्लाहकार उपसमिति (ATA-SC) मार्फत् राष्ट्रिय कृषि जैविक विविधता संरक्षण समिति (NABCC) मा कार्ययोजना पेश गरी २०७९ सालदेखि राष्ट्रिय कृषि जैविक विविधता बर्षको रुपमा घोषणा गरी मनाउने निर्णय भएको छ। उक्त निर्णयलाई नेपाल सरकारको आर्थिक बर्ष २०७९/८० को बजेट वक्तव्यमा पनि उल्लेख भएकोले

तालिका १. अन्तरराष्ट्रिय र राष्ट्रिय दिवसहरू

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
- 2019–2028: United Nations Decade of Family Farming
- 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 विशेष दिन, सप्ताह

- १-७ वैशाख: राष्ट्रिय वन्यजन्तु सप्ताह
- २५ वैशाख: नेपाल कृषि अनुसन्धान परिषद वार्षिकोत्सव
- १५ असार: राष्ट्रिय धान दिवस
- ७ असोज: राष्ट्रिय संरक्षण दिवस
- २१ असोज: जिन बैंक तथा कृषि जैविक विविधता दिवस
- २९ चैत्र: वनस्पति विभाग वार्षिकोत्सव, वनस्पति दिवस र राष्ट्रिय वनस्पति पुरस्कार

राष्ट्रिय कृषि जैविक....

सम्बन्धित निकायहरूले यो वर्षमा कृषि जैविक विविधता सम्बन्धी बिशेष कार्यक्रमहरू आयोजना गरेर मनाउने भएका छन्। यो बर्ष गरिने केहि कार्यहरू र भविष्यमा गर्नु पर्ने कार्यहरू तल उल्लेख गरिएको छ।

नेपालको थुप्रै कृषि आनुवंशिक स्रोतहरू राष्ट्रिय तथा अन्तर्राष्ट्रिय स्तरमा प्रतिस्पर्धा गर्न सक्ने भए पनि प्राथमिकताको आधारमा हेर्दा रैथाने कृषि आनुवंशिक स्रोतहरू धेरैनै पछाडि परेका छन्। साथै संस्कृति संग जोडिएका विविध कृषि उपजलाई अति महत्व दिने पर्वहरू जस्तै माघे संक्रान्ति, सतबीज छर्ने दिनलाई राष्ट्रिय स्तरको रुपमा नियमित महत्व दिने व्यवस्था हुन सके रैथाने कृषि आनुवंशिक स्रोतहरूको संरक्षण र दिगो उपयोगमा टेवा पुग्न जान्छ।

तल उल्लेखित कार्यले नेपाल सरकारले तयार गरेको तथा प्रतिबद्धता जनाएको विभिन्न राष्ट्रिय तथा अन्तर्राष्ट्रिय नीति नियम र सम्झौताहरू आदिमा उल्लेखित उदेश्यहरू पुरा गर्न ठूलो टेवा पुग्न जाने छ। जस्तै: Agrobiodiversity policy 2014, IMISAP 2017, ADS 2015, National Seed Policy 1999, National Seed Vision 2013-2025, National climate change policy 2019, Environment Protection Act 2019, Zero hunger challenge national action plan 2016-25, Food and nutritional security plan of action 2013, The right to food and food sovereignty 2018, 15th Plan, National agriculture policy 2004, ITPGRFA 2004, CBD 1992, Aichi targets 2011-2020, Nagoya protocol 2014, SDG 2015, Global Plan of action 2013, Delhi declaration 2016, The 2021 Rome Manifesto, Kunming Declaration 2021, The Summit's Action Tracks 2021, Glasgow Climate Pact COP26 2021, Kunming COP15 2022, International Year of Pulses 2021, International Year of Fruits and Vegetables 2022, International Year of Artisanal Fisheries and Aquaculture 2023, UN Decade of Action on Nutrition (2016-2025, United Nations Decade of Family Farming 2019–2028, United Nations Decade on Ecosystem Restoration 2021 –2030

२. राष्ट्रिय कृषि जैविक विविधता बर्ष २०७९ को नारा र उद्धेश्य

नारा

जीवन तथा वातावरणको लागि कृषि जैविक विविधता। (Agrobiodiversity for life and environment)

उद्धेश्यहरू

सबैमा कृषि जैविक विविधताको महत्वको बारे जनचेतना बढाई तीनको संरक्षण तथा उपयोगमा जोड दिने।

