Association of Nepalese Agricultural Professionals of Americas (NAPA)

Quarterly Newsletter

AGRI-CONNECTION

June 2023 | Volume 8, Issue 2

Inside:

Rice and corn fields in the Western Nepal - Sushil Thapa

PROSPERITY THROUGH AGRICULTURAL TRANSFORMATION

Message from the President

Dr. Pradeep Wagle, NAPA President

Dear NAPA members and beyond,

It is my great pleasure to announce the release of our quarterly newsletter Agri-connection (AC), **Volume 8** ***Issue 2.*** As usual, this new issue highlights the incredible work being done by our committees and members. I would like to thank all of our members and well-wishers who have contributed to this newsletter and to the success of our organization.

In this issue, you can enjoy reading several articles and research synopses covering a diverse range of pertinent subjects, condensed highlights of Nepal's noteworthy agricultural news/events, and additional intriguing content.

NAPA specialized committees organized several events in the past quarter. Webinar Committee (WC) organized the 34th webinar (panel discussion) on "*Viability of Domestic Vegetable Value Chain & Food Security/Safety in Nepal*" on April 16. The 35th Webinar on "*Breeding Innovations in CGIAR for Global Food Security*" by Dr. Bhoja Raj Basnet, Senior Scientist - CGIAR, has been scheduled for July 23. The Student Coordination Committee (SCC) hosted a members-only event on the manuscript writing process on May 14. President Dr. Pradeep Wagle covered all aspects of the manuscript writing process in his talk. The Socio-Economic and Cultural Committee (SECC) organized a very informative webinar on financial wellness on June 19. Mr. Amit Bansal, Director of the Center for Financial Health and Wellness at Oklahoma State University, delivered a talk on "Discover the Secrets of Financial Wellness and Take Control of Your Finance." The The Research and Capacity Building Committee (RCBC) has released the first installment of the Research Mini-Grants (RMG) and is planning to organize a series of literacy and professional development programs for awardees.

As you all know NAPA is organizing the 4th Biennial International Scientific Conference in Baltimore, Maryland, USA from May 24-26, 2024. I am pleased to announce that Dr. Lila B. Karki, the founding president of NAPA, will be the chair of the Conference Organizing Committee. The chairs of various subcommittees, such as the Scientific Committee, Student Essay Writing Contest, Rapid Fire Competition, Ag. Poem Competition, Fundraising, and Local Organizing Committee are still being finalized. However, we are confident that we will have a strong team in place to plan and execute a successful conference. I encourage you to save the dates for the conference and plan to attend it in person, if possible. Please stay tuned for more updates in the coming months.

Finally, I would like to express my sincere gratitude to the AC Editorial Board, led by Dr. Sushil Thapa, for their dedication and hard work. The board has played a vital role in ensuring the quality and relevance of the AC. I encourage all of our members to stay engaged with AC by sending contributions to newsletter@napaamericas.org.

Thank you for your continued support!

For past issues of Agri-Connection, please visit:

https://napaamericas.org/newsletter.php

Editorial

Animal husbandry is closely aligned with Nepalese livelihoods and is the main source of income for rural families. Time and again, various infectious diseases threaten the livestock and poultry industries leading to substantial and severe economic losses. Lumpy Skin Disease (LSD), which first appeared in Nepal in June 2020, is a highly contagious viral disease found in cattle and buffaloes. The disease remains difficult to control due to the lack of effective treatments. Although livestock mortality rate is relatively low, the disease can lead to temporary loss of milk production, temporary or permanent infertility of bulls, skin damage, and even death. More than 10,000 animals have been reported dead in the country since the first outbreak. Therefore, it is very important that farmers receive adequate compensation and that vaccination programs are in place to prevent further spread of the infection.

Among the assorted agriculture-related news and events in Nepal, the LSD is the major highlight in this issue. Articles on environmental sustainability, vertical farming, citrus greening disease, bee keeping, and acid lime farming make this issue very special and useful to our readers. As usual, this issue includes sections on webinar series, panel discussion, research brief, KidsZone, and membership update, and summarizes NAPA's initiatives and achievements in organizational development, networking, research funding, and philanthropy. Many thanks President Dr. Pradeep Wagle, Vice President Dr. Ramjee Ghimire, and General Secretary Dr. Nityananda Khanal for your feedback, support, and encouragement as always.

Agri-Connection is an effort to connect the Nepali souls worldwide. We invite you to be a part of this glorious journey by reading, writing, and sharing your feedback.

AGRI-CONNECTION
Editorial Board

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Nepali Editing

AGRI-CONNECTION
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Association of Nepalese Agricultural Professionals of Americas (NAPA)
Email : napa@napaamericas.org
Website: https://napaamericas.org/

NAPA Proudly Announces

Fourth Biennial International Scientific Conference - 2024

Please save the date!

NAPA

4th Biennial International Scientific Conference

Date: May 24-26, 2024
(Memorial Weekend)

Mode: Hybrid

Venue: Baltimore, Maryland, USA

www.napaamericas.org

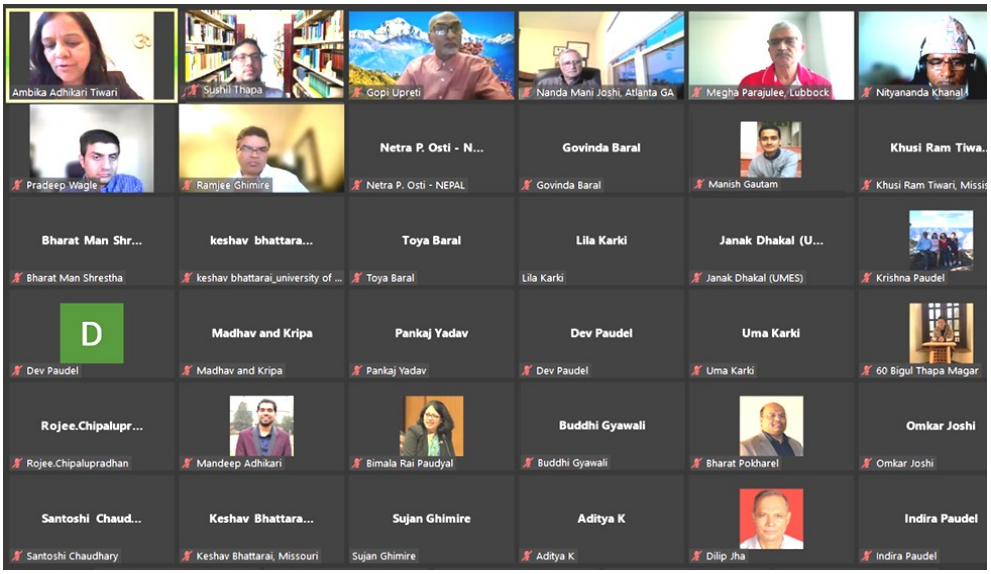
Stay Tuned for Updates

Eighth Annual General Meeting

NAPA organized its 8th Annual General Meeting (AGM) virtually on Friday, May 26, 2023. General Secretary Dr. Nityananda Khanal gave opening remarks. He also highlighted the meeting agendas and logistics. President Dr. Pradeep Wagle welcomed the meeting participants and introduced Ms. Ambika Tiwari as the meeting Chairperson.

Dr. Wagle presented the NAPA annual report covering initiatives taken and achievements made through various committees. Following are the highlights of the report.

- Organized an International Symposium on "Agricultural Policy and Practices in Nepal" in collaboration with the Policy Research Institute (PRI), Nepal. Thirty-eight (38) presentations were made from five countries (USA, Canada, Nepal, Australia, and Bangladesh). Twenty presenters submitted full papers for the Special Issue of Nepal Public Policy Review Journal, published by the PRI, Nepal. Twelve papers have been published in the special issue.
- NAPA was the Co-Investigator in the three grant proposals submitted to USDA/NIFA by faculty from Kentucky State University. One grant proposal has been recently funded and NAPA will receive ~$15,000 through a contractual agreement. The fund will be utilized to organize capacity building activities in Nepal.
- NAPA Research Mini-Grant program has been the attraction for students and young researches in Nepal. This year NAPA received 69 proposals from undergraduate students at various institutions in Nepal and 15 of them have been selected for funding.
- Hosted four webinars on:
  - Current status and future directions towards transforming agricultural education, research, and development in Nepal, delivered by Dr. Punya P. Regmi, Vice Chancellor at Agriculture and Forestry University, Nepal
  - Perspectives on Nepal's agricultural development policy: Potential for collaboration among NAPA, PRI, and other institutions, by Dr. Bishnu R. Upreti, Executive Chairperson at Policy Research Institute, Nepal
  - Transformative pathway towards food sovereignty, circular economy, and agroecosystems health, by Dr. Nityananda Khanal, Research Scientist at Agri-Food Canada and NAPA General Secretary
  - Tax Literacy Program, by Mr. Dinesh Dulal, Federally Licensed Tax Practitioner at Creative Tax Services, LLC, Texas
- Hosted five panel discussions and interactions on:
  - Agro-biodiversity for agricultural sustainability, conferred by Dr. Devendra Gauchan, Dr. Bal Krishna Joshi, Dr. Bhuminand Devkota, and Dr. Dilip Panthi
  - Viability of domestic vegetable value chain and food security/safety in Nepal, conferred by Dr. Suroj Pokhrel, Mr. Yuba R. Gurung, and Dr. Vidur Ghimire



Eighth Annual...

