‘Bamboo’ – One solution for thousand issues!

BAMBOO CULTIVATION
WITH
BUY BACK ASSURANCE

Arable Earth
WE NURTURE THE NATURE

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1. ARABLE EARTH PRIVATE LIMITED

1.1. Introduction to Company

Welcome to **Arable Earth Private Limited!** *We nurture the nature…*

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. 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, minimize environmental impact, and increase profitability…

1.2. Business Description

Promoting Bamboo plantation & Processing: 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 forests provide habitats for various species and restore ecosystems. Bamboo requires less chemicals and land, promoting sustainability.

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 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.

1.3. Vision

Our vision is to create a world where bamboo is recognized as a vital resource for a sustainable future. We aspire to be the go-to platform for individuals, businesses, and organizations seeking information, inspiration, and access to a wide range of bamboo products. By championing the use of bamboo and supporting responsible sourcing and manufacturing practices, we envision a greener and more prosperous planet for generations to come.

1.4. Mission Statement

Our team at ARABLE EARTH is to be the leading platform for bamboo cultivation and bamboo products. Promoting sustainable economic empowerment by using bamboo as the product. We aim to raise awareness about the benefits of bamboo, foster a community of bamboo enthusiasts, and provide a one-stop destination for high-quality, eco-friendly bamboo products. At present we are having working plans for Karnataka, Telangana and Andhra Pradesh.

Here are some Key Components of Arable Earth ……

Agriculture Practices: Arable Earth is proposing to adopt Good Agriculture Practices in all of their projects. Good Agricultural Practices (GAPs) are a set of guidelines and principles designed to ensure the safe, sustainable, and responsible production of agricultural products. These practices aim to minimize environmental impact, enhance food safety, promote efficient resource use, and improve overall agricultural productivity.

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 optimize water usage, reducing waste and maximizing crop health.

Climate Monitoring: Stay ahead of changing weather patterns and environmental conditions with our climate monitoring tools.

1.5. Organizational Values

Sustainability: We are committed to promoting sustainable practices throughout the bamboo industry. We strive to showcase products that are ethically sourced, crafted, and delivered, ensuring minimal impact on the environment.

Quality: We believe in the inherent qualities of bamboo and are dedicated to offering products that meet the highest standards of quality, durability, and aesthetics. We carefully curate our product selection to ensure customer satisfaction.

Community: We aim to build a vibrant community of bamboo enthusiasts, artisans, and environmentally-conscious individuals. We encourage knowledge-sharing, collaboration, and meaningful connections to foster a sense of belonging and purpose.

Empowerment: We support and empower local communities engaged in bamboo cultivation and product manufacturing. By promoting fair trade practices, we contribute to the economic well-being of bamboo-dependent communities.

Education: We strive to be a reliable source of information on bamboo - its benefits, cultivation, processing, and diverse applications. We aim to educate our audience on the positive impact of bamboo products on the environment and society.

Innovation: We embrace innovation and creativity in the bamboo industry. We seek out cutting-edge bamboo technologies and novel product designs to stay at the forefront of the market.

Customer-Centric: We priorities our customer needs and satisfaction. We provide excellent customer service, transparent communication, and a seamless online shopping experience.

1.6. Business Model

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1.7. Bamboo Sector - Growth Opportunities

Given its prominence and relevance in the society and its culture, both rural and urban, bamboo is an excellent source of economic growth and development. World over and specifically in India, millions of households depend on bamboo for their income, food and utilities. In India, 8.6 million people depend for their livelihoods on bamboo and bamboo industries. According to the Dalwai committee report on Doubling Farmer's Income, bamboo sector is heavily underutilized and has the potential to create more than 516-million-man days of work every year.

