



Agri-Connection

Vol. 4, Issue 3, November 2019

A QUARTERLY NEWSLETTER

President's Desk

Greetings, NAPA community and beyond:

We salute all those committed and hardworking members whose tireless contributions have made NAPA a growing professional organization in the Americas and beyond. The executive committee (EC) along with the Advisory Council and various committees and sub-committees have been putting collective energy to serve and giving back to the community. Some of the major highlights in this quarter included but not limited to: 1) Three professional Webinars were organized; NAPA observed World Food Day 2019 by organizing a special webinar on 'how can emerging tools of agricultural biotechnology assist Nepal in its quest for food security?'; 2) The total membership has grown to 330 in three years of professional journey; 3) *Global Journal of Agriculture and Allied Sciences (GJAAS)* is ready-to release its first issue anytime soon; 4) The ever first book of NAPA on 'Food Security in Nepal: Principles and Practices' is at ready-to-go printing house anytime soon; 5) NAPA 2020: the 2nd Biennial conference organizing committee has published conference flyer, brochure, and banner for the conference and moving forward on its preparation.

Membership is steadily increasing; life membership reached 112; we warmly and gracefully welcome all new NAPA members on-board. We feel honored having all of you distinguished professionals, emerging scientists, entrepreneurs, and students from agriculture and allied disciplines as one NAPA

family. We will keep fueling momentum and elevating the scope and impact of NAPA with your collective expertise and energy. Please join us to share your expertise, time, energy, monetary contribution, and creative thoughts and ideas to serve the community at the highest



possible level. On behalf of Executive Committee, I sincerely thank all self-motivated professional volunteers for their great enthusiasm, dedication, and willingness in serving the NAPA community and its stakeholders through webinars, donations, time, expertise, creative thoughts, collective energy, serving on various sub-committees, serving as reviewers and editors, and many other ways. Our great appreciation is always extended to the generous donors and sponsors of NAPA's flagship program; scholarship, mini-research, and endowments, 'one dollar makes a difference.'

Finally, we greatly appreciate all volunteer contributors to the Agri-Connection (AC) online newsletter. Finally, sincere appreciation and thanks to all hard working **Agri-Connection** Editorial Board. We look forward to welcoming all of you to Atlanta, Georgia, USA for NAPA 2020, the 2nd NAPA Biennial International Conference, with the theme "*Global Food Security through Agricultural Transformation*".

" Together, we can make a difference."

Lila B. Karki, Ph.D.

Association of Nepalese Agricultural Professionals of Americas (NAPA)

website: www.napaamericas.org

<https://www.facebook.com/napa2072/>

E-mail: napa2072@gmail.com; Twitter: [@napa2072](https://twitter.com/napa2072)

Editorial

Some parallels between autumn-season (*Sharad Ritu* in Nepali) festivals in Nepal and North America bring a great sensation of cultural atmosphere for Nepalese living in North America. Nepalese *Dashain* and Canadian Thanksgiving mostly occur very close together in time – from same day to some days apart in different years. A shared essence of both festivals is getting together with families, relatives and friends, offering gratitude and receiving blessings.

While *Tihar* very closely follows *Dashain* in our culture, Halloween follows Thanksgiving the same way. So, *Tihar* and Halloween also befall in very close time frame and have interesting analogy. While we go to neighboring door-steps for performing *Deusi-Bhailo* and getting gifts of money and estival cuisines, North Americans go to neighboring door-steps with disguising attire of ghost asking for “treat or trick”, and are graciously treated with candies and snack packets. Halloween offers excellent opportunity of blending of new immigrants with local communities. Children enjoy disguising as ghost for “treat or trick” so much!

It is exhilarating to find multiple cross-matches of Nepalese and North American cultural celebrations.

The *Nwagi* in Nepal and Thanksgiving in North America have common essence of celebrating new harvest with special meals, and offering thankfulness to God for the mercy of food. Although the US version of Thanksgiving is celebrated on last Thursday in November, the essence is the same – gather in unity and express gratitude. The *Deepawali* (lighting) in *Tihar*, and erecting Lingo wrapped with garland in *Thulo-Ekadashi* parallels lighting and erecting Christmas tree in homes in North America. It is thrilling to have similar sense of festivities in the overseas neighborhoods - thousands of kilometers away from original abode!

In the modern fast-pace lives, the festivals offer powerful therapy of relaxation, reconciliation of differences, and healing of stressful feelings. Let’s keep the great essence of our heritage going with diverse merriments benefiting ourselves and those around us. Happy Festivals !



Nityananda Khanal, Ph.D., P.Ag.

NAPA

Association of Nepalese Agricultural Professionals of Americas



Agri-Connection
Vol. 4, Issue 3, November 2019

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For past issues of Agri-Connection, please visit the link below:

<http://napaamericas.org/agri-connection.php>

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NAPA Proudly Announces



NAPA 2020: 2nd Biennial Conference

“GLOBAL FOOD SECURITY THROUGH AGRICULTURAL TRANSFORMATION”

Join Us in Atlanta

May 22-24, 2020

Crowne Plaza (Atlanta-Airport)
1325 Virginia Ave., Atlanta, GA 30344, USA

Conference highlights:

- Student writing contest, Rapid-fire presentations
- Student competitive oral & poster presentations
- Professional oral & poster presentations
- Panel discussions on *Global/Nepal Food Security, Gender in Agriculture, Leadership in Agriculture*
- Professional workshops: Successful grant writing, Data analytics and report writing
- Research mini-grants and scholarship for academic excellence: review and future strategy
- Cultural night
- Charity event: Giving back to community and more

For details: <http://napaamericas.org/conference2020/index.php>

Crown Plaza Atlanta-Airport

1325 Virginia Avenue Atlanta, GA 30344, USA

Phone: 1-404-768-666

Hotel Booking Information:

- Booking website: <https://book.passkey.com/e/49941148>
- Reservations must be made on or before the cut-off date of MAY 15, 2020 to be eligible for the group rate.
- Reservations can be cancelled by 6 PM, 24 hours prior to the arrival without any penalties.
- Based on the availability of rooms and the availability of group rates, the group rate will be offered three days prior and three days following the official meeting dates.
- This hotel is located close (~2 miles) to Hartsfield-Jackson Atlanta International Airport and provides 24/7 free shuttle service to the domestic terminal.
- Many of the Atlanta attractions are in a short drive from the hotel. More information about the hotel location and nearby attractions is available at: <https://bit.ly/2Xhz556>





2nd NAPA Biennial International Scientific Conference 2020

MAY 22-24, 2020 (MEMORIAL WEEKEND)
CROWNE PLAZA ATLANTA-AIRPORT Atlanta, Georgia, USA

CALL FOR ABSTRACT

The Conference Organizing Committee (COC) is pleased to announce the call for abstracts on the theme "Global Food Security through Agricultural Transformation" for NAPA 2020, 2nd Biennial Conference of the Association of Nepalese Agricultural Professionals of Americas (NAPA). Abstract submission is open on topics related to Agricultural and Allied Sciences that advance any aspect of NAPA disciplines and ultimately help achieve the secured and sustainable supplies of food, feed, fuel, and fiber (4F) to meet the needs of the current and the next generations without compromising the opportunities of future generations. This call solicits abstracts for oral and poster presentations. **Students will have opportunities for oral and poster presentation competitions. The first three of each of the student sessions will be recognized and awarded with cash prizes (\$250.00, \$150.00; and \$100.00) and certificates of appreciation.**

The abstract should be limited to 200 to 300 words and must be submitted using the abstract form available in NAPA website. Specifically, please adhere to the following format when developing and submitting the abstracts:

- Paper Title
- Author(s), Affiliation(s) and email of corresponding author
- Presenting Author
- Discipline
- Keywords: Three to five
- Abstract: Include a brief introduction, objectives, methods, results/expected results, and discussion/conclusions.
- Font Type and Size: Times New Roman; 12 points
- Margin: 1 inch all sides
- Line Spacing: Single



**SUBMIT YOUR
ABSTRACT**

TOPIC AREAS/DISCIPLINES (including but not limited to):

Crop and Soil Science; Plant Pathology; Entomology; Natural Resources; Plant Breeding and Genetics; Viticulture and Enology; Weed Science; Animal Sciences; Comparative and Veterinary Medicine; Aquaculture; Food and Nutrition Technology; Water and Environmental Sciences; Agricultural Education, Extension; Agricultural/Bio-system Engineering and Technology; Agricultural and Resource Economics; Rural Sociology; Agricultural Statistics and Research Methods; Biomedical Sciences; Precision Farming; Food Security; Gender and Agriculture; Remittances and Agriculture; Rural Livelihoods; Sustainable Agriculture; Organic Farming; and any related disciplines.

Deadlines: The abstract must be submitted by **December 31, 2019 (11:59 pm ET)**. Abstract can be submitted through the link: <https://forms.gle/xoatexJRRNg5u4sx7> or through an email to napaconference2020@gmail.com and manoj.karkee@gmail.com. Abstracts will be reviewed by the Scientific Sub-committee and the corresponding author(s) will be notified of decision via email by February 1, 2020.



Funding for the travel: A limited number of travel grants (registration waiver or gratis hotel room for three nights on a shared basis or meals for 3-day conference, or in combination) are available to support students and young professionals from developing countries.

Manoj Karkee, PhD
Chair, Scientific Sub-committee



CALL FOR 3-MINUTE RAPID ORAL PRESENTATION

We are pleased to invite authors to submit abstracts for “rapid scientific presentation” at the Second Biennial Scientific Conference of the Association of Nepalese Agricultural Professionals of Americas (NAPA). The conference will be held during May 22-24, 2020 in Atlanta, Georgia. The rapid oral presentation needs to be delivered to an expert audience within three minutes.

Please note that **you do not need to submit a separate abstract for this session**. Oral and poster presentation speakers are requested to indicate their interest by selecting this option in the online abstract submission portal (<http://bit.ly/2020NAPA>).

Followings are the rules for 3-minute rapid oral presentation:

1. Please prepare a single static PowerPoint as no slide transition is allowed.
2. The slide needs to be presented at the beginning of the presentation.
3. Presentations are limited to 3 minutes maximum and competitors exceeding 3 minutes are disqualified.
4. The decision of the adjudicating panel is final.
5. The first, second, and third place winners will be awarded by a cash prize of \$50, \$30, and \$20 and appreciate certificates.

Please feel free to contact the organizing committee, should you have any questions regarding this session.

Dr. Omkar Joshi, Chair; Email: omkar.joshi@okstate.edu

Dr. Buddhi Gyawali Email: bgyawali@gmail.com

Dr. Dev Paudel Email: merodev@gmail.com

3-minute rapid oral presentation, NAPA

Association of Nepalese Agricultural Professionals of Americas (NAPA)

Website: www.napaamericas.org

E-mail: napa2072@gmail.com



Call for the Student Writing Contest

NAPA 2nd Biennial Conference Organizing Committee is pleased to announce the 2020 College and University Students' Essay Writing Contest. A full-time student enrolled in a college, including community or vocational college, and/or university around the globe pursuing a degree in agricultural or allied field is eligible to participate.

