

AGRICULTURE NEWS LETTER

# MISSION ARABLE

## FARMING FORTUNES

VOLUME:01||ISSUE:01|| AUGUST-2023

Welcome to the first edition of our Agriculture Newsletter MISSION ARABLE, brought to you by **ARABLE EARTH PRIVATE LIMITED**, Hyderabad. The news letter designed by Arable earth team exclusively dedicated to farmers. In each issue, we'll bring you a wealth of practical insights, expert advice and cutting-edge techniques to help cultivate thriving crops, maximise yields and overcome challenges on the farm. Stay tuned for a harvest of valuable information to enhance your agricultural journey.



**ARABLE EARTH**  
WE NURTURE THE NATURE

### EVOLUTION OF AGRICULTURE



fig.01

Taking roots around 12,000 years ago, agriculture triggered such a change in society and the way which were people lived. That such development has been dubbed as the "Neolithic Revolution". Traditional hunt & live lifestyle, followed by humans since their evolution was changed in favour of permanent settlements and a reliable food supply by doing agriculture. Out of agriculture, cities and civilisation grew because of assured food supply and domestication of animals. This change meets the demand of people and the global population rocketed from some five million people 10,000 years ago to more than seven billion today. Over time advancements in techniques, tools and technologies lead to the development of various agriculture practices such as irrigation, crop rotation and selective breeding. The process has played a crucial role in shaping societies and has contributed to the growth of civilisation and economies.

Agriculture began independently in different parts of the globe and include a diverse range of taxa. At least eleven separate regions of the olden new world were involved as independent centres of origin. Wild grains were collected and eaten from at least 105,000 years ago. However domestication did not occur until much later. The earliest evidence of small-scale cultivation of edible grasses is from around 21,000 BC with the Ohalo people on the shores of the sea of galilee.



fig.02

The evolution of agriculture stands as a defining chapter in human history, reshaping societies and landscapes in profound ways. From the humble beginnings of cultivating crops and domesticating animals to the modern practices of precision farming and genetic engineering, agriculture has undergone a remarkable journey of innovation and transformation.

The evolution of agriculture has led to significant advancements in food production, societal development and environmental impact. This transformation enabled larger populations, the rise of civilisations and the establishment of complex societies. However, the expansion of agriculture has also brought challenges such as land degradation, loss of biodiversity and environmental degradation. Moving forward, sustainable and innovative agricultural practices will be crucial to ensuring food security while minimising negative impacts on the planet.

cont.page.2



fig.03

### HIGHLIGHTS OF THIS NEWS LETTER

VOLUME:01||ISSUE:01

- Evolution of agriculture.
- Nature's first handshake - Seed.
- Unveiling the secret life of plant - Tomato.
- Green Tech Innovation - Shade nets.
- Nature's Defence : NSKE Solution.
- Interview with Sri. R.K.Mehta.
- Event - Seed Mela.
- Importance of Biochar.
- About Bambusa balcooa.
- About ARABLE EARTH Private Limited.

# EVOLUTION OF AGRICULTURE IN INDIA

Indian Agriculture has long, old and beyond memory of history which begins with the Indus valley civilisation. One of the oldest water regulating structure in the world is Grand Anicut dam on river Kaveri (1st-2nd Century CE) in Thanjavur district, Tamil Nadu.

Agriculture activity during the second millennium BC included rice cultivation in the Kashmir and Harappan regions. Mixed farming was the basis of the Indus valley economy.

Several wild cereals including rice grew in the Vindhyan Hills and rice cultivation at sites such as Chopani-Mando and Mahagara may have been underway as early as 7,000 BC.

Irrigation was developed in the Indus Valley Civilisation by around 4,500 BCE. The size and prosperity of the Indus civilisation grew as a result of this innovation, which eventually led to more planned settlements making use of drainage and sewers. Sophisticated irrigation and water storage system were developed by the Indus Valley Civilisation, including artificial reservoirs at Girnar dated to 3,000 BCE and an early canal irrigation system from circa 2,600 BCE. Archaeological evidence of an animal drawn plough dates back to 2,500 BC was found in the Indus Valley Civilisation.

## VEDIC PERIOD

Agriculture during the Vedic period was a crucial part of society and economy. The Vedic people were primarily pastoralists, but they also practiced agriculture. They cultivated various crops such as barley, rice, wheat and pulses. Agriculture played a role in sustaining their settlements and supporting the growth of communities. The Rigveda, one of the oldest Vedic texts, contains references to agriculture practices including ploughing, sowing and harvesting. The availability of agricultural produce contributed to the stability and development of society.

## REPUBLIC OF INDIA (1947 CE ONWARDS)

Bakra Nangal Dam (completed-1963) is the largest dam located at Bilaspur district, Himachal Pradesh in India, such big dams on the rivers changed the agriculture picture of India. Republic India in 1950's-1960's is not self sufficient to feed its people. Special programmes were undertaken to improve food and cash crops supply. The Grow More food campaign (1940s) and the Integrated Production Programme (1950s) focus on food and cash crops supply respectively. Five-year plans of India, oriented towards agriculture development soon followed. Land reclamation, land development, mechanisation, electrification, use of chemical fertilisers in particular and development of agriculture oriented "package approach" of taking a set of actions instead of promoting single aspect soon followed under government supervision. Many "production revolutions" initiated from 1960's onwards included Green Revolution, Yellow Revolution (oilseed: 1986 to 1990), Operation Flood (dairy: 1970-1996), Blue Revolution (fishing: 1973-2002) etc.

Following the economic reforms of 1991, significant growth was registered in the agricultural sector, which was by now benefiting from the earlier reforms and the new year innovations of Agro-processing and Biotechnology. Due to the growth and prosperity that followed India's economic reforms a strong middle class emerged as the main consumer of fruits, dairy, fish, meat and vegetables, a marked shift from the earlier staple based consumption.

