ONLY NEWS PAPER PUBLISHED IN INDIA FOR SCIENTIFIC COMMUNITIES

NESA

NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

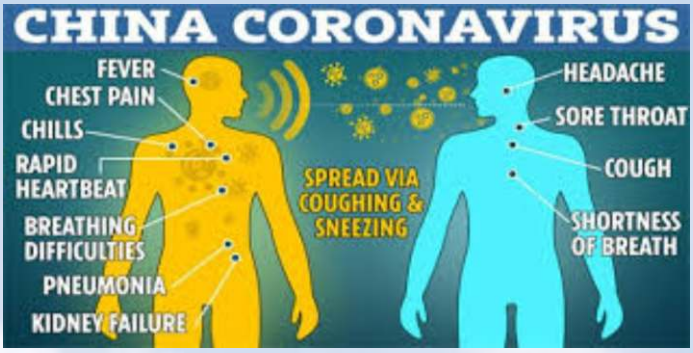
Vol. 22 Issue - 12 (MONTHLY) December 2019

NOVEL CORONA VIRUS (2019N COV) AND OUR CONCERN

Sajid Husain, Ph.D., Professor
Department of Microbiology
Ch. Bansi Lal University, Bhiwani, Haryana, India
Email: *professorshusain@gmail.com*

We have heard a lot about corona viruses that have killed many peoples in 2003& 2012 AD from severe acute respiratory syndrome(SARS) and Middle East respiratory syndrome(MERS). However the first case of corona virus (CoV) infection came to our knowledge, was in the year 1960. Corona virus generally but not often, infect to human& animal as well. Corona viruses have a crown like structure, therefore they are being called as corona viruses, have single stranded RNA, causing airborne infections. If it infects to animals like pigs or cows causes diarrhea, but in birds is responsible for upper respiratory tract diseases. Corona virus infections manifest symptoms similar to that of cold causing viruses like rhinovirus induced pathogenicity, as sneezing, coughing and short of breathing. In addition to aforesaid symptoms when infection reaches to lower respiratory tract, may cause pneumonia, heart disease, kidney failure, and complex infections among people with weakened immune system.

Recently on December 31st.2019, information about 2019-nCoV was reported from China (Wuhan city, a Center of origin)here "n" representing novel corona virus because it was different in symptomatology from reported corona virus infections to humans. The present novel corona virus spreads through



sneezing, coughing, touching objects like(already contaminated through infected patients), door-knob, tears soaked clothes or tears, nasal droppings, hand shake & face touching.

There are reports that more than 41 people have been died (3 cases out of China) and sero-positive cases increasing day by day beyond 1000 reported in this week ending January 25, 2020. The virus has been routed to Japan, Hong Kong, Saudi Arabia, USA, Taiwan, Russia, Australia, France and Malaysia also including many more countries from where reports are yet to be awaited.

The different countries have established the screening centers at all entry points. So that quarantine may be done at very nascent stage of controlling machinery.

There is no vaccine available for this new virus, common medicine prescribed as for rhino or influenza viruses are recommended. Further studies like novel virus sequence & immunological responses are yet to be studied before synthesizing targeted medicines and developing a potent vaccine, stopping secondary pathogen emergence.

Therefore, it is recommended to do rest, intake plenty of water and use humidifiers. So it is advised,"***prevention is always better than cure***".

NANOTECHNOLOGY FOR SUSTAINABLE AGRICULTURE: THE STATE OF THE SCIENCE AND RECENT DEVELOPMENTS

Abhishek Singh[1], Alok Kumar Singh[1], Vishnu D Rajput[2] and R.S. Sengar[1]
Department of Agricultural Biotechnology
Sardar Vallabhbhai Patel University of
Agriculture and Technology, Meerut[1].
Southern Federal University Rostov-on-Don, Russia[2].
Corresponding author: *intmsc.abhi@gmail.com*

Nanotechnology is manipulation or self-assembly of individual atoms, molecules, or molecular dusters into structures to create materials and devices with new or vastly different properties. Nanotechnology can work from the top down (which means reducing the size of the smallest structures to the Nano scale smallest e.g. photonics applications in Nano electronics and Nano engineering) or the bottom up (which involves manipulating individual atoms and molecules into nanostructures and more closely resembles chemistry or biology).

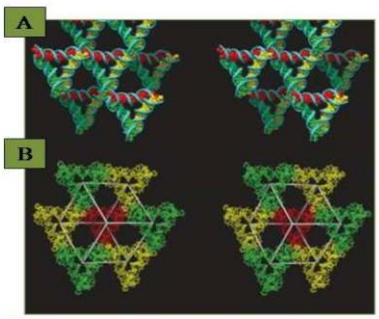
Agriculture forms the backbone of third world economics. Research in Agriculture has always dealt with improving the efficiency or crop production, food processing, food safety and environmental consequences of food production, storage and distribution. Recently, scientist have started using application of nanotechnology to deliver the genes to specific sites at cellular levels and rearrange the atoms in the DNA of the same organism to get expression of desired character, thus skipping the time consuming process of transferring the gene from the foreign organisms. In the management aspects, efforts are made to increase the efficiency of applied fertilizer with the help of nano clays and zeolites and restoration of soil fertility by releasing fixed nutrients. Research on smart seeds programmed to germinate under favorable conditions with Nano polymer coating are encouraging.

In the controlled environment, agriculture and precision farming input requirement of crops are diagnosed based on enhancing the quality of the natural needs and delivered in the required quantities in right time at right place conscientious effort to provide a with the help of nanobiosensor and satellite system. Nanoherbicides are being developed to address the problems in perennial weed management and exhausting weed seed bank. Remediation of environmental contamination of the industrial waste and agricultural chemicals like pesticide herbicide residue are possible through metal nanoparticles. A reappraisal of attitudes towards food security, increasing emphasis on environmental compliance and alternations to the Common Agricultural policy all combine to make farming and rural land owning far less profitable than in previous times. In agriculture and food systems, the fundamental life processes are explored through research is molecular kind cellular biology. New tools for molecular and cellular biology are needed that are specifically designed for separation, identification and quantificationof individual molecules. This is possible with nanotechnology and could permit rapid advances in agriculture research, such as reproductive science and technology, conversion of agricultural and food wastes to energy and other useful byproducts through' enzymatic Nanobioprocessing, disease prevention and treatment in plants and animals. To excel in these and other areas or agriculture and required novel tools that allows us to work and explore living cells and biomolecules at the molecule scale. Nanotechnology holds such a promise.

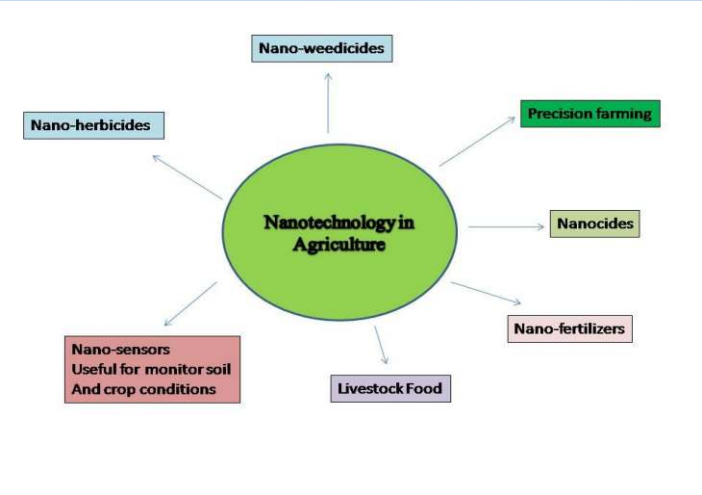
Application and Benefits: Nanotechnology has the potential to revolutionize the agricultural and food industry with new tools for the molecular treatment of diseases, rapid disease detection, enhancing the ability of plants to absorb nutrients etc. Smart sensors and smart delivery systems will help the agricultural industry combat viruses and other crop pathogens. Precision farming has been a long-desired goal to maximize output (i.e. crop yields) while minimizing input (i.e. fertilizers, pesticides, herbicides, etc.) through monitoring environmental variables and applying targeted action. Precision fanning makes use of computers, global satellite positioning systems, and remote sensing devices to measure highly localizeden iron mental conditions thus determining whether crops are growing at maximum efficiency or precisely identifying the nature and location of problems.