Essay Topic

"Making the choice: feeding the world through agricultural innovation and transformation in 21st century"

General guidelines:

- The essay should be written in English language.
- The essay must be author's original work and should be attested by inserting a statement followed by author's full name.
- The essay should follow the standard academic essay structure and format that include an introduction with a thesis statement(s) followed by the body of supporting arguments logically organized using headings/sub-headings that lead to a conclusion(s) and future prospective.
- The essay can be developed based on student's own experience, online research, and scientific literature review.
- Appropriate credits must be given to the work of others through appropriate citation. The essay will be disqualified for the competition if any evidence of plagiarism is established. The committee strongly discourages plagiarism of any form and advises students to avoid engaging in such activity.
- The essay should contain **at least 2,000 words but not exceed 3,000 words**, excluding footnotes, tables, figures, and references, and should be formatted double-spaced.
- A complete list of references cited should be included in the reference section of the essay.
- The essay should have author's name, affiliated college or university, degree program, mailing address, and email ID. A proof of student status is required (e.g., student ID card with expiration date or unofficial transcript or a letter from the college or university certifying the student status).
- A pdf copy of the essay must be uploaded online at: <http://bit.ly/NAPA-SWC> The pdf file should be named "NAPA_2020_SWC_STUDENT NAME_COLLEGE OR UNIVERSITY NAME". The deadline for submission is **January 31st, 2020**.
- Only one essay can be submitted per contestant.
- The results of the writing contest will be announced during the first week of April 2020.
- **The first, second, and third place winners will be awarded with a certificate and cash prizes of \$300.00, \$200.00, and \$100.00, respectively** at NAPA Second Biennial Conference on May 22-24, 2020 at Crowne Plaza Hotel, 1325 Virginia Ave, Atlanta, GA 30344, USA. Winners are encouraged (but not required) to be presented at the award ceremony.



If you have any questions/concerns, please contact:

Dr. Bharat Pokharel
Chair, 2020 Student Writing Contest Sub-committee
Email: Bharat.Pokharel@gmail.com

Essay Writing
Contest



नापा सम्मेलन - २०२०

नापा (NAPA) कृषि कविता प्रतियोगितामा संबन्धि सूचना

अमेरिकाको एटलान्टा (Atlanta) शहरमा मे २२-२४, २०२० मा हुन गईरहेको दोस्रो (द्विवार्षिक) अधिवेशनमा आयोजना हुन लागेको कृषि कविता वाचन प्रतियोगितामा संलग्न हुन इच्छुक सम्पूर्ण सर्जकज्युहरुलाई आफ्नो रचना आगामी मार्च ३०, २०२० भित्र निम्न ठेगानामा पठाउन हार्दिक अनुरोध गर्दछौं।

प्रतियोगिताका नियमहरु:

१. कविता कृषि तथा सम्बद्ध विषयसंग आधारित हुनुपर्नेछ।
२. कविता शुद्ध नेपाली भाषामा २०० शब्दमा नबढाई लेखिएको हुनुपर्नेछ।
३. श्रष्टा आफैले वाचन गर्नुपर्नेछ।
४. ३ सदस्यीय निर्णायक समितिले कविताको मूल्यांकन गर्नेछ।
५. उत्कृष्ट (प्रथम, द्वितीय, र तृतीय) ३ कवितालाई क्रमशः \$२००, १५०, र १०० तथा प्रमाणपत्रले सम्मान गरिनेछ।
६. कविता आगामी मार्च ३०, २०२० भित्र निम्न ठेगानामा पठाउनु पर्नेछ।



कविता पठाउने ठेगाना:

napaconference2020@gmail.com

indira2003paudel@gmail.com

डा. इन्दिरा पौडेल

संयोजक

कृषि कविता प्रतियोगिता समिति



NAPA News

NAPA's participation on 15th Joint Convention of Nepalese Association of Southeast Americas and Association of Nepalese in Midwest America

Ms. Ambika Tiwari - NAPA life member and former Treasurer, Dr. Romy Das Karna - NAPA Executive Committee member, and some other NAPA members participated in the 15th Joint Convention of Nepalese Association of Southeast Americas (NASEA) and Association of Nepalese in Midwest America (ANMA) held at Winston-Salem, North Carolina, USA on August 30 - September 1, 2019. Ms. Tiwari delivered a presentation on **“Food Security Challenges and Opportunities: How NAPA Can Contribute to Agricultural Transformation in Nepal”**. She highlighted NAPA's vision, activities, initiatives and future strategies in the presentation.

Attended by 35-45 participants, the program was well organized and the presentation was effective in generating discussions. Several participants appreciated NAPA's current progress and future strategies to help agricultural developments in Nepal. Several participants were keen to know how NAPA can contribute to help increase Nepal's agricultural productivity and overall livelihood. According to Ms. Tiwari, professionals from different disciplines who were present in the scientific session agreed that without agricultural transformation, development in Nepalese agricultural sector is impossible. Several audiences also indicated that NAPA should bring



similar presentations in the future and spread awareness among stakeholders to help promote agricultural development in Nepal. here were some associations who were also interested to collaborate with NAPA and launch programs side by side to educate and spread awareness in the country. “I am so pleased to hear from the representatives of some professional organizations that without food security that NAPA is committed to explore more, we can't keep our people healthy; let's work together," said Ms. Tiwari. As many organizations became aware of NAPA's promising vision and initiatives, NAPA has tremendous opportunities to work for Nepal and demonstrate our commitment to help our motherland and humankind.

Brain Gain Initiative Meeting in Chicago

NAPA General Secretary Dr. Pradeep Wagle delivered a talk entitled **"NAPA's Role on Agricultural Transformation in Nepal"** at the Brain Gain Initiative program in Chicago, Illinois, USA. Dr. Wagle also cordially invited Honorable Foreign Minister Mr. Pradeep Kumar Gyawali, Ambassador Dr. Arjun Kumar Karki, and other participants for NAPA's 2nd Biennial Scientific International Conference, to be held in Atlanta, Georgia, USA on May 22-24, 2020. Several NAPA members including Drs. Prem Bhandari, Lila Khatiwada, Gopi Upreti, Satis Devkota, Buddhi Gyawali, Durga D. Poudel, Krishna Lal Poudel and beyond participated in the program.



NAPA News

NAPA Outreach Activities

Interaction program in Louisiana:

President Karki, Lila B. along with life member Uma Karki visited agricultural and allied disciplines' faculty and students at Louisiana State University, Baton Rouge, Louisiana in August 2019. Life member Krishna Poudel hosted an interaction program about NAPA past-present-future activities. Many students showed their interest to join NAPA and expressed their desire to contribute to NAPA. NAPA is thankful to Dr. Poudel for hosting the meeting.



A few members were seen on green NAPA hat.



Florida Zoom conferencing:

Membership Drive Committee organized a zoom meeting with agricultural and allied disciplines' students at the University of Florida, Gainesville in July 2019. President Karki, Vice-president Parajulee, and General Secretary and Membership Drive Committee Chair elaborated NAPA's journey, present status, and future strategy with 12/15 participants. Thanks Dr. Dev Poudel, life member and NSA president Dipendra Shai for hosting the meeting.

Interaction program in Georgia:

President Karki visited agricultural and allied disciplines' students at the University of Georgia in Athens in June 2019. Life member Shiva Makaju other NAPA members and potential members participated in the interaction at the community center hall. President Karki briefly described the past activities, present status, and future strategy of NAPA. The meeting was very fruitful. Many students showed their interest to join NAPA and expressed their desire to contribute to NAPA. NAPA is thankful to Chandra Dhakal, Usha Bhatt, Shiva Makaju, and all for hosting the meeting.

AAEA Conference, Atlanta

President Karki shared NAPA proceedings, brochures, and pens with NAPA members and beyond at the Agricultural and Applied Economics Conference (AAEA) in Atlanta in July 2019. He invited all of them to participate in NAPA 2020 conference in Atlanta, Georgia during May 22-24. He also requested potential members to join and share their expertise to promote NAPA's goal 'Global Food Security through Agricultural Transformation'. Life members Krishna Poudel, Aditya Khanal, and member Chandara K. Dhakal also joined.



Agri-Connection Newsletter is an excellent medium to reach out to the audiences in the world through your articles, essays, informative collections, and literary creativities. Send them by email at napa2072@gmail.com anytime!

- Agri-Connection Editorial Board

NAPA News

NAPA Outreach Activities

NAPA's Contribution to Tribhuvan University/IAAS Postgraduate Curriculum Development

Tribhuvan University/Institute of Agriculture and Animal Science (TU/IAAS), in partnership with USAID, requested NAPA Executive Committee to recommend scientists and professionals representing various agricultural disciplines for consideration to serve as experts in post-graduate curriculum revision. NAPA announced the IAAS request to its members and solicited the self-nomination for consideration. NAPA submitted nominations of candidates representing five agricultural and natural science disciplines. TU/IAAS selected NAPA Vice President Megha Parajulee for their first round of curriculum revision project.



Vice President Parajulee delivered a lecture on Cooperative Extension in Nepal and NAPA's potential role in collaborative partnerships at IAAS Lamjung Campus.

NAPA authorized Parajulee to represent NAPA for the two-week assignment (September 14-27, 2019) to help revise the IAAS postgraduate curriculum. During the assignment, he conducted a comprehensive gap analysis and need assessment for IAAS via examination of several land grant university curricula in agriculture in the United States prior to his arrival in Nepal. While in Nepal, he organized six interaction programs to further assess the need and gaps in the curricula. An extensive



A 1-day workshop to discuss Dr. Parajulee's preliminary report and interaction with agricultural consumer line agencies, Kathmandu

interaction program was held at IAAS Lamjung Campus focusing on Plant Science curricula on September 18, 2019. Entire faculty was involved in this interaction which included the presentation by each faculty of department-wise course curricula, current strength and limitation in courses, and the perceived issues with the current courses. He also engaged in Q&A sessions with faculty members as a group to ensure that all issues were captured. A separate session was organized with students that included a seminar by Dr. Parajulee on agricultural education, cooperative extension, and the curriculum that serves the research-teaching-extension and service in global agriculture. Dr. Parajulee delivered an adjunct seminar on NAPA's role, vision, and possible areas of collaboration with faculty and students at IAAS. Similar interaction programs as in Lamjung Campus were held at IAAS Paklihawa Campus on September 19, 2019. A fourth interaction program was held at IAAS Rampur Campus in Khairahani which involved the visit of the teaching/research facility, Q&A with Campus Chief and few faculty members and students. In addition, an interaction was held at Department of Agriculture which included the meeting with several senior level agriculture officers including the Director General and Deputy Director General. Such informal interaction was initiated by Dr. Parajulee to seek input from his former students about the post-graduate curricula based on their long career in agriculture service.

A one-day workshop was held in Kathmandu on September 26, 2019 with IAAS and agriculture stakeholder agencies (AFU, NARC, MoALD, and I/NGOs), discussed the preliminary findings based on Dr. Parajulee's interactions with IAAS faculty and students at four campuses, and the needs and gaps were further identified based on collective discussion at the workshop. The product of the two-week assignment was a recommendation by Dr. Parajulee for a comprehensive overhaul of IAAS postgraduate curriculum.



Vice President Parajulee conducting an interaction program with IAAS Paklihawa students and faculty on agriculture curricula and NAPA's programs and activities.

NAPA News

Community Services by NAPA Members

Blood donation in Nashville

Each year, Nashville Nepalese Association (NNA) hosts a blood donation drive in partnership with the American Red Cross. This year too, the community had an enthusiastic participation in the drive. A total of 18 generous donors including NAPA members Sarita Acharya, Santos Kaji Thapa and Deependra Bhatta donated a total of 13 units of blood, which will potentially save 39 lives. NAPA member and Chair of 2020 Student Writing Contest Sub-committee Dr. Bharat Pokharel coordinated the program with assistance from Atullya Dangol, AJ Bhattarai and Sarita Acharya.



**DONATE
BLOOD** +

Blood donation in Lubbock

Blood Donors of America Life Member and NAPA Joint Life Member Sharmila Parajulee donated blood at the Lubbock Blood Drive on August 31, 2019 on the occasion of Teej.



Appeal for donation/sponsor for Research Mini-Grant Pool Funds

We are encouraged to have so many proactive donors and sponsors contributing to **Research Mini-Grant (RMG) Pool Funds** in a short period. NAPA respectfully requests all generous donors to spare a few dollars by sacrificing small expenses (such as coffee/tea/drinks/movie/dining out etc.) for the next few months in order to generate a mini-grant pool money for collaborative research in Nepal. More importantly, we seek RMG sponsors to support collaborative research for developing capacity of undergraduate/graduate students, local faculty, and post graduate professionals (\$200 and up). Therefore, you have been invited to make a difference in research-based agricultural education in Nepal by

sponsoring at least one mini-grant for an impactful scientific investigation. However, anyone willing to contribute to RMG for collaborative research may donate any amount to the RMG pool funds and the amount will be disbursed to support selected small-scale projects. Such pool-funded projects will be solicited, evaluated, selected, supported, and managed by Executive Committee in consultation and as per the recommendation by Resource and Capacity Building Committee (RCBC) depending on the amount of funds in the RMG pool fund. Your generosity is NAPA's inspiration to serve the community back in the motherland and beyond.