Since 1991, changing consumption patterns led to a revolution in high value agriculture while the need for cereals is experienced a decline. The per capita consumption of cereals declined from 192 to 152 kilograms from 1977 to 1999 while the consumption of fruits increased by 553%, vegetables by 167%, dairy products by 105% and non-vegetarian products by 85% in India's rural areas alone. Urban areas experienced a similar increase. Since independence India has become one of the largest producer of wheat, potato, spices, rubber, tea, fish, flowers, fruits and vegetables in the world. The "Ministry of Agriculture" oversees the activities relating to agriculture in India. Various institutions for agriculture related research in India were organised under the "Indian Council of Agriculture". Other organisations such as the National Dairy Development Board (est.1965) and National Bank for Agriculture and Rural Development (NABARD-est.1982) aided the formation of co-operative and improved financing to agriculture sector.

## CONCLUSIONS

Indian agriculture forms the backbone of Indian economy and despite concerted industrialisation in the last six decades, agriculture occupies a place of pride. Being the largest sector in the country it provides employment to around 65% of the total work force in the country. But in the recent years, its share in the GDP has declined to 20.2% in 2021-22. There is lot of scope for improvement in this sector. Summarising the important points, we can conclude that

- Indian agriculture needs to shift itself from traditional approach to scientific approach.
- Indian agriculture should focus on market-oriented produce rather than self-sufficiency of food grains.
- Indian agriculture needs to adapt technological and research-oriented environment instead of struggling in traditional and superstitious environment.
- Indian government should provide modern technology access to the rural farmers along with knowledge of markets and export potential.
- Indian agriculture should aim to be free from middle men dominant market and establish market access directly to farmers.
- Indian agriculture shows a lot of potential because it has the largest diversity in physiography and climate and as largest amount of resources such as man power.
- Indian agriculture should utilise these resources and develop the agriculture sector into one of the fastest growing, largest contributing sectors of our economy.

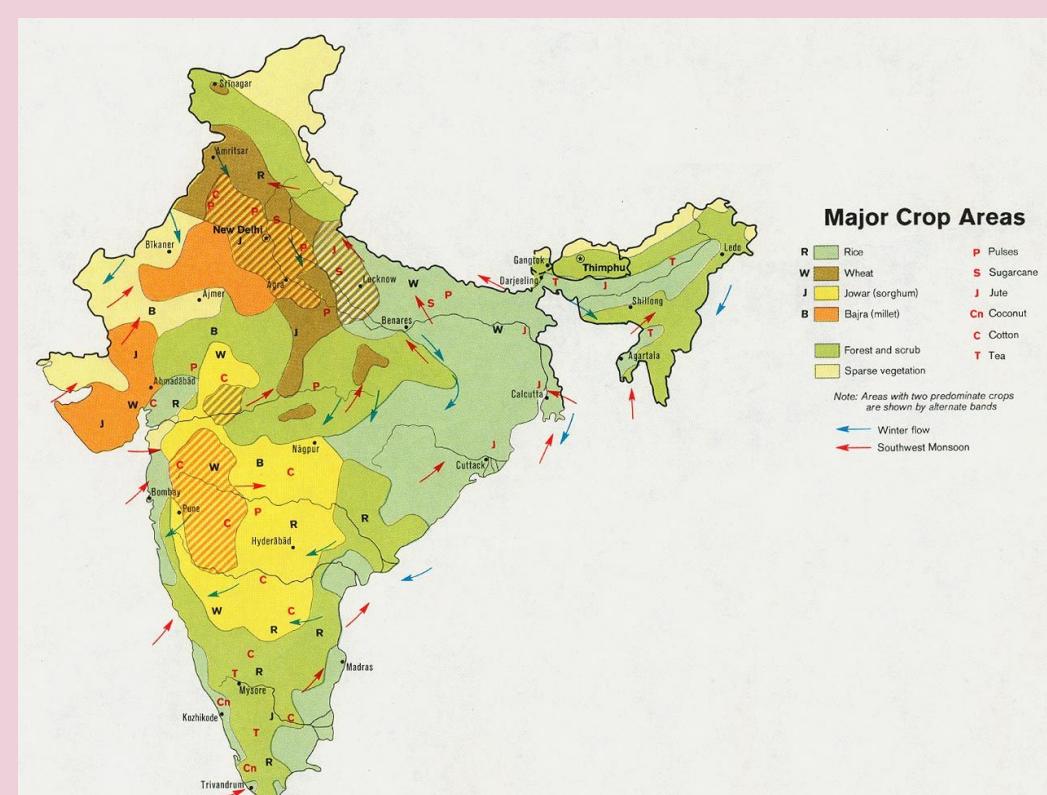


fig.04

## SEED: NATURE'S FIRST HANDSHAKE WITH THE FUTURE

Seeds are fundamental to plant reproduction and play a crucial role in growth and development plants.

Every farmer should be able to access healthy seed which are genetically pure with high seed vigour & good yield and profit to the farmers. Mostly these days farmers are facing problems of not getting quality seeds. The seeds plays a vital role in agriculture and act as a carrier of the genetic potential of variety.



fig.05

### KNOW ABOUT SEED

Seed is a basic agricultural input & it is an embryo embedded in the food storage tissue. Availability of quality seed is important to the production of quality agri produce. In the production of certified, quality seed, the seed producers plays a major role in the increase of food production in our country.



fig.06

In the current scenario the demand for good quality certified seeds is far exceeds the availability in the market. In selection of quality seeds, government of India brought a portal that helps in identifying the certified seed. Which is indicated with a tag. The tag on certified seed is in **blue colour** which helps farmers to choose better quality of seed.

### SELECTION OF GOOD QUALITY SEED

Seed with good germination capacity and seed vigor are considered as quality seed. Physical purity of seed should be maintained at 96% to 98%. The seed should be of uniform size and shape without any damage. The seed with physical quality should have uniform size, weight, colour and should be free from stones, debris & dust.

