

EDITORIAL MEMBERS

EDITORS

Dr. V.P. Pandey

Ex. Professor & Dean
College of Horticulture & Forestry
ANDUAT, Kumarganj, Ayodhya- 224229 (U.P.)
Email- vppandey2012@gmail.com

Dr. G.C. Yadav

Associate Professor & PI, AICRP on Veg. Crops
Department Of Vegetable Science
College of Horticulture & Forestry
ANDUAT, Kumarganj, Ayodhya- 224229 (U.P.)
Email- gcy1972@gmail.com

Dr. Gaurav Sharma

Associate Professor & Head
Department of Horticulture
RLBCAU, Jhansi (U.P.)
Email- gauravhort@gmail.com

Dr. A.K. Singh

Associate Professor & Head
Deptt. of Soil Science & Agril. Chemistry
P.G. College, Ghazipur (U.P.)
Email- gs.mahadev@gmail.com

Dr. Sudhir Kumar Sahi

Associate Professor
Department of Dairy Technology
U.P. College, Varanasi (U.P.)
Email- sudhirkumarshahijcb@gmail.com

Dr. Dharendra Singh

Retd. Professor, University Head & Sr. Spice Breeder
Department of Plant Breeding & Genetics
SKN Agriculture University, Jobner (Rajasthan)
Email- dhirendrasinghjobner@gmail.com

Dr. Ajit Kumar Singh

Senior Scientist
Department of Plant Pathology
College of Agriculture & Research Station
IGKV, Raigarh (Chhattisgarh)
Email- ajitspices8@gmail.com

Dr. Ashutosh Sharma

Assistant Professor
Department of Agril. Extension & Communication
RLBCAU, Jhansi (U.P.)
Email- ashutoshsharmac3@gmail.com

Dr. Rajan Chaudhary

Subject Matter Specialist
Department of Agro-Meteorology
Krishi Vigyan Kendra, Khunti (Jharkhand)
Email- rmausam@gmail.com

Dr. P.D. Meena

Principal Scientist
Plant Pathology
ICAR-DRMR, Bharatpur (Rajasthan)
Email- prabhu.meena5@icar.gov.in

Editor-In- Chief

Dr. Devraj Singh

Assistant Professor
Deptt. of Vegetable Science, CGC, Chandigarh
Email- timesofag@gmail.com
Village- Urdaha, Post- Samsapur, Sitapur- 261403 (U.P.)

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Founder & Technical Head

Mr. Aman Kumar

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Mr. Vishwajeet Yadav, SVPUAT, Meerut



Few Words

Today, the whole world is in the grip of covid-19 epidemic which has baffled the economy path of both the nation and the world. In such a time as this, a country like India needs to be extremely vigilant. It is out in the open that the Indian economy is signaling the whole world. In moments like these, when climate change is having it's own different mood, a nation like India demands a skilled manager.

Our magazine "Times of Agriculture" includes published articles by experts of varied disciplines in the context of various contemporary situations as well as conditions pertaining to agriculture, the benefit of which will be received by everyone. Articles on diverse affairs allied to agriculture work of the country and the world will be published in this magazine to be utilized by agricultural students, agricultural scientists and farmer brothers. In the successful running of this magazine, the cooperation and assistance of senior agricultural scientists of the state and the country has been received and successful endeavors shall be taken unabated with the intention that their experiences and ideas may reach to you through publication in this magazine.

I believe that the magazine "Times of Agriculture" will bring a new revolution in the agriculture text of various latest and scientific activities of agriculture through it's active members. From time to time, success stories of various progressive farmers of the country will also be published in this magazine, so that we may continue to obtain different kinds of experiences.