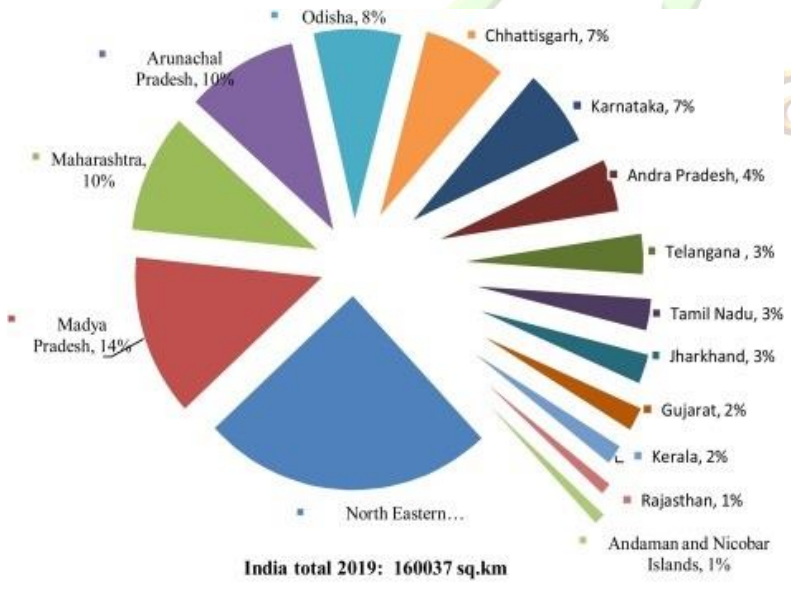
Indian bamboo is currently estimated to create value equal to USD 4.4 billion – approximately 130 times the USD 34 million recorded in 2003. In China, the world's largest bamboo producer, production was valued at USD 19.5 billion in 2012 – an increase of nearly 50 per cent from the 13.1 billion recorded in 2010. According to International Bamboo and Rattan Organization, the estimated worth of bamboo and rattan sector across the world is approx. USD 60 billion a year and its annual international trade is close to USD 2.5 billion.

2. BAMBOO & IT'S MARKET ANALYSIS

2.1. Bamboo

Bamboo is a type of woody grass that belongs to the family Poaceae. It is one of the fastest-growing plants on Earth and is renowned for its versatility, strength, and ecological benefits. Bamboo is characterized by its tall, slender, and hollow cylindrical stems known as culms. These culms can vary in height, ranging from a few feet to over 100 feet, depending on the species. The diameter of bamboo culms can also vary, from as thin as a pencil to several inches. Bamboo is known for its rapid growth rate. Some species can grow very fast under ideal conditions, making it one of the fastest-growing plants on the planet. Bamboo plays a vital role in environmental conservation. It is a highly sustainable resource because it regenerates quickly after harvesting and does not require replanting. Furthermore, bamboo forests are excellent at sequestering carbon dioxide, which helps mitigate climate change.

2.2. Market Trends



Commercial clustering of sustainable bamboo species in India.

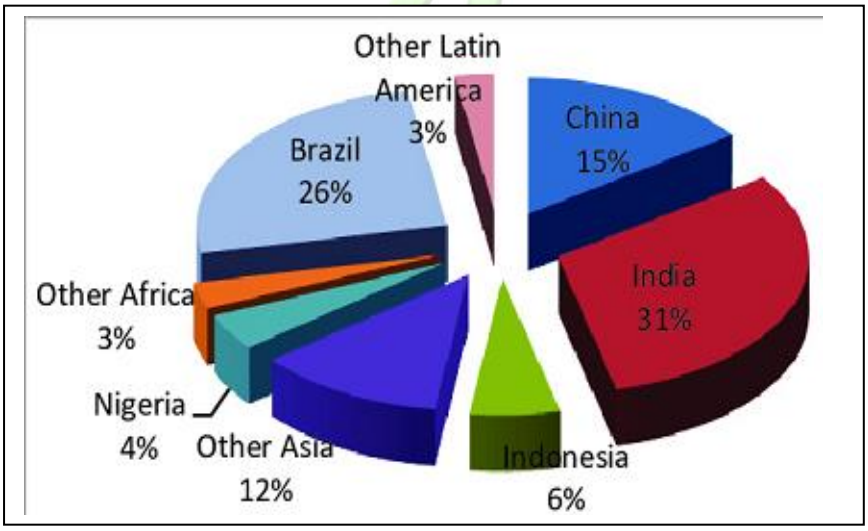
NITI Aayog is developing a policy to boost bamboo cultivation and utilization in various sectors. The global bamboo market is projected to reach $98.3 billion by 2025. NITI Aayog is working on a comprehensive policy to maximize the benefits of bamboo, often referred to as 'green gold', due to its potential in sectors such as biofuel. The aim is to encourage and support the entire bamboo value chain, from cultivation to production and development, as this tree-like grass gains popularity in infrastructure and biofuel industries. According to a senior government official quoted in an ET report, multiple meetings have been held under the guidance of NITI Aayog member Ramesh Chand to create a blueprint that will boost bamboo cultivation and utilization. The proposed strategy will encompass plantation, production, processing, standardization, and utilization, with the goal of establishing a circular economy within the sector. The policy, expected to be released by the end of this year, will also include setting BIS standards for bamboo, certification of food and safety standards for bamboo products, and geographical indications (GI) tagging to enhance export opportunities. The government is particularly interested in promoting the large-scale use of bamboo for bio-ethanol production in order to reduce India's reliance on imported fossil fuels.