Genetic purity of seed should be maintained in order to ensure the quality of the seed. Seed with high moisture content will lose its germination vigor & viability soon. Hence, it is necessary to maintain correct moisture content of the seed.



fig.07

## UNVELING THE SECRET LIFE OF PLANT: TOMATO

**Tomato:** *Lycopersicon esculentum* belong to the genus lycopersicon under Solanaceae family. The cultivation area available for the production of tomato across India during the year 2023 is estimated to have amounted to 864 thousand hectares, the estimated Indian production of tomato is 19.01 million tons. In India major tomato growing states are Telangana, Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra. Tomato is mainly grown as rabi crop. Tomato is propagated by seeds. Seed selection is an important aspect.



fig.08

Certified seed is the best for the cultivation of tomato crop. In order to grow seedlings, first we should raise them in the nursery bed. Bed must be 1m (W) x 3m (L) is to be prepared with a height of 20 cm. The requirement of seed/acre is approximately 150g/acre. Mostly tomato seedlings are grown under shade net, poly house etc. 20-25 days old seedlings are used for transplanting with spacing of 50 cm x 60 cm.

### TIME OF IRRIGATION : DRIP

In the initial period, regular irrigation through the field channel is found to be adequate. Irrigation should be provided once in 7 to 10 days depending on the soil & weather conditions. Drip irrigation is recommended for optimum quality & quantity.



fig.09

### STAKING IN TOMATOES

The plant can be provided support with the help of small bamboo sticks to increase the production. Staking also provides support to plants and also to avoid spread on the ground by assisting in their upward natural growth habit. In order to maintain fertile soil, organic matters can be added. Weeds start growing four to five weeks after transplanting the tomato saplings. Hence, focus has to be on extensive weed control during this period. After transplanting, regular weeding is required. In close observation it is found that pest & disease first strike the well nourished plants. And management should be done when it happens.



fig.10



fig.11

The crop will be ready for harvest in about 60 to 90 days after transplanting. The yield of tomato is approximately 15 to 20 tons/acre. Now a days, a conservative yield of 25 tons/acre has been assumed.



## GREEN TECH INNOVATION: SHADE NETS

New technology plays a major role in the Agriculture. Innovation helps in the crop cultivation from initial stage to the harvest of the Agri produce. In this innovative technology, the focus will be on sustainability and environment friendly practices.



fig.12

### SHADE NETS MAJOR ROLE IN AGRICULTURE

In this innovation, "shade nets" are one such innovation that plays a major role in the agriculture sector. A shade net is generally a synthetic fiber net made up of HDPE plastic (High density poly ethylene). Which reduce the intensity of direct sunlight according to the necessity of crops. Nets are used to protect crops such as plants, vegetables, fruits and flower from birds, insects, etc., A shade percentage of 35% to 60% is ideal for vegetables and flowers.

### IMPORTANCE OF SHADE NETS

Light, humidity, temperature and carbon dioxide levels can be controlled with the help of these nets. From the present excessive temperatures, the shade nets provide cooling atmosphere to the crops. It also controls humidity and makes the ambiance suitable inside the nets for plant growth & development.



fig.13

White shade net cloths reduce the amount of harshness (or) strength of the light enters and improves the quality of the light spectrum. Thus, it speeds up the plant growth more than a green or black shade net cloth. For this reason, farmers are often used white shade net for flowering plants.



fig.14

Now a days this shade net usage is increasing because of its advantage in the agriculture. Comparing to past decade, approximately 30% to 50% of shade net usage is increased in agriculture sector. By using shade net crop average yield, colour and shape is improved. Approximately 30% of income is increased comparing to open field cultivation. This innovation brought a lot of changes not only in agriculture but also in many sectors.

## NATURE'S DEFENCE: NSKE SOLUTION NEEM SEED KERNEL EXTRACT FOR PREVENTING ALL PEST AND DISEASES

Neem Seed Kernel Extract act as a repellent. It is used in agriculture as a natural and eco-friendly pesticide.

### PEST CONTROLLED

Beetle larvae, butterfly and moth caterpillars, stalk borer, true bugs, plant and leaf hoppers, adult beetles, thrips, fruit flies, scale insects, mealy bugs etc.

### MATERIAL REQUIRED

For preparation of 5% NSKE solution, following material are required.....

- Neem seed kernel (well dried) - 1 kg
- Hand filter for primary filtering
- Muslin cloth for filtering
- Mixer grinder
- Five litres of water

### METHODOLOGY

- Take 1 kg of shade dried neem seed kernel.
- Grind the kernels gently into small pieces, flakes and granules.
- Soak this powdered 1 kg of neem seed kernel for 24 hours in 5 litres of water.
- Thoroughly stir this milky white solution/liquid.
- Filter with hand filter first to remove neem seed kernel particles in big size.
- Filter through double layer of muslin cloth and make the solution without any residues and particles of neem seed kernel.
- It should be in the form of fine solution/liquid without any residues with milky white colour.
- This solution can be stored for 25 to 30 days under room temperature.

### DOSE:

- These 5 litres of NSKE solution is sufficient and enough to mix in 100 litres of water.
- Add 50 ml of this NSKE solution to 1 litre of water and use it as foliar spray.
- For 15 litres of knapsack sprayer use 750 ml of NSKE solution.
- This concentration of the extract can be increased depending on the intensity of pest attack.



fig.15

### THINGS TO BE TAKEN CARE

- Collect the Neem fruits during bearing season and air-dry them under shade.
- Do not use the seeds over eight months of age. The seeds stored over and above this age lose their phyto-chemical potency and results may reduced.
- Remove the outer seed coat and use only the kernel.
- Always use freshly prepared neem seed kernel extract (NSKE).
- Mix the spray solution well before use.
- Spray the extract after 3:30 pm to get effective results.
- Drench the plant from top to bottom.
- Make it as a habit to spray NSKE solution for every 7/10 days depending upon the crop and pest intensity.

Compiled by:  
Mr. N. RAGHU RAM.  
Sampadha Farms and Consultants

## SEED MELA

The annual event of SEED MELA has been organized by the Professor Jayashankar Telangana State Agricultural University (PJTSAU) had held at the university campus in Rajendra Nagar and simultaneously other 18 research institutes across the Telangana State on 24th, May 2023. After the inauguration of the seed mela Agriculture Minister has made visit to all the exhibition stalls arranged by the PJTSAU, ICAR institutes, veterinary and horticulture universities, state and central government seed agencies as part of the seed mela 2023. Similar seed melas held at three regional Agricultural research stations (Jagitial, Warangal and Palem) KVK's and other research stations.

