



Pakistan Society for
Horticultural Science



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Appreciation to Prof. Dr. Aman Ullah Malik, Prof. Dr. Ishtiaq A. Rajwana and Dr. Basharat Ali Saleem for their Contributions to PSHS

On behalf of PSHS finance secretary, we would like to thank Prof. Dr. Aman Ullah Malik, Prof. Dr. Ishtiaq A. Rajwana, and Dr. Basharat Ali Saleem for fulfilling their commitment of financial contribution of Rs. 20,000/- each for PSHS as committed in the last Annual General Body Meeting at IUB, Bahawalpur. We also look forward to other distinguished members for the same gesture as per their commitments as well.



Heartiest Felicitations to Prof. Dr. Muhammad Azam Khan on being Elected as President, PSHS, Adjunct Professor to The Maldives National University and Member, Coordination and Monitoring Division, Pakistan Agriculture Research Council, Islamabad

On behalf of Pakistan Society for Horticultural Science (PSHS) and the Hortimag editorial team, we extend our warmest congratulations to Prof. Dr. Muhammad Azam Khan on being elected as president, Pakistan Society for Horticultural Science, adjunct Professor to Maldives National University as well as Member Coordination and Monitoring Division, PARC, Islamabad. His vision, commitment and active participation in academics and R&D will help to flourish the horticulture sector nationally as well as globally. We wish all the best to Dr. Azam Khan for his new endeavors. Good Luck!!



Heartiest Congratulations to Dr. Mehdi Maqbool for Assuming the Charge as Chairman, Department of Horticulture, University of Poonch, Rawalakot, AJK

PSHS family and Hortimag editorial team congratulates Dr. Mehdi Maqbool on assuming the charge as Chairman, Department of Horticulture, University of Poonch, Rawalakot. Being a young researcher, his leadership skills and dedication are commendable. We strongly believe that under his leadership, the department of horticulture will flourish more. May his tenure be filled with success. Best wishes!



Felicitations to Dr. Iftikhar Ahmad on Assuming Charge as Director, Business Incubation Centre, UAF

Dr. Iftikhar Ahmad, Associate Professor, IHS, UAF assumed the charge of Director, Business Incubation Centre (BIC), UAF on January 30, 2024. His new role reflects his commitment and dedication to encouraging students to foster their entrepreneurial skills and facilitating them to find new business opportunities and investments. Dr. Iftikhar's leadership will undoubtedly lead the BIC to new heights at UAF. On behalf of PSHS and Hortimag editorial team, we congratulate Dr. Iftikhar Ahmad and extend warm wishes for his future endeavors. Cheers!!



Congratulations to Dr. Sajjad Hussain for Appointment as Associate Professor at Texas A&M University, Kingsville, USA

PSHS and Hortimag editorial team congratulate Dr. Sajjad Hussain (Ex-General Secretary PSHS) on his appointment as Associate Professor of Horticulture at Citrus Center, Weslaco, Texas A&M University, Kingsville, USA. We believe that Dr. Sajjad's efforts will lead to further technological advancements and foster innovations in field of horticulture along with networking and collaboration between US and Pakistani citrus industry. Best wishes!!





Congratulations to Newly Elected General Body of PSHS

Hortimag editorial board heartily felicitates the newly elected cabinet of PSHS for 2024-25 and hope that young team will leave no stone unturned for uplifting the society and horticultural community.

President	Prof. Dr. Muhammad Azam Khan, Member, Coordination and Monitoring Division, Pakistan Agriculture Research Council (PARC), Islamabad.
Vice President (Punjab)	Dr. Basharat Ali Saleem, Director, Horticulture Extension, Government of Punjab, Lahore.
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General Secretary	Dr. Umer Habib, Assistant Professor, Department of Horticulture, PMAS-Arid Agriculture University, Rawalpindi.
Joint Secretary	Dr. Hafiz Nazar Faried, Assistant Professor, Department of Horticulture, MNS University of Agriculture, Multan.
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Student Councilors	To be announced by each Vice President



PSHS and Department of Horticultural Sciences, The Islamia University of Bahawalpur, Organized 8th International Horticulture Conference and Expo 2024

Pakistan Society for Horticultural Science (PSHS) in collaboration with Department of Horticultural Sciences (DHS), Faculty of Agriculture and Environment, The Islamia University of Bahawalpur (IUB) organized 8th International Horticulture Conference and first ever Horti-Expo of South Punjab (IHCE-2024) on February 26-28, 2024 at Khawja Ghulam Farid Auditorium, IUB. The theme of the event was 'Innovations in Sustainable Horticulture' and objectives of

participated in the event along with about 10,000 walk-in visitors of Horti-Expo. The International conference was diversified by the active and physical participation of international delegates from Turkey and Egypt and online participation from USA, China, Australia etc. The exhibitors of Horti-Expo included growers and nursery businesses, traders (exporters, importers, domestic businesses, online traders), input suppliers (fertilizers, pesticides, seed), service providers (processors, logistic and storage companies, advisory/extension services), food industries, machinery and equipment businesses, academic and research institutions, regulatory/certification bodies, social enterprises and other relevant organizations.

The inaugural ceremony for IHCE-2024 was held on February 26, 2024 at Khawja Ghulam Farid Auditorium, IUB. The chief guest of the ceremony was Prof. Dr. Ishtiaq Ahmad Rajwana, Vice Chancellor, MNS University of Agriculture, Multan, other participants were Dr. Muhammad Nafees, Chairman Department of Horticulture, IUB, Prof. Dr. Aman Ullah Malik (Rtd.), Ex-Dean Faculty of Agriculture, UAF /Ex-Director IHS, Prof. Dr. Taki Demir, Dean Faculty of Agriculture, Sakarya University of Applied Science, Türkiye, Dr. Akbar Anjum (Rtd.), Ex-Chairman Department of Horticulture, BZU Multan, Mr. Allah Bakhsh, Director General (Research) Punjab, Mr. Athar Hussain Khokhar, Chief Executive Officer, PHDEC, and Mr. Ali Riaz Cheema, the Zonal Sales Manager of Engro Fertilizers.

The ceremony started with the recitation of few verses from Holy Quran followed by Naat Rasool Maqbool and National Anthem. In his keynote speech, Dr. Aman Ullah Malik highlighted the status and challenges faced by horticulture industry and the possible solutions to overcome the problems. Prof. Taki Demir discussed the status of horticulture plant production in Turkey and future production risks that farmers can face. Dr. Ishtiaq Ahmad Rajwana highlighted the challenges of agriculture education in Pakistan. Prof. Dr. Tanveer Hussain, Dean Faculty of Agriculture, IUB (the patron of IHCE-2024) appreciated the efforts of team of Department of Horticultural Sciences to organize such a successful conference and expo and thanks to the international and national participants to attend this event.



the conference were to exchange recent R&D based knowledge and developments in horticulture, to understand challenges and set R&D goals for sustainable horticulture as well as to strengthen collaboration among national and international academia, research and industry for joint horticultural ventures. About 500 registered professionals including academia, researchers, extension workers, government officials, traders, exporters, input suppliers and service providers



Overall, about 250 abstracts were received from various national and international scientists. Among these abstracts, 74 abstracts were accepted for oral presentation. A total of 8 technical sessions were managed where conference participants shared the knowledge and recommendation with relevant topic of each technical session. Among the submitted abstracts, 121 were accepted for poster presentation at IHCE-2024. The scientists show-cased their R&D presented their posters to the evaluation committee. The evaluation of posters was independently done, and certificates were awarded to presenters of first three poster positions as well as five best poster presenters.

The first-ever Horti-Expo of South Punjab was also organized as the part of IHCE-2024. The inauguration of the Horti Expo was done by Vice Chancellor, IUB Prof. Dr. Naveed Akhtar. The expo provided opportunities of market development (B2B and B2C Networking), showcasing the products and services (display/sale stalls), technical learnings and ideas, and national and international academia-industry linkages. The exhibitors including Bazargankala Co. Tehran, Iran, Engro Fertilizers Ltd., Pakistan, ACIAR/Australian Aid funded Citrus Value Chain Project (HORT/2020/129), MG Agri. Foods, Multan, Moon Star Seeds Pvt. Ltd, Hyderabad, FB Exporters, Multan, The Mango Company, Jalalpur Pirwala, Mehar Landscaping Company, Pattoki, Green Circle, Lahore, Al-Hadi Impex Pvt. Ltd, Multan, Al-Qasim Bagh, Dera Ghazi Khan, Food For Life, Dera Ghazi Khan, Alif Khan Afridi Drip Irrigation Parts Suppliers, Rawalpindi, Pak Diamond Food Factory, Bahawalpur, Pakistan Horticulture Development and Export Company (PHDEC), Institute of Horticultural Sciences, University of Agriculture Faisalabad, PMAS Arid Agriculture University, Rawalpindi, Mango Research Institute, Multan, Citrus Research Institute, Sargodha, Fruit Research Institute, RARI, Bahawalpur, Department of Plant Protection (DPP),



Government of Pakistan and Department of Horticultural Sciences, FA&E, IUB.

A cultural event was held on first day evening to provide the participants the opportunity to know and celebrate the shared heritage of South Punjab. The students of IUB presented various cultural performances, talents and creativity. The closing ceremony was held on 27th February, 2024, at Khawja Ghulam Farid Auditorium of IUB. The ceremony was chaired by Prof. Dr. Taki Damir, Dean Faculty of Agriculture, Sakarya University of Applied Sciences, Türkiye as Chief Guest with co-chair by Prof. Dr. Tanveer Hussain, Dean Faculty of Agriculture and Environment, IUB. Prof. (Rtd.) Dr. Muhammad Akbar Anjum, Ex-Chairman Department of Horticulture, BZU, Multan presented the overall conference recommendations. In the end, the ceremony chair and co-chair shared their views about the event and emphasized the role of horticulture sector in global sustainability. The ceremony was ended with the souvenir distribution, group photo and vote of thanks by the focal person of IHCE-2024, Prof. Dr. Muhammad Nafees, Chairman Department of Horticultural Sciences, IUB.



Spring Flower Festival 2024

Department of Horticulture, MNS University of Agriculture, Multan



The Department of Horticulture and Directorate of Estate Management under the umbrella of Pakistan Society for Horticultural Science at MNS University of Agriculture, Multan organized a two-day flower show during the Spring Flower Festival on March 07-08, 2024 which was attended by a large number of flower lovers. The flower festival promised to be an extraordinary celebration of the university's most beloved event, paying homage to the luscious flowers grown across the Multan. This two-day extravaganza provided a platform for students, academicians, farmers, growers, and businesses associated with the floriculture industry to exhibit their finest produce and engage with flower enthusiasts.

The Vice Chancellor, Prof. Dr. Ishtiaq A. Rajwana inaugurated the ceremony along with the Dr. Tanveer Ahmed, Chairman Department of Horticulture, Mr. Tahir Saeed, Horticulturist, Floriculture Research Institute Multan, Mr. Tahir Saeed, Dr. Muhammad Amin, Associate Professor, The Islamia University of Bahawalpur and other faculty members and guests from industries. Addressing the participants of the flower show, the Vice Chancellor said that flowers give us a message of peace and security. He said that the darkness spread in the society can be turned into light by perfuming it with the fragrance of love and brotherhood. He said that it has been the tradition of MNS University of Agriculture to organize a flower show every year, which not only provides entertainment to the people but also provides opportunities for the students to acquire expertise.

Spring flowers, which are blooming in all their beautiful colors, delight nature lovers. More than 50 varieties of spring flowers were displayed from educational and research institutions and various industrial groups of the city, which were placed in mounds and stalls. Dozens of different flower arrangements, showcasing the colors of creative ideas as a befitting celebration of the spring season, were displayed by university students as well as the Floriculture Research Institute, Multan, The Islamia University of Bahawalpur, Cantonment Board Multan, Patoki Nursery and other organizations. Along with the flower show, a painting competition was also held, in which a large number of students participated. Honorary shields were distributed among the students with the best skills.

The grand festival received widespread acclaim and garnered extensive media coverage from numerous national networks, such as Rohi TV, Express News, PTV, University TV channels and many more. The event's success was amplified by this widespread recognition in the media, reflecting the festival's significant impact. The flower show continued till the evening of March 8, 2024.





Mango Field Day: Unveiling the Secrets of Healthy Mango Production

Mr. Muhammad Umair¹, Dr. Kashif Razzaq^{1*}, Mr. Shahzad Zafar², Dr. H. Nazar. Faried¹

¹Department of Horticulture, MNS University of Agriculture, Multan

²Mango Research Institute, Multan

Mango is the 2nd major fresh and exportable fruit of Pakistan after citrus. Globally, Pakistan stands at 6th position in mango production. Pakistan exports mango to neighboring countries including UAE, Iran, Oman, Afghanistan, Qatar and Kingdom of Saudi Arabia. Mango productivity and quality is affected by various factors including floor management, irrigation, nutrition and postharvest handling.

In this regard, pre and postharvest management related mango field day was organized on June 26, 2024, by Mango Research Institute (MRI), Multan in collaboration with Mr. Ghulam Qadir Bhutta's Chenab Mango Farm, Jalalpur (Multan). Different stakeholders including mango growers, exporters, researchers, input suppliers and value-added product developers participated in the event to understand the progressive outlook of floor and canopy management strategies of mango orchard. The faculty members and postgraduate students from MNS University of Agriculture Multan and Mango Research Station Shujabad also participated in this field activity to broaden their vision vis-à-vis mango supply chain. Prof. Dr. Ishtiaq Ahmed Rajwana (Vice Chancellor, MNS University of Agriculture, Multan) graced the event as a chief guest. This mega field day provided valuable insights and practical knowledge on orchard floor management, irrigation and fertilizer scheduling, and postharvest fruit handling for improved mango production, quality and export.

