ELA

Everyone loves Agriculture

College Magazine

Goa College of Agriculture

Ela, Old Goa

Editor
Ms Sulochana Dessai
Librarian, Goa College of Agriculture

Published by
Dr Suresh Kunkalikar
Principal, Goa College of Agriculture

Publication
Feb 2024

Content

Sr. No.	Title	Author	Page No.
1	Along for the ride	Applesta da Costa	1-2
2	Tripping on knowledge and experiences	Sanjana Rao	3-6
3	Mandovi, amchi	Cleto Fernandes	7
4	Celebrating Millets- International Year of Millets 2023	Chenoa Coutinho	8-9
5	CRISPR/Cas9 – Induced gene editing tool to accelerate plant breeding	Sumedha C. Prabhu	10-12
6	Nachneachem Fest	Rishab D Naik	13
7	The gleaming shroom	Pamela De Souza	14
8	Natures Treasure	Parth Prabhu Velguenkar	15
9	Matti – The state tree of Goa	Susann Costa	16-17
10	Europe bans Genetically Modified Organisms (GMOs)	Manya Hegde	18-21
11	The Nutri-Cereal: MILLETS	Ria Vaz	22-23
12	Agriculture impertration towards its young graduates	Dr. Shreyas Subhashchandra Jadhav	24-26
13	VEGGIE MANIA		27
14	A Tearful Sight	Applesta da Costa	28
15	Growing Oyster Mushrooms: A Student's Journey into Sustainable Agriculture	Aakhil Shaikh	29-30
16	Need for Biodiversity Conservation	Maziya Fernandes	31-32
17	Everything, In time	Chenoa Coutinho	33
18	Nature	Atharv Barve	34
19	Memoirs of the college exposure tour to the south of our beautiful country.	Pamela De Souza	35-37
20	Significance of crop rotation and diversity.	Sarah Pires	38-39
21	Zonavoranchi Zomat	Cleto Fernandes	40-41
22	Finding inner peace among nature	Parth Prabhu Velguenkar	42

Along for the ride

By **Applesta da Costa**
(Psychologist)

Yes, human beings are inherently social beings. We dwell in an environment of companionship right from the time we are conceived in the womb till we breathe our last. Human beings live in a space with unceasing contact with another being, be it at home, house of worship, places of education, workplace, and so on.

UBUNTU! An African concept that translates, **"Humanity towards others"** is characterized by a bond that is fondly shared with others. A bond that is crucial to uphold peace and practice empathy. Our idea of self is shaped by our constant interactions with other people. We feel, think, and act as a response to our interactions with others. **I am because We are**. As humans, no matter how hard we try, we cannot exist in isolation. People may grow as individuals encompassing their personality, interests, patterns of behaviors, and thinking capacity, however, it is influenced by others to some degree.

Although a number of us strive to have a solitary life, it is difficult or rather impossible. As stated by Abraham Maslow, every individual follows a hierarchy of physiological and psychological needs. It is understood that a certain level of human connection is seen as a prerequisite to satisfying basic needs and climbing the hierarchy to self-actualization, a desire to reach one's full potential. As social beings, humans rely on cooperation from others to survive and thrive.

We all need someone to raise our spirits, don't we?

Human beings have the ability to share and match their emotions to each other through mirror neurons. The mirror neurons are essential brain cells that make us social and assist us to understand the emotions, actions, and intentions of other people. In the absence of mirror neurons, my smile would not evoke you to smile back nor would we be able to experience and respond to

emotions felt by others. Empathy would not exist. Humans are wired to internalize the mental state and actions of others and reciprocate accordingly.

In conclusion, even as dark sides prevail, as social beings, people need to consciously harness compassion and strive to achieve human communion to provide safe spaces for each other. Because in the end ‘I am’ only because ‘We are’.

Tripping on knowledge and experiences.

By Sanjana Rao {T.Y. B.Sc. (Hons.) Agri.}

An Educational tour was organized for students pursuing third-year B.Sc. (Hons.) Agri., with the objective to give us practical knowledge about various topics, exposure to various research institutes, and most importantly to show us the extent that science in the field of agriculture is evolving day by day.

We started our journey on 22/3/23 from Goa to Bengaluru and reached our destination the next day around noon. On the first day, we visited the National Bureau of Agricultural Insect Resources. Here Dr. Raghavendra and Dr. Lakshmi gave us information about the institution and showed us a small video, sharing with us the history, aim, vision, and research done by the institution. Further, they showed us the mass multiplication of various insects like *Trichogramma spp.* and also the Eri species of the silkworm. Later that day, we visited the Iskon temple, were blessed to hear the story of Lord Shri Krishna, and got to know more about the temple's history.

On 24/3/23, we got an opportunity to visit GKVK. It's a must to visit this institution. The campus and the research undertaken by the institute are something that every student of agriculture must witness. Ms. Safina, Assistant Prof in Entomology Department gave us a tour of the entomology lab. Dr. Shivmurthy, Assistant Prof in Extension Department gave us brief information about the history of GKVK. We got an opportunity to visit the various departments like agronomy, soil science, pathology, horticulture, genetics, etc. In the department of pathology, we got the chance to view an old herbarium and various slides ofpathogens like *Perithiceum*. Dr. Hanumanthappa, Assistant Prof in Horticulture Department showed us a tissue culture-themed garden and made us well versed with the tissue culture of Banana. They produce a G9 variety of bananas by tissue culture. They also cultivate the Aishwarya variety of Mango, and the Chintamani variety of Jamun among others. In the evening we went to Visvesvaraya Industrial and Technological Museum, Bangalore (VITM), which was another awesome place to gain knowledge andinteresting facts.

On 25/3/23,we got permission to visit IIHR. At this institute, we received information about their research on the development and refinement of production technology for different fruit crops. For instance, improvement of Pummelo, Grapefruit, Annona, Jackfruit, and Guava for yield and quality;breeding of purple passion fruit and

strawberry for superior traits; rootstock and mildew resistance breeding for grapes;incorporation of bacterial blight resistance for pomegranate; breeding papaya for PRSV tolerance; Improvement of jack fruit for quality and productivity and the evaluation of under-utilized fruits for yield, quality, and adaptability. Afterward, we visited their mango orchards and ornamental and medicinal plant fields which contained so many varieties. Later we went to one of the famous gardens known for its landscaping i.e., Lalbagh Botanical Garden, the work is amazing, and every bit of it was wonderful.

In the early morning of 26/3/23, our journey began for Mysore. We went to Sri Chamarajendra Zoological Gardens which comprises an areaof 64 ha. The Mysore Zoo is built with the objective to conserve breeding; rescue and rehabilitate and study wild animals, birds, and plants and educate the general public visiting the zoo.

We were fortunate to witness various endangered species of exotic creatures. In the evening we got to be a part of the colorful Brindavan Gardens which is famous for its dam and fountain show.