(Devaraj Singh)

Editor-In-Chief



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DeHaat: **ONE STEP SOLUTION** **FOR FARMERS**

Anand Kumar Pathak
Nodal Manager, DeHaat

“ It provides all inputs from seed to market, effective advisory to the associated farmers with proper guidance in their own language to overcome the problems they face during whole process from seed to market and resulted an increment of up to 20% gate prices for the farmer. Instead of above mentioned services DeHaat also provide the Agriculture Credit, Crop Insurance, Soil testing and many more services for farmer welfare. ”

About DeHaat

DeHaat is a technology-based platform offering end-to-end agricultural services to farmers, including distribution of high-quality agri inputs, customized farm advisory, access to financial services, and market linkages for selling their produce.

DeHaat is one of the fastest growing start-ups in Agri Tech sector and one of the very few companies providing all essential services to the farming community in India. Currently DeHaat are operating in eastern India - Bihar, UP, Jharkhand and Odisha with 2,000 farmers in our service network. DeHaat's objective is to build All-enabled technologies to revolutionize supply chain and production efficiency of the farm sector and bring our services to 5 million farmers by 2024.





Background

DeHaat was founded by IIT Delhi alumnus, Shashank Kumar, and IIT Kharagpur alumnus, Manish Kumar, in 2012 from Vaishali district in Patna, India. DeHaat was the online platform of the company which connected the farmers with micro entrepreneurs to coordinate on agricultural inputs and on marketing the agricultural produce to buyers. In 2014, DeHaat raised Rs 5 million from angel investors. In 2015, Manish parted ways with DeHaat and exited the startup. DeHaat had another round of funding of Rs 5 million in 2016 from the IIM Kolkata Innovation Center.

Currently DeHaat has been working with institutions like **EDF, FICCI, CISCO, ITC, NABARD, Department of Agriculture-Bihar** and many more.

Functions

- 1- DeHaat provides all input required for their crop, such as seeds, fertilizer and crop protection. It's robust technology solutions for supply chain management enables us to provide direct cost saving to the farmer up to 15%, delivery of input at farmers' doorstep.
- 2- DeHaat provides cost effective advisory to it's associated farmers. In advisory DeHaat provides- farmers meeting, training, IVR calls, crop advisory calls and farmer field visit for field related queries. With proper guidance by the advisory team of DeHaat , having knowledge of Agriculture with detail micro level on field experience of average 8+years which brings highly cost-effective module of farmers advisory services in local language, farmers can overcome the problems they face during whole process of cultivation
- 3- DeHaat Technology Solution has been designed to create a transparent marketplace to provide direct market access to farmers and a reliable supply chain for large institutional buyers. With our "last mile connection" with the