By using centralized data to determine soil conditions and plant development, seeding, fertilizer, chemical and water use can line-tuned to lower production costs and potentially increase production- all benefiting the farmer. Precision farming can also help to reduce agricultural waste and thus keep environmental pollution to a minimum. Although not fully implemented yet, tiny sensors and monitoring systems enabled by nanotechnology will have a large impact on future precision farming methodologies. One of the major roles for nanotechnology-enabled devices will be the increased use of twig memos sensors linked into a GPS system for real-time monitoring. These Nano sensors could be distributed throughout the field where they can monitor soil conditions and crop growth. Wireless sensor; ate already being used in certain parts of the USA and Australia. To maintain crop yields. Integrated Pest Management systems, which mix traditional methods of crop rotation with biological pest control methods, are becoming popular and implemented in many countries, such as India. In the future, Nano scale devices with novel properties could be used to make agricultural systems -smart". For example, devices could be used to identify plant health issues before these become visible to the farmer. Such devices may be capable of responding to different situations by taking appropriate remedial action. If not, they will alert the farmer to the problem.

Other companies employ suspensions of Nano scale particles (Nano emulsions), which can he either water or oil-based and contain uniform suspensions of pesticidal or herbicidal nanoparticles in the range of 200-400 nm. These can be easily incorporated in various media such as gels, creams; liquids etc. and have multiple applications for preventative measures, treatment or preservation of the harvested product. In other area scientist are working on various technologies to make fertilizers and pesticide delivery systems which can respond to environmental changes. The ultimate aims to tailor thes e products in such a way that they



(A) Stereographic image of the surrounding of triangle.
(B) Stereographic image of the rhombohebral (White lines) formed by triangles
Source: ISAAA



will release their cargo in a controlled manner (slowly or quickly) in response to different signals e.g. magnetic fields, heat, ultrasound, moisture, etc. New research also aims to make plants use water, pesticides and fertilizers more efficiently, to reduce pollution and to make agriculture more environmentally friendly.

Implications of Nanotechnology

Potential risks of nanotechnology can broadly be grouped into three areas:

- the risk to health and environment front nanoparticles and nanomaterial's;
- the risk posed by molecular manufacturing (or advanced nanotechnology);
- Societal risks.

Nanotechnology concern the ethical and social issues associated with development in nanotechnology, a science which encompass several fields of science and engineering, including biology, chemistry, computing. And materials science. Nanotechnology refers to the manipulation of very small-scale matter – a nanometer is one billionth of a meter, and nanotechnology is generally used to mean work on matter at 100 nanometers and smaller.

Social risks related to nanotechnology development include the possibility of military applications of nanotechnology (such as implants and other means for soldier enhancement) as well as enhanced surveillance capabilities through Nano-sensor. However those applications still belong to science-fiction and will not be possible in the next decades. Significant environmental, health, and safety issues might arise with development in nanotechnology since some negative effects of nanoparticles in our environment might be overlooked. Such issues include potential occupational safety and health concerns for those involved in the manufacture of nanotechnologies. However nature itself creates all kinds of Nano objects, so probable dangers are not due to the Nano scale alone but due to the fact that toxic materials become more harmful when ingested or inhaled as nanoparticles.

Nanotechnology use in different areas in agricultural:

Nano-Fertilizers: Fertilizers play a pivotal role in agricultural production. It has been unequivocally demonstrated that fertilizer contribute to the tune of 35-40% of the productivity of any crops. Without the fertilizer input, it is hardly possible to sustain agricultural productivity of our country.

Considering its importance, the Government of India is heavily subsidizing the cost of fertilizers, particularly urea to encourage farmers to use them to promote productivity of crops. This resulted in imbalanced fertilization and occurrence of nitrate pollution in ground waters. In the past few decades, use efficiencies of N, P and K fertilizers remained constant as 30-35%, 18-20% and 35-40%, respectively, leaving a major portion of added fertilizers stay in the soil or enter into aquatic system causing eutrophication. Attempts are being made to synthesize nano-fertilizers in order to regulate the release of nutrients depending on the requirement of crops. A very few nano-fertilizer formulations have been synthesized in China, Germany and USA and are being tested under laboratory conditions. This process increases the nutrient-use efficiencies, besides preventing environmental hazard. Carbon nano-tubes (CNTs) are nanomaterials widely used inbiological and material sciences Single and multiwall carbon nano tubes are commercially available to carry out smart delivery of water nutrients and medicines etc. CNT carries extensive surface area they have the potential to regulate the moisture under constraints of irrigation or drought conditions. The approaches include nano-polymer for seed hardening, nano-sensors, nano-barcodes, use of nanomagnetic particles for aerial seeding etc.

Use in Food Systems 0

Since food systems encompass food availability, access and utilization, the scope of applications of nanotechnology for enhancing food security must encompass entire agricultural production—consumption systems. Further, in a rapidly globalizing economy, increasing access to food and its utilization in rural areas will be determined primarily by increase in rural incomes. The primary source of increasing rural incomes has been recognized as value addition across the different links in the agricultural production—consumption chain. These links include farm inputs, farm production systems, postharvest management and processing and finally markets and consumers. From the food security perspective, it is therefore necessary that application of nanotechnology be not limited to the farm production level, but be extended across all the links of the agricultural value chain to increase agricultural productivities, product quality, consumer acceptance and resource use efficiencies. This will s help to reduce farm costs, raise the a value of production, increase rural incomes and enhance the quality of the natural resource base of agricultural production systems. In doing so, it is important to view nanotechnology as an enabling technology that can complement conventional technologies and biotechnology. Considering the concerns on biosafety and consumer acceptance emerging after agro biotechnology based-products have entered the market place during last two decades, it is also essential that integrating and deploying new technologies like nanotechnology in agricultural and food systems be made after understanding the various societal and environmental implications.

Nanotechnology and soil science

Nanotechnology (NT) is being visualized as a rapidly evolving field that has potential to revolutionize agriculture and food systems and improve the conditions of the poor. Nanotechnology when applied as a tool, in tandem with other measures, can seek to address some of the world's most critical sustainable development problems in the areas of water, energy, health and environment, agriculture, and biodiversity and ecosystem management. These five areas, collectively known as WEHAB, were identified in the 2002 United Nations Johannesburg Summit on Sustainable Development (Report of the World Summit on Sustainable Development, 2002). A UN Survey on potential applications of nanotechnology in developing countries identified agricultural productivity enhancement as the second most critical area of application for attaining the millennium development goals while

energy conversion and storage was ranked first and water treatment as the third areas needing focus. Similar to the water-saving nano-membranes, along with zeolites and hydrogels, there are other applications of nanotechnology to soil science. There are also new analytical techniques for characterization of soil properties.

Crop Improvement: Nanotechnology has also shown its ability in modifying the genetic constitution of the crop plants thereby helping in further improvement. Mutations both natural and induced have long since played an important role in crop improvement. Instead of using certain chemical compounds like MMS, EMS and physical mutagens like X-ray, gamma ray, etc. for conventionally induced mutation studies, nanotechnology has showed a new dimension in mutation research.

Challenges

There are new challenges in this sector including a growing demand for healthy, safe food; an increasing risk of disease: and threats to agricultural and fishery production from changing weather patterns. However, creating a bio economy is a challenging and complex process involving the convergence of different branches of science.

Future prospects

In the near future nanostructured catalysts will be available which will increase the efficiency of pesticides and herbicides, allowing lower doses to be used. Nanotechnology will also protect theenvironment indirectly through the use of alternative (renewable) energy supplies, and filters or catalysts to reduce pollution and clean-up existing pollutants.

Summary: Globally, many countries have identified the potential of nanotechnology in the agri-food sector and are investing a significant amount in it. The United States Department of Agriculture (USDA) has set out ambitious plans to be achieved in the short, medium and long term, and aims to discover novel Phenomena, processes and tools to address challenges faced by the agricultural sector. Equal importance has been given to the societal issues associated with nanotechnology and to improve public awareness. Other development in the Agricultural Sector due to Nanotechnology Agriculture is the backbone of most developing countries, with more than 60% of the population reliant on it for their livelihood. As well as developing improved systems for monitoring environmental conditions and delivering nutrients or pesticides as appropriate, nanotechnology can improve our understanding of the biology of different crops and thus potentially enhance yields or nutritional values. In addition, it can offer routes to added value crops or environmental remediation. Particle farming is one such example, which yields nanoparticles for industrial use by growing plants in defined soils. For example, research has shown that alfalfa plants grown in gold rich soil absorb gold nanoparticles through their roots and accumulate these in their tissues. The gold nanoparticles can be mechanically seprated from the plant tissue following harvest.