Mr. Ghulam Qadir Bhuta (owner of the Chenab Mango Farm and chairman Punjab Mango Research Development Board) and Hafiz Asif-ur-Rahman (Director, MRI, Multan) welcomed the guests and participants. The session was started with few verses of the Holy Quran. Mr. Shahzad Zaffar (Senior Scientific Officer Horticulture) highlighted the issues of mango sector of Pakistan due to abrupt changes in climate. He emphasized on the floor management, root architecture development as per the plant age, and irrigation strategies to sustain quality mango production. He elaborated that trench should be developed according to the size of the tree canopy to reduce the problems of dieback in mango. Natural green mulches (grass belts) should sustain to conserve moisture,



sustain rhizosphere temperature and enhance soil fertility. Temperature under canopy should be 15-30 °C for appropriate tree growth and development. Mr. Ghulam Qadir Bhuta, the orchard owner, further mentioned that he has been adopting scientific pre- and post-harvest mango crop management practices for the last 10 years based upon the outcome of MRI R&D. He elaborated and demonstrated the orchard floor management interventions including trench system for irrigation. He said that mangoes need only moisture in rootzone instead of flooding. Moreover, he said that regularly application of FYM and proper floor management particularly in Azeem Chaunsa variety is important for quality fruit production. Moreover, Mr. Jahanzaib Dharala (a progressive mango grower of Multan who also got training of mango orchard floor management from Australia) guided the participants about trench system and effective irrigation scheduling. He advised the famers to irrigate the orchard according to soil type and availability of water. Mr. Zaffar Mahy (progressive mango grower) discussed the maturity behavior of mango varieties based upon physiological parameters. He highlighted that mango maturity is a critical factor in determining the optimal harvest time, which impacts fruit quality and shelf life.



Mr. Asif-ur-Rehman (Director, MRI, Multan) discussed postharvest management practices in mango particularly for export purpose. He briefed the participants that white Chaunsa should be harvested at TSS of 7 °brix for export. He advised the farmers to harvest mangoes at proper harvest maturity to reduce fruit damage and extend shelf life. Lastly, he thanked all the participants for actively participating in the field day.

At the end of session Prof. Dr Ishtiaq A. Rajwana, the Vice Chancellor, MNS University of Agriculture, Multan in his concluding remarks appreciated the efforts of MRI team and Mr. Ghulam Qadir Bhutta for providing such platform for mango stakeholders particularly farmers to enhance mango productivity. Moreover, he advised the farmers to adopt such interventions elaborated and demonstrated by the researchers and mango growers to enhance the productivity and quality of mango.

Take Home Message:

1. Effective floor management is crucial for improving the canopy and fruit quality of mango trees.
2. Ensure green mulches in orchards especially during summer conditions with clean cultivation in winters.

3. A taper raised bed (9-12 inch) around the tree should be developed based on the soil type, tree's age, and canopy size. However, raised bed length should be 3-3.5 ft from main trunk in tree with an age of above 10 years.
4. Moreover, raised bed and small tree system are the futuristic technologies. However, the R&D is in progress for developing recommendations for these technologies.
5. Proper irrigation is essential for successful mango production. However, over-irrigation is more harmful than under-irrigation.
6. Irrigation and fertilizer scheduling should be considered according to soil type and water availability to ensure optimal growing conditions for mango growth.
7. Optimal harvest maturity is a critical factor for obtaining best quality attributes with prolonged shelf life. For example, TSS measuring before harvesting to fetch higher market income.
8. Trench (1 ft wide and 2-2.5 ft depth) should be developed in older trees (age > 35 years) indicating decline symptoms.

Webinar on “Lemons and Limes Cultivation in Pakistan”

Department of Horticultural Sciences, The Islamia University of Bahawalpur, Pakistan

A webinar on “Lemons and Limes Cultivation in Pakistan, Crop Management, Challenges and Opportunities” was organized by Department of Horticultural Sciences, The Islamia University of Bahawalpur (IUB), Pakistan in collaboration with Pakistan Horticulture Development and Export Company (PHDEC), Islamabad on April 03, 2024. A total of 140 participants including citrus growers, citrus nursery owners, researchers, processors and exporters, faculty members and students participated using zoom link in this activity.

Mr. Athar Hussain Khokhar, CEO PHDEC delivered a welcome note and briefed the participants regarding the PHDEC and its initiatives and interventions to uplift horticulture sector of Pakistan. Then, Dr. Muhammad Azher Nawaz, Associate Professor, Department of Horticultural Sciences, IUB delivered a talk titled “Lemons and Limes Cultivation in Pakistan, Crop Management, Challenges and Opportunities”. Dr. Azher Nawaz emphasized the lemons and limes orchard management with a special focus on fruit development, and insect pest and disease management. Additionally, he shared the information regarding the available lemon and lime

germplasm in Pakistan, judicious use of fertilizers and pesticides, gap filling in orchards, and proper pruning and training of lemon plants. There was a question answer session for the participants, and a healthy debate was observed between the researchers and the farming community.

Finally, Prof. Dr. Muhammad Nafees, Chairman Department of Horticultural Sciences, IUB shared his thoughts regarding the uses of lemon and limes for various purposes. He shared information regarding the prospectus of lemon and limes cultivation in Pakistan, and acknowledged the participants and appreciated the efforts of PHDEC for organizing this webinar in collaboration.





Indoor Plants; Identification, Care, and Management Workshop

Department of Horticulture, MNS University of Agriculture Multan

Department of Horticulture and the Department of Home Sciences, MNS University of Agriculture, Multan in collaboration with the Pakistan Society for Horticultural Science, organized "Indoor Plants: Identification, Care, and Management Workshop" on May 22nd, 2024. The workshop, aimed at educating participants on the importance of indoor plants, drew a large and diverse audience. It was attended by many students and faculty members from various departments, as well as individuals from MNSUAM, the broader Multan community, and the landscape industry.

The event featured Prof. Dr. Junaid Ali Khan, Principal Officer of ORIC at MNSUAM, as the chief guest. Dr. Hafiz Nazar Faried hosted the ceremony, which commenced with the recitation of the Holy Quran and a Naat. In welcome address, Dr. Tanveer Ahmad, Associate Professor in the Department of Horticulture, emphasized the significance and potential of indoor plants. He advocated for the establishment of additional nurseries to cultivate a wider variety of indoor plants. Dr. Tanveer Ahmad extended a warm welcome to all guests and participants attending the workshop.

Mr. Chaudhry Anees Ahmad from Multan Garden Center (a representative of the industry) gave a presentation on indoor plants. He introduced Multan Garden Center and informed the audience about the use and benefits of organic fertilizers in indoor plants. He also displayed their products including pots, potting media, fertilizers, tools, equipment, etc for the management of indoor plants. Dr. Gulzar Akhtar, Assistant Professor of Department of Horticulture, served as the resource person for the workshop. He provided an overview of indoor plants, highlighting the significant amount of time humans spend indoors estimated at 80-90%. Acknowledging the higher pollutant levels indoors compared to outdoor environments, he underscored the potential health risks associated with indoor air quality including mental health disorders and various illnesses. Dr. Gulzar Akhtar emphasized the therapeutic advantages of indoor plants, elucidating their capacity to mitigate depression. A hands-on practical session was conducted, allowing participants to gain firsthand experience in planting and transplanting techniques through live demonstrations. The session

covered essential elements of plant care, encompassing watering schedules, humidity control, temperature management, light exposure requirements, repotting procedures, cleaning methods, and pruning techniques tailored to indoor plants.

Following the conclusion of the event, expressions of gratitude were extended to all attendees, accompanied by the distribution of certificates to acknowledge the participation of each individual.

1. Developing an understanding of different types of indoor plants, their unique characteristics, and their specific environmental needs is crucial for proper care and management.
2. Indoor plants improve air quality, enhance mood, increase productivity, and provide aesthetic value to indoor spaces.
3. Essential care practices include appropriate watering, ensuring adequate light, proper fertilization, and regular pruning should be followed.
4. Organic fertilizers can enhance plant growth and health while being environmentally friendly.
5. Establishing more nurseries and promoting the cultivation of a variety of indoor plants to encourage biodiversity and sustainability within the community.
6. Collaboration between educational institutions, the community, and the landscape industry can enhance knowledge sharing and promote best practices in indoor plant care.





International Webinar on “Advances in Breeding, Orchard Management and Certification Programs for Sustainable Citrus Production in Italy”

Institute of Horticultural Sciences, University of Agriculture, Faisalabad

An international webinar was organized by Institute of Horticultural Sciences (IHS), UAF on March 11, 2024 under a PARB funded project entitled: “Import of High Value Germplasm & Technologies of Elite Exotic Fruits, Vegetables & Medicinal Crops for Diversification & Sustainable Production in Punjab”. Prof. Dr. Ahmad Sattar Khan, Director, IHS, UAF in his inaugural address emphasized the need for germplasm diversification and nursery certification in citrus. The theme of the webinar was to introduce about the citrus genetic resources and varieties available at Research Center for Olive, Fruit and Citrus Crops at Catania Italy and their progress of their breeding programs, advances in orchard management and overview of nursery certification programs. Leading researchers of the CREA center presented their research and technologies in this webinar and shared their experiences. Dr. Usman, manager of the PARB project, highlighted his visit to CREA germplasm resource center in

2010 with Prof. Dr. Maria A. Germana, Professor, Palermo University and other colleagues. He also presented the status of existing citrus germplasm, grapefruit and limes breeding program and introduced objectives and activities of the PARB project. He emphasized the need for conservation and sharing of germplasm resources. Both parties agreed to continue such activities and further strengthen their collaborations in future. More than 100 participants from different educational and research organizations participated in this international event.



Seminar on “Breeding in Vegetable and Medicinal Crops for Germplasm Diversification and Sustainable Production”

Institute of Horticultural Sciences, University of Agriculture, Faisalabad

A seminar was organized by Institute of Horticultural Sciences (IHS), UAF on March 07, 2024 under a PARB funded project entitled: “Import of High Value Germplasm & Technologies of Elite Exotic Fruits, Vegetables & Medicinal Crops for Diversification & Sustainable Production in Punjab”. The seminar provided a platform for researchers of IHS-UAF and VRI-AARI, Faisalabad to showcase the outcomes of breeding programs, discuss challenges and explore new opportunities. Prof. Dr. Ahmad Sattar Khan, Director, IHS-UAF in his inaugural address highlighted the need for breeding and germplasm diversification in horticultural crops. Dr. Usman, PARB project manager presented the key objectives of the project and highlighted its progress towards germplasm diversification in vegetable and spice crops. Renown vegetable breeders from VRI, Dr. Khurram Ziaf (IHS) and Dr. Basharat Saleem, Deputy Director Horticulture Extension participated in the seminar and presented their research and outreach activities. Dr. Khurram Ziaf presented new strategies to enhance onion production in Punjab. Prof. Dr.

Azeem Iqbal Khan, Chairman, Department of Plant Breeding and Genetics, UAF and Prof. Dr. Amjad Aulakh, Ex-Dean Faculty of Agriculture also appreciated the progress of IHS-UAF and VRI-AARI and shared their views about the progress and achievements. Overall, the event underscored the commitment of the participants to furthering agricultural research and innovation for sustainable development and addressing food security challenges.





Role of Ornamental Plants in Phytoremediation of Soil Heavy Metals

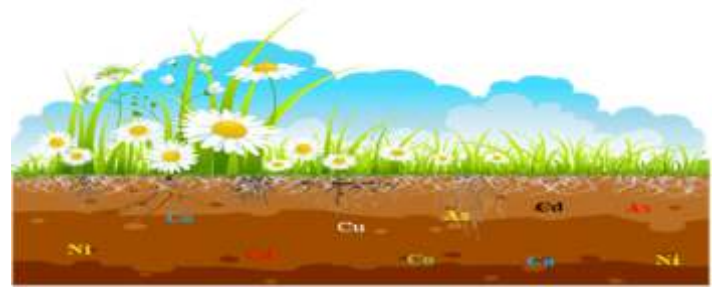
Dr. Gulzar Akhtar, M. Rizwan Shah and Kinza Shahid

Department of Horticulture, MNS University of Agriculture, Multan

Soil comprises different organic and inorganic components that facilitate plant growth and development by providing nutrients, water, mechanical support, etc. Unfortunately, the continuous addition of contaminants in the soil from natural (animal waste, plant residues) and anthropogenic activities (industrial waste, agriculture, household waste) deteriorates its physical and chemical properties. These soil contaminants are also introduced into the food chain and affect human health due to the intensive production of food crops in such contaminated soils. Among different soil pollutants, heavy metals are very common and harmful to plant growth and development. Moreover, the uptake of these metals also affects the health of human beings.

These metals have high atomic density, typically five times higher than the density of water, and are beneficial for plants growth at lower doses e.g. cobalt (Co) is an essential nutrient for a plant that is involved in nitrogen fixation and enzyme activation, nickel (Ni) is the main component of the urease enzyme and involved in nitrogen fixation in legumes, manganese (Mn) is an essential cofactor of oxygen-evolving complex (OEC) of the photosynthetic machinery during water splitting, zinc (Zn) is involved in transcription, replication process and acting as a cofactor of alcohol dehydrogenase and carbonic anhydrase, iron (Fe) is involved in enzymatic processes like leghemoglobin, ferredoxin, and catalase, copper (Cu) is required for photosynthesis and a cofactor of superoxide dismutase and ascorbate oxidase, and mercury (Hg) is involved in water uptake, photosynthesis, and transpiration rate. Whereas higher doses affect plants by inhibiting growth, photosynthesis, enzyme activities, and water potential, damaging nucleic acids that produce reactive oxygen species (ROS) that ultimately lead to lipid peroxidation and cell death. Food crops grown in contaminated soils cause health issues such as cardiac failure, lung cancer, diarrhea, osteoporosis, intravascular hemolysis, respiratory cancer disease, skin problems, hematological dysfunctions disease, and failure of the nervous and immune systems after being consumed.

Different sources are responsible for the production of heavy metals such as arsenic (As) produced from pesticides, mining, and petroleum refining; chromium (Cr) from the tanning, steel, textile, sludge, and industrial waste



industries; silver (Ag) from processing photos, mining, battery production, and smelting; Hg from coal burning, wood, medical waste and volcanic eruptions; selenium (Se) from burning of coal and mining; Cu from mining, polishing, printing, and painting, and lead (Pb) from paints, battery waste and pesticide.

To overview heavy metal toxicity different physical (soil extraction, washing, stabilization, and solidification), chemical (chemical fixation, leaching), and biological (using microorganisms) methods have been commonly used worldwide. On the other hand, these methods are as costly, time-consuming, labor-intensive, less effective for large areas, create secondary pollutants, and disturb the soil's physiochemical properties. Alternatively, phytoremediation is an economic and eco-friendly approach using plants to mitigate soil heavy metal pollution. During phytoremediation plants adopt different mechanisms such as phytoextraction, phytovolatilization, phytodegradation, phytostabilization and rhizofiltration to remove toxins from the soil. The efficiency of phytoremediation depends on the availability and concentration of heavy metals in soil.

A variety of plants (edible and non-edible) could be used for phytoremediation of soil heavy metals. Most soils of peri-urban areas in Pakistan are polluted with heavy metals and commonly used for growing food crops like vegetables which is the major reason for adding heavy metals to the food chain and creating health issues for consumers. On the other hand, seasonal flowering plants could be potentially used to grow in heavy metal-polluted soils for the phytoremediation of soils. Moreover, income could be generated through selling the flowers, bulbs, and seeds of these flowers. Furthermore, these flowering plants will also improve the aesthetic beautification of the area.



