AGRI JOY LLP

(Project Report)

Project Type: Flat Bed, A – Frame. NFT-Hydroponics

(Area 500 Sq. MT /5000 Sq. Ft / 0.12 Acre)

Crop: Fruits, Herbs, Leafy Greens, Flowers

Courtesy,
INDIAN HYDROPONICS,
Team Agri Joy

CONTENTS

WHAT IS HYDROPONICS?

Hydroponics is the science of growing plants without soil. If you haven't heard of hydroponics, you may have heard of "soilless culture" which is another name often used to describe the same thing. The same natural elements necessary for plant growth in soils are used, with the advantage that your plants are not restricted by weeds or soil-borne pests and diseases.

The History of Hydroponics

Hydroponic techniques, though they may seem to be a new technology, have been in use for centuries. The earliest known use of hydroponics are the Hanging Gardens of Babylon, the Floating Gardens of Kashmir and the Aztec people of Mexico who used rafts on shallow lakes to grow plants. Also, hieroglyphic records in Egypt dating back to several hundred years B.C. describe the growing of plants in water. More recently, mobile hydroponic farms have been used to feed soldiers during the Second World War in the South Pacific.

Today, hydroponics is beginning to play a more important role in the world's agricultural production. Increasing populations, climatic changes, lack of water in some areas or poor-quality water are all factors influencing the trend towards alternative methods of horticulture. Hydroponics is allowing many to have fresh food where normally they would have to have it shipped in or stored for long periods. A prime example of this is on Naval submarines, where hydroponics is used to supply the crew with fresh fruit and vegetables.

BENEFITS OF HYDROPONICS

A hydroponic system has the following advantages. Hydroponics allows you to grow plants more efficiently, using in some cases up to 95% less water than soil-based horticulture. With many plants, hydroponics will give you a higher quality plant, at a higher yield. Other advantages are as follows:

1. Slightly denser planting, allowing greater use of area you have available
2. Produce looks better and lasts longer
3. Water stress in hot conditions is reduced
4. Suited to non-arable areas
5. Plants reach maturity in much shorter time
6. Soil pests and diseases significantly reduced
7. Hydroponic Gardens require less maintenance

Introduction to Company

Agri Joy LLP is a registered Agri tech start-up associated with IIM Ahmedabad. Located in the Northern state of Uttar Pradesh, Agri Joy is a Limited Liability Partnership Company formed on 22nd Jan, 2020. It provides NextGen solutions for the fast transforming Agri Tech industry.
The company is founded by two young entrepreneurs. Mr Priyanshu Jain and Mr Aniket Shukla. Both are the Directors and Co-founders of the company. The former belongs to management domain and the latter hails from the tech domain.
Being associated with CIIE.CO, Startup Uttarakhand and similar other organizations the company is based at Dehradun Uttarakhand, with its registered office in Agra, Uttar Pradesh.

The immense passion and interest in the agriculture industry compelled the co-founders to start a venture in the same. Whether a person is an entrepreneur, a hobbyist and even a farmer, the venture helps them set up their hydroponics (soilless) farms at their spaces. Solutions starting from 4 planter setup to 44,000+ plant setup, the company provides all round support to the grower from seed to plate. The farms have variations from manually operated, semi-automated to even fully automated commercially viable ones. The company also operates via a sub brand called Indian Hydroponics Society. As of now the society is a 10,000 + active member community operating Pan India. It acts as a consultancy branch and basically works to promote Hydroponics technique and Next Generation agricultural practices.

The company is driven by a single mission statement, which is to empower people to grow their own clean, fresh, nutritious and pesticide free food.
Agri Joy acts as a one stop solution in the hydroponics niche and hence operates via online and offline modes. Doing business Via E commerce, leveraging social media resources, gives the start-up, much needed exposure, vital leads and prospects.

PROCEDURE

Hydroponics is a highly efficient method of growing plants. In soils, nutrients and water are randomly placed, and often plants need to expend a lot of energy to find the water and nutrients by growing roots to find them. By expending this energy, the plants growth is not as fast as it could be. In a hydroponic garden, the nutrients and water are delivered straight to the plant's roots, allowing the plants to grow faster, and allowing harvesting to be done sooner, simply because the plants are putting more of their energy into growing above the ground, instead of under it.