- Women in agricultural education in Nepal: Status and prospectives initiatives, by Dr. Kalyani Mishra Tripathi, Ms. Pushpa Pandey, and Ms. Anugya Bhattarai
- Career in Industry, by Mr. Krishna Neupane, Dr. Madhav Dhakal, Dr. Piush Khanal, Dr. Pratibha Acharya, and Dr. Sudhir Yadhav
- Manuscript writing by Dr. Pradeep Wagle

- Three issues of Agri-Connection, Vol. 7, Issue 1, joint Issue 2 and 3, and Issue 4 have been released.
- A poem compendium entitled *"Krishika Suseliharu"* part-2 has been released.
- Nominated a new Editor-in-Chief Dr. Uma Karki for the Global Journal of Agricultural and Allied Sciences (GJAAS) and expanded the editorial board.
- The NAPA website has been revised and updated with a new feature of the member log-in system.
- The database of Nepalese agricultural professionals (who are NAPA members) has been launched.

Treasurer Dr. Bishwo Adhikari presented the Financial Report that included a total amount of about $70,000.00 in various accounts and investments.

Immediate Past President and Endowment Fund Advisory Board (EFAB) Chair Dr. Megha N. Parajulee presented the status of the endowment fund.

Founding President and 4th Biennial International Scientific Conference Organizing Committee Chair Dr. Lila B. Karki announced the conference date (May 24-26, 2024) and venue (Baltimore, USA).

By-laws Amendment Committee Chair Dr. Megha N. Parajulee presented some proposed amendments, which were ratified through the virtual polls by NAPA members who attended the program.

Vice President Dr. Ramjee Ghimire delivered the thank you note to members and chairperson following the open forum discussion and Q/A session. Finally, the AGM Chair Ms. Adhikari adjourned the meeting with the summary and way forwards.

Webinar Series - 34

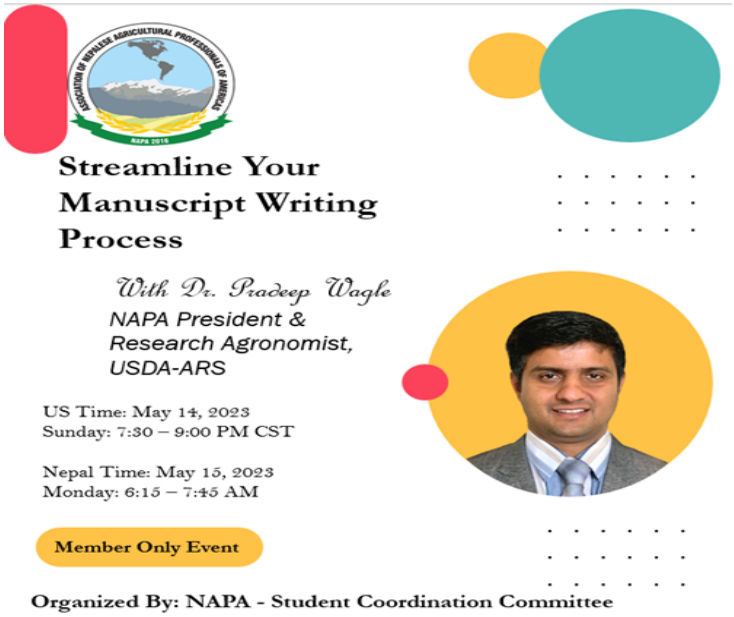
The Webinar Committee (WC) hosted the 34th webinar and panel discussion intitled "Viability of Domestic Vegetable Value Chain and Food Security/Safety in Nepal," which was jointly conferred by Dr. Suroj Pokhrel, Mr. Yuba R. Gurung, and Dr. Vidur Ghimire. Mr. Rajendrajung Rayamajhi was unable to attend the program.

The talk covered the current scenario on existing fresh vegetable production and distribution systems, availability of quality inputs, government support system, and marketing issues, including the associated problems, threats, and challenges.

Manuscript Writing

The Student Co-ordination Committee (SCC) hosted a members-only event on manuscript writing process on May 14, 2013. President Dr. Pradeep Wagle was the resource person. Dr. Wagle covered all aspects of the manuscript writing process in his talk. He also answered participants' questions. The event was moderated by SCC Chair Mr. Madhav Parajuli.

The SCC is looking forward to organizing more events for the professional development of members in the future.



Seminar on Financial Literacy

The Socio-Economic and Cultural Committee (SECC) organized a webinar on financial wellness on June 18, 2023. The webinar, entitled "Discover the Secrets of Financial Wellness and Take Control of Your Finance," was moderated by SECC Chairman Mr. Dol P. Dhakal. President Dr. Pradeep Wagle welcomed the participants and introduced the speaker, Mr. Amit Bansal. Mr. Bansal is the Director of the Center for Financial Health and Wellness at Oklahoma State University.

Mr. Bansal gave a presentation on the broad theme of personal finance. He covered topics such as budgeting, saving, investing, and retirement planning. The presentation was followed by Q&A session at the end.

The audience had many questions for Mr. Bansal, and he answered them in a clear and concise way. The webinar was well-received by the participants, who thanked SECC for organizing such an informative event.

It is hoped that the program sensitized NAPA members about the significance and practical approach to improve financial well-being. The SECC is proud to have organized such a valuable event, and it looks forward to organizing more webinars in the future.

Research Brief

Pregnant Ewes and Does Performed Better Indoor vs. Outdoor During Winter

Sadikshya Lamsal*, Uma Karki, Santoshi Chaudhary, and Durga Dhakal

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**Email: slamsal3101@tuskegee.edu*

Small ruminants are mostly raised on pastures in the southeast USA throughout the year. The variation in seasons and associated weather conditions can affect animals' performance. Previous studies showed animals spending more time indoors during the winter season when they were given free access to both indoor and outdoor facilities. However, the information on the performance of small ruminants when kept indoors and outdoors is scant.

Methodology

A study was conducted at Tuskegee University to evaluate the performance of pregnant does and ewes when raised indoor and outdoor during winter. This experiment was conducted for 45 days from late January to mid-March 2023. Pregnant animals (16 Kiko does and 18 Katahdin-St. Croix-cross ewes) were divided into two uniform groups. Group-1 animals (8 does and 9 ewes) were kept outdoor in a grazing plot that consisted of mobile shelters, mineral feeders, hay feeders, and watering troughs (Figure 1). Group-2 animals (8 does and 9 ewes) were kept indoors in individual pens consisting of separate containers for grains, hay, mineral mix, and water (Figure 2). Both groups were provided with *ad libitum* hay, loose mineral mix, fresh water, and corn-soybean (mixed at 3:2 ratio) supplements at the rate of 0.8% of their live weight. Ambient temperature and relative humidity were measured for both systems. Animal performance data (live weight, BCS, and FAMACHA score) were taken on Day 1, weekly during the study, and at the end of the study.

Figure 1. Outdoor animals in a grazing plot with feeders and shelters, Tuskegee, Alabama, USA.

Results

Results showed that indoor conditions were better for enhancing the performance of pregnant does and ewes during winter. Indoor does had a better FAMACHA score (9%; $p<0.01$) and indoor ewes had a better body condition score (BCS) (5%; $p<0.01$) compared to outdoor does and ewes respectively. Indoor temperature was higher (13%; $p<0.05$) while relative humidity was lower (6%; $p<0.05$) than outdoor.

Figure 2. Indoor animals in individual pens with feeders and waterers, Tuskegee, Alabama, USA.

Nepal News

Highlights of agriculture-related news/events in Nepal

Compiled by: Bibek Sodari
Agriculture and Forestry University (AFU), Chitwan, Nepal
Email: bibeksodari333@gmail.com

Lumpy Skin epidemic sweeps the nation

The majority of small-scale dairy and cattle farms in all 14 districts of Koshi Province have experienced animal cases of lumpy skin disease, according to the Directorate of Livestock and Fishery Development. Swelling around the neck, wounds around the tail, abdomen, and udder, sores developing and water flowing from the wounds, nodules on the skin, and pus in the mouth are a few indications of the illness. Mosquito, fly, and other insect bites are the main means of disease transmission. According to Dr. Manoj Kumar Mahato, head of the Veterinary Hospital and Animal Service Center, Panchthar, farmers have reported milk losses up to 80% after their dairy cows suffered from the disease. The Nepal Dairy Association (NDA) demanded that the outbreak be controlled as soon as possible. The NDA appealed to the federal, provincial, and local governments to address the issue seriously and compensate the farmers who were harmed. The statement states, "The disease has spread in 73 districts and killed 9,410 cows, oxen, and buffalos nationwide."

(Source: The Kathmandu Post, 06/16/2023)

Production of Kalanamak paddy decreases

Kalanamak paddy, known for its soft and small grains and pleasant scent while cooking, is facing a decline in production. This variety of paddy used to be a staple crop for farmers in the Rupandehi and southern Kapilvastu districts. It has a distinctive appearance, with tall stalks and black grains. In the past, Kalanamak paddy was cultivated on over 900 hectares of land in these two districts. However, the area under cultivation has shrunk to just 350 hectares in recent years. Farmers are abandoning this variety because of its lower productivity. According to Chandraprasad Gupta, the Information Officer of the Agriculture Knowledge Centre in Kapilvastu, more efforts are needed to revive the production of Kalanamak paddy.

(Source: Setopati, 09/05/2023)

Drought hits maize crop in Udayapur district

The prolonged drought in Udhyapur has devastated maize plantings. Farmers in the area are worried about the corn that was sown at the end of Chaitra, as there has been no rain since the seedlings were planted. As a result, the corn plants have begun to wilt. The loss of the maize crop has left farmers in despair. Birendra Magar, a farmer from Rautamai Rural Municipality-4, said that the lack of rain for such a long time has dried up his maize seedlings. Farmers are worried that crop failure could lead to a famine.