- राष्ट्रिय स्तरमा कृषि जैविक विविधता संरक्षणका उपयुक्त विधि एवं पद्धतिहरूको विकास र अवलम्वन गरी कृषिका रैथाने जातहरू लोप हुनबाट बचाउने।
- कृषि जैविक विविधता संरक्षण एवं प्रवर्द्धनको लागि उपयुक्त नीतिगत एवं संस्थागत व्यवस्थाको विकास एवं सुधार गर्ने।
- कृषि जैविक विविधताको राष्ट्रिय अभिलेख तयार गर्ने।
- कृषि जैविक विविधता संरक्षणमा संलग्न संघसँस्थाहरू बीच सहकार्य र सञ्जालीकरण गर्ने।
- राष्ट्रिय कृषि जैविक विविधता वर्ष २०७९ कार्यान्वयनको समिक्षा समेतको आधारमा सन् २०२४ लाई International Year of Agrobiodiversity मनाउनको लागि संयुक्त राष्ट्रसंघमा नेपालको तर्फबाट प्रस्ताव पेश गर्ने।
- रैथाने कृषि आनुबंशिक श्रोत संरक्षण, सम्बर्धन तथा दिगो उपयोगका लागि राष्ट्रिय गौरबको योजनाको अबधारणापत्र तयार गर्ने।

३. प्रमुख कार्यक्रमहरू

३.१ राष्ट्रिय स्तरमा घोषणा गरी नियमित मनाउन सकिने कार्यक्रमहरू

- हरेक वर्ष माघे संक्रान्ति (माघ १ गते) लाई राष्ट्रिय कृषि जैविक विविधता दिवश घोषणा गरी माध महिनाको पहिलो हप्ता (१-७ गते) को समय अवधि भरी साता ब्यापी रुपमा राष्ट्रिय कृषि जैविक विविधता सप्ताह कार्यक्रम संचालन गर्ने र रैथाने परिकार तथा कन्दमुलको महत्व उजागर गर्ने प्रकृतिका कार्यक्रमहरू सञ्चालन गर्ने।
- बाला चतुर्दशी (मंसिर कृष्ण चतुर्दशी) अर्थात सतबिज छर्ने दिनलाई राष्ट्रिय कृषि जैविक विविधता संरक्षण दिवसको रुपमा मनाउने। यो दिन प्रकृतिमा कृषि आनुवंशिक स्रोतको रुपमा सतबीज छर्ने धार्मिक परम्परा रहेकोले उक्त दिनलाई प्रकृतिमा कृषि

राष्ट्रिय कृषि जैविक....

आनुवंशिक स्रोत दिवसको रुपमा लिने। घरेलु कृषिजन्य बीउहरू बाहेक अन्य घरेलु पशुपंक्षी, माछा, कृषि कीरा, घाँसेबाली, कृषि सूक्ष्म जीवाणुहरूलाई धार्मिक स्थलहरू र अन्य सार्वजनिक स्थलहरूमा छर्ने र छाड्ने, र कृषि वंशाणु आरक्ष स्थल स्थापना गर्ने।