FLAVONOIDS- ROLE AS ANTICANCER AGENT

Debolina Roy[1], Arnab Chakravorty[2] and Deepshikha Gupta[*3]
Amity Institute of Applied Sciences
Amity University, Sector 125, Noida-201301
E-maiL; [1]debolinautsavroy@gmail.com;
[2]arnchakchemi@gmail.com; [*3]dgupta2@amity.edu

INTRODUCTION

Today, the occurrence of cancer has become very prevalent especially high rate of breast cancer has been diagnosed in women, prostate cancer and mouth cancer in men. The link between a diet rich in fruits and vegetables and reduction in occurrence of health daunting diseases has been evidenced by many researchers with partial role of polyphenols too. Major sources of polyphenols are fruits, vegetables, tea, oils and seeds. Flavonoids are diverse group of polyphenol phytonutrient responsible for vivid colours in fruits and vegetables. Chemically, flavonoids have the general structure of a 15-carbon skeleton, which consists of two phenyl rings (A and B) and a heterocyclic ring (C). This carbon structure can be abbreviated C6-C3-C6 as depicted in figure 1. The various classes of flavonoids based on their structure are flavonols, flavones, flavonones, flavanols, anthocyanidins, isoflavones, flavonols, chalcones, catechins, flavans, dihydrochalcones and bioflavonoids.

All the major classes of flavonoids have anti-cancer properties.

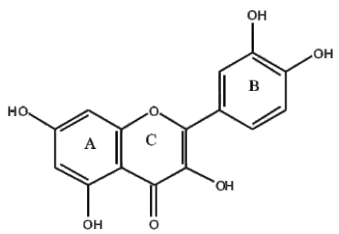


Figure 1: Flavonoid (2-phenyl-1,4-benzopyrone backbone)

1. **FLAVANOLS:** these are present in apples, chocolates, strawberries, green and black tea. They have inverse effects towards human oral, prostrate and rectal cancer.
2. **ANTHOCYANIDINS:** the major sources are blueberries, blackberries, aubergine and black currant and can fight against colorectal cancer.
3. **FLAVONES:** these are present in onions, lemon juice, grape juice, kale, cherries, broccoli, capsicum etc. and have the ability to fight against a number of cancers including- lung cancer, thyroid cancer, leukaemia, oral cancer, breast cancer, stomach, laryngeal and colon cancers.
4. **ISOFLAVONOIDS:** these are present in soya beans, soy milk, beer etc. and possess high potential to fight against breast cancer, thyroid cancer, and kidney cancers etc.

Role of Flavonoids in cancer cell biology

This section explains how flavonoids show their anti-cancer effects. It has been experimentally found out that they often as act enzyme inhibitors and ligand receptors which are responsible for signalling mutations or are important for the growth and metastasis of cancer cells. Flavonoid-protein interactions together with their anti-cancer properties are the key features for their anti-cancer effects. These interactions are either electrostatic of through Van-der Waals'. Due to phenolic promiscuity in the cell nucleus the flavonoids can bind to the cell-nuclear structures including DNA, RNA, Histones etc., and hence help in flavonoid-protein interactions.Flowchart depicting the transformation of a normal cell into a cancer cell and role of flavonoids as anticancer agent due to their capacity to bind to certain enzymes and proteins.

1. Inhibition of Pro-oxidant enzymes: ROS i.e., Reactive Oxygen Species such as superoxide ion, hydrogen peroxide and hydroxyl radicals are a major requirement for tumour promotion and proliferation.ROS plays an important role in DNA damaging which leads to mutagenic signalling, resistance to apoptosis and activation of prooncogen enzymes such as cFOS and cJUN.Lipoxygenases (LOX), Cyclooxygenases (COX) and Xanthine Oxidases (XO) are common metalloenzymes whose catalytic cycle involves the release of a large amount of ROS and hence would aid in the growth of cancer cells. Flavonoids, due to their anti-

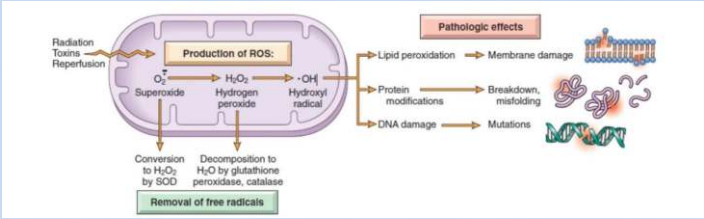


Fig. 2: The generation, removal and role of ROS in cell injury. The ROS produced in cell are removed spontaneously by specialized enzymes. Excessive production of ROS leads to their accumulation in cells leading to damage of lipids, proteins and DNA causing cell injury.

oxidant and anti-inflammatory properties inhibit these prooxidant enzymes and hence decrease the amount of ROS. It was found that NOX-I which is an enzyme producing superoxide ion-an ROS, is overexpressed in colon and prostate cancer aiding the growth of these cancer cells. Figure 2 depicts the generation of ROS species in the mitochondria of a cell that may be responsible in membrane damage due to lipid peroxidation.

2. Modulate the metabolism of carcinogens: The activation of procarcinogen to a carcinogen is an important step in carcinogenesis and flavonoids can affect this step. Flavonoids exert their effect on this step by two possible pathways.

- Interaction with phase-I enzymes such as Cytochrome P450.
- Interaction with phase-II enzymes to increase the hydrophilicity and hence the removal of these compounds from the body.

Phase-I enzymes help in the metabolic activation of pro-carcinogens such as polyaromatic hydrocarbons (PAHs) to carcinogens (PAHs epoxides). CYP P450 monooxygenases have many isoforms such as CYP 1A1, 1A2, 1B1 which play a key role in the metabolism of xenobiotic including carcinogens. CYP-flavonoid interactions can induce and eventually inhibit the biosynthesis of CYP 1A1 by interacting with aryl hydrogen receptors (ArH) which inhibit the gene expression for CYP 1A1. Flavonoids (especially quercetin) have the capacity to directly bind to several CYP isoforms involved in xenobiotic mechanisms and inhibit the enzyme activity. The CYP P450-Flavonoid complex formed is a neutralized toxin which is lipophilic in nature and has to be converted into a more hydrophilic form which is done in phase-II detoxification.Xenobiotic, drugs and flavonoids follow the same course of metabolism. As these compounds are lipophilic in nature, so the first step involving the conjugation of these drugs to increase their hydrophilicity is a key step in their metabolism. This step is performed by the phase-II enzymes. Flavonoids have also been demonstrated to activate these phase-II enzymes and thereby increase detoxification and elimination of carcinogens from the body. Figure 3 a-b shows how various phase-II enzymes using given required nutrients convert the lipophilic neutralized toxin into a more hydrophilic form so that it can be easily removed from the body.UDPglucuronosyltransferases (UGT), a phase-II enzyme, use UDP-glucuronic acid as an important agent during glucuronidation and transfer glucuronic acid to available substrates thereby making them more water soluble and facilitating their excretion in the urine or bile. Similarly, sulfotransferases (SULT), a phase-II enzyme catalyse the transfer of a sulfonate group, glutathione S-transferases (GST) transfer glutathione and N-acetyltransferases transfer acetyl moiety to an appropriate substrate. It has been shown that all these phase II enzymes are affected by flavonoids in cell and Induce apoptosis and cell cycle arrest.

3. Induction of Apoptosis and cell cycle arrest:

Apoptosis is the programmed death of a cell to eliminate the unwanted parts. Oncogenesis is a result of dysregulation of apoptosis and cell-cycle arrest. There are certain genes such as p53 which plays a pivotal role as tumour suppressor by controlling apoptosis and cell cycle arrest by binding to regulatory DNA sequences and activating the inhibition of genes involved in apoptosis (s.a. PERP, NOXA, PUMA). Epigallactocatechin gallate (EGCG) – a flavonoid is very potent in inducing apoptosis by activating p53 and p73.Nuclear factor-kappa B (NF-rB) family of transcriptionfactors consists of five members which have genes such as p50, p52, p65 (Rel A),c-Rel, and Rel B, which can stop the process of apoptosis. NF-rB is activatedby free radicals, inflammatory stimuli, cytokines, carcinogens, tumour promoters, endotoxins, c-

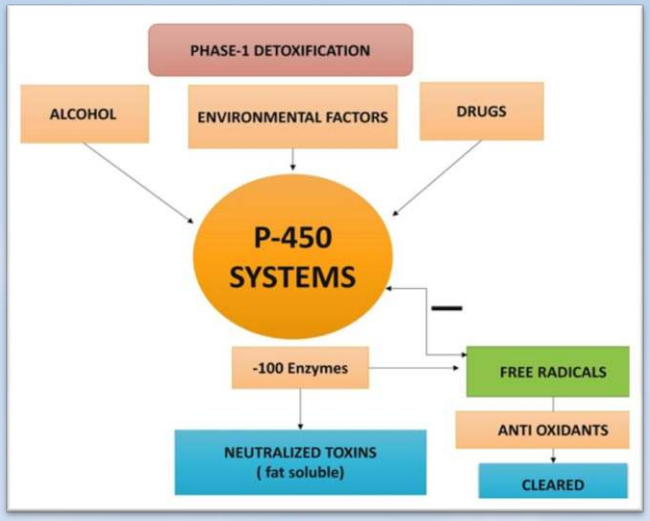


Fig.3a: Phase-1 Detoxification.

