



Agri-Connection

Vol. 5, Issue 1, March 2020

A QUARTERLY NEWSLETTER

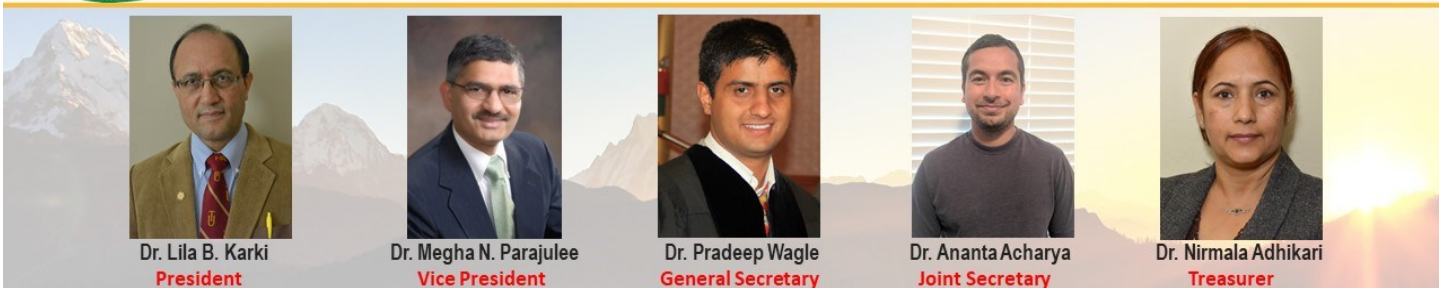


NAPA

नव बर्ष २०७७ को हार्दिक मंगलमय शुभकामना

Stay healthy, stay safe

Association of Nepalese Agricultural Professionals of Americas



Dr. Lila B. Karki
President

Dr. Megha N. Parajulee
Vice President

Dr. Pradeep Wagle
General Secretary

Dr. Ananta Acharya
Joint Secretary

Dr. Nirmala Adhikari
Treasurer



Ms. Kemika Bhandari
Member

Dr. Romy Das Karna
Member

Dr. Lila Khatiwada
Member

Dr. Manoj Karkee
Member

Mr. Sanjok Poudel
Member

Mr. Bijesh Mishra
Member

www.napaamericas.org

napa2072@gmail.com

[@napa2072](https://twitter.com/napa2072)

www.facebook.com/napa2072



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)



Agri-Connection

Vol. 5, Issue 1, March 2020

A QUARTERLY NEWSLETTER

President's Desk

NAPA community and beyond:

We salute all committed and hardworking members whose tireless contributions have made NAPA a vibrant and emerging professional organization in the Americas and beyond. We proudly celebrate NAPA's history-making accomplishments and the impact it has made toward agricultural transformation within its four years of establishment. I would like to share with you major milestones achieved by the 2018-2020 team: 1) Excellent growth in membership, 375 people have joined NAPA thus far, 2) 137 individuals became life members (Life, Senior, Associate, and Joint), 3) Eleven professional Webinars organized; 4) Observed World Food Day 2019; 5) The inaugural issue of Global Journal of Agriculture and Allied Sciences (GJAAS) published its online version; 6) Three Research and Policy Briefs released; 7) NAPA's first book on 'Principles and Practices of Food Security: Sustainable, Sufficient and Safe Food for Healthy Living in Nepal' is in the printing house; 8) Contributed expertise to develop postgraduate curriculum at Tribhuvan University, Institute of Agriculture and Animal Sciences, Nepal; 9) Provided experts' feedback on agriculture sector draft plan prepared by the National Planning Commission, Nepal; 10) Awarded 15 mini-research grants in Nepal; 11) Delivered three presentations about NAPA's progress and future strategies in various meetings/ conferences; 12) Organized eight outreach meetings across America and in Nepal; 13) All legwork for NAPA 2020, the 2nd Biennial Conference was performed. However, the conference has been postponed until further notice due to COVID-19 pandemic; 14) Organized two NAPA Day events; 15) Awarded >\$3,000.00 mini-research grants and \$700.00 academic excellence scholarships; 16) Three new committees: Nepalese Women in Agricultural and Allied Professionals (WAAP), Resource and Capacity

Building (RCBC) and Community – Charitable Services are in operation.

We feel honored having increasingly self-motivated proactive professionals, emerging scientists, entrepreneurs, and students from agriculture and allied disciplines as one NAPA family. We will leave no stone unturned to keep fueling momentum and elevating the scope and impact of NAPA on 'Global Food Security through Agricultural Transformation' with our collective expertise and energy. Please join us to share your expertise, time, energy, monetary contribution, and creative thoughts and ideas to keep the organization moving forward. On behalf of the Executive Committee, I sincerely thank all self-motivated professional volunteers for their great enthusiasm, dedication, and willingness in serving the NAPA community through webinars, donations, time, expertise, creative thoughts, collective energy, various sub-committees, as reviewers and editors, and in many other ways. Our great appreciation is always extended to the generous donors and sponsors of NAPA's flagship programs, including scholarships, research mini-grants, endowments, and conferences. We greatly appreciate all volunteer contributors to the Agri-Connection online newsletter and Research and Policy Brief. Sincere appreciation and thanks to all hardworking Editorial Boards (Agri-Connection, GJAAS, NAPA Book, and Research and Policy Brief) and various sub-committees for their outstanding work. Your support to underpin "Global Food Security through Agricultural Transformation" as ONE NAPA family is above and beyond any appreciation.



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

The current Issue of Agri-Connection comes out to you in a business continuity mode due to the Corona Virus (COVID-19) pandemic. However, we are privileged to feature the results of a significant initiative of NAPA – summaries of studies funded by NAPA Mini-Grant Projects. NAPA funded 15 Mini-grant projects across various academic intuitions in Nepal, of which interim summary results of 11 projects undertaken by individual or group of students are presented in this Issue.

The study themes of 10 Mini-grant projects featured in this Issue are related to two staple crops – maize and rice, and five horticultural/cash crops – cauliflower, cowpea, ginger, marigold and tomato, covering the aspects of cultivar evaluation, crop establishment, plant density, weed and residue management, crop nutrition, and marketing system. One study pertained to dairy cattle operations and milk marketing system. Nine projects involved experimental studies, while two projects adopted survey research methodology. Some of the study summaries could have been more factual, succinct and up-to-date if the Agri-Connection editorial team had received

responses to their comments and suggestions from some of the student researchers. Also featured in this Issue are an article about state of pesticide use in Nepal.



I would like to thank the Agri-Connection editors Dr. Sushil Thapa, Dr. Romy Das Karna, Mr. Sanjok Poudel, and Mr. Shailes Bhattarai for their concerted efforts in editing the Mini-grant research summaries and the article featured in this Issue, and for their contribution in updating the membership and members' achievements. I also owe thanks to Mr. Tikaram Wagle for his kind support with Nepali edits.

I wish you and your families good health and perseverance towards success through the COVID-19 pandemic situation. Happy Nepali New Year 2077!

Nityananda Khanal, Ph.D.

NAPA

Association of Nepalese Agricultural Professionals of Americas



Agri-Connection
Vol. 5, Issue 1, March 2020

Editorial Board

Editor-in-Chief

Dr. Nityananda Khanal

Editors

Dr. Sushil Thapa

Dr. Romy Das Karna

Editorial Assistants

Mr. Sanjok Poudel

Mr. Shailes Bhattarai

Nepali Editing: Tikaram Wagle

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

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

**NAPA Executive
Committee
(2018-2020)**

President

Dr. Lila B. Karki

Vice President

Dr. Megha N. Parajulee

General Secretary

Dr. Pradeep Wagle

Joint Secretary

Dr. Ananta Acharya

Treasurer

Dr. Nirmala Adhikari

Executive Members

Ms. Kemika Bhandari

Dr. Lila K. Khatiwada

Dr. Romy Das Karna

Dr. Manoj Karkee

Mr. Sanjok Poudel

Mr. Bijesh Mishra

Advisory Council

Dr. Nanda P. Joshi

Prof. Gopi Upreti

Dr. Krishna P. Sharma

Dr. Yam B. Thapa

Dr. Upendra M. Sainju

Dr. Suman Rimal Gautam

Dr. Ishwari P. Dhakal

Dr. Prakash Malla

Dr. Dainik B. Karki Nepali

Dr. Narayan Khadka

(Legal Advisor)

Nepal Liaison

Mr. Kiran Ojha

In this issue

	<u>Page</u>
Editorial	3
NAPA 2020 Conference postponed	5
NAPA 2020 Election	6
NAPA 2019-2020 Mini-grant Projects: Research Summaries	
• Plant Density for Hybrid Maize Cultivars	7
• Promising Maize Genotypes in Mid-hills of Nepal	9
• Ginger in Salyan District of Nepal	10
• Evaluation of Cowpea Germplasm	12
• Effect of Phosphorus on Marigold	14
• Nutrient Management for Cauliflower	16
• Milk Production and Marketing Chain	18
• Plant growth regulators on Marigold	20
• Caelifera Diversity in Rice Fields	21
• Plant Growth Regulators on Tunnel-grown Tomato	23
• Establishment and Weed Management on Rice	25
NAPA Committees	26
New NAPA Members	27
Featured NAPA Member of the Quarter	28
COVID-19 Special Webinar	29
NAPA Outreach	29
Article:	
Pesticide Use in Nepal: Need to wake up and act now	31
साहित्यिक कुना: कविता	34
Recruit more members – win prizes!	35

NAPA 2020 Conference Postponed Until Further Notice!!

Considering the current uncertainty surrounding the coronavirus pandemic, travel, and gathering restrictions (over 10/50 people), NAPA Executive Committee (EC) meeting held on March 18, 2020, has unanimously decided to postpone the NAPA biennial scientific conference scheduled for May 22-24, 2020 in Atlanta, Georgia, USA until further notice. We will reschedule the conference as soon as conditions for an international conference become favorable. Members who have registered for the conference will maintain their registration status for the rescheduled date.

Nevertheless, NAPA's two critical activities, including annual general meeting and the election of new Executive Committee, will be held as scheduled. Please stay tuned for forthcoming announcements from the election commission and NAPA EC.

We encourage all of you to stay safe and help keep others safe from this unprecedented COVID-19 pandemic.

Heartfelt Condolences!!!



We express our heartfelt condolence to our bereaved NAPA member Agni Nepal for the loss of his beloved father Pitamber Upadhyaya Nepal (B.S. 1990/08/26 – 2076/10/04). May the departed soul rest in peace!



We express our heartfelt condolence to our bereaved NAPA member Rishi Ram Bhandari for the loss of his beloved mother Nandakali Bhandari (11/03/1959 – 03/06/2020). May the departed soul rest in peace!



We are deeply saddened by the news of untimely demise of Jhanka Prasad Neupane, retired professor, Institute of Agriculture And Animal Sciences, Tribhuvan University, Nepal. May the departed soul rest in peace!

Association of Nepalese Agricultural Professionals of Americas

NAPA 2020 Election

The Election Commission of the Association of Nepalese Agricultural Professionals of Americas (NAPA) would like to inform that due to the unprecedented issues related to COVID-19, the 2020 election for the NAPA Executive Committee will be entirely conducted through online voting, and the previously announced on-site voting has been cancelled. However, NAPA2020 conference has been postponed and further details will be provided in the future.

Self-nomination is open from March 28, 2020 until April 22, 2020.

Online voting will open from May 15, 2020 (8:00 AM ET) until May 21, 2020 (11:59 PM ET).

Self-nominations are currently open. [Please CLICK](#)

[HERE to submit nomination.](#)

Positions Open

The nominations are currently open for the following positions:

- President (1)
- Vice President-VP (1)
- General Secretary-GS (1)
- Joint Secretary-JS (1)
- Treasurer (1)
- Executive Members-EM (6)

NAPA 2020 Election



Nomination Guidelines and Procedures

While submitting a self-nomination, the following guidelines and procedures must be followed:

- Must be a NAPA member in good standing.
- In the case of the President, have served at least one term in the EC.
- One individual member is eligible to compete for only one position.
- The position being self-nominated must be clearly specified.
- The following information about the nominee must be provided:
 - a. Name:
 - b. Current mailing address:
 - c. Valid e-mail address:
 - d. Valid phone number:
 - e. Member in Good Standing as of April 17, 2020: Yes or No
 - f. Current Officer: Yes or No
- A statement must be provided by the nominee that, to his/her best knowledge, he/she is eligible for the position according to the nomination guidelines described above and in the NAPA bylaws.