Seasonal flowers are also called annual flowers because they complete their life cycle in one growing season and are killed by extreme weather conditions. Similarly, some perennial flowers are also called annuals due to their tender stems and seasonal flowering habit. These flowers are classified as summer (e.g. zinnia, tuberose, celosia, balsam, marigold, and portulaca) and winter (e.g. stock, antirrhinum, gladiolus, hollyhock, and poinsettia) seasonal flowers. The availability of flowers depends on the climate, location, and local growing conditions.

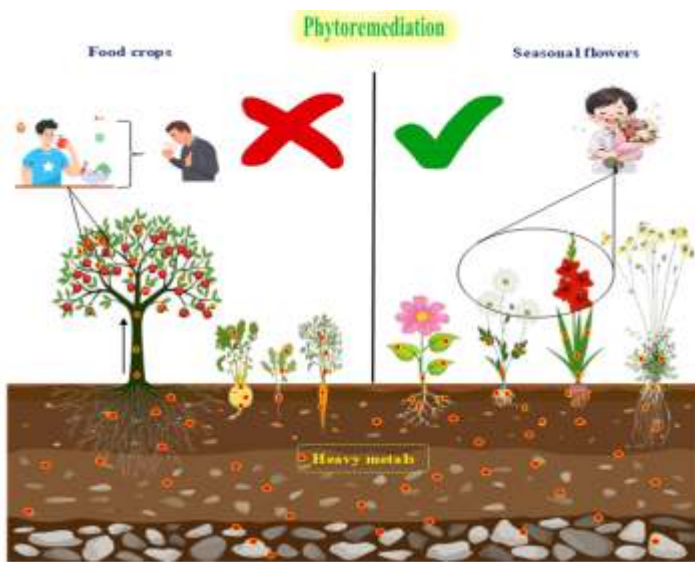
comes in various colors including pink, purple, maroon, orange, yellow, and red. Celosia produces flower heads that are vibrant, fluffy flower heads that resemble feathered plumes. It has three distinct flower types plumed, wheat, and cockscomb that are easy to care for and bloom for a long time.

Tuberose (*Polianthes tuberosa*) is a herbaceous bulbous plant that blooms in the summer. It is propagated through bulbs and produces white, fragrant flowers belonging to the Amaryllidaceae family. The leaves are bright green and slightly fleshy. It is a famous cut flower of the summer season that is commonly used as a cut flower in bouquets and for interior decoration in vases.

Snapdragon (*Antirrhinum majus*) is common winter season plants of the family Plantaginaceae. Its erect spikes are covered with buds that open from the bottom to the top. Flowers are available in a range of colors. It is propagated through the seeds used as cut flowers, potted plants for borders, and bedded plants.

Gladiolus (*Gladiolus grandiflorus*) is a famous bulbous flower of the winter season of the family Iridaceae. It is also known as the queen of bulbous flowers due to its massive flower spike with brilliant colors, shapes and size. It is propagated through corms (underground storage organs) that should be healthy and of sufficient length.

Stock (*Mathiola incana*) is also a fragrant spiky flower of the winter season that belongs to the family Brassicaceae. It comes in different colors such as white, pink, red, blue, purple, and creamy yellow. It is propagated through seeds and widely used as bedding, potting, and a cut flower.



These flowers are grown for different uses like

- To provide a mass of color in the landscape
- To fill shrubbery beds in the early stages
- To grow as a flower bed, border, pot, or planter
- To be used as cut flowers

The following important seasonal flowers could be used for phytoremediation of soil heavy metal pollution

Zinnia (*Zinnia elegans*) is a summer annual flowering plant belonging to the Asteraceae family. It is propagated through seeds and offers a wide variety of flower colors. It can be used as cut flowers, potted and bedded plants. The foliage of a zinnia plant is of varying shades of green, but the flowers can come in nearly all colors and sometimes a combination of colors. There are three distinct types of zinnia based on floral structure: single, double, and semi-double. Prolific bloomer.

Celosia (*Celosia plumosa*) is a low-maintenance summer annual flowering plant that belongs to the family Amaranthaceae. It can be propagated from seeds or cuttings and prefers full sunlight with well-drained soil. It





Practicing Agriculture in the Air Through Aeroponics

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The frequent diversity in global climate is rising an alarming condition of drought, due to which agricultural sector is facing various problems. This hinders the sustainable food production, a major challenge of today's world. The demand of food by mass population is increasing day by day and getting a plenty supply of food is not a luxury but a necessity. But in a near future, maximum utilization of natural resources will be a matter of focus. Soil, water, air and light are the natural resources, but their utmost utilization matters the most. Due to regular chemical usage, lands are being disrupted for crop production. Other reasons include the region wise change in climate, frequent cropping, and poor irrigation systems. Water is the essential resource and a basic need of the world, but this natural resource face problems due to its scarcity. This scarcity of water poses significant concerns to agriculture, affecting the productivity and sustainability of crops. Contrasting, limitation of resources in previous years resulted in decreased yield to great extent. It's the most prominent reason of fears that the food production would not be enough in the future. Hence, scientists have introduced new technologies to enhance farming under controlled environment. In this regards, soilless system is considered the best evolved techniques, specifically, aeroponics and hydroponics.

Aeroponics

Aeroponics is a promising medium-less technique in which roots hang in the air and nutrients are provided to the plant with the process of misting. This technique enable the grower to access the nutrients at the root area across the whole plant lifecycle, water management systems, and the environment. Aeroponics farming offers comparatively better benefits than the traditional methods of farming such as the proper aeration, efficient water usage, reduced space, and infection free plants. This method requires 95% less water than the conventional farming. In aeroponics, the nutrients are

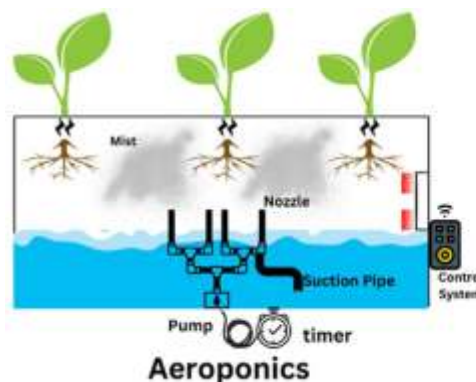
mixed with water in reservoir. After filtration, these are pumped to the pressurized tank, and it then supplied to roots of plants in form of mist. Water droplets should be of accurate size that can hold the essential nutrients and supply to the roots but should not precipitate out of root mass.

Types of aeroponics

1. Low-pressure units: In this system, the roots are above the reservoir of nutrient solution. The nutrient solution is provided with the low pump through jets.
2. High-pressure devices: In these devices, mist is created by high pressure pumps. This system is usually used to cultivate high value crops.
3. Ultrasonic fogger aeroponics: The fog particles are extremely small (less than 5 microns), which can enhance nutrient absorption and oxygen availability.

Advantages of aeroponics

1. It is used to grow pharmaceutical medicinal plants.
2. Single potato plant can grow more than 100 minitubers in a single row, contrasting to conventional methods that grows approximately 8 daughter tubers in a year and only 5 to 6 tubers per plant in the greenhouse in 90 days.
3. Less water usage. For instance, conventional practices require 200-400 liters of water to grow 1 Kg tomatoes, hydroponics used about 70 liters, while aeroponics utilizes only 20 liters of water.
4. Plant growth is fast.





Mustard's Surprising Benefits for Plant Growth

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Mustard Seeds

Mustard Cake

A variety of plant-derived materials are used as organic fertilizers, including fresh plant matter, animal manures, and agricultural by-products. Inorganic fertilizers differ significantly in nutrient content, and readily biodegradable materials provide superior nutrient sources. A mustard oil cake powder, which is also called mustard cake or sarson ki khali, is a byproduct of the extraction of mustard oil from mustard seeds. In agriculture and gardening, it is an organic fertilizer that is highly nutritious. There is a great nutritional value in this powder, including nitrogen, phosphorus, and potassium, which are essential for plant growth and development. As a fertilizer, mustard cake is widely used for flowering plants as well as vegetables. This fertilizer is rich in protein and provides a wide variety of micronutrients. It is widely believed that mustard oil cake powder enhances soil fertility, improves soil structure, and fosters healthy, robust plants when added to the soil. Furthermore, it facilitates the development of a strong root system and enhances the resistance of plants to environmental stress and disease.

Unadulterated fungus-free mustard cake fertilizer is used

An oil extraction unit that is reliable should be purchased. As much as possible, it always purchased freshly produced Sarso Kali as opposed to old-stored stock, and it systematically tested every batch for foreign material. Following that, it should be stored in a dry and hygienic environment to prevent fungal and bacterial

contamination. An inspection must be conducted for checking from time to time.

What are its benefits?

1. As part of the potting soil: There are a number of other components that can be incorporated into potting soil such as coco peat, sand, perlite, and garden soil, with mustard cake powder being one of them. It is primarily intended for flowering plants and vegetables. In order to result in extensive blooming and accelerated growth, please ensure that you use only a very small amount of mustard cake powder in the potting mix.
2. A nematode-suppressing property: This compound suppresses nematode populations in the soil, which can adversely affect plant roots.
3. Conditioners for soil: Aeration and water retention are enhanced through soil aeration, which facilitates root development and nutrient absorption by plants.
4. Environmentally friendly agriculture: As a fertilizer, mustard oil cake powder supports organic farming practices, reduces dependence on synthetic chemical fertilizers, and contributes to sustainable agricultural practices.
5. Inorganic pesticides: *Brassica juncea* and *Sinapis alba* produce chemical compounds known as glucosinolates. As these plants are mowed and incorporated into the soil, fungus and nematode populations are reduced. Furthermore, glucosinolates found in mustard oil cake powder produce toxic compounds when they are in contact with soil, acting as a natural pest repellent and reducing soil-borne pathogens.
6. Mustard as green mulch: It is convenient to incorporate this fast-growing cover crop back into the soil after it has died off, working organic matter back into the soil. A deep freeze will kill mustard at 26°F, that's why some gardeners wait for the winter cold to occur. Instead of waiting for winterkill, mow or chop it down and bring the plant matter back to the soil. Prevent self-sowing and nuisance by performing this step before the plants go to seed.



7. **Nutritious:** The mustard oil cake powder contains a lot of essential nutrients such as nitrogen, phosphorus, and potassium. As well as nitrogen and potassium, it provides plants with macro- and micro-elements.

- a) **Nitrogen:** A plant's vibrant green color is a result of nitrogen, and a plant deficient in nitrogen will turn yellow. Nitrogen improves growth and flower and fruit development.
- b) **Phosphorus:** A major function of phosphorus is to transport and store energy within plants as well as to make the roots, seeds, and plants more resistant to stress.
- c) **Potassium:** Contributes to the process of photosynthesis.
- d) **Zinc:** Plants are usually stunted in their growth if zinc is not adequately supplied. Zinc deficiency can result in yellowing/bronzing of leaves between veins and stunted growth.
- e) **Sulfur:** A substantial amount of sulfur is necessary for the formation of chlorophyll as well as for the neutralization of soil acidity.
- f) **Magnesium:** A lack of magnesium will result in a slow or stunted growth of plant life. Magnesium is a vital component of photosynthesis, converting sunlight into energy needed by the plant for growth.
- g) **Manganese:** Among other things, manganese plays a significant role in a wide range of plant biological processes, including respiration and photosynthesis.
Despite the fact that mustard cake powder contains no other ingredients besides mustard itself, it is a universal and harmless fertilizer. In addition to being used as a liquid organic fertilizer, it can also be mixed with soil.

8. **Prevent erosion and suppress weeds:** In recent years, cover crops have become more popular among gardeners for a number of reasons. In addition, they facilitate the building of soil and contribute to the overall ecosystem, allowing the garden to thrive and improve over time. Yellow mustard can prevent erosion and suppress weeds in the garden. Mustard acts as a cover crop by loosening up compacted soil by growing deep roots 1-3 feet below the

surface. In contrast to most ordinary crops, yellow mustard roots scavenge nutrients from deeper depths than most other crops. Moreover, this plant thrives in cool conditions and grows quickly, so it is an excellent option for planting in the fall.

- 9. **Protects buds from premature drop:** Adding mustard cake to your plantings twice a month will provide them with the essential protein and prevent premature bud drop. In 5 liters of water, soak 100 grams of mustard cake for one night. Water your plants twice a month and use a cup of slow-release fertilizer.
- 10. **Prolonged release of nutrients:** As mustard oil cake powder releases nutrients slowly over time, it provides plants with a steady and prolonged supply of essential nutrients.
- 11. **Solve fungus problem:** Mustard cake application solves fungus issues in flowering plants. Use only a tiny amount of mustard cake powder in the pots for extensive blooming and accelerated growth. Therefore, if you add one liter of mustard cake to twenty liters of water, the ratio will be 1:20. It can be applied to 150 to 200 pots. After two weeks, the fungus problem will be solved.

Conclusion

A mustard cake is a natural fertilizer for flowering plants that contains nitrogen, which stimulates roots and plant growth, as well as potassium, which is essential for the development and health of plants. Mustard cake powder is used as a plant fertilizer as it contains high amount of nitrogen. It can be mixed with soil or water to provide nutrients and to improve plant growth.



Mustard Cake Powder



An Indigenous Three Sisters Gardening Method

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The three sisters method is an ancient farming practice that originated among the indigenous peoples of North America. This method involves planting three main crops corn, beans, and squash together in a symbiotic relationship that mimics the natural ecosystem. By growing these crops in close proximity, farmers can create a mutually beneficial and productive garden that requires minimal external inputs. Today, the three sisters method has gained recognition worldwide for its sustainable and ecological approach to farming, and is being rediscovered and embraced by gardeners and farmers seeking a more harmonious relationship with the natural world.

Understanding three sisters planting

This method involves plantation of three main crops; corn, beans and squash in close proximity. Each crop plays crucial role in supporting the others by creating the favorable environment that promotes the healthy plant growth and higher yield.

Corn: In this trio, corn is elder and taller sister that serves as a natural trellis for the beans to climb. Its sturdy stalks provide support and stability, preventing the beans from sprawling on the ground.

Beans: Beans are nitrogen-fixing plants and act as giving sister in this planting system, because they have the ability to fix nitrogen in soil through root nodules and convert nitrogen into a form that plants can use. They climb up the corn stalks, utilizing them as support, and in return, they provide nitrogen to the soil, which benefits all three crops.