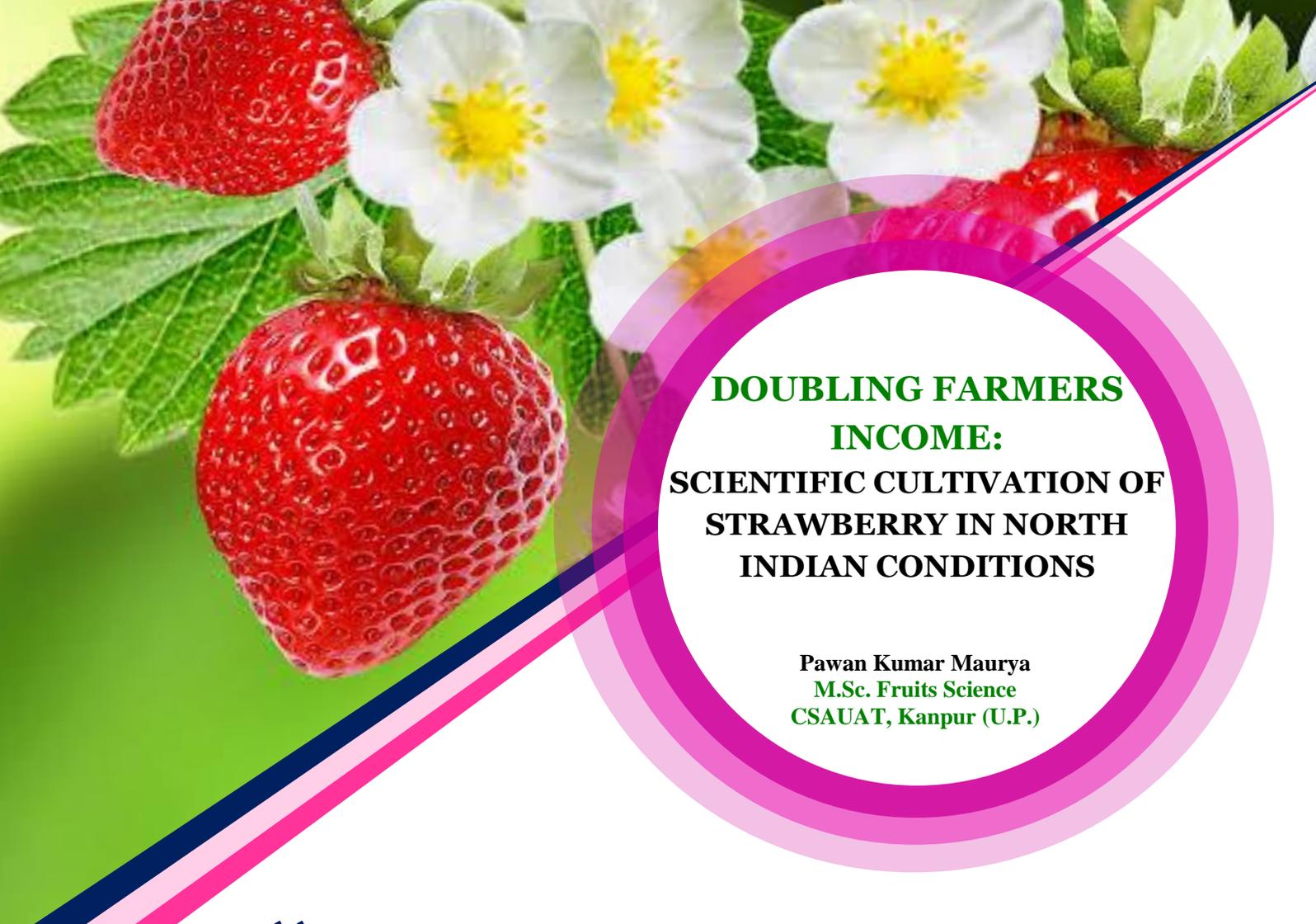
farmers and their farms, we continue direct on-field monitoring over quantity and quality over the produce growth cycle and provide full logistical support for harvesting and transportation, storage at conveniently located DeHaat Collection Centers– thus eliminating distress selling and the meddling middlemen that has been affecting Farmers in India for generations. This has resulted an increment of up to 20% gate prices for the farmer.

- 4- Instead of above mentioned services DeHaat also provide the Agriculture Credit, Crop Insurance, Soil testing and many more services for farmer welfare.

Achievements

- 1- **Best Agritech startup award, 2019** by Samunnati.
- 2- Founder Shashank Kumar got featured by Forbes India magazine as “**Forbes 30 Under 30**” in 2014.
- 3- Winner of “**NABARD Salaried Social Entrepreneur 2013**” at ISB, Hyderabad
- 4- Founder Shashank Kumar was awarded as “**Ashoka Fellow**” in the year 2013 as one of the global change-maker.
- 5- “**Social entrepreneur of the year**” 2011-12 by Hindustan Dainik; Recognized by Hon'able Chief Minister of Bihar, Sri Nitish Kumar.