Hydroponics allows you to grow more plants per square meter. This is because the plants do not need to compete with weeds and each other for the food and water that is in soil, this food and water is delivered straight to them.\n

It is also very important to note that, despite many myths, plants grown in hydroponics are no different to plants grown in soil, they will have the same physiology. Plants grown in a hydroponic system take the same nutrients as those grown in soil, though the content can be more accurately controlled. The basic difference between the two methods is the way in which nutrients and water are delivered to the plants.

In hydroponics, the nutrient salts are already refined and the plants do not need to wait for the nutrients to break down to their basic form. However, with soil-based agriculture, plants are fed nutrients via manures and composts which must break down into their basic form (nutrient salts) before the plants can use them.

Commercially, hydroponic systems often use artificial lighting. This can make the cost of a system much more expensive. If you have sunlight readily available, then this will be unnecessary. If you don't, while the initial costs may be relatively high, many of our customers find that a lighting system, while being necessary, is not the hassle and ongoing expense they may have expected.

COMMERCIAL FARM SETUP STAGES

There is a total of five stages while setting up a commercial farm practicing hydroponics.

They are:

1. Site feasibility study
2. Project Design
3. Project development
4. Additional training
5. Assistance in sales and marketing

Project development stages

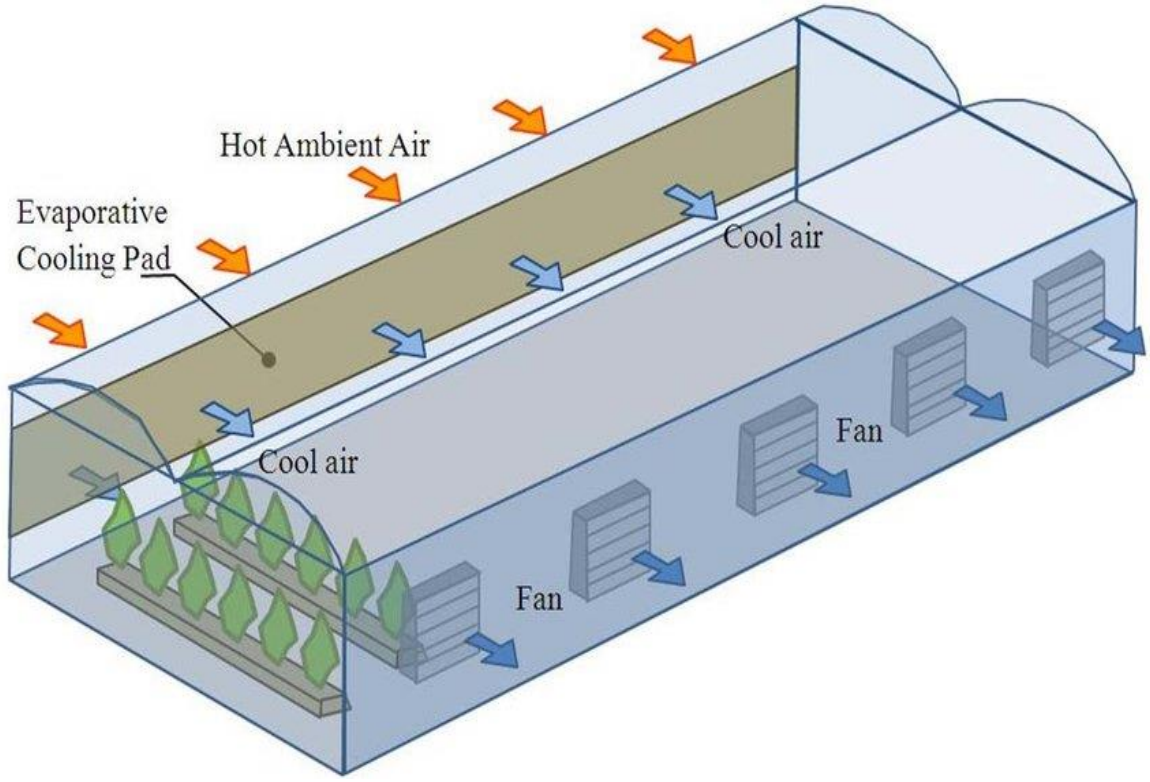
Fan-pad playhouse

· Structure

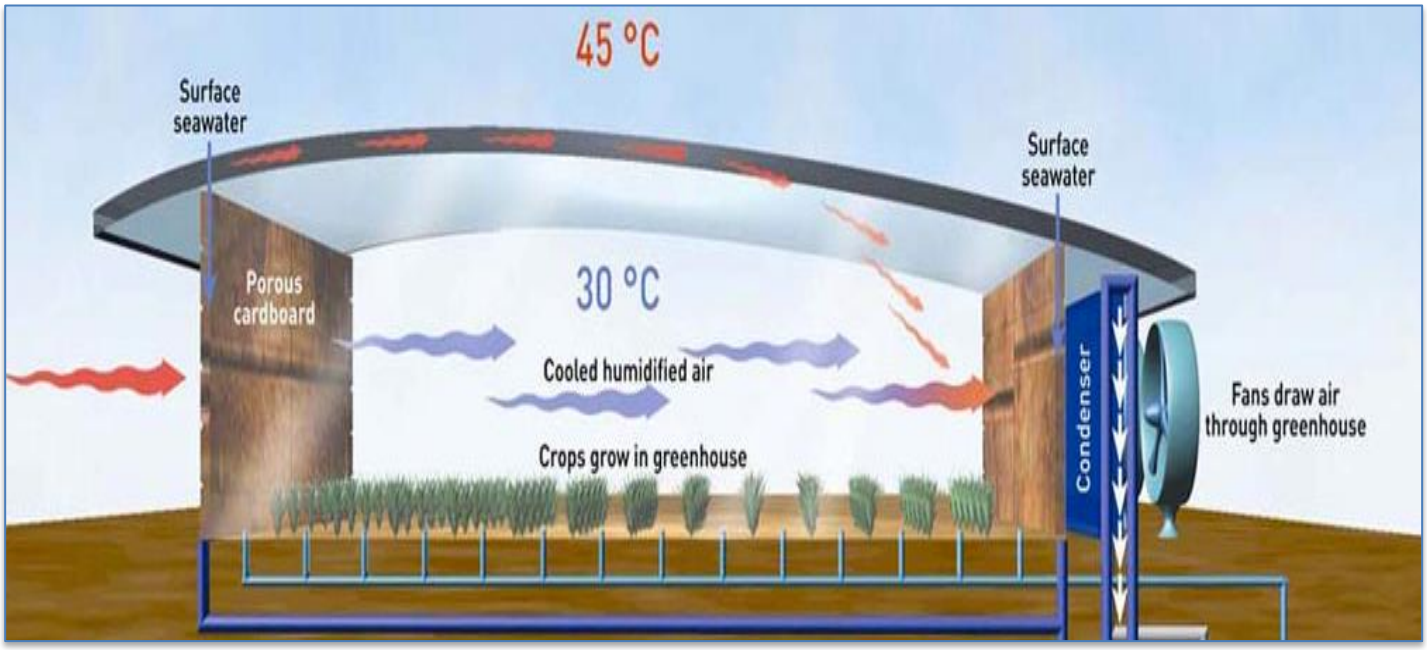
· Irrigation setup

· Nutrient and dosing system/ Fertigation Setup

· Automations and machinery setup.



A doubly Shaded fan pad green house is suggested for a Humid climate city.