2.3. Market Size and Growth Projections

Indian communities have used bamboo in many sustainable and feasible ways for centuries. So, the legacy of traditions, skills and knowledge on using bamboo vitally stands as a huge asset to us today. There are many craftsmen and artisans who are trained to build/create bamboo products in newer and innovative ways.

Indian bamboo market currently has a demand of 27 million tons of bamboo every year. Though we have 30% production of the world's bamboo resources, we only meet 50% of the domestic demand. Rest 50% is imported from China (majorly) and other South East Asian countries. Nearly 10 million people are employed in the bamboo industry today in India.

In the last decade, bamboo cultivation at private farmlands has increased, and many private bamboo product manufacturers (significant level) have been established. From the government side, there are many subsidies and training programs for cultivating bamboo and making value-added products out of them. All these trends will help India's bamboo sector start meeting up the local demand fully and significantly reduce bamboo product import.



2.4. Future Market of Bamboo

Future Market Insights recently published a report on the bamboo product market report, and that estimated a global revenue surge of 631% CAGR. And this growth will be accelerated by the people's shift in focus towards sustainability and the availability of affordable bamboo products.

While addressing a virtual exhibition on bamboo technology, Nitin Gadkari, the union minister of MSME (India), said that the bamboo industry in India will be worth Rs 25 to 30 thousand crores rupees soon.

He added that technologically proven, cost-effective, and attractive product designing can establish and promote the use and demand for bamboo, encouraging people to go for bamboo plantations. He also assured that assistance from the Ministry of MSME for any scheme related to the production, manufacturing and promotion of bamboo and bamboo-based products would be provided. With all these facts and details, we can understand that the growth of the bamboo market in India will increase steadily in the future.

As the awareness for going sustainable and taking up a minimalistic lifestyle grows, the demand for bamboo will also increase. But with great demand comes the need for a great supply. There can be an increase in the number of bamboo manufacturers and players in the market, which may lead to unattainable demand. To meet such demand large scale bamboo plantations to be encouraged across the country. This market demand can be met if the government and private bamboo players create a framework and build a healthy demand and supply chain. There needs to be an implementation structure, and the urgent focus needs to be on creating policies and tools for enabling the bamboo market to grow. The attention also needs to be on connecting the local small-scale bamboo product manufacturers inside the framework, and there should be space for everyone to thrive equally. Understanding the potential of bamboo and its characteristics, other sectors like interior design, event managers, furniture manufacturers, and clothing industries need to recognize it and come together to successfully establish a sustainable future in India

2.5. Conclusion

With people starting to think about and, to an extent, implementing and enjoying zero waste lifestyle and green living, we can foresee a significant sustainable and environmentally friendly future. And this might help in reverting the damages done to the environment in the past. While making minimalistic and sustainable lifestyle choices, people largely choose bamboo-based products. While demand for bamboo products will help the bamboo market thrive in India, it can also have its downsides too. If those downsides can be addressed effectively, there is no doubt that people will go for a bamboo-based lifestyle in future.