On 27/3/23 morning, we visited the most beautiful Mysore Palace and were mesmerized by the artwork on walls, poles, paintings, and monuments, and by the beauty of the palace. The most interesting was the history present in the palace. Ending our Mysore stay, we took a train and began our journey towardErnakulum in the afternoon.

On 28/3/23, we visited the Coconut Development Board, where we got to know about various coconut products developed by that board like powder, juice, chips, and so on. Through the history of the board, we became aware that Goa comes under the Bengaluru board. Then we visited Kerala Folklore Museum which aims to provide art education to students and assist to provide visual and academic knowledge to art lovers, researchers, and travelers. Folklore Museum is the only architectural museum in Kerala that treasuressculptures of stone, wood and bronze, ancient terracotta, objects from the Stone Age, jewelry, paintings, musical instruments, and tribal and folk art among others. This ethnic museum is the essence of the life and culture of the common man who lived in the past 1000 years. One of the best places we got to discover. In the evening we got to witness the beautiful sunset on a boat ride. Then began our journey to Kanyakumari.

On 29/3/23, we got the opportunity to be a part of ICAR-KVK Thirupathisaram. Mrs. Pratibha the Farm Manager explained to us about the irrigation system, channels, cash crops like rubber and coconut cultivated there, the constraints they

face while cultivating, and the techniques to combat them. We also visited Vivekananda Rock Memorial, a monument and popular tourist attraction in Kanyakumari, and thereafter returned to Trivandrum after witnessing aneye-soothing sunset.

On the last day,we finally visited CMFRI where we were briefly oriented about the institution and the various species and varieties of tuber crops like sweet potato, yam, casava, etc. They showed us their Biopesticide Production Unit where the production of 3 Biopesticides namely, Shreya, Maenma, and Nannahappens. We also visited their processing unit and gained information to become an entrepreneur. They have various machines like dry blenders, RND machines, dough mixers, etc.

I am blessed to be a part of this wonderful journey. I would like to thank Prof. Shreyas Jadhav, Mrs. Sailee, and the Goa College of Agriculture for organizing this informative educational tour.

Mandovi, amchi

By Cleto Fernandes {F.Y. B.Sc. (Hons.) Agri.}

Ostomtchea ghanttar thaun, vhavta hanv pavsacho lott gheun
Vatter sogllench panchvem zata, mhojea ghodd udkak lagun
Goyant hanv bhitor sortam, tumchea adarak pavunk
Mandovi nanv mhojem, sodanch vhavta tumchi tan bhagounk

Sobar xekdde zale, tumchea purvozannim kelo mhozo upeog
Nustem marun, Kallvam kaddun, voir kaddim bhurgeam-ballank
Xitoll udok vapri mhojem, xet rovpak xettamnim
Vhoddeamnim poinn kori, tarvam ietolim bori vhoddlim

Aiz mhaka polloit zallear, sogllinch mhoji durdoxa
Tisro pul ubo zala, soroll mhaka vhavunk anink ani zago urla?
Casino-nth soglli garbage korta mhojem udok mhellem
Sewage pipeline sodllea udkant, chit re monxea koslo aila toh mhojer akant.

Celebrating Millets- International Year of Millets 2023

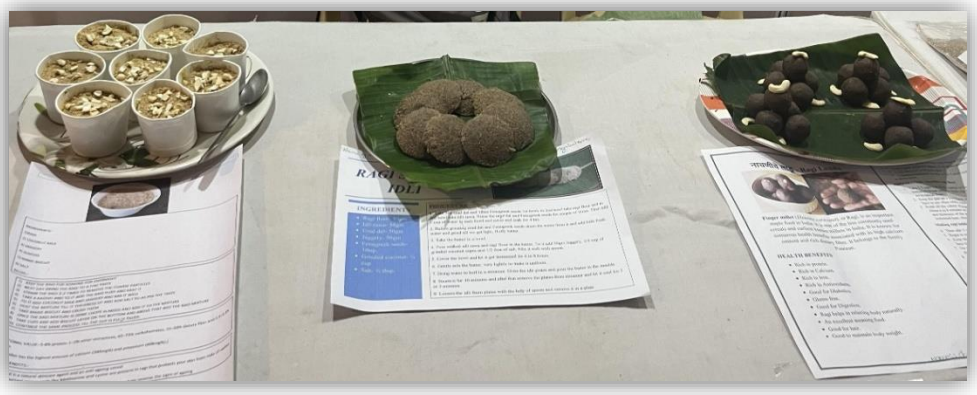
By Chenoa Coutinho {Sr. B.Sc. (Hons.) Agri.}

In March 2021 during the 75th session, The United Nations General Assembly declared 2023 as the International Year of Millets (IYoM 2023). The Food and Agriculture Organization has taken the lead to celebrate IYoM in collaboration with other stakeholders.

What are Millets? Millet is a collective term referring to a number of small-seeded annual grasses that are cultivated as grain crops, primarily on marginal lands in dry areas in temperate, subtropical, and tropical regions. The most important species are pearl millet, finger millet, proso millet, and foxtail millet. A multimedia exhibition, Panjim was organized to celebrate the year of millets to educate the visitors about the importance of millets and also encourage the inclusion of millets in daily diet. At the exhibition, ICAR-Coastal Agricultural Research Institute (CCARI) put up a stall where visitors could see samples of different millets, and millet products and interact with the subject matter expert on millets.

The students of Goa College of Agriculture participated in the Recipe Competition organized as a part of the exhibit. Pairs of two, set up their stalls and displayed various products prepared out of millets, ranging from traditional Goan teezan, saatva, to modern jowar cakes and ragi pancakes, we had it all. This exhibition was an incredible initiative by the Government, to create awareness about the importance of millet and how we can incorporate it in our daily lives.

'We have to reboot ourselves by switching to organics and millets.'- Krishna Byre Gowda




MILLETS
Millets: Illustrations
Eat Millets, Stay Healthy
MILLETS
MILLETS: PANICLES & GRAINS
BARNYARD
PEARL
PROSO
SORGHUM
Eat Millets, Stay Healthy
MILLETS
Finger Millet Recipes

CRISPR/Cas9 – Induced gene editing tool to accelerate plant breeding

By Sumedha C. Prabhu (Asst. Prof. in Agricultural Botany)

Production of agriculture around the world is encountering unusual difficulties. With a 9.6 billion population by 2050, there will be a 60% increase in the need for staple crops. It is the need of the hour to develop cultivars with improved resilience to harsh environments, higher yields, and improved quality because the green revolution's rate of increase in yield has been steadily declining and harmful climate change is anticipated to further restrict plant production. However, more efficient and time-saving breeding techniques are needed because conventional crop breeding methods are labour-intensive, time-consuming, and complicated.

What is CRISPR- Cas9?