Election Timetable

Date	Actions
2020-02-03	First Notice sent regarding Election for the Executive Committee — highlights the eligibility to vote and membership requirements
2020-03-28	Nomination Opens – Call for nomination for all EC positions
2020-04-17	Last date to be member or renew membership –Only dues paying members in good standing by this date shall be eligible to contest or vote in the election
2020-04-22	Last date for submitting nomination for all positions to the Election Commission
2020-04-24	Publication of eligible voters which will be posted on NAPA website (http://www.napaamericas.org/)
2020-04-27	Last day to claim on voters list (Eligibility of voting members)
2020-04-29	Publication of corrected/revised eligible voter list will be published on NAPA website
2020-04-30	A list of candidates will be posted on NAPA website
2020-05-05	Last date to submit any concern about the nominated candidates to the Election Commission
2020-05-09	Last day to withdraw nomination by candidates.
2020-05-11	Publication of final list of candidates will be posted on NAPA website
2020-05-15	Online voting begins May 15, at 8:00 AM and ends on May
2020-05-21	Online voting ends May 21, at 11:59PM Eastern Time
2020-05-24	Announcement of Election Result

Please email NAPAElection2020@gmail.com for any concerns or issues.

Thank you.

Election Commission

Dr. Prakash B. Malla, Chief Commissioner

Dr. Narayan Khadka, Commissioner

Dr. Ramesh Pokhrel, Commissioner

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Agronomic Performance of Maize Hybrid Cultivars under Different Plant Densities in Spring Season in Dang, Nepal

Rupak Karn

Agriculture and Forestry University, Rampur, Chitwan, Nepal

Correspondence: coolrupak99@gmail.com

Rationale

Farmers in Nepal generally maintain lower plant density of maize crops than the optimum or recommended level (Koirala et al., 1977; Gurung and Rijal, 1993). Chand et al. (1990) reported low plant density as one of the major yield-limiting factors in maize productivity in farmers' field. A generally recommended crop density for normal duration open-pollinated maize varieties in Nepal is 53,300 plants ha^{-1} (Sherchan et al., 2004). However, optimal plant density may considerably vary with location, growing season, plant stature, maturity classes, and crop management regimes. The primary objective of this study was to evaluate the agronomic performance of maize hybrids under different plant densities in the spring season in Dang. The secondary objective was to understand the interaction between the hybrid cultivars and plant densities on crop productivity.

Study progress

The study has been completed with all the data analysis and interpretation. Article writing for publication is underway.

Research Methods

The experiment was laid out in a split-plot design with three replicates. The main-plot factor comprised three levels of spacing at 30 cm, 25 cm, and 20 cm between plants on the rows spaced 60 cm apart, which makes a plant density of 55,555, 66,666, and 83,333 plants ha^{-1} respectively for three different levels of spacing. Likewise, the sub-plot factor contained three maize hybrid cultivars namely Rajkumar, Pioneer-3533, and Bioseed-9220. The size of the individual plot was 3.6 m \times 3 m (10.8 m^2). The replicates were separated by 1-m wide strip, while individual plots within a replicate were separated by 0.5 m wide strips.



Results

Each cultivar showed an increase in grain yield with an increase in plant density. A significantly higher yield (12.887 kg ha^{-1}) was obtained at 83,333 plants ha^{-1} and it was 30.9 % and 18.9% higher than at the densities of 55,555 and 66,666 plants ha^{-1} respectively. Pioneer-3533 produced the highest mean yield of 11,608 kg ha^{-1} which was 12% and 10% higher than that of Rajkumar and Bioseed-9220 respectively. The higher yield of Pioneer-3533 was associated with significantly higher leaf area index (4.0 at 90 DAP), number of cobs harvested per hectare (66,646), number of kernels per row (38.1), number of kernels per cob (597.2), shelling percentage (70.2%), less sterility (7.7%), and bareness percentage (6.7%). Therefore, the cultivar Pioneer-3533 at the density of 83,333 plants ha^{-1} is recommended for spring maize crop in Dang and the areas with similar climatic conditions.

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Plant Density for Hybrid Maize Cultivars (Cont.)

Research's experience

To work in the farmer's field and gain knowledge at the local level is a rewarding experience for me. Farmers are facing a lot of problems as they lack knowledge about cultivation practices, fertilizer dose for hybrid, modern methods of weeding, etc. This project provided me an opportunity to disseminate my knowledge to the farmers about improved cultivars and crop management practices.



Researcher's Short Biography

Mr. Rupak Karn, a permanent resident of Bariyarpur-07, Rautahat, Nepal, is one of the recipients of NAPA Research Mini-Grants-2019. He accomplished an Agriculture-Internship project in affiliation with Agriculture and Forestry University (AFU) and Prime Minister Agricultural Modernization Project (PMAMP) at Maize Superzone Implementation Unit, Lamahi, Dang, Nepal. He recently completed his Bachelor's degree from AFU, Rampur, Chitwan, Nepal. Before joining AFU, he graduated

with his School Leaving Certificate from Prabhat Secondary English Boarding School, Rautahat in 2011 and Intermediate degree in Science (+2) from the National School of Sciences in 2014, both by first division with distinction. He can be contacted by phone at 9865424195 or by email: coolrupa-k99@gmail.com for any questions about this research project.

References

Chand, S., Gurung, B., Sherchan, D., Thapa, Y., Tiwari, T., Shrestha, R., et al. (1990). Maize Research Report. *Summer Crops Working Group Meeting*. Rampur, Chitwan: NMRP.

Gurung, B., & Rijal, D. (1993). *Plant population study of maize*. PAC.

Koirala, S., Lal, K., & Palikhe, M. (1977). Report on Maize variety cum densities trail. *Proceedings of 4th National Maize Development Workshop* (pp. 52-57). Rampur, Nepal: NMDP.

Sherchan, D., Adhikari, K., Bista, B., & Sharma, D. (2004). Sustainable maize production system in Nepal. *Proceedings of the 24th National Summer Crops Research Workshop* (pp. 1-14). Khumaltar: NARC.

Study advisors

Local advisor

Shrawan Kumar Sah, Ph.D.

Professor, Department of Agronomy
Agriculture and Forestry University, Rampur,
Chitwan, Nepal
Email: sksah@afu.edu.np

NAPA advisor

Nityanand Khanal, Ph.D.

Research Scientist, Agriculture and Agri-Food
Canada, Beaverlodge Research Farm, Beaverlodge,
Alberta, Canada
Email: nityananda.khanal@gmail.com

Acknowledgements

The research presented in this manuscript is partially/fully supported by Mini-grant awarded by the Association of Nepalese Agricultural Professionals of Americas (NAPA).

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Varietal Evaluation of Promising Maize (*Zea mays* L.) Genotypes in Mid-hills of Nepal

Bipin Neupane

Institute of Agriculture and Animal Sciences, Tribhuvan University, Nepal

Email: neuapnebnp63@gmail.com

Rationale

Most of the released crop varieties in Nepal are trialed at research stations only but not in the producers' fields due to lack of proper extension facilities. Some released varieties are not even accepted by farmers due to lower than expected levels of production. Therefore, there is a dominance of multinational seeds and their varieties in the Nepalese market. The primary objective of this study was to compare maize varieties released in Nepal and multinational maize varieties under field conditions to evaluate their adaptability and performances in the farmers' field. In addition, the relationship between grain yields with yield attributing parameters was also analyzed.

Study progress

The study was started in May 2019. All field works have been completed. Data analysis and interpretation are being undertaken.

Research Methods

The experiment was carried out at Sundarbajar, Lamjung (600 masl) in Randomized Complete Block Design with three replications of fourteen maize varieties as treatments (total of 42 plots). The maize varieties included: Rampur Hybrid-4, Rampur Hybrid-6, Rampur Hybrid-10, RML-86/RML-96, RML-95/RML-96, RML-11-2/RML-18, RL-240/ RL-111, RL-213/ RML-17, RL-248/ RML-25, RL-35-1/RL-105, Ganga Kaberi 3114, Pioneer, Pariposa-4525, and Rashi-3022. The size of the individual plot was 5 m x 2 m (10 m²) with a spacing of 75 cm x 25 cm. A fertilizer dose of 120:60:40 NPK kg ha⁻¹ was applied as suggested by the National Maize Research Programme (NMRP). Following phenotypic and agronomic variables were recorded:

Quantitative: NDVI, infrared gun, germination percentage, anthesis-silking, plant height, no. of ears/plant, no. of leaves, ear height, stem circumference, tassel branching, ear circumference, no. of grain rows, no. of grains/row, ear length, test weight, and grain yield.

Qualitative: Tassel color, silk color at emergence, leaf color, leaf pubescence, leaf orientation, leaf width, husk cover, kernel row arrangement, grain texture, and ear aspect.

Results

Highest grain yield of 11.98 ton ha⁻¹ was obtained in Pioneer hybrid followed by Rampur Hybrid-6 (11.25 ton ha⁻¹), Ganga Kaberi (10.78 ton ha⁻¹), and Pariposa-4525 (9.89 ton ha⁻¹). This preliminary result shows that multinational hybrid varieties have greater adaptability than locally released varieties in Nepal by (NMRP). However, the final results are yet to be analyzed completely to make any recommendations.

Researcher's experience

To work in the farmer's field was a great opportunity for me. Farmers are facing a lot of problems due to the sluggish system of seed marketing and market information system. Similarly, the existing seed production and dissemination system of NMRP is also not sufficient to meet farmers' needs. However, there is a high potential of hybrid maize to have an impact on maize production. Further evaluation of varieties for other important characteristics and yield attributes could be carried out in the future.

Researcher's Short Biography

Mr. Bipin Neupane, a permanent resident of Manohara-07, Kathmandu, Nepal, is one of the recipients of NAPA Research Mini-Grants 2019. He is pursuing his undergraduate degree at the Institute of Agriculture and Animal Sciences (IAAS), TU and is currently in his final semester. Before joining IAAS, he completed his School Leaving Certificate and Intermediate degree in Science (+2) from Manakamana Higher Secondary School, Kathmandu, both in first division with distinction. He was Former President at Students' Farmer Field School at Sundarbajar Municipality, Former Secretary at Technical Students' Association of Nepal (TSAN),

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Promising Maize Genotypes in Mid-hills of Nepal (Cont.)

Lamjung Campus, Author and Editor at Agriculture Aspirants and Aspire mini and Resource Person at TSAN Technical Bootcamp -2018 and 2019. He secured the third position in District level Proposal writing and Presentation competition and volunteered at MAPATHON: Help Map Out Vulnerable Places in Nepal- By ICIMOD. He can be contacted by phone at 9843549952 or by email: neuapnebpn63@gmail.com for any questions.

Study advisors

Local advisor

Ankur Poudel.
Assistant Professor, IAAS,
Tribhuvan University, Nepal
Email: ankur.iaas@gmail.com

NAPA advisor

Pradeep Wagle, Ph.D.
Research Ecologist, USDA-ARS, Oklahoma
Email: pradeep.wagle@usda.gov

Acknowledgements

The research presented in this manuscript is partially/fully supported by Mini-grant awarded by the Association of Nepalese Agricultural Professionals of Americas (NAPA).

Production and Marketing of Ginger (*Zingiber officinale*) in Salyan District, Nepal

Shristi Upadhyaya

Agriculture and Forestry University, Rampur, Nepal
Email: shristiup624@gmail.com

Rationale

The farmers in Salyan district, Nepal are not fully aware of the production economics and marketing of ginger (USAID, 2011). Similarly, producers do not have direct contact and access to the market. Hence, working with middle-man is the major option for the transaction of local produce in Salyan district (Khanal, 2018). Due to this situation, farmers are unable to get a fair price of agricultural produce, including ginger. The major objective of the study was to understand the economics of production and marketing status of ginger in Salyan district.

Study Progress

The study was started in May 2019. As of now, all the research activities are completed, a first draft report has been prepared and submitted to the research advisor for final review.