- सुन्तलालाई राष्ट्रिय फलको रुपमा घोषणा गर्ने।

३.२ प्रचार प्रसार तथा अभिलेखीकरण कार्यहरू

- विभिन्न संचार माध्यमहरूवाट कृषि जैविक विविधता संरक्षण एवं उपयोगका विविध पक्षहरूमा नियमित अन्तरक्रिया गर्ने।
- Public Service Announcement (PSA) जिंगल, टिकटक, आदि बनाउने।
- सामाजिक संजाल-प्रतियोगिता संचालन गर्ने।
- स्कूल-हाजिरी जवाफ, चित्रकला प्रतियोगिता संचालन गर्ने।
- सांस्कृतिक कार्यक्रम, दोहोरी प्रतियोगिता, सडक नाटक जस्ता कार्यक्रमहरू गर्ने।
- जैविक विविधता सद्भावना दुत चयन र परिचालन गर्ने।
- राष्ट्रिय, प्रादेशिक र स्थानीय सञ्चार माध्यम तथा आम सञ्चारका अन्य माध्यमको उपयोग गरी वर्षै भरि रैथाने जात र अन्य कृषि जैविक विविधता संरक्षणको महत्व बारे श्रव्यदृष्य र पाठ्य सामाग्री प्रसारण एवं प्रकाशन गर्ने।
- सार्वजनिक संचार माध्यमहरू बाट नियमित रुपमा कृषि जैविक विविधता सम्बन्धी सामाग्री प्रकाशन तथा प्रसारण गर्नको लागि क्षमता विकास र आवश्यक सहजीकरण गर्ने ।
- रैथाने कृषि आनुवंशिक स्रोतहरू परम्परागत ज्ञान र परिकारहरूको प्रचार प्रसार, संरक्षण, सम्बर्धन, प्रबर्धन, बजारीकरण एवं अभिलेखीकरण गर्ने ।
- जिन बैंकले अगाडि सारेको ८० वटा कृषि जैविक विविधताको संरक्षण र उपयोग सम्बन्धी कार्य तथा असल अभ्यासहरू लाई प्रकाशन गरी प्रचार प्रसार गर्ने।
- प्रत्येक जिल्लाको कृषि जैविक विविधता प्रोफाइलको लागि आवश्यक कार्य गर्ने र सबै जिल्लाको कृषि जैविक विविधताको सूचाङ्क (Index) तयार गर्ने।
- नेपालमा कृषि जैविक विविधता सम्बन्धी किताब प्रकाशन गर्ने ।
- राष्ट्रिय जिन बैंकको कार्यगत कृषि जैविक विविधताको सूची तयार गर्ने।
- नेपाल कृषि अनुसन्धान परिषद अन्तर्गतको सम्पूर्ण कृषि जैविक विविधताको अभिलेख तयार गर्ने।
- कृषि जैविक विविधता सम्बन्धी शब्दकोष प्रकाशन गर्ने।
- राष्ट्रिय जिन बैंकमा भएको तथ्यांकमा online मार्फत सबैलाई पहुँच पु-याउने।
- स्थानीय तहहरूमा अवस्थित लोपोन्मुख बाली एवं जातको अभिलेखीकरणको लागि online database प्रणाली विकास गरी कार्यान्वयनमा ल्याउने।
- महत्वपूर्ण रैथाने जातहरूलाई राष्ट्रिय बीउविजन समितिमा सूचीकृत गर्ने ।
- पञ्च-गुणीय कृषि उपजलाई प्रचार प्रसार गर्ने।
- तेस्रो राष्ट्रिय कृषि जैविक विविधता कार्यशाला गोष्ठीको साथै कृषक स्तर, प्रदेश स्तर र राष्ट्रिय स्तरका तालिम/गोष्ठी संचालन गर्ने।
- लोपन्मुख र दुर्लभ जातहरूको खोज, संकलन तथा अभिलेखीकरण साथै प्रत्येक जिल्लाबाट कम्तिमा ५ वटा लोपन्मुख रैथाने जातहरू राष्ट्रिय जिन बैंकमा पठाउने व्यवस्था गर्ने।

३.३ संरक्षण कार्यहरू

- जलीय कुण्ड जिन बैंक, पशुपंक्षी फार्म जिन बैंक, फिल्ड जिन बैंक तथा आलु पार्क, उखु पार्क, कृषि वंशाणु आरक्ष स्थल, कीरा फिल्ड जिनबैंक, च्याउ पार्क आदिको स्थापन गर्ने ।
- कृषि वृक्षारोपणको सुरुवात गर्ने र पार्क र उद्यानहरूमा कृषि जैविक स्रोतहरूको संरक्षण गर्ने ।

राष्ट्रिय कृषि जैविक....

- सुरक्षित संचय संरचना (Svalbard Seed Vault) मा बिउहरू संरक्षण गर्ने।
- कृषि जैविक विविधता मेलाहरू संचालन गर्ने।
- रैथाने विभिन्न कृषि उपजहरू लाई भौगोलिक संकेत चिन्ह प्रदान गर्ने।
- सम्वन्धित निकायहरू बाट लोपन्मुख रैथाने जातहरू राष्ट्रिय जिन बैंकमा पठाउने व्यवस्था गर्ने।
- सामुदायिक जिन बैंक, सामुदायिक बीउ बैंक, सामुदायिक फिल्ड जिनबैंक र सामुदायिक जलीय कुण्ड जिन बैंकहरू, घरायसी जिन बैंकहरू, कीरा फिल्ड जिन बैंक आदिको स्थापना तथा प्रबर्धनका साथै पुरानो सार्बजनिक बगैचा जस्तै आँपको बगैचालाई पुनर्जीवित गरी संरक्षण र दिगो उपयोग गर्न र संचालनमा सहयोग गर्ने। त्यस्तै पशुपंक्षी फार्म जिन बैंक, आलु पार्क, उखु पार्क, कृषि वंशाणु आरक्ष स्थल, कीराफिल्ड जिन बैंक, च्याउ पार्क आदिको स्थापना गर्ने।
- शैक्षिक संस्थाहहरू (स्कूल र कलेज) मा फिल्ड जिन बैंक, जलीय कुण्ड जिन बैंक र कीरा फिल्ड जिन बैंकहरू स्थापना गर्ने।
- सुन्दरता मार्फत रैथाने फूलहरूको संरक्षण र उपयोग गर्ने साथै जडिबुटी संरक्षण उद्यान स्थापना गर्ने।
- फलफूल, फूल तथा जडिबुटी संरक्षण उद्यान स्थापना तथा पुनर्जीवित गर्ने।
- कृषि कार्यलय, कृषि फार्म, अनुसन्धान क्षेत्र र शैक्षिक क्षेत्र कीरा, शुक्ष्म जीवाणु र चरा मैत्री बनाउन पहल गर्ने।