The CRISPR- (clustered regularly interspaced short palindromic repeats)–Cas9 (CRISPR-associated protein) so-called 'genetic scissors' were developed in 2012 by two researchers *viz.*, Emmanuelle Charpentier and Jennifer Doudna at the University of California, Berkeley for which they were awarded the Nobel Prize in Chemistry in 2020. It is a novel technique that enables geneticists and medical researchers to edit parts of the genome by removing, adding, or altering sections of the DNA sequence. It is one of the most accurate methods of genome manipulation and has drawn a lot of interest recently due to its wide range of uses in the breeding and development of agricultural crops and animals as well as human health applications.

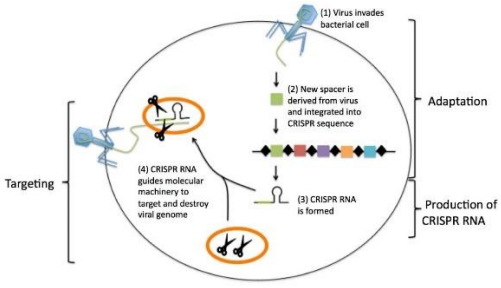
How does it work?

To protect the bacteria from repeated virus attacks, the CRISPR immune system undergoes the following 3 steps-

1. Adaptation - When viral DNA intrudes the bacterium, the viral DNA is cut into small bits and transformed into a new spacer between the repetitions. They will act as a hereditary reminder of earlier infections.

2. Creation of CRISPR RNA - A single-stranded RNA is produced by transcription of the CRISPR sequence, which also includes spacers and the Cas genes. The resulting single-stranded RNA – "CRISPR RNA" has spacers that include copies of the viral DNA sequence that is causing the invasion.

3. Targeting: Viral DNA will be recognized by the CRISPR RNAs, which then direct the CRISPR-associated proteins. The targeted viral material is then cleaved and eliminated by the protein.



Applications of CRISPR- Cas9 in crop improvement

Due to its ability to recognize specific DNA sequences, the CRISPR-Cas9 system has been widely used in the process of creating better crops by improving traits like yield, quality, and resistance to abiotic and biotic stress, herbicide resistance, plant aesthetics, and plant architecture. It also allows the researcher to perform DNA-free gene editing, Gene knockouts, Transient gene silencing, and Gene insertions. It is a highly specialized genome editing tool that can speed up the domestication process of crops, and help in haploid induction and fixing of heterosis. It has been utilized in various crops like rice, wheat, barley, maize, tomato, potato, soyabean, oilseed rape, cassava, watermelon, and so on for enhancing their traits of interest.

Effective transfer of CRISPR machinery to the appropriate plant cells and subsequent regeneration of viable plants represents a significant barrier to the use of CRISPR tools in agriculture. The preferred delivery method is still traditional tissue culture techniques, but these are time-consuming, labour-intensive, and prone to causing random somatic mutations, all of which limit the efficiency benefit offered by CRISPR tools. In addition, a lot of crop species resist regeneration by tissue culture. To achieve high-efficiency genome editing in plants, novel delivery techniques must be developed. These could involve direct administration to plant apical meristems or pollen grains to obtain modified plants without the need for tissue culture or even the use of regeneration boosters to enable tissue culture in resistant species.

Future Prospects

CRISPR/Cas9 systems find use in many facets of crop breeding in addition to basic research in crop sciences. It will play a major role in safeguarding the world's food supply in a sustainable way. However, more advancements in these adaptable technologies are required before they can be effectively used in crop enhancement. The potential of genome-editing tools for crop development can be unlocked by comprehending the molecular underpinnings of agronomic traits and preserving crop genetic diversity.

NACHNEACHEM FEST

By Rishab D Naik {Sr. B.Sc. (Hons.) Agri.}

This year, Nachneachem Fest was organized by the Directorate of Agriculture on 12 March 2023 at Agriculture Farm, Duler, Mapusa. The objective of the fest was to increase awareness and the importance of millet among people and farmers. The fest was held from 11 am to 5 pm.

The fest commenced with a speech by the Director of Agriculture, Mr. Nevil Alphonso, who addressed the gathering on the importance and health benefits of millet. He also spoke about the government's initiative to launch various schemes, technologies, and marketing subsidies to attract farmers and people towards this superfood. Mr. Nevil also informed us that the United Nations has declared the year 2023 as the international year of millets.

Thereafter, Mr. Marius Fernandes, one of the organizers of the fest also addressed the people present for the fest. Farmers, members of the Self-Help Groups, students of Goa College of Agriculture, chefs from the Taj Hotel, and the general public participated in the fest. Different food products made from millet which were prepared by the SHGs such as cakes, ladoos, bhakri, cookies, and so on were on sale at the venue. The students of Goa College of Agriculture also prepared and sold ladoos made of finger millets to the crowd present. We also had the opportunity to interact with the Goa 365 news channel about our delicious finger millet ladoos that got sold quickly. The fest also exhibited traditional cultural dances of Goa, talk shows, skits, and songs, creating a pleasant ambiance for everyone present at the fest.

The gleaming shroom

By Pamela De Souza {T.Y. B.Sc. (Hons.) Agri.}

Some are good; some are bad,
In the world of fungi, none are sad.
They care for nothing and just sprout,
Nothing affects them except drought.

Among the dead leaves and the branches,
Lived a toadstool in one of the darkest trenches.
Though it lived in the dark,
It had its own little spark.

It glowed day and night,
It looked very pretty emitting its light.
Green fluorescence seemed so bright,
Hidden inside the trench, the jewel didn't look right.

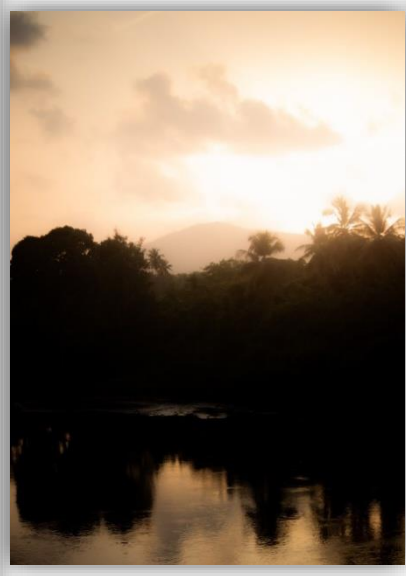
Many days after a long nap,
It decided to take a step.
It tried to move but could not,
It envied the movable animals a lot.

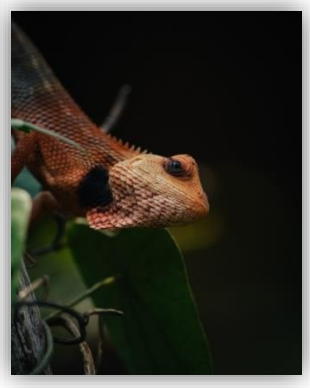
It said to itself,
“Oh! I lived all these years by myself.”
“I' will not spread my spores to die in dark,”
“Let them be free and the sky their only ark.”