### MAIN THEME OF THE EVENT

Agriculture Minister Sri S. Niranjan Reddy stated that Telangana state should become a seed bowl to the entire world, because Telangana has favourable weather conditions for seed production of high quality seeds in different crops. Sri Niranjan Reddy advised the agriculture department officials regarding the active involvement of farmers in the seed production, it will enhance the income levels of the farmers and it makes the agriculture profession a profitable one. It also attracts young farmers towards the farming, especially seed production. Agricultural university scientists and department of agriculture must put special focus to encourage farmers towards the seed production and organise required training programmes to the farmers in the state.

He said that farmers should also be trained on the natural and organic farming methods for protecting and enhancing the soil fertility. After formation of Telangana state, the government has been giving special thrust to agriculture & allied sectors and providing irrigation facility to the farmers in a large scale. There is need to utilise available water resources for remunerative agricultural practices in the state. The government is also encouraging and establishing food processing units in large scale across the state and the work is under progress. With its initiative farmers will largely benefited and ensures high returns for their agricultural produces.



fig.16

### CONCLUSION

Because of SEED MELA, availability of seeds are increased with affordable prices also create awareness about uses of advanced technology in farming by using natural resources. And also increase seed production and allied sectors in order to encourage the young farmers.

## BIOCHAR

### BIOCHAR OFFERS SEVERAL KEY BENEFITS TO FARMERS IN AGRICULTURE

#### WHAT IS BIOCHAR?

The solid material obtained from the thermochemical conversion of biomass in limited oxygen. Biochar is carbon rich substance, which is produced by pyrolysis method.

#### IMPROVED SOIL FERTILITY

Biochar has a high surface area and can hold onto nutrients, preventing them from leaching away. This means that essential nutrients remain available to plants for longer periods, leading to improved soil fertility.

#### ENHANCED WATER RETENTION

The porous structure of biochar allows it to absorb and retain water, reducing irrigation needs and helping plants survive during dry periods.

#### INCREASED MICROBIAL ACTIVITY

Biochar provides a habitat for beneficial micro organisms, fostering a healthier soil ecosystem. These microbes assist in nutrient cycling, disease suppression and overall soil health.

#### REDUCED SOIL EROSION

By binding with soil particles and improving soil structure, biochar can help prevent soil erosion caused by wind and water.

#### CARBON SEQUESTRATION

Incorporating biochar into soil can lock carbon away for hundreds or even thousands of years, aiding in climate change mitigation.

#### ENHANCED CROP YIELDS

The improved soil properties resulting from biochar application often lead to increased plant growth, higher crop yields and better-quality produce.

#### REDUCED DEPENDENCY ON SYNTHETIC FERTILISERS

Biochar's nutrient retention properties can reduce the need for excessive synthetic fertilisers, helping farmers save on input costs and decreasing the risk of nutrient runoff into water bodies.

#### CONCLUSION

By incorporating biochar into their farming practices, farmers can promote sustainable agriculture, improve soil quality and contribute to both environmental and economic benefits.