(Source: My Republica, 05/14/2023)

NWRP develops new cultivars of wheat

After years of research, the Nepal Wheat Research Programme (NWRP) has developed four new wheat varieties. Two of the varieties, NL 1446 and BL 4818, are recommended for the terai region, while the other two, NL 1179 and NL 1488, are recommended for the hilly region. These new varieties develop profuse tillers and bigger grain sizes leading to better productivity. They are also more resistant to pests and diseases. The newly released varieties are made available to the farmers after going through registration and release procedures. The continuous development of new varieties is necessary as wheat varieties are under the consistent threat of different exotic diseases.

(Source: Kantipur TV, 05/28/2023)

Nepal...

NIA halts agriculture insurance procedures

Nepal Insurance Association (NIA) announced that it will be halting all agriculture insurance procedures from Jestha 1, 2080 BS. The association has decided to discontinue agriculture insurance until receipt of payment from the government related to the subsidy amount granted to the farmers. Consequently, crop and livestock insurance is being halted throughout the country. As a result, the agriculture sector has become insecure as farmers are unable to insure their crops and livestock.

(Source: RSS, 05/28/2023)

Nepal imports Murrah buffaloes

Nepal is going to import improved Murrah male buffaloes from Inida (with the help of Indian Government) for improving the breeds of buffalo in Nepal. In Nepal, a national campaign for artificial insemination was launched in 2069 B.S. for increasing milk production. Thereafter, animal breeding offices have been established in Pokhara, Lahan, and Nepalgunj for the collection of semen and transporting it to the different parts of the country. A significant amount of semen collection is done at these offices, which has been a good source of national income.

(Source: RSS, 06/08/2023)

Agriculture Learning Centre opens at Simkot, Humla

Agriculture Learning Centre has been put into operation at Simkot of Humla. It is supported by Integrated Centre for Mountain Development (ICIMOD) in cooperation with the Centre for Indigenous Peoples' Research and Development (CIPRED) under the grape project. It has been running in three wards of Simkot Rural Municipality to support the agriculture sector and mitigate the effect of climate change. This learning centre has been launched with the cultivation of different vegetables like cauliflower, cabbage, tomato, carrot, garlic etc.

(Source: Madhyana Daily, 06/ 09/2023)

AKC, Tanahun promotes turmeric farming

Agriculture Knowledge Centre (AKC), Tanahun has prioritized turmeric farming to get rid of monkey attacks. After a consistent invasion of monkeys in fruits and cereals farming, the Centre has decided to promote turmeric farming. According to the head of AKC Kulprasad Tiwari, about 20 farmers have started turmeric farming in 200 ropanies (10 hectares) of land at Byas Municipality – 8, Setibesi. Proper marketing and packaging of domestically produced turmeric for export is being planned.

(Source: Muktikhabar, 06/12/2023)

Increasing illegal import of chemical fertilizers

Officials in Rampur, Palpa, have found a cache of chemical fertilizers that had been illegally imported. It was sealed and sent to Butwal for further investigation. The vice-president of Rampur Municipality in coordination with police officials sealed the fertilizers as they didn't find bills and the owners. The person who stored these fertilizers remains to be identified. Another cache of illegally imported fertilizer that was intercepted in Ramba Rural Municipality Ward No. 1 is currently under investigation.

(Source: RSS, 06/13/2023)

Onion price raises by double within a week

The recent announcement made by the government to levy 13 percent VAT on imported vegetables and fruits has led to a rapid increment in the price of onion in the market. According to the officials, there is no official import of onion since the 21st of Jestha and brokers are capitalizing on this opportunity to raise the price of onion in the market. According to Kalimati Committee, onion was sold at the price of NRs.32-35/kg until Jestha 15/16 and later it was raised at the rate of NRs. 50/kg until Jestha 21. Again, the price was raised to NRs. 60/kg after Jestha 22.

(Source: Gorkhapatra Daily, 06/14/2023)

USAID launches new partnership with Agriculture and Forestry University

Clinton White, an agency counsellor for USAID, unveiled a $5 million USAID Agriculture Higher Education initiative in Chitwan. According to a statement released by the US Embassy in Kathmandu, USAID awarded Tuskegee University this five-year activity in December 2022 to work with Nepali partner Sathguru, Inc. to strengthen the university's research and teaching methodologies to increase the number of students who are prepared for the workforce and the capacity of the Agriculture and Forestry University (AFU).

(Source: My Republica, 06/15/ 2023)

Nepal...

National budget allocation increases for agriculture

The budget for the upcoming fiscal year 2080/81 was revealed by Finance Minister Dr. Prakash Sharan Mahat duri ng a Monday parliamentary session. Finance Minister Mahat announced that NRs. 58,98,000,000 would be granted for the development of agriculture and livestock. The agriculture sector received a budget of NRs. 55,89,000,000 crores in the last fiscal year, which is NRs. 3,09,000,000 less than the new budget. The government is mandated by the constitution to release the annual budget on Jestha 15.

(Source: The Himalayan Times, 5/29/2023)

Permaculture breathes new life into ghost towns

The population decline in hill districts like Dhankuta, Ramechhap, Khotang, Manang, Bhojpur, and Tehrathum has been the most rapid in the last ten years. However, Dhankuta has seen a resurgence in population. Because of a new farming method known as permaculture, people are moving back to their communities. The permaculture method is an innovative framework for developing productive ecosystems with the diversity, stability, and resilience of natural ecosystems. Utilization of land, resources, people, and the environment is the idea. Chaubise Rural Municipality, which used to be barren, is now fertile and has seen an increase in visitors in recent times. People travel here to observe a green organic farm and the remarkable accomplishments of the returning citizens.

(Source: The Kathmandu Post, 06/16/2023)

Farmers throw tomatoes on the road

At Kalimati Vegetable Market, farmers have resorted to throwing tomatoes on the road, citing unfair market rates. Binaya Shrestha, the information officer of the Kalimati Fruit and Vegetable Market Development Board, said that farmers discarded tomatoes in and around the market area after they were not able to sell at reasonable prices. Famers threw 30 tons of tomatoes on the road. According to Geeta Acharya, president of the Kalimati Fruit and Vegetable Market Traders Committee, farmers from Ramkot, Nagarjun, and Thankot were compelled to discard their produce.

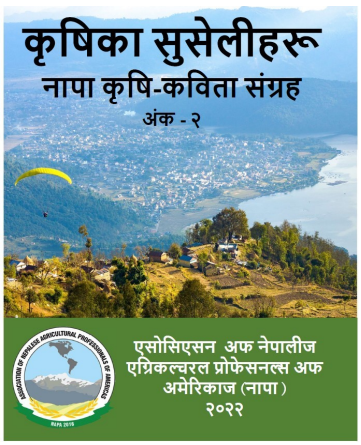
(Source: OnlineKhabar, 06/18/2023)

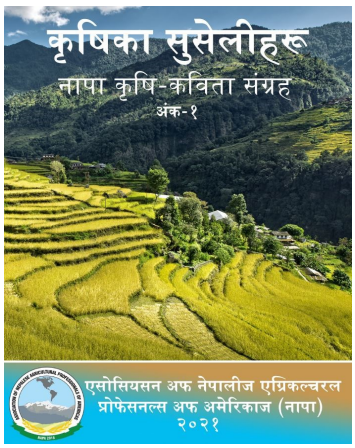
Government forms a committee to address problems of sugarcane farmers

To address the issue of sugarcane farmers' payments, the government formed a committee under the leadership of a government secretary. A committee was recently established by the Council of Ministers, with Govinda Prasad Sharma, secretary of the Ministry of Agriculture, serving as its coordinator. The committee will have joint secretaries from the Office of the Prime Minister and the Council of Ministers, the Ministry of Finance, the Ministry of Industry, Commerce and Supplies, and the Ministry of Home Affairs, according to the Office of the Prime Minister and the Council of Ministers. Due to long-standing no payment of their debts, farmers from Kapilvastu and Kanchanpur have been protesting in Kathmandu for the past two weeks.

(Source: My Republica, 05/31/2023)

NAPA Publishes Agri-Poem Compendiums





Appeal for Contribution to NAPA Endowment Fund

ENDOWMENT FUND ADVISORY BOARD

~ESTD. 2020~

Chair

Dr. Megha N. Parajulee

Director

Dr. Lila B. Karki

Dr. Pradeep Wagle

Director/ Member Secretary

Dr. Aditya R. Khanal

Outreach & Investment Coordinator

Dr. Basu D. Bhandari

Dear Sir/Madam:

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

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

The Endowment Fund Advisory Board has already received a pledge commitment of over $110,000.

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

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

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

Please support NAPA with your kind donations!

Appreciation to Endowment Fund Donors

On behalf of the NAPA, the Endowment Fund Advisory Board (EFAB) extends its sincere appreciation to all the generous sponsors for your timely deposit of the installment to the EFAB bank account. Your dedicated contribution and commitment will make NAPA's growth and program sustainable in the near future.

Thank you our new donors for your valuable contribution to the organization!