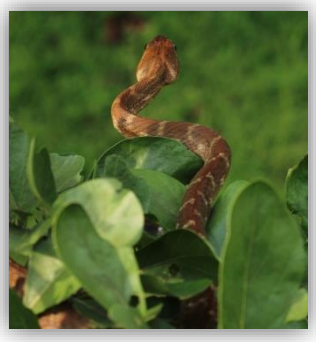
Natures Treasure by Parth Prabhu Velguenkar {F.Y. B.Sc. (Hons.) Agri.}









Matti – The state tree of Goa

By Susann Costa {S.Y. B.Sc. (Hons.) Agri.}

Matti tree goes with the Botanical name *Terminalia elliptical* andbelongs to the family of Combretaceae. It is also commonly known as Asna, Saaj, Taukyyan, Indian-Laurel, Sadar, and Marda. Matti tree is indigenous to the state and has enjoyed the label of being a state tree for the last 30 years. The government wants to attract the attention of the public toward the ecological importance of Matti tree in the state and country and preserve it.

Matti tree also gets the term "Crocodile bark" due to its featured pattern of crocodile skin found on the bark. The Matti tree grows up to 30m high having a trunk with a 1m diameter. The fruit of the matti tree takes a shape of an ovoid, having an average length of 3cm along with 5 wings that cannot extend beyond the apex of the fruit. The tree flowers from February to March, while fruiting occurs from the month of June to October.

The plant reproduces through natural regeneration. The most common methods of propagation of the matti tree are direct sowing, root cuttings, and shoot cuttings. The timber of the tree is given economic value due to its strength and durability. It is widely used to manufacture furniture and railway wagons and in construction work.

The Bark is an excellent source of tannin that is widely used in the leather industry to manufacture different products. In some parts of India, the leaves are extensively only used in sericulture i.e. to feed commercially reared silkworms.

Traditionally, water stored in the stem of the tree was often used for the purpose of drinking by folks living in the forest. The plant is known to possess many medicinal properties like antifungal, antioxidant, anti-hyper-glycaemic, anti-diarrhoeal, and anti-leucorrheal. The matti tree is a symbolic representation of the floral wealth of Goa's forest and rightfully deserves the title of being the 'state tree' despite sharing the title with the coconut palm, which is also an integral part of the Goan culture.

Europe bans Genetically Modified Organisms (GMOs)

By Manya Hegde {S.Y. B.Sc. (Hons.) Agri.}

GMO stands for "Genetically Modified Organism." It refers to an organism whose genetic material has been altered in a way that would not occur naturally through mating or natural recombination. This genetic modification is usually done in a laboratory using biotechnology techniques and is often done to improve the organism's traits or to introduce new traits that are beneficial to humans, such as resistance to pests or tolerance to herbicides. GMOs are widely used in agriculture, but they can also be used in medicine, research, and other fields.

As we are aware, European Union (EU) has many strict regulations on the use of GMOs in agriculture and the cultivation of most GMO crops is banned within its borders.

Why did this ban come into effect? It is important to note that the regulations surrounding GMOs vary between different countries and regions. While some countries in Europe have banned the cultivation of certain GMOs, others have approved the use of a few.

The reasons behind the ban on GMOs in Europe are complex and multifaceted. Some concerns

In addition, there has been a significant amount of public opposition to GMOs in Europe, with many people expressing concerns about the long-term that have been raised including potential risks to human health, environmental damage, and impacts on biodiversity. There have also been concerns about the potential of GMOs to crossbreed with wild plants and create new, unpredictable organisms. effects of these organisms on the food supply and the environment.

Overall, the decision to ban or regulate GMOs is often based on a complex balancing of risks and benefits and involves input from scientists, policymakers, industry representatives, and the public.

However, there have been concerns about the use of banned GMOs in Europe, particularly in the form of imported products that may contain genetically modified ingredients.

The EU's approach to GMOs is based on the precautionary principle, which means that where there is uncertainty about the potential risks of a product or technology, caution should be exercised. This approach has led to the establishment of strict regulations for the approval of GMOs in the EU, which involves an

extensive assessment of the potential risks to human health and the environment.

Currently, only one GMO crop is approved for cultivation in the EU – a type of maize known as MON 810. However, several countries, including France, Germany, and Italy, have banned its cultivation within their borders. In addition, several other GMO crops have been approved for import into the EU exclusively for use in food and animal feed, but not for cultivation.

In 2020, the European Union's Rapid Alert System for Food and Feed (RASFF) reported that over 350 food and feed products had been found to contain unauthorized GMOs in the previous year.

These incidents have raised concerns about the effectiveness of the EU's regulatory framework for GMOs, particularly in relation to the detection and monitoring of illegal GMOs. There have also been concerns about the potential environmental impact of these illegal GMOs, including the risk of unintended effects on non-target species and ecosystems.

To address these concerns, the EU has recently proposed changes to its regulations on GMOs, including the introduction of more stringent controls on imports and the establishment of a harmonized detection method for illegal GMOs. These changes are intended to strengthen the EU's regulatory framework for GMOs and ensure that banned GMOs are not being used in Europe.

To conclude, the proposed changes to the EU's GMO regulations are intended to address these concerns and ensure that the use of GMOs in Europe is safe and sustainable.

Image 1 source: https://sustainablepulse.com/2015/01/13/eu-parliament-votes-yes-gmo-opt-member-states/#.ZEjDNXZBzIU

Image 2 source: https://www.europarl.europa.eu/news/en/headlines/society/20151013STO97392/eight-things-you-should-know-about-gmos

GMOs

The amount of corn and soy in the EU

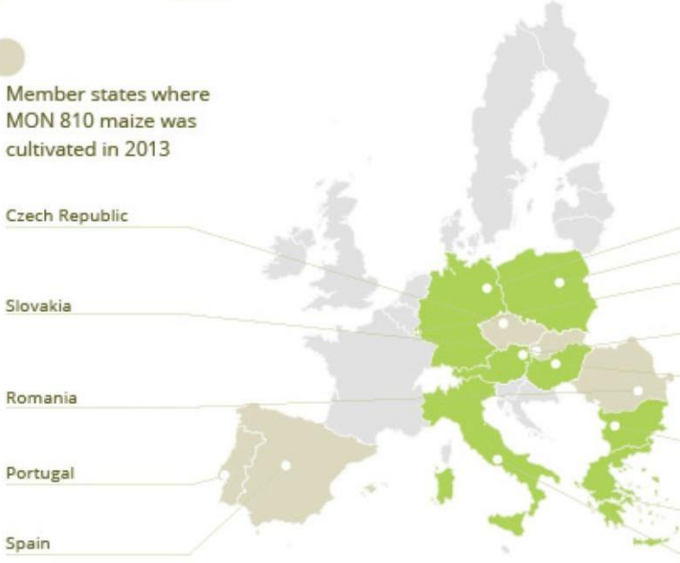
2013

MON810 Maize

The insect-resistant maize MON 810 from Monsanto is the main GM crop grown in the EU

Member states where MON 810 maize was cultivated in 2013

Member states who adopted safeguard clauses to prohibit its cultivation on their territory



Amount of land used to grow MON810 in the EU in 2013


FOR A
GMO-FREE
EUROPE

The Nutri-Cereal: MILLETS

By Ria Vaz {Sr. B.Sc. (Hons.) Agri.}

The ones whose existence was insignificant around the world. Though healthy and nutritious, they were deprived of a status of a noteworthy position. Besides being a native to our land, it was never cherished and here we are in the year 2023, a year that brought all glory and fame to this valuable cereal i.e. millets. Marking the year as International Year of Millets; 365 days dedicated entirely to millets.