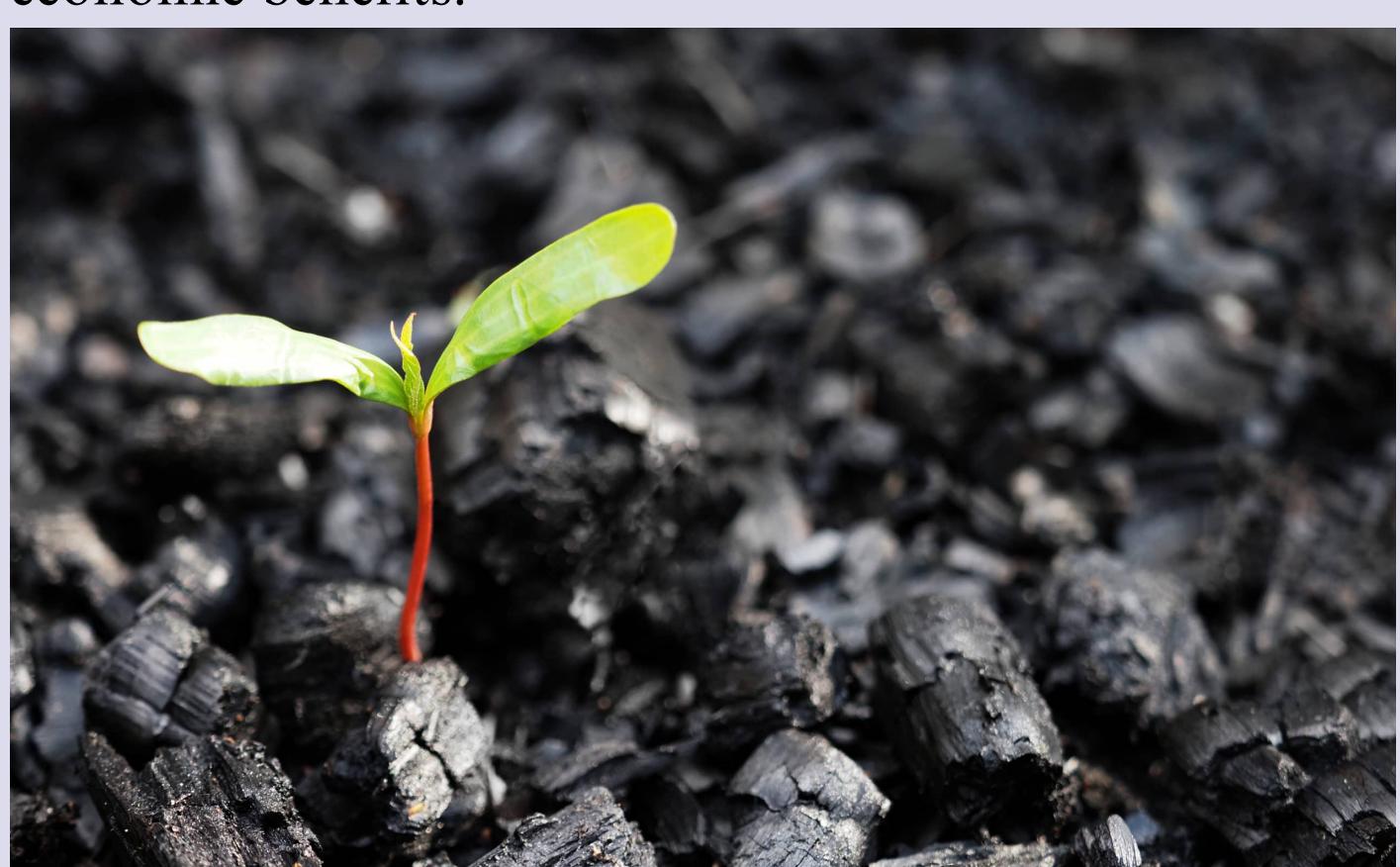


fig.17

# INTERVIEW

In this interview, we are thrilled to introduce Sri R.K. Mehta. A true bamboo and biochar visionary. The man who has many years of experience in Bamboo sector. This remarkable individual has dedicated his life for exploring the incredible potential of bamboo, pushing out the boundaries of innovation, sustainability. We ARABLE EARTH team (Kamalakar, Indhu, Naresh, Ganesh, Teja Sri) has joined him to explore his inspiring journey.



**Sri R K MEHTA**

## What inspired your vision for bamboo/ biochar ?

I went for a bamboo awareness meet 12 years back. At that time I was worried about Global Warming and still on this date also it is bothering me. I understood that bamboo is very good in intake of carbon dioxide. It is a best solution for climate control or mitigation of climate. That is my first love & logic towards bamboo. Then I saw it as a wonderful plantation considering it as a mitigation of climate and create jobs in rural and urban areas. Mostly in rural areas handicrafts and other cottage industries could be created. Another interesting thing is bamboo shoots, which is accepted as very good food in various parts of the world and people are processing bamboo shoots. So, among many benefits of bamboo plantation which touched me are:

- 1) Reducing global warming.
- 2) Creating Job opportunities.
- 3) Producing feed stock for many industries especially biochar.

These are three reasons that inspired my vision for bamboo and biochar.

## How do you communicate and inspire others to share your vision ?

Mostly I communicate through one-to-one meetings, seminars and webinars. Also exchange of valuable information through WhatsApp groups. Recently we conducted a seminar in Hyderabad on Biochar in association with ni-MSME

## What is the best process to produce the biochar ?

Pyrolysis is the best process for biochar production.

## What is economical benefit to biochar producers ?

Producing Biochar is a net profit making activity. With 3kg of biomass 1kg of biochar can be produced. Cost of biomass is Rs.3/- per kg and selling price of biochar is Rs.20/- per kg. One Bangalore based company Astro-Eco is producing 10 tons of biochar a day.

## Which is the best feed stock to produce biochar?

Any softwood is best feed stock to produce biochar. Bamboo is one of such best feed stock.

## Is there any international market for biochar ?

Yes! It is there in Japan, Europe and America.

## What are the key factors that determine the quality of bamboo as a construction material ?

The height, strength, shape, girth and age of bamboo determines its quality. Matured bamboo is stronger than steel. Quality of bamboo varies from specie to specie.

## How Telangana can become torch bearer in biochar movement?

Telangana has good weather conditions to produce biochar. which is suitable to dry the biomass to produce biochar at its optimum moisture condition which is 8% to 10%.

## What is the feed stock to biochar conversion ratio?

Feed stock to biochar ratio is 3:1 that means 3kg of biomass produce 1kg of biochar.

## Can large scale production of biochar is feasible, may be a 100 ton per a day ?

Yes, large scale production is feasible. if the availability of feed stock is assured from a organised way.

## What is the potential risk or drawback associated with improper biochar application?

Improper biochar application can lead to negative outcomes. If not used correctly, it might affect soil nutrient balance, water retention, contamination and soil structure. Inadequate biochar preparation or incorrect application rates can result in nutrient immobilisation, reducing plant growth. It is crucial to follow guidelines from agronomists for proper application to avoid these risks.



## How farmers produce and use biochar at farm level ?

As I said this before, farmers can produce biochar by feedstock selection, pyrolysis, composting and different methods. At farm level biochar is used for soil health, crop yield and water filtration.

## What are some unique characteristics of bamboo that makes it an interesting plant ?

That it is very strengthen, lighter in weight, strong root system and continuous growth.

## What are the potential agricultural benefits of using biochar in soil?

When biochar is added to the soil, it acts as a host for nutrients and release them according to the need of plants. It holds the carbon of soil & air and keep it for 100's of years.

## **What is the purpose of using biochar in agriculture ? How does biochar helps in improving soil fertility ?**

The main purpose of bamboo biochar has 5 benefits.

1. Proper utilisation of nutrients.
2. Can enrich both organic and inorganic fertilisers.
3. Can reduce the volume of fertilisers.
4. Climate control capability.
5. 100 years of carbon incorporation.

## **What are some potential challenges or risks associated with production of biochar ?**

Emissions during production: The production process of biochar involves pyrolysis, which emits gases like carbon monoxide and volatile organic compounds. Proper emission management is crucial to avoid environmental issues.

## **What are some notable examples of successful bamboo based products or projects ?**

Agarbatti (incense) sticks by bamboo, charcoal, bio fuel, biochar, chips, pellets and briquettes.

## **How can biochar be used beyond agriculture, such as in water treatment or water management ?**

In water treatment or water management - biochar itself act like a sponge and absorbs when it is placed in dirty water. It absorbs all the waste materials (or) waste particles and purifies the water.

## **How to fortify manure and bio-fertiliser with biochar ?**

Add 100 kg of biochar to 1,000 kg (1 ton) of manure and keep it aside for a minimum of 60 days. Along with biochar you can add microbial cultures to fortify the manure.