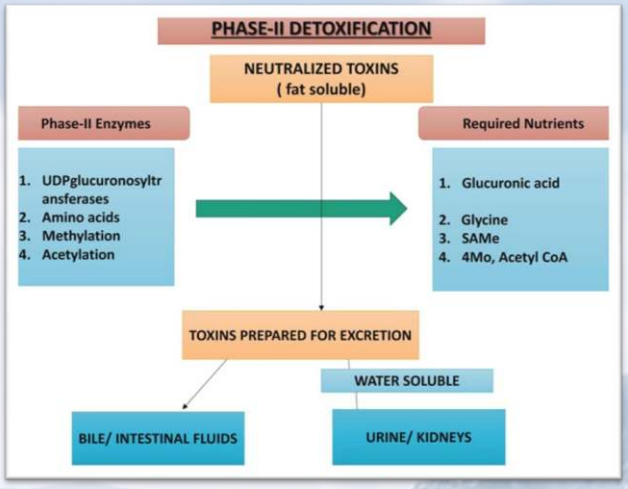


Fig. 3b: Phase-2 Detoxification.

radiation, ultraviolet(UV) light, and X-rays and induces NF-rB target genesimportant for cellular growth and transformation, suppressionof apoptosis, invasion, metastasis, chemo resistance, radio resistance, and inflammation. Flavonoids mayblock one or more steps in the NF-rB signalling pathway which can supress the growth of genes coding for stopping apoptosis.

4. Role as Angiogenesis Inhibitor:

Angiogenesis is the formation of new blood vessels. This is a crucial step for angiogenesis as it helps in the diffusion of nutrients and oxygen required for the growth and proliferation of cancer cells. They are also important for the proliferation and migration of endothelial cells and lumen formation. Flavonoids act as angiogenesis inhibitors and thus have therapeutic applications in cancer treatment. Genistein is an extremely potent inhibitor of angiogenesis along with isoflavones such as genistein, daidzein.

Figure 4 depicts the transition of normal cell into a cancer cell. Initiation happens as result of various carcinogens such as UV rays, nicotine etc. which can cause mutations in the DNA that leads to the genes coding for cancer cells. During initiation the free radical generation is enhanced. They damage the DNA and hence play an important role in the development of cancer. Phase-I enzymes such as CYP P450 1A1 which activate the pro-carcinogens to carcinogens, also gets activated whereas phase-II enzymes which help in the removal of neutralized toxins from the body by increasing their hydrophilicity gets inactivated. Once initiated the balance between proliferation and apoptosis is disturbed and there is no cell cycle arrest and also inhibition of apoptosis occurs which results in increased tumour growth.The growing benign tumour takes ROS from

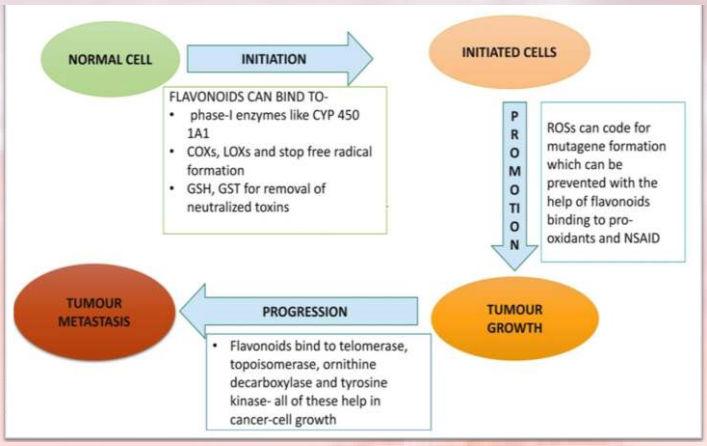


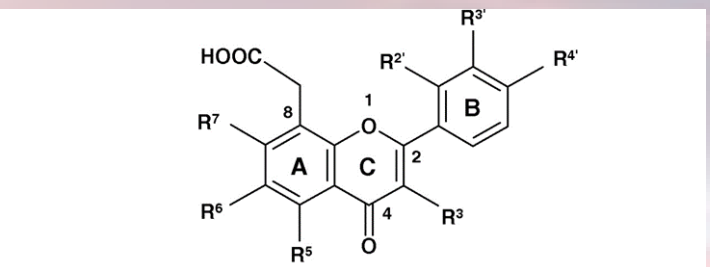
Fig. 4: Flowchart depicting the transformation of a normal cell into a cancer cell and role of flavonoids as anticancer agent due to their capacity to bind to certain enzymes and proteins.

prooxidant enzymes like COXs required for their growth and proliferation. Cytokines such as Tumour Necrosis Factor (TNF) play an important role in regulation of immune cells, apoptosis and inhibiting tumerogenesis and is supressed during cancer cell growth. They take up nutrients from the growing blood vessels and Oxygen from ROS and metastasise and the benign tumour changes into a malignant one and forms cancer.Flavonoids can stop the process of carcinogenesis at various steps by binding to various enzymes and proteins which aids the growth of cancer cells, formation of mutagene etc. Flavonoids bind to the CYP isoforms such as CYP 450 1A1 and forms a complex which stops the procarcinogen from changing into carcinogens and also becomes a neutralized toxin.ROS, electrophiles and free-radicals can result in the formation of a mutagene due to DNA damage. Flavonoids binds to the prooxidant enzymes (COXs, LOXs) which release these free radicals and ROS and hence prevent the promotion of cancer. NSAID are anti-inflammatory medicines. Flavonoids also bind to the phase-II enzymes such as GSH, GST and help in the removal of the removal of phase-I neutralized toxins by increasing their hydrophilicity. Telomerase enzyme normally helps in cell-aging but in cancer its activity is altered making the cell immortal by preventing shortening of telomeres in the chromosome. Topoisomerase normally unwinds extra coils in the DNA but during carcinogenesis this process too is disrupted leading to an abnormal structure of DNA.Ornithine decarboxylase (ODC1 gene) catalyses the conversion of ornithine to putrescine which is a precursor of polyamines-essential for cell proliferation.Tyrosine kinase causes the phosphorylation of tyrosine which can result in unregulated growth of cells which is important for the proliferation of cancer cells. Flavonoids binds to all these above mentioned enzymes and prevents the growth of cancer cells in the body or formation of mutagenes.

Some Important Flavonoids used as anticancer agents

a) FISETIN: Its IUPAC name is 2-(3,4-dihydroxyphenyl)-3,7-dihydroxychromen-4-one and is a plant polyphenol from the flavonol group. It can be found in many plants, where it serves as a colouring agent. The main sources of are strawberries, apples, persimmons, onions, cucumbers, wine and tea. Fisetin exhibits ant proliferative, anti-angiogenic and antioxidative properties required to reduce the growth of cancer-cells and also promotes apoptosis.The role of Fisetin as one of the best anti-cancer agents is discussed below:

i) Fisetin blocks the PI3K/AKT/mTOR pathway which is directly related to cellular quiescence, proliferation of cells for cancer growth and in many cancers, this pathway is overactive and hence inhibits apoptosis.
ii) Fisetin has been shown to be an anti-proliferative agent and also a topoisomerase inhibitor.
iii) It can also inhibit the activity of pro-inflammatory cytokines, TNF-αand most importantly- Nuclear factor kappa B which is responsible for inhibiting apoptosis during carcinogenesis.



Flavone-8-acetic acid (FAA) and its hydroxylated derivatives

Compound	R2'	R3'	R4'	R3	R5	R6	R7
Flavone-8-acetic acid (FAA)	H	H	H	H	H	H	H
2'-OH FAA	OH	H	H	H	H	H	H
3'-OH FFA	H	OH	H	H	H	H	H
4'-OH FAA	H	H	OH	H	H	H	H
3-OH FAA	H	H	H	OH	H	H	H
5-OH FAA	H	H	H	H	OH	H	H
6-OH FAA	H	H	H	H	H	OH	H
7-OH FAA	H	H	H	H	H	H	OH

Fig. 6 : Flavone-8-acetic acid and its hydroxylated derivatives

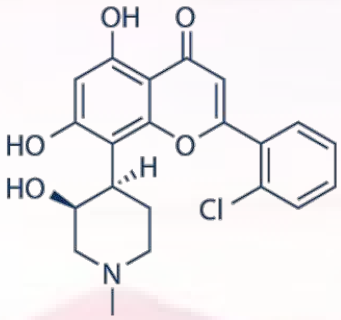


Fig. 7: Structure of Flavopiridol

iv) It also acts as a powerful reducing agent chemically reacting with the ROS species and hence neutralizing them.
v) Fisetin is able to scavenge free radicals as a result of its electron donating capacity, which is due to the presence of two hydroxyl groups on one ring and a hydroxyl group on another ring.