Research Methods

The study was conducted in three Municipalities of Salyan district: Sarada, Bagchaur, and Siddha-

kumakh. Siddha-kumakh is considered rural locale compared to other Municipalities. These locations were purposively selected as the major ginger cultivated areas of Ginger/Turmeric zone under the Prime Minister Agricultural Modernization Project (PMAMP) project. Ginger farmers from Siddhakumakh, Sarada, and Bagchaur were selected by simple random sampling. Out of 568 ginger producing farmers in the area, 60 farmers (10.6%) were included for the study. The primary data were collected through a household survey with the help of a semi-structured interview schedule. The secondary data were collected from published articles, reports, books, District Agriculture Development Office (DADO) profiles, etc. The data collected from the household surveys and other means were coded, tabulated, and analyzed by using Statistical Package for Social Sciences (SPSS), and MS Excel. Mostly, descriptive statistics were used for the analysis of the collected data.

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Ginger in Salyan District of Nepal

Results

The average area under ginger cultivation was found 0.13 ha/household. The average cost of production per hectare was NRs. 4,20,000. The productivity of ginger in the study area was 14.4 mt ha⁻¹ which was higher than the national average (12.32 mt ha⁻¹) and district average (12.26 mt ha⁻¹) productivity. On average, the selling price of fresh ginger was NRs. 29.3 kg⁻¹ and that of dried ginger was found NRs. 201.4 kg⁻¹. Local traders were major market actors for influencing the price of ginger in the study area. Despite many problems, the ginger production in the study area was a profitable business with a benefit to cost (B:C) ratio of 1.53. When alternative pathways of post-harvest practices were followed, the B:C ratio would be 1.68, 1.46, 2.02 for Case I (only fresh ginger was sold), Case II (only dry ginger, *sutho* was sold), and Case III (sold as seed rhizome), respectively under the same production system. Low as well as fluctuating market price, lack of proper storage and processing facilities were recorded as major problems in ginger marketing. Rhizome rot and lack of technical backup were found as the main hindrance in ginger production.

Research's Experiences

The number of ginger producers is in the decreasing trend for the last few years despite the fact that it has high production potential. Although the major reasons behind the decreasing trend were generalized through the household survey and group discussions, it was difficult to analyze the reason in the micro-level due to short duration of the study. Due to small sample size, not all the ginger growing locations in the district were accessible. The government should intervene in the pricing of ginger by either through some form of subsidies to the farmers or by helping farmers to get a fair price for their product. Also, there should be a provision of linking the farmers directly to the end consumers so that maximum profit is owned by the farmers themselves and not the middlemen.

Researchers' Biography

Ms. Shristi Upadhyaya from Bharatpur, Chitwan is a recent Agriculture Graduate from Agriculture and Forestry University, Rampur. Ms. Upadhyaya has been engaged in the field of research for a considerable amount of time. She has been working as a team member in a project entitled "Developing Alternative Protein Resource for Poultry Using Black Soldier Fly Larva" funded by Dr. Mahabir Pun's National Innovation Center and supported by Directorate of Research and Extension, AFU. She also recently participated as a global talent for UN-LEASH Innovation Lab 2019, a platform to help achieve the United Nations Sustainable Development Goals (SDGs) held in Shenzhen, China. She is highly interested to explore agricultural economics as a major subject for her further studies.

Study advisors

Local Advisor

Om Prakash Singh, Ph.D.
Associate Professor
Department of Extension and Rural Sociology, AFU
Email: opsingh@afu.edu.np

NAPA Advisor

Lila B. Karki, Ph.D.
Agricultural Extension Economist
Tuskegee University, Alabama, USA
Email: drkarkilb@gmail.com

Acknowledgements

The research presented in this manuscript is partially/fully supported by Mini-grant awarded by the Association of Nepalese Agricultural Professionals of Americas (NAPA).

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Germplasm Evaluation of Cowpea (*Vigna unguiculata* L.) in Dang District, Nepal^{1*}

Abina Pokhrel, Ashmita Gurung, Asmita Bhandari, Suruchi Sharma and Yashoda Bohara

Agriculture Science program, Campus of Live Sciences

Mid-West Academy and Research Institute Tulsipur, Dang, Nepal

¹All authors contributed equally to the project

*Correspondance: manojbasnet99@gmail.com

Rationale

The cultivation of cowpea is still based on indigenous knowledge and traditional farming systems. Most of the farmers grow cowpea in marginal, rain-fed and low fertile land with little or no external inputs. Since staking has been scarce in urban areas, cultivation of vegetable type cowpea varieties like Sarlahi Tane is difficult due to its indeterminate growth habit that needs staking for a good yield. Limited studies have attempted to identify suitable cultivars, proper crop management, and harvest technology of cowpea in Nepal. Due to this, cowpea production and yield in Nepal are lower compared to other developing countries. The objective of this study was to evaluate the productivity and adaptability of different germplasm of vegetable cowpea in Dang district of Nepal.

Study Progress

Seed sowing was done on September 13, 2019. The yield parameters were recorded on November 8, 2019.

Research Methods

The study was carried out in the research field of Campus of Live Sciences, Tulsipur, Dang. Randomized complete block design (RCBD) was used with the single factor of six varieties with three replications. The varieties were IT07K-298-15, IT04K-227-4, IT86F-2062-5, Malepatan-1, Gajale-bodi, Prakash, and long yard bean. Growth parameters like plant height, number of leaves and number of branches were recorded from sample plants on 15, 25, and 35 days after sowing (DAS). Final data are yet to be analyzed.

Results

Till 35 days after sowing (DAS), highest plant height was observed in long yard bean (121.7 cm) followed by Malepatan (44.7 cm), IT04K-227-4 (44.4 cm),

IT86F-2062-5 (38.74 cm), IT07K-298-15 (36.2 cm), and lowest in Gajale-bodi (35.8 cm). The variation in the number of branches ranged from 6.9-10.5 plant⁻¹ with the highest branch number in IT86F-2062-5 (10.4 plant⁻¹) and lowest in Malepatan-1 (6.9 plant⁻¹). IT86F-2062-5 produced highest number of leaves plant⁻¹ and variety Malepatan-1 produced lowest number of leaves plant⁻¹.

The longest pod was produced in long yard bean



(53.7 cm) followed by Malepatan-1 (27.5 cm), while shortest pod lengths were recorded in Gajale-bodi (15.1 cm) and IT04k-298-15 (15.3 cm) which were statistically similar with IT86F-2062-5 (16.7 cm), IT04K-227-4 (17.65 cm), and Prakash (22.8 cm) (Figure 1). Individual pod weight varied from 6 to 25 g between the cowpea varieties. The highest average pod weight was recorded in long yard bean (25 g pod⁻¹) and lowest in Gajale bodi (6 g pod⁻¹). Varieties Prakash and long yard bean produced the maximum number of seeds pod⁻¹, with the average of 15.0 and 14.8 seeds pod⁻¹, respectively, which were followed by IT86F-2062-5 (14.2 seeds pod⁻¹), IT04K-227-4 (14.1 seeds pod⁻¹), Malepatan-1 (13.1 seeds pod⁻¹), Gajale-bodi (12.0 seeds pod⁻¹), and IT07K-298-15 (11.0 seeds pod⁻¹) (Figure 1).

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Evaluation of Cowpea Germplasm (Cont.)

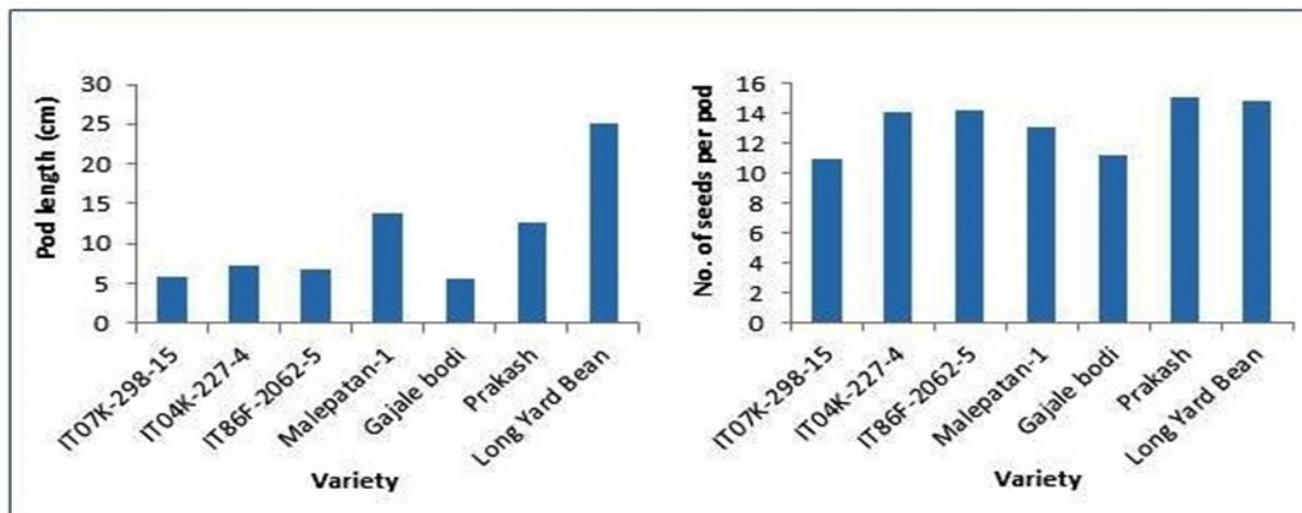


Figure 1: Pod length (left graph) and number of seeds per pod (right graph) for different cowpea varieties.

Researchers' Experience

During the period of this study, various problems were encountered. Insect pests such as hoppers, aphids, and diseases such as powdery mildew and bean mosaic virus were observed. The problem of weeds was also seen. Virus-infected plants were uprooted and fungal diseases were treated with sulfur-containing fungicides and bio-control agent *Trichoderma viridea*. Hand weeding was done to control weed and insecticide was applied to control insects. So, we learned that the use of integrated pest management (IPM) practices is important to reduce the effect of disease/pest in cowpea farming.

Researchers' Biography

A team of five students pursuing their Bachelor's degree in Agriculture Science program (2015 intake) at Campus of Live Sciences, Tulsipur, Dang undertook the study. Ms **Abina Pokhrel** (Dhikura-2, Arghakhan-chi) completed her S.L.C from Gandaki Public Boarding School, Mhenpi, Kathmandu in 2011 and higher secondary education from Takshashila Academy, Samakhusi, Kathmandu in 2014. Ms **Ashmita Gurung** (Bhoje-7, Lamjung) completed her S.L.C from Gyanodaya Boarding School, Lakeside, Pokhara in 2012 and higher secondary education from Global College, Ranipauwa, Pokhara in 2015 A.D. Ms **Asmita Bhandari** (Tulsipur-9, Dang) completed her S.L.C (2012) and higher secondary education (2015) from Tulsu Higher Secondary School, Tulsipur, Dang.

Ms **Suruchi Sharma** (Ghorahi-10, Dang) completed her S.L.C. from Srijana Balvatika English Boarding School, Bijauri, Dang in 2012 and higher secondary education from Gorkha International Public Higher Secondary School, Dang in 2015. **Yashoda Bohara** (Dhangadhi, Kailali) completed her S.L.C from Far West Secondary School, Dhangadhi, Kailali in 2012 and higher secondary education from Capital College and Research Center, Kathmandu in 2015. All authors have been in Agriculture Science program at the Campus of Live Sciences since 2016 A.D

Study advisors

Local advisor

Manoj Basnet, Associate Professor
Department of Horticulture, IAAS, Paklihawa
Email: manojbasnet99@gmail.com

NAPA advisor

Prem Bhandari, Ph.D.
Population Studies Center
University of Michigan, USA
Email: pbhandari115@gmail.com

Acknowledgements

The research presented in this manuscript is partially/fully supported by *Jit-Shavitra Mini-Research Grant* through the **NAPA Scholarship for Academic Excellence Fund** of the Association of Nepalese Agricultural Professionals of Americas (NAPA).