NAPA Endowment Fund

Bronze Sponsor

Dr. Dilip Panthee
Mrs. Sarita G. Panthee

Total Pledged Amount: $2,500 (Two Thousand & Five Hundred USD over 5 Years
$500/Year Starting in 2023

NAPA Endowment Fund

Bronze Sponsor

Dr. Khusi R. Tiwari
Mrs. Ambika Adhikari Tiwari

in honor of ***Bibek Tiwari***

Total Pledged Amount: $2,000 (Two Thousand USD over 5 Years)
$400/Year Starting in 2023

NAPA Endowment Fund

Bronze Sponsor

Dr. Bishwo Adhikari
Mrs. Bhagawati Tiwari

Total Pledged Amount: $2,000 (Two Thousand USD over 10 Years)
$100/Year Starting in 2023

NAPA Endowment Fund

Green Sponsor

Mr. Dol P. Dhakal
Mrs. Bhuwan Subedi

Total Pledged Amount: $500 (Five Hundred USD in 2023)

NAPA Endowment Fund

Green Sponsor

Dr. Pramod Pokhrel
Mrs. Puspa Ghimire

Total Pledged Amount: $500 (Five Hundred USD over 5 Years)
$100/Year Starting in 2023

Membership Update (June 30, 2023)

Member Category	Members
Founding life member	5
Life member	128
Associate life member	72
Student member	105
Associate student member	10
Regular member	15

Student Member	Affiliation
Abishkar Regmi	Texas Tech University, USA
Bigul Thapa Magar	Oklahoma State University, USA
Binod Pokhrel	Oklahoma State University, USA
Dharmendra Kalauni	University of Florida, USA
Dikshya Sapkota	New Mexico State University, USA
Kumar Shrestha	University of Arkansas, PineBluff, USA
Sulav Dhakal	University of Wyoming, USA

Student Member	Affiliation
Bibechana Paudel	Agriculture and Forestry University, Nepal Current: Nepal Agricultural Research Council
Pankaj Kumar Yadav	Agriculture and Forestry University, Nepal
Prabina Bhujel	Agriculture and Forestry University, Nepal
Prakriti Ghimire	Tribhuvan University, Nepal
Ramchandra Neupane	Agriculture and Forestry University, Nepal
Shobha Pokhrel	Tribhuvan University, Nepal

Life Member	Affiliation
Janak Dhakal	University of Maryland Eastern Shore, USA

Welcome New NAPA Members on Board!

Appeal to Join/Renew NAPA Membership

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

A few reasons to join/renew NAPA membership:

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

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

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

Thank you.

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

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

Membership Type and Fee

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

Table 1. Membership fees and eligibility.

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

NAPA is for and by members. Please join NAPA and request your friends and family to join too. We would like to request eligible and interested people to join the NAPA family and work together with other fellow members. You can access this link to join NAPA: https://napaamericas.org/join-napa.php.

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KidsZone

Fun Facts About Momo

Sushan Thapa

Grade 5, Missouri

The history of Momo

Momo was first originated in the 14th century in Southeast Asia. The first Momo was made by a Nepalese Newari girl. They made Momo in Tibet at the same time. But, today, Momo is more popular in Nepal than in Tibet. It is also popular in Bhutan and India. Nepalese people like to say Momo is from Nepal.

Ten fun facts about Momo

1. The word "Momo" is derived from the Tibetan word "mog mog" which means a filled bun.
2. The Himalayan Momo dish is believed to have spread to Nepal along with the flood of the Tibetan diaspora.
3. Some people believe that Nepali Newari merchants who visited Tibet brought Momo recipe to Nepal.
4. Momos are bite-sized dumplings made with a spoonful of stuffing wrapped in dough.
5. There are two types of Momos, the traditional Veg. and Non-Veg.
6. Momos are prepared in three ways, steamed, fried, and pan-fried.
7. Steamed Momo have less calories and can be replaced for salad.
8. Momo offers a number of health benefits like it repairs muscles and lowers blood sugar levels.
9. Now-a-days, Momo is available almost in every continent except Antarctica.
10. More Momos are sold in winter than in summer.

Please Encourage Your Kids to Participate

Dear NAPA members and AC readers,

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

Please include the following:

Name:
School (optional):
Grade:
State/District:
(And a photograph)

KIDS TODAY, SCIENTISTS TOMORROW!

Revisiting Neoclassical Economics and Environmental Sustainability

Prof. Gopi Upreti

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One of the most difficult problems in the development discourse today is the lack of appropriate analytical methodologies and techniques to appraise sustainable development projects. It is true that measurement of biophysical conditions of the environment is essential first step in determining whether a given use or exploitative practice is sustainable or not. Uncertainties in these measurements and lack of understanding of ecosystem processes hamper the guidance of economic planners and managers. It is especially difficult to detect and predict the shift to unacceptable degradation in a highly productively managed ecosystem, such as intensive agriculture or forestry. Opportunities for improved measurement are to be found in new approaches such as restoration ecology, long-term ecological research, and the concept of *"keystone species."* Tremendous difficulties lie ahead in the incorporation of environmental objectives in four major techniques of economic planning: social cost benefit analysis, resource accounting, macro-economic policy, and applied project or sectorial research. These difficulties arise from two main factors.

Firstly, the environmental impacts are usually difficult to measure, value and predict as they are not marketed but have intangible attributes and are enjoyed or consumed collectively. Secondly, the basic tenets of conventional economics (neoclassical economics), as they are tailored to maximizing profit and growth, are fundamentally contradictory to the requirements of sustainable development. Hence, fundamental reorientation in the objectives and the technique of the economic analysis is therefore necessary. How to internalize the environmental costs into the social cost benefit analysis has become the most pivotal issue in the environmental/ ecological economics and this demands a great deal of concerted efforts and consensus among experts in this particular area of inquiry. The purpose of any such methodology would be first, to identify and measure the environmental effects and then, to translate them into monetary value for inclusion in the formal project analysis. A number of critics including Barbier (1987), Goodland and Ledec (1987), Rees (1990), Upreti (1994), and Hall (1990;2004) have pointed out that following inherent shortcomings of the neoclassical economics in an attempt to show why this economic model cannot be used as a guide for *sustainable development* in general and measurement of the environmental effects in particular, associated with any development project. This warrants a review of some of these shortcomings in understanding the complexity of *environmental sustainability* and *sustainable development* that has become so pervasively ubiquitous in contemporary development literature.

1. Gross national product cannot be a proxy for human wellbeing

The neoclassical economics evaluates the development projects on the basis of their projected contribution to a country's gross national product (GNP) and it does not consider the fact that the GNP is only a partial measure of those conditions that contribute to human happiness and well beings. It does not say anything about the distribution of wealth. It does not measure non-market transaction and, therefore undervalues both environmental services and non-market sources of natural capital resources. GNP does not have any provision to include in the analysis of the economic benefits of properly functioning ecosystems or their degradation, because such processes do not interact with market and are not integrated in the analysis.

2. Neoclassical economic models have not been subjected to validation

The fundamentals assumptions of the neoclassical economics remain virtually untested. Empirical tests to validate economic models have not been undertaken in developed as well as less developed countries. The objective economic analysis such as cost benefit analysis of a project, total cost and the least cost of a project based on arbitrary and convenient assumptions may produce logically and mathematically coherent, but not necessarily correct models. Classical and neoclassical theories, developed on the concepts of market existed in agrarian societies, have been transferred more or less unchanged to the application in the modern industrial capitalist world without considering the industrialization, the development of large corporations and institutions or the impacts of advertising, and the consequences of the power of money itself, each of which characterizes contemporary society and the markets where we buy and sell.

3. Neoclassical economics causes the destruction of natural capitals

The critics argue that the fundamental premises of neoclassical economics lead to the destruction of natural

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ecosystems and natural capitals since market prices do not reflect the ecosystem services (Hall, 1990; Rees, 1990). In reality, neoclassical economics destroys the real natural wealth on which depend the manmade capital wealth. The economic policies driven by the neoclassical economics have devastating effects on the natural resource base and the economics of developing countries because such policies encourage excessive burrowing from developed countries, hence subjecting them to growing debt servicing. This, in effect, creates pressures on these nations to the mining of the natural resources to get a quick return on the investment so that lending agencies can get their cash return. This is the main cause for the enormous amount of capital flights that takes place every year from developing countries to the developed ones in the form of debt servicing.

Another factor that directly contributes to the destruction of natural capital resources is the use of discount rate in the economic analysis. Discount rate reflects the cost of borrowing money from commercial banks and changes with the monetary policies and other factors. A high discount rate heavily discounts the future. As Rees (1990) points out since many of the direct benefits of natural ecosystems are gained at low rates (as measured in dollars) but over very long, even indefinite time scales, their value tends to be heavily discounted. Present decisions are made by discounting the future, but this procedure has a very serious repercussion on certain aspect of natural ecosystem specially the vital life support ecosystem services (Goodland and Ledec, 1987). A negative discount rate for natural capital resources and ecosystem services would be well justified rather than normal positive discount rate from the perspective of sustainable development. This could lead to the conservation and protection of natural resources and ecosystem. Hall (1990) articulates very well the consequences of discounting the natural capitals: *"Due to depletion, a barrel of oil is likely to be more, not less valuable in the future. The same is true for a ton of soil or a hectare of forest. The use of positive discount rate makes any of the resources essentially worthless in a decade or two. Society cannot afford to discount the future. If forests are destroyed, the rainfall, and hence agricultural production, of a region may be diminished. If discounting is used in economic analysis, the value of agricultural loss would appear negligible. Much of the Levants was forested and farmed in Biblical times, but is now desert, probably due to largely human activities. The money gained from that original deforestation was almost certainly trivial, even if invested, compared to a loss of thousand or more years' agricultural production."*

It is unfortunate that the underlying facts expressed in the above statement of Hall have not caught the attention of mainstream economists in the light of the rapid degradation of ecosystem services and adverse climate change. The assumptions and modus operandi of neoclassical economics with respect to the uses of natural capital resources of Earth must be revisited and modified to make them compatible with the sustainable uses of these resources if we are truly committed to the sustainable living on planet Earth.