Woody Grass is a bamboo-centric platform that celebrates sustainability and green living with a wide range of products, including furniture, garden accessories, lamps and lighting, home decor products, organizers and toiletries. We postulate to build a future driven by alternative solutions and sustainable choices. To make this bamboo sector vibrant and profitable, it is essential to promote large scale scientific and organized bamboo plantation.

3. MARKETING PLAN

3.1. Overall Market Strategy

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 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.

3.2. Biomass Fuels

Biomass Pellets & Briquettes for co-firing.

Biomass pellet suppliers fetch better prices from other industries. Unavailability of biomass pellets of agricultural residues is emerging as a dampener in implementing the Union power ministry's direction to co-fire biomass with coal in thermal power plants. Substituting 5-7 per cent of coal with biomass in coal-based power plants can save 38 million tonnes of carbon dioxide emissions, said finance minister Nirmala Sitharaman in her budget speech in 2022. However, the existing infrastructure may not be robust enough to turn this into reality.

Around 95,000 - 96,000 tons of biomass pellets are required per day for co-firing, according to the 'National Mission on use of biomass for coal thermal power plants' set up by the Union power ministry. But India's pellet manufacturing capacity is 7,000 tonnes per day at present despite a surplus 228 million tonnes of agricultural residue available in the country, the department data showed.

The department informed that the manufacturing capacity may be expanded soon. This demand-supply gap has further intensified in the last two months. This is because pellet suppliers favour selling their product to industries such as textile, food processing, metal based or in open market at Rs 12-13 per kilogram (even higher in some places in Punjab), instead of supplying it to coal thermal power plants at the offered price of Rs 8-9 per kg. Earlier last year, the NTPC-Dadri was procuring biomass pellets at only Rs 5.35 per kg.

Biomass demand of industries escalated since the Commission for Air Quality Management in National Capital Region and Adjoining Areas directed industries in Delhi-National Capital Region to switch to cleaner fuels by end of September 2022.

To date, 36 giga watts of coal-based thermal power capacity in the country has successfully co-fired biomass. But several of these plants have only carried out trial-runs and are in the process of required modifications and upgrades in the plant to accommodate biomass co-firing at 5-10 per cent.

3.3. Co Firing of Bifocal

Coal power plants that successfully co-fired biomass

Developer	Capacity (MW)
NTPC	25,830
Haryana Power Generation Corporation Ltd (HPGCL)	1,800
Larsen & Turbo (L&T)	1,400
Adani Power	1,320
Apraava Energy (China Light Power)	1,320
Jaypee Group	1,320
Jindal Power Ltd	1,000
Calcutta Electric Supply Corporation (CESC)	750
Dhariwal Infrastructure Ltd (wholly owned subsidy of CESC)	600
Haldia Energy Ltd	600
Uttar Pradesh Rajya Vidyut Utpadan Nigam	500

Source: *Union Ministry of Power (May 2022)*

Several coal-based power generators such as HPGCL, Jindal India Thermal Power Ltd, Nabha Power Ltd, Hiranmaye Energy, Gujarat State electricity Corporation Ltd (GSECL) have issued tenders for supply of biomass offering, a seven-year contract to successful bidders to ensure a long-term continuous supply of biomass.

3.4. Overall Market Strategy

Skewed demand-supply

NTPC-Dadri started co-firing biomass in November 2019 after demonstrating successful trial runs in 2017. But the co-firing is being done only intermittently based on the availability of biomass. The plant uses around 25,000 tonnes of coal for daily generation. In the last two-and-a-half years, however, it has co-fired only 20,000 tonnes of biomass, officials informed the Centre for Science and Environment, a Delhi-based non-profit. This huge gap is due to the seasonal availability and unreliable supply of biomass pellets to the utility. The Mahatma Gandhi thermal power plant by the CLP group in Jhajjar has also co-fired biomass only 70-75 times till date from the first trial-run in February, 2022. At present, their boiler can only co-fire at 0.2-0.5 per cent as opposed to the mandatory minimum of 5 per cent. To enhance co-firing, process changes such as creation of separate bunkers for feeding biomass into the mill for crushing will need to be made. The process changes are still under review. The plant has a bowl mill and can only use biomass that is torrefied (preheated at 250-300 degrees Celsius to remove volatile matter and reduce moisture). There are even fewer suppliers of torrefied pellets in the market.