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Effect of Phosphorus on Growth and Flowering of Marigold (*Tagetes erecta*)^{1*}

Indu Regmi, Jaya Upadhyay, Laxmi Pandey, Sabina Poudel and Srijana Chapain

Agriculture Science program, Campus of Live Sciences

Mid-West Academy and Research Institute Tulsipur, Dang, Nepal

¹All authors contributed equally to the project

*Correspondance: manojbasnet99@gmail.com

Rationale

Phosphorous is needed for normal growth and development of plants due to its vital role in diverse metabolic functions. Lack of phosphorus impairs photosynthesis and energy metabolism leading to the formation of photo-protective pigments which is manifested as purple coloration in the foliage. There is a complex interactions between the phosphorus, iron, zinc and other nutrients. It is therefore crucial to maintain a balanced amount of phosphorus in the soil by fertilizing correctly. Studying the effect of different doses of phosphorus on target crops helps determine an optimum dose at which maximum yield is obtained. The objective of this study is to find out the optimum phosphorus dose for enhancing yield and quality of marigold flowers in the climatic condition of Tulsipur, Dang. The findings of this result may provide information to determine levels of inputs for the maximum profitable yield of marigold to meet market demand.



Study progress

Our research started on the 25th of July 2019. The field experiment completed with the harvest of marigold flowers on 19th October, 2019.

Research Methods

The research was carried out at the horticulture research farm of MARICoLS, Tulsipur Dang in the year 2019. The experiment was laid out in Randomized Complete Block Design with seven different treatments comprising doses of phosphorus at 0, 20, 40, 60, 80, 100, 120 P₂O₅ kg ha⁻¹ which were replicated three times. Each plot had 20 plants and data were taken from five random plants after tagging. Descriptive summary of results are presented here. Detail statistical analysis is yet to be done.

Results

The phosphorus doses had differential effects on individual flower properties and flower yield. The treatment with 120 P₂O₅ kg ha⁻¹ (t7) gave the highest flower diameter and weight on average (Figure 1). Though numerical data between the treatments shows little variation in terms of weight and diameter, the treatments with higher phosphorus had better visual appeal of the flowers than that of the unfertilized plots.

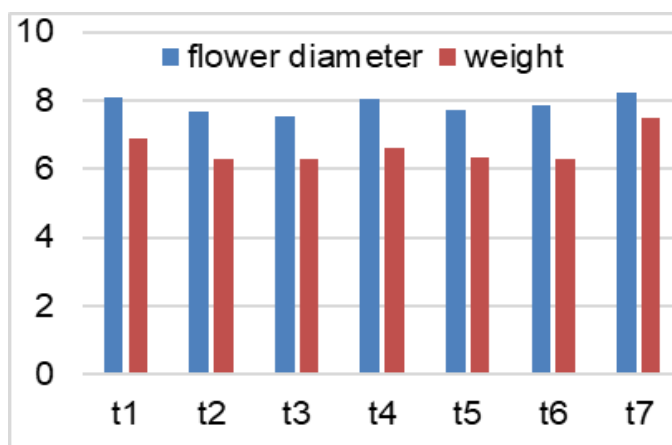


Figure 1: Fresh flower weight and diameter at different levels of phosphorus application

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Effect of Phosphorus on Marigold (Cont.)

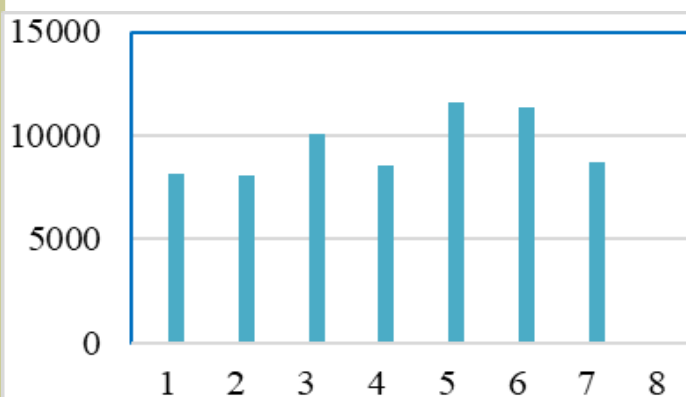


Figure 2: Effect of phosphorus levels on flower yield of marigold

The yields of fresh flowers differed inconsistently between the levels of phosphorous applied. It is probable that the site variability might have obscured the treatment effects in some plots (please see below in the limitation of the study). Different doses of phosphorus had significant effect on yield governing parameters of the marigold flower. The diameter and fresh flower weight of sample plants were found higher in treatment 7 (120 kg P₂O₅ ha⁻¹) (Figure 1), while in terms of flower yield per unit area, treatment 5 (80 kg P₂O₅ ha⁻¹) gave the best result (Figure 2). The bud formation and full bloom were observed earlier in treatment 5 (80 kg P₂O₅ ha⁻¹), treatment 6 (100 kg P₂O₅ ha⁻¹) and treatment 7 (120 kg P₂O₅ ha⁻¹) as compared to remaining other treatments.

Researchers' Experience

The study might have given more accurate results if done in a larger area. Incorporating other factors such as drip irrigation and plastic mulching might have given some more information which are important management practices for better production. The research outcomes would have provided some important insights if we had taken the shading effect into consideration.

There were various obstacles and hindrances seen during our study. Shading effect was seen due to the presence of mango trees in our research plot. So, unavailability of the uniform and regular land was a problem. Soil condition was another issue. The soil in the study area was low in organic matter. Our soil texture was of clayey type, instead marigold thrives well in well-drained loamy texture.

Researchers' Short Biography

This study was a team effort of five students of Bachelor of Science in Agriculture (BSc Ag) at Campus of Live Sciences, Tulsipur, Dang. They started their Bachelor program in 2015. Ms **Indu Regmi** from Sankhamul, Salyan, completed her School Leaving Certificate (SLC) from Himal Academy Tulsipur Dang, securing first division with distinction in 2013 and higher secondary education with 1st division from Trinity International College, Dillibazar, Kathmandu in 2015. Ms **Jaya Upadhyay** from Rupauliya, Nawalparasi completed her SLC from Kumudini English Boarding Higher Secondary School, Bardghat, Nawalparasi securing first division with distinction in 2013 and higher secondary securing first division with distinction from Tiltottma Campus, Butwal, Rupendehi in 2015. Ms **Laxmi Pandey** completed her SLC from Adarsh Samudayik Vidhya Mandir, Sadakpur, Kailali, securing first division in 2013 and higher secondary from Everest English Boarding Higher Secondary School, Butwal securing first division in 2015. Ms **Sabina Paudel** from Bharatpur, Chitwan completed her SLC from Valmiki Shikshya Sadan in 2013 and higher secondary from Trinity International College, Dillibazar, Kathmandu, securing first division in 2015. Ms **Srijana Chapain** from Bhurigaun, Bardiya completed her SLC from Tribhuvan Ma Vi, Bhurigaun, Bardiya securing first division in 2012 and higher secondary from Xavier International college, Kalopul, Kathmandu securing first division in 2014.

Study advisors

Local advisor

Manoj Basnet, Associate Professor
Department of Horticulture, IAAS, Paklihawa
Email: manojbasnet99@gmail.com

NAPA advisor

Prem Bhandari, Ph.D.
Population Studies Center
University of Michigan, USA
Email: pbhandari115@gmail.com

Acknowledgements

The research presented in this manuscript is partially/fully supported by *Jit-Shavitra Mini-Research Grant* through the **NAPA Scholarship for Academic Excellence Fund** of the Association of Nepalese

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Effect of Different Types of Fertilizers on the Vitamin C Content of Cauliflower^{1*}

Shirisa Acharya, Saurav Bhandari, Ashika Bista, Poonam Belbase, and Subham Kaphe

Agriculture Science program, Campus of Live Sciences

Mid-West Academy and Research Institute Tulsipur, Dang, Nepal

¹All authors contributed equally to the project

*Correspondance: manojbasnet99@gmail.com

Rationale

Farmers growing Cauliflower in Nepal have limited knowledge on the appropriate date of planting, nutrient requirement, and the role of different organic and inorganic fertilizers in the production of Cauliflower. It is generally accepted that optimal use of inorganic fertilizers increase crop yield. However, there is insufficient knowledge about the effect of yield on the quality of the produce such as vitamin and mineral content. Consumption of produce that received excess amount of fertilizers may causes the toxicity and metabolic disorders. The amount of vitamin C in the curd of cauliflower affect the palatability. The lack of vitamin C content in the human diet causes scurvy disease which can be reduced by the intake of the cauliflower. The objective of the study was to determine the effect of different types of fertilizers on vitamin C content of cauliflower.

Research Methods

The study was carried out in the Campus of Live Sciences, Tulsipur, Dang. A field experiment was conducted in Randomized complete block design (RCBD) with seven fertilizer treatments and replicated 3 times. The treatment included - T1: farmyard

manure (FYM), T2: poultry manure, T3: compost, T4: NPK, T5: mustard cake, T6: control (without fertilizer) and T7: vermicompost. Data on stem diameter, plant height, and no of leaves per plant were collected from sample plants on 30, 45, and 70 days after transplanting (DAT). Sample plants were selected in all the plots excluding the border plants. The data were analyzed using the software SPSS.

Study progress

The study was started on 4th September 2019 and is in progress.



Table 1: Phenotypic variables at different developmental stages of cauliflower under different fertilizer treatments

Treatment	30 DAT			45 DAT			70 DAT
	Stem diameter (cm)	Average height (cm)	Average no. of leaves	Stem diameter (cm)	Average height (cm)	Average no of leaves	Curd diameter (cm)
T1	0.8	24.25	11	1.1	32.3	13.2	12.91
T2	0.75	23.41	9.33	0.9	30.4	11.8	11.12
T3	0.75	24	11.4	1.0	30.1	12.9	11.99
T4	0.83	20.03	9.5	0.9	30.4	11.7	17.25
T5	0.62	28.16	9.52	1.1	37.8	11.6	14.183
T6	0.55	20.122	9.29	0.6	21.2	10.4	10.90
T7	0.7	28.7	10.91	1.0	33.7	13.9	13.68

NAPA 2019-2020 Mini-grant Projects Research Summaries

Nutrient Management for Cauliflower (Cont.)

Table 2. Comparison of study results between 2018 and 2019

Treatment	2018 (Highest)	2019 (Highest)
Diameter of stem	NPK(1.25cm)	FYM (1.10cm)
Plant height	NPK(48.81cm)	Mustard cake (37.83cm)
Number of leaves	NPK(11.5)	Vermicompost(13.91)
Curd diameter	Mustard cake(15.6cm)	NPK(17.25cm)

Summary and Conclusion

On the basis of observed data, we found that the diameter of stem was highest in FYM (1.10 cm), height was highest in mustard cake (37.83 cm) treatment, leaf number was highest in vermicompost (13.91) treatment, and curd diameter was highest in NPK (17.25) treatment. In terms of plant growth variables, T6 (control) was found to be least performing in all parameters considered. However, other parameters such as yield, curd diameter, and vitamin c content are yet to be determined.

Researchers' experience

- Occurrence of disease on cauliflower
- Timely unavailability of vermicompost
- The soil was dry, stony, and highly plastic when watered
- Shading effect due to mango orchards
- Land reclamation may be needed



Researchers' short biography

This study was a shared effort of five students of Bachelor of Science in Agriculture (BSc Ag) at Campus of Live Sciences, Tulsipur, Dang. The study



team included Ms **Shirisa Acharya** from Biratnagar, Morang; Mr. **Saurav Bhandari** from Chitwan; Mr. **Subham Kaphle** from Chitwan; Ms **Ashika Bista** from Koshi Haraicha, Morang.; and Ms **Poonam Belbase** from Kapilvastu. They started their Bachelor program in 2016.

Study advisors

Local advisor

Manoj Basnet, Associate Professor
Department of Horticulture, IAAS, Paklihawa
Email: manojbasnet99@gmail.com

NAPA advisor

Prem Bhandari, Ph.D.
Population Studies Center
University of Michigan, USA
Email: pbhandari115@gmail.com

Acknowledgements

The research presented in this manuscript is partially/fully supported by *Jit-Shavitra Mini-Research Grant* through the **NAPA Scholarship for Academic Excellence Fund** of the Association of Nepalese Agricultural Professionals of Americas (NAPA).