4. The market is the wrong yardstick for large scale economic analysis

Hall (1990) and Rees (1990) consider that market is a wrong yardstick for large scale economic analysis. They point out that the economic decisions of the entire nation are made on the basis of individual consumers' behaviors on the assumption that the consumers rationally allocate their monetary resources in a way that is best for them. The neoclassical economics assumes that people' wants and needs are best expressed by their purchasing behavior in the marketplace, and this behavior is a direct function of how much money one possesses rather than the function of one's wants and needs. It follows that the people, who do not have enough money, do not display purchasing behavior in the marketplace and, consequently do not have wants and needs which is not the case. This is interesting to note that neoclassical economics does not say anything about the needs and the wants of those people who do not have money to purchase from the market. Hence, the neoclassical economics avoids the necessary discussion about economic means and ends and replaces it with simplistic objectives based on short sighted and manipulated human greed (Hall 2004).

5. Price does not always reflect scarcity

Economists regard price as the best measure of scarcity but it reflects very poorly many important aspects of scarcity. A large contingent of scientists from environment to economics have argued against the perspective of Barnett and Morse (1963) that inflation corrected price changes are the only relevant measure of scarcity. Daly (1990) demonstrated that as all resources become scarcer, then the prices of all goods, including resources, will inflate as a general trend and inflation corrected values for all materials will not increase. Barnet and Morse's analysis (they found no indication of increasing scarcity of raw materials as reflected by their prices) was incomplete because the decreasing price of energy and its increasing use masked the consequences of resource depletion. Only the development that entails social, economic, and ecological sustainability can be called "sustainable development" in the true sense. The ecological sustainability is the basis for the social and economic sustainability which is totally ignored by such analysis.

Revisiting Neoclassical...

Conclusion

The current growth development paradigm advanced by neoclassical economists under the rubric of *'sustainable development'* is simply a self-defeating proposition. An economic system with infinite growth in a finite resource-base of planet Earth is simply inconceivable to be sustainable. In order for an economic system to be sustainable, it must remain within the regenerative capacity of planetary ecosystem, and, by default, such system is bound to be a 'Steady-State Economy' as Daly and Townsend (1993) have been advocating over the last three decades. In my opinion, the success or failure of sustainable development paradigm primarily rests on solving basic human needs and reversing ecologically hostile consumerism while maintaining the productive capacity of planetary ecosystem. Environmental conservation and the satisfaction of human needs should not be viewed as the antithesis of each other whereas ecologically hostile consumerism (consumption pattern in Western world) is the very antithesis of environmental sustainability (Upreti, 1994). It remains to be seen how long it is going to take for the neoclassical mainstream economists to come to the terms of 'Steady-State Economy' which seems inevitable for the existential preservation of humanity and the living system on planet Earth. Longer they take to recognize this *inconvenient truth* and revisit their basic assumptions (assumptions of neoclassical economics), harder they inflict misery and suffering on humanity and the living system on planet Earth. They may think that they are saving the world but in reality, they are pushing the world to the brink of planetary catastrophes.

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Vertical Farming: The Future of Urban Agriculture

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"Necessity is the mother of invention."

This proverb signifies the capacity of humans to find appropriate solutions to problems as they emerge. As the world's population continues to grow, the demand for food is likely to increase. However, cultivable land is shrinking due to urbanization, leading to lesser production. It is high time to adopt innovative approaches to maintain productivity and feed the growing population. Vertical farming could be a potential technology to grow more food in less space using limited resources.

In vertical farming, crops are grown vertically, stacked in layers, with the application of artificial lights within a controlled environment (3Peaks, 2023). This method, which incorporates soil-free growing technique, aims to reduce pressure on traditional agricultural land by farming upwards instead of outward. It is especially appealing for use in urban areas (Beacham et al., 2019). This technique primarily includes hydroponics, aeroponics, and aquaponics. Hydroponics involves growing plants in a nutrient-rich medium, using 90% less water than traditional agricultural methods, while aeroponics involves growing plants using a misting system, using 95% less water (Admin, 2022). Aquaponics combines hydroponics and aquaculture, where the waste produced by fish is used to fertile plants (Permaculture Research Institute, 2016). Hydroponics and aeroponics can be conveniently practiced on rooftops or in abandoned warehouses in limited spaces. These techniques allow crop production in urban areas that are otherwise incapable of agricultural production otherwise.

The cities are often dominated by a hunk of concrete and steel, full of vehicles, lots of pollution, and not enough land for the production to feed the people. Vertical farming could be an easy way to transform these chaotic cities into a visually appealing, pollution-free, and green environment. It can transform cities by providing a sustainable source of fresh produce, creating green spaces, and improving air quality. Since minimal resources are used, it can reduce the carbon footprint during food production.

One of the main benefits of vertical farming in urban areas is its capacity to offer year-round access to fresh and regional produce, as it maintains consistent growing conditions regardless of the weather outside and is significantly less vulnerable to climate change (Chatterjee et al., 2020). Additionally, compared to traditional agricultural production systems, vertical farming offers specific economic benefits. It permits layered growth, which maximizes yield per square meter of growing space. This feature is especially helpful in urban areas (Van Gerrewey et al., 2021). For example, a vertical farm can produce 80 times more lettuce per square meter than an open-field farm and more than 12 times what a greenhouse can produce (Van Gerrewey et al., 2021). Vertical farms can grow food in urban areas and places where traditional agriculture is not feasible. LED lights are used along with other sensors and automation necessary to create ideal growing conditions for crops. As the crop is grown in a controlled environment, there won't be issues with pests and insects, which eliminates the necessity for synthetic pesticides. This would lead to the consumption of healthy food and, consequently, a healthy life. Furthermore, the elimination of drudgery from agriculture is achieved as there is no need for manual weeding, tilling of land, watering, or the use of fertilizer and pesticides. Also, vertical farming can create jobs and stimulate economic growth in urban areas.

Some of the challenges associated with vertical farming in cities include high initial costs, technical complexities, and limited crop diversity. However, the advantages of vertical farming outweigh the aforementioned challenges. Such farms can reduce energy costs by using renewable sources of energy. As the technology improves and becomes widely accepted, the cost is

Figure 1. A view of vertical farming.

Vertical Farming...

expected to decrease. Skilled professionals could be hired to address the technological complexities, and research should be intensified to establish crop diversification.

Vertical farming has huge potential to transform the food production process, making it more sustainable, efficient, and resilient. It has been actively adopted by many cities around the world to secure food supply and advance sustainable urban development. Many people believe that a significant portion of the future of agriculture may include vertical farming. Farms are becoming high-tech with the advancement of agricultural technology. This has enabled farmers to produce more, pollute less, and be prepared for the challenges that the future holds (Eden Green Technology, 2023).

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(Ms. Subedi is a final year undergraduate student at AFU. She is interested in agricultural research and development).

Quote of the Quarter

"If you want something done, ask a busy person to do it." - Laura Ingalls Wilder

Management of Citrus Greening Disease

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1. Introduction

Citrus greening, or Huanglongbing (HLB), is a devastating plant disease affecting citrus trees worldwide, threatening their long-term sustainability (Grafton-Cardwell et al., 2013). It was first discovered in the 1910s in the Chaoshan region of Guangdong Province in China (Reinking, 1919), and was formally known as "Yellow shoot disease" (Bove, 2006). Initially, it was assumed that abiotic factors like Zn deficiency, toxicity, or poor drainage system were responsible for the cause of HLB (Obergolzer et al., 1957). However, after years of research, it was determined that a gram-negative bacterium was the causative agent for the disease (Garnier and Bove, 1977). The disease is caused by a bacterium called *Candidatus Liberibacter* spp., which is transmitted by the Asian citrus psyllid (*Diaphorina citri*) insect in Asia and America and the African citrus psyllid (*Trioza erytreae*) in Africa (do Carmo Teixeira et al., 2005). According to regionality, heat sensitivity, and 16S rDNA, the pathogen is primarily differentiated into *Candidatus Liberibacter asiaticus* (CaLas), *Candidatus Liberibacter africanus* (CaLaf), and *Candidatus Liberibacter americanus* (CaLam) (Bove, 2006).

2. Distribution

HLB is widespread around the world and distributed in 64 nations throughout Asia, Africa, North America, South America, and Oceania (CABI, 2023). The bacteria that causes HLB have been detected in 7 of the top 10 orange-producing nations worldwide. *Candidatus Liberibacter asiaticus*, the Asian variant, is prevalent in North and South America, Asia, Oceania, and partially in Africa (CABI, 2023). This form of the disease is a major concern for citrus growers in US states including Florida and California. *Candidatus Liberibacter americanus* was first found in 2004 in São Paulo, Brazil, and is only partially detected in Brazil (Bove, 2006). *Candidatus Liberibacter africanus*, the African variant, is only found in Africa, south of the Sahara and has a more constrained geographic distribution, and is less severe than other strains (Bove, 2006).

3. Symptoms

Citrus greening leads to a decline in tree health and productivity, causing fruit to become small, distorted, and bitter, ultimately resulting in the death of the tree. The disease interferes with the physiological processes of citrus trees, leading to branch dieback (Morgan et al., 2015). HLB, which translates to "yellow dragon disease" is named after the first symptom that typically appears as a yellow shoot on a tree. Symptoms of Liberibacter pathogen infection in trees include mild to severe yellowing of the shoots and gradual yellowing of the entire tree (Batool et al., 2007). Moreover, leaves may develop thicker, leathery midribs and lateral veins that may become larger, bloated, and corky (Batool et al., 2007). Compared to leaves from healthy trees, those infected with the greening virus had significantly higher K content and lower Ca and Mg levels (Koen and Langenegger, 1970). Roots are also affected and start decaying from the rootlets (Da Graca, 1991). The root system has only a small number of fibrous roots, probably due to root starvation (Da Graca, 1991). The stylar end of symptomatic fruit remains green as it ripens, giving to the name "greening" (Bove, 2006). The fruits are lopsided, revealing dark abortive seeds, and when the fruit is split in half, darkened vascular bundles are visible in the fruit axis (Bove, 2006). While all cultivars of citrus species are susceptible to HLB to varying degrees (Gottwald et al., 2012).