Hence after administering a cell with Fisetin the colony-forming tendency of cancer cells decreases and as it blocks all the pathways which result in inhibition of apoptosis-therefore apoptosis of cells occur and their numbers start decreasing and finally cell cycle arrest also occurs in the G2/M phase.

b) FLAVONE-8-ACETIC ACID: This is a synthetic flavonoid with vascular targeting properties and has excellent properties to reduce tumour blood flow. FAA exhibits anti-proliferative effects on the endothelial cells and as a result of a superoxide-dependent mechanism, which induces changes in permeability of the vasculature of the tumour. Due to this,

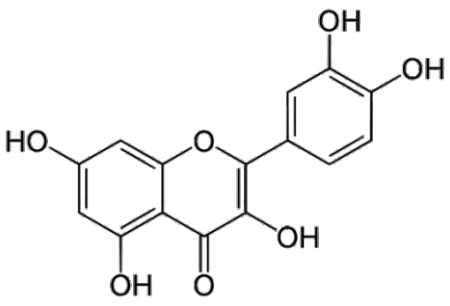


Fig. 8: Structure of Quercetin

tumour necrosis and promotion of shunting of blood flow to viable regions of the tumour occurs, increasing their oxygenation and rendering them more susceptible to the antitumor effects of hyperthermia and ionizing radiation which ultimately kills the tumour cells. FAA also has its effect on cell cycle arrest.It was experimentally observed FAA-mediated G2/M cell cycle arrest in mammary carcinoma cells at a concentration which previously showed anti-tumour effects in rodent models. The cell cycle arrest was accompanied by an increase in the P34cdc2 (cdc2) cyclin-dependent kinase activity.

c) FLAVOPIRIDOL: Flavopiridols, a synthetic flavones are highly potent in the inhibition of CDKs- 1, 2, 4 and 7 and clearly blocking cell cycle progression at G1/S & G2/M boundaries.Pre-clinical studies showed that it could induce programmed cell death, promote differentiation, inhibit angiogenic processes and modulate transcriptional events. It is also the first cdk inhibitor to be tested in clinical trials.Flavopiridols bind to the ATP-binding site of CDKs, resulting in reversible, competitive enzyme inhibition at concentrations of less than 100 nM. It is a relatively nonspecific CDK inhibitor and inhibits all CDKs, (it is a bit less effective against CDK7). Flavopiridols induces G1S or G2M arrest, presumably a consequence of inhibition of CDK1 and CDK2. Flavopiridols may also act to block cell cycle progression by down regulating cyclin D1 levels, inhibiting the CDK-activating complex (CDK7), or both and thus causing cell-cycle arrest effectively.

It also results in direct and indirect inhibition of receptor activation (EGFR) and/or a direct inhibition of kinases (pp60 Src, PKC, Erk-1) involved in the signal transduction pathway so that it could play a role in the antiproliferative activity of flavopiridol.Its other antitumoral activity included high rate of apoptosis, especially in leukemic cells; synergy with the antitumoral activity of many cytostatic; independence of its efficacy on pRb, p53 and Bcl-2 expression; lack of interference with the most frequent multidrug resistance proteins (P-glycoprotein and MRP-190); and a strong antiangiogenic activity.

d) QUERCETIN: (3,3′,4′,5,7-pentahydroxyflavone): Quercetin is one of the most abundant dietary flavonoids. It is found in onions, citrus fruits, broccoli, tomatoes, red wine and black tea. It was found that quercetin at various concentrations, suppresses tumour growth of various cancer cell lines which include breast, colorectal, stomach, lung, ovarian, melanoma and leukaemia. Due to its anti-oxidant and anti-inflammatory actions it is used to treat cancer. It has a special ability to scavenge ROSs and an ability to inhibit the enzymes responsible for activation of carcinogens. The polyphenolic chemical substructure stops oxidation by acting as a scavenger of free radicals that are responsible for oxidative chain reactions. It is a non-specific protein-kinase enzyme inhibitor . Quercetin are potent inhibitors of sulfotransferases 1A1-this is important for the chemoprevention of sulfation-induced carcinogenesis.

Conclusion

Flavonoids greatly influence the cascade of immunological events associated with the development and progression of cancer. By understanding their mechanism of action with various organelles, enzymes and proteins we can better utilize them and their potential as anti-cancer agents can be better exploited. They have the potential to control cell proliferation, stop the process of angiogenesis wherever needed, are extremely good anti-oxidants also and hence they can display in vivo anti-cancer/ anti-tumour activities. Moreover, their availability is very good as they are present in many common food items and having a diet rich in flavonoids has been shown to actually reduce the risk of cancer and prevent many of them such as prostate, colon, lung, breast, stomach and kidney cancers. The therapeutic potential of flavonoids and their synthetic analogues as anti-cancer agents is very high and hence they are one of the best anti-cancer agents.

Acknowledgments: Authorsare thankful to Department of Chemistry, Amity Institute of Applied Sciences, Amity University Uttar Pradesh for providing the necessary facilities.

Conflicts of Interest: The author declares no conflict of interest.

References:

1) **Flavonoids:** Anticancer Properties By Duraipandiyan Veeramuthu, William Raja Tharius Raja, Naif Abdullah Al-Dhabi and Ignacimuthu Savarimuthu. Submitted: October 10th 2016, Reviewed: February 23rd 2017, Published: August 23rd 2017. www.livescience.com/52524-flavonoids.html
2) By Jessie Szalay - Live Science Contributor October 20, 2015
3) **Lotito SB, Zhang WJ, Yang CS, Crozier A, Frei B.** Metabolic conversion of dietary flavonoids alters their anti-inflammatory and antioxidant properties. *Free Radic Biol Med.* 2011;51(2):454-463. (PubMed)
4) **REVIEW ARTICLE:** Anti-cancer potential of flavonoids: recent trends and future Perspectives Priya Batra Anil K. Sharma Received: 14 December 2012 / Accepted: 15 January 2013 / Published online: 12 February 2013_ The Author(s) 2013. This article is published with open access at Springerlink.com
5) **J Nutr Metab.** 2015; 2015: 760689. Published online 2015 Jun 16. doi: 10.1155/2015/760689 PMCID: PMC4488002 PMID: 26167297 Modulation of Metabolic Detoxification Pathways Using Foods and Food-Derived Components: A Scientific Review with Clinical Application
6) J Exp Clin Cancer Res. 2011; 30(1): 87. Published online 2011 Sep 26. doi: 10.1186/1756-9966-30-87 PMCID: PMC3197541 PMID: 21943236
7) Apoptosis in cancer -Scott W. Lowe, Athena W. Lin Carcinogenesis, Volume 21, Issue 3, March 2000, Pages 485–495, https://doi.org/10.1093/carcin/21.3.485
8) Vasc Health Risk Manag. 2006 Sep; 2(3): 213–219. Published online 2006 Sep. doi: 10.2147/vhrm.2006.2.3.213 PMCID: PMC1993983 PMID: 17326328
9) www.nature.com/articles/nrc1252 Review Article Published: 01 January 2004 Cytokines in cancer pathogenesis and cancer therapy Glenn Dranoff Nature Reviews Cancer volume 4, pages11–22(2004)
10) Int J Mol Med. 2018 Aug; 42(2): 811–820. Published online 2018 May 2. doi: 10.3892/ijmm.2018.3654 PMCID: PMC6034928 PMID: 29749427 Anti-cancer effects of fisetin on mammary carcinoma cells via regulation of the PI3K/Akt/mTOR pathway: In vitro and in vivo studies
11) Biomedicine & Pharmacotherapy-Volume 97, January 2018, Pages 928-940 A review on the chemotherapeutic potential of fisetin: In vitro evidences Author links open overlay panel KiruthikaSundarraj1 Azhwar Raghunath1 Ekambaram Perumal www.cancer.gov/publications/dictionaries/cancer-drug/def/flavone-acetic-acid
12) NCI Drug Dictionary dmd.aspetjournals.org/content/35/11/2023
13) Minh Hien Pham, Nicolas Auzeil, Anne Regazzetti, Daniel Dauzonne, Annabelle Dugay, Marie-Claude Menet, Daniel Scherman and Guy G. Chabot. Drug Metabolism and Disposition November 2007, 35 (11) 2023-2034; DOI: https://doi.org/10.1124/dmd.107.017012
14) Cancer Chemotherapy and Pharmacology-October 1989, Volume 24, Issue 5, pp 269–272 | Cite as Flavone 8-acetic acid: our current understanding of its mechanism of action in solid tumours www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/flavopiridol
15) **Joseph E. Tomaszewski**, ... Karen M. Schweikart, in Anticancer Drug Development, 2002 sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/flavopiridol
16) **Stacey M. Ivanchuk, James T. Rutka**, in Handbook of Brain Tumor Chemotherapy, 2006
17) 2017 Aug; 38(2): 819–828. Published online 2017 Jun 28. doi: 10.3892/or.2017.5766
18) Biomedicine & Pharmacotherapy- Volume 121, January 2020, 109604 Pharmacological basis and new insights of quercetin action in respect to its anti-cancer effects.
19) Quercetin, a Natural Flavonoid Interacts with DNA, Arrests Cell Cycle and Causes Tumor Regression by Activating Mitochondrial Pathway of Apoptosis Shikha Srivastava, Ranganatha R. Somasagara, Mahesh Hegde, Mayilaadumveettil Nishana, Satish Kumar Tadi, Mrinal Srivastava, Bibha Choudhary & Sathees C. Raghavan Scientific Reports volume 6, Article number: 24049 (2016)
20) Induction of Apoptosis by Quercetin: Involvement of Heat Shock Protein Yu-quan Wei, Xia Zhao, Yoshitaka Kariya, Hideki Fukata, Keisuke Teshigawara and Atsushi Uchida DOI: Published September 1994
21) Robbins Basic pathology 10th ed. Kumar V., Abbas AK, Water JC Editors Publisher Elsevier, Pennsylvania.