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Existing Cattle Milk Production and Marketing Chain in Bharatpur-16, Chitwan, Nepal

Iebu Devkota

Faculty of Animal Science, Veterinary Science and Fishery
Agriculture and Forestry University, Rampur, Chitwan, Nepal
Email: ebudevkota@gmail.com

Rationale

Dairy farming is one of the prestigious occupations among other agriculture sub-sectors, contributing 2/3rd to Agriculture Gross Domestic Product (CBS, 2010) and thereby drawing urban capital to rural areas (NEPC, 2014). The recent development of milk processing and chilling centers have created a ripple effect in flourishing commercial dairy farming systems (Timsina, 2010). Therefore, the knowledge of factors that have been affecting milk composition makes farmers more aware of the reasons behind the fluctuation in their solid-not-fat (SNF) and Fat percentage and can help them to formulate the rations accordingly. The major objective of the study was to understand the economics of production and marketing status of milk produced in the traditional cattle rearing system in Bharatpur-16, Chitwan district.

Study Progress

The study is in progress. Household surveys, data collection from milk producers' cooperatives (MPC) and its entry, and literature review have been done. Final data analysis, interpretation and report writing are in progress.

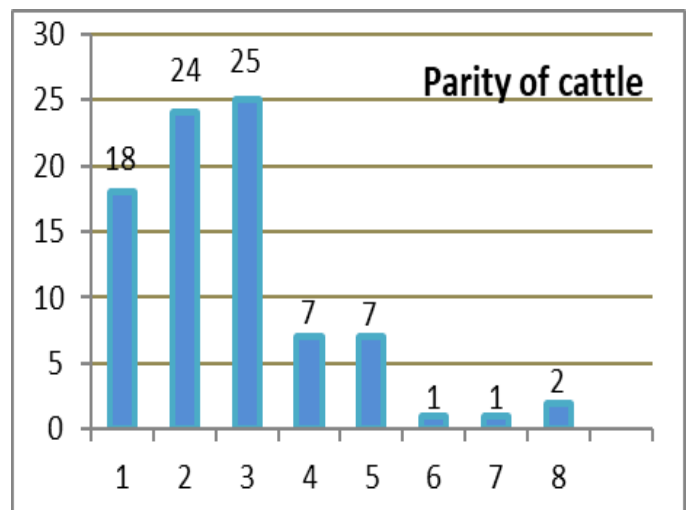
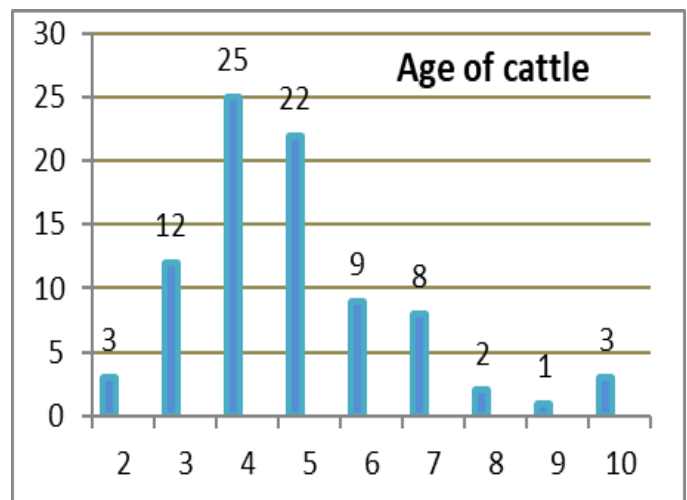
Research Methods

Vijayanagar and Gadhi areas in Chitwan were chosen for the study due to abundance of small scale farmers rearing cattle traditionally. Thirty farmers each were selected from the members' list of two MPCs. Two collection centers or processing units that receive milk from MPC were selected for the interview. The study involved household survey, interview of key informant and field observation to collect primary data with the supplementation of milk producer records as secondary information. The data obtained will be coded, tabulated and analyzed using various statistical software like MS-Excel and SPSS. Different descriptive and inferential statistics will be used for the analysis of collected data.

Results

The average milk produced annually by each household is 145,312.97 liters. The common breeds identified during the survey were Jersey and Jersey*Local cross, but the clear identification was difficult due to lack of knowledge of farmers.

The following bar diagram shows 25 cattle were 4 months old and 25 cattle had parity of 3.



NAPA 2019-2020 Mini-grant Projects Research Summaries

Milk Production and Marketing Chain (Cont.)

The following table shows the average value of different reproductive and milk production traits found in sample cattle.

Reproductive traits	Average value	Milk production traits	Average value
Postpartum Estrus	89.84 days	Colostrum days	3.73 days
Calving interval	410.07 days	Peak yield	11.46 liters
Service per conception	1.57	Days to reach peak yield	17.09 days
		Dry period	52.86 days
		Lactation length	353.70 days

Researcher's Short Biography

Ms. Iebu Devkota, a permanent resident of Dhapasi, Kathmandu Nepal, is one of the recipients of NAPA Research Mini-Grants-2019. She accomplished volunteering with World Vets (WVS), International Aid for Animals from November 12-18, 2018 in their Spay and Neuter Camp. She also participated in the International Poultry Symposium 2018 held at Bharatpur Garden Resort from Kartik 11 to 14, 2075 as a poster presenter. She is currently a student at Agriculture and Forestry University (AFU), Faculty of Animal Science, Veterinary Science and Fishery, Rampur, Chitwan. She can be contacted by phone at +977 9841794622 or by email: ebudevkota@gmail.com for any questions about this research project.

Study advisors

Local advisor

Hom Bahadur Basnet, Ph.D.
Professor, Department of Microbiology and Parasitology, Agriculture and Forestry University, Rampur, Chitwan, Nepal
Email: hombasnet@gmail.com

NAPA advisor

Uma Karki, Ph.D.
Professor, State Extension Livestock Specialist
Tuskegee University
Email: ukarki@tuskegee.edu

Acknowledgements

The research presented in this manuscript is partially/fully supported by Mini-grant awarded by the Association of Nepalese Agricultural Professionals of Americas (NAPA).

Novel-coronavirus-2019: Some Facts from WHO Website

A pneumonia of unknown cause detected in Wuhan, China was first reported to the WHO Country Office in China on 31 December 2019.

The outbreak was declared a Public Health Emergency of International Concern on 30 January 2020.

On 11 February 2020, WHO announced a name for the new coronavirus disease: COVID-19.

The WHO declared the coronavirus outbreak a pandemic on March 11, 2020.

To stay up to date, follow [@DrTedros](https://twitter.com/DrTedros) and [@WHO](https://twitter.com/WHO) on Twitter, read WHO's [daily situation reports and news releases](#), and watch our regular [press conferences](#).

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>

NAPA 2019-2020 Mini-grant Projects Research Summaries

Effect of Plant Growth Regulators on Growth, Flowering and Yield Attributes of Marigold (*Tagetes sp.*)^{1*}

Gaurav Adhikari, Susil Khanal, Kritika Adhikari and Susmita Sigdel

Agriculture and Forestry University, Chitwan, Nepal

¹All authors contributed equally to the project

*Correspondence: bshrestha@afu.edu.np

Rationale

Hormonal imbalance causes non-uniformity in flowering, plant height, and yield in marigold. Moreover, poor mobilization of metabolic reserves, early senescence, growth inhibition, reduced oil formation, and limited seasonal growth reduce the marketability of loose flowers and timely release of flowers to the market. The plant development processes can be manipulated with the use of plant growth regulators.

Study progress

In the second week of June, marigold cuttings were prepared and kept in the net house. Then, the field was prepared during the last week of July and those cuttings were transplanted in the first week of August. After transplanting, pinching of apical floral buds was done for about a month and data were collected at 15 days intervals. As the crop underwent weed pressure, heavy rainfall, and high wind speed during the growing season.

Research Methods

The study was conducted at the Horticulture Farm, Agriculture and Forestry University (AFU). Different concentrations of Gibberellins, NAA, and Ethrel were compared with untreated control in a randomized complete block design (RCBD) with three replications. Monthly data on rainfall, temperature (maximum and minimum), and relative humidity during the entire crop growing period were collected from the agrometeorological station, National Maize Research Program, Rampur, Chitwan.

Soil texture, organic carbon, organic matter, pH, total nitrogen, soil available phosphorus and potassium were tested. Days to first flower-bud initiation and opening of the first flower, duration of flowering, number of flowers per plant, plant height, number of primary branches, number of secondary branches, number of nodes, leaf area index, and number of leaves per plant were recorded from five sample

plants every 10 days interval. Finally, the weight of individual flower, flower diameter, weight of flowers per plant, and number of flowers per plant were recorded.

Results

Although data are yet to be analyzed, the preliminary results showed the improved performance of marigold when treated with different concentrations of Gibberellins, NAA, and Ethrel than left untreated (control). Among the treatments, the application of Gibberellin @ 300 ppm had the most pronounced effect on the growth and yield of marigold.

Researchers' experience

It was necessary to be careful while taking cuttings. Utmost care must be taken while transplanting as there is a chance of fungal infection during the rainy season. Affected plants must be discarded in order to protect the main field. As the marigold was cultivated during the rainy season, there was a serious problem of weed. We also observed the problem of waterlogging and damping-off disease. There was also a problem of sex expression due to which the planted seedlings were picked off and then, next seedling was transplanted. Hence, further studies should explore the impact of drought in sex expression.

Researchers' Short Biography

The study was a shared project of four undergraduate students of Agriculture and Forestry University, Chitwan Nepal. Mr. **Gaurav Adhikari** is a final year undergraduate student at AFU, Chitwan. He volunteered for Amnesty International, Red Cross, IAAS Nepal, Bharatpur Metropolitan environment week campaign, and Youth Thinkers' Society, Chitwan. He has been the head of CSA Organic Farm and is involved in research of yam and mushroom.

NAPA 2019-2020 Mini-grant Projects Research Summaries

Plant growth regulators on Marigold (Cont.)

Mr. **Susil Khanal** is currently studying BS in agriculture, the third semester at AFU, Chitwan. He volunteered for Nepal Youth Red Cross, AFU and Youth Thinkers' Society – Chitwan. He was awarded with the Mahatma Gandhi Scholarship Scheme (MGSS) 2016/17 and Golden Jubilee Scholarship 2018 by the Indian Embassy. Ms. **Kritika Adhikari** is a third-year undergraduate student at AFU, Chitwan. She volunteered for Bharatpur Metropolitan during the environment week campaign for consecutive 3 years. She is also a member of the U.S. Embassy Youth Council and a regional ambassador of an international organization, Thought For Food (TFF). Ms. **Susmita Sigdel** is also an undergraduate student at AFU, Chitwan. She is a council member of U.S. Embassy Youth Council Batch 2019/2020. Currently, she is working as an ambassador of TFF.

Study advisors

Local Advisor

Bishal Shrestha
Assistant Professor, AFU, Chitwan
Email: bshrestha@afu.edu.np

NAPA Advisor

Shiva Makaju, Ph.D.
Research Professional, College of Agricultural and Environmental Sciences, University of Georgia
Email: shmakaju@gmail.com

Acknowledgements

The research presented in this manuscript is partially/fully supported by Mini-grant awarded by the Association of Nepalese Agricultural Professionals of Americas (NAPA).

Altitudinal Variation of Orthoptera (suborder: Caelifera) Species Richness and Diversity in Rice Fields of Central Nepal

Madan Subedi

Agriculture and Forestry University, Chitwan, Nepal
madansubedi13@gmail.com

Rationale

Rice is a major staple food in Nepal. It is grown from an altitude of 60 to 3,050 meters above mean sea level (MASL) in Nepal (Mallick, 1981). The productivity of rice in Nepal is 3.37 tons/ha (AICC, 2018), which is less compared to other rice-producing nations. Among several factors limiting the production of rice, insect/pests are considered as the major ones resulting in a total loss of 25-30% (Adhikari et al., 2018). Orthopterans are one of the major insect pests of rice crop in Nepal (Ansari et al., 2015). Twenty-six species of grasshoppers are found to infest rice plants in Northern-India (Akhur et al., 2012). However, no recent studies have attempted to understand the species diversity of orthoptera in rice crop in Nepal. Further, the species composition is found to differ with variation in altitude (Sirina et al., 2010). Identification of insect pests and their behavior is key to their successful management. This study was undertaken to assess

the richness and diversity of different species of orthoptera at different altitudes of central Nepal.