Nabha Thermal Power Plant (L&T, Punjab), similarly, has had no takers so far for its tender on the supply of pellets. The plant has co-fired 13 tonnes of biomass only.

3.5. Govt Intervention

Nearly 0.25-0.3 million tonnes of biomass pellets are required to generate 1 GW of electricity at 7 per cent co-firing, according to the power ministry's policy on biomass utilisation. The 'National Mission on use of Biomass in coal-based thermal power plants', also called SAMARTH — Sustainable Agrarian Mission on use of Agro-residue in Thermal Power Plants — has shared a list of 70-80 pellet manufacturers with the power plants. The government has stressed on increasing the capacity of pellet manufacturers and in this regard, several trainings for pellet manufacturers have been conducted by the National Power Training Institute all over the country. In order to further strengthen and regulate the supply chain, the manufacturers were also asked to be registered under SAMARTH. *Down To Earth* had reported earlier that the biomass co-firing can help cut emissions from the thermal power sector by 90-180 million tonnes by 2030, replacing 50-100 million tonnes of coal.

A *CSE* survey of the power plants in Delhi-NCR revealed that there are apprehensions among power plant operators about the continuous and reliable supply of biomass. It is challenging to store biomass pellets for long durations at the plant sites since they absorb moisture from air quickly, rendering them useless for co-firing. Typically, only pellets with up to 14 per cent of moisture can be used for combustion along with coal. Biomass co-firing is an effective way to curb emissions from open burning of crop residue; it also decarbonises the process of electricity generation using coal. Mapping of existing manufacturers and incentivising entrepreneurs to set up more pellet manufacturing plants need to be explored by SAMARTH. The mission also needs to ensure the price of biomass pellets are capped and protected from fluctuations in market demand.

Finally, and perhaps most importantly, platforms need to be established to ensure farmers have an intrinsic role in this business model of pellet manufacturing and co-firing in power plants.

4. PROPOSED PRODUCTION

4.1. Biochar

ABOUT BIOCHAR MADE OUT OF BAMBOO

Biochar is a carbon-rich material produced from the thermal decomposition of organic biomass in a low-oxygen environment, often used as a soil amendment to enhance fertility and sequester carbon.

Biochar is produced through the pyrolysis of organic materials of biomass such as farm residues, farm waste, crop residues, forest waste, bamboo etc., in a low-oxygen environment. The process of making biochar involves heating the organic material to high temperatures, typically between 400°C to 700°C, in a process called pyrolysis. During this process, volatile gases and liquids are driven off, leaving behind a carbon-rich solid residue which is the biochar.

AEPL is proposing to establish Biochar producing unit with a capacity of 20 tons/ day in each and every Bamboo cluster, where Bamboo plantation is 500 tons/ acre.

When bamboo is used as the feedstock for biochar production, it offers several advantages and benefits:

In first phase, Arable Earth is proposing to establish production units of high-quality biochar all across the clusters where the bamboo plantation is done in very large scale. Arable Earth is bringing latest European technology for the production of biochar. To produce one ton of biochar we need four tons of bamboo as feedstock.

Proposed biochar unit capacity per day: 20 tons
Bamboo required per day: 80 tons
Estimated bamboo yield per acre per annum on an average: 40 tons
Required acres per day: 2 acres
Total extent of plantation required to meet the demand of raw material 29,200 tons: 730 acres

4.2. Bamboo Pellets

ABOUT PELLETS MADE OUT OF BAMBOO

Bamboo pellets are a type of biofuel made from compressed bamboo biomass. They are used as a renewable and eco-friendly alternative to traditional fossil fuels like coal, oil or natural gas. Bamboo is an attractive source for pellets due to its rapid growth, high energy content, and sustainability. The process of making bamboo pellets involves several steps. Overall, bamboo pellets offer a promising and environmentally friendly solution for energy needs, particularly in regions where bamboo is abundant. They contribute to reducing the dependency on fossil fuels and help combat climate change.