Policy/Research Brief series publication: Appeal for your contribution

Dear valued NAPA members,

NAPA publishes Research/Policy Brief (RPB) as a concise summary of original research or literature review pertaining to various aspects of agriculture and related areas in Nepal. This publication is intended to articulate evidential issues, and suggest policy alternatives and/or practical options for improving the situation. Previous issues of RPBs are available online at <http://www.napaamericas.org/research-and-policy-briefs.php>. Please submit your articles in the area of Agricultural and/or Allied Sciences, including but not limited to Agricultural Ecology; Agricultural Economics; Agricultural Engineering; Agricultural Extension; Agroclimatology; Agronomy/Crop Science; Animal Science and Veterinary Medicine; Applications of Remote Sensing, Geographic Information System (GIS), and Crop Modeling in Agriculture; Climate Change; Environmental Science; Entomology/Plant Protection; Farming Systems and Sustainable Agriculture; Forestry/Agro-forestry; Horticulture; Natural Resources; Plant Breeding/Applied Genetics/Bio-technology; Plant Pathology; Soil Science; Weed Science, and related disciplines.

Here is a brief guideline on how to write RPB for your kind reference:

Title must be engaging and brief and of not more than **10 words**.

Abstract should have succinct statements of aim, problem, summary of research, and policy implications / recommendations - maximum of **100 words**.

The **Body** of the brief should consist of **aim, problem, methods, research findings, conclusion/discussion** with main takeaway messages, **policy implications, actionable recommendations** and **references**.

The brief should be written in **plain language with broad range of audience in mind**, such as agricultural professionals, stakeholders, and policy makers in Nepal.

Use **American English** with **active voice**.

The content should preferably be less than **six pages**.

Use **figures and graphs** to illustrate the facts and demonstrate patterns.

Use **12-point Times New Roman** font. Margins should be 2.5 cm (1 inch) on all sides.

Indent the first line of paragraphs by 0.5”.

Do not annex any appendices.

Limit references to 10. Format references in accordance with the **American Psychological Association (APA)**, 6th edition.

Submit the manuscript as a **Microsoft Word** document

For additional information please contact:



Dr. Ramjee Ghimire
Editor-in-Chief
Policy and Research Brief
Association of Nepalese Agricultural
Professionals of Americas (NAPA)
E-mail: ramghi@gmail.com

[http://www.napaamericas.org/research-policy-brief-editorial-](http://www.napaamericas.org/research-policy-brief-editorial-committee.php)

[committee.php](http://www.napaamericas.org/research-policy-brief-editorial-committee.php)

Donation Appeal for Scholarships and Endowment Funds

With the donation received from sponsors, NAPA has established:

- ♦ **A Scholarship Fund for awarding meritorious students in Nepal**
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A robotic harvester developed by Dr. Manoj Karkee's team (<https://labs.wsu.edu/karkee-ag-robotics/>) under evaluation in a commercial apple orchard in Washington State. (Courtesy: Dr. Manoj Karkee)



A Mini-grant winner student, Rupak Karna taking observation on maize experiment in Nepal. (Courtesy: Dr. Rupak Karna)



Extensive white fields of two contrasting crops — Fiber (cotton) from Mississippi Delta in the left (Courtesy: anonymous) and Fragrance (white lavender) from Oregon in the right (Courtesy: Nityananda Khanal)

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Recent NAPA Webinars/talk Sessions

Cannabis as an Economic Crop: Prospect and Possible Use in Nepalese Context



Dr. Niranjan Aryal, Scientist at VRS labs, Long Beach California, USA, presented a 7th webinar covering contemporary perspectives in Cannabis as an economic crop on August 10, 2019. With an extensive global focus on the medical and economic aspects of cannabis, Dr. Aryal highlighted on

the use, history, and potential socio-economic importance of cannabis plant as an economic crop in the Nepalese context.

In the background to the crop, Dr. Aryal stated: "Human consumption of cannabis in various forms for medical and recreational purposes can be traced back to before-the-common era. Human selection of specific Cannabis strains has greatly altered the characteristics of the plant. Despite the long history of domestication and selective breeding, the evolutionary aspects and the underlying genetics have not been adequately understood. Due to

increased legalization of cannabis in western countries, including several states in the USA, the plant has attracted researchers and industrialists." Dr. Aryal also highlighted some biochemistry of active compounds in the Cannabis and their pharmaceutical values.

Dr. Aryal also elaborated that Nepalese civilization has a strong religious, medical, and recreational relation with Cannabis, hence, its pharmaceutical exploitations can boost the country's economy and bring back the prosperity to Nepalese people. He concluded that studies on the medical values of different cannabinoids, terpenoids, and other secondary metabolites in the cannabis plant may yield great utility to human society. At the end of the webinar, Dr. Aryal responded to several questions from participants. About 25 NAPA members from various countries attended this webinar.

Dr. Aryal holds a PhD (2018) in Plant Biotechnology from Montana State University, USA.

Agro-biodiversity in Nepal: Conservation and utilization prospects and challenges



In the NAPA's 14th Talk Session conducted on September 14, 2019, **Dr. Bal Krishna Joshi**, Senior Scientist, Nepal Agricultural Research Council (NARC), provided a thorough insight into Nepal's agro-biodiversity and significance of its conservation and utilization for agricultural development in Nepal.

He highlighted that just three crops: rice, wheat, and maize contribute nearly 60% of calories and proteins that people obtain from plants in the world. "Nepal ranks 49th position in terms of biodiversity richness in the world and 10th in Asia. There are 790 plant species having food value in Nepal and 577 are already cultivated. Among 577 cultivated species, 484 are indigenous and 93 are introduced species. Unfortunately, more than 50% of agro-biodiversity has been lost and country's dependency is about 95-100% on foreign germplasm for agricultural research and development". Dr. Joshi also discussed recent initiatives to conserve agro-biodiversity in Nepal. He stated that 25 conservation

approaches have been practiced in Nepal to manage all the agricultural genetic resources. "National Gene bank has adopted four conservation strategies, namely ex-situ, on-farm, in-situ, and breeding along with 60 different good practices. National Gene bank currently holds more than 15,000 accessions of 100 plant species in Seed Bank, Tissue Banks, and Field Gene banks. Nevertheless, only 5% agro-biodiversity has been used in research and development". He also outlined the roles NAPA could play in the effort of safeguarding Nepal's agro-biodiversity. NAPA President responded that NAPA is interested to have further conversations with Dr. Joshi and other experts of NARC to identify the areas of collaboration. Dr. Joshi responded to several questions from webinar participants.

Dr. Joshi has been involved in conserving and managing agro-genetic resources, molecular breeding, and isozyme analysis of rice and buckwheat since early 1990s. He has published over 300 articles (journal articles, books, and book chapters) and is the Editor-in-Chief of the Journal of Nepal Agricultural Research Council since 2018.

Recent NAPA Webinars/Talk Session

How can emerging tools of agricultural biotechnology assist Nepal in its quest for food security?



NAPA had an honor of having **Dr. Channapatna S. Prakash**, Dean and a professor of crop genetics and biotechnology of the College of Arts and Science (CAS) at Tuskegee University, Alabama, USA, as a presenter in the NAPA's 15th Talk Session. In his presentation, Dr. Prakash provided

an overview of these novel technologies with examples of successful research outcomes in many developing and developed countries. He stated that many recent developments in agricultural biotechnology hold considerable potential in advancing sustainable development in Nepal. He discussed advances in genomics, gene transfer, proteomics, bioinformatics, and genome engineering and how these innovations can be employed to enhance ecologically friendly crop and animal production for small holders in Nepal. As these novel genetics technologies are already making an impact on agriculture in many countries, there is considerable interest on how Nepal can benefit from them. Dr. Prakash called upon impacting policy makers to ensure creation of favorable policy environments to support and integrate research on these frontier technologies in the current agricultural research in

Nepal. He further highlighted the importance of enhancing public understanding of emerging technologies to ensure their wider societal acceptance. Dr. Prakash addressed the concerns surrounding the negative impact of dependency of imported seeds on the local seed conservation by highlighting the fact that benefits of genetically modified (GM) technology far outweigh the associated costs. Also, he emphasized the public sector of Nepal should step up and adopt a robust mechanism of germplasm collection and gene bank. The talk session was attended by many members and non-members of NAPA from Nepal, Australia, Canada and around the USA.

Dr. Prakash was recognized for his outstanding work on agricultural biotechnology outreach with the award of the prestigious 2015 Borlaug CAST Communication Award, by the Council of Agricultural Science and Technology. He was also recognized by *Huffington Post* as among the **Top 30 social influencers in biopharma and biotech**. He also serves as Co-Editor-in-Chief of a highly respected journal *GM Crops & Food*. He has won numerous prestigious awards, including the Morrison-Evans Outstanding Scientist Award.

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Featured NAPA Member of the Quarter (Jun–Sep 2019)



Ramjee P. Ghimire, Ph.D.
 Researcher, Department of Animal Science
 Michigan State University

Education:

B.V.Sc., Konkan Agricultural University, India

M.S., Agricultural and Rural Development, Western Sydney University, Australia

Ph.D., Community, Agriculture, Recreation and Resource Studies, Michigan State University

Dr. Ramjee P. Ghimire is an experienced program planner, development worker, and researcher. Currently, he is working as a researcher in the Department of Animal Science at Michigan State University (MSU). Prior to joining MSU, Dr. Ghimire served for over 15 years, first half as the field veterinarian and later half as the senior officer, contributing to designing policy and leading monitoring and evaluation in the Department of Livestock Services at the Ministry of Agriculture (MoA) in Nepal.

The following are Dr. Ghimire's major undertakings:

- ◆ Involved in many interdisciplinary projects and has secured grants for his research and development projects.
- ◆ Serving as a team member in an Exchanges, Training, and Scholarship component of USAID funded project, Center of Excellence in Agriculture in Egypt.
- ◆ Serving as an investigator and working with the MSU Extension program, he recently completed a Comprehensive Compost Manure Marketing project wherein he did project planning, design and administer surveys, and analyzed research data.
- ◆ Serving as a team member of the WorldTAP program within the College of Agriculture and Natural Resources at MSU and coordinating the publication of poster and policy briefs.
- ◆ Currently writing a book chapter on Agricultural Extension Services in Nepal: Past, Present, and Future.
- ◆ Recognized as one of the best presenter at the 30th Conference of Association of International Agricultural and Extension Education in Miami, Florida.
- ◆ Serving as a reviewer for over half a dozen journals.
- ◆ Affiliation with Association for Asian Studies, American Evaluation Association, Association of International Agricultural and Extension Education, and North American Colleges and Teachers of Agriculture.
- ◆ He serves as an advisor for the Nepalese Association of Michigan, and Nepalese Student Association at MSU.
- ◆ Life member of Nepalese Agricultural Professionals of Americas (NAPA)
- ◆ Editor-in-Chief of the NAPA's Research and Policy Brief Editorial Committee and a member of the Resource and Capacity Building Committee (RCBC).
- ◆ One of the co-organizers for the forthcoming NAPA Second Biennial International Scientific Conference 2020.

About Featured NAPA Member

Every issue of Agri-connection has been featuring one of the outstanding NAPA members in different areas of agriculture and allied sciences.

In consultation with NAPA Executive Officers, Agri-Connection Editorial Committee identifies a member who is highly active in various NAPA roles and can be seen as a rising star in NAPA Community.

Article

Global food security through agricultural transformation

A concise version of the essay that won Third Place Award in the Student Writing Contest organized by NAPA in 2018

Santosh Thapa, Ph.D.