Research Methods

Four rice growing sites at different altitudes were selected from Chitwan and Parbat districts as follows: 1) Rampur, Chitwan - 258 MASL (27°38'14" N latitude, 84°21',25" E longitude), 2) Modibeni, Parbat - 758 MASL (28°12'6" N latitude, 83°40',23" E longitude), 3) Kairimta, Parbat - 1258 MASL (28°16'12" N latitude, 83°43'4"E longitude), and 4) Kalimati, Parbat - 1758 MSL (28°16'34" N latitude, 83°42'10" E longitude).

Five plots (each of 4 x 10 m² total area) were selected at each site. Insect samples were taken with a sweeping net of 0.3 m diameter. Sweeping was done in such a way that all the plot area was covered. For example, if 1 plot = 4 x 10 m², then 1 walk dragging the net covered 3 m² area. In this way, around 14 sweeps were needed to cover a plot.

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Caelifera Diversity in Rice Fields (Cont.)

In total, 70 walks were needed to cover the area at each location for the plot dimension of 4 x 10 m². The plot dimensions, however, varied due to heterogeneity in hilly terraces. Grasshoppers were collected at the end of each month in each of the sites. The adults were kept alive for some time for the purpose of identification in insect collection jars. The nymphs were also kept alive until they turned into an adult.

Study progress

The study was started in April 2019 and the process of pest identification was continued until rice harvesting in late November or early December. Data are not fully analyzed yet.

Results

Till early November, 16 species of grasshoppers have been identified (including nymphs and adults) and the species found were: *Nepalocoryanda latifrons*, *Peripolus nepalensis*, *Oxya hyla*, *Oxya grandis*, *Oxya japonica*, *Phlaeoba infumata*, *Hieroglyphus banian*, *Aulacobothrus sp.*, *Acrida exaltata*, *Atractomorpha crenulata*, *Trilophidia annulata*, *Spathosternum prassiniferum*, *Spathosternum venulosum*, *Xenocatantops humilis*, *Stenocatantops splendens*, and *Eyrepocnemis alacris*. The process of identification is going on and the species number is expected to reach around 20-25. The statistical analyses on richness and diversity are yet to be done.

Researcher's experience

I learned about the methods of insect collection, rearing of insects in captivity, and the transportation of insects from different sites. I also learned how to identify grasshopper species including different nymphal stages, egg-laying, and molting in grasshopper. I also had a chance to learn about insect ecology, different morphological structures in grasshopper, and their damage symptoms in plants.

There were some limitations such as only one place was selected at each altitude level due to time and budget constraints. Life table study could not be done due to the lack of a controlled environment for grasshopper rearing. I suggest expanding this type of study to other crops and agro-ecosystems.

Researcher's short biography

Mr. **Madan Subedi**, a permanent resident of Modi Rural Municipality-05, Parbat is doing his MS majoring entomology at AFU, Chitwan. He completed his BS in agriculture from AFU, Chitwan in 2018 and higher secondary in science from Goldengate International Higher Secondary School, Kathmandu in 2012. He is currently employed as an agriculture officer at Agriculture Science Centre, Ghyalchok, Gorkha. He will be continuing this research for his MS program under the guidance of Dr. Resham Bahadur Thapa, Adjunct Professor, AFU, Chitwan. For any questions about this study, he can be reached at phone +977-9846224000 or at email: madansubedi13@gmail.com.

Study advisors

Local Advisor

Bhola Gautam
Assistant professor
AFU, Rampur, Chitwan
Email: bgautam@afu.edu.np

NAPA Advisor

Megha N. Parajulee, Ph.D.
Professor, Faculty Fellow, and Texas A&M University Regents Fellow, Lubbock, Texas, USA
Email: m-parajulee@tamu.edu

Acknowledgements

The research presented in this manuscript is partially/fully supported by Mini-grant awarded by the Association of Nepalese Agricultural Professionals of Americas (NAPA).

NAPA 2019-2020 Mini-grant Projects

Research Summaries

Influence of Gibberellic Acid and Naphthaleneacetic Acid on Performance of Tomato (*Lycopersicon Esculentum* Mill.) under Protected Cultivation in Kaski, Nepal

Ritesh Kumar Jha

Agriculture and Forestry University, Rampur, Chitwan, Nepal
 ritesh.lord.of.truth@gmail.com

Rationale

The average yield of tomato is very low in summer due to several constraints. High temperature above optimal leads to failure of tomato fruit set due to the disruption of sugar metabolism and proline translocation during the narrow window of male reproductive development. Deficiency of gibberellins and auxins enhanced the activity of repressor proteins (i.e. DELLA and Aux/IAAs) leading to negative feedback by inhibiting cell division and expansion. Higher temperature interferes with fruit set and results in flower drop due to an impaired complex of a physiological process in the pistil. The productivity of tomatoes during the summer months can be improved either by the application of growth-regulating substances that enhance production of gibberellins and auxins in plants. Among various plant growth regulators (PGR), gibberellic acid (GA_3) and naphthaleneacetic acid (NAA) have been reported to show promising effects on tomato crops. NAA is involved in many physiological processes like prevention of pre-harvest fruit drop, flower induction, fruit set, delayed senescence, and increased yield. Along with NAA, GA_3 enhances growth parameters and control fruit growth as well as development by increasing the number and size of tomato fruits. In addition to this, protected horticulture makes small holdings viable by producing maximum from limited land.

Research Methods

The study was carried out during the summer of 2018 and 2019 at the Kham Ghale Krishi Farm, in Chauthe, Kaski. Tomato cultivar Srijana was used for the study. The study was carried out in a randomized complete block design with 16 PGR treatments which were replicated three times. The size of each plot was 1.8 m x 1.2 m with 60 cm spacing between rows and 45 cm spacing between plants within each row thus making a total of eight plants per plot. Tomato plants were transplanted from nursery to the field on 31st December in 2018 and 2019. Well decomposed farmyard manure was applied at the rate of 40 t ha⁻¹ and NPK were applied at the rate of 200:200:120 kg ha⁻¹. The total yield of the tomato plants was recorded at the end of the study.



Results

The tomato fruit yield was significantly influenced by the levels of GA_3 , NAA, and their interactions. Among four levels of NAA, the highest yield (109.91 t ha⁻¹) was recorded with NAA @ 25 ppm which was 10.37%, 17.47%, and 24.78% higher over control, NAA @ 50 ppm and NAA @ 75 ppm, respectively.



NAPA 2019-2020 Mini-grant Projects Research Summaries

Plant Growth Regulators on Tunnel-grown Tomato (Cont.)

Similarly, for GA₃ applications, a significantly higher fruit yield (103.46 t ha⁻¹) was obtained with GA₃ @ 50 ppm and it was 13.91 %, 10.31%, and 6.74 % higher over control, GA₃@ 25 ppm, and GA₃@ 75 ppm, respectively. Interactions between GA₃ and NAA levels were significant for all yield attributes. Regression analysis on the effect of GA₃ and NAA on the yield of tomato showed polynomial trend showing optimal yield, while the physical dose of GA₃ was 52.65 ppm and NAA was 20.29 ppm respectively. It can be concluded that the production of tomato could be improved by the combined application of GA₃ @ 50 ppm and NAA @ 25 ppm under the protected condition of Pokhara, Nepal.

Recommendations for Future Research

The present investigation should be repeated to confirm the findings with popular cultivars of tomato.

The important fruit quality parameters such as pericarp thickness, pH, acidity, lycopene, and Vitamin C should also be evaluated in the future studies.

Researcher's short biography

Mr. **Ritesh Kumar Jha** completed his Bachelor's Degree in Agriculture Science in 2019 from Agricul-

ture and Forestry University, Rampur, Chitwan, Nepal. He is currently pursuing his Master's degree in Agri-economics in the same university. He has several published several articles in national and international journals. For any questions about this study, he can be reached at email: ritesh.lord.of.truth@gmail.com

Study advisors

Local Advisor

Arjun Kumar Shrestha, Ph.D.
Professor, AFU, Rampur, Chitwan, Nepal
Email: akshrestha@afu.edu.np

NAPA Advisor

Shyam Kandel, Ph.D.
Research Plant Pathologist, USDA, Salinas, CA
Email: kandelsl@gmail.com

Acknowledgements

The research presented in this manuscript is partially/fully supported by Mini-grant awarded by the Association of Nepalese Agricultural Professionals of Americas (NAPA).

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.

NAPA 2019-2020 Mini-grant Projects Research Summaries

Effect of Planting Methods, Crop Residue Management and Weed Control Practices on Growth and Yield of Rice (*Oryza saliva* L) at Bhairahawa, Nepal

Barsha Sharma

Institute of Agriculture And Animal Science, Chitwan, Nepal

Email: agribarsha77@gmail.com

Rationale

Labour scarcity, increasing production costs and declining or static productivity are the major challenges of agriculture in Nepal. As a result, people are hesitant to rely on agriculture and therefore resort to go abroad for labour work. In recent years, rice yield is also either stagnant or on the decline along with decline in profitability and efficiencies in input use. Dry seeding of rice with zero tillage (ZT) can help to address the problem of labour scarcity and high cost of production, if effective weed management technology is available. Yields of dry seeded rice were broadly comparable with those of transplanted rice in absence of weed competition (Singh *et al.*, 2011).

Study progress

This research was started after harvesting of wheat in April, 2019, where 50% residue of wheat was left over in plots. Crop was harvested in November 22, 2019. Data of fertile tillers m⁻² has been taken, whereas other yield attribute data compilation is in progress. We are targeting to complete it as soon as possible as analysis and report writing is still to be done and submission deadline is coming soon.

Research Method

Three factor split-split plot design was used in the experiment, where planting method was allocated in main plot, residue management in subplot and weed management practices in sub-sub plot. The treatments were replicated three times with total 16 different treatments.

Planting methods: 1. Zero tillage, and 2. Conventional transplanting method.

Plant residue management: 1. 50% residue management, and 2. No residue management condition.

Weed management: 1. Chemical weeding (Pendimethalin at 2DAS/DAT and 2,4D at 25DAS /DAT), 2. Hand weeding (20 and 40 DAS/DAT), 3. One chemical and one hand weeding (Pendimethalin at 2DAS, 20DAS/DAT one hand weeding), 4. No weed management condition.

Glyphosate was used in zero tillage direct sowing method before two weeks of sowing. Tillage was done and manure was used in transplanting methods as required for it. Sowing of seed was done in June 18, 2019. After 30 days

of seed sowing/transplanting (DAS/DAT), data for growth characteristics were recorded at 15 days intervals. Weed data for density and weed dry weight was taken at every 15 days up to 60 DAS/DAT.

Results

Weed population was quite low in those plots where plant residue was left over. Hand weeding resulted in lowest dry weight of weed at 60 DAS/DAT. Other results are still to be analyzed critically.

Researcher's experience

From treatment selection to layout and randomization of treatment in field. Each and every steps are most required to acquire practical knowledge

Researcher's short biography

Barsha Sharma is an MSc Ag student majoring in agronomy, currently in 4th semester at Institute of Agriculture And Animal Science, Chitwan, Nepal. She was a member of Red Cross Society in her College whereby she volunteered in various activities from tree plantation to plant clinics. Besides she also extended her volunteer service to governmental school children to teach English language for about six months.

Study advisors:

Local Advisor

Bishnu Bilas Adhikari, Ph.D.
Associate Professor, IAAS, TU, Chitwan, Nepal
Email: bishnuadhi2011@gmail.com

NAPA Advisor

Sushil Thapa, Ph.D.
Research Scientist, Texas A&M AgriLife Research, USA
Email: sushil.thapa@ag.tamu.edu

Acknowledgements:

The research presented in this manuscript is partially/fully supported by Mini-grant awarded by the Association of Nepalese Agricultural Professionals of Americas (NAPA).