4. Impact and Economic Loss

The future of citrus production is at risk due to the widespread and destructive impact of citrus greening. Citrus greening has been described as the most significant global challenge faced by the citrus industries globally (Gottwald et al., 2012). There are no resistant commercial citrus varieties and curable chemicals for this disease. Therefore, HLB is frequently referred to as citrus "AIDS" due to the lack of an effective treatment. The impacts of citrus greening on the citrus industry have been significant, including reduced fruit quality, decreased tree health, decreased yield, and increased production cost. HLB-affected trees may stop producing in 2 to 5 years, with a lifespan reduced from 50 years to 7 to 10 years (Ehsani et al., 2016). The environmental impact of greening is also more pronounced as many growers have increased the use of pesticides to control the HLB insect vector resulting in negative effects on the environment and biodiversity of non-target species. The scientific community is actively looking for HLB solutions on many fronts, but it may still take years until solutions are discovered and put into practice.

HLB is responsible for a significant amount of the economic losses in citrus production in Africa, Asia, and the American continents (Paudyal, 2015). By the early

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1990s, the disease is believed to have eradicated more than 60 million trees worldwide (Aubert, 1992). Citrus greening is expected to be the main cause of the U.S. production decline from 2 Million tons to 697,000 tons, the lowest level in more than 56 years (USDA FAS, 2023). Particularly in Florida, the disease is thought to affect 80% of citrus trees and 90% of the total cultivated land, leading to a decrease in orange acreage and yield by 26% and 42%, respectively (Singerman and Useche, 2017). Since the state's initial outbreak in 2005, damages to the Florida citrus sector are projected to have exceeded $4.5 billion (Hodges and Spreen, 2012). Several Brazilian citrus orchards have had to lose hundreds of thousands of trees due to the introduction of *L. asiaticus* and the discovery of *L. americanus* there. In Guangxi, China, alone, 7.4 million trees were lost to HLB in 2020, while more than 10 million diseased trees were cut down every year throughout China (Zhou, 2020).

5. Latest Findings and Emerging Trends in Disease Management

In recent years, researchers all around the globe have made great strides in their knowledge of the HLB disease as well as the creation of its control measures. Efforts to manage this disease have been ongoing, with research focused on developing disease-resistant citrus cultivars, using of biotechnological approach, improving vector control strategies, and enhancing various orchard management practices. Some of the emerging trends in the management of citrus greening disease are described below.

5.1. Genome editing

The application of genetic engineering technology is widespread in developing citrus disease-resistant varieties against several pathogens. One of the most significant advancement is that genome editing technologies provide hope for creating citrus types immune to HLB. Citrus plant genes have been modified using CRISPR/Cas9 gene editing to make them immune to several pathogens, including HLB (Sun et al., 2019). CRISPR/Cas9 technology has been utilized in various studies to alter disease susceptibility genes, preventing the development of HLB symptoms in citrus (Jia et al., 2017). Additionally, CRISPR technology can be used to silence genes that cause the plant's hypersensitive response to HLB bacterial infection. The application of CRISPR/Cas9 gene editing has also shown success in reducing HLB insect vector survival by knocking out the Thioredoxin gene (Hunter et al., 2018). The application of genome editing in citrus remains in the experimental phase, and there are legal and moral problems that need to be addressed.

5.2 Use of Resistant Citrus Cultivars against HLB

The development of HLB Resistant citrus cultivars would be the most effective disease management strategy. Researchers have been studying different citrus species and related plant species to identify genes associated with HLB resistance. Multiple studies have shown that the use of resistant citrus germplasm, such as *Poncirus trifoliata* and *Simmon's trifoliate*, reduces the rate of HLB spread (Munir et al., 2018). Dutt et al. (2015) demonstrated that Transgenic sweet orange cultivars "Hamlin" and "Valencia" overexpress an Arabidopsis thaliana NPR1 gene under the control of either a constitutive CaMV 35S promoter or an Arabidopsis SUC2 (AtSUC2) promoter, developed long-lasting disease resistance to HLB. It may take several years before HLB-resistant cultivars become widely available to citrus growers.

5.3 Use of Nanoparticle

Researchers have created nanoparticle-based compositions of antibiotics and other HLB control agents that may be sprayed directly onto citrus trees. Nanoparticles are also used as a delivery mechanism for HLB control compounds through the plant cuticle. Since the HLB pathogen is a phloem-limited bacteria, delivering effective compounds through foliar spray can be challenging. Nanoparticles are used to penetrate the plant cuticle to ensure effective delivery. Zinkicide TMN110 (ZnK), a nonphytotoxic zinc oxide (ZnO)-based nanoformulation, has been found to have potent in vitro antibacterial actions against the culturable species of the genus *Liberibacter crescens,* as it can move within the plant (Naranjo et al., 2020). Recent studies have demonstrated that antimicrobial substances capable of inhibiting the growth of CLas in citrus trees can delivered via nanoparticles (Munir et al., 2018). Moreover, nanoparticles may enhance the effectiveness of current HLB therapies, including antibiotics and plant stimulators.

5.4 High-throughput phenotyping (HTP) and Machine learning (ML)

High-throughput phenotyping (HTP) is a rapid method of monitoring and evaluating multiple phenotypic traits associated with growth, production, and stress tolerance (Pabuayon et al., 2019). HTP uses advanced technologies, such as imaging and sensors, to assess plant responses to environmental stimuli or disease symptoms, such as leaf yellowing, blotchy mottle, and twig dieback. Researchers are analyzing vast volumes of data on citrus plant traits using machine learning and other techniques to uncover variables linked to HLB resistance. High-throughput phenotyping for citrus HLB resistance can aid in the quick screening of large populations of plants for disease resistance, accelerating the production of HLB-resistant citrus varieties. The citrus

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sector is increasingly utilizing high-throughput imaging and machine learning to combat citrus greening (Singh et al., 2016). Hyperspectral imaging, fluorescence imaging, and thermal imaging detect subtle changes in plants and identify HLB symptoms before they become visible to the naked eye.

5.5 Biological control: Predators and Parasitoids

The use of insect predators, parasitoids, and other natural enemies against *Diaphorina citri*, the Asian citrus psyllid, is a recent trend in the classical biological control program of HLB (Milosavljevic et al., 2017). The two major parasitoids of *D. citri* currently known are the ectoparasitoid *Tamarixia radiate* (Hymenoptera: Eulophidae) and the endoparasitoid *Diaphorencyrtus aligarhensis* (Hymenoptera: Encrytidae) (Grafton-Cardwell et al., 2013). T. *radiate* is the parasitoid of fourth and fifth instar nymphs of ACP, while *D. aligarhensis* is the parasitoid of second, third, and fourth instar ACP nymphs (Bistline-East et al., 2015; Milosavljevic et al., 2017). Other studies on predators of Asian citrus psyllid have revealed *Chrysoperla comanche* (Neuroptera: Chrysopidae) larvae most frequently ingested eggs and third-fourth instar nymphs of ACP and *Diomus pumilio* (Coleoptera: Coccinellidae) adults like to prey on ACP eggs and first-third instar nymphs (Goldmann, 2017). The release of biological control agents in HLB-affected citrus orchardshas been shown to significantly reduce ACP populations and slow the spread of HLB, but further research is needed to optimize their effectiveness and develop best practices for their use in citrus orchards.

5.6 Integrated Pest Management (IPM)

HLB control methods, such as the use of integrated pest management (IPM) principles, are gaining importance in recent days. IPM utilizes a variety of management techniques, including cultural control practices, the use of entomopathogenic fungi (EPF), chemical control methods as well as biological control, to eradicate HLB as well as other citrus pests. The use of EPF such as *Beauveria bassiana* and *Metarhizium anisopliae* in the IPM program resulted in infection to Asian citrus psyllid, mainly their nymphs and resulting in mortality and slowing down the spread of HLB (Corallo et al., 2021). Some study also demonstrates that EPF had a minimal effect on natural enemies of *D. citri* suggesting that the EPF and predators had compatible effects with each other. Furthermore, Corallo et al. (2021) also showed that EPF had very little effect on natural enemies of ACP, indicating that EPF and predators had compatible effects. The use of antimicrobial compounds for the control of citrus greening is also a component of an integrated management approach. Several antibacterial substances such as sodium sulfadimethoxine and sodium sulfathiazole may be effective against *Candidatus liberibacter asiaticus* (CaLas). Future research on citrus greening should focus on evaluating the effectiveness of various IPM strategies under different field conditions and optimizing the integration of these strategies for sustainable citrus production.

5.7 Plant Protection Structures

Citrus farmers have recently begun using various types of protection structures to prevent HLB infection and its spread. These structures are designed to keep citrus trees from coming into contact with the insect vector that carries the disease bacteria, working on the principle of psyllid exclusion. The use of Citrus Under Protective Screen (CUPS) has been proven effective to control HLB infection (Schumann et al., 2020). CUPS serve as screen houses where the trees are grown throughout their lifespans, significantly increasing the expense of citrus production but preventing HLB infection. In addition to CUPS, individual protective covers (IPCs) are widely adopted in citrus farms in Florida. IPCs are also based on the exclusion of citrus psyllids from individual trees using a protective mesh bag. IPCs are considered more economical than CUPS but can only be used for 2-3 years in the field.