Tennessee State University, USA Email: thapasantosh065@gmail.com



Background

The correlation between the advancement in human well-being and the transfiguration in the source of food, water, and energy use is one of the influential trademarks of human history. Food security is an imperative factor to all dimensions of sustainable development. Along with the energy, food security is a prime aspect of macroeconomic growth, a crucial source of environmental stress at regional, national, and international level, and a vital requisite for social needs as its inequity in distribution and quality yield in social issues (Munasinghe, 2002). The abundant, affordable, and reliable food supply and services in accordance with socio-economic needs and in a safe and environmentally benign pattern enhances the economic expansion. When scarce, it curbs the economic expansion yielding a change in technological and consumption patterns. The meteoric rise in world population, global industrialization, and urbanization have triggered the increase in demand for food and energy over the last century.

The global food supply is disproportionately centralized in Western societies and developed nations. This inequitable distribution of agricultural commodities and food supply culminates in socio-economic tensions, geopolitical unrest and imperils the food security of the importing nations. The potential supply of food along with oil (gas) poses exigent policy issue in a world where the food and energy demand over the next 15-20 years is anticipated to grow rapidly (Rizer, 2011). As such, the dwindling supply of indigenous agricultural resources and food in developing economies, coupled with global warming as a foremost environmental concern have added new immediacy to the renewed interest in the pursuit of accessible, affordable, and eco-friendly sustainable global food supply. In brief, achieving the global food security is and will remain as one of the major contemporary concerns for the next few decades in the global avenue. This requires a global strategy, policy reforms, multifaceted public-private collaboration as well as investment in research-based agriculture and

biotechnology.

It is a universal right of every individual to have adequate access to the food supply. In 21st century, agriculture is more than just a source of food; it is the principal contributor to the individual as well as the national economy. The availability of the food is not a vital concern; rather the access to optimum food sources is of prime concern. A nation with self-sufficiency in food production doesn't necessarily guarantee food security at the grassroots level. An epitome of this is, many Indian citizens are not food secure despite India being self-sufficient; to the sharp contrary, agriculture in Singapore is non-existent, nevertheless, its citizens are food secure (Schmidhuber, and Tubiello, 2007).

Challenges and Prospects of Agricultural Transformation

There are numerous issues facing global food security. Global food security is a challenge, while climate change is a culprit. Climate change looms large as a threat to hampering agricultural productivity. The farmers across the globe, especially in developing nations are extensively vulnerable to adverse impacts owing to global warming. It is the agriculture sector that feels the effects of climate change more than any other sectors. It even affects the national revenue and limits the potential capacity of a country to procure food grains on the global market (Field et al., 2014).

The agro-ecological disorders ensued from climate change aggravates change in land suitability, perturbs bio-diversity, and thereby escalating crop yield risks. This hinders food production in various intricate ways and exacerbates vulnerability to hunger and malnutrition (Schmidhuber, and Tubiello, 2007). Even the easy access to food supply is at high risk under climate change (Wheeler and Broun, 2013). In addition, climate variability and adverse environmental disorders can favor the epidemic of infectious and water-borne diseases. This leads to decline in labor productivity and hence affect food safety and its security (Palut et al., 2007).

Global food security through agricultural transformation

Biotic stressors including weeds, insect pests, nematodes, and pathogens affect every crop field. These biotic threats claim around 15% of the total harvest every year globally (Oerke 2006). In addition, the excessive use of pesticides and insecticides have further caused the rise in pests outbreaks resulting a loss in crop productivity (Chakraborty and Newton, 2011). Apart from these biotic stresses, the abiotic factors such as drought, salinity, heat, soil pollution, toxicity are some of the forefront threats that result in low crop yield. As of today, there is a dearth of appropriate technology in the developing nations for tackling biotic and abiotic stresses.

Hence, it's a high time for us to act collectively to the intense urgency of the present, thereby developing innovative tools to aid farmers conserve scarce natural resources while producing food and fiber to the world.

Climate-smart agriculture (CSA) can portray a prominent role in ensuring food security. CSA is the modern approach that constitutes scientific farming techniques and technologies to transform and re-orient the existing agricultural systems. The advancement in CSA enhances sustainable food production from the existing agricultural land with less carbon footprint (Tylor, 2018). CSA approaches include but not limited to improved grassland and forestry management under landscape approach; integrated livestock, aquaculture, crop and agro-forestry systems; practices such as cover crops, highly productive crops, reduced tillage, crop residues; use of better plant varieties and breeds, biotech plants, microbial inoculants and even anaerobic digesters (Lipper et al., 2014; McIntyre, 2009) Likewise, the exploitation of digitalized tools, data science, and information technology facilitates to analyze the status and the current needs of a field. For instance, it benefits in making precise decisions about the usage of farm inputs such as right fertilizers and pesticides at right time, right spot and right quantity (Bongiovanni and Lowenberg-DeBoer, 2004). The reduction in the use of agri-chemicals, insecticides and pesticides lead to the less damage to the natural habitats, reduces economic burden and lower resistance (King, 2017).

There are multiple options to helping plants to withstand biotic and abiotic stresses. The cohesive cocktail approaches of the modern innovations such as biotechnology, genomics, plant breeding techniques,

use of agricultural biologicals, utilization of digital tools such as robotics and sensing technology along with the adaptation of agronomic and cropping practices can impart customizable solutions to various problems. The deployment of microbial products to replace agri-chemicals and the exploitation of agricultural biological technology called BioDirect™, which involves naturally occurring phenomenon called ribonucleic acid interference (RNAi) can further offer better pest and disease tolerance, thereby improving crop yield (<https://monsanto.com/innovations/agricultural-biologicals/>). Such a technological revolution in farming hold promise to enhance productivity, while reducing the impact on natural eco-systems.

The plant quarantine is the foremost line of managing the risk of plant disease and pests. The use of balanced pesticides in systems of integrated pest management (IPM) is one of the critical methods to control pests and pathogens, particularly fungi, nematodes, and their vectors. The plant breeding techniques have been instrumental in the development of improved crop varieties, which offer a win-win situation for better crop harvest as well as a positive impact on agro-ecosystem. The use of environmentally benign molecular breeding techniques based on genetic mapping and DNA markers such as Marker-assisted selection (MAS) deliver better selectivity of genotypes. An archetype of this is the use of MAS technique in bean breeding as a tool to limit various diseases such as bean rust, bacterial light, white mold, etc. (Kelly et al., 2003; Beaver and Osorno, 2009). The genetically engineered plants have also delivered optimum efficacy in phytoremediation by protecting soil contamination from toxic chemicals and heavy metals (Vasil, 1998) For example, stem rust in wheat is an outstanding issue that poses imminent threats in global food security especially in vulnerable parts of the world (Vurro et al., 2010). The development of polymerase chain reaction markers for the selection of stem rust resistance gene through the application of modern critical genomics, and molecular biology approach is the most efficacious strategy for controlling stem rust epidemics, thereby enabling food supply (Helguera et al., 2003; Mago et al. 2011).

The exploitation of genome sequencing, chip sequencing, the use of metagenomics, proteomics, transcriptomics, meat-transcriptomics, gene editing using CRISPR (clustered regularly interspaced short

Global food security through agricultural transformation

palindromic repeats) technology, the advancement involving the highly phylogenetic traits show further prospect for reducing the crop yield-gap and boost the global food production. Such novel technologies also boost the efficiency in livestock production and their products. For instance, the use of genetically improved plant varieties with modified composition as animal feed could enhance the meat production efficiency in livestock as well as reduce methane emissions (Godfray et al., 2010; Hays et al., 2013).

In developing nations, the post-harvest loss of various food produce is significant due to the lack of food-chain infrastructures, proper scientific knowledge, and investment in cold storage technologies. The development of modern storage facilities, greater public investment in transport pre-requisites, sophisticated market functioning, and capital availability are essential to prevent gluts and wastages (WRAP, 2008).

Another emblematic concern in terms of global food supply perspective is the use of food crops and the agricultural land for the production of biofuel feedstock (Gasparatos et al., 2013). This would engender an inherent stress on food commodities and hence intimately linked to global food supply. The exploitation of microbial metagenomes for the development of novel biological enzymes that could deconstruct the cellulosic biomass could complement in the cellulosic biofuel industry, thereby reducing the strain on food supply chain and the natural habitats (Thapa et al., 2017).

Conclusions

Global food security is in a quandary. Feeding an additional two to three billion new guests who will join the planetary dinner table by 2050 is not straightforward albeit achievable. The call for rational approaches without irreparably deteriorating the natural systems while achieving United Nations' Sustainable Development Goals (i.e. ending hunger and achieving food security by 2030) is of notable gravity. The greatest breakthrough in agricultural transformation will likely come through the compounding incorporation of multiple biotechnological omics tools (i.e. genomics, proteomics, transcriptomics, meta-transcriptomics, bioinformatics), agricultural engineering and mechanization, big data and nanotechnology-based sensors and digital technology in agriculture science. Such advancement in science and technology have the prodigious

potential for helping farmers enhance production efficiency.

References

- Munasinghe, M., *Macroeconomics and the Environment*. 2002: Edward Elgar Publishing.
- Rizer, A., *The National Security Threat of Energy Dependence: A Call for a Nuclear Renaissance*. Harv. Nat'l Sec. J., 2011. 2: p. 193-11. Schmidhuber, J. and F.N. Tubiello, *Global food security under climate change*. Proc Natl Acad Sci U S A, 2007. 104(50): p. 19703-8.
- Godfray, H.C.J., et al., *Food security: the challenge of feeding 9 billion people*. science, 2010. 327(5967): p. 812-818.
- Field, C.B., et al., *Climate change 2014: impacts, adaptation, and vulnerability*. Vol. 1. 2014: Cambridge University Press Cambridge and New York.
- Palut, M.P.J. and O.F. Canziani, *Contribution of working group II to the fourth assessment report of the intergovernmental panel on climate change*. 2007, Cambridge University Press.
- Wheeler, T. and J. Von Braun, *Climate change impacts on global food security*. Science, 2013. 341(6145): p. 508-513.
- Taylor, M., *Climate-smart agriculture: what is it good for?* The Journal of Peasant Studies, 2018. 45(1): p. 89-107.
- McIntyre, B.D., *International assessment of agricultural knowledge, science and technology for development (IAASTD): global report*. 2009.
- Lipper, L., et al., *Climate-smart agriculture for food security*. Nature Climate Change, 2014. 4(12): p. 1068-1072.
- King, A., *The Future of Agriculture*. Nature, 2017. 544(7651): p. S21-S23.
- Bongiovanni, R. and J. Lowenberg-DeBoer, *Precision agriculture and sustainability*. Precision agriculture, 2004. 5(4): p. 359-387.
- Chakraborty, S. and A.C. Newton, *Climate change, plant diseases and food security: an overview*. Plant Pathology, 2011. 60(1): p. 2-14.
- Oerke, E.-C., *Crop losses to pests*. The Journal of Agricultural Science, 2006. 144(1): p. 31-43.
- Vasil, I.K., *Agriculture: Biotechnology and food security for the 21st century: A real-world perspective*. Nature Biotechnology, 1998. 16(5): p. 399-33. Kelly, J., et al., *Tagging and mapping of genes and QTL and molecular marker-assisted selection for traits of economic importance in bean and cowpea*. Field Crops Research, 2003. 82(2-3): p. 135-154.
- Beaver, J.S. and J.M. Osorno, *Achievements and limitations of contemporary common bean breeding using conventional and molecular approaches*. Euphytica, 2009. 168(2): p. 145-175.
- Vurro, M., B. Bonciani, and G. Vannacci, *Emerging infectious diseases of crop plants in developing countries: impact on agriculture and socio-economic consequences*. Food Security, 2010. 2(2): p. 113-132.
- Xiong, J.S., J. Ding, and Y. Li, *Genome-editing technologies and their potential application in horticultural crop breeding*. Hortic Res, 2015. 2: p. 15019.
- Hayes, B.J., H.A. Lewin, and M.E. Goddard, *The future of livestock breeding: genomic selection for efficiency, reduced emissions intensity, and adaptation*. Trends in Genetics, 2013. 29(4): p. 206-214.
- Waste and Resources Action Programme (WRAP), The Food We Waste (WRAP, Banbury, UK, 2008)*.
- Gasparatos, A., P. Stromberg, and K. Takeuchi, *Sustainability impacts of first-generation biofuels*. Animal Frontiers, 2013. 3(2): p. 12-26.
- Santosh Thapa, H.L., Joshua O, Hair Sarabjit Bhatti and Suping Zhou, *Metagenomics Prospective in Bio-mining The Microbial Enzymes*. Journal of Genes and Proteins, 2017. 1(1).