**DOUBLING FARMERS
INCOME:
SCIENTIFIC CULTIVATION OF
STRAWBERRY IN NORTH
INDIAN CONDITIONS**

**Pawan Kumar Maurya
M.Sc. Fruits Science
CSAUAT, Kanpur (U.P.)**

“ Strawberry (*Fragaria ananasa*) is a manmade fruit crop which is developed by cross between *Fragaria chilonensis* × *Fragaria virginiana*. Strawberry is a temperate fruit crop, it required chilling hours besides temperate climate it cultivated in tropical and subtropical conditions of India. In sense of nutritive value this is very rich in antioxidant, vitamin- C, minerals like P, K, Fe and Ca. It is very tasty, delicious and high price fruit crop. ”

Scientific cultivation of strawberry

Soil and climate

For cultivation of strawberry the requirement of soil and climate is most important factor for its cultivation. Therefore, you know about which type of soil is better for its cultivation. It should be grown well at soil pH 5.5 to 7.5 but optimum pH 5.5 to 6.5 is required for proper growth and development.

The temperature is also very most important for its cultivation. The optimum temperature for its growth is 20 to 25 degree centigrade.

Propagating materials

Strawberry crop is asexually/Vegetatively propagated crop. It is propagated through runners. In north Indian condition the propagating material not easily available



therefore, runners are imported from another state like where strawberry cultivation is done. Some states like Himanchal Pradesh, Uttarakhand, etc.

Suitable variety for North Indian condition

In North India, mostly subtropical climate is found. For in this condition the most suitable variety is **Chandler**. Chandler variety most commonly grown in north Indian conditions. It is resistant against physical damages caused by rain and tolerant to viruses, it is short day type variety.



Planting of strawberry

Strawberry runners can be planted at a distance of plant to plant 45cm and row to row 45cm. The runner should be planted at 15-20cm raised beds and 90-120cm distance should be kept between two beds. The planting in single or double rows system.

Planting time

In north Indian condition the best planting time of runner in month of November to December.

Mulching

Mulching is most important cultural practice of strawberry cultivation. Mulching should be done for preventing of berry to direct contact with soil and to check the growth of weed population and earning high quality fruits.



Irrigation management in strawberry

Frequent irrigation rather than a few heavy ones favours the crop. Excess irrigation is harmful for its cultivation. If give the excess irrigation the chance of Botrytis rot is more in strawberry. Drip irrigation is most profitable method of irrigation in strawberry.

Nutrients management

Nutrient supply is most important for its cultivation. The recommended dose of FYM is 20 to 25 tonnes per hectare mixed in soil before planting of runners in the field than 25 kg N, 45kg P and 40 kg K per hectare required. If you want to planting in pot than 1:1:2 ratio sand, soil and FYM are filled in pots.

Sometimes foliar application should be done with urea 2%, zinc sulphate 0.5%, calcium sulphate 0.5% and boric acid 0.1% is beneficial for getting quality fruits.



Flower and fruit setting in strawberry

Most of the cultivars produce hermaphrodite flowers and are self-fertile. However, some also produce male or staminate, pistillate and imperfect flower which require cross pollination. The pollinating agent Honey bees. A typical inflorescence bears primary, secondary, tertiary and quaternary flowers. But majority of fruits develops from tertiary flowers rather than primary and secondary.



Harvesting and yield

Berries should be harvest when 50-75% skin of the berry develop colour. For long distance market berry should be harvested immediately after full colour appearance. On average yield is 5-6 tonnes per hectare obtained.

Packaging and storage

Strawberry is a highly perishable fruit crops. Therefore, strawberry should be store for very short time. The storage temperature is 0.5 degree centigrade and 90% relative humidity for 5-7 days. Strawberry fruits are packed in corrugated card board.

Plant protection measures

Strawberry plants are severely affected by some insect pest and diseases:

Insects

White grubs and cut worms

Cut the roots and stems of young plants that can be control by deep ploughing and drenching the soil with chlorpyrifos @ 2ml per liter of water.



Blossom weevil

That's make deep tunnels in the flower bud and shriveled, flower may die. Two spray of carbofuron 6-10 kg per hectare is required.