३.४ मूल्य श्रंखला विकास एवं प्रबर्द्धनात्मक कार्यहरू

- स्थानीय परिकारहरूलाइ होमस्टे तथा बजार संग समन्वय गरी प्रबर्द्धन गर्ने, स्थानीय खाद्य मेला गर्ने।
- ठाउँ बिशेष जात तथा परिकारको कार्यलाई बिशेष जोड दिने।
- विद्यालयको दिवा खाजा कार्यक्रममा रैथाने खाना एवं परिकार समावेश गर्ने।
- खाद्य मेला तथा खाद्य परिकार कार्यशाला सञ्चालन गर्ने।
- रैथाने जातका कृषि उपजको व्यापारिक चिनारी सहित बजार प्रवर्द्धन गर्ने।
- खाद्य व्यवस्था तथा व्यापार कम्पनी मार्फत रैथाने कृषि उपज खरिद र विक्रिवितरणको व्यवस्था गर्ने।
- स्थानीय स्तरका औपचारिक कार्यक्रमहरूमा खाजाको रुपमा स्थानीय रुपमा उपलव्ध रैथाने कृषि उपजमा आधारित परिकार प्रयोग गर्ने।

३.५ प्रोत्साहन कार्यहरू

- कृषि जैविक विविधताको संरक्षण र उपयोगमा योगदान गर्ने कृषक, कर्मचारी, सामुदायिक जिन र बीउ बैंक, र समुदायमा आधारित अन्य संघसंस्थालाई पुरस्कारको व्यवस्था गर्ने।
- कृषि जैविक विविधता संग जोडिएको संस्कृति र धार्मिक परम्परालाई बढावा दिने, र अध्ययन अनुसन्धान गर्ने।
- अवलोकनात्मक भ्रमणहरू तथा तालिमहरू संचालन गर्ने ।
- सांस्कृतिक, हिज्जे, नाटक, संगीत, दोहरी, कविता आदि कार्यक्रम संचालन गर्ने।

३.६ नीतिगत सुधारहरू

- IMISAP (ITPGRFA-MLS Implementation Strategy and Action Plan) लाई परिमार्जित गर्ने र सोहि अनुरुप कार्य गर्ने ।
- 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 तयार गर्ने ।
- ठुलाठुला परियोजना संचालन गर्दा वातावरणीय प्रभाव मूल्याङ्कन (EIA) र कृषि जैविक विविधता प्रभाव मूल्याङ्कन (Agrobiodiversity Impact Assessment (AIA)) लाई अनिवार्य गर्ने व्यवस्था गर्ने।

राष्ट्रिय कृषि जैविक....

- विकासे जातहरूको विस्तार गर्दा पहिले स्थानीय जातहरूको संकलन गरेर मात्र त्यस स्थानमा विकासे जात लगाउने प्रणालीको ब्यवस्था गर्ने।
- खाद्य पोषण र जलवायु सम्बन्धी नीति नियममा कृषि जैविक विविधतालाई केन्द्रमा राखेर समाधान खोज्ने प्रणालीको विकास गर्ने।
- अन्तर्राष्ट्रिय सन्धि अनुसार कृषि आनुवंशिक स्रोतमा सबैको पहुँचको लागि आवश्यक कार्य गर्ने। नेपालको केहि स्थानीय जातहरू अन्तराष्ट्रिय सन्धि अनुसार सबैलाई पहुँचको लागि आवश्यक कार्य गर्ने र Multi Lateral System (MLS) मा रहेको लाखौं कृषि जैविक स्रोतहरूमा पहुँचको लागि सहजीकरण गर्ने।
- कृषि जैविक विविधता संरक्षण तथा उपयोग ऐन तयार गर्ने ।
- कृषि जैविक विविधता नीति परिमार्जन गर्ने।
- Red zoning and red listing को कार्यलाई नीतिगत बनाउने।