Members' Publications and Presentations



Journal Articles

- Acharya, P., **R. Ghimire**, and Y. Cho. 2019. Linking soil health to crop production: Dairy compost application rates affect soil properties and sorghum biomass. *Sustainability* 11, 3552. DOI: <https://doi.org/10.3390/su11133552>.
- Bicego, B., **Sapkota, A.**, & Torrion, J. A. (2019). Differential Nitrogen and Water Impacts on Yield and Quality of Wheat Classes. *Agronomy Journal*, 111, 1–12. doi:10.2134/agronj2019.04.0283
- Bista, P., R. Ghimire**, S. Machado, and L. Pritchett. 2019. Biochar effects on soil properties and wheat biomass vary with fertility management. *Agronomy* 9(10): 623. DOI: <https://doi.org/10.3390/agronomy9100623>.
- Charles C. Mischke, David J. Wise, Craig S. Tucker, Matt J. Griffin, Beth H. Baker, Terry E. Greenway, Todd S. Byars, **Ambika Tiwari**. (2019). Copper Sulfate Pretreatment for Snail Control Reduces Channel Catfish Fry Survival. *North American Journal of Aquaculture*. DOI: <https://doi.org/10.1002/naaq.10083>
- Ganesh Kumar, Menghe H. Li, David J. Wise, Charles C. Mischke, Billy Rutland, **Ambika Tiwari**, Suja Aarattuthodiyil, Matt J. Griffin, Lester H. Khoo, Brian Ott, Les Torrains, Craig S. Tucker. (2019). Performance of Channel Catfish and Hybrid Catfish in Single-batch, Intensively Aerated Ponds. *North American Journal of Aquaculture*. DOI: <https://doi.org/10.1002/naag.10109>
- Ghimire, R., P. Bista**, and S. Machado. 2019. Long-term management effects and temperature sensitivity of soil organic carbon in grassland and agricultural soils. *Nature Scientific Reports* 9:12151. DOI: <https://doi.org/10.1038/s41598-019-48237-7>.
- Ghimire R., V.R. Thapa**, A. Cano, and V. Acosta-Martinez. 2019. Soil organic carbon and microbial community responses to croplands and grasslands management. *Applied Soil Ecology* 141: 30-37. Doi: <https://doi.org/10.3390/su11133552>.
- Ghimire, R., B. Ghimire**, A.O. Mesbah, **U. M. Sainju**, and O.J. Idowu. 2019. Cover crops effects on soil organic matter and nutrient dynamics in a winter wheat-summer fallow system. *Agronomy Journal* 111: 2108-2115. DOI: <https://doi.org/10.2134/agronj2018.08.0492>.
- Matt J. Griffin, Lester H. Khoo, Stephen R. Reichley, Cynthia Ware, Thomas G. Rosser, Neely R. Albeson, Ethan T. Woodyard, Linda M. Pote, Terrence E. Greenway, **Ambika Tiwari**, Charles C. Mischke & David J. Wise. (2018). Encapsulation of *Bolbophorus damnificus* (Digenea: Bolbophoridae) Metacercariae in Juvenile Channel Catfish, *Ictalurus punctatus*, is Linked to Delayed-onset Mortality. *Journal of the World Aquaculture Society*. 49(3):601-611 DOI: <https://doi.org/10.1111/jwas.12472>
- Menghe H. Li, David J. Wise, Charles C. Mischke, Suja Aarattuthodiyil, **Ambika Tiwari**, Penelope M. Lucas, Craig S. Tucker, Eugene L. Torrains, & Thishya Perera. (2018). Pond-raised Hybrid Catfish, ♀ *Ictalurus punctatus* × ♂ *Ictalurus furcatus*, Do Not Respond to Microbial Phytase Superdosing. *Journal of the World Aquaculture Society*. DOI: <https://doi.org/10.1111/jwas.12539>
- Muhammad, I., **U.M. Sainju**, A. Khan, F. Zhao, **R. Ghimire**, X. Fu, and J. Wang. 2019. Regulation of soil CO₂ and N₂O emissions by cover crops: a meta-analysis. *Soil and Tillage Research* 192: 103-122. DOI: <https://doi.org/10.1016/j.still.2019.04.020>.

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Members' Publications and Presentations

Journal Articles

- Paneru, B., Karki, U., Bhattra, S., & Ellis, N.** (2019). Production Period of Different Browse Species Suitable for Grazing Small Ruminants. *Professional Agricultural Workers Journal*, 7(1), 89.
- Sapkota, A., Meccage, E., Stougaard, R. N., Bicego, B., & Torrion, J. A.** (2019). Applied Boron Increases Alfalfa Petiole Boron Concentration across Water Regimes, Not Yield. *Agronomy Journal*, 111(6), 1-10.
- Thapa, V. R., Ghimire, R., Duval, B. D., & Marsalis, M. A.** (2019). Conservation Systems for Positive Net Ecosystem Carbon Balance in Semiarid Drylands. *Agrosystems, Geosciences & Environment*, 2(1). doi:10.2134/age2019.03.0022
- Thapa, V.R., R. Ghimire, B. Duval, and M. Marsalis.** 2019. Soil organic carbon and net ecosystem carbon balance in semiarid cropping systems. *Agrosystems, Geosciences, and Environment* 2:190022. DOI: <https://doi.10.2134/age2019.03.0022>.
- Thapa, S., J.C. Rudd, Q. Xue, M. Bhandari, S.K. Reddy, K.E. Jessup, S. Liu, R.N. Devkota, J. Baker, S. Baker.** 2019. Use of NDVI for characterizing winter wheat response to water stress in a semi-arid environment. *Journal of crop improvement*. 33(5): 633-648. DOI:10.1080/15427528.2019.1648348
- Wagle, P., P. H. Gowda, P. Manjunatha, B. K. Northup, A. C. Rocateli, and S. Taghvaeian.** 2019. Carbon and water dynamics in co-located winter wheat and canola fields in the U.S. Southern Great Plains. *Agricultural and Forest Meteorology* 279: 107714. DOI: <https://doi.org/10.1016/j.agrformet.2019.107714>.
- Wagle, P., P. H. Gowda, B. K. Northup, P. J. Starks, and J. P. S. Neel.** 2019. Response of tallgrass prairie to management in the U.S. Southern Great Plains: Site descriptions, management practices, and eddy covariance instrumentation for a long-term experiment. *Remote Sensing* 11(17): 1988. DOI: <https://doi.org/10.3390/rs11171988>.
- Wagle, P. and P. H. Gowda.** 2019. Editorial for the special issue "remote sensing of evapotranspiration (ET)". *Remote Sensing* 11: 2146. DOI: <https://doi:10.3390/rs11182146>.
- Wijekoon, C., Singer, S., Weselake, R., Subedi, U., & Acharya, S. N.** 2019. Evaluation of virus-induced gene silencing methods for forage legumes including alfalfa, sainfoin and fenugreek. *Canadian Journal of Plant Science*. doi:10.1139/CJPS-2018-0329.
- Karki, L. B. and U. Karki.** 2019. Economic implications of year-round forage production and grazing management. *Professional Agricultural Workers Journal* 7(1): 50-64.

Oral Presentation

- Subedi, B., He, G.** (2019). Base editing to induce mutagenesis in FAD2 gene of peanut CRISPR/nCas9. In proceedings of 47th George Washington Carver Lecture Series (GWCLS), October 4, 2019, Tuskegee University, Tuskegee, AL.

Poster Presentations

- Dhakal, K, Zhu, Q., Friel, J., Edwards, C., Donovan, P., Zhang, B., & Li, S.** (2019). Use of drone images to study canopy cover in edamame. First Annual SPES Graduate Student Poster Show Competition, October 31, 2019, Blacksburg, VA.
- Thapa, V. R., Ghimire, R., & Acosta-Martinez, V.** (2019). Soil Microbial properties as a indicator of soil health under Limited-Irrigation crop rotation in semi arid Eastern New Mexico. Soil Health Institute Annual Meeting. July 16-18, 2019, Sacramento, CA.

Welcome New NAPA Members on Board

We are growing !

Our total NAPA membership is at 331 that includes 66 Life Members, 64 General/Regular Members, 142 Student Members, 44 Associate Members, and 15 Family/Joint Members. We are greatly privileged to welcome the following new members in this quarter !

Associate Members

- ◆ Mr. Ram K. Shrestha, Nepal
- ◆ Mr. Thaneswar Bhandari , Nepal

General/Regular Members

- ◆ Dr. Youssouf Diabate, AL
- ◆ Dr. Uttam Bhattarai, GA

Life Members

- ◆ Dr. Prafulla Regmi, NC
- ◆ Dr. Kalpana Khanal, MA
- ◆ Dr. Siroj Pokharel, CA
- ◆ Mr. Pramod Pokhrel, TX
- ◆ Dr. Madhav Dhakal, MS
- ◆ Ms. Geeta Kharel, AL
- ◆ Dr. Lila Khatiwada , IN
- ◆ Dr. Laxman Adhikari , KS

Students Members

- ◆ Mr. Deva Raj Khanal, South Dakota State Univ.
- ◆ Mr. Mandeep Adhikari, Mississippi State Univ.
- ◆ Mr. Saurav Kunwar, University of Georgia
- ◆ Mr. Anukul Bhattarai, University of Georgia
- ◆ Mr. Sudeep Pandey, University of Georgia
- ◆ Mr. Udaya Subedi, Univ. of Lethbridge, Alberta, Canada
- ◆ Ms. Sapana Pokhrel, Mississippi State Univ.
- ◆ Mr. Suraj Sapkota, University of Georgia
- ◆ Ms. Prakriti Sharma, South Dakota State Univ.

Enjoy privileges with your NAPA membership: Just a few examples

- Peer-to-peer networking and research collaboration opportunities
- 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 NAPA awards, scholarships, and endowment funds
- Share expertise via NAPA's Talk Sessions (Webinars) and Online Teaching/Learning Programs
- Discounted rates for registration and hotel reservation during scientific conferences organized by NAPA; and many more !

Article

Fresh produce safety and quality in Federal Nepal: Issues, need, and way forward

Dr. Bed Khatiwada and Shobha Osti
Email: bedkhatiwada@gmail.com



Context

Fresh produce, especially fruit and vegetables, are integral part of the Nepalese food system. Traditionally grown in backyards, home gardens and terrace risers for subsistence, fresh produce are major source of minerals, vitamins, proteins, and carbohydrates among other nutrients. Increased urbanization and rapid outmigration of economically active members of rural farm households into the urban areas and for foreign economic opportunities have resulted in growing dependence on market for their fresh produce need, while having their farms in the rural areas left uncultivated. Increased market demand for produce motivated farmers to use synthetic chemicals such as pesticides, fertilizers, growth regulators and so on to boost productivity and reap higher profit. Lack of strict enforcement of existing acts, regulations and standards on food safety and quality along pre-harvest or postharvest supply chain has led to haphazard use of chemicals either to boost production or prolong shelf life. The situation is pathetic both for imported as well as local fresh produce due to high level of chemical residues posing detrimental consequences on human and environmental health. Unfortunately, the issues of 'quality or safety' in food system have received sporadic attention, while major thrust on 'agriculture sector' is dominated by 'quantity' focused policies and goals.