Diseases

Verticillium wilt

The main symptoms are appear on the leaves. The older leaves turn become brown and shriveled, finally plant may die. Apply proper crop rotation and soil fumigation with formalin.



Leaf spot

Spots of different shape and size appear on the leaves which may drying and defoliate. The use of Hexaconazole 0.5ml per liter of water or Carbendazime @ 0.5 g per liter of water.



Disorders

Albinism

This disorder appear due to lack of proper colour, acid taste and become less firm. The fruit quality reduces and consumers are avoided this type of fruits. It is nearly always associated with excess of nitrogen fertility level. To avoid albinism, proper mulching and fertilization should be done.







IMPACT OF PESTICIDE RESIDUE ON EXPORT OF BASMATI RICE

Ankur Prakash Verma and Vinod Kumar

Deptt. of Entomology
SVPUAT, Meerut (U.P.)

“*Basmati is long grain aromatic rice grown for many centuries in the specific geographical area, at the Himalayan foot hills of Indian sub-continent. The areas include the states like J & K, Himanchal Pradesh, Punjab, Haryana, Delhi, Uttarakhand and western Uttar Pradesh. India is the leading exporter of the Basmati Rice to the global market. The country has exported 44,14,562.21 MT of Basmati Rice to the world for the worth of Rs. 32,804.19 crores (or 4,722.46 US\$ Mill.) during the year 2018-19. (Source: APEDA)*”

Indian agricultural exports have been facing rejection in important markets such as the United States (US), the EU (European Union), Australia and Japan because they do not meet food safety requirements, also known as sanitary and phytosanitary (SPS) standards and due to detection of residues of pesticides exceeding prescribed Maximum Residue Limit (MRLs) imposed to protect the health and safety of consumers of importing countries and regions. (Mukherjee *et al.*, 2019).



The main reason behind the pesticide residue is that the farmer uses the pesticides as a preventive measure for the control of diseases and insects without always checking the Economic Threshold Level (ETL) for pests threatening the crop which is not recommended. In India, the FSSAI (Food Safety and Standards Authority of India) has specified the MRL of insecticides to be used on food grains. However, the implementation of the regulation is in question.

Despite the focus on minimizing the fertilizer and pesticide use, Basmati Rice exports from India have declined by 9.6% in April-September, 2019-20, since the European Commission reduced maximum residue levels for Tricyclazole to **0.01 parts per million (ppm)** from 1 ppm for all crops in 2018.

India's export of Basmati Rice to World

Year/Period	Quantity ('000 MT)	Growth (%)	Value (US\$ million)	Growth (%)
2016-17	3,999.72		3,222.33	
2017-18	4,051.90	1.30	4,165.00	29.25
2018-19	4,415.09	8.96	4,712.58	13.15
2018-19 (Apr-Sep)	2,082.51		2,247.34	
2019-20 (Apr-Sep)	1,870.78	-10.17	2,031.83	-9.59

Source: *APEDA*

Hence the major reason for such decline in Basmati export is primarily non-judicious use of pesticides by rice growers leading to decline of imports by EU, as per the inputs received from exporters. As evident from the table below, the export of Basmati from India to EU declined by 38% and 9% in 2018-19 and 2019-20 (April-Sep) respectively.



India's exports of Basmati rice to EU

Year/Period	Quantity ('000 MT)	Growth (%)	Value (US\$ million)	Growth (%)
2016-17	355.92	-	258.93	-
2017-18	397.21	11.60	367.67	42.00
2018-19	224.05	-43.59	226.68	-38.35
2018-19 (Apr-Sep)	106.22	-	108.83	-
2019-20 (Apr-Sep)	96.91	-8.76	99.03	-9.00

Source: *APEDA*

The other reason for decline in Basmati exports, as per industry inputs is the decline in demand from Iran. The import of Basmati by Iran from India **declined by 28.16% in 2019-20 (April-September)** over 2018-19 in terms of quantity as per APEDA.