NFT A-Frame Vertical 500 sqm

Farm Cost Metrics

Setup Costs Components	5,000 Sq. Ft/ 500 sqm
No. of Plants per cycle	16,464 (7-levels)
NFT stands & other fittings	7,00,000/-
Nutrient Dosing and Mixing Automations	1,25,000/-
Greenhouse Fan Pad	2100/sqm = 10,50,000/-
Compound, Storage Area, Motors, Electricity Fittings, Plant grow Beds, Foundation Costs, Levelling, Raised Loft, Water Tanks, Fertilizer Mixing units, Pipeline Stands, Consumables, Grow beds, Miscellaneous, Labor, Consultancy Charges	8,87,750/-
Estimated Total	26,62,750/-

*Prices sometimes depend upon subsidies and materials used while development

Profitability Scope

Total Number of frame structures = **12**

Total Number of plants = **16,404**

Everyday harvest = 1 Frame structure

Average daily harvest of basil = 50 to 60 grams per plant

(We only take high quality top 4 leaves) X 1372 Plants

Daily harvest in grams = 68000 to 82000 (70,000 grams): 7**0kg**

Avg Price of Basil is 120/- INR per Kg

Now let's check the economics metrics of a 200-gm sample crop grown in 500 sqm system.

Sample crop (Lettuce)	500 sqm
No. of Plants	~16,404
Production Per Plants/Cycle	200 gm
Total Production per Cycle	3,280 kg
Cycle Per Year	10
Total Production Per Year	32,800 kg
5% Mortality	1640 kg
Net Production Per Year	31,160 kg
Average Rate	Rs 100/kg
Turnover	31,16,000 Rs
Expenses	36/kg
Expenses Per Year	11,80,800 Rs
NET PROFIT PER YEAR	19,35,200 Rs

*ROI within 2 years expected.

*assuming ideal market condition available throughout the year (average case scenario).

Some other important cost metrics.

Poly house costing based of its type for 500 sqm.

Flat Roof Shade Net with Cable purlin (Wire Rope Net House) - 3 L to 5 L

Flat Roof Shade Net with Pipe purlin (Shade Net House) - 6 L to 8 L

Dome-shaped Poly house (naturally ventilated Poly House) - 8 L to 9 L

Dome-shaped Poly house with fan and pad cooling system (Climate Controlled Poly House) -10 L to 12 L

To adjust the metrics and calculate the plants as per your preference, use following formula.

a. Leafy - 2.5 plants/sq. feet (flatbed or vertical - plant density is same)

b. Vine - 1 Plant/2.5 sq. feet.

Frame size for Horizontal NFT layout

To be able to tend to the plants, we should restrict the single bench width to approx. 4 to 5 feet so that an average human being can tend to the plants from either side. Also, the inter-bench spacing should allow sufficient walking/working space for a couple of workers/visitors between the two hydroponic NFT frames. As such, let us keep the spacing between two benches to be two feet. For the length part, we will go with the maximum length in which the channels come, which is 6 m. Using the above numbers, we can fit 32 NFT frames in a 500 sqm size.

NFT Channel length required for 500 sqm Hydroponic Farm.

To figure out the number of channels in each frame. While deciding on this parameter, it is vital to understand the spacing needs and spread for the crop you plan to grow. Each plant should get sufficient light and space to produce foliage. This number would vary from crop to crop.

Additionally, one would also need to take into account the size of the NFT channel and the spacing across both lateral as well as longitudinal dimension. Let us work with an average case number of 7 channels per bench (ideal case in specific crops may be + - 1). For 32 frames, the total number of channels we will use will be 224. At each channel length of 6 m, the total length of NFT channels will come at 1,344 meters.

NFT Channels cost for 500 sqm

At these volumes, the NFT channels may cost anywhere between 200₹ to 320₹ per meter at the going rates in 2020. The covered channels will cost less while the two-part channels (with openable top lid and separate base channel) will cost more. Further, the price will vary based on the grade of material used, thickness, whether it is lead-free or not, etc.

Closed lid or fixed NFT channels can cost around 2.7 L for 500 sqm.

2 part or open lid NFT channels can cost around 4.3 L for 500 sqm.