NAPA Committees

Membership Drive Committee (MDC)

Chair

Dr. Pradeep Wagle

Co-Chair

Dr. Santosh Dhakal

Student Coordination Committee (SCC)

Chair

Mr. Bikash Poudel

Co-Chair

Mr. Bikash Ghimire

Secretary

Ms. Sangeeta Karki

Members

Mr. Ram B. Khadka

Mr. Sujan Bhattarai

Mr. Hari Krishna Poudel

Ms. Sadikshya Sharma

Mr. Buddhi Achhami

Mr. Kshitiz Dhakal

Mr. Binod Gyawali

Ms Ishwora Dhungana

Mr. Nabin Prasad Sedhain

Mr. Yogendra Upadhya

Webinar/Talk Organizing Committee (TOC)

Chair

Dr. Lila K. Khatiwada

Members

Dr. Lila B. Karki

Dr. Megha N. Parajulee

Dr. Pradeep Wagle

Dr. Prem B. Bhandari

Book Publication Committee (BPC)

Editor-in-Chief

Dr. Drona P. Rasali

Co-Editor-in-Chief/Managing Editor

Dr. Prem B. Bhandari

Editors:

Dr. Megha N. Parajulee

Dr. Ram Acharya

Dr. Uma Karki

Dr. Raju Adhikari

Global Journal of Agricultural & Allied Sciences (GJAAS)

Editor-in-Chief

Dr. Megha N. Parajulee

Managing Editors

Dr. Pradeep Wagle

Dr. Bharat Pokharel

Editors

Dr. Krishna P. Paudel

Dr. Chakra Budhathoki

Dr. Kalidas Subedi

Dr. Nabaraj Devkota

Dr. Prem B. Bhandari

Dr. Jagadish Timsina

Dr. Uma Karki



Community and Charitable Services Committee (CCSC)

Coordinator

Mr. Resham Gharti/GT

Members

Dr. Laxman Adhikari

Mr. Yubaraj Kumar Karki

Resource and Capacity Building Committee (RCBC)

Coordinator/Chair

Dr. Buddhi P. Lamsal

Co-Chair

Dr. Ramjee Ghimire

Members

Dr. Lila K. Khatiwada

Dr. Manoj Karkee

Dr. Aditya R. Khanal

Dr. Surendra K.C.

Nepalese Women in Agricultural and Allied Professionals (WAAP)

Coordinator

Dr. Prakriti Bista-Ghimire

Members

Ms. Ambika Tiwari

Dr. Shristi Ghimire

Ms. Ranjana Rawal

Research/Policy Brief (RPB)

Editor-in-Chief

Dr. Ramjee Ghimire

Editors:

Dr. Suman Rimal Gautam

Dr. Lila K. Khatiwada

Dr. Bhawani Mishra

IT Committee

Chair

Dr. Ananta Acharya

Dr. Dev Paudel

Webmaster

Mr. Tanka Kafle

Media Coordinator

Mr. Bijay Thapa



NAPA

Association of Nepalese Agricultural Professionals of Americas

Welcome New NAPA Members on Board

We are growing !

Our total NAPA membership is at 375 that includes 77 Life Members, 62 General/Regular Members, 160 Student Members, 59 Associate Members, and 17 Family/Joint Members. We are greatly privileged to welcome the following new members in this quarter !

Students Members

- Mr. Anand Tiwari, Tuskegee University, Alabama
- Ms. Pratima Bhandari, New Mexico State University
- Ms. Subarna Sharma, Mississippi State University
- Ms. Laxmi Kharel, Mississippi State University
- Mr. Manoj Sapkota, University of Georgia
- Ms. Renu Ojha, Tennessee State University
- Ms. Anju Pandey, Tennessee State University
- Ms. Asmita Devkota, Tennessee State University
- Ms. Shreya Hamal, Tennessee State University
- Ms. Bimala Acharya, Tennessee State University
- Ms. Nevershi Andrea Ellis, Tuskegee University
- Mr. Pawan Devkota, Texas Tech University
- Mr. Rishi Ram Bhandari, Auburn University

Associate Life Members

- Mr. Durga Prasad Dawadi, Nepal
- Mr. Kiran Roka, Nepal
- Mr. Dinesh Bahadur Karki, Nepal
- Mr. Prakash Gurung, Nepal
- Mr. Krishna P. Sharma, Nepal
- Ms. Samita Paudel, Nepal
- Mr. Deependra Dhakal, Nepal
- Mr. Krishna Hari Devkota, Nepal
- Mr. Ravindra Kumar Yadav, Nepal
- Mr. Ramesh Upreti, Nepal
- Mr. Nirajan Bhandari, Nepal

Family/Joint Life Members

- Mrs. Bhuwan Subedi, Texas

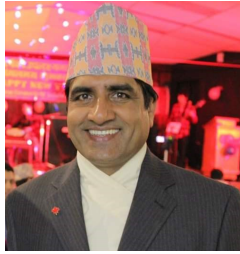
Life Members

- Mr. Maha Gelal, Georgia
- Dr. Sanjay Lamsal, Ohio
- Dr. Jhalendra Rijal, California
- Dr. Sonisa Sharma, Oklahoma
- Dr. Kundan Dhakal, Oklahoma
- Dr. Rajen Bajgain, Oklahoma
- Dr. Prem Kandel, Pennsylvania
- Dr. Bharat Man Shrestha, Alberta, Canada
- Mrs. Gita Koirala Bhandari, Texas

General/Regular Members

- Dr. Purna Kandel, Ontario, Canada

Featured NAPA Member of the Quarter (Jan - Mar 2020)



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

Research Scientist
Agriculture and Agri-Food Canada
Beaverlodge Research Farm
Alberta, Canada

Education:

Ph.D., Plant Science, University of Saskatchewan, Saskatoon, SK, Canada (2011)

M.Sc., Agricultural Systems, Chiang Mai University, Chiang Mai, Thailand (2000)

B.Sc. Agriculture, Institute of Agriculture and Animal Sciences, Tribhuvan University, Nepal (1994)

Professional background:

Dr. Khanal currently leads Forage Research Program at Beaverlodge Research Farm of Agriculture and Agri-Food Canada, a department of Government of Canada. After his appointment as a Research Scientist in 2016, Dr. Khanal has effectively been founding a new program in collaboration with provincial specialists, industry stakeholders and researchers across Canada. In a short period, he has expanded and diversified the program, covering the aspects of cropping systems design, soils and plant nutrient management, plant growth regulation, plant protection, population improvement, breeder's seed maintenance and cultivar testing for local adaptation. Currently he is leading 10 research projects on herbage seed production, while collaborating with other researchers in five additional projects on herbage production and nutritive quality. With the diverse project portfolio, Dr. Khanal currently leads a team of five regular staff. The program hires a number of summer students every season, and has a plan to train two university graduates as high-skill professionals by 2023. He serves as an advisor to various industry associations and is invited to deliver talks in industry events. He has chaired a number of international conference sessions. He also receives numerous visits and calls from farmers and seed companies seeking his advice.

With an alternating sequence of professional work and post-secondary education, Dr. Khanal has built on expertise in crop physiology, agronomy and breeding of forages and field crops. He received over a dozen of academic scholarship awards including Outstanding PhD Student Award, and numerous recognitions for his dedicated professional work. He is affiliated with six professional forums including: Association of Nepalese Agricultural Professional of Americas (NAPA), Agriculture Promotion Committee (a joint initiative of the

Government of Nepal and Non-resident Nepalese Association), Alberta Institute of Agrologists, Canadian Society of Agronomy, Canadian Society of Plant Biologists and American Society of Agronomy. Before coming to Canada for PhD, Dr. Khanal served Nepalese communities in the motherland through governmental and non-governmental system as a teacher, technician, researcher and developmental specialist for over a decade.

Nepalese community services in Canada:

- Helped hundreds of Nepalese individuals and families in immigration related matters such as application for visas, permanent residency and citizenship
- Helped newly arrived Nepalese and Bhutanese immigrants in settlement, tax filing, and service acquisition process
- Coordinated emergency responses and family contacts, and facilitated insurance claims for the victims and their families
- Acted as an interpreter for Nepalese individuals who faced unordinary situation such as court cases
- Took initiatives in cultural promotion events, such as folk-festival pavilions and Nepali language school
- Took initiatives in founding Nepalese Community of Saskatoon and rapport-building with Nepalese in other cities in western Canada.

Involvement with NAPA:

- NAPA member since 2016 and NAPA life member since 2018
- One of the participants, presenters, session chairs, posters evaluation judges at the 1st NAPA Conference held in Oklahoma, USA in 2018
- Contributor/donor/sponsor of NAPA flagship projects/programs
- Editor-in-chief of the NAPA quarterly online newsletter **Agri-Connection** since 2018 and brought out nine issues of the same thus far
- Coordinated poetry program in the NAPA Day celebration event in last two years
- Served as an advisor to a NAPA Mini-grant study undertaken by agriculture and forestry university student in Nepal.
- Serving as one of the Co-chairs of the 2nd NAPA Conference 2020.

NAPA is very much delighted to recognize Dr. Nityananda Khanal as a featured member of the quarter for his outstanding contribution and unwavering dedication while serving the community in various capacity. Congratulations Dr. Khanal!

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.

COVID-19 Special Webinar



NAPA is truly thankful to Dr. Sanjeeb Sapkota, an employee of Federal Public Health Agency – The Centers for Disease Control and Prevention (CDC), who delivered a webinar on Coronavirus Disease – 2019 (COVID -19) Pandemic on March 14, 2020. Dr. Sapkota is

the Chair of Non-resident Nepali Association (NRNA) Health Committee. He has direct experience of working in several pandemics, including 2009 Pandemic Influenza. During this talk, Dr. Sapkota provided valuable information about the characteristics of a pandemic in general and more specifically about the nature of Severe Acute Respiratory Syndrome Coronavirus – 2 (SARS-CoV2), its transmission, clinical characteristics, and control and prevention measures. COVID-19 is caused by the most

recently identified coronavirus, SARS-CoV2, which is spread from person to person through small droplets dispersed from the nose or mouth. The coronavirus can also be transmitted after touching contaminated objects or surfaces and then touching eyes, nose or mouth. The chances of being infected with or spreading coronavirus can be reduced by following social and physical distancing, and regularly and thoroughly cleaning hands with an alcohol-based sanitizer or soap and water. Dr. Sapkota requested all the participants to follow the specific prevention measures suggested by State and Federal governments. Dr. Sapkota's presentation stimulated interactive discussion among the participants who joined virtually from various parts of USA, Canada, and Nepal. During interactive discussion, Dr. Santosh Dhakal, research scholar from The Johns Hopkins University, also added about the drugs which have shown optimistic results against COVID-19 in experimental settings. The zoom talk was recorded and shared with wider audiences in social media as well.

NAPA Outreach

Interaction program in Nashville, Tennessee



President Karki, Lila B., along with life member Dr. Uma Karki visited agricultural and allied disciplines' faculty and students at Tennessee State University Nashville, Tennessee, on February 28, 2020. NAPA life members Drs. Bharat Pokharel and Aditya Khanal hosted an interaction program about NAPA's past, present and future activities followed by an introductory program with the students of agricultural and allied disciplines as listed below.

Madhav Parajuli, Kripa Dhakal, Bandana Bhusal, Bimala Acharya, Asmita Devkota, Sudhip Adhikari, Binod Gyawali, Anju Pandey, Shreya Singh Hamal, and Renu Ojha from TSU attended the program. A few students (prospective members) showed their interest to join NAPA and expressed their desire to contribute to NAPA in all capacity they can. NAPA is thankful to all of them for coming to the meeting and sharing their willingness to heighten NAPA's identity around the globe.

Online Bioinformatics Class to Students at Agriculture and Forestry University, Nepal

M. Sc. Students of biotechnology at AFU Center for Biotechnology experienced something new this year. Dr. Ananta Acharya, Joint secretary of NAPA conducted online Bioinformatics course in collaboration with Dr. Ishwari Prasad Kadariya, Director of Center for Biotechnology, AFU. Nine students and faculty members participated in the course which was conducted over online for 3 months. The students received lecture through Zoom conference calling and did hands-on analysis and computation over cloud computing resources. This was second year of this collaboration.



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***
(<http://napaamericas.org/napa-scholarships-sponsors.php>)
- ♦ ***An Endowment Fund for awarding emergency relief and charitable support***
(<http://napaamericas.org/endowment-fund-announcement.php>).

NAPA extends gratitude to its bountiful donors and appeals to the potential donors for their generosity.