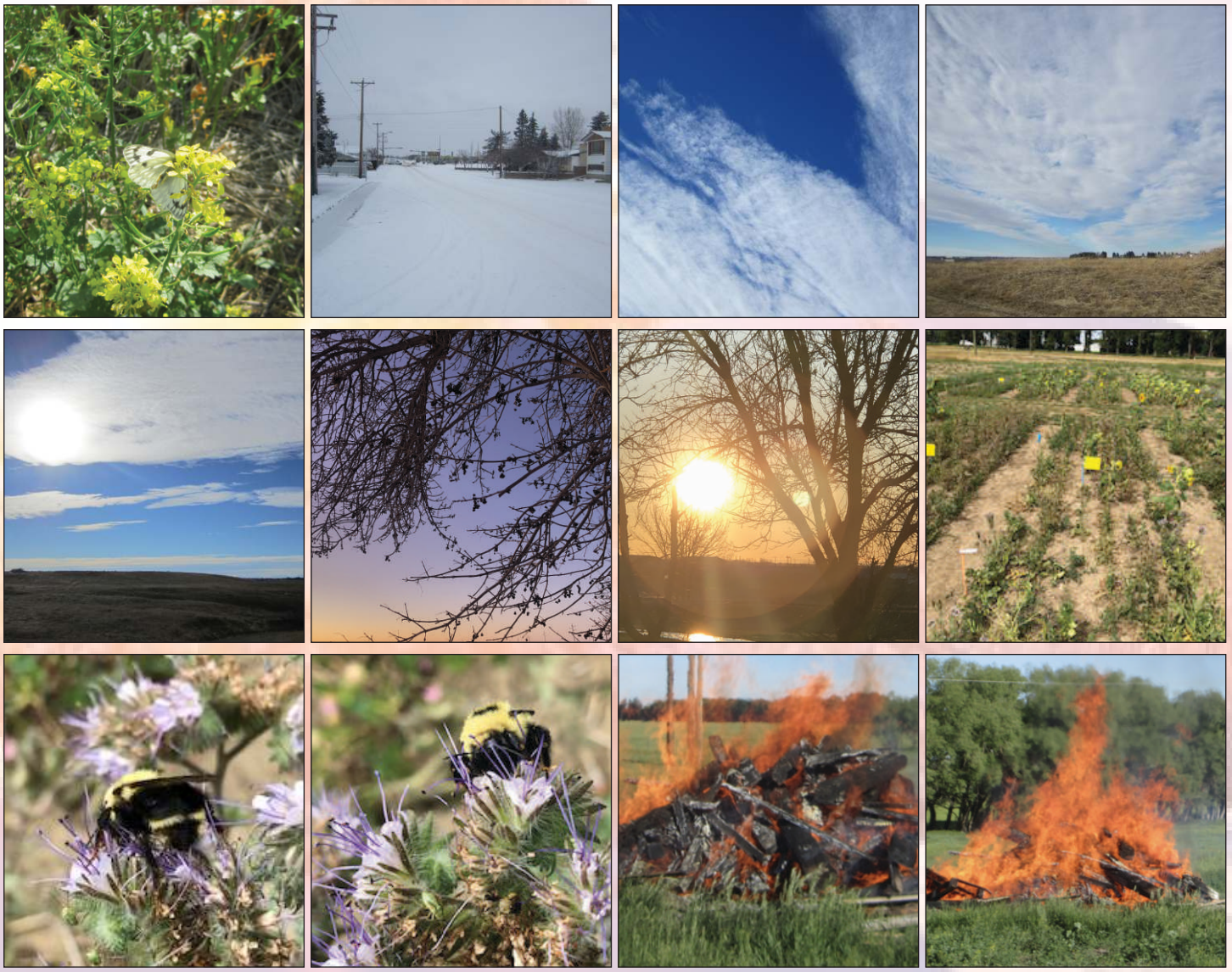
NEW DELHI AT CROSS ROADS

S. Dasgupta[1*] and S. K. Basu[2]
[1]UG-2, Department of International Relations
Jadavpur University, Kolkata India 700032;
[2]PS, Lethbridge AB Canada T1J 4B3
email: dasgupta_sauro@yahoo.in

Climate change refers to change in the global climate pattern, in particularly beginning from the 20th century and which is mainly caused by the use of fossil fuels and non-renewable energy sources. In the past few months we observe that here the climatic conditions of Delhi have suffered a very horrible blow and it has been seen that the conditions have worsened after Diwali. The indiscriminate burning of crop stubble by the farmers in some parts of western India has lead to alarming levels of air pollution in Delhi. Unfortunately due to the vote bank politics this issue has not been given more importance. Due to rising air pollution and various climatic changes in many parts of the world we observe mechanism to reduce climate change have not been effective. Sadly politicians often call the climate change a hoax and accuse India and China for the same, especially in case of some US politicians.

In Delhi we observed that the number of air purifiers is the number of air purifiers is the highest in the Prime Minister's office and in the Rashtrapati Bhavan, while people are suffocating in the horrible atmospheric conditions of Delhi. Unfortunately many politicians are ignoring this, saying that they don't have time for mitigating the crisis. Accusations by parties at one another are worsening the matter and no relief is being provided to the people. It's gratifying to note that all is not bad in India. In West Bengal, the government has made it mandatory for people to travel in electric vehicles from 2030 and has banned the plying of other vehicles from that date. The concept of 'Green Cities' in West Bengal, i.e. balancing greenery with urban development gas has benefitted us all. Pollution has reduced and the environment is becoming better day by day.

These developments lead us to believe that everything is fortunately not bad. Steps been taken to ensure that the climate changes not affect the Indian people and we have also. Odisha,West Bengal, Tamil Nadu and Rajasthan are doing a lot in this regard. The Sadhguru's Isha Foundation has started a programme called Cauvery Calling wherein they are planning to plant 1.3 crore trees along the Cauvery basin so that the water does not dry up and that the environment remains unaffected. Many more initiatives by the politicians, the community leaders, NGOs and ordinary citizens must take place. We must come forward to do something for the environment otherwise it will be too late. Photo credit: S. K. Basu



"NATIONAL FARMERS DAY- 23RD DECEMBER" SCHEMES AND AWARDS FOR THE FRAMERS

RS Tomar and Sushma Tiwari
Editorial Board, e-Newsletter, NESA, New Delhi
(Source of Information: PIB, GoI, Ministry of A&FW)

Krishi Karman Awards

Prime Minister Shri Narendra Modi distributed Agriculture Minister's Krishi Karman Awards for Progressive Farmers and Commendation Awards to the states at a public meeting in Tumkur, Karnataka. He also released the 3rd installment of PM Kisan (Pradhan Mantri Kisan Samman Nidhi) of Rs 2000 for the period December 2019 - March 2020. This will benefit approximately 6 crore beneficiaries and distributed Kisan Credit Cards (KCC) to select farmers of Karnataka. Prime Minister will also hand over Certificates to beneficiaries under PM Kisan from 8 States / UTs. Prime Minister also handed over the keys of Deep Sea fishing Vessels and Fishing Vessel Transponders to select farmers of Tamil Nadu.