Squash: Acting as a ground cover, squash plants create a living mulch that shades the soil, conserves moisture, and suppresses weeds. This little sister helps maintain soil moisture levels and reduces the need for excessive watering.

Benefits of three sisters planting

The synergy among corn, beans, and squash offers several advantages over monoculture farming.

- Nitrogen fixation by beans enriches the soil, reducing the dependence on synthetic fertilizers and promoting sustainable soil health.

- The interplanting of different crops reduces the chances of pest attack. Moreover, squash help to suppress weeds by blocking the exposure of weed seeds to sunlight.
- The dense foliage of squash helps retain soil moisture, reducing water evaporation and the need for frequent irrigation.
- By utilizing vertical space and ground cover, three sisters planting optimizes space usage, allowing for higher yields per square meter.
- Three sisters complement each other nutritionally as corn act as source of carbohydrates, beans as protein and squashes as vitamins and minerals that is necessary for balanced diet.



Plantation scheme of three sisters

The selection of variety, season and planting distance is important for this planting scheme. Sweet corn, beans and zucchini can successfully be planted resulting great benefits from this system. Pumpkin can also be used only in case if soil is well fertile and there is great space for plantation in garden because pumpkin is vigorously growing vegetable. Moreover, select compact growing squash variety if space is less. Similarly, select tall corn variety so that beans have sufficient space to climb and do not overcrowd corn. For plantation of these three crops, select a sunny spot receiving 6 to 8 hours sunlight in garden with well-drained soil.



Dig the soil to a depth of about 12 inches, break up clumps and remove rocks and debris. Incorporate organic matter like compost or well decomposed farm-yard manure to improve soil fertility and drainage. These three crops are warm season and sensitive to frost. At high temperature and low humidity, the tasseling of the corn is severely affected. Therefore, plantation of corn during early season is important so that pollen release and tasseling period should be completed before June to early July which is major time to induce sterility. Create mounds spaced about 3 feet apart in rows, as corn grows best in clusters for pollination. Plant 4 to 6 corn seeds per mound, 1 to 2 inches deep. Space seeds about 6 to 8 inches apart within the mound. Ensure each mound has adequate space for corn to grow tall without shading neighboring mounds excessively.

Beans are planted when corn plants are 4 to 6 inch tall. It allows corn to provide the sturdy support structure to the beans. Direct sowing of bean seeds should be done at base of each corn stalk about 1 inch deep. Spacing is important as beans should be spaced evenly around corn for proper climbing. Squash should be planted in small mounds between corn mounds. Squashes require full sunlight so it

should be planted at proper place with care. The 3 to 4 seeds of squash per mound planted 1 inch deep and 2 to 3 feet spacing within their own cluster are recommended. From beans, the distance should be at least 1 foot.

Plants should be irrigated immediately after planting and continue to water according to crops requirement particularly during dry spells. Over watering should be avoided. Though squashes are enough to act as mulch to conserve soil moisture, however, if necessary, then mulching should be done. Harvest corn when the ears are plump and the kernels are fully developed. Beans can be harvested when the pods are firm and well-filled. Squash is ready when the rind is tough and cannot be punctured easily with a fingernail.

Conclusion

Three sisters planting is a good example of sustainable gardening that encourages biodiversity and ecological balance. By understanding and following scheme of plantation, a thriving garden can be created that not only results in high yield but also enriches the soil for future crops.

Revolutionary Solar Tunnel Dryer Technology Developed by Agriculture Research Institute, D.I. Khan

The Food Technology Section and Dr. Shahzada Arshad Saleem Saddozai at Agriculture Research Institute, D.I. Khan, have revolutionized processing and drying technology with a groundbreaking Solar Tunnel Dryer (STD) adaptation. Successful trials were conducted drying mangoes, and the technology also shows promise for other fruits and vegetables. This innovative breakthrough, featuring a pioneering hybrid design with a poly carbonate sheet, enables enhanced food preservation, waste reduction, and quality improvement. The impact on the food processing industry promises to be transformative, driving food

security, economic growth and sustainable development in the region.





Insects/pests, Diseases and Disorders of Floricultural Crops

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Insects/pests

Sr. No.	Insect/ Pest	Symptoms/Causes	Active Season	Host Crops	Control Measures
Sucking insects					
1	Aphid	Curling and distortion of leaves, severe attack may cause drying, wilting of leaves and colonies on tender twigs	Feb-April Sep-Nov	Roses, ornamental kale, Chrysanthemum etc.	<ul style="list-style-type: none"> Use yellow sticky traps in green house Lady beetles may be encouraged to eat aphids. Spray Acephate (ai: Acephate, Company: Syngenta) or Niab Eco (NIAB Fsd)
2	Jassid	Leaf yellowing, wilting and abnormal leaf shape	July-Sep	Roses, Marigold, Tuberosa, Hibiscus species	<ul style="list-style-type: none"> Spray Acephate (ai: Acephate, Company: Syngenta) or Niab Eco (NIAB Fsd)
3	Mealy bug	Leaves yellowing, stunting, dieback or death of the plants	Feb-Aug	Hibiscus species	Do hoeing under trees in December, spread coopex powder and flood the hoed area, wrap plastic bands on stems of trees, if adults observed, spray Cruiser (ai: Thiamethoxam, Company: Syngenta)
4	Scales	Poor growth, wilting of leaves and branches and ultimately death of plant	April-Nov	Roses, cactus, jasmine sp., hibiscus sp., ficus chrysanthemum	Spray Movento (ai: Spirotetramat, Company: Bayer), Route (ai: Malthion, Company: Kanzo)
5	Spider mites	Whitish yellow spots on leaves and webs woven on foliage	April-Oct	Roses, hibiscus, marigold, zinnia, rudbeckia,	Spray water on lower side of the leaves at 3-5 days interval or Oberon (ai: Spiromesifen, Company: Bayer)
6	Termites	Damage plants roots and cause wilting of plants	April-Sep	Trees, shrubs, climber, palms and seasonal flowers	Flood Chlorpyrifos (ai: Chlorpyrifos, Company name: Syngenta), Fipronil (ai: Fipronil, Company: Jaffer group) particularly in drought conditions
7	Thrips	Discoloration, distortion, premature drying of leaves, flowers, and buds	Mar-Oct	Roses, ficus, marigold, zinnia,	Spray neem oil or NIAB Eco (Company: NIAB, Faisalabad)
8	Whitefly	Sticky upper-surface of leaves and possible black sooty mold, leaf yellowing	Mar-Sep	Roses, stock, snapdragon, hibiscus species, egg plant	Fix yellow sticky bands in green house or in field or spray Curacron (ai: Profenofos, Company: Syngenta) or Biosal (HEJ), Institute of Chemistry, University of Karachi)
9	Wooly Aphid	Yellowing foliage, poor plant growth, branch dieback, and development of cankers and galls on limbs or roots	April-June	Ficus, Hibscus, chrysanthemum	Spray Talstar (ai: Bifenthrin, Company: FMC corporation)
Chewing insect/cut worms					
1	Cutworms	Feed on stem and leaves	Mar-Oct	Roses, jasminum species, marigold, gladiolus	Spray Cymbush (ai: Cypermethrin, Company: Syngenta)
2	Bollworms	Damage flowers at bud stage	Mar-Oct	Roses, jasminum species, marigold, gladiolus	Spray Cymbush (ai: Cypermethrin, Company: Syngenta)
3	Cycad blue	Chew new leaves	Feb-Oct	Cycad palms	Spray Match (Lufenuron) by Syngenta
4	Leaf minor	Larvae eat the leaf chlorophyll	Feb-Sep	Nasturtium, marigold, chrysanthemum,	Avoid excessive nitrogen use & spray Nova Star (ai: Bifenthrin+Abamectin, Company: FMC)
5	Leaf roll caterpillar	Leaf drying & defoliation	Mar-June	Ficus species, Molsri	Spray Match (Lufenuron) by Syngenta
6	Nematodes	Blockage of roots, stunting of plant and yellowing of leaves	Jan-Dec	Rose, jasminums species, lillium	Spread Rugby granules (ai: Cadusafos , Company: FMC) in infected soils
7	Rodents	Feed on seeds and kill young plants	Jan-Dec	Tulip, gladiolus, dahlia, iris	Formulate Zinc phosphide with any attractive substance to trap rodents
8	Grubs	Damage plant roots	Aug-Oct	Turf grasses	Flood Advantage (ai: Carbosulfan, Company: FMC)
9	Slugs and snails	Damage seeds, seedlings, underground tubers and leaves	July-Oct	Marigold, Dahlia, Chrysanthemum, roses, Calendula	<ul style="list-style-type: none"> Spread Stanza (ai: Metaldehyde, Company: Kanzo) or Temik (ai: Aldicarb, Company: Global prodcuts) granules in infested area For home garden, Verve baits (ai: Iron phosphate) may be used Pour salt on insects
10	Red palm weevil	Stem and crown	Summer	Palms	<ul style="list-style-type: none"> Pour Diptrex (ai: trichlorfon, Compnay: ICI) using a funnel, then plug this hole. Use pheromone traps to attract



Diseases

Sr. No.	Pest	Symptoms/Causes	Active Season	Host Crops	Control Measures
Fungal diseases					
1	Black spot	Circular black spots surrounded by yellow area	Warm humid	Rose	Uses sterile secateurs for pruning and spray Capnazole (Active Ingredient: Captan 70% w/w + Hexaconazole 5% w/w, Company: Jaffer group)
2	Dieback	Drying of twigs from tip down wards	Bad pruning and injury to stem enhance disease spread	Rose	Uses sterile secateurs for pruning and spray Shincar (ai: Carbendazim, Company: FMC)
3	Powdery mildew	White powdery spots on leaves and stems	Low light, shade, high day and low night temperature	Dahlia, Roses, Chrysanthemum,	Spray Kumulus (ai: Sulphur, Company: FMC) or (ai: Difenconazole, Company: Syngenta)
4	Downy mildew	Yellow spots on the upper leaf surface between the leaf veins	Cool wet season	Rose, basil, impatiens, dahlia	Spray Score (ai: Difenconazole, Company: Syngenta)
5	Fusarium corm rot	Leaf yellowing, dark brown, circular, rotting areas on the corm	In the field or during storage	Gladiolus, saffron, lillium,	Soil sterilization, use disease free corms, dipping of corms in Tosin-M Thiophanate Methyl, Company: Arysta Life Science UPL)
6	Damping off	Rotting of stem and root tissues at and below the soil line and seedlings collapsed	At seedling stage	Plants propagated by seed	Use well drained substrate and dress seeds with Benlate
7	Botrytis blight	Brownish spots on shoots, leaves and flowers	All year round but cool weather favorable for spread	Rose, marigold, gladiolus, tuberose, lillium,	Apply preventive spray of Protocol (ai: Chlorothalonil, Company: FMC)
8	Pythium	Cotton-like mycelia appear in the early morning on turf	Summer season	Turf grasses	Provide adequate soil drainage and apply Aliette (ai: Fosetyl AI 80% WP, Company: Bayer) or Ridomil gold (ai: Mefenoxam, Company: Syngenta)
9	Black leg	Black discoloration of stems	High temperature	Pelargonium	Sprenc with Aliette (ai: Fosetyl AI 80% WP, Company: Bayer)
10	Fairy rings	Wilted and dried circular shapes in turf field	Spring to early fall	Turf grasses	Apply preventive spray of Protocol (ai: Chlorothalonil, Company: FMC) or Folio gold (ai: Chlorothalonil+ Mefenoxam, Company: Syngenta)
11	Dry rot	Yellowing of leaves and drying	Prolonged cool and rainy weather	Gladiolus	Treat corms with Topsin-M (Thiophanate Methyl, Company: Arysta Life Science UPL) for 10 minutes before sowing.
12	Rust	Small yellow spots appear on either side of the leaves that eventually develop into orange-color	High humidity and moderately high temperature	Gladiolus, roses	Spray Tilt (ai: Propiconazole, Company: Syngenta) or Score (ai: Difenconazole, Company: Syngenta)
13	Blue mold	Layer of blue spores appear on bulbs	Spread due to high humidity and poor ventilation	Lillium, gladiolus, hyacinth	Bulb treatment with Topsin-M (Thiophanate Methyl, Company: Arysta Life Science UPL) before storage and sowing
14	Basal rot	Bulb browning, leaf yellowing and dieback	Temperature above 25°C	Tulip, Lillium,	Treat corms with Topsin-M Thiophanate Methyl, Company: Arysta Life Science UPL) for 10 minutes before sowing.
	Sclerotinia stem rot	Water-soaked white to grey lesions appear on stem and leaves	Wet-humid conditions favor this disease	Chrysanthemum, carnation	Drench soil with H ₂ O ₂ before planting chrysanthemum and carnation.
Bacterial diseases					
1	Bacterial wilt	Plant died suddenly after wilting of leaves	High temperature and poor drainage of soil	Pelargonium, Philodendron, Dieffenbachia, Anthurium	<ol style="list-style-type: none"> 1. High concentration of Calcium can reduced bacterial wilt. 2. Diseased plants should be removed promptly to prevent spread. 3. Apply preventive spray of Kasumin (ai: Kasugamycin, Company: Arysta life sciences)



2	Bacterial blight	Small water-soaked spots appear on leaves	Promoted by cool and wet weather	Anthurium, Dieffenbachia	<ol style="list-style-type: none"> 1. Use disease free plants, sterilize soil before cultivation and avoid overhead irrigation 2. Crop rotation and application of copper based fungicides are effective to control this disease 3. Apply preventive spray of Kasumin (ai: Kasugamycin, Company: Arysta life sciences)
3	Bacterial leaf spot	Water-soaked spots appear on the underside of the leaf first	Warm-humid conditions are favorable for disease spread	Begonia, pelargonium	Apply preventive spray of Kasumin (ai: Kasugamycin, Company: Arysta life sciences) or

Viral diseases

1	Rose rosette disease	Leaves become deformed, crinkled, and brittle with yellow mosaics and red pigmentation	Hot, dry weather when mites are more active	Rose	Adopt control measures for mites and use disease free planting material.
2	Stem necrosis virus	Necrotic streaks on the stem, wilting of leaves and stems	When thrips are active	Chrysanthemum	Adopt control measures for thrips
3	Necrotic spot virus	Necrotic lesions surrounded by yellow areas on leaves followed by necrosis on whole plant	When thrips are active	Impatiens	Adopt control measures for thrips and use sterilize tools for vegetative propagation
4	Cucumber mosaic virus	Yellow mottling, distortion and stunting.	When aphids are active	Lilies, delphiniums, primulas	Adopt control measures for aphids and use disease free planting material.