**kamalakar, Indhu, Naresh, R.K.Mehta, Ganesh, TejaSri**

## **Interview experience:**

The way we approached Sri R.K.Mehta is genuine curiosity and respect for his idea & vision. Interviewing such a knowledgeable personality is a great opportunity for us to learn and gain new knowledge. Meeting a visionary in the field of bamboo and biochar is truly inspiring. His passion for sustainable materials and environmental conservation was evident in every word he spoke. He shared innovative ideas about using bamboo for construction and its potential to sequester carbon. His insights into biochar's role in soil improvement and carbon capture were equally fascinating. Overall, it was an enlightening experience that left a lasting impression on us.

## **BAMBUSA BALCOOA**

*A potential Bamboo variety*

**Scientific name:** Bambusa balcooa, Origin: India, Bangladesh, Myanmar, Nepal, Vietnam.

**Family:** Poaceae, Tribe: Bambuseae, Genus: Bambusa  
**Growth habit:** Dense Clumping.

Bambusa balcooa is a tropical clumping bamboo originating from Northeast India. This bamboo species is often used as a food source, scaffolding, paper pulp, wood chips etc.

### **MORPHOLOGICAL STRUCTURE**

**Planting material:** Seeds, etc.,

**Height:** Grows up to 16 m to 25 m.

**Diameter:** 8 cm to 15 cm.

**Leaves:** 15 cm to 30 cm long mostly leaves are narrow.

**Roots:** Fibrous root system.

**Culm:** Single stem in a clump.

**Clump:** A group of culms.

**Flowering:** Gregarious flowering.

**PLANTING MATERIAL:** It is a vegetative propagation method. Mostly bamboo is grown by these propagative methods like Cutting, air layering, offsets. Nowadays tissue culture plants also available as planting material.

Bamboo seeds are the reproductive material of bamboo plants, which are part of the grass family. They are small, hard seeds that can be used to grow new bamboo plant. Mostly this method is not much followed due to its germination time period which is upto 2 years.

**HEIGHT:** Bamboo is the fastest growing plant on earth. Bambusa balcooa grows upto the height of 16 mtr to 25 mtr. The distance between inter node is 20 cm to 45 cm. The width thickness of wall is 15 cm.

**LEAVES:** Bambusa balcooa leaves are narrow and long in shape tapering to a slight point opposing the stem end. The deep green leaves are tough, leathery and smooth and are connected to stem. The length of leaves is 13 cm to 30 cm and width is 2.5 cm to 5 cm.

**ROOTS:** Bambusa balcooa has fibrous root system. Bamboo plants root system creates an effective watershed, stitching the soil together along river bank, deforested areas and in places prone to mudslides. It also greatly reduces rain runoff. Because of its root system it helps in arresting soil erosion by binding the soil.

**CULM:** The height of Bambusa balcooa culm is 16 mtr to 25 mtr height on average and the diameter is 7-15 cm on average. Culms are greyish green and thickness of wall, where the diameter of the cavity is about one-third of that of the culm. Nodes are thickened with a whitish ring above and have short small hairs below.

**CLUMP:** Group of culms in a plant is known as clump. In Bambusa balcooa more than 30 to 40 culms are formed. The thickness and height of culms are varied to culm to culm in a clump. Based on the culm's formation clump density is determined. A culm in the clump is harvested by its age, height and thickness.



**FLOWERING TYPES:** In Bamboo there are 3 different types of flowering, 1) Continuous flowering, 2) Sporadic flowering, 3) Gregarious flowering. *Bambusa balcooa* comes under Gregarious flowering. Flowering happens for every 30 to 45 years. Once it flowers bamboo will die. This is the main disadvantage in bamboo plantation. Now a days technology available to produce sterile bamboo by adapting Tissue Culture Technology.

**CLIMATE AND HABITAT:** *Bambusa balcooa* is believed to originated from northeast India. Mostly it grows in temperate regions. Now it acclaimed to all parts of India and it can be found in many agroclimatic regions of India. In order to flourish, this species of bamboo requires a tropical habitat, warm and humid like Araku, Khammam, Ooty, Kodaikanal. It thrives in Telangana, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra. Now farmers across this region are growing *Bambusa balcooa* under commercial cultivation.

**GROWTH AND DEVELOPMENT:** The shoots of *B. balcooa* emerge above the ground during the rainy season and reach full culm length within 2-3 months. The lateral branches develop simultaneously with the elongation of the culm. A culm becomes mature in 3 to 4 years. From an experiment on culm production and clump expansion in Bangladesh, in which planted offsets were left undisturbed during 10 years. The clump diameter of *Bambusa balcooa* increased from 9.5 cm to 80 cm in 5 years after planting. And it increased to 130 cm after 10 years.

The average production of full-grown culms per year increased from one in the first year to three after five years and decreased to two in the remaining years, probably due to increased competition. The average culm length increased almost linearly from 2.5 mtr in the first year to about 23 mtr in the 7th year and remained constant at about 22 mtr in the following years. The average culm diameter increased linearly from 1.5 cm in the first year to a constant maximum of about 8 cm from the 7th year onwards. It seems advisable to start harvesting mature culms about 6 years after planting, selective cutting may encourage new culms to develop.

Now a days it is possible to harvest the culms on completion of 36 months after plantation due to improved agronomic practices.

#### **CULTIVATING BAMBUSA BALCOOA:**

Its formidable size and density make *B. balcooa* a popular species for commercial cultivation. Like most bamboos, this variety does not require rich soil, and it grows quite quickly. It should produce full sized shoots within 5 or 6 years. Shoots that come up in the earlier years might only reach half of their full size.

Thick and massive culms make this a useful species for many applications. Building and construction are the most common uses, although the culms aren't perfectly straight, so they typically lend themselves to more rustic structure. The high levels of biomass also make it an ideal feedstock for producing biofuel, activated charcoal, biochar, bio-coal and bio-ethanol.

**THREE WAYS TO GROW BAMBUSA BALCOOA:** Depending on what you want from your bamboo farm, there are basically 3 different strategies for cultivating this specie. And you might consider similar options if you're planting to farm other tropical timber bamboos like Guadua or D asper.