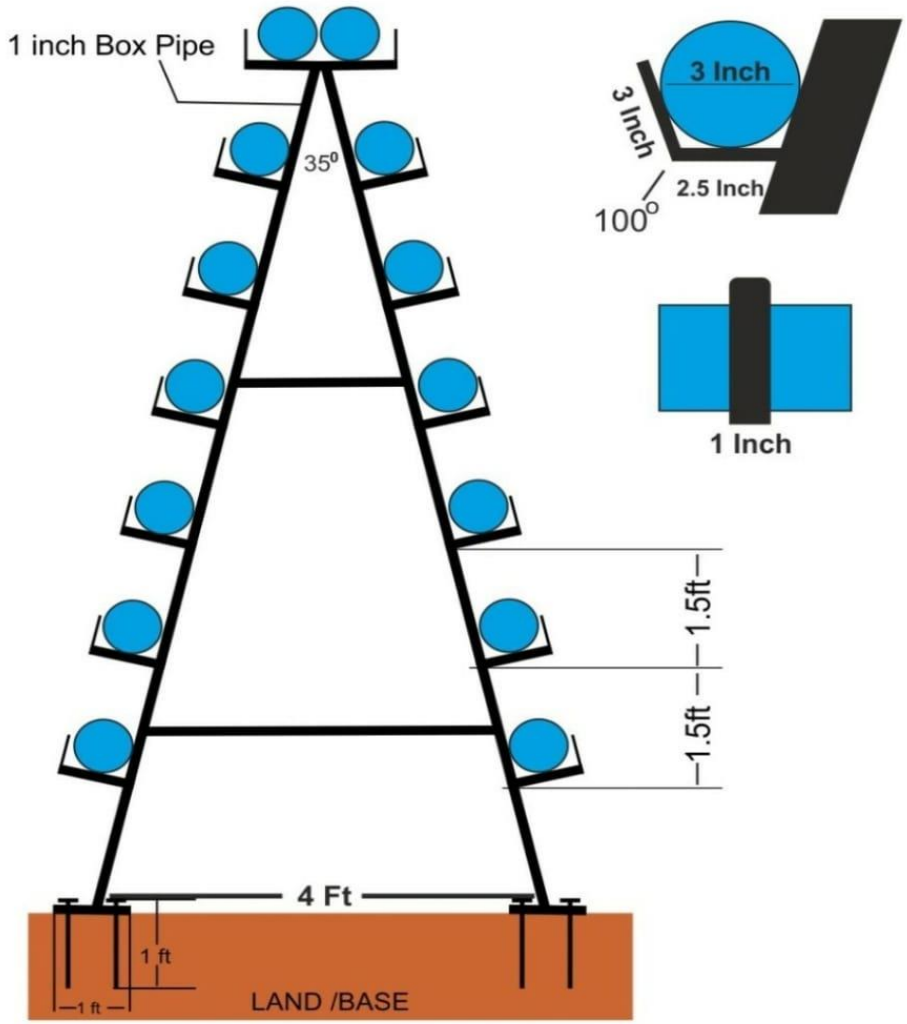
In addition to the cost of NFT channels, there will be additional costs towards End-caps for these channels, plumbing connections, the stand or frame to support NFT channels, labor, and service charges of the experts that you will engage in the installation, etc. These all components may look small but when added in its entirety, can easily set you back by another 1-2L.

Thus, overall, an NFT channel based Hydroponic set-up in 500 sqm can cost approx. 4 L to 6 L for the NFT structure set-up. a 500 sqm Hydroponic NFT farm can cost between 10 L and 12 L for setting up the poly house and the NFT structure.

The third major head of cost which is towards technology, automation, and making this farm work.

Proposed Farm Layout

Planned Structure:



A – Frame is Suitable for increasing production capacity and favorable for ample Sun light condition.

NFT Flat Bed 500 sqm

Farm Cost Metrics

Setup Costs Components	**510.967 Sqm/ 5500 sqft**
No of Plants per Cycle	12000
Nft Stands and Other fittings	5,50,000/-
Nutrient Dosing and Mixing automations	1,25,000/-
Greenhouse fan & Pad	10,50,000/-
Compound, Storage Area, Motors, Electricity Fittings, Plant Grow Beds, Foundation Costs, Levelling, Mats, Water Tanks, Frame Stands, Consumables, Miscellaneous, Labour, Consultancy Charges	6,75,000/-
Estimated total	**24,00,000/-**

Profitability Scope

Number of Plants	12000
Production per plant	0.25 kg
No.of Cycles per year	10-12
Total Production per Year	~30,000 kg
5-10 % Mortality	3000 kg
Net Production	27,000 kg
Avg rate per kg	120/-
Turnover	32,60,000/-
Expenses	~6,00,000/-
Profitability per year	**26,60,000/-**

Agri Joy Farm construction

Operational farm sample.