४. अपेक्षित उपलव्धीहरू

- कृषि जैविक विविधताको महत्वबारे जनचेतना एवं जागरुकतामा अभिवृद्धि।
- सरोकारवालाहरू बिच सहकार्यमा सुधार।
- कृषि जैविक विविधता संरक्षणको भावी कार्यदिशा तय गर्नमा पृष्ठपोषण।
- समग्र कृषि जैविक विविधता संरक्षण र दिगो उपयोग।

यो घोषणालाई सफल बनाउन सबै सरकारी, गैर सरकारी संघसंस्था, तथा व्यक्तिहरूलाई आ-आफ्नो तर्फबाट सक्ने सहयोग गर्न गराउनु हुन अनुरोध गर्दै नेपालमा कृषि पेशालाई सम्मानजनक पेशाको रुपमा स्थापित गर्न र आत्मनिर्भर कृषि बनाउन तर्फ तपाई हामी तत्पर रहौं ।

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कृषि कविता

(नपाको तेस्रो द्वैवार्षिक बैज्ञानिक सम्मेलन-२०२२ अन्तरगत आयोजित कृषि कविता प्रतियोगितामा प्रथम स्थान हासिल गर्न सफल कविता, बधाई छ रोजिना लोहनी)

मेरो देश र खेती

रोजिना लोहनी, भरतपुर

हाम्रो देश छ उच्च शिखर झनै यो शान हाम्रो धरा
जाती छन् र अनेक वृक्ष लहरा होला दबाई जरा ।
यो माटो अति उर्वरा छ मलिलो खेती फलाए उही
कोदो धान मकै फले फल अलैची फल्छ गेडागुडी ।।

रोप्छौ खेत फलाउछौ खनिज त्यो खान्छौ र बाँच्छौ जन
भर्छौं पेट अहो छ शान्ति मनमा को बाँच्छ खेती विना ।
तिम्रा आँट र जोस जाँगर सरी भित्रिन्छ मोती यहाँ
खोज्दै जाँउ छ स्रोत बाहुबलमा जान्छौ र अन्तै कहाँ ।।

नेपाली पनमा लिएर मनमा उर्जा र उत्साह लिई
फर्के है अव लौ स्वदेश जगमा गर्छौं अरे उन्नती ।
गाई गोठ बनाई पाल पशु ती बन्छौ अरे उद्यमी
खेतीमा अनुदान दिन्छ सहजै हट्नेछ दुःखै पनि ।।

खेतीमा छ अयोग्य भूमि त जहाँ उद्योगधन्दा गरूँ
पैठारी गर लौ स्वदेश जगमा उब्जिन्छ खेतीहरू ।
बेसीका जति सम्म फाँट छ त्यहाँ फल्नेछ मोती अव
बाँझो खेत नराख है बन तिमी आफैं अझै मालिक ।।

गाईबाट छ प्राप्त गोरस झनै गौ मुत्र चोखो चिज
बीउ बीजन रोप उच्च सबले खोजी अझै उन्नत ।
माछा मासु र सुन्तला फल अझै अण्डा छ ताजा झन
खाएरै अव फ्रेस तत्व मन लौ शुद्दी बनाऊ तन ।।

जागौं आफू जुटेर पौरख गरी देखाउ है वीरता
नारा मात्र सधै नजप्नु अति भो टाढै बसोस् भ्रष्टता ।
आफैं बाट शुरू गरौं अव नयाँ जो कामको थालनी
साझा होस् व्यवहार राष्ट्र भरमा माटो छ साक्षी भनी।।

कविता

- सुशील थापा

झल्को आँखाभरि

सयपत्री मखमली, फुल्थे पाखाभरि
दसैँ आउँदा, तिहार आउँदा, झल्को आँखाभरि

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

हतार हुन्थ्यो नयाँ लुगा, नयाँ जुत्ता लाउन
टीका थाप्नभन्दा पनि पैसा कमाउन
निधारमा रातो टीका, पैसा हातैभरि

देउसी-भैलो खेल्ने गर्थे, सबै जम्मा भई
रातो माटो, चिप्लो बाटो, घर-घर गई
केटाकेटी लिङ्गे पिङ्गमा, धान त खेतैभरि

दिदी लिन भाइ जान्थ्यो, तिहारको बेला
सहरको त के कुरा भो, गाउँमै लाग्थ्यो मेला
यादहरू बाँकी नै छन्, मनमुटुभरि

सयपत्री मखमली, फुल्थे पाखाभरि
दशैँ आउँदा, तिहार आउँदा, झल्को आँखाभरि।

(सेतोपाटी - २०७८)