Other schemes like crop insurance, soil health cards and 100% neem coated urea along with this scheme are for the farmers, Annadata.

In the fisheries sector, the government is working at three levels to strengthen the sector. First - Encouraging fisheries in villages through financial assistance to fishermen. Second- Modernizing the fishing boats under the Blue Revolution Scheme. And third - Constructing modern infrastructure related to fish trade and business. The fishermen of our country are now linked to the Kisan Credit Card facility. New fishing harbors are being built in large rivers and in the sea for the convenience of fish farmers. A special fund of Rs 7.50 thousand crore has also been created for modern infrastructure. Fishermen's boats are being modernized for deep sea fishing and navigation devices are being installed in boats for the protection of fishermen with the help of ISRO.

A new category in the Krishi Karman Award, for Nutri Cereals, Horticulture and Organic Agriculture is to implement soon focusing nutritional security of the country. This will give impetus to people and states doing better work in these areas. A toll-free number for the beneficiaries of PM-Kisan Yojana, 155261 has been started at which the farmers will be able to know their payment status. It shows the Government's commitment to social security for small and marginal farmers, that two important welfare schemes – PM-Kisan which provides income support and PM- Kisan Maandhan-Yojana (PM-KMY) for pension assistance are being implemented. Mobile application is also being developed for ease of access of PM Kisan Portal facilities for farmers.

Data Bank of Farmers

The Department of Agriculture, Cooperation and Farmers Welfare has constituted a Task Force to develop a comprehensive Farmers' Database for better planning, monitoring, strategy formulation and smooth implementation of schemes for the entire country. This Centralised Farmers Database shall be useful for various activities like issuing soil health cards, dissemination of crop advisories to the farmers, precision farming, smart cards for farmers to facilitate e-governance, crop insurance, settlement of compensation claims, grant of agricultural subsidies, community/village resource centres etc. At present, Centralised Farmers Database has not been created in the country. However, under PM-KISAN 90,165,852 number of farmers has been registered in the country as on 30.11.2019, out of which 5,813,813 numbers of farmers are registered in Rajasthan.

Adoption of Integrated Organic Farming System by States

The ICAR-Indian Institute of Farming Systems Research, Modipuram has developed One acre Integrated Organic Farming System (IOFS) models under the scheme All India Network Programme on Organic Farming (AI-NPOF). Further, a model for Sikkim was also developed by Regional centre of ICAR-Research Complex for North Eastern Region, Gangtok, Sikkim.

Kerala: The IOFS model comprising of Crops (Turmeric, Coconut, Fodder, Yam, Banana, Tapioca and Vegetable cowpea) + livestock (2 cows) has been developed at Calicut (Kerala). The model could generate net income of Rs 1, 23, 00 lakhs /acre and 89% of the seeds /planting materials and nutrients required within the system.

Meghalaya: One acre IOFS model comprising of crops and cropping systems rice – lentil, rice – pea, maize + soybean - french bean, vegetables (tomato, cabbage, cauliflower, broccoli, brinjal, chilli, spinach, carrot, pumpkin, bitter gourd etc.), fruits (Assam lemon, papaya, peach, guava) and fodder crops, livestock (1 milch cow & 1 calf), fishery in 0.046 ha has been established at Umiam (Meghalaya). Net income of Rs. 73,903/year was recorded. The model could also generate 80% of the seeds /planting materials, nutrients required within the system.

Sikkim: A 1.25 acre IOFS model comprising of cropping systems (rice – vegetable pea, rice – potato – dhaincha, rice – toria – dhaincha, rice – cabbage–dhaincha, maize– soybean– buckwheat, coriander– radish– broccoli– fenugreek and cauliflower– pea– beet root– spinach), 2 cows and 50 poultry birds has been developed for Sikkim. Net income of Rs. 1, 37,000/year can be obtained from this model.

Tamil Nadu: One acre Integrated Organic Farming System (IOFS) model comprising of cropping systems okra+ leaf coriander–maize + cowpea (fodder), green manure- cotton- sorghum, and fodder grasses (CoCN4 and desmanthus)+ agroforestry (Sesbania grandiflora, Thespesia populnea, Lucaena leucocephala)+ dairy (2 cows+vermicompost+ boundry plantations (desmanthus, banana, glyricidia)+ supporting area (manure pit, threshing floor) has been established at Coimbatore (Tamil Nadu). The IOFS model could generate net return of Rs. 1,68,669/acre. The system generates 84% of the organic inputs such as seeds/planting materials, nutrients and botanical formulations for insect-disease management within the system.

Need based trainings are also given to develop integrated organic farming system models.

Zero Budget Natural Farming

The ICAR-Indian Institute of Farming Systems Research initiated a study on Evaluation of Zero Budget Natural Farming practices in Basmati/

coarse rice-wheat system from Rabi 2017 at 4 locations namely Modipuram, Pantnagar, Ludhiana, Kurukshetra .

Also as per information available, the details of States practicing ZBNF are as follows:

1.Karnataka – has initiated implementation of ZBNF on pilot basis in an area of 2000 ha in each of the 10 Agro Climatic Zones of the State through the respective State Agriculture/ horticulture Universities as demonstrations/ Scientific experimental trials in farmer's fields and in the research stations of the concerned universities.

2.Himachal Pradesh - is implementing State funded scheme 'Prakritik Kheti Khushal Kisan' since May, 2018, the details of which are as: 2018-19- 2669 farmers, Area: 357 ha.

3.Kerala – only awareness programmes, trainings and workshops to draw interest of farmers towards ZBNF has been imparted.

4.Andhra Pradesh - launched ZBNF in September 2015 under the Rashtriya Krishi Vikas Yojana. Rythu Sadhikara Samstha (RySS), Govt. of Andhra Pradesh is conducting experiments to generate the scientific evidence of the ZBNF in collaboration with University of Reading, UK World Agro forestry Centre, Nairobi, FAO & resource NGOs/Civil Society Organizations like Centre for Sustainable Agriculture, Hyderabad.

5.Himachal Pradesh: The findings of studies conducted by the state indicated that ZBNF practice showed an improvement in soil quality within a single cropping season and incidence of Invasive leaf miner was significantly less in ZBNF system as compared to the organic farming and conventional farming.

6.Construction of Cold Storages

Department of Agriculture, Cooperation & Farmers Welfare is implementing Mission for Integrated Development of Horticulture (MIDH) for holistic development of Horticulture in the country, which includes assistance for development of Post Harvest Management (PHM) including setting up of cold storages. Under MIDH, Rs. 31.50 crore were allocated to the State of Nagaland during 2016-17, Rs. 41.50 crore in 2017-18 and Rs. 32.00 crore in 2018-19 for various horticulture activities including construction of cold storages. However, the State Government of Nagaland has reported that no funds have been utilised for construction of cold storages during this period.

Further, Ministry of Food Processing Industries (MOFPI) is implementing the Scheme for "Integrated Cold Chain and Value Addition Infrastructure" as one of the components of Pradhan Mantri Kisan Sampada Yojana with the objective of reducing post-harvest losses of horticulture & non-horticulture produce and providing remunerative price to farmers for their produce. Under the scheme, MoFPI has approved one cold chain project in Dimapur, Nagaland during 2017-18 with an assistance of Rs.8.10 crore which has been completed and is functional. Another cold chain project in Dimapur, Nagaland has been approved during 2018-19 with an assistance of Rs. 9.67 crore, which is under implementation. No cold chain project was approved for Nagaland by MoFPI during 2016-17.

Antibiotics in Crops

Aureofungin, Kasugamycin, Validamycin and Streptomycin+ Tetracycline combination are antibiotics which are registered under the Insecticide Act 1968 for use as pesticides to combat certain fungal and bacterial diseases in plants.The use of these pesticides is regulated under the Insecticide Act 1968 and the rules framed there under. While registering the pesticide, the label and leaflets are also approved which contains the details of crop, disease/pest against which it is recommended, dose rate, directions about use, chemical composition, toxicity triangle, precautions to use and packaging specifications. Pesticides are toxic substances but they do not pose any adverse effect on human beings, animals and the environment if they are used as per the label and leaflet approved by the Registration Committee. Pesticides are registered for use in the country by the Registration Committee only after satisfying about their efficacy and safety to human health, animal and environment.