Millets are not new to us. They have been safeguarded in the ancient texts of Yajurveda, indicating how common the cultivation and consumption of these nutri-loaded grains was. Even before a few decades ago, our forefathers relied majorly on millet as the staple food. Millets are of various types. The most common are finger millets (Nachni or ragi), Bajra, and Sorghum. The not-so-common millets are Fox Tail millet, Proso millets, Kodo millets and Barnyard. Sorghum is termed the king of coarse cereals while the real queen of millets is Lahari Bai, belonging to the Baiga tribe of the Dindori district in Madhya Pradesh. She is the Millet woman of India who got a shout-out from the honorable Prime Minister Shri Narendra Modi for her diverse collection of millets which she calls 'Shree Ann'. She not only preserves the millet but also distributes it to the farmers of nearby villages to cultivate it. As the pillars of the nation and as agriculturists, we too need to create awareness and propagate the cultivation of millets and preserve the germplasm of other crops.

Although this year, we embrace millet, most of our taste buds dance to the tunes of fast food. With time, the urban outlook got the millets termed as 'coarse grains', as we got ourselves adapted to shifting our palates to refined food by following the western nations, trends of the time, and mouthwatering advertisements of the other foods that kept drifting us away from the millets.

Millets, a poor man’s crop requires less of resources to cultivate. With climate change posing struggles for mankind, this Nutri-cereal is highly resilient. It can even survive a drought. Millets have the answers to man's whys and hows; which will emerge in the near future. It fights the challenges posed by changes in climate as well as combats the

nutritional deficiencies that modern man is facing.

In Goa, we are familiar with finger millets (Eleusine Coracana), which are very rich in calcium. Though vanishing with time and along with generations of the past, we are still aware of recipes like tizaan, ambil, pinagr, and satva that are made from ragi. While the tragedy lies in completely forgetting our millet gems like Vari (little millet), we ought to wake up from our slumber before we lose the germplasm. Our farmers from different states of the country have also been into the cultivation of millets for ages but nowadays although cultivation and consumption of millets are seen, we realize that the focus is only on the major millets. With NITI Aayog signing the Statement of Intent with United Nations World Food Programme in 2021 and embarking on the current year as the International Year of Millets, it will help in reviving millets by supporting small-scale farmers at a large.

The winds changed for millets when United Nations declared 2023 as the International Year of Millets after receiving a request from the Indian government. These grains are now more spoken about with regard to their history, nutritional value, and recipes. Numerous competitions, talks, events, and huge banners are being organized to raise awareness and promote millet among the public. It is gaining popularity and we hope that eventually, we see them on our plates even in the finest restaurants. Millets are superfoods that are gluten-free, and rich in dietary fibers, proteins, minerals, and vitamins. With people being health conscious, millets have great market potential. With the processing of millets coming into the picture, this Nutri-cereal will gradually establish its presence in our diets. As rightly quoted on the billboards by the Department of Agriculture, "Know your millets, grow your millets, and consume your millets."

Agriculture impertration towards its young graduates

Dr. Shreyas Subhashchandra Jadhav
Assistant Professor of Agriculture Extension Education

Although ample research is retained on agriculture as an aging commerce. The average age of farmers in India is reported to be around 62 which signifies the need to fill in the boots of agriculture by the contemporary generation of farmers- The Youth. Young people are seen increasingly pursuing non-agricultural jobs rather than their family line of occupation. The World Bank states that 79% of the world's rural poor predominantly earn a living through farming and that the agricultural sector employs half the rural population of the entire subcontinent of India. Most smallholder agriculturalists live in poverty, operating crop, and livestock farms that aren't as prolific as they could be, and miss out on critical prospects to contribute to their larger food systems.

However, the expansion of the farming sector can efficiently boost the revenues of deprived families manifold compared to other industries. Two out of three young individuals in developing countries like India live on lands with the most agroecological prospective. The role of young graduates in agriculture is in fact that of enormous opportunity — to grow more food, convert local food systems, and shape economies that revitalize entire societies out of poverty by putting their innovative young minds into action. The unemployment rate for youth is currently three times that of adults in all regions of the world as reported by The Food and Agriculture Organization in 2021. India, a country that claims to have the globe's youngest population, estimates that two-thirds of the youth are out of work or working in weak, low-paying positions.

As reported in *The State of Food Security and Nutrition in the World 2021*, the COVID-19 pandemic damaged jobs and food systems; contributing to an increase in global hunger of up to 161 million people. Engaging youth in agriculture as an available, opportune, and essential sector for growth is essential to strengthen local food systems, feed communities, and provide gainful employment

opportunities for the world's increasing young population.

Despite its challenges, agriculture still remains the biggest platform for job creation.

While this field holds a prospective future in many countries, it remains unpleasant to young people. Farmers across the world regularly challenge questions such as climate change, pests and invasive species, outdated farming practices, and limited access to technology, all of which hinder productivity and income generation. The demanding role of youth in agriculture, which includes nearly 30,000 young Indians and hundreds of farmers and farm organizations in India, identifies additional challenges preventing youth from fully engaging in farming, most notably lack of financing, land, markets and training. The hindered development of young people affects the progress of the neighbourhood and the nation. Simultaneously, rural areas' socio-economic growth and prosperity are reliant on the same youth. If given the chance, they are precious human assets who can contribute meaningfully to build the country. Although vocational training and extension services have the potential to be effective instruments for developing the capacity of rural youth and teaching agricultural skills, they have to look beyond to impart the essential skills, which can lead to great employment results. These boundaries have fuelled a generational disinterest in farming, with many young people viewing it as an unstable livelihood and turning instead towards urban centres to find opportunities.

Agriculture is a career path that young people in India don't want to explore nor do their parents. This comes into being because they are of the impression that since agriculture is not driven by technology, it is not aspirational for the youth.

On the contrary, research also states that young people can be heartened to contribute to agriculture if adequate resources are provided despite their scepticism. Many do consider agribusiness as a manageable livelihood that is important for a nation's development. Additionally, technology is also crucial to this revolution. It can help agriculture by enlightening the way it is perceived as well as its productivity. However, many smallholder farmers scuffle with low-tech adoption which contributes to low output. A study revealed that from those

who are involved in agriculture, only 23% of respondents use any form of technology such as an app, SMS, website or software. Young people and smallholder farmers also specified they would embrace technology if the tools were affordable and if they would receive training on how to use them.