- **High-density Farming:** 1,000 plants per acre, with plants spaced 4 feet apart in rows 10 feet apart. First harvest after 3 years. Uses include biomass such as power generation, bio-CNG, bio-ethanol, bio-diesel, activated charcoal, and stakes for tender plants in orchard & vegetable cultivation and bamboo plants first harvest will be 36 months.

- **Medium-density Farming:** 500 plants per acre, with plants spaced 7 feet apart in row 12 feet apart. First harvest after 4 years. Uses include paper pulp, furniture, timber, banana stakes, handicrafts.

- **Low-density Farming:** 200 plants per acre, with plants spaced 15 feet apart in rows 15 feet apart. First harvest after 5 years. Produce the largest and highest-quality poles, best for use in building and construction.

**PEST AND DISEASES:** A serious disease of *B. balcooa* is bamboo blight, attacking young bamboos during or soon after the elongation growth and resulting in dieback. *Sarocladium oryzae* (*Acremonium strictum*) is the main fungus associated with blight symptoms, but the causal agent is not yet known.

Insects spread the disease within a culm but also to other culms. Improvement of cultural practices (burning of infested parts, mulching and covering clumps with soil before the rainy season, not over harvesting culms) promotes the growth of more healthy and vigorous culms in clumps and such culms are less susceptible to blight. Drenching the soil of affected clumps with fungicide (e.g., fytolan 0.4% or dithane M45 0.4% before the rainy season also promotes survival of new culms.

**IMPORTANCE AND USES:** *Bambusa balcooa* species is most commercially viable species under genus due to its thickness and largest robust culms commonly used in construction purposes of house, other frameworks and in making of agricultural implements, baskets, bridges and also for making papers.

In agriculture usage *Bambusa balcooa* is best for biochar production due to its highest product biomass. By that high amount of biochar is produced from *Bambusa balcooa*. Most important that their imposing size, the individual stalks of this bamboo species have particularly thick culm walls. This thickness makes the poles especially strong resistant to cracking, and useful for building.

**FURTHER PROCESS OF BAMBUSA BALCOOA IN THE PRODUCTION OF BIOCHAR:** Biochar is the carbon rich organic matter. Where bamboo can produce 99% biochar and 1% ash. *Bambusa balcooa* is the best raw material for the biochar production. Because there are multiple benefits in bamboo from observing carbon dioxide in environment to enriching carbon in soil.

**WHY BAMBUSA BALCOOA IS BEST FOR BIOCHAR?** *BAMBUSA BALCOOA* has thickness of 6 inches culm and it produces high amount of biomass comparing to another bamboo species. When we use bamboo in biochar mostly we consider its biomass not its height and internodal distance. So, *Bambusa balcooa* can produce biomass in its weight by that increasing of biomass leads to the increasing of biochar.

Join the journey.....

"FROM IDEAS TO IMPACT"

GET INSIDE OUR NEW STARTUP NEWS LETTER



ARABLE EARTH  
WE NURTURE THE NATURE

Welcome to Arable Earth Private Limited  
We Nurture the Nature...

Dear Farmers, Enthusiasts, and Partners,

We are thrilled to introduce Arable Earth Private Limited, a pioneering venture that stands at the intersection of tradition and technology in the world of agriculture. As we embark on this journey, our mission is to revolutionise the way we think about farming, ensuring sustainable practices, bountiful harvests and a flourishing planet for generations to come. Sowing the Seeds of Innovation in Agriculture is our aim.

## Our Vision

At Arable Earth, we envision a world where the beauty of farming is harmonised with cutting-edge techniques. Our vision is to be at the forefront of agricultural innovation, empowering farmers with the tools they need to enhance productivity, minimise environmental impact, and increase the profitability.

## Our Commitment

**We are committed to Innovation:** Unearthing groundbreaking solutions and technologies that redefine agricultural norms. From precision farming and smart irrigation to data-driven insights, we're dedicated to finding new ways to optimise every aspect of the farming process.

**Sustainability:** Embracing practices that care for the Earth as much as they do for our crops. By prioritising sustainable methods, we are determined to preserve natural resources, minimise waste and create a lasting ecological balance.

**Community:** Cultivating more than just crops, we're nurturing a sense of togetherness within the farming community. We aim to foster knowledge-sharing, collaboration and the spirit of growth among farmers, experts and enthusiasts.

## Our Offerings

Arable Earth Private Limited is promoting bamboo plantation. Here are few concise lines outlining the benefits and advantages of bamboo. Bamboo is one of the fastest-growing plants, making it highly renewable. Bamboo absorbs more carbon dioxide than many other plants. Bamboo's extensive root system prevents erosion and enhances soil quality. Bamboo is used for diverse products from furniture to textiles and construction materials. Bamboo products are strong, lightweight, and long-lasting. Bamboo's natural compounds reduce the need for pesticides during cultivation. Bamboo products decompose naturally, reducing environmental impact. Bamboo cultivation supports local economies and livelihoods. Bamboo plantations provide habitats for various species and restore ecosystems. Bamboo requires fewer chemicals and land, promoting sustainability.

**Value Adding to Bamboo:** Arable Earth is proposing to establish value adding units to bamboo. Bamboo offers a wide array of by-products that can be derived from different parts of the bamboo plant. These by-products contribute to its versatility and usefulness in various industries. Arable Earth is proposing to produce Biochar, chips, pellets and briquettes by using bamboo as feedstock.

**Advanced Agricultural Equipment:** We provide a range of cutting-edge machinery and tools that streamline farming operations, making them more efficient and effective than ever before.

**Data-Driven Insights:** Our technology harnesses the power of data to provide actionable insights, helping farmers make informed decisions that can significantly impact yields and resource management.

**Smart Irrigation Solutions:** We understand the importance of water conservation. Our smart irrigation systems optimise water usage, reducing waste and maximising crop health.

**Climate Monitoring:** Stay ahead of changing weather patterns and environmental conditions with our climate monitoring tools. Be prepared for whatever Mother Nature has in store.