The FAO data shows that the fertilizer and pesticide use by India is very high, as evident from the table below India's NPK fertilizer use per area of cropland in 2017 was **156.93 kg/hectare** as against the world average of **122.74 kg/hectare**.

Fertilizer (NPK) use in 2017

Country/Region	Fertiliser use in Kg/Ha
India	156.93
Pakistan	148.7
World	122.74

Source: *FAO*

Speaking on the issue, A.K. Singh, Director, Indian Agricultural Research Institute (IARI) said, “We are educating farmers about fungicides and pesticides- how to use, when to use and how much to use and if this is taken care then the issue of residue doesn’t come.”

How to overcome this problem

The unappeasable market’s demand has pushed farmers to use excessive pesticides to gain more output even though it actually depletes the soil health and increases input cost. The wide communication gap between the farmers, market/exporters and scientists results in unawareness among the farmers that leads to many unexpected problems. A mechanism should be constructed to bridge the gaps which restrict the dissemination of information to farmers, who are the actual manufacturers. Proper infrastructure should be ensured in order to store the food grains so that farmers are not compelled to use preservatives. The farmers should be trained in order to utilize many disease and insect resistant/tolerant varieties available in the market to gain more profit.

The regulatory institutions shall ensure the Indian products comply with international standards. India shall also explore strategies to regulate and brand its organic food so that farmers can earn more from the lesser input, given the organic food does not face any such barriers.





**SOIL HEALTH CARD:
AN INITIATIVE TO
MAKE YOUR SOIL
HEALTHY**

Kumar Anshuman

**Deptt. of Soil Science & Agril. Chemi.
ANDUAT, Kumarganj, Ayodhya (U.P.)**

“Soil health card provides information to farmers on nutrient status of their soil along with recommendation on appropriate dosage of nutrients to be applied for improving soil health and its fertility.”

The country wide application of soil health card has led to a decline in the use of chemical fertilizer by 10%. A study conducted by the National Productivity Council (NPC) says the application of Soil Health Card recommendations has led to a decline of 8-10% in use of chemical fertilizers. “It has also raised the productivity by 5-6%,” the study said. In the second phase of the scheme’s implementation, 11.69 crore Soil Health Cards were distributed to farmers in two years.

About the scheme

The International year of soils was celebrated in 2015 the same year India’s unique programme of soil health card was launched on February 19 to assess the nutrient status of every farm holding in the country. Soil Health Card Scheme was launched by Prime Minister Shri Narendra Modi on 19.02.2015 at Suratgarh, Rajasthan. The scheme has been introduced to assist State Governments to issue soil health cards to all farmers in the country. Soil health card provides information to farmers on nutrient status of their soil along with recommendation on appropriate dosage of nutrients to be applied for improving soil health and its fertility. From 2015 to 2017, in Cycle I, 10.74 crore soil health cards were distributed to farmers. In Cycle-II (2017-19), 11.69 crore soil health cards have been distributed to farmers across the country.



About the soil health card

A Soil Health Card is used to assess the current status of soil health and, when used over time, to determine changes in soil health that are affected by land management. It displays soil health indicators and associated descriptive terms. The indicators are typically based on farmers' practical experience and knowledge of local natural resources. The card lists soil health indicators that can be assessed without the aid of technical or laboratory equipment.



Soil health card parameters

It will contain the status of his soil with respect to 12 parameters, namely N,P,K (Macro-nutrients); S (Secondary- nutrient); Zn, Fe, Cu, Mn, Bo (Micro – nutrients); and pH, EC, OC (Physical parameters). Based on this, the SHC will also indicate fertilizer recommendations and soil amendment required for the farm.

Objectives

1. To improve soil quality and profitability of farmers.
2. Employment generation for rural youth.
3. To update information on soil analysis.
4. To provide soil testing facilities to farmers at their doorstep.