5.8 Antibiotics

Antibiotics are often employed to treat or prevent a variety of bacterial infections in plants, either by killing the bacteria or preventing their multiplication and spread. Studies have shown that antibiotics, including Ampicillin, Carbenicillin, Penicillin, Cefalexin, Rifampicin, and Sulfadimethoxine, were all highly effective in eliminating or suppressing *Candidatus Liberibacter asiaticus* (Zhang et al., 2014). Excellent control of HLB was achieved with the trunk injection of antibiotics such as penicillin, streptomycin, and oxytetracycline hydrochloride (Hu et al., 2018). However, due to the presence of the HLB pathogen in citrus phloem, antibiotics often fail to completely eradicate the infection because only a small amount of the effective compounds reach the target areas. Therefore, effective antibiotic delivery mechanisms should be developed to increase their efficiency.

6. Conclusion

Citrus greening is a complex and devastating disease that poses a significant threat to the future of citrus production. However, emerging trends and mitigation measures offer hope for the industry. It is imperative, therefore, that researchers, industry leaders, and policymakers continue to collaborate and invest in innovative solutions for managing citrus greening disease, to create a more sustainable and resilient future for the citrus industry.

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Not All Flowers Are Good for Bees

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Honeybees depend on flowering plants for their nectar and pollen needs. Nepal is rich in plant diversity due to great variation in climate and topography with an estimation of over 9,000 species of flowering plants (Partap, 1997). However, bees do not visit all plants, they have floral preferences. Floral visits are frequent in some plants, while bees never visit some flowers. Plants that are visited by honeybees are categorized as bee plants or bee floras and those flowering plants that bees do not visit are non-bee floras and are useless to honeybees.

Having some knowledge regarding bee forages and non-bee forages is important before establishing an apiary. By exploring the knowledge about bee flora and conserving them, the production of honey and the agri-products can be increased to a greater amount (Partap, 1997). Lack of sufficient foraging plants results in insufficient nectar availability. This might result in bees starving to death ultimately hindering honey production and the economic aspect of beekeeping (Koch and Stevenson, 2017). So, being a beekeeper, knowledge about useful and useless flowering plants (both wild and agricultural) for apiary and their availability in the area is crucial. Identification of bee forages is possible by various methods as mentioned below (Gurung, 2012).

- through training and experience,
- study of books, statistics, and articles, published by botanists,
- study of herbarium or plant collection and preserved plants,
- collection and identification of flowers in a lab by technicians,
- observation of flowers being visited by bees,
- study of the foraging potential of the area, and
- laboratory analysis of the pollen contained in honey to identify the floral source (mellisopalynology)

To ensure bee forage, maintaining a bee calendar and mapping bee flora is necessary. While preparing the calendar, the reach of honeybees should be considered as *Apis melifera* can forage up to 2 km and *A. cerana* up to 5 km. Although there are many flowers that bees visit, the number is still low compared to useless flowering plants for beekeeping. Hindu Kush Himalayan region has only above 1,000 bee forages, while total flowering plants are estimated above 9000 species (Partap, 1997), and during the mapping of bee floras, more than 50% of the total flowering plants were found to be useless to honeybees (Ali, 2020). Cranshaw (n.d.), based on observation from 2007-2009 in 319 entries of flowering plants from public garden plantings in Larimer, Denver, Adams, and Cheyenne counties, found that 98 entries were never visited by honeybees.

Some plants are even toxic to honeybees. For example, *Astragalus miser* var. serotinus is found to be toxic. Some other plants (e.g. coriander; *Coriandrum sativum*) are less frequently visited by honeybees (*Apis mellifera*) than wild bees (*Andrena cinerea*). Therefore, identifying honeybee plants in a specific region and their potential benefit to honeybee colonies as a source of pollen, nectar or both is very important (Abou-Shaara, 2015).

Bee or bee sting allergies can occur in some persons. To create a bee-free landscape, flowers not attractive to bees can be planted (Gardener, 2021). Nectars produced from some plants like *Lyonia ovalifolia*, *Prinsepia utilis*, and some species of Rhododendron as well as *Cannabis sativa* are toxic to humans and are not desirable for beekeeping as well (Bista and Shivakoti, 1970).

1. Repellents

Few flowering plants act as repellents by either preventing detection or giving undesirable responses to visiting honeybees. Bees can see most colors from orange to ultraviolet (which humans cannot see), but they cannot see infrared or red. They detect red and infrared colors as black. So, plants like red geranium and red roses are natural repellents. Similarly, wasps and bees detest the scents of plants that have strong or overpowering aromas like mint, citrus, or aromatic scents (Crawford, 2021). Because of their morphological incompatibility with *Aloe vryheidensis* flowers and bitter nectar taste, honeybees strongly reject the nectar of these plants (Johnson et. al., 2006). Also, tube-shaped and double-flowered floras are unappealing to bees (Vogel, 2020).

2. Toxic plants

The nectar and pollen of some plants are toxic to bees. Poisoning is due to the presence of certain sugar mainly mannose in pollen and nectar that is absorbed by bees but cannot metabolize. Once accumulates above a critical level, it blocks carbohydrate metabolism and ceases muscular activity resulting in the death of honeybees (Partap, 1997).

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Table 1: List of honeybee-repelling flowers (Gardener, 2021).

Name of plant	Cause of repelling
Red lilies	Red color
Yarrow 'Paprika'	Red color
Hummingbird Mint	Red color
Red Hot Poker	The flower shape and color
Cardinal flower	Red color
Maltese Cross	Red color
Chrysanthemum	Lack of pollen or nectar
Red petunias	Red color
Celosia	Red color and flower structure
Cardinal Vine	Red flower
Marigold	Double-flowered and high scented
Geranium	High scented
Artemesia	Highly scented
Rose	Red color
Basil	Highly scented

Table 2: List of toxic plants and their cause of toxicity to honeybees (Partap, 1997).

Name of plant	Cause of toxicity
Monkshood	Diterpenoid alkaloids
Marsh marigold	Insecticidal property
Foxglove	Poisonous pollen
Black henbane	Alkaloids kill foraging bees
Tobacco	Insecticidal property
Opium poppy	Poisonous stigmata exudate

3. Not preferred

Some flowers are temporarily or permanently rejected by honeybees due to a preference for other flowers blooming at the same time. There can be different reasons or factors that affect a bee's response.

3.1 Nectar content

While honey bees are foraging randomly, depending on the nectar content in flowers, they accept fewer empty flowers and reject more empty flowers. This might be due to the odor of nectar or bee scent from other bees' visits (Wetherwax, 1986). Honey bees leave short-lived repellent scent marks to identify and reject probing. The mechanism was proved through an experiment comparing bee-emptied and artificially emptied flowers where there was no incidence of bee-rejecting artificially emptied flowers (Goulson et al., 1998).

There is hereditary variation in nectar yield due to differences in the volume of nectariferous tissue, nectary size, the diameter of the receptacle, and the number of nectary stomata. Nectar yield may differ between male and female flowers, the yield of male banana, male willow, and female cucumber flowers produce more nectar compared to their counterpart. Similarly, the age of flowers also affects nectar production; cucumbers produce most of their nectar on the day of anthesis and a majority of flowers produce little or none on the second day (Partap, 1997).

3.2 Native vs non-native host plants

Researchers have different findings regarding the preference of honey bees to native and non-native plants. A total of 16 different studies suggest that in 44% of the cases, bees are more attracted to native plants, while 38% of cases claim that non-native plants are more attractive to bees than native plants. However, some other study report that there is no difference in the attractiveness of native and non-native plants for bees (18%) (Rahini et al., 2022).

3.3 Occurrence of predators

Pollinators shift their foraging from most attractive to less attractive flowers in the presence of predators as predators like crab spiders wait for their prey on the most attractive flowers (Jones and Dornhaus, 2011).

4. Conclusion

Many flowering plants are not useful to honeybees or in the bee-keeping industry. Although they are either useless or harmful to the bee industry, their identification and distribution are important for successful beekeeping. These plants can have other uses such as insecticides and repellents. Before establishing apiculture, a Floral survey is highly recommended for the identification of bee forages in the area.

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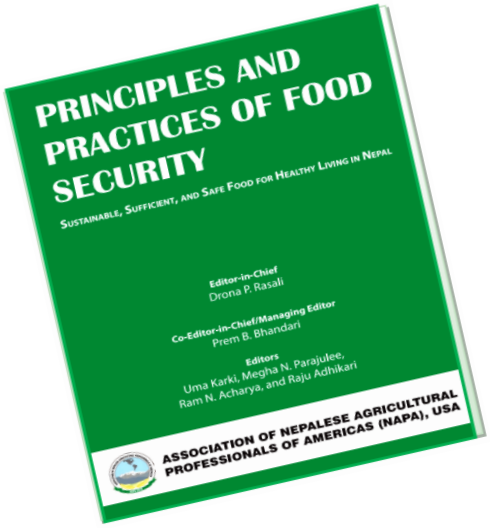

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Acid Lime: An economically Viable Crop in Terai and Inner-Terai Regions

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1. Introduction

Acid lime (*Citrus aurantifolia*) also known as "Kagati" is a commercial fruit that has traditionally been grown in most parts of Nepal. In terms of area and productivity, it ranks third among commercial citrus species after mandarin and sweet orange. The acid lime is cultivated between 800-1400 masl in the mid hills spanning from east to west, as well as 125 masl in the terai to 1800 masl in the high hills (Dhakal et al., 2002). In the Terai region, three lime cultivars have been grown: acid lime (Pahade Kagati or Sun Kagati), eureka (Chasme Kagati), and natural hybrid types. Among them, acid lime has high commercial value in the market due to its better aroma, appropriate size, and medicinal value. Two varieties of acid lime viz. Sunkagati-1 (NCRP-55) and Sunkagati-2 (NCRP-49) were identified as ideal for the Terai region of Nepal. These varieties are very popular among farmers in recent years and most of them have been commercially cultivated (NCRP, 2012).