AEPL is proposing to establish pellets producing unit with a capacity of 40 tons/ day in each and every Bamboo cluster, where Bamboo plantation is 500 tons/ acre.

In first phase, Arable Earth is proposing to establish production units of high-quality pellets all across the clusters where the bamboo plantation is done in very large scale. Arable Earth is bringing latest production technology for the production pellets. To produce one ton of pellets we need on ton of bamboo as feedstock.

Proposed pellet making unit capacity per day: 200 tons
Bamboo required per day: 200 tons
Estimated bamboo yield per acre per annum on an average: 40 tons
Required acres per day: 5 acres
Total extent of plantation required to meet the demand of raw material 73,000 tons: 1,825 acres

4.3. Bamboo Briquettes

ABOUT BRIQUETTES MADE OUT OF BAMBOO

Bamboo briquettes are a type of biomass fuel that is produced by compressing bamboo biomass into a solid form. They are commonly used as an eco-friendly alternative to traditional charcoal or wood for cooking and heating purposes. When using bamboo briquettes, it is important to consider factors such as proper storage to maintain their quality, the type of stove or equipment they are used in, and any regulations or guidelines related to their use in your region.

AEPL is proposing to establish briquettes producing unit with a capacity of 40 tons/ day in each and every Bamboo cluster, where Bamboo plantation is 500 tons/ acre.

Bamboo briquettes can be a promising solution for sustainable energy and fuel needs, offering an environmentally friendly alternative to conventional options. If you're considering using bamboo briquettes, it is a good idea to research local suppliers, learn about their production process, and understand how they can best be integrated into your specific use cases.

In first phase, Arable Earth is proposing to establish production units of high-quality briquettes all across the clusters where the bamboo plantation is done in very large scale. Arable Earth is bringing latest technology for the production briquettes. To produce one ton of briquettes we need one ton of bamboo as feedstock.

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4.4. Bamboo Chips

ABOUT CHIPS MADE OUT OF BAMBOO

Bamboo chips refer to small pieces or shreds of bamboo material that are commonly used for various purposes, including gardening, landscaping, mulching, animal bedding, and even as a biomass feedstock for various industrial applications.

AEPL is proposing to establish chips producing unit with a capacity of 40 tons/ day in each and every Bamboo cluster, where Bamboo plantation is 500 tons/ acre.

In summary, bamboo chips are versatile materials that can be used for a variety of applications, ranging from gardening and landscaping to industrial biomass feedstock. Their eco-friendly nature, sustainability, and versatility make them a popular choice for individuals and industries looking for innovative and responsible solutions.

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Total extent of plantation required to meet the demand of raw material 73,000 tons: 1,825 acres

5. PROMOTING BAMBOO PLANTATION

To meet the requirement of raw material, very large-scale bamboo plantation is required. Bamboo cultivation requires good knowledge of agronomy practices for the good and quality yield of bamboo. AEPL is having good & commanding knowledge on bamboo cultivation. Arable Earth Private Limited is promoting bamboo plantation with farmers participation. AEPL provides complete cultivation technical knowledge to the farmers who are interested in bamboo plantation. AEPL will provide

5.1. Services offered

- Site inspection
- Assessing the proposed land
- Suggesting suitable layout for the land
- Providing cultivation techniques
- Supplying best quality bamboo plants at a cost
- Assisting in establishing the plantation
- Providing tips, solutions, suggestions for good growth of bamboo plantation
- Periodical visits by AEPL team

5.2. Buy Back Assurance

Arable Earth Private Limited purchases of bamboo on maturity after 36 months. AEPL deputes personnel to the farmers plantation to assess the volume of the bamboo culms available. AEPL issues a Buy Back Assurance letter to the farmers. AEPL collects the harvested bamboo at farm gate. Price and other terms will be clearly mentioned in Buy Back Assurance letter.

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