Quality: a luxury jargon or an objective reality?

Quality is the most erroneously used term in the current world market due to the lack of well-defined measurable indicators. In fact, quality is a 'quantitative' measurement of overall excellence of any product/services and has distinct measurable indices. Food safety and food quality are complementary attributes of food in that food safety refers to the properties food being free from health hazards to the consumers, whereas food quality is the overall excellence of the product in terms of nutrient content, size, shape, color, flavor, freshness, and hence signifies the product's value to consumers. Fresh produce safety implies the absence of physical, microbial or chemical hazards. Recent issue of tampering of strawberries with needle in Australia is most obvious example of food safety

concern. Infection of leafy vegetables with certain microbes including *E. Coli*, *Listeria* and so on due to the use of infected water are examples of microbial hazards. In Nepal, the practice of washing vegetables such as broadleaf mustard (rayo), spinach, radish and carrot using contaminated water are some notorious examples of compromising food safety. Produce quality, in other hand, refers to wholesomeness of the produce measurable in terms of physical or sensory indicators such as size, shape, color, visual appeal/defects, flavor, taste, internal texture, and flesh color.

All these internal or external quality parameters are reflections of nutritive value of the produce. For example, tomato with proper color development infers to good lycopene, carotenoid and anthocyanin content which are antioxidants with good health benefits. Similarly leafy vegetables are rich source of vitamins, minerals, and other micronutrients in their tender and fresh state, whereas pale, shriveled produce lacking of aroma indicate loss of nutrients. Consumption of low quality fresh produce with poor nutritive state or containing residues of hazardous chemicals is a mere compromise on consumers' health.

The way forward

The consumers are increasingly becoming conscious of the way food is produced, processed, transported, handled and marketed. They are now asking for the establishment of strong regulatory mechanism, monitoring and enforcement of standards for food safety and consumer health. Fresh produce is only a part of the entire food system. Thus, any discussion on need of fresh produce safety and quality should be viewed under broader framework of 'food safety and quality'.

Effective national food safety and quality assurance systems are imperative to protect the health and safety of people. It is also important to ensure the national standards of food safety and quality while foods are exported or imported to conform. Food safety/quality standards and guidelines are the basic minimum requirements to develop food control systems at national level.

Fresh produce safety and quality in Federal Nepal

Every member country of World Trade Organization (WTO) has opportunities for global food trade provided they have adopted the food control systems like *Codex alimentarius* or the country's own standards. Nepal does have acts, legislations, standards and guidelines in place to ensure food safety and quality. However, effective food quality assurance is challenged by the weakness in surveillance, monitoring, and its legal enforcement. Therefore, systematic and continuous enforcement of the regulatory measures are critical to minimize fraud, reduce adulteration and control deception.

Food standards of Nepal provide important guidelines for the quality of dairy products, fats and oils, fruit juices, jam and candy, spices and condiments, bottled drinking water, salts, cereals, legumes and their processed products including biscuits and noodles. Food standards have clearly stipulated the maximum residue limits for permitted pesticides and heavy metals including lead, arsenic, nickel, copper, and zinc. Furthermore, food standards have also specified the permitted use of preservatives by classifying them into the first and second classes. However, these standards are deficient in the aspects of fresh produce safety and quality, leaving outstanding lacks in the general guidelines for proper practices.

The quality specifications and standards in fresh produce include four major components namely general appearances, major defects, minor defects, and consignment criteria. The general appearance features include size, shape, color, visual appearance (e.g., glossy or rough), sensory features (e.g., crunchy, juicy), and maturity indicators such as total soluble solids or acidity content or firmness. The general appearance influences the presentation and visual appeal of fresh produce in the market and thereby affecting consumers' perception of quality. Major defect, depending on the type of fresh produce, includes signs of infestation of insect pests and diseases, physiological disorders and temperature related injuries such as chilling, freezing, and sunburn. Minor defects take account of minor skin marks and blemishes, and minor pest damage, which do not affect the overall quality of fruit. Consignment criteria is another important aspect in fresh produce quality which includes the degree of major and minor defects accepted by two parties (buyer and seller) along with packaging and labeling requirements and other certificates including sanitary and phytosanitary (SPS) documents. Consignment



Figure: Persimmon in the display in store.

criteria also include monitoring the level of chemical residues and contaminants as per national food act and standard.

Conclusion

Awareness of consumers is the driver of food safety and quality. Conscious consumers can pressurize the state to have appropriate regulatory mechanism. Fundamentally, it is the responsibility and commitment of the state to ensure safe and quality food to their people. Thus, government should be proactive in developing and enforcing the standards and guidelines for fresh produce safety and quality. Assurance of food safety and quality has multiple impacts on overall economic development of the country. It explicitly reduces health related costs, enhances economic performance of people and helps promote tourism. In the eve of Visit Nepal 2020, the tourism sector can benefit largely by assuring food safety and quality, and thereby elevating the confidence of tourists on the food hygiene, safety and quality standards. After federalism in Nepal, the food safety and quality matters are under the jurisdiction of local government. Hence, the local government should be empowered with required technical assistance, human resources and facilities (laboratories, mobile food quality testing service etc.) for proper enforcement of the food act at the local level. Enforcement of the food standards as prescribed in food act and food regulations is the first and foremost action needed at all levels.

Dr. B. Khatiwada is an expert in Postharvest Quality of Fresh Produce, working in fresh produce industry in Brisbane, Australia and Ms S. Osti is a Food Technologist, working with Dairy Industry in Brisbane Australia

Celebrating the Success: Members' Achievements

Graduate Assistantship

Mr. Saruj Khadka, Ph.D. Assistantship at University of Missouri, Columbia, Missouri State from Fall 2019. Best of luck on your career!



Mr. Amit Sharma, Ph.D. Assistantship in Biomedical & Veterinary Medical Sciences at Louisiana State University, Baton Rouge, Louisiana from Fall 2019. Best of luck on your career!



Student Competition Awards

Ms. Binita Subedi, Masters in Plant and Soil Science at Tuskegee University won First Place in Student Oral Competition at 47th George Washington Carver Lecture Series (GWCLS), October 4, 2019, Tuskegee University, Tuskegee, AL. Congratulations Ms. Subedi!



Mr. Sujan Bhattarai, Ph.D. in Aquaculture/Fisheries at University of Arkansas at Pine Bluff from Fall 2019. Best of luck on your career!



Happy Married Life



Congratulations to our NAPA Member Shankar Gaire and Barsha Bastola on their marriage!



May this beautiful couple have happy, healthy, and fortunate family life!

Please renew your membership (become life member if possible) if you have received renewal emails from NAPA before.
- Dr. Pradeep Wagle, Membership Drive Committee Chair

Celebrating the Success: Members' Achievements



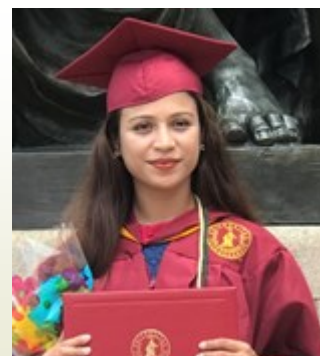
Congratulations New Graduates



Ms. Sangita Karki Graduates with her Master's Degree

Ms. Sangita Karki graduated with a Masters in Plant and Soil Science;
Concentration: Environmental Microbiology from Tuskegee University
Thesis title: Comparative assessment of soil health characteristics in response to woodland and silvopasture land use systems

Congratulations to Ms. Karki on her academic accomplishment!



Mr. Shailes Bhattraai Graduated with his Master's Degree

Mr. Shailes Bhattraai graduated with a Masters in Animal and Poultry Science;
Concentration: Animal Sciences from Tuskegee University
Thesis title: Evaluating the use of small ruminants in woodlands: Behavior, performance, and ecosystem impacts

Congratulations to Mr. Bhattraai on his academic accomplishment!



Mr. Amit Sharma Graduated with his Master's Degree

Mr. Amit Sharma graduated with a Masters in Aquaculture/Aquatic Sciences;
Concentration: Aquaculture/Aquatic Sciences from Kentucky State University.
Thesis title: Evaluation of spawning aids for induced spawning of Large-mouth Bass (*Micropterus salmoides*)

Congratulations to Mr. Sharma on his academic accomplishment!



An Appeal To Join/Renew NAPA Membership

NAPA would like to remind all members other than Life Members and Associate Members from Nepal to renew membership for another term (2018-2020) that started from the Oklahoma Conference (May 26-27, 2018). If you are not sure of your renewal date, please contact us at napa2072@gmail.com. Your contributions thus far to bring NAPA to the current level is greatly appreciated. Meanwhile, we would like to request potential members to join NAPA. We look forward to receiving your continued support and contribution (time, money, expertise, and creative ideas/thoughts) to advance NAPA to the next level - *'a common professional platform -for all of us.'*

A few reasons to join/renew NAPA membership:

NAPA is a member-driven voluntary organization. NAPA offers various benefits to its members to advance their career growth and successes at all stages. NAPA member benefits include (but not limited to):

- 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 NAPA awards, scholarships, and endowment funds
- Opportunity to share scientific works, experiences, and expertise via NAPA'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 NAPA's programs and activities
- Volunteering and charitable opportunities
- Discounted rates for registration and hotel reservation during scientific conferences organized by NAPA



NAPA has adjusted its life membership fees from \$500.00 to \$200.00 (\$300.00 for eligible couples) to encourage eligible members to become life member of the organization. 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. Pradeep Wagle
NAPA General Secretary
Chair Membership Drive Committee
Email: napa2072@gmail.com



Article

Agricultural research for Nepal's development: Redefining role of Agriculture and Forestry University¹ Part II



- Dr. Bishnu Raj Upreti
Email: bishnu.upreti@gmail.com

Global scenario of investment in agricultural research

According to the Statistical portal (2018), the top 10 countries investing in gross research and development (R&D) are the United States (USD 552.98 billion), China (USD 474.81 billion), Japan (USD 186.64 billion), Germany (USD 116.56 billion), South Korea (USD 88.23 billion), India (USD 83.27 billion), France (USD 53.12 billion), Russia (USD 58.62 billion), UK (USD 49.61 billion), and Brazil (USD 37.45 billion), respectively. Nepal is not included in the list since it failed to invest the minimum amount of 50 million USD, which serves as the main criteria for inclusion. Though the global spending on R&D has reached 1.7 trillion USD, the top 10 countries account for 80% of it. Investment in R&D is expected to increase substantially by 2030 as many countries have committed to greater allocation of fund for research towards Sustainable Development Goals (SDGs). Many developing countries are not yet able to internalize the role of research and therefore have not allocated resource required to conduct meaningful agricultural research that is needed to tackle the agricultural problems faced by the country.

The success of high growth and high productivity of agriculture in developed countries such as USA, France, the Netherlands, and Australia was mainly

because of the high investment in agricultural research. According to Paul Heisey and Keith Fuglie, 'universities and public research institutes in developed countries are carrying out outstanding research that bridge the gaps between inventions in basic biology and other basic sciences and their applications to agriculture'.

The QS World University Rankings 2016 by Subject on world's top five agriculture and forestry university report lists Wageningen University as the topmost followed by University of California Davis, Cornell University, University of California Berkeley, and Agro Paristech, respectively. One of the three main criteria used to assess the ranking was 'research impact' and other two were academic reputation and employer reputation. They are high ranking institutes because of their full autonomy, commitments, resources and concerted efforts of executives, academics, students and related stakeholders. If AFU wants to be a good performing institution, it has to ground education and research as an integral part within the university.

Potential of agriculture research for economic growth in South Asia and Nepal

Creating an effective agricultural research and innovation systems is vital for economic growth. Ghose (2014) argues that effective agricultural

¹This article constitutes second part of an extended discussion paper to be published in the current and forthcoming Agri-Connection issues. The 1st part was published in Agri-Connection Volume 4, Issue 2. The paper was originally presented at the seminar "National Agriculture and Forestry Education Policy in Nepal" held in Bharatpur, Nepal on 26 November, 2018.