## *Join Us on this Journey...*

*We invite you to be part of our venture, whether you're a seasoned farmer or an agricultural enthusiast or an industry partner. Together, we can create a greener and more sustainable future. Our aim is one field, one crop and one innovation at a time.*

*Connect with us at [arableearth@gmail.com](mailto:arableearth@gmail.com) to explore how "Arable Earth Private Limited" can collaborate with you to cultivate growth and nurture life.*

*Here's to a promising future, rooted in the soil and reaching for the sky!*

*Sincerely,*

**Arable Earth Private Limited,  
G 02-03 Ground floor,  
Shangrilla Plaza,  
Road No. 2, Banjara Hills,  
HYDERABAD- 500034,  
Telangana State, INDIA**

**Phone: 040-40128999  
Email: [arableearth@gmail.com](mailto:arableearth@gmail.com)  
[www.areableearth.in](http://www.areableearth.in)**

## REFERENCES

**fig.1:**

<https://images.app.goo.gl/BHHvGouRadAZ8XUu6>

**fig.2:**

<https://images.app.goo.gl/FTi5xcsQoiGvaUDN7>

**fig.3:**

<https://images.app.goo.gl/uCYsTHTsHinSMm3w8>

**fig.4:**

[https://www.google.com/imgres?imgurl=https%3A%2F%2Fwww.researchgate.net%2Fpublication%2F325067830%2Ffigure%2Ffig8%2FAS%3A624784899596298%401525971736458%2FThe-major-crop-growing-areas-of-India-Growing-regionsfortheprimarycropofrice.png&tbnid=7pfHsnK4AOdbeM&vet=1&imgrefurl=https%3A%2F%2Fwww.researchgate.net%2Ffigure%2FThe major crop growing areas of India Growing regions for the primary crop of rice\\_fig8\\_325067830&docid=IojZH44hn6TM&w=850&h=661&source=sh%2Fx%2Fim%2F0](https://www.google.com/imgres?imgurl=https%3A%2F%2Fwww.researchgate.net%2Fpublication%2F325067830%2Ffigure%2Ffig8%2FAS%3A624784899596298%401525971736458%2FThe-major-crop-growing-areas-of-India-Growing-regionsfortheprimarycropofrice.png&tbnid=7pfHsnK4AOdbeM&vet=1&imgrefurl=https%3A%2F%2Fwww.researchgate.net%2Ffigure%2FThe major crop growing areas of India Growing regions for the primary crop of rice_fig8_325067830&docid=IojZH44hn6TM&w=850&h=661&source=sh%2Fx%2Fim%2F0)

**fig.5:**

[https://www.google.com/imgres?imgurl=https%3A%2F%2Fm.mediaamazon.com%2Fimages%2FI%2F418wwHsJQjL\\_AC\\_UF1000%2C1000\\_QL80\\_.jpg&tbnid=dAulE2Lam3IosM&vet=1&imgrefurl=https%3A%2F%2Fwww.amazon.in%2FGaillardiaMarigoldAfricaAVG150200Seeds%2Fdp%2FB07DSXVV6J&docid=whXXxfNnT42pOM&w=1000&h=750&source=sh%2Fx%2Fim%2F0](https://www.google.com/imgres?imgurl=https%3A%2F%2Fm.mediaamazon.com%2Fimages%2FI%2F418wwHsJQjL_AC_UF1000%2C1000_QL80_.jpg&tbnid=dAulE2Lam3IosM&vet=1&imgrefurl=https%3A%2F%2Fwww.amazon.in%2FGaillardiaMarigoldAfricaAVG150200Seeds%2Fdp%2FB07DSXVV6J&docid=whXXxfNnT42pOM&w=1000&h=750&source=sh%2Fx%2Fim%2F0)

**fig.6:**

<https://images.app.goo.gl/oNQf3cM5jWd21nCE7>

**fig.7:**

<https://images.app.goo.gl/eUWdLsQB5y6Hu9cS6>

**fig.8:**

<https://images.app.goo.gl/UJz8jbXcFbeqQMkx6>

**fig.9:**

<https://images.app.goo.gl/bUTaSsQBH8ag3QZA9>

**fig.10:**

<https://images.app.goo.gl/iaASytCUbHTpGa796>

**fig.11:**

<https://images.app.goo.gl/vQBphmcFCsQHZXiE7>

**fig.12:**

<https://images.app.goo.gl/f5Zui4SRAoMMhEJk9>

**fig.13:**

<https://images.app.goo.gl/6zvG8TyiL7cVp61XA>

**fig.14:**

<https://images.app.goo.gl/K8PByfZ1gpBRiKJM6>

**fig.15:**

<https://images.app.goo.gl/sc8nGdbuWeMjG2g87>

**fig.16:**

<https://www.pjtsau.edu.in/seedmela2023pjtsauauditorium-24-05-2023.html>

**fig.17:**

<https://images.app.goo.gl/hKVYcLagkEy9Hbdp9>



Ganesh, Kamalakar, Raghu Ram, Indhu, Tejasri, Naresh

## EDITORIAL BOARD

**Mr. N. RAGHU RAM**  
Editor

[nooksram@gmail.com](mailto:nooksram@gmail.com)

### EDITORIAL TEAM

**K. NARESH GOUD**  
Team leader

[goud8813@gmail.com](mailto:goud8813@gmail.com)

**V. INDHU**

[vookindhu459@gmail.com](mailto:vookindhu459@gmail.com)

**G. KAMALAKAR REDDY**

[kamalakarreddy2003@gmail.com](mailto:kamalakarreddy2003@gmail.com)

**G. GANESH**

[govindaganesh5@gmail.com](mailto:govindaganesh5@gmail.com)

**N. TEJA SRI**

[navilatejasree010@gmail.com](mailto:navilatejasree010@gmail.com)

**M. SUJANA**

Co-Ordinator

[sujanatatineni@gmail.com](mailto:sujanatatineni@gmail.com)

## Published by;

**Arable Earth Private Limited,**  
**G 02-03 Ground floor,**  
**Shangrilla Plaza,**  
**Road No. 2, Banjara Hills,**  
**HYDERABAD- 500034,**  
**Telangana State, INDIA**