Products -

Hydroponics is the production of vegetables in state-of-the-art, temperature-controlled, multi-span tunnels. The structures being created are multi-spans, complete with computer temperature sensors, automatic opening and closing vents, automatic misting units and temperature-controlled fans.
The advantages of growing in high-tech poly-house are:

1. Faster, longer growth
2. Harvest labor reduced by 80%
3. Reduced harvest time
4. Provide optimum temperature for plant growth
5. Yearlong production
6. Zero climate dependency
7. Better yield per plant
8. Continues market availability
9. Scope of vertical farming

Agri Joy's first line of production will be lettuce/ basil & Strawberry

Lettuce
One of the most commonly grown hydroponic crops, lettuce (Lactuca sativa) matures in a little more than a month. Tiny seeds germinate in a soilless growing medium before being transferred to a water-based solution that provides all the nutrients they need to reach harvest size. Net pots inserted into the panels hold the lettuce plants as they grow to maturity. With this method, we can enjoy fresh lettuce any time of the year.

Name	Sprouting stage	Cotyledons	Transplantation	Harvesting	Average weight
Lettuce	0 - 6 Days	6 - 12 Days	12 - 25 Days	25 - 40 Days	300 grams

[1] 300 Grams is the average of Lettuce production considering various varieties. Some seeds like iceberg lettuce grows up to 300grams in size and some as green leafy grows up to 900 grams

[2] Weight of lettuce varies as per maturity level. We are targeting 60% maturity (High in demand).

Basil

Basil is another most commonly grown hydroponic crop, basil (*Osmium basilicas*) matures in a little more than a month. Tiny seeds germinate in a soilless growing medium before being transferred to a water-based solution that provides all the nutrients they need to reach harvest size. Net pots inserted into the panels hold the basil plants as they grow to maturity. With this method, we can enjoy fresh basil any time of year.

Name	Sprouting stage	Cotyledons	Transplantation	Harvesting	Average weight
Basil	0 - 6 Days	6 - 12 Days	12 - 25 Days	25 - 40 Days	180 grams

*[1] 180 Grams is average of Basil production considering various varieties. Some seeds like lemon basil grows up to 75grams in size and some as sweet Italian basil grow up to 250 grams

*[2] Weight of basil varies as per maturity level & stem size. We are targeting 30% maturity & 15cm stem length (High in demand).

For strawberries we use Runners/ stems of already healthy plant species and regrow them via Hydroponics.

These stems/runners can be purchased via trusted Labs etc.