Benefits

Farmers get detailed information about their farm soil health. A Soil Health Card also informs about the suitability of the soil for which crops. As per the media reports, farmers can increase crop production by using balanced amounts of fertilizers for the selected crop based on nutrients available in the soil. A Soil Health Card also informs that excessive use of fertilizers is not good for crops. This soil health card also helps to save money to increase the fertility of the soil.



Drawbacks

1. Many farmers are unable to understand the content of soil health card, therefore they are unable to follow the recommended practices.
2. The number of soil samples per unit area are not based on soil variability.
3. There is Lack of Coordination among agricultural extension officers and farmers.
4. Lack of some important physio-chemical and biological parameters of soil such as microbial activity, moisture retention activity etc.
5. The soil health card is more emphasized on chemical nutrient parameters.
6. Some important indicators like
 - (i) Cropping history of farm,
 - (ii) water holding capacity (soil moisture),
 - (iii) slope of soil,
 - (iv) depth of soil,
 - (v) soil texture (bulk density)
 - (vi) Micro-biological activity etc. are not included.
7. Lack of adequate soil testing infrastructure.





NEEM:
**A SHARP WEAPON FOR
AGRICULTURE SECTOR**

Anubhuti Singh

ANDUAT, Kumarganj, Ayodhya

“Neem and its components play a role in the treatment and prevention of various diseases, especially in the Indian subcontinent and has been widely used in Chinese, Ayurvedic and Unani medicines worldwide.”

Neem (*Azadirachta indica*) is a member of the Meliaceae family and its role as a health-promoting effect is attributed to it being a rich source of antioxidants. It has been widely used in Chinese, Ayurvedic and Unani medicines worldwide in the treatment and prevention of various diseases, especially in the Indian subcontinent. Earlier discoveries confirmed that neem and its components play a role in the prevention of disease and pathogenesis. Neem tree is found in abundance in tropical and semi-tropical regions like India, Bangladesh, Pakistan and Nepal. It is a fast growing tree that is 20–23 meters tall and upright and has a diameter of around 4-5 feet. The leaves are mixed, immature, each containing 5–15 leaflets. Its fruits are green in color which turn golden yellow on ripening in the months of June-August.



The active compound of neem

It shows a therapeutic role in health management due to its rich sources of a variety of ingredients. The most important active ingredient is Azadirachtin and the others are Nimbolinine, Nimbin, Nimbidin, Nimbidol, Sodium Nimbate, Gedunin, Salinin, and Quercetin. The leaves contain elements such as nimbin, nimbenin, 6-desacetylnimbin, nimbolyl, nimboldid, ascorbic acid, n-hexacosanol and amino acids, 7-desacetyl-7-benzoylazadiridone, 7-desacetyl-7-benzoyl. Quercetin and β -sitosterol, polyphenolic flavonoids, were purified from fresh leaves of neem and were known to possess antibacterial and antifungal properties and the seeds contain valuable components including gendunin and azadirachtin.

Why neem is so valuable in agriculture?

These are some of the reasons why it is valuable in agriculture:

Animal feed

The high cost of traditional feedstuffs has already sent a lot of cattle out of business, leading to animal feed production and human feeding. There has been a decrease in availability for the needs of. The provision of fodder alone accounts for 60–80 of the total cost of livestock production in developing countries. In an effort to develop new feedstuffs



for animal husbandry, many researchers have investigated the proximal structure in recent times. Proximate analysis results of neem showed that neem leaf food contained 92.42 dry matter 7.58 moisture, 20.68 crude protein 16.60 crude fiber, 4.13 ether extracts, 7.10 ash and 43.9 nitrogen-free extracts. Neem cake is also widely used as an animal food.