While digital literacy for rural farmers must remain a consideration, the World Bank has reported technology to have "significant potential to improve efficiency, equity, and environmental sustainability in the food system." And in places where it is accessible, we already see smallholder farmers use digital tools to revolutionize their work around the world.

The Indian government along with several state governments have launched a variety of programs and continue to do so in order to fully employ the potential of youth and the demographic dividend. Programs such as AARYA, Skill India, Start-up India are founded on the tenets of social inclusion, gender equality, and rural development that is sustainable. Young people who are supported to innovate and overcome barriers have the potential to repair food systems, reduce hunger and unemployment, and secure a sustainable, promising future for communities around the world. We can unleash possibilities and employ youth across the value chain, including them in processing, transportation and equipment maintenance.

Globally, there is a lot of talk about what will happen in the next 10 to 20 years. Agriculture will always be here. Agriculture can be an employ patron for the future as long as its young graduates think innovatively. Agriculture is a sustainable profession.

VEGGIE MANIA

The students of Commercial Horticulture Module organized a two day event- VEGGIE MANIA (Battle of the Greens). The event was open for all students of B.Sc. (Hons.) from 20th to 21st March 2023 at the Goa College of Agriculture premises. The hosts of the event focused on integrating innovation and simpleness to bring out the best of our local veggies. Over the two days, varied competitions were held to honor the vegetables. These were essay and poetry writing, Poster making, slogan writing, rangoli art, vegetable carving, recipe making, quiz, and monologue competition.

A Tearful Sight

By Applesta da Costa (Psychologist)- written in 2012

Oh what a sight of pain
To watch a tree being cut in vain.

My eyes filled with tears
And my mind full of fears
Thinking what will happen
If we cut them seventy times seven.

Not a tree will remain on Earth
At our future generations' birth
How are they going to survive?
With no oxygen and food in life.

We will be able to see a tree
Only as a picture on the internet for free
Labeled as 'Extinct- Now not seen'
On the top list of a magazine.

Oh what a sight of pain
To watch a tree being cut in vain.

Growing Oyster Mushrooms: A Student's Journey into Sustainable Agriculture.

Aakhil Shaikh {Sr. B.Sc. (Hons.) Agri.}

The third most popularly grown mushroom globally, the oyster mushroom ranks second in India. Known for its high-quality flavor and nutritional value, it can even thrive on decaying matter. In India, oyster mushrooms are commonly known as Dhingri and derive the name from their shell-like appearance. Oyster mushroom production is a fascinating and as profitable field that has caught my attention as a student. After conducting some research, I discovered that oyster mushrooms are an excellent source of protein, vitamins, and minerals, making them a popular ingredient in many cuisines.

One of the things that I find exciting about oyster mushroom production is that it can be done on a small scale with limited resources. As a student, I do not have access to large areas of land or resources and hence I started my module to grow oyster mushrooms in a small space using simple techniques.

To begin, I obtained mushroom spawn from a reliable supplier and then prepared a substrate using paddy straw. The success of a good yield depends on the purity and quality of the spawn used. To ensure this, I sterilized the substrate to eliminate any unwanted microorganisms and filled it into bags. After inoculating the bags with the mushroom spawn, I placed them in a dark and humid environment. Within a few days, I noticed mycelium growing in the bags, indicating that the mushrooms were thriving. I continued to monitor the temperature, humidity, and light levels to ensure optimal growth conditions and gave adequate irrigation supply to the bags.

A few weeks later, I harvested my first batch of oyster mushrooms, which was an exciting experience. I was amazed by how easy it was to grow these mushrooms and the satisfaction of producing my own food was immense. To sum it up, the production of oyster mushrooms is an excellent way for students to learn about sustainable agriculture and grow their own food. With minimal resources and passion, anyone can get started in this exciting field and enjoy the benefits of producing fresh, healthy, and delicious mushrooms.

Need for Biodiversity Conservation

By Maziya Fernandes {S.Y. B.Sc. (Hons.) Agri.}

Biodiversity is the main characteristic of nature which serves as the very basis of ecological stability. A diverse ecosystem gives rise to diverse forms of life and diverse cultures that promote sustainability.

Our Biodiversity largely quenches human needs and safeguards human health. The forests, oceans, lakes, and rivers contain an abundance of food resources. Communities all over the world have developed knowledge and found ways to derive their livelihood from nature's diverse resources. Primitive men discovered tools, resources, skills, language and so on that gradually evolved and are used today by modern men.

For instance, many synthetic drugs including aspirin were first discovered in wild plants and animals. Previously, humans relied on species of wild and cultivated plants for medicines as a part of their primary healthcare.

Today, however, the biodiversity is under threat of extinction. To meet the need and greed of the increasing population, men have overused natural resources. Additionally, they have engaged in rapid industrialization, increasing pollution and further degrading the environment by producing acid rain and greenhouse gases among other issues.

The survival of diverse living organisms including humans is interdependent on each other. Animals and plants have a strong relationship with their habitat. But due to the destruction of the forest, many creatures became homeless and have now become endangered.

Large-scale poaching of animals for assets like the snake and mink for their skin, elephants for ivory, deer for horns, and whales for blubber have reduced the number of these species. There is a need to preserve species of animals that are getting endangered. Additionally, there is also a need to protect land. Increased grazing by animals is seen to be a significant threat to pastoral lands. It is believed that the famous Sahara Desert is now a result of overgrazing by the different tribes of herbivores.

Protecting the environment and biodiversity is a well-felt need all over the world. Globally, United Nations organized Earth Summits to gather stakeholders and discuss issues pertaining to the environment. The recent earth summit was held in

Sweden in June 2022, calling everyone to take responsibility to meet the Sustainable Developmental Goals (SGDs).

Owing to the importance and need to conserve biodiversity, the Government of India has set up several national parks and hundreds of sanctuaries all over the country, where hunting is strictly prohibited. The felling of trees is also under the control of the government.

Besides this, community awareness is an effective form of fighting for biodiversity as seen through the Chipko Movement in UP and Save Silent Valley in Kerala. Additionally, the distribution of educational material and organizing awareness sessions with the assistance of student volunteers, environment activists, and other social agencies can stress the need to conserve wildlife and can preserve our ecosystem at a local level.

Everything, In time.