Footnote: * Fungicides are more effective when used on preventative basis, curative applications have little effect.

Disorders

Sr. No.	Disorders	Causes	Host Crops	Control Measures
1	Bull heads	Low temperature for extended period results in malformation of petals	Roses	Prune bullheads and allow new flowers to develop in warmer weather
2	Etiolation	Insufficient light retards chlorophyll formation and promotes long internodes, thus leading spindly growth	Winter and summer annual flowers	Provide sufficient light to seedling after germination
3	Pre-mature leaf chlorosis	Lower leaf yellowing	Lilium	<ul style="list-style-type: none"> • Add calcium to the crop nutrition • Add Benzyl adenine and Gibberellic acid
	Failure to open flower	Too much low or high temperature and low sunlight conditions	Roses,	Protect crop from low and high temperature and provide sufficient light.
4	Roundup spray drift	High winds	Any crop	Avoid spray during windy weather
5	Calyx splitting	Over dose of nitrogen and	Carnation	Avoid over dose of nitrogen
6	Leaf chlorosis	Fe deficiency	Gladiolus	Spray 0.2-0.5% solution of Chelated iron.
7	Upper leaf necrosis	Ca deficiency	Lilies	Spray 2% solution of calcium nitrate
8	Bud abortion	Environmental stress, high temperature or inconsistent irrigation	Lilies	Secure plants from environmental stress and apply proper cultural practices.
9	Topple	Ca deficiency, excessive cooling or high temperature during forcing	Tulip	Spray 2% solution of calcium nitrate and avoid overwatering
10	Frost injury	Exposure of plants to cold-weather conditions	Lily, rose, gladiolus, marigold, petunia	Irrigate and mulch the plants before start of frost.
11	Sunscald	Rapid fluctuation in temperature	Most common in thin barked ornamental trees and shrubs	Wrap young tree stem with light color covering material
12	Fasciation	Genetic mutation, viral and bacterial infection	China aster, Celosia	Use balance nutrition and avoid any damage to plant parts to stop its spread



Bermudagrass Maintenance Calendar

Dr. Muhammad Asif, Dr. Iftikhar Ahmad, Dr. Adnan Younas and Dr. Mohsin Bashir

Institute of Horticultural Sciences, University of Agriculture, Faisalabad

Activities	March to May	June to August	September to November	December to February
Mowing	<ul style="list-style-type: none"> -Mow when the lawn first turns green -Use a rotary or reel mower set as low as possible without scalping the lawn. -Mow the grass before it grows taller than 2¹/₂ inches. -This initial mowing will remove excess dormant tissue and establish the desired mowing height for the year. 	<ul style="list-style-type: none"> -Mow to the desired height. -This grass has a range of acceptable heights (5/8 to 2¹/₂ inches). -Mowing heights below 1 inch will require a reel mower and very level ground. 	<ul style="list-style-type: none"> -Continue mowing using the March to May guidelines until several weeks before the first expected frost. -If the lawn is not over seeded in the winter, raise the mowing height 1/2 inch to provide more protection from winter kill. 	<ul style="list-style-type: none"> -Mow to remove leaves and other debris. Leaf removal will enable earlier and more consistent spring green-up.
Fertilization	<ul style="list-style-type: none"> -Apply nutrients based on soil testing. In the absence of a soil test, apply 250 to 500 grams of nitrogen (N) per 1,000 square feet several weeks after the lawn turns fully green. (Typically between early March and April). 	<ul style="list-style-type: none"> -Apply 500 grams of N per 1,000 square feet every four to six weeks using the March to May fertilization guidelines. 	<ul style="list-style-type: none"> -To minimize spring dead spot, apply no more than 250 grams N per 1,000 square feet in end October, or four weeks before the first expected frost. -Use a low N, high potassium fertilizer like 5-10-30, or supplement with 500 grams of potash (K₂O) per 1,000 square feet four to six weeks before expected frost. 	<ul style="list-style-type: none"> -Do not fertilize at this time. Submit soil samples for analysis every two to three years to determine nutrient requirements. -Depending on the results of your soil test, you may need to apply lime or sulfur to adjust soil pH.
Watering	<ul style="list-style-type: none"> -Supplement rainfall as needed so that the lawn gets about 1 inch of water each week. -Sandy soils require more frequent watering (about 1/2 inch of water every third day). 	<ul style="list-style-type: none"> -Follow guidelines for March through May. 	<ul style="list-style-type: none"> -Although irrigation is not usually necessary, make sure the soil doesn't get powder-dry. 	<ul style="list-style-type: none"> -Follow guidelines for September through November.
Weed Control	<ul style="list-style-type: none"> -Apply pre-emergence herbicides from mid-February to early March. -Apply post-emergence herbicides in May as needed to control summer annual and perennial broadleaf weeds like white clover, knotweed, spurge, and lespedeza. 	<ul style="list-style-type: none"> -Two or three total applications from seven to ten days apart are required to control crabgrass and goose grass. -Do not apply herbicides during a drought or when grass and weeds are not actively growing. 	<ul style="list-style-type: none"> -Follow guidelines for June to August. 	<ul style="list-style-type: none"> -Apply broadleaf herbicides as necessary to control winter annual weeds. -Atrazine or simazine can be applied to control annual bluegrass and winter annual broadleaf weeds.



Activities	March to May	June to August	September to November	December to February
Insect Control	<ul style="list-style-type: none"> -White grubs may be active at this time, but spring curative applications are not effective. -Make note of areas with white grub activity and plan to apply a preventive application in the following spring or early summer. -Specific timing will vary depending on white grub species, so plan to make an application when adult flight is at its peak. 	<ul style="list-style-type: none"> -Preventive treatments for white grubs can occur in June, when adults are flying and starting to lay eggs. -The best time to apply curative treatments is when grubs are actively feeding near the soil surface, about 24 hours after significant rainfall. 	<ul style="list-style-type: none"> -Curative applications applied in early fall may control some white grubs, but efficacy will vary depending on the size of grub. -Identify and make note of problem areas for preventive applications in late spring to early summer. 	<ul style="list-style-type: none"> -Follow guidelines from the previous months.
Disease Control	<ul style="list-style-type: none"> -Bermudagrass breaks dormancy, spring dead-spot may appear as circular patches of tan or brown sunken turf. -Patches may be 2 inches to 3 feet in diameter and typically appear on turf that is 3 to 5 years old. Apply N monthly from mid-May to mid-August to promote recovery, and map affected areas for possible fungicide treatment in the fall. 		<ul style="list-style-type: none"> -If spring dead spot was a problem, apply an appropriate fungicide to problem areas at the highest label rates. -Applications are most effective when soil temperatures are between 15 and 25°C. -To move the fungicide into the root zone, apply with a large volume of water (20 liters per 1,000 square feet) or water in with at least 1/8 inch of irrigation immediately after application. 	
Thatch Removal	<ul style="list-style-type: none"> -If thatch (a layer of undecomposed grass) is thicker than 1/2 inch, power rake (vertical mow) in late May. -Vertical mow only after the lawn has completely greened up, or recovery will be very slow. 			



Prospects of Avocado “Makhan Phal” Cultivation in Pakistan

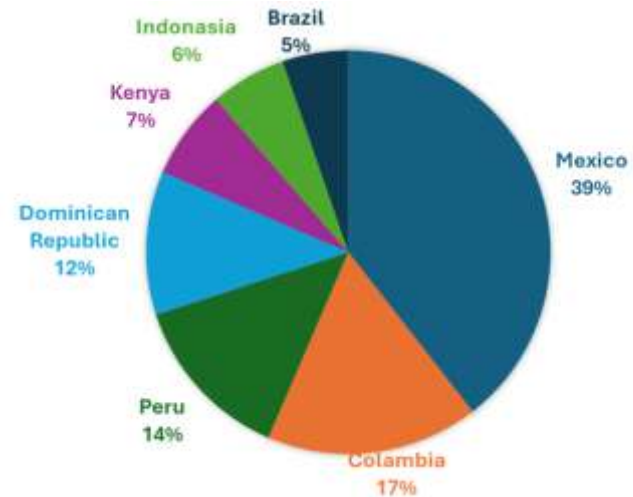
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The avocado, *Persea americana*, belongs to the family Lauraceae and is a medium-sized evergreen tree of subtropical climates. Avocado originated in central America and South Mexico. It is commonly known as 'alligator pear', 'avocado' while in Pakistan it is called as 'makkhan phal' or 'butter fruit' owing to its creamy texture and buttery flavor. Avocados are bright green to dark green colored fruits with many pits and leathery skin that are utilized in a variety of dishes, such as wraps, salads, smoothies, and brownies. It is highly prized for its large, oily fruit designated as superfood. Avocados are frequently offered in hard, unripe flesh, that will be ripe in 2 to 3 days at room temperature or by placing it in direct sunlight. Avocado flesh when exposed to air becomes brown however, it's completely tasty. Fruits can weigh from 100-1000 g, 7-20 cm in length and up to 15 cm in diameter. Avocado fruit is rich in calories, has many minerals, high in protein, contains fat-soluble vitamins (A and B) and moderate amounts of vitamins D and E which are lacking in other fruits. Avocados have monosaturated fat which is good to control cholesterol and are very low in sugar and fiber content. Its fruit is a large berry having a single brown seed (2-3 inches long) which is also rich source of antioxidants, phytates and alkaloids. Globally, avocado has transformed now from a niche food item to a culinary phenomenon. About 18% to 23% of the fruits dry weight is produced as agro-industrial by products during industrial processing of avocados, mostly in the form of peel and seed which are rich sources of phytochemical substances and could be recycled.

During 2021, global avocado fruit production was 8.7 million tons. Mexico was the top avocado producer with 39% share (2.52 million tons) of the global production followed by Columbia (17%) and Peru (12%), respectively (Fig. 1; FAOSTAT 2022). Avocado is highly consumed in Mexico (17%), USA (16%) and Dominican Republic (10%). In last two decades, its consumption has increased from 1 Kg per capita to 4.2 kg per capita in US due to its richness in nutrients.

Avocado trees can be tall or spreading having elliptic shaped leaves (10–30 cm long). The small green flowers appear in clusters and need minimum four weeks of cool weather (above 10°C) for blooming. The trees perform



better in rich loamy or sandy loam and well drained soils having temperatures between 15°C to 30°C with moderate humid conditions.

Avocado is a shallow rooted tree and root system is sensitive to transplanting shock. Young plants don't absorb water very well. The pH requirement of avocado is 6-6.5. In clayey soils, mounding of plants is suggested on beds. Root growth will be affected below 10°C and above 30°C temperature. Young plants need protection from cold temperatures and frost. Mature trees can tolerate low temperatures up to -5°C for a short period. The trees have higher water demand and shall be properly irrigated for a better and quality yield. Temperatures above 40°C for longer times could restrict plant growth, cause flower necrosis and fruit drops.

Commercial avocado orchards commonly utilize clonally produced rootstocks and seedlings. Sexual propagation generally takes more than 10 years to bloom and bear a commercial crop. Vegetative propagation ensures identical offspring, early bearing (3-4 years) and sustained productivity. Avocados are globally propagated by cuttings, budding, grafting, and other vegetative methods including micropropagation. Commercially popular avocado varieties include 'Bacon', 'Fuerte', 'Gwen', 'Hass', 'Lamb Hass', 'Pinkerton' and 'Reed'. Common diseases of avocado are canker, fruit rots, root rots, sunblotch, wilts and blights while major insects are borers, caterpillars, lace bugs, mites and thrips.



Avocado popularity is rising in Pakistan and seedling plants are available at major commercial nurseries. In Pakistan, the American avocado varieties viz. California Long and Ceylon Blue were introduced in 1954 and planted at Hill Fruit Research Substation (HFRI), Murree and are bearing fruit. A local selection 'Murree Gola' is growing in the Northern Punjab including Nowshera and Murree hills. Murree Gola is recommended for lower hills and foot mountains while Ceylon Blue is suitable for plane areas with cool environments. National Agriculture Research Center (NARC), Islamabad has recently claimed domestication of avocado varieties in 1980s under an Italian funded project viz. Fuerte and Cyclone Purple and development of hybrids suitable for cultivation in the Pothohar region, south Punjab, upper Baluchistan, and Khyber Pakhtunkhwa. In Punjab, we are working on importing germplasm of different exotic fruit crops including avocado and its cultivation under a PARB funded project entitled: "Import of High Value Germplasm and Technologies of Elite Exotic Fruits, Vegetable and Medicinal Crops for Diversification and Sustainable

Production in Punjab". We have also collected avocado germplasm for adaptability and research purposes and disseminating plant material to the collaborating research institutes for trials. Conclusively, avocado cultivation offers enormous potential and could be a highly profitable for the farmers and other industrial stakeholders.



Fig. 2. Avocado plant, fruit, leaves and flowers



ایک عہد تمام ہوا.....!