Neem oil

Neem oil is also known as Margosa oil and is derived from the kernel of the neem tree. These oils are extracted by cold pressing or CT cold pressing method or solvent extraction. CT The yield of pure neem oil obtained by cold pressing method is high because solvent is not used for extraction in this method. This oil is a brown colored liquid with the smell of garlic. Neem oil is slightly soluble in water with pH values of 6.5 to 7.5, its boiling point is greater than 200 Celsius and freezing point is more than 13⁰C. Neem oil is used for the manufacture of neem oil pesticides as it contains azadirachtin which affects more than 600 species including pests, nematodes, fungi and viruses and is used for non-target organisms such as beneficial predators, honey completely safe for bees, pollinators, fish, and birds.



Neem Cake

It is one of the most valuable products of the Neem tree. Neem seeds are obtained from neem seed kernels and used as bio-fertilizers that can be used for organic farms, agriculture, orchards and lawns that are natural micronutrients with macroporous ingredients Contains elements. It is very cost-effective and capable of providing 15–20 better yields than conventional urea and fertilizers. Compared to urea which is a nutrient collector, neem cake contains nutrients for the plants and it maintains the strength of soil. In addition, neem cake also controls nematodes and other soil borne pests that help the roots absorb nutrients in a regular and optimal manner. This is the reason why more farmers are now using neem cake more for their crops.

Insecticide

Neem insecticide/insecticide manufacture is a neem based botanical product containing *Azadirachtin* as the active ingredient. *Azadirachtin* is found to be very effective for insects of more than 600 species. Neem insecticide is a natural product, absolutely non-toxic. It is 100 biodegradable and





environmentally friendly. It is completely safe for humans and beneficial insects like honey bees. It can be mixed with other synthetic pesticides and also enhances their action. It is effective for over 600 species of pests.

Afforestation

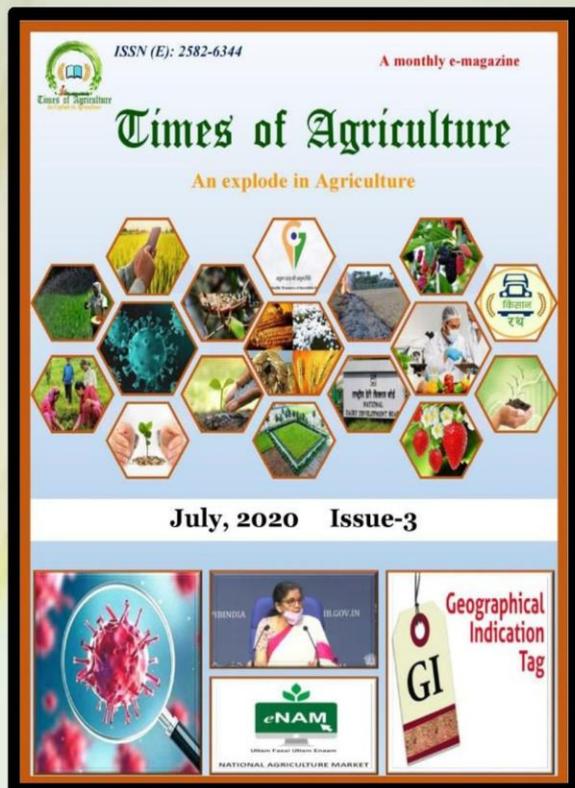
Neem has a big role in afforestation. Large-scale planting of neem trees helps to prevent desertification, deforestation, soil erosion and reduce extreme global temperatures. The ability of neem trees to have a high rate of photosynthesis and helps to release more oxygen than many other tree species and makes a great contribution to purifying the environment. Many neem products have water purifying activity such as powder of neem leaves can be used as a biosorbent to remove dyes such as Congo red from water. The temperature under the Neem tree has been found to be ~ 10 ° C lower than the surrounding temperature during the summer months in northern parts of India. In agro-forestry, neem product benefits extend to shade, firewood, timber, wind break, provide shelter and prevent desertification in semi-arid areas.





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