By Chenoa Coutinho {Sr. B.Sc. (Hons.) Agri.}

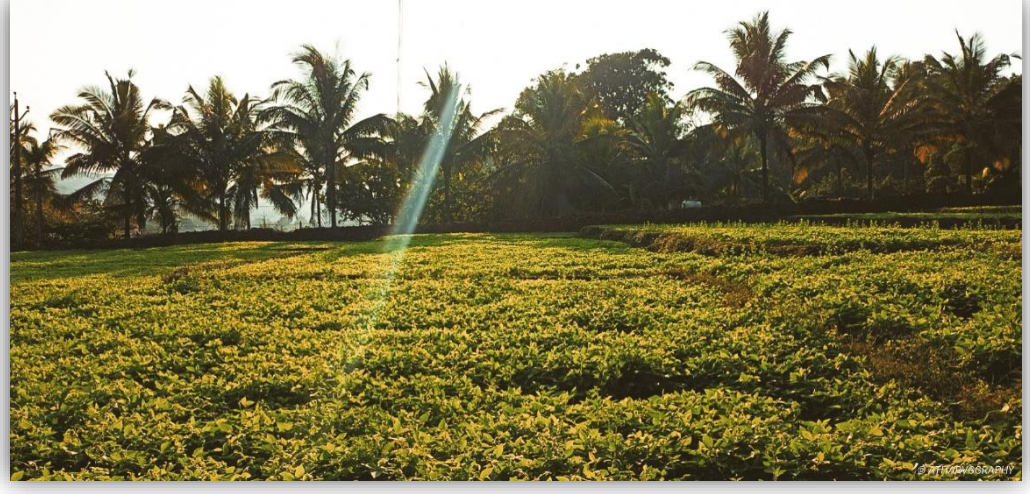
Everything, In time
Ahead, it's a climb,
A war between your heart and brain,
A fight to keep going forward,
A step closer to your goal.

Everything, In time
On the Battlefield,
Giving in your heart, mind, and soul,
That's the way you achieve the goal.

Everything, In time
Focus, on what can still be done,
Let go of what can't be fixed,
You've got this.

Everything, In time
You'll make it there,
You are a bright star,
Sayonara, to the faded,
Welcome, life.

Nature by Atharv Barve



Memoirs of the college exposure tour to the south of our beautiful country.

By Pamela De Souza {T.Y B.Sc. (Hons.) Agri.}

South India is known for a multitude of experiences; ranging from its diverse culture, architecture, cuisine, picturesque sights, educational institutes and, lush agricultural lands among others. Our 8 days journey began on 22nd March 2023 as we departed for Bangalore from Goa. A tour to visit the leading institutes equipped with courses and research related to agricultural sciences.

Day 1

Our overnight train journey commenced at 11:30 pm and ended at 12:30 pm as we arrived at Yeshwantpur station. Soon after, our bus arrived and we headed towards Kaveri Lodge to rest and freshen up. After a mini-resting session, we visited the National Bureau of Agricultural Insects Resources (NBAIR).

At NBAIR, we were greeted by Dr. Laximi, a research scientist who gave us a brief orientation of the campus, history, and the engagements of the institution. It was stated by her that they collect, conserve, and research on insecticides and, utilize insects that are important in the field of agriculture. Thereafter, Dr. Raghuvendra, another research scientist took over and gave us more insights about the institute. He then led us to the meeting hall where we watched a small video about the institute and the work conducted there. We observed and gained information from the head scientist on varied types of pests, insects, and predators reared in the premises that are generally found living off agricultural crops. A few of the insects we observed were Pumpkin Mealy Bugs reared on a pumpkin along with its predator Lady Bug Beetle. We also saw Eeri Silkworm reared with Castor leaves, Lacewing (*Chrysoperla carnea)*, eggs of Rice Moth (used as a host to its predators), andpests of Brassicaceae. After gaining knowledge, we departed from NBAIR and visited the ISKON temple and ended the evening sinking into the architectural beauty of the temple that houses many devotees in it.

Day 2

Today, we visited Gandhi Krishi Vigyana Kendra (GKVK). The orientation visit started in the entomology lab. It was very nice to see different types of insects which were collected by the institute. In particular, I found the Tortoise Beetle very fascinating. Insects like Lemon Butterfly, Dung rollers, and different types of beetles were also presented to us. Next, we saw the genetics section of the college which eventually led us to the agronomy lab and we were guided by the professor in charge who also explained to us in detail about the different apparatus used in the lab. These apparatus included the Kjeldhal Nitrogen Analyser, Leaf Area Meter, Thermostat, and Food Digester. After the agronomy lab, we visited the plant pathology lab. Here we were shown the oldest Herbarium specimens, which were preserved, one of which was given to the institute by Sir E.J. Butler, a leading Irish mycologist and plant pathologist. We were also explained the modern techniques of preserving different specimen. Additionally, we viewed a permanent slide composed of Anthracnose of pomegranate and were guided through the samples of diseases. At the horticulture lab, we saw the nursery which had different plants for sale, the tissue culture lab consisting of samples of bananas, and, the mango orchard

After GKVK, we visited the Vishweshvaraya Museum, where we saw different machines, the historical origins of seeds, the biotechnology section which included Mandel's laws, and the uses of medicinal plants.

Day 3

At the Indian Institute of Horticulture Research, we gained knowledge about the different varieties of plants grown and bred in the institute, the schemes offered to the students, and different resistant varieties sold to farmers. In the field, we saw flower plants like Gladiolus, Roses, Chrysanthemums, Lilies, and herbal plants such as cinnamon, clove, basil, water hyssop, and an orchard of dragon fruit and so on. We then visited the Lal Bhag garden. We enjoyed the scenic beauty and the view of different plants around the garden for almost 2 hours. The day ended with memories of beautiful plants from the garden.

Day 4

Early morning, the students and faculty departed from Bangalore by bus and arrived at Mysore by 11:00 am. Today was a relaxed day of sightseeing where we visited Mysore Zoo and Vrindavan Gardens. The zoo and garden were worth the visit as we saw different animals, reptiles, birds, flowering plants, and aged old trees among others.

Day 5

On day 5, we visited the famous Mysore Palace showcasing the history of the royal family, the Wadiyars, through beautiful architecture and historical artifacts. Concluding the 3-hour visit to Mysore Palace, we took a train journey to Ernakulam in the afternoon. All of us engaged in a game of UNO to keep our spirits high.

Day 6

Upon reaching the Ernakulam railway station at 4:30 am, we were picked up by the transport that took us to our lodge. Today, we visited the Coconut Development Board where the director explained to us about the products prepared from coconuts, their benefits and their uses. She also briefed us about coconut flowering and pollination. Next, we visited Central Marine Fisheries Institute in Cochin. It was very mesmerizing to see the aquatic creatures, different corals, Live and dead fish of various sizes, and sea algae. Later we visited the Kerala folklore museum. It was a great historic visit to view vintage jewelry, perfume bottles, tea time set up, and so on. In the evening we visited the backwaters of Cochin and enjoyed a boat ride there. We left for Kanyakumari by 8:00 pm.

Day 7

As scheduled, today we visited Swami Vivekananda Rock Memorial where every corner of the place reminded us of the life of Swami Vivekananda. The saint who influenced youth to be better and who made young people realize their worth and potential. Later, we visited the temple and Mahatma Gandhi Museum. The museum again depicted the life of Mahatma Gandhi. In the evening we visited a beach at Kanyakumari and headed off to Trivandrum for a stay at CTCRI.