زمانہ بڑے شوق سے سن رہا تھا ہمیں سو گئے داستاں کہتے کہتے

5 اگست 2024 کی رات اہل زراعت پر بہت بھاری تھی کیونکہ اسی رات محترم ڈاکٹر بشارت علی سلیم ڈپٹی ڈائریکٹر ہارٹیکلچر پاکستان لاہور اس دنیافانی سے کوچ کر کے اپنے رب کے حضور پیش ہو گئے۔ مرحوم عرصہ دراز سے عارضہ قلب میں مبتلا تھے۔ کم ہی لوگ جانتے ہوں گے کہ آپ تقریباً پچھلے بیس سال سے اس مرض میں مبتلا تھے لیکن کبھی بھی اس عارضے کو اپنے پیشہ وارانہ فرائض میں حائل نہ ہونے دیا اور ہمیشہ محنت، لگن اور جانفشانی سے ملکی زراعت کی آبیاری کی۔ آپ عرصہ دراز تک (1988 تا 2021) سرگودھا میں تعینات رہے اور باغبان حضرات کی دل و جان سے خدمت کی۔ سرکاری محکموں میں کم ہی ایسے لوگ دیکھے ہیں جو اپنے پیشہ وارانہ فرائض، اپنی انتہائی صلاحیت سے ادا کرتے ہوں لیکن ڈاکٹر صاحب کا معاملہ مختلف تھا۔ آپ پیشہ وارانہ ذمہ داری ادا کرنے کے ساتھ ساتھ اپنے رب کی رضا کیلئے خدمتِ خلق میں مصروف رہتے تھے۔

آپ ایک انتہائی اچھے ریسرچر ہونے کے ساتھ ساتھ ایک اعلیٰ پائے کے ایکسیٹیشن ورکر تھے۔ آپ کی موجودگی تر شاہہ پھلوں کے کاشتکاروں کیلئے کسی نعمت سے کم نہ تھی۔ میں نے اپنی چوبیس سالہ رفاقت کے دوران ڈاکٹر صاحب کو تو اتنے ساتھ فیلڈ وزٹ کرتے اور کسانوں کی رہنمائی کرتے ہوئے پایا۔ آپ کا تر شاہہ پھلوں کے کاشتکاروں سے ایک خاص کارشتہ تھا، وہ آپ سے رہنمائی لینے کیلئے بے تاب رہتے تھے، اور آپ کی بتائی گئی تجاویز پر اندھا دھند اعتماد کرتے تھے۔ آپ کے جانے سے بلاشبہ ایک خلا پیدا ہوا ہے جسے پرکرتا نامن نظر آتا ہے۔ مجھے یہ کہنے میں کوئی عار نہیں کہ اس وقت سرکاری محکموں میں ان کے لیول کا ایک بھی زرعی سائنسدان نظر نہیں آتا جو ان کی جگہ لے سکے، جو ڈاکٹر صاحب کی طرح کسانوں سے مستقل رابطے میں ہو اور تر شاہہ پھلوں کے کاشتکاران کی بات سنتے اور اس پر عمل کرتے ہوں۔

ہوئے نامور بے نشان کیسے کہیں زمین کھا گئی آسمان کیسے کہیں

راقم الحروف نے کسانوں کو ان کی وفات پر دھاڑیں مار کر روتے ہوئے اور ان کے ایک دوست کو ان کی قبر سے لپٹ کر روتے ہوئے دیکھا ہے۔ ڈاکٹر صاحب کی وفات کے بعد ان کے ایک دوست کے ریمارکس کچھ یوں تھے کہ ڈاکٹر صاحب ایک انتہائی مخلص، بے لوث اور بے ضرقت قسم کے انسان تھے، ہمیشہ دوسروں کے کام آتے تھے۔ ہمیشہ کھری اور بچی بات کرتے تھے، کسی سے بغض اور عداوت نہ تھی۔ آخر میں کہتے "یار ڈاکٹر صاحب کی طرح کے انسان اب آئی نہیں رہے" اور ساتھ ہی رو پڑے۔ ڈاکٹر صاحب کی وفات پر ہر ملنے والے کو کبھی اور رنجیدہ پایا، ایسے لگتا کہ ہر شخص کا ڈاکٹر صاحب کے ساتھ ایک خاص تعلق ہے۔ ایک اچھے انسان کی تمام خوبیاں آپ میں موجود تھیں، اگر آپ کا کسی سے کوئی مسئلہ ہوتا اور وقتی طور پر ناراض ہو جاتے یا آپ کے ساتھ کوئی ناراض ہو جاتا تو بہت جلد معاملے کو لٹھا لینے اور کسی سے بھی دیر تک ناراض نہ رہتے تھے۔ مجھے دوران ملازمت ڈاکٹر صاحب کے ساتھ بطور ہم مٹ ایک لمبے عرصے تک رہنے کا موقع ملا، آپ کو ہمیشہ ایک اچھے انسان کے روپ میں دیکھا۔ ہر ایک سے ہنسی خوشی ملتے تھے اور پریشان حال لوگوں کی مدد میں پیش پیش رہتے تھے۔ طبیعت میں مذہبی رجحان غالب تھا اور صوم و صلہ کے پابند تھے۔ 6 اگست 2024 بروز منگل آپ کی نماز جنازہ آج آئی شہر چنیوٹ میں ادا کی گئی۔ نماز جنازہ میں لواحقین، دوستوں، اور رشتہ داروں کے علاوہ محکمہ زراعت لاہور و سرگودھا، زرعی یونیورسٹی فیصل آباد، ملتان، یونیورسٹی آف سرگودھا، اسلامیہ یونیورسٹی بہاولپور کے زرعی ماہرین اور دروازے آئے ہوئے کسانوں نے کثیر تعداد میں شرکت کی۔

مجھڑا کچھ اس ادا سے کدرت ہی بدل گئی اک شخص سارے شہر کو ویران کر گیا

رب کریم سے دعا ہے کہ وہ ڈاکٹر بشارت علی سلیم صاحب کی فیملی اور ان کے دوستوں کو صبر کی توفیق دے، اور ڈاکٹر صاحب کو کروٹ کروٹ جنت نصیب فرمائے، آمین



Webinar on “Post-harvest Management Techniques of Cut Flowers for Export Markets” Organized by Pakistan Horticulture Development and Export Company

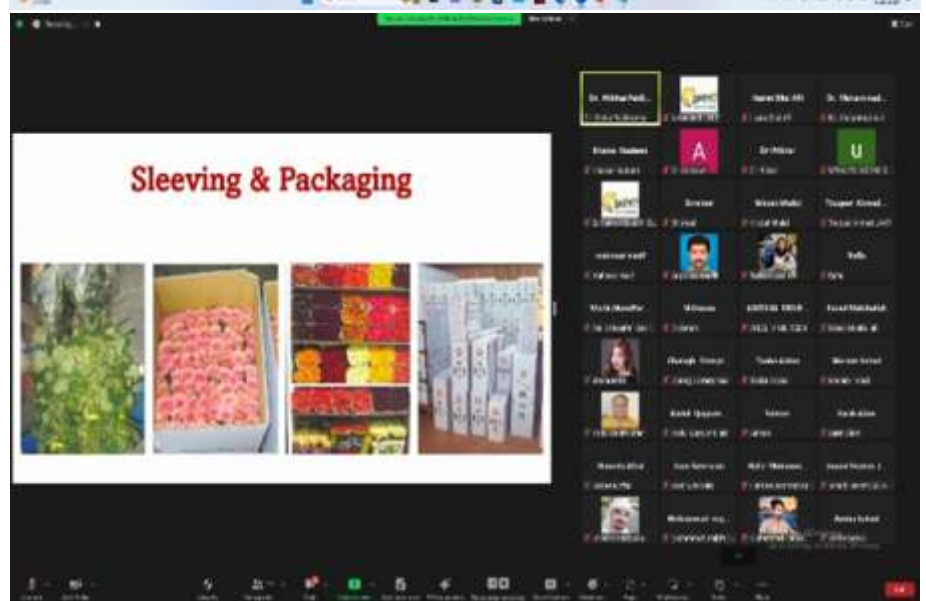
Pakistan Horticulture Development and Export Company (PHDEC) hosted a webinar focused on “Post-harvest Management Techniques of Cut Flowers for Export Markets.” The event targeted processors, potential growers and exporters of floriculture sector.

Pakistan is a country of small farming households, where floriculture is the best option of enhancing the income of the under privileged. Country has favorable climate and cheap labor for growing these crops whereas they need much less land and water for production. Keeping in view above, PHDEC organized this webinar to guide progressive growers/farmers and exporters about recommended harvesting, postharvest handling, and packing techniques for cut flowers of Pakistan.

Dr. Iftikhar Ahmad, Associate Professor (Floriculture & Landscape), Institute of Horticultural Sciences, University of Agriculture Faisalabad, presented importance of postharvest management for cut flowers, maintaining quality during postharvest handling, pre-harvest factors affecting postharvest handling, cut flower handling procedures, grading, and bunching of cut flowers. He stated that harvested flowers shouldn't be placed on soil to avoid contamination of the foliage and flowers with disease causing organisms. He explained that packing materials should be easily available, light in weight and should have reasonable strength to withstand transit stress.

Dr. Iftikhar added that flowers should be harvested in the morning when temperatures are low and plant water content is high, make cuts to the plant to obtain long, sturdy stems. Remove the foliage on the stems that will be below the water which will decay and encourage bacterial growth. He explained that flowers occupy only 0.5% of the cultivated area of Pakistan while country has favorable agro-

climatic and socioeconomic conditions for horticulture sector. He further added that less training facilities to the farmers on export parameters, underdeveloped domestic market with poor post-harvest handling and lack of technical knowledge for drying flowers are major issues in floriculture sector. A large number of growers/farmers, R&D professionals, entrepreneurs, and academia participated and appreciated PHDEC's initiative.





Flower and Landscape Expo 2024 Organized by Institute of Horticultural Sciences, UAF

A three-day event, flower and landscape expo, was organized by Institute of Horticultural Sciences, UAF, at Oval Ground Lawns on March 05-07, 2024. It was a pleasant sunny day to begin a flower exhibition. The chief guest of the event, Vice Chancellor, University of Agriculture, Faisalabad, Prof. Dr. Iqrar Ahmad Khan inaugurated the event along with delegates from across the country, faculty members, students, and a large number of community members along with gardeners and amateurs.

A large number of postgraduate and undergraduate students along with various government and private organizations participated in the expo and displayed their floral products and ornamental plant varieties. Students presented their ideas in the form of beautiful special displays, photo frames, and aesthetic garden displays. Along with special displays, fresh and dry flower arrangements along with cut flowers were also displayed. The visitors were very excited after watching mesmerizing display of flowers, houseplants, and different varieties of cacti, succulents and beautiful display of bonsai. The beauty of flowering plants and eye-catching floral arrangements were just perfect to visit and enjoy. At the prize distribution ceremony, Prof. Dr. Muhammad Sarwar Khan, Dean Faculty of Agriculture and Prof. Dr.



Ahmad Sattar Khan, Director, Institute of Horticultural Sciences, University of Agriculture, Faisalabad, shared their views regarding the event, appreciated and encouraged students, staff and organizing floriculture faculty for organizing this expo successfully. They also distributed prizes among winners and staff members of participating institutes. It was an informative exhibition for students and visitors. These types of events are the sources to increase practical knowledge and skills among youth. Secondly, it aimed to show the progress in field of floriculture and landscape in Pakistan.



(9) مناسب دیکھ بھال اور حفاظت:

بلعموم موسمی پھولدار پودوں پر کیڑے مکوڑوں کا حملہ کم ہی ہوتا ہے۔ بعض اوقات پودوں پر رس چوسنے والے کیڑوں (Sucking Insects) مثلاً سفید مکھی، تڑپس اور تیلے کا حملہ ہوتا ہے جو پھولوں کو بد نما بنا دیتا ہے اس کی روک تھام کے لیے مناسب زہریں یا نیم کے پتوں کا عرق استعمال کرنا چاہیے۔ اس کے علاوہ موسم گرما میں خاص طور پر پھولوں میں درجہ حرارت ایک حد سے بڑھ جانے کی صورت میں سے پودوں پر جھلساؤ بھی ہو جاتا ہے جس سے پورا پودا یا پھولوں کی پتیوں سکر جاتی ہیں۔ رس چوسنے والے کیڑوں کے حملہ کی صورت میں اسیسیفٹ (Acephate) یا کونفیڈور (Confidor) استعمال کرنی چاہیے جبکہ پودوں/پھولوں کو جھلساؤ سے بچانے کے لیے بروقت آپاشی سے درجہ حرارت کو برقرار رکھنے کے لیے ہر ممکن کوشش کرنی چاہیے۔



(6) بیج کے ذریعے طریقہ کاشت:

بیج کے ذریعے پھولوں کی کاشت کے لیے زمین/گملوں میں بیج کی بوائی کی جاتی ہے تاہم دور حاضر میں پھولوں کی بیجیاں پلاسٹک کی خلیوں والے ٹرے/ (Plug trays) میں کی جاتی ہے۔ جس کی بدولت عمدہ اور صحت مند بیجی حاصل کی جاتی ہے اور کم مقدار میں بیج استعمال کیا جاتا ہے۔ ٹرے میں بیج کو لگا کر آخر میں اس کو ناریل کے برادے (coco coir) یا پتوں کی کھاد (Leaf compost) سے ڈھانپ دیں تاکہ روشنی اور پانی براہ راست بیج تک نہ پہنچ سکیں لیکن نمی برقرار رہے۔ نیز بیجی کو فوارا کی مدد سے پانی لگادیں اور مناسب سایہ دار جگہ پر منتقل کر دیں۔

(7) آپاشی کا طریقہ:

پودوں کو زمین میں لگانے کے بعد اہم مرحلہ انہیں پانی دینا ہے۔ بیج یا بیجی کی کامیاب نشوونما کے لیے انہیں مناسب طریقے سے پانی دیں جس کے لیے درج ذیل طریقے اپنائے جاسکتے ہیں۔

i) پہلے طریقے میں بیج والے گملوں کو نرم زمین پر رکھ کر ان کے گرد مٹی کی کیاری بنا دیں اور اس میں پانی چھوڑ دیں، ایک گھنٹے تک پانی خود ہی اوپر آجائے گا۔

ii) دوسرے طریقے کے مطابق تمام گملے ایک ساتھ جوڑ کر ان پر سوکھی گھاس یا پرالی بچھا دیں اور پھر اس پر فورے کی مدد سے پانی چھڑکاؤ کریں جب محسوس ہونے لگے کہ بیج اگنا شروع ہو گیا ہے تو اوپر ڈالی گئی پرالی وغیرہ ہٹا دیں، اس کے بعد مٹی کی نمی دور ہونے پر حسب ضرورت پانی لگائیں۔ بیج بونے اور بیجی منتقل کرنے کے فوراً بعد فورے (Sprinkler) کی مدد سے پانی لگانا چاہیے۔ گرمیوں میں پانی کا دورانیہ موسم کی مناسبت سے زمین/کھیت میں تین تا چار دن، جبکہ گملوں میں دو تا تین دن بعد ہونا چاہیے۔

(8) موسم گرما میں کاشت ہونے والے اہم پھول:

موسم گرما میں کاشت کے لیے مندرجہ ذیل پھول چس آرانی میں نمایاں حیثیت کے حامل ہیں:

- | | |
|---------------|-----------------------------|
| (Sunflower) | (i) سورج مکھی |
| (Zinnia) | (ii) گل زینت |
| (Cock's Comb) | (iii) گل قلعہ |
| (Portulaca) | (iv) گل دوپہری |
| (Geranium) | (v) گل شمع رانی/پلا رگو نیم |
| (Cosmos) | (vii) کاسموس |
| (Gaillardia) | (viii) گلارڈیا/گل نمدا |
| (Gompherena) | (ix) گمفرینا/یاگل جمل |
| (Periwinkle) | (x) رتن جوت |

مندرجہ بالا پھولوں کے علاوہ موسم گرما میں کاشت ہونے والے پھولوں کی فہرست میں چند اور پھول بھی ہیں جو پھولوں کے کاشتکار کاشت کر کے منافع بخش آمدن بھی حاصل کر سکتے ہیں۔