Performance of Agricultural Schemes

As per the erstwhile Planning Commission's estimates based on the survey conducted by the National Sample Survey Office (NSSO) in 2011-12, 25.7% of rural population is living below the poverty line (BPL) including farm and non-farm rural population. However, separate estimate on the number of farmers living below the poverty line is not available. Keeping in view the challenges before the farming community, Government of India regularly monitors and evaluates Schemes from time to time through independent agencies/institutes and revamps them based on the feedback.

The outcome of performance evaluation of some schemes are as follows and many of them have been revamped based on such studies:

Rashtriya Krishi Vikas Yojana- Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RKVY-RAFTAAR): The concurrent evaluation of implementation of the RKVY was done during 2016-17 by Institute of Economic Growth (IEG) Delhi. Based partially on the recommendations, the scheme was revamped as RKVY-RAFTAAR which is currently in operation for 2017-18 to 2019-20 with major focus on pre & post-harvest infrastructure, besides promoting agri-entrepreneurship and innovations.

National Mission on Micro Irrigation: An Impact evaluation study was conducted in 2014 by Global Agri System and conclusions reached were that due the operation of the scheme (i) Irrigation cost reduced by 20% to 50% with average of 32.3%. (ii) Electricity consumption reduced by about 31%. (iii) Average productivity of fruits and vegetables increased by about 42.3 % and 52.8%. (iv)Overall income enhancement of farmers was in the range of 20% to 68% with an average of 48.5%.

Soil Health Card Scheme: Two impact evaluation studies have been conducted for Soil Health Card Scheme. The first study was by the National Productivity Council (NPC) in February 2016 and the 2nd study was conducted by MANAGE, Hyderabad in 2017. Constant improvement is carried out in scheme design and implementation based on such studies.

Assistance to Female Farmers

The Department of Rural Development, Ministry of Rural Development is implementing Mahila Kisan Sashaktikaran Pariyojana (MKSP) to empower women in agriculture by making systematic investments to enhance their participation and productivity, as also to create and sustain their agriculture-based livelihoods.

Under MKSP, a total number of 36.06 lakh Mahila Kisans have been benefitted through 84 projects in 24 States/UTs in the country, out of which 1.81 lakhs women have been benefitted in the State of Maharashtra. A total Central allocation of Rs.847.48 crore has been made towards implementation of the approved projects, out of which an amount of Rs. 52.15 crore has been allocated for projects in Maharashtra State.

The Department of Agriculture Cooperation and Farmers Welfare is also providing additional support and assistance to female farmers, over and above the male farmers under various Schemes namely Agri-Clinic & Agri-Business Centre (ACABC), Integrated Schemes of Agricultural Marketing (ISAM), Sub-Mission of Agricultural Mechanization (SMAM) and National Food Security Mission (NFSM).

Besides, female farmers can also avail the benefits under all the schemes implemented by the Department as per eligibility.

Increase in Rabi Crops Sowing area (by 35.9 Lakh Hectare)

The area sown so far and that sown during last year this time is as follows: (Area in lakh hectare)

Crops	Area Sown in 2019-20	Area Sown in 2018-19
Wheat	297.02	270.75
Rice	13.90	11.93
Pulses	140.13	136.83
Coarse cereals	46.66	42.12
Oilseeds	74.12	74.72
Total Crops	571.84	536.35

NESA ACTIVITIES 2019

A REPORT ON NATIONAL CONFERENCE ON GLOBAL WARMING AND CLIMATE CHANGE: IT'S IMPACT ON HUMAN HEALTH AND BIODIVERSITY (GWCC)

APRIL 22, 2019

Raj Kumar Goel Institute of Technology (Pharmacy), on the occasion of EARTH DAY organized a National Conference on Global Warming And Climate Change: Its impact on human health and Biodiversity (GWCC) in association with National Environmental Science Academy (NESA), New Delhi on April 22, 2019.

All the delegates and participants took a pledge to conserve the resources of the country.

All respective delegates also planted Medicinal Plants in Herbal Garden at the campus.

Technical session 1 started with a talk on "Genomics of finger millet for climate resilient agriculture" by Dr. Amol Kumar U Solanke, Scientist ICAR-National institute for plant biotechnology, New Delhi. Dr. Solanke in his talk stressed upon why the study of finger millet genomics for stress tolerance especially for heat and drought stress is important.

World Ozone Day and World Environment Health Day

National Workshop

on

"Sustainable Solutions for Environment Health and Climate Change: Circular Economy, Green Technology and Governance"

September 24, 2019 @ Amity University, Noida

The National Workshop on **World Environment Day** was organized on **September 24, 2019** at Amity University, UP, with the theme **"Sustainable Solutions for Environment Health and Climate Change: Circular Economy, Green Technology and Governance"** by Amity Institute of Environmental Sciences (AIES) and Amity Institute of Environmental Toxicology, Safety and Management (AIETSM). The workshop was organized on the occasion of UN "World Ozone Day and World Environment Health Day" in September to sensitize students, faculty and public about importance of Environmental safety and public health.

Moving towards sustainability is a social challenge and a global challenge that will take efforts from local and national governments, international cooperation, as tools from academics and researchers to help put in place the best practices and knowledge to encourage these essential changes. Appraising circular economy advantages to going green, developing new technologies and redesigning systems in a flexible and reversible manner to benefit the environment and public health is need of the hour.

Glimpses of MESSAGE

TEQIP III Sponsored
International Conference on
MATERIALS FOR ENVIRONMENT, SUSTAINABLE SOCIETY AND GLOBAL EMPOWERMENT - 2019 (MESSAGE - 2019)
19 – 20, December, 2019
Venue: Department of Nanotechnology, Visvesvaraya Technological University
Center for Postgraduate Studies, Muddenahalli, Chikkaballapur - 562101, Karnataka

Jointly Organized by — *In Association with*

Department of Nanotechnology, Visvesvaraya Technological University Center for Postgraduate Studies, Muddenahalli, Chikkaballapur - 562101, Karnataka
National Environmental Science Academy (NESA), New Delhi
Patna - Aryabhatta Knowledge University, Patna, Bihar
Biju Patnaik University of Technology (BPUT), Rourkela Odisha

To,

Vol. 22 Issue - 12 (Monthly) December 2019

From
NATIONAL ENVIRONMENTAL SCIENCE ACADEMY
206 Raj Tower -1, Alaknanda Community Centre,
New Delhi -110019. Ph.: 011-2602 3614
E-mails: nesapublications@gmail.com; nesapub@yahoo.co.in

INVITATION OF RESEARCH ARTICLES for PUBLICATION in NESA Journals

INTERNATIONAL JOURNAL ON AGRICULTURAL SCIENCES
ISSN NO. 0976-450X | NAAS RATING 2.60

INTERNATIONAL JOURNAL ON ENVIRONMENTAL SCIENCES
ISSN NO. 0976-4534 | NAAS RATING 3.06

INTERNATIONAL JOURNAL ON BIOLOGICAL SCIENCES
ISSN NO. 0976-4518 | NAAS RATING 3.14

INTERNATIONAL JOURNAL ON CHEMICAL SCIENCES
ISSN NO. 0976-4526

INTERNATIONAL JOURNAL ON PHYSICAL SCIENCES
ISSN NO. 2230-9683

INDIAN JOURNAL OF UNANI MEDICINE
ISSN NO. 0974-6056

Please submit the manuscript:
http://nesa-india.org/nesa-journal/

These JOURNALS ON DIFFERENT SUBJECTS are being published by this Academy. Send your manuscripts for peer-review by e-mail. **THE AUTHORS MUST MENTION ADDRESS, Contact Nos. and E-MAIL ID** in their forwarding letter. Proof will be sent for correction before publishing. A pledge for originality will be signed by the authors. Five sets of reprints will be dispatched within 30 days after the receipt of the PROCESSING FEE. along with a press print soft copy of final version of manuscript. All remittances are to be sent by a crossed Bank Draft in favour of **NATIONAL ENVIRONMENTAL SCIENCE ACADEMY** payable at **NEW DELHI**.

For further details and **NOTES FOR AUTHORS**,
http://nesa-india.org/nesa-journal/
Please contact Academy at
nesapublications@gmail.com nesapub@yahoo.co.in

Save our planet Earth! Save the Environment and you will Save the Life and Future. Save the Environment, Save the World. Taking care of environment is not an obligation – Our environment is our life.

I CAN .. CAN YOU?

Rechargeable batteries instead of disposables
Durable instead of disposables
Plastic, avoid it as much as you can
Donate old furniture and clothes instead of throwing them away
Plants. Put a beautiful potted plant in you balcony