Day 8

On the last day of our tour, we visited Potato and Tuber Crops Research Institute (CTCRI). At this institute, we learned many things about tubers and the products one can process out of them. We were also shown the machinery used for the processing and explained about the leaves of tubers being processed into biogas. Sir explained to us about different varieties of tubers also like yam, cassava, sweet potato, potato, and their nutritional values. Many of which are disease resistant, high yielding, and have a good starch content. It was a great experience at CTCRI. Finally, our memorable tour came to an end and we were on our way back to Goa. We boarded a train to Goa at 3:30 pm and arrived at 10:30 am.

Overall, it was a great tour filled with knowledge and experiences.

Significance of crop rotation and diversity.

By Sarah Pires {S.Y. B.Sc. (Hons.) Agri.}

Drive out monotony every beat, with
Crop rotation's utter heat!

Well, monotony is definitely very boring, so just think about it… if you keep growing the same crop over and over again on the same plot, what are the possibilities or the wrath the particular plot would face? Yes, it would lead to the multiplication of pests due to the monoculture that's prevailing as one would see in the classic example of rice and sugarcane that are constantly attacked by stem borers. Therefore, if we follow monoculture, the bacteria, and pests would have guaranteed their permanent residence as their favored food source would always be present for them.

Crop rotation includes using the same land to grow varied crops in recurrent succession. There are a variety of benefits if you opt for crop rotation on your farm. It helps in increasing soil fertility, and the yield of crops, and reduces the risk of soil erosion. Rotating the crops with legumes like Alfalfa beans and Soybeans is recommended because they reduce weeds and enrich the soil by partnering with nitrogen-fixing bacteria in the soil.

In order to avoid pests, one could try growing the crops a little earlier than usual. For this, you need to have a basic idea of when the pests could arise so that the loss of yield could be avoided. The focus should be laid on choosing crops with a short duration, so that they mature early. Diversification has shown to be very helpful for farmers as they would have the option to sell different products and no longer rely on a single crop and market price.

Crop rotation has its own set of disadvantages too. For instance, there is a risk that the initial costs could go higher for the purchase of any machinery and other resources that are required to make a profit. There could also be a potential risk of failure of yield due to other factors (biotic and abiotic) when only one type of crop is grown. There would be no yield for that particular season and the farmer would have to wait till the next season.

Improper implementation can be very harmful too. Each crop needs different types of attention, resources, and planting techniques that cost time and capital. The farmer should have adequate knowledge of crops, for instance, during which season the crop should be grown or during which phase the pests could attack. To avoid pest attacks, they could also consider using resistant crops. While engaging in crop rotation, farmers need to consider

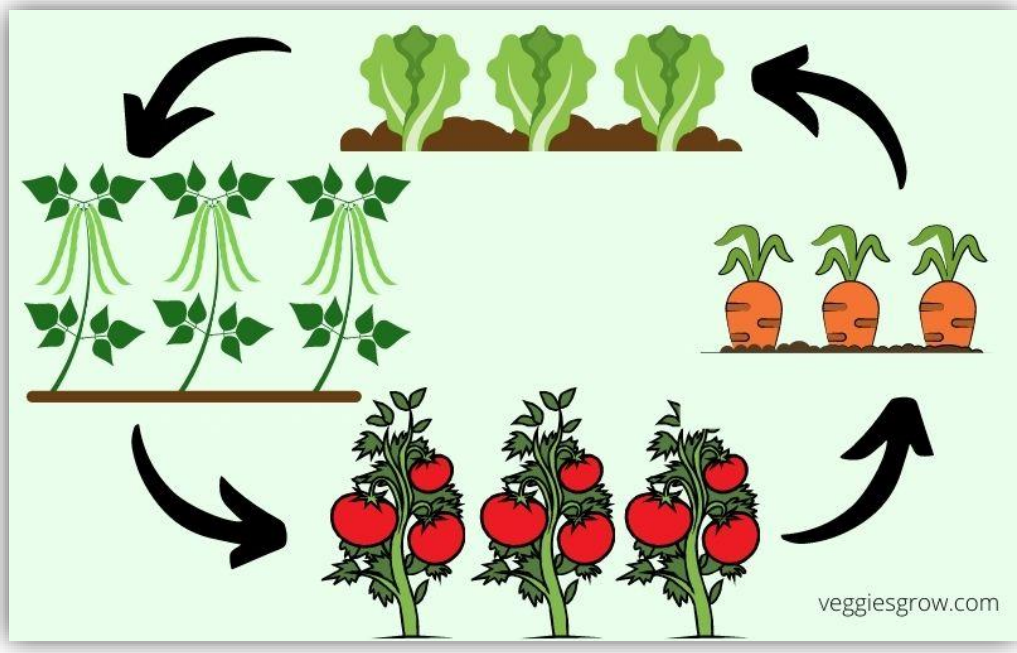
crops such as Alliums, legumes, Brassicas, Umbellifers, and Nightshades. Crop rotation does not allow a farmer to focus s on a single crop throughout the year on a large scale as it would damage the soil.

On the other hand, we see that certain locations and their climates are more favorable only for monoculture, meaning a certain kind of crop would only need a specific climate and soil type to grow effectively.

.

In closing, farmers need to effectively strategize the type of farming practices to be implemented in response to the resources available for a productive yield.

Image source: https://veggiesgrow.com/importance-of-crop-rotation/



Zonavoranchi Zomat
By Cleto Fernandes {F.Y. B.Sc. (Hons.) Agri.}

Adim zaito nachlo pavsant
Mellot toso bhovlom udkant
Onduchea vorsak bhazlo votant
Bebean hundrak sanglem xetant

Undran bebeachem dukh aikolem
Burkant bosun barik niall'lem
Tachem kalliz dukhamni bhorlem
Sorpan tem rokddench parkilem

Ravunk amkam na suvat
Sorpan mhollem soddun kat
Kosli hi mon'xachi zat?
Makodd uloilo haloit hat

Makddacho to aikun ulo
Dholintlo zago zalo kolo
Khorpit aplo lamb polo
Ekach nettan ghatlo kulo

Ek zomat apoili kolean
President-achi kodel ghetli xivan
Secretary-chem kam kelem hot'tean
Chav vanttli vagachea pettean

'Corruption' bond korunk vavurtole
Odikariank vochun melltole
Sogllea chorank bondkhonnint ghaltole
Osle zaite nirnnoi ghetle

Nitoll udkachim tollim puroilim
Xetant 'building'-am bandun kaddlim
Zaitim pixaponnam mon'xan kelim
'Illegal Construction'-acher ulovpam zalim

Kansvan dolle motte kele
Axechea 'builder'ak xirap soddle
Montreank bori budh xikoitole

Kheteanche pette ragan uloile

Zomat bhorich vhoddli zali
Ratchea barank ti sompli
Chaniek bhorich nihid aili
Anxvelan tika forsan uttloili

Vakho ho zonavoranche zomaticho
Bariksannen tacher niall korcho
Fuddar amchea hea monisponnacho
Koslo zatolo polloun gheumcho

Finding inner peace among nature by Parth Prabhu Velguenkar