موسم گرما کے پھولوں کی کاشت

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جاتی ہے۔

(3) بوائی کیلئے زمین کی تیاری:

پھولوں کی پیبری تیار کرنے کے لیے بیجوں کو لگانا مقصود ہوتا ہے (silt)، ایک حصہ گوبر کی کھاد (Farm Yard Manure) یا پتوں کی کھاد (Leaf compost) اور ایک حصہ میرا زمین (Loamy soil) کو یکجان کر کے گلوں میں استعمال کیا جاسکتا ہے۔ تاہم زرعی یونیورسٹی فیصل آباد کے شعبہ ہارٹیکلچر میں پوائے ایف گرو (UAF-Gro) نامی ایک نامیاتی میڈیا تیار کیا گیا ہے جو ان پھولوں کی نرسری کی تیاری کے لیے نہایت موزوں ہے اور استعمال کیا جاسکتا ہے۔ جبکہ اگر زمین میں بیج بونا مقصود ہو تو زمین کو اچھی طرح سے نرم اور بھر بھر کر کے اس میں گوبر کی گلی سڑی یا پتوں کی کھاد کو ملا کر اس کو مناسب سائز کی چھوٹی چھوٹی کیاریوں / کھیلوں میں تقسیم کر لیا جاتا ہے۔ اور بیج بونے کے بعد پرائی وغیرہ سے ڈھانپ دیا جاتا ہے۔ جب بیج کی نموشروع ہو جائے تو اس کو ہٹا دیا جاتا ہے۔

(4) پیبری کی کھیت میں منتقلی:

گریموں میں پیبری کھیت میں ایسے دن منتقل کریں جب مطلع ابرا آلود ہو یا سہ پہر/شام کے اوقات میں زمین میں پیبری منتقل کریں۔ جس دن پیبری لگانی ہو اسی دن صبح کو پیبری کو ہلکا سا پانی دے دیا جائے تاکہ پودے نکالتے وقت جڑیں متاثر نہ ہوں۔ پھولوں کی پیبریاں عام طور پر رٹوں / پٹریوں (Ridges) یا چوڑے پٹریوں (Beds) کے دونوں کناروں پر لگائی جاتی ہیں۔ ان پر پیبری لگانے سے قبل آبپاشی کریں۔ اگر پیبری کھیت میں دیر سے منتقل کرنا مقصود ہو تو جڑوں پر گیلی مٹی لگا کر اسے گیلے ٹاٹ وغیرہ سے ڈھانپ دیں یا سایہ دار جگہ پر رکھیں۔ پیبری لگانے کے دو تا تین یوم کے اندر کھیت کو دوبارہ آبپاشی کریں اور آٹھ تا دس دن بعد کھیت کا معائنہ کریں اور جس جگہ پودا مر چکا ہو تو اس جگہ نیا پودا لگائیں تاکہ پودوں کی تعداد کم نہ ہو اور پیداوار بھی متاثر نہ ہو۔

(5) کھاد کا مناسب انتخاب اور استعمال:

پیبریوں کے زمین میں منتقلی کے وقت کھاد کا استعمال بہت اہمیت کا حامل ہوتا ہے۔ زمین کی داغ بیل کے دوران اس میں نائٹروجن، فاسفورس اور پوٹاش (NPK) 20:20:40 کلوگرام فی ایکڑ استعمال کریں کیونکہ یہ پھولوں کی پیبریوں کے زمین میں منتقلی کے بعد (Transplanting shock) کو کم کرنے اور پودوں کی بڑھوتری کے لیے بہترین کھاد ہے۔ موسمی پھولوں کی پیبریوں کو بہ نسبت تراشیدہ پھولوں کے کھاد کی کم ضرورت ہوتی ہے تاہم این۔ پی۔ کے کھاد کے علاوہ ڈی۔ اے۔ پی (DAP) یا کین گوآرا (CAN GUARA) کھاد کا استعمال 15 تا 30 دن کے بعد پانی لگانے کے ہمراہ کریں۔ نیز پودوں پر پھول بننے کے عمل کے آغاز پر پودوں پر بائیوسٹیمولینٹ جیسا کہ جبریلک ایسڈ (Gibberellic acid) یا ایبا ان (Isabion) کا سپرے لازمی کریں۔

پھول اللہ تعالیٰ کی ایک ایسی پرکشش تخلیق ہیں جو اپنے خوبصورت، دیدہ زیب رنگوں اور انواع کے ذریعے قدرت کی رنگینیوں کی بھرپور عکاسی کرتے ہیں۔ یہ خوبصورتی کے اظہار اور فطری عناصر کی رو نمائی کرنے میں اہم کردار ادا کرتے ہیں لہذا مختلف رنگ، اشکال اور ہیئت کی بدولت انسان کی معاشرتی اور تمدنی زندگی پر نمایاں طور پر اثر انداز ہوتے ہیں۔ مزید برآں موسمی پھول اپنے متنوع رنگوں کی بدولت انسان کی شخصیت اور اس کے مزاج کو خوشگوار بنانے میں بھی معاون ثابت ہوتے ہیں۔ الغرض پھول نہ صرف خوبصورت ہوتے ہیں بلکہ قدرت اور فطرت کے شاہکار رنگوں کی نمائندگی بھی کرتے ہیں۔

☆ موسمی پھولوں کی اہمیت:

موسمی پھول قدرت کے حسن و صنایع اور جمالیاتی کمال کا نمونہ ہوتے ہیں۔ جو بھرپور دلکش رنگوں کے امتزاج کے باعث باغبانی، چمن و آرائی میں خاصی اہمیت کے حامل ہیں۔ موسم گرما میں درجہ حرارت میں اضافے کے باعث ہر طرف ہریالی کم ہوتی دکھائی دیتی ہے وہیں یہ پھول اپنے خوش نما اور دلکش رنگوں کے ذریعے تازگی اور ہر سو بہار سا کاماں پیش کرتے دکھائی دیتے ہیں۔ نیز یہ بات بھی ثابت ہو چکی ہے کہ پھولوں کی پسندیدگی انسانی فطرت کے بہت سے پہلوؤں کو اجاگر کرتی ہے۔

☆ موسمی پھولوں کی کاشت درج ذیل دو طریقوں سے کی جاتی ہے:-

(i) بذریعہ بیج (ii) بذریعہ پیبری

☆ موسمی پھولوں کی تیاری کے لیے درکار عوامل:

موسمی پھولوں کی تیاری کے لیے درج ذیل عوامل درکار ہوتے ہیں:

(1) بیج کا انتخاب:

موسمی پھولوں کے لیے عمدہ کوالٹی بیجوں کا انتخاب نہایت ضروری ہوتا ہے۔ منڈیوں میں مقامی اور درآمد شدہ دونوں طرح کے بیج دستیاب ہوتے ہیں۔ مقامی بیج کم قیمت میں دستیاب ہوتے ہیں لہذا باغبانی میں نئے افراد کو انہی کو ترجیح دینی چاہیے تاکہ وہ مالی نقصان سے بچ جائیں اور تجربہ بھی حاصل کر لیں۔ بصورت دیگر کاشتکار کسی نرسری سے مناسب سائز کی پیبری بھی کاشت کر سکتے ہیں۔ تاہم درآمد شدہ دوغلے (Hybrid) بیجوں کے استعمال سے بہترین پھول حاصل ہوتے ہیں جو مقامی بیجوں سے تیار شدہ پھولوں سے بہتر ہوتے ہیں۔

(2) وقت کاشت:

میدانی علاقوں میں موسم گرما کے پھولوں کے بیج کی بوائی کا مناسب وقت وسط فروری تا وسط مارچ ہوتا ہے۔ عموماً بیج 5 تا 7 دن کے دوران نمو پانا شروع ہو جاتے ہیں۔ 2 تا 3 ہفتوں بعد جب دو تا تین پتے واضح ہو جائیں تو پیبری منتقلی کے لیے تیار ہو جاتی ہے۔ موسم گرما کے پھول اپریل تا وسط جولائی تک کھلتے رہتے ہیں۔ اور عمدہ پھولوں کے حصول کے لیے مناسب درجہ حرارت 25 تا 35 ڈگری سینٹی گریڈ ہوتا ہے۔ درجہ حرارت 40 ڈگری سینٹی گریڈ سے بڑھنے کے باعث انکی کوالٹی متاثر ہونا شروع ہو

خشک کر لیں۔ پھر خشک جڑوں کو بیک کر کے خشک اور سایہ دار جگہ پر رکھیں۔ لیکن اس بات کا خاص خیال رکھیں کہ جڑیں اچھی طرح خشک ہوں کیونکہ سٹوریج کے دوران نمی، کھل کی کوالٹی کو بری طرح متاثر کرتی ہے۔



کھل کی آوری (Capitulum inflorescence of Kuth)

گل آوری اور بیج کی پیداوار (Flowering and seed production):

کھل کا پودا پہلے سال میں پھول نہیں دیتا بلکہ دو یا تین سال کے بعد پودوں پر پھول آتے ہیں۔ بالائی علاقوں میں کھل پر مئی سے جولائی تک پھول آتے ہیں جبکہ بیج ستمبر اور اکتوبر میں پک کر تیار ہوتے ہیں۔ بیج کو برداشت کرنے کا بہترین وقت اکتوبر ہے جب پھول خشک ہو جائیں اور بیج والا شگوفہ (cypsela) گھلنا شروع ہو جائے تب شاخوں (Flowering stalk) کو کاٹ کر دھوپ میں رکھ دیں۔ شگوفوں کے خشک ہونے پر بیج باہر نکل آئیں گے۔ اس کے بعد بیجوں سے کچرا اور غیر معیاری بیج کو نکال کر صاف کر لیں۔ اور پیکنگ کر کے موزوں (خشک اور ہوادار) جگہ پر سٹور کر لیں۔ فصل پر حملہ ہونے والی بیماریاں اور کیڑے اور اس کا انسداد:

اس پودے پر کسی خاص بیماری یا کیڑے کا حملہ نہیں ہوتا۔ تاہم بعض اوقات کالا تیل املہ اور ہوتا ہے۔ جو کہ پتوں کی چٹائی سٹ، پتوں اور جڑ کے مابین حصہ سے رس چوس کر نقصان پہنچاتا ہے اسکے جسم سے ایک میٹھا مادہ خارج کرتا ہے جس سے پتوں پر سیاہ قسم کی اُلی لگ جاتی ہے جو کہ ضیائی تالیف کے عمل کو روک دیتی ہے اس کی وجہ سے پودے کی نشوونما اور پیداوار پر منفی اثرات مرتب ہوتے ہیں۔

سست تیلہ کے غیر کیمیائی انسداد کے لیے اس کے دشمن کیڑے جیسے لیڈی برڈ بیٹل اور کرائی سو پرلا وغیرہ کی تعداد کو فروغ دیں۔ اس کے علاوہ پاور سپر میز کے ذریعے زیادہ پریشور سے پانی کا سپرے کریں۔ اور شدید حملہ ہونے کی صورت میں کسی کیڑے مارا دیات کا استعمال کریں۔

• امیڈا کلو پرڈ بحساب 250 ملی لیٹر فی ایکڑ

• ڈائی میتھیوٹ بحساب 400 ملی لیٹر فی ایکڑ

• اسٹیامپر ڈیپلس لیڈ اسائی ہیلو تھرین بحساب 150 گرام فی ایکڑ

میں کڑوا اور اس کی جڑ سیاہ رنگت کی ہوتی ہے۔

زمین کی تیاری:

کھل کی کاشت اس کی جڑ کے حصول کے لیے کی جاتی ہے، اس لیے زمین بجائی سے پہلے کافی گہرائی تک اچھی طرح تیار کرنی چاہیے۔ پکی/چکنی زمین اس کی جڑوں کی نشوونما کو بری طرح متاثر کرتی ہے۔ اس کے لیے وتر حالت میں زمین کو تین تا چار مرتبہ گہرا ہل چلا کر اور سہاگہ دے کر اچھی طرح تیار کر لینا چاہیے۔ زمین کی تیاری سے قبل داب سسٹم کے ذریعے جزی بوٹیوں کی تلفی کر لی جائے جس سے پیداوار پر مثبت اثرات مرتب ہوتے ہیں۔

پودوں کی منتقلی اور آبپاشی:

جب کھل کی بیجری/پودے کے تین سے چار پتے بن جائیں تو کھیت میں منتقل کر دیں۔ بالائی شمالی علاقہ جات میں کھل کو پٹریوں کی بجائے ہموار زمین میں منتقل کرنا چاہیے کیونکہ تحقیق کے مطابق ہموار زمین میں کاشت شدہ کھل کی فصل پٹریوں پر کاشت کی نسبت زیادہ پیداوار دیتی ہے۔ ہموار زمین میں کاشت سے پہلے، زمین میں پانی لگا دیں۔ جب پانی زمین میں اچھی طرح جذب ہو جائے تو 30 سینٹی میٹر کے فاصلہ پر پودے لگائیں جبکہ قطار سے قطار کا فاصلہ 45 سینٹی میٹر رکھیں۔ کاشت کے تین، چار دن بعد کھیت کو دوبارہ ہلکی آبپاشی کریں۔ پودوں کی منتقلی کے بعد ضرورت کے مطابق آبپاشی کرتے رہیں کیونکہ کھل پانی کے لحاظ سے ایک اعتدال پسند فصل ہے۔

جڑی بوٹیوں کی تلفی اور کھادوں کا استعمال:

پودوں کی منتقلی کے بعد، نقصان دہ جڑی بوٹیوں کی تلفی کو یقینی بنائیں کیونکہ جڑی بوٹیاں روشنی، پانی اور نباتاتی اجزاء کے لیے کھل کے پودوں سے مقابلہ کرتی ہیں اور کھل کی پیداوار کو بری طرح متاثر کرتی ہیں۔ کھل کی اچھی پیداوار کیلئے، کھادوں کی مقدار کے تعین کیلئے ابھی تحقیق ہونا باقی ہے تاہم K:P:N (50:50:100) کلوگرام فی ایکڑ کے حساب سے استعمال کرنے سے کھل کی پیداوار بڑھائی جاسکتی ہے۔

برداشت اور بعد از برداشت:

کھل کی معیاری اور بہترین پیداوار کے لیے، کھل کی فصل کو اگر بذریعہ جڑ یا بیج کاشت کی گئی ہو، تین سال کے بعد برداشت کرنا چاہیے جبکہ سکرز سے کاشت شدہ فصل کو دو سال بعد برداشت کیا جاسکتا ہے۔ کھل کی جڑوں کو اکتوبر میں برداشت کریں جب اس کے پتے خشک ہونا شروع ہو جائیں۔ جڑوں کو برداشت کرنے کے لیے پودے کے گرد 2 فٹ گہرا گڑھا بنائیں اور جڑوں کو زمین سے نکال لیں۔ جڑیں نکالتے ہوئے اس بات کو یقینی بنائیں کہ پودے کی ایک جڑ یا جڑ کا ٹکڑا زمین میں باقی رہے تاکہ آئندہ سال اس سے پودا نکل آئے۔ اس طرح فصل ساہا سال پیداوار دیتی رہی گی اور پودے منتقل کرنے کا عمل بار بار نہیں دوہرانا پڑے گا۔ برداشت کے بعد جڑوں کو اچھی طرح صاف کریں اور دھوپ میں اچھی طرح



درجہ حرارت بڑھتا ہے اور برف پگھلنا شروع ہوتی ہے تب بیج کی خوابیدگی کی حالت (Dormancy) ختم ہو جاتی ہے اور اپریل کے پہلے ہفتے میں اگاؤ شروع ہو جاتا ہے کھ کے پودے دو سے تین پتوں پر کھیتوں میں منتقل کیے جاتے ہیں۔

ماؤنٹین ایگریکلچرل ریسرچ سٹیشن استور میں کیے گئے تجربات کے مطابق، کھ کے بیج کے اگاؤ کے لیے درکار کم درجہ حرارت کا دورانیہ (Chilling requirement to break dormancy) 5 تا 7 دن ہے جبکہ شرح اگاؤ 75 سے 80 فیصد ہوتا ہے۔ بیج کا اگاؤ تقریباً 14 سے 16 دن بعد شروع ہوتا ہے جس کے لیے دن کا اوسط درجہ حرارت 25 سے 28 ڈگری سینٹی گریڈ اور رات کا اوسط درجہ حرارت 0 ڈگری سینٹی گریڈ سے زیادہ ہو۔ یہ درجہ حرارت استور کے زیریں علاقوں (گوریکوٹ اور گردونواح) میں اپریل کے پہلے ہفتے میں میسر ہوتا ہے جبکہ کھ کے قدرتی مسکن (کانیل اور بھونج پتر) میں بیج کا اگاؤ جون کے تیسرے سے آخری ہفتے میں شروع ہوتا ہے۔



کھ میں اگی کے لیے پگھلا ہوا بیج

کاشت بذریعہ جڑ:

اس طریقہ کاشت میں کھ کی جڑیں کاٹ کر لگائی جاتی ہیں جس میں جڑوں کو دو سے چار انچ کاٹ کر، کاشت والی جگہ پر براہ راست منتقل کیا جاتا ہے۔ جس کے لیے 5 تا 6 انچ گہرا گڑھا بنائیں اور جڑوں کو افقی سمت میں رکھ کر دبائیں۔

کاشت بذریعہ سکرز (Suckers):

اس طریقہ کار کو عام طور پر نہیں اپنایا جاتا۔ لیکن کھ کی کاشت بذریعہ سکرز ممکن ہے۔ کھ کے دو سالہ پودے سکرز پیدا کرتے ہیں جن کو زمین سے احتیاط کے ساتھ نکال کر دوسرے کھیت میں منتقل کیا جاتا ہے۔ سکرز کو منتقل کرنے کا بہترین وقت اپریل ہے۔ لیکن اگر سکرز نکالنے میں احتیاط نہ کی جائے تو اصل پودے (Mother plant) کی پیداوار پر منفی اثرات مرتب ہوتے ہیں۔

اقسام:

کھ کی دو اقسام ہیں۔ جنہیں یونانی طب کی اصطلاح میں قسط شیریں (قسط اکلو) اور قسط تلخ (قسط المر) کہا جاتا ہے۔ قسط شیریں کی جڑ اقلقہ میں میٹھی اور اندر سے زرد سفید ہوتی ہے، جبکہ قسط تلخ اقلقہ

بارشیں زیادہ ہوں، اس کی کاشت کیلئے بہترین ہیں۔ جبکہ قدرتی طور پر یہ پودا تقریباً 12 ہزار سے 14 ہزار فٹ بلندی تک پایا جاتا ہے۔ جہاں سال کا نصف حصہ برف سے ڈھکا رہتا ہے اور اس کا درجہ حرارت زیادہ سے زیادہ 25 ڈگری سینٹی گریڈ ہوتا ہے۔

زمین کا انتخاب:

کھ کی کاشت کے لیے زرخیز تیلی میرا زمین بہترین ہے جس میں نامیاتی مادہ کثیر مقدار میں موجود ہو۔ کیونکہ اس پودے کو بہترین پیداوار کے لیے اجزائے کبیرہ، صغیرہ اور نامیاتی مادہ درکار ہوتے ہیں۔ قدرتی مسکن میں پتوں، گھاس، جڑی بوٹیوں اور دیگر اشیاء کے گلنے سڑنے سے کھ کو وافر مقدار میں نباتاتی اجزاء میسر ہوتے ہیں جو کہ اس کی بہترین پیداوار کا ضامن ہوتے ہیں۔ اس کے علاوہ ایسی زمین کا انتخاب کرنا چاہے جس میں براہ راست روشنی نہ پڑے۔ کیونکہ براہ راست تیز روشنی اس کی نشوونما کو متاثر کرتی ہے۔ جبکہ سایہ دار جگہ پر اس کی جڑوں کی زیادہ پیداوار حاصل ہوتی ہے۔ لیکن بلا واسطہ اور بالواسطہ روشنی اس کے ثانوی اجزاء (Secondary metabolites) پر کیا اثرات مرتب کرتی ہے اس پر تحقیق ہونا باقی ہے۔



کھ کے بیج

وقت کاشت:

یہ شمالی علاقہ جات کے بالائی علاقوں میں ستمبر کے آخری ہفتے سے اکتوبر کے آخر تک کاشت کیا جاسکتا ہے۔ اس کی کاشت تین طریقوں سے ممکن ہے۔

- کاشت بذریعہ بیج
- کاشت بذریعہ جڑ
- کاشت بذریعہ سکرز

کاشت بذریعہ بیج:

کھ کی کاشت بذریعہ بیج کے لیے 400 سے 450 گرام فی کنال بیج درکار ہوتا ہے۔ بیج کے ذریعے کاشت میں سب سے پہلے بنییری تیار کی جاتی ہے، جس کے لیے سب سے پہلے زمین کو ہل اور سہاگہ چلا کر اچھی طرح تیار کیا جاتا ہے اس کے بعد چار انچ کے فاصلے پر چھ تا سات سینٹی میٹر گہری لائنیں لگائیں اور اس میں بیج کا کیرا کریں۔ اس کے بعد فوراً ہی کی مدد سے اچھی طرح پانی لگائیں۔ بنییری کی کاشت ستمبر کے آخری ہفتے سے اکتوبر تک کی جاسکتی ہے۔ بیج کا شرح اگاؤ درجہ حرارت پر منحصر ہوتا ہے۔ جب

کھ کی پیداواری ٹیکنالوجی

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پودے کے متعدد حصوں کے غیر قانونی تجارت، جانوروں کے باجے قابو چرنا اور اسکے مسکن کی تباہی وغیرہ بھی شامل ہیں۔ سڑکوں کی تعمیر، تفریحی اور فوجی سرگرمیاں اس کے مسکن کی تباہی کی بڑی وجہ ہیں۔ اسی لیے بین الاقوامی یونین برائے تحفظ قدرت (IUCN) کی طرف سے 2014 میں اس پودے کو خطرے سے دوچار انواع کی سرخ فہرست (Red list of Threatened Species) میں شامل کیا گیا تھا۔ جبکہ اسے 2015 میں انتہائی خطرے سے دوچار انواع (Critically Endangered Species) میں شامل کر دیا گیا ہے۔ اسی لیے محکمہ جنگلات، پاکستان کی جانب سے اس پودے کی نکاسی/ برداشت پر مکمل پابندی عائد ہے۔

جائے مقام (Habitat):

کھ ہندوستان اور کشمیر کا مقامی پودا ہے جو کہ کوہ ہمالیہ کے پہاڑوں اور ہماچل پردیش میں بکثرت پایا جاتا ہے۔ یہ پودا ہندوستان کے جموں و کشمیر کے علاقوں، پیر پنجال، لڈر، دراس، زنکار، سوروادی، بالائی کشن گنگا، پونچھ وادی اور ہماچل پردیش کے کنور، لاہول، سیتی، چمبر اور بارہ بنگال کے علاقوں میں پایا جاتا ہے۔ جبکہ پاکستان میں آزاد کشمیر کے ضلع پونچھ اور گلگت بلتستان کے ضلع استور کے علاقہ کانیل اور ہوج پتر کے جنگلات میں موجود ہے۔

روایتی استعمالات:

شمالی علاقہ جات میں یہ بیٹ کے کیڑوں کو ختم کرنے کے لیے استعمال کیا جاتا ہے۔ اس کے علاوہ اسے مقامی طور پر کپڑوں کو پھوندی سے بچانے کے لیے بھی استعمال کیا جاتا ہے کیونکہ اس میں پھوندی کش خواص موجود ہیں۔

ادویاتی استعمالات:

کھ کی جڑیں ذائقہ میں کڑوی اور تیز خوشبودار ہوتی ہیں، جس سے تیل کشیدہ (Essential oil) کیا جاتا ہے۔ اس کا تیل مختلف بیماریوں کے علاج کیلئے مختلف ادویات میں استعمال کیا جاتا ہے۔ اس میں سوزش کش، جراثیم کش، اینالجیسک، السر، اینٹی کینسر، اور کلانی جگر محافظ خصوصیات ہیں۔ اس کا Essential oil باضمے اور سانس کے مسائل میں بھی مدد کرتا ہے۔ یہ جلد کے لیے ایک بہترین علاج ہے کیونکہ یہ عمر بڑھنے کی علامات کو کم کرتا ہے، مثلاً جھگی ہوئی جلد، باریک جھریاں اور عمر کے دھبے (Age spots)، جس سے جلد چمکدار نظر آتی ہے۔ اس کے علاوہ یہ بالوں کو دھونے اور بالوں کے علاج کے لیے استعمال کیا جاتا ہے۔ یہ بالوں کے گرنے سے متعلق مسائل سے نجات دلانے میں مدد کرتا ہے۔ اس کے ساتھ ساتھ یہ اداسی، تناؤ اور جذباتی تناؤ پر قابو پانے میں مددگار ہے۔

آب و ہوا:

اس پودے کی کاشت کیلئے سرد آب و ہوا (جہاں موسم گرم میں درجہ حرارت 32 ڈگری سینٹی گریڈ سے زیادہ نہ ہو) موزوں ہے۔ اسی لئے 7000 فٹ سے زیادہ بلندی والے علاقے جہاں عموماً برف باری اور

پاکستان کو اللہ تعالیٰ نے بے شمار نعمتوں سے نوازا ہے۔ پاکستان کی آب و ہوا اس کے جغرافیہ کی طرح متنوع ہے۔ اس خطے میں آب و ہوا عام طور پر ساحل سمندر کے قریب اور دریائے سندھ کے نشیبی میدانوں کے ساتھ خشک اور گرم جبکہ شمالی بالائی علاقوں اور ہمالیہ میں آہستہ آہستہ ٹھنڈی ہوتی چلی جاتی ہے۔ پاکستان میں اس متفرق آب و ہوا کی وجہ سے پودوں کی بے شمار اقسام پائی جاتی ہیں، جن میں زیادہ تر غیر شناخت شدہ ہیں۔ ان میں اکثریت ادویاتی پودا جات اور جڑی بوٹیوں کی ہے۔ قدیم حکمتی دور سے جدید ادویاتی نظام تک، انسانی زندگی میں ادویاتی پودوں کا کردار نظر انداز نہیں کیا جاسکتا۔ پودے ادویات کا اہم ذریعہ ہیں جو کہ انسانی صحت میں اہم کردار ادا کرتے ہیں۔ اسی لیے دنیا کی دو تہائی آبادی اپنی بنیادی صحت کے لیے ادویاتی پودوں پر انحصار کرتی ہے۔

ادویاتی پودوں کی بے بہا خصوصیات کے پیش نظر، پاکستان زرعی تحقیقاتی کونسل کے زیر اہتمام 1994 میں ماؤنٹین اگریکلچرل ریسرچ اسٹیشن استور کا قیام عمل میں آیا، جس کا بنیادی مقصد شمالی علاقہ جات کے ادویاتی پودوں پر تحقیقاتی سرگرمیوں کے ذریعہ ان کی پیداوار کو فروغ دینا ہے۔ اسی سلسلہ میں کھ پر تحقیقی کام کیا گیا جس کے نتائج درج ذیل ہیں۔



کھ

تعارف:

کھ کوہ ہمالیہ کا ایک نایاب پودا ہے۔ اس کا نباتاتی نام *Saussurea costussyn lappa* ہے۔ جبکہ اسے شینا زبان میں بینال، انگریزی میں *Indian costus* اور ادویاتی دنیا میں کھ کہا جاتا ہے۔ کھ ایک کثیر سالہ پودا (Perennial plant) ہے جس کی اونچائی تقریباً 6 تا 7 فٹ ہوتی ہے۔ اس کے پتے لمبے اور گوشہ دار (lobate) شکل کے ہوتے ہیں جبکہ تناسیلا، مضبوط، اور ریشہ دار (Erect, stout and fibrous) ہوتا ہے۔ اس کے پھول گہرے جامنی سے سیاہ رنگ کے ہوتے ہیں جن سے 3 ملی میٹر لمبا پھل (cypsela) بنتا ہے۔ اس پودے کی جڑ تقریباً 45 سے 60 سینٹی میٹر لمبی ہوتی ہے۔ اس پودے کی جڑوں کو طبی اہمیت حاصل ہے۔ جس کی ادویاتی خصوصیات کی وجہ سے مقامی اور بین الاقوامی مارکیٹ میں اس کی مانگ بہت زیادہ ہے جو کہ اس پودے کی غیر قانونی برداشت کی سب سے بڑی وجہ ہے۔ اس کے علاوہ غیر منظم طریقے سے برداشت اور زیادہ استحصال، اس



Pak Bloom

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DIVERSIFICATION, VALUE ADDITION & SUPPLY CHAIN MANAGEMENT OF FLORICULTURE INDUSTRY

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Organized by:

Institute of Horticultural Sciences, University of Agriculture, Faisalabad, Pakistan

Details/Queries/Registration: Dr. Ittikhar Ahmad, Workshop Coordinator (Ph: +92-334-7416664, E-mail: ittikharahmadhashmi@gmail.com)



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