² See <https://www.statista.com/statistics/732247/worldwide-research-and-development-gross-expenditure-top-countries/> for details

³ See <http://uis.unesco.org/apps/visualisations/research-and-development-spending/> for details

⁴ See <https://www.ers.usda.gov/amber-waves/2018/may/agricultural-research-in-high-income-countries-faces-new-challenges-as-public-funding-stalls/> for details

Agricultural research for Nepal's development

Asia. This region is home to one-fourth of the world's population with the largest proportion of under-nourished people, and is the second poorest region contributing only 2.2% in the global annual GDP. Hence, it is also a fertile ground for conflict and instability. Investment in agricultural research is paramount to achieve peace and stability and livelihood security in the region. Ghose (2014) highlights that agriculture is an important contributor to the economy of South Asia because it employs 60% of the total workforce and generates 20% of the total GDP. Ghose (2014) further expresses that 'though there is growing evidence that technological innovation has a key role to play in increasing agricultural production and strengthening food security system, agricultural research, and development sector has failed to garner sufficient attention till now'. Nepal's agriculture sector is also largely marginalized, subsistent, and still waiting for modernization and commercialization.

According to the Global Food Security Index (2018), South Asian countries have very low food security level. In the ranking of 113 countries, Sri Lanka ranks 67th with the score of 54.3; India ranks 76th with the score of 50.1; Pakistan ranks 77th with the score of 49.1; Bangladesh ranks 83rd with the score of 43.3; and Nepal holds 79th rank with the score of 46. Hence, the potential for agricultural research is high for ensuring food security and enhancing economic growth in the region in general and Nepal in particular.

In recent decades, many universities in South Asia have aspired to land grant model to address challenges faced by agriculture. How feasible it is, how keen the decision-makers are, and how it should be handled in South Asian context are still issues of debate. Nepal and other South Asian countries can draw upon a concept and requisites for the land grant model from the success of the United States to create and enhance the performance of agricultural colleges and universities.

Land grant model of managing agriculture universities

President Abraham Lincoln had established the United States Land Grant Colleges and Universities of Agriculture through the Morrill Land-Grants Act in 1862. Consequently, the Land Grant Colleges and Universities of Agriculture model opened up a new

horizon of research and development in the agriculture sector of the United States (Rahman, 2017). Additionally, this model eased access of average Americans to technical and higher education in agriculture (ibid). It took several decades in the United States to fully operationalize Land Grant Model through the legislation of three crucial Acts (Morrill Act 1862, Hatch Act 1877, and Smith Liver Act 1914) that ensured the three types of activities namely education, research, and extension in a very complementary way to be delivered through college of agriculture for teaching, through agriculture experiment station for research, and through cooperative extension stations for extension with very strong partnership between local, state, and central governments.

Land Grant System is a legalized and institutionalized provision in which the federal government provides state-owned land to either build a college or university (for agriculture and mechanic arts) or sell the land and use the money to build at least one college for agriculture or mechanic arts (Rahman, 2017). Over time, together with the change in the dynamics of higher education and agriculture, the land grant colleges were upgraded to universities.

While signing the Morrill Act 1862, President Lincoln said, '*The land grant university system is being built on behalf of the people, who have invested in these public universities their hopes, their support, and their confidence*' (Cordova, 2005). Hence, even after 156 years, the land grant model is operating effectively with world-class research, education, innovative public outreach programs, and extension schemes. Colleges and universities under the United States land grant model are now leading sources of policy input to the United States government in research, education, and extension services (Rahman, 2017; Cordova, 2005). The United States land grant system is still relevant today because of the time-tested, tripartite mission of these public universities: teaching, research, and public service. This model has not only promoted universities to focus on agriculture and mechanic arts but also ensured access of ordinary Americans to a college education for the first time. Later, another act called the Hatch Act 1887 provided legal scope for the establishment of the research mission by founding an agricultural experiment station in conjunction with each of the land grant universities. Further, the Smith-Lever Act passed in 1914 gave a legal framework for creating the Cooperative Extension system – a county, state, and

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knowledge from the university to the end-users of research (Cordova, 2005).

China is revolutionizing agriculture by integrating advanced research and education. China's agricultural sector has achieved a rate of 6% per capita growth for two full decades mainly because of its emphasis on agricultural biotechnology research. However, China is continuously looking to improve on an already productive agriculture sector to make it more environmentally sustainable and highly competitive by opting for a highly successful land grant university system of the United States (Cordova, 2005). China has developed its own National Agricultural Technology Extension Service under the Ministry of Agriculture first without engaging agricultural universities. In contrast, in the United States, the cooperative extension is embedded in the land grant universities. Hence, China is now considering land grant model to utilize seamless continuum from basic research to applied research to outreach by a cooperative extension (Cordova, 2005).

The land grant model university-based research enables scientists to take an integrated systems approach in advancing agriculture in collaboration with farmers, industries, traders, and exporters rather than a top-down approach. This model not only have positive impacts on food production, environmental protection, technology transfer, and the economy but also plays an important role in public policy as honest brokers in public debates about controversial topics, and as a provider of objective, and science-based evidence to help inform decision-makers. The United States land grant universities are in the forefront of genomics-based discovery, leading to safer and more nutritious foods, stress-resistant crops, disease-resistant animals, foods with prolonged shelf life, and noble bio-based products such as plastics, alternative fuels, and pharmaceuticals (Cordova, 2005).

A major criticism of the advanced of biotechnology is its social, economic, political, environmental, and ethical consequences. Hence, universities need to serve as an honest broker to identify relevant policy issues; act as a clearinghouse for credible information by disseminating sound, science-based information to both the public and decision-makers; and initiate research to explore the potential impacts of biotechnology (Cordova, 2005). The basic theoretical

orientation of establishing Agriculture and Forestry University (AFU) was towards the Land Grant Model, but it lacked vision about all essential components of it. The legal arrangement of establishing AFU contained transfer of land (and properties) from Institute of Agriculture and Animal Sciences and Institute of Forestry of Tribhuvan University (TU) to AFU. However, this became a perennial source of tension and conflict between the two government universities as TU resisted to transfer the legally mandated land to AFU. Hence, the very essence of the Land grant Model was challenged from there.

Situation of agricultural research priority in Nepal

Nepal's reliance on the spill-over effect of the research done in the west or developed countries will not lead to agricultural advancement. Rise of modern biotechnology and enhanced Intellectual Property Rights (IPR) regimes in developed countries mean that technologies that were once freely accessible will be less accessible in the future. Biotech companies from developed countries are limiting incentives to develop technologies suitable for less-developed countries (Pardey et al., 2006). Moreover, when the national research capacity is weak, international research agencies become dominant. An example is the dominant involvement of Consultative Group in Agricultural Research (CGIAR) in agricultural research in Africa for four decades of its existence (Roy-Macauley *et. al*, 2016). However, instead of drastically changing the hunger situation, it created more dependency. Hence, it is the right time for Nepal to invest in agriculture research for developing the capacity to innovate new agricultural technologies.

The government of Nepal needs to boost investment in agricultural research to enhance productivity without deteriorating the environment, to reduce poverty, improve livelihoods and well-being of farmers, and to contribute to trade promotion and overall macro-economic development. For this, it is essential to develop competent human resources capable of conducting theoretically grounded, methodologically sound, and pragmatically relevant research that paves ways for modernizing and commercializing agriculture. At the same time, it is paramount to improve market access, to ensure effective dissemination of research findings, to facilitate designing a strong

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legal framework for developing robust technologies and production processing marketing infrastructures. Moreover, it is essential to ensure farmers' access to capital and inputs, and safeguard natural resources available in the country. Unfortunately, policy and decision-makers of Nepal so far have not been able to understand the importance of research in economic development, social justice, and sustainable impacts on the country.

According to the UNESCO Institute of Statistics, Nepal spends 0.3% of GDP on research. All the research spending that comes from the government (no private funding) is approximately 16,000 USD with the Purchasing Power Parity comprising of 92 % male and 8 % female researchers. This amount covers all types of research and therefore it is very difficult to find total allocation only for research in agriculture.

If we look at the situation of the budget allocation for research, less than 10% of the total budget of Ministry of Agriculture Development (the name of this ministry is so frequently changed and hence, for the sake of easy understanding this name is used) is allocated to the Nepal Agriculture Research Council (NARC) (Table 1). Experienced people share that more than 60% of the NARC budget is spent in administrative and management functions and only about 40% goes to actual research.

According to Parajuli and Upreti (2018), less than

7% of the total budget of the universities in Nepal is allocated for research and even this amount is mostly used for the administrative costs related to research than the actual research. Referring to the 20 years (2052-53 to 2071-72) of research grants (NRS 800 million) provided by the University Grant Commission (UGC) to different eligible universities, they highlight that only 350 of 800 million was allocated for actual research and remaining was invested in conference, seminars, and administrative costs. This scenario demonstrates the unsatisfactory situation of research in Nepal.

It is high time to reflect on what went wrong in our agricultural system in Nepal that was exporting food five decades back is now turned into a net food-importer? Where is the role and contribution of research? Who is responsible for such a shameful situation?

In Nepal, it is imperative that the national agricultural research system be restructured to capitalize on the agricultural potential to drive overall economic development. A functional goal-oriented network of key agricultural research institutions such as AFU, NARC, and other components of national agricultural research systems including private sector, individual researchers, state, academics, etc. can become instrumental in protecting biodiversity and plant genetic resources, while preventing bio-piracy. As the global population will reach 9 billion in 2050,

Table 1: Allocation of the annual budget (NRS) to NARC with national and MOAD (in 000)

S.N.	Fiscal Year	Total Budget (National)	Total Budget (MoAD)	Total Budget (NARC)	% of MoAD to NARC
1	2010-2011	337900000	10523526	980000	9.31
2	2011-2012	377970260	12431084	1060000	8.26
3	2012-2013	351936700	9013420	938100	10.4
4	2013-2014	517240000	21400000	1750000	8.18
5	2014-2015	618100000	23283178	1735051	7.45
6	2015-2016	819468884	26682580	2087397	7.60
7	2016-2017	1048921354	27438261	2072987	7.56
8	2017-2018	1278994855	24261937	2456408	10.12
9	2018-2019	1315161700	33712100	2377800	7.05

Source: Compiled by Rajendra Pandit, NARC, 2018 November

Agricultural research for Nepal's development

the declining population growth rate and agriculture profession in the developed world (Lele *et. al*, 2010) provide opportunities for universities such as AFU to advance education-research-extension in Nepal. Hence, it is urgent to strengthen the national research capacity and integrate them into university systems for national development.

Establishing several institutions without defined clarity of roles, operational framework towards a common goal and underpinning with robust policy measures will not only delay the pace of agricultural development but also cause a waste of resources and will ultimately induce conflict. Is AFU able to operate with its full potential and scope? In my assessment, it is not, and therefore legal, policy, and institutional restructuring is essential to meet the national demand. Establishing a new institution leaving AFU as such is inappropriate and short-sighted. In such a situation, why is the need of Deemed to be University (DU) in Agriculture envisioned? What additional contributions DU will make which is not possible from AFU? Why is it not possible to integrate the work of NARC and existing AFU to have complementary effects? Why not expand the mandate of AFU and strengthen it to serve the national need of country? Why conflict over property between TU and AFU if both are state universities with their specific scope and mandate? Why is AFU not able to fully carry its mandate and instead entering the cycle of protests, conflict, and violence? Who is responsible for such deterioration (e.g., burning of the university building, padlocking, and obstruction of teaching) of AFU within a few years of its establishment? Why is the government letting it go this way? Why is the provision of 'education-research-extension' stated in the Agricultural Development Strategy (2015-2035) not being enforced into action? Are trade unionism and political partisan of employees relevant in AFU and other research and educational institutions? These are few of many pertinent questions that the key stakeholders must answer if AFU is to be relevant and deliver the impacts as per the mandate and spirits. These issues

must be debated in public to make an informed choice of options for restructuring.