2. Agro-climatic compatibility

The agro-climatic condition of terai and inner terai are favorable for acid lime cultivation. The high-temperature regime, moderate rainfall, abundant sunshine, soil fertility, and fewer diseases and pest infestations make these regions highly suitable for acid lime farming. It thrives well in tropical and subtropical climates with temperatures ranging from 18ºC to 35ºC. It can be promisingly cultivated in a wide range of soil types- loamy, sandy. and clayey soils. Moreover, the water requirement of the crop is relatively low as compared to other horticultural crops which enables farming in the region with limited irrigation. Well-distributed annual rainfall of 800-1000 mm is suitable for acid lime cultivation.

3. Market, production economics, and employment dynamics

The national production of acid lime is far behind self-sufficiency. The fruit is extensively consumed in fresh as well as processed products like pickles, juices, and beverages. Acid lime is a key ingredient in traditional Ayurveda medicines and is a rich source of Vitamin C. The growing population, consumer preferences, consumer knowledge of nutritional value, tourist influx, and development of small and medium agro-processing enterprises in the nation are key reasons for the rising demand for lime and lemon. Since, acid lime holds a big market share in the countries like India, Srilanka, and the Middle East countries, these markets can be penetrated by the surplus production in the country. Commercial acid lime production is a profitable enterprise. The low initial investment and high market demand for the crop are attracting new entrepreneurs. In the context of Nepal, the benefit-cost ratio is greater than 1 and the pay-back period is less than one-third of the total productive age of the acid lime orchard (Subedi and Timsina, 2023). The high yield potential and profitability justify the economic viability of the crop. Although grafted seedling of acid lime shows minimal bearing from the very first year of age, the commercial bearing starts from two to three years of planting and a well-managed orchard has 20-22 years of economic age with yield up to 30-35 tons per hectare. The average price of the acid lime is NRs. 100/kg which may raise to NRs. 150 during the lean production season of April-May.

Acid lime farming can have a significant impact on rural livelihood. It ensures employment opportunities and serves as a stable source of income among farmers and entrepreneurs. There is a plethora of preparations and management practices to be performed in the lime orchard. This creates opportunities for both skilled and unskilled manpower for the operations like land preparation, planting, pruning, weeding, fertilization, pesticide spraying, and harvesting. Acid lime provides a greater scope to integrate other farming practices such as agroforestry and intercropping with vegetables, legumes, and spices that diversifies the income sources in rural areas.

4. Major avenues of business

According to the market and resources available such as land, capital, technology, irrigations, skill, and knowledge of the farmer or the farmers' group, the major agro-business activities on acid lime could be fresh fruit production, seedling production, and production of value-added products. Farmers with sufficient landholding and availability of irrigation sources, labor, manure, and mulches can maintain an orchard dedicated to fresh fruit production. For this, farmers should be aware of site selection, planting, crop management, harvesting, and marketing. Land preparations, planting, irrigation, fertilization, weeding, training and pruning, diseases and pest management, harvesting, grading, and marketing are the major on-farm and off-farm operations in

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Table 1: Estimation of the cost incurred in acid lime farming (Subedi and Timsina, 2023).

Costs items	Year 1 (base year)		Year 2		Average of year 3 to year 7	
	Mean (NRs./ha)	% of the total cost	Mean (NRs./ha)	% of total cost	Mean (NRs./ha)	% of the total cost
Layout	9655	2.4	-	-	-	-
Sapling	104875	25.3	-	-	-	-
Equipment	34171	8.3	-	-	-	-
Investment cost, total	**148701**	**36.0**	-	-	-	-
Farmyard manure (FYM)	38048	9.2	94419	19.2	91407.75	17.5
Chemical fertilizers	10823	2.6	35591	7.2	57456.3	11.0
Human labor	70282	17.0	86439	17.6	101854.4	19.5
Disease/pest management	9734	2.5	31018	6.3	28728.15	5.5
Micronutrients	2206	0.5	17375	3.5	24549.51	4.7
Irrigation	8910	2.2	15018	3.1	19848.54	3.8
Variable cost, total	**140003**	**34.0**	**279860**	**56.9**	**323844.6**	**62.0**
Land rent	82059	19.7	123849	25.2	120135.9	23.0
Bank interest	42402	10.3	88262	17.9	78349.5	15.0
Fixed cost, total	**124461**	**30.0**	**212111**	**43.1**	**198485.0**	**38.0**
Total cost	**413165**	**100.0**	**491971**	**100.0**	**522330.0**	**100.0**

Figure 1. Surveying of the acid lime farms in Nawalpur, Nepal.

Figure 2. An acid lime farmer in Nawalpur, Nepal.

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acid lime production. Similarly, another scope among the farmers may be nursery management for seedling production. Seedling trees are highly susceptible to *Phytophthora* root rot disease which is one of the devastating diseases of citrus. Therefore, the demand for grafted saplings using trifoliate orange rootstock is increasing. Grafted seedlings reduce the incidence of citrus decline by controlling *Phytophthora* root rot, citrus tristeza virus, and blights. They can proliferate well in heavy soil too (Chalise et al., 2014). Sapling production could be vital for farmers in peri-urban areas with land constraints, as the market demand is high for it. The knowledge of rootstock and scion for grafting is necessary for quality saplings production. Farmers can work in the value-addition of the crop by preparing the products such as lime juices, pickles, chutneys, syrup, and concentrates which have greater consumer attraction. Access to technologies for processing, branding, storage, and an easier market channel would be instrumental in promoting acid-lime-based industries. It seems feasible for Terai and the inner Terai regions of Nepal.

5. Government support

National Citrus Research Program (NCRP), Warm Temperate Horticulture Centre, Prime Minister Agriculture Modernization Project (PMAMP) citrus zone programs, Agriculture Knowledge Centre (AKC), and local governments are the major institutions promoting acid lime farming in Nepal. They are supporting the farmers with a wide spectrum of services like sapling production and distribution, fertilizer recommendation, insect pest management, technical guidance for training and pruning, marketing of the products, and many more. PMAMP's super zone and zone programs of citrus in the districts like Syangja, Sindhuli, Nawalparasi, East, Gorkha, Gulmi, and Udyapur have been a boon to the acid lime growers. Farmers are provided with technical guidance and farm equipment and machinery such as sprayers, protective wear, irrigation pumps, pruning scissors, harvesting ladders, harvesting crates, mini-tillers, micronutrients, Bordeaux paste, and so on, which has enhanced the orchard yields. Besides these, there is a provision of crop insurance by the government and private sectors enabling farmers to share the risk.

6. Constraints and opportunities

The production constraints of acid lime are region specific and a farmer should be aware of such issues before and during the orchard establishment. Poor field drainage and irrigation, disease and pest attacks, capital and credit constraints, climatic hazards, and market issues are to be sorted for successful farming of acid lime. The green stink bug and leaf miner are the major insect pests while canker and root rot diseases are major diseases limiting the yield of acid lime in many regions.

The site selection for the acid lime should be done wisely considering the irrigation source, drainage, soil properties, road access, and the scope of collective farming. A detailed plan for fixed cost and running cost of the acid lime farm should be made under the supervision of the technical officers of government agencies like PMAMP, AKC, municipality, or a progressive farmer. For insect pest and disease management, Integrated Pest Management (IPM) and organic methods should be prioritized followed by the application of chemical pesticides and fungicides at recommended doses. Crop insurance can be an effective tool for risk sharing during weather hazards such as hailstones. By addressing these constraints and implementing suitable mitigation measures, farmers can enhance the production and profitability of acid lime.

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नफर्कनेका नाममा

अश्विना ढकाल
चुँदी , तनहुँ

आमाले खोरियामा मकै खन्दाखन्दै
जन्मेका मेरा साइँला दाइ
खेतमा लगाइएको गहुँ बेचेर पढे
आमाले सोचे जस्तै
ठूलो मान्छे बने
स्वदेशमा मात्र हैन
विदेशमा पनि
नाम र दाम कमाउने भए
मेरा साइँला दाइ
परदेश भासिएपछि
बुढीआमा एक्ली रहेकी हुन्
माली गाई
आमाको साथी भएकी हुन्
गाउँको जङ्गलमा एक्लो घर
आँगनमा नाति खेलाउने आमाको रहर
अपसोच !
साइँला दाइले परिवार परदेशै लगे
आमामात्रै गाउँमा एक्लै छोडे।

विदेश जाउँ,
खोरियाको माया लाग्छ
आफ्नै पसिना भिजेको माटोले तान्छ
नजाउँ,
प्राण उड्दा सुनपानी दिने कोही हुन्न
हृदयको भाषाले कसैलाई छुन्न
यस्तै गुनगुनाउने मेरी यी आमालाई
नयाँ चोली र पछ्यौरी भन्दा पनि
पुरानै धोतीको आँचलमा
नातिनी लुटपुटिएको हेर्न मन छ।

सक्छौ भने साइँला दाइ,
आमाको पुकार सुन
मनमा केही कुरा अवश्य गुन
तिमीलाई हुर्काएर
ठूलो मान्छे बनाएको तिम्रो माटोले
तिमीलाई नै रोजेको छ
रुखो खोरियाले हराभरा हुन
तिम्रैसाथ खोजेको छ।

आउ साइँला दाइ,
तिमी र म मिली बाँझो बारी पुनः खनौँ
धाँजा फाटेका खेतमा पुनः सिंचाइ गरौँ
बगैँचामा आँप र कटहर पुनः रोपौँ
आमाको रित्तो कोख पुनः भरौँ
अनि, खोरियामा र टारीखेत हराभरा पार्दै
देशको मुहार फेर्ने संकल्प गरौँ।

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