Join NAPA: Blend your professionalism with philanthropy

Visit <http://napaamericas.org/join-napa.php> for membership information.

Here are NAPA membership categories and fee schedules:

Life membership (One-time payment)

Regular: US\$200 - Bachelor degree or equivalent qualifications in agriculture or related field.

Eligible spouse: US\$100

Senior (65 years or more): US\$100

Joint/family: US\$50

Associate (outside Nepal): US\$100

Associate (Nepal): NRs. 5,000

General membership (For 2 Years)

Regular: US\$50

Student: US\$25

Associate (outside Nepal): US\$25

Joint/family: US\$15



BECOME A

MEMBER

JOIN TODAY!

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

Article

Pesticide Use in Nepal: Need to wake up and act now!

Sunil Dulal¹ and Bed P. Khatiwada²

¹Senior Agriculture Officer at Nepal Public Health Foundation, Bharatpur Nepal

²Fresh Produce Postharvest Specialist in Brisbane, Australia

Correspondence: ag.dulalsunil@gmail.com; bedkhatiwada@gmail.com

Background

Use of pesticides has been mainstay of agricultural pest management worldwide. With the invention of dichloro diphenyl trichloroethane (DDT) in 1939 by Paul Muller, the use of chemical pesticides increased globally. In Nepal, the history of using chemical pesticides is traced back to 1950s with the introduction of DDT in the 1950s for the control of mosquitoes causing Malaria disease. Since then, the use of chemical pesticides has been in vogue for controlling pests, which is well supported by the agricultural policies in the country. Reckless use of highly persistent chemical pesticides without any personal protective equipment (PPE) and without consideration to detrimental impacts on human health, soil, water, and environment have been great cause for concern.

Pesticide use in Nepal: Alarming

In Nepal, there were about 3035 registered pesticides with their trade names and 170 registered pesticides with their common names (PQPMC, 2018). The use of pesticides is in increasing trend, with 40% increase from FY 2013/14 to 2017/18 (Fig. 1). Also, the investment of farmers on pesticides increased from NRs. 552 million to NRs. 836 million during the same period.

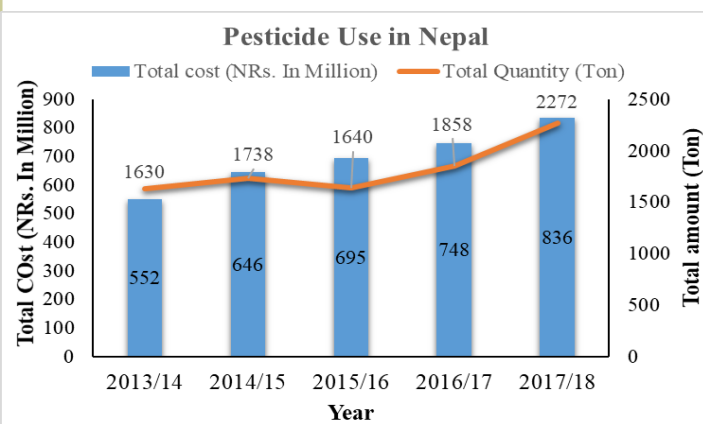


Figure 1. Recent trend of pesticides use in Nepal (Source: PQPMC, 2018).

Compared to many other countries, the use of chemical pesticides in Nepal is still low. In the year 2015, the annual use of pesticides in Nepal was estimated to be 396 g a.i ha⁻¹ (Plant Protection Directorate, 2015), which appears low as compared to the developed countries such as Japan (10.8 kg a.i ha⁻¹) and USA (1.5 kg a.i ha⁻¹) (Arora et al., 2011). However, some commercial vegetable growing areas receive frequent application of pesticides culminating in substantially a higher amount than the national average of 396 g a.i ha⁻¹ (Pokhrel, 2014; Table 1).

Table 1. Frequency and amount of pesticide use in different vegetables in Nepal (Source: Pokhrel, 2014).

S.N.	Vegetable	Frequency	Amount (kg a.i. ha ⁻¹)
1	Eggplant	23	15.93
2	Capsicum	17	11.71
3	Tomato	15	9.20
4	Lady's finger	10	6.94
5	Cucumber	9	6.54
6	Cowpea	8	5.82
7	Bitter gourd	8	5.40
8	Bottle Gourd	7	5.06
9	Cauliflower	7	5.02

Geographically, the use of pesticides is higher in Terai area than in the mid-hill and high hill areas. A survey conducted by Plant Protection Directorate in 2015 found that Jhapa ranked first on consumption of pesticides (1.66 kg a.i ha⁻¹) followed by Kavre (1.85 kg a.i ha⁻¹), Rautahat (1.73 kg a.i ha⁻¹), Banke (1.25 kg a.i ha⁻¹), and Chitwan (0.71 kg a.i ha⁻¹).

The strategy adopted by Nepal to reduce the use of pesticides

During 1970s, different governmental organizations such as Cotton Development Committee, Government agriculture farms and research stations, Agricultural Inputs Corporation, District Agriculture Development Office and frontline extension workers promoted the use of chemical pesticides for crop protection in Nepal.

Article

Pesticide Use in Nepal (Cont.)

After the plant-hoppers outbreak in rice that caused huge economic loss in 1996, government of Nepal started emphasizing on integrated pest management (IPM). The IPM farmers field schools encouraged the participants to prepare and use plant-based bio-pesticides. However, the use of alternative pesticides is still negligible in terms of quantity and acreage when compared with the amount of chemical pesticides.

Nepal being the signatory of Basel, Rotterdam and Stockholm conventions, there are obligations to ban the hazardous pesticides. Altogether 21 pesticides have been banned in Nepal. The Pesticide Act - 1991 and Pesticide Regulation - 1993 constitute the legislative framework for safe handling and application of pesticides in Nepal. Consumer Protection Act - 1998 had been promulgated but it does not dictate the production of pesticide-free agricultural products.

Pesticide residue analysis is done in vegetables using Rapid Bioassay of Pesticide Residue (RBPR) technique in major markets. Seven laboratory facilities are established in different regions under Plant Protection Directorate, which is crucial to pave the path for moving towards the pesticide regulation among farmers.

Gaps and future directions

Integrated pest management is a strong approach adopted by the Government of Nepal for reducing the use of chemical pesticides for almost two decades. But promoting the IPM through farmer field school may not be an adequate solution. There is a need for the integration of different sectors for the reduction of pesticides use. One of the major concerns is the lack of effective botanical and biological pesticides. Due to the unavailability of reliable and effective microorganisms or biological pesticides, farmers are reluctant to use IPM and organic pest management practices. Government bodies like Nepal Agricultural Research Council (NARC), Nepal Academy of Science and Technology (NAST) should now conduct more research to develop effective and eco-friendly tools and technology for pest management as an alternative to chemical pesticides. Increasing consumer awareness should be another strategy as consumers are the major drivers for change. Consumers' mindset towards more attractive, disease- and pest-free produce should be reoriented through mass aware-

ness programs using electronic, social and print media, and street dramas. Involvement of major stakeholders including health workers, school teachers, and female community health volunteers should be encouraged. Promotion of plant clinic in commercial farming areas for identification of the problem and use of the effective measures to identify the cause of problem and use of specific and suitable measures to control targeted pest are important. In the current context of decentralized agricultural extension services, local government should be enabled to regulate the use of chemical pesticides through adequate human resources and facilities. A package program focused on botanical pesticides and safe handling of chemical pesticides should be extended to farmers who produce vegetables on a commercial basis. A sound system of monitoring for pesticide residues at the local level and residue analysis at the marketplace are imperative. Consumers and markets are the major drivers for directing the agriculture system towards pesticide regulated or organic. So, consumer awareness about ill impacts of harmful chemicals and pesticide free produce should be promoted as a long terms measures for reducing use of hazardous chemical pesticides.

References

- Arora, S. (2011). *Pesticides: Status, Latest WHO Ranking, Regulation and Label Claims in India*. National Centre for Integrated Pest Management, Indian Council for Agricultural Research, Pusa Campus, New Delhi, India
- MoAD. (2012/13). *Statistical Information on Nepalese Agriculture*. Ministry of Agricultural Development, Nepal
- Pokhrel, M. R. (2014). *Situation of chemical pesticides in vegetable production and possible stepforwards*. Agriculture and Forestry University, Action Aid Nepal, Global Print connection Pvt. Ltd., Dillibazar, Kathamndu Nepal
- Plant Protection Directorate (2015). *Annual progress report*. Plant Protection Directorate, Hariharbhawan, Lalitpur, Nepal
- PQPMC (2018). *Registered Pesticides list and pesticides consumption statistics*. Plant Quarantine and Pesticide Management Centre, Hariharbhawan, Lalitpur, Nepal

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. 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

**BECOME A
MEMBER**
JOIN TODAY!

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

Renew now

"हिजोको कर्म = कोरोना "

अन्धकारमा झुण्डिरहेको एउटा कालो चमेरोले
वरपर आँखा घुमाउदै, पखेटा फट्फट्याउदै हेर्दै थियो
मानिसहरु चोटले हाँसेको अनि दुखले बाँचेका
संघर्षपूर्ण दिनहरु ।

साना साना बचेराहरु माथि आकाशमा
हावाको बेगसंगै चिर्बिराउदै खेल्दै थिए
गन्दै थिए कोही धर्ती तर्फ हेर्दै
धर्ती भरि पछारिएका मानव लाशहरु
आफन्तको वियोगमा गिङ्गिडयाइ रहेका एकाध झुत्ता ।

तिनै मानवले हिजोको दिनमा ब्यर्थे सहिद बनाएका
कलिला भरिला सन्तानहरु चियाउदै थियो
एउटा बुड्यौली माउ चमेरो
भन्दै थियो सायद मानव
तिमीले गरेको पापको उपज भोग्दैछौ आज ।

आज धर्ती खुल्ला छ, अनि शान्त छ
एक हुल बकुल्लाहरु निसन्देह उड्दै छन् बादलमुनि
रानी मौरी सहित एक गोला, भुन्भुनाउदै मच्चिरहेछ
सडकमा कुकुरहरु सारा बाटो मेरो भन्दै पल्टिरहेका छन्
तर्साउने छैन तिनलाई आज कुनै शिकारीको बन्दुकले
न कुनै चिम्प्री को धुँवाले
न कुनै गाडीको आवाजले ।

हिजो उसले मिठो मानि मानि खाएको
सय्यौ जातिका हाडछालाले बोकेका अनेकअनेक रोगहरु
आज तिम्रो शरीरमा पसेर तहसनहस पाउँछ
पुस्तौदेखि सम्हाल्दै आएको तिम्रो अचूक शक्तिलाई
यसरी पछाउँछ कि मानौ,
जोडिने छैन ति नसाहरु कहिल्यै
बग्ने छैन रगत ति नलिहरुमा कहिल्यै
धड्किने छैन त्यो मुटु उस्तै गरि फेरि कहिल्यै ।

हे मानव, नखाउ मासु सक्छौ? नखाउ सिनो
प्रकृतिले पक्कै दिएकोछ होइन र?
हामी र गिद्ध बिचमा केहि थान फरकहरु
संसारमै सर्बोक्लिस्ट ठात्रे हाम्रै घमण्डीले त होइन?
आज पिँजडामा कैद भएका छौ हामी
अनि दुर्बल भनिएका प्राणी घुम्दै छ खुलेआम ।

ढिलो भएको छैन सायद हाम्रो सभ्यता जोगाउन
सुष्म सुष्म जिवाणुले हाम्रो विश्वास ढलाउन
नसुधिए अझै, जन्मिने छन् धेरै यस्ता कोरोनाहरु
मेटाउने छन् मानव अस्तित्व सदाका लागि
मेटाउने छन् मानव अस्तित्व सदाका लागि ।

- शैलेस भट्टराइ



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.

Member Recruiting Benefits:

To be eligible to win any of the following prizes, your recruited NAPA members must write your name in the “referred by” row on the membership form. Each member you recruit will add up points in your account as specified below:

One life member = 10 points

One member in any other category = 5 points

Those willing to win the prizes should accumulate 75, 50, and 25 points. The winners may receive a complementary room for three nights, conference registration fee waiver, and complementary lunch coupon or equivalent scholarship in 2020 Biennial Conference, respectively.

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