For achieving the government motto of '*Prosperous Nepal and Happy Nepali*', the government must put agricultural research in a high priority national agenda. It requires coherent organizational framework and implementation strategy at all three tiers of governments - federal, state, and local.

(Part III to be continued in the next issue)

References

- Cordova F. A. (2005), The Lad Grant Model: A Lesson from the past, an investment in the future. China Agricultural University (16 September 2005) (key note address by Vice Chancellor of California University System)
- Ghose, B. (2014), Promoting Agricultural Research and Development to Strengthen Food Security in South Asia. *International Journal of Agronomy*. Volume 2014, Article ID 589809, P.6
- Lele U., Jules, P., Eugene T., and Eduardo T. (2010), *Transforming Agricultural Research for Development*. Rome: The Global Forum for Agricultural Research (GFAR)
- Parajuli L. R. and Uprety D. (2018) Pragyik Anusandhan kina kamjor ? Lead article published at Bichar Section of the *Nagarik Daily* 7 Ashoj 2075 Sunday (22 Sept. 2018), P.7.
- Pardey, P. G., Alston, J. M. and Piggott, R. R. (eds.) (2006), *Agricultural R&D in the developing world: Too little, too late?* Washington, DC: International Food Policy Research Institute.
- Rahman, M. A. (2017), United States Land Grant Model: Lessons for Developing Countries. *Journal of Arid Agriculture & Vegetable Gardening* <http://aridagriculture.com/2017/09/19/united-states-land-grant-college-of-agriculture-lessons-for-developing-countries/>
- Roy-Macauley, H.; Izac, A-M; and Rijsberman, F. (2016), The role of CGIAR in agricultural research for development in Africa South of the Sahara. In *Agricultural research in Africa: Investing in future harvests*. Lynam, J.; Beintema, N. M.; Roseboom, J.; and Badiane, O. (eds.). Chapter 15. Pp. 401-422. Washington, D.C.: International Food Policy Research Institute (IFPRI). http://dx.doi.org/10.2499/9780896292123_15
- Dr. Bishnu Raj Upreti** is Adjunct Professor at Agriculture and Forestry University and visiting faculty/senior researcher at Kathmandu University. Engaged in teaching and research on social and public policy issues., he is regular visiting scholar in different US and European universities and research centres.

किशानी बाल्यकालका स्मृतिहरु

रितुहरुका रङ्गहरु, अपार प्रकृति समीपता
रिति रिवाजका प्रसङ्गहरु, जन जीवन विशेषता
राम रमिताका उमङ्गहरु, निश्चल माया ममता
स्मृतिका तरङ्गहरु, छचल्किन्छन् बनेर कविता

परिवारको गर्जो टार्ने, गाईवस्तु र खेतिपाति थिए
पुख्रौली बिंडो थाम्ने, साक्षात साखा सन्तति थिए
माझाघरे तल्लाघरे, पर्म साट्ने साथी थिए
मूठी रोपी मूरी स्याहार्ने, लक्ष्य कति जाति थिए !

जलवायुको ताल सङ्ग, खेलनु सधै संघर्ष हुन्थ्यो
चैते हुरि र बैशाखे खडेरी पछि, जव मनसुन वर्षा हुन्थ्यो
पहुल उब्जनीको आशा हुन्थ्यो, सवको मनमा हर्ष हुन्थ्यो
मकैका घोगा र धानका बाला, लर्किएको चर्चा हुन्थ्यो

हरेस नखाइ सामना गर्ने, जीविकाका ती परीक्षाहरु
कति निर्मल सपनाहरु, अनि निष्कलङ्क इच्छाहरु
पवित्र सन्कल्प, पौरखी भावना, सीमित महत्वकाङ्क्षा
प्रेरणा बनुन् सन्ततिलाई, ती आत्म सन्तुष्टिका शिक्षाहरु !

नित्यानन्द खनाल

साहित्यिक कुना



लाहुरमा

विशाल कोलम्बिया नदीको
ऊ ल्यो किनारामा उभिएर
परको लमतन्न पुल नियाल्दै गर्दा
ती नदी माथि उडेरहेका बकुल्ला जस्तै
अनायास फटफटिएर मनको पन्ख
हुडकिन्छन भावनाहरु
झने पर छितिज तिर
र बहकिन्छन, बेगिन्छन
प्रशान्त महासगर माथि
अनि गुडन थाल्छन कोशी ब्यारेजमा।

बढो भएर ढलेको उत्तिसको फडुकेमा
थर थर खुट्टा कमाउदै लम्किएको बढो मान्छे जस्तो
यो बढो ब्यारेजमा थर थर गर्दै लम्किरहेछ थोत्रो बस
भर्खर झिसमिसमा भारदहका जहाजी केराहरु कोचेर
हिजो साझ राजधानीमा निलेका
म जस्तै एकहुल पूर्वलि र अरु लाखौ तिसनाहरु बोकेर।

तेही तिसनाहरुको एक फब्ल्याटो
टुक्रिएर उत्रिन्छ झुम्कामा
र लाग्छ किनारै किनार चतरा नहरको
माथि पहाडहरुको निसाना साँधेर
आँफैले उडाएको धुलोलै पुरिएको धुले बाटोमा
घर पुग्ने उक्कठ उत्सुकताले पोतेर
झरी परेर खुलेको ट्याम्के सरी
सम्झनाहरु बोकेर।

पिखुवा नपुग्दै साँझ नपरोस भनि
सास न बास दौडिरहेछन रहरहरु
बाराह क्षेत्रमा पाप र पुन्य छुट्याउने ढुङ्गा उचाल्दै
कोकायाको लामो झालुडे पुलमा पुलकित भावनाहरु
अझै दगुर्दछन
त्रिबेणी काटेर अरुणाका बगरै बगर।

पिखुवाका प्रत्येक जंघारमा
जीवनको सानो टुक्रा ओकलेर
२२ पटक खारिएका पाइतालाहरु जब कावा तर्छन
अब डुब्दै गएको घामले पिरोल्दैन

फेदिको उकालो र ओडारे खोला त आफ्नै सडी हुन
साँझ, मध्य रात, झिसमिसे कि मध्यान्हको चर्को घाम
तिन्ले चिन्छन मलाइ र स्वागत गरिरहन्छन
आँखा आकाशमै भए पनि गोडाले बाटो भेट्ने ठाउ पुगेपछि
रातले पिरोल्दैन
अन्धकारले तर्साउँदैन।

ऊ ल्यो ओडारे पारि पखेरिमा छ
मेरो सानो घर
मेरो सानो संसार
र तल छ पिखुवा खोला
हरदम सुसाइरहेको
मानौ उ पहरेदारी गर्दैछ, मेरो जिन्दगीको

साहित्यिक कुना

हो त्यही पिखुवा तरेर
लाग्यो होला दशे उकालो
सरदको मन्द हावा सुग्ने
रानीबनको जुरेली संग पिरती साटेर
बुमिलाको राँटे पिङमा घुम्दै
रातमाटेको लिङ्गे पिङ मच्चाएर
राँडेएर आयो होला
मेरो आंगनिको सयपत्री सरी
सम्पूर्ण बिरानीहरु बिर्सेर
बेदनीहरु छोपेर
कलकल
छलछल
चन्चल
उन्मक्त
प्रफुल्ल।

यी भावनाहरु किन नै जल पन्थी भन्दा छिटो उड्छन
किन सपनाहरु सिरानी मुनी सुत्दैनन
किन मन पिपलडाडाको पिपल जस्तो पिल्पिले भएको
कोलम्बियाको छालमा डुब्दै उत्रिदै गएको ऊ ल्यो काठको टुक्रा जस्तै
बग्दै बग्दै
सरासरी
नदी भरी
किन मन उही कुइनेटोमा ठोक्किरहन्छ
फेरि फेरि
घरि घरि किन दसै फुलबारीको लाहुरे फूल जस्तो मनमोहक हुन्न

पुनस्चः

पिखुवा, ओडारे र कावा - भोजपुरका साना ठुला खोलाहरु
कोलम्बिया - वाशिङ्टन र ओरेगन राज्य हरु हुँदै बग्ने ठुलो नदी
फडुके - पहाडतिर साघु (पुल) नभएको अवस्थामा खोला साघुरो भएको
ठाउमा रुखको फेद वा काठ तेर्साएर बनाएको खोला तर्ने साधन
झुम्का - महेन्द्र लोकमार्ग मा पर्ने चतरा नहरको किनारामा भएको सानो
बजार (सुनसरी जिल्ला होला) ट्याम्के - भोजपुरको सबैभन्दा अग्लो डाँडो
(खोटाङ-सङ्को सिमाना नजिकैको), मध्य पहाडी भेगमा अग्लो मध्यको
डाडो।

कोकाया - बाराहक्षेत्र धाम सँगै रहेको खहरे खोला जस्को चौडा बगर तल
सप्त कोशी सम्म फैलेको छ। अर्को शब्दमा कोकाया र सप्तकोशीको
दोभानमा बाराहक्षेत्र धाम पर्दछ।

मनोज कार्की

Recruit More Members – Win Prizes!

NAPA is devoted to inviting students, professionals, and practitioners from all agricultural and allied disciplines to this scientific platform. NAPA is a member-driven organization where everyone takes the ownership and put collective energy as one team for its growth and advancement. NAPA is fortunate to have 293 self-motivated, hardworking, and dedicated members thus far. We are working relentlessly to continue the momentum built by the NAPA's Inaugural Executive Team and the First Biennial Conference.

Each member irrespective of their geographic location and profession brings insight, creative ideas, and willingness to serve the community to accomplish the long-term goal of **“Global Food Security through Agricultural Transformation.”** The more members we bring into the community, the stronger NAPA becomes and quicker it expands services to achieve the set objectives. In addition to an aggressive agenda to further NAPA activities to its stakeholders, this two-year tenure (2018-2020) is earmarked for Membership Expansion and Outreach. Therefore, we want to encourage our dedicated members and well-wishers to promote NAPA to the next level by recruiting eligible friends/colleagues/students in your network. In addition to numerous professional benefits and networking, we have created the following incentives to recognize your hard work and dedication for Membership Expansion and Outreach. The highest three recruiters will be recognized at the 2020 Biennial Conference.

Member Benefits:

- Peer-to-peer networking and research collaboration opportunities as well as professional development and advancement.
- Opportunity of publishing scientific works in NAPA's various outlets (GJAAS Journal, Book, Research/Policy Brief, and Agri-Connection).
- E-subscriptions to the NAPA publications and Monthly/Bimonthly webinars.
- Opportunity to sponsor scholarships and research mini-grants in preferred agricultural institutions and disciplines in Nepal through NAPA.
- Free/reduced registration (75-100%) costs to the biennial scientific conference and educational tours. Discounted rates for hotel reservations during NAPA conferences.
- Eligibility for conference travel awards, NAPA awards, and professional development opportunities (speaker, moderator, judge, and outstanding service/performance awards). NAPA distributed more than \$10,000.00 monetary awards and bestowed many recognitions in the 2018 biennial scientific conference.
- Opportunities to serve in leadership roles on the executive committees, various professional committees, and advisory councils.
- Access to job opportunities, extensive networking (government, university, INGOs, NGOs, industries), and graduate and post-graduate opportunities.
- Opportunity to share scientific works, experiences, and expertise via NAPA's Talk Sessions (Webinars) and Online Teaching/Learning Programs.
- Joining global expert repository to contribute to Nepalese Agriculture and beyond.

Your Contribution to NAPA is Tax Deductible

Effective January 6, 2016, Internal Revenue Service of the United States government has determined NAPA as an entity exempt from federal income tax under Internal Revenue Code (IRC) Section 501(c)(3). Now any contributions made to NAPA will be tax deductible under IRC Section

Association of Nepalese Agricultural Professionals of Americas (NAPA)

Website: www.napaamericas.org

E-mail: napa2072@gmail.com