Competitive Edge

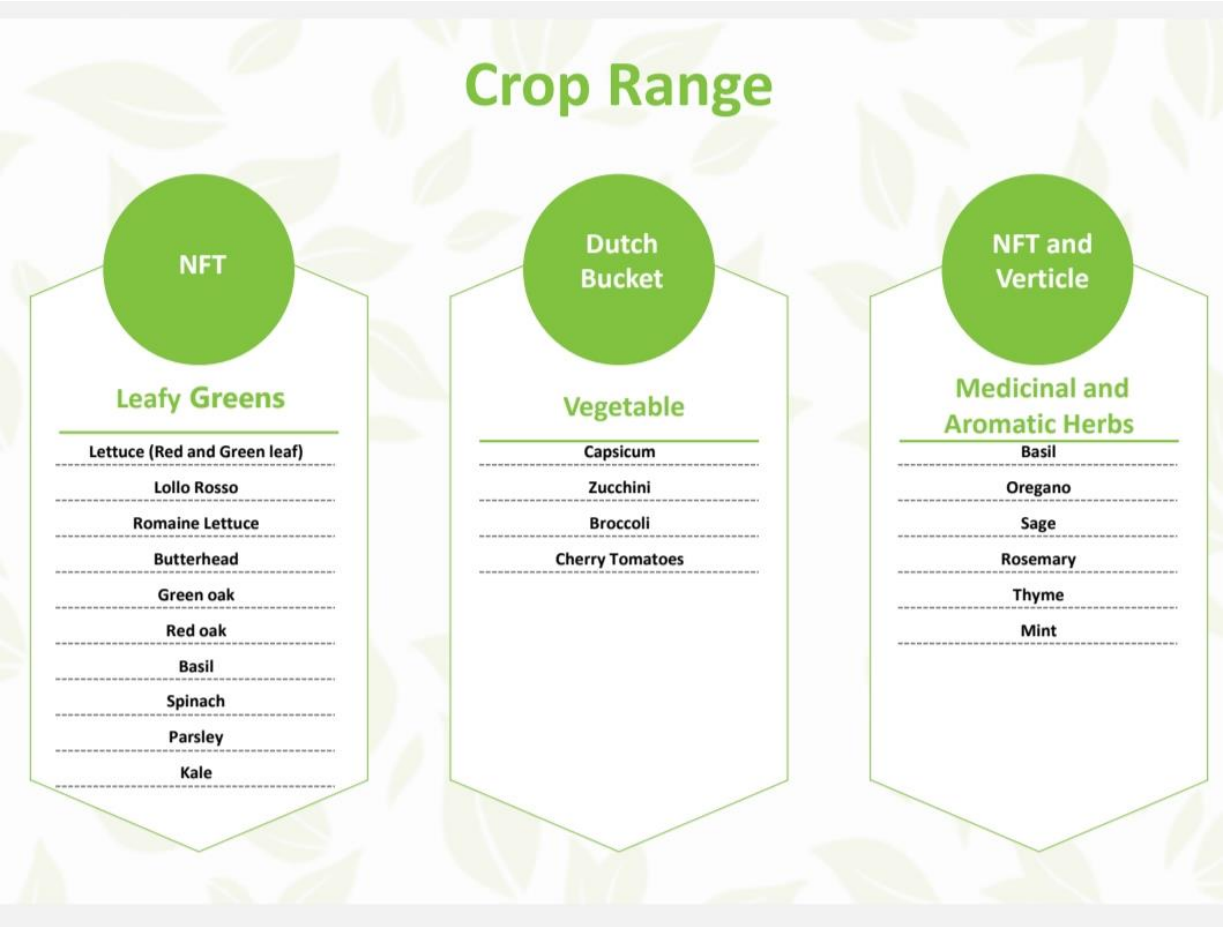
In the open market we will make our place with minimum friction due to some added advantages we achieve due to production setup.
Our main competitive advantages are:

1. High Nutrient rich vegetables.
2. Zero use of pesticides.
3. Zero harmful chemical usage.
4. Better quality and spotless leaves.
5. High production capacity.
6. Zero soil contact.
7. Delivered with roots to restaurants (on-demand), So can be kept fresh until consumed.
8. Ready to use cut packaging for retail outlets.

Important Assumptions

- **All our future sales forecast and profitability statements are based upon few assumptions. Here are few things we assume:**
- **Steady demand for these products.**
- **No major climate change that would make these products easier to grow without hydroponics in this area.**
- **Sudden Food habits change in the market.**
- **No major natural disaster or situation of Act-of-God in the project area.**
- **Sudden exponential increment in cost of raw materials.**
- **Assuming a stable economy and political environment.**
- **Assumed interest rates and exchange rates and tax structure will not have major changes.**
- **No sudden changes in agriculture laws, regulations, standards and related administrative processes.**
- **All the costs defined exclude import or any custom Taxes.**
- **All the costs mentioned above are just representative values and not a committed price. The accurate cost of the Project will be derived after site feasibility and necessary surveys.**

Vegetable Scope



Plants	Price (INR)
Pok Choy	130
Lollo Rosso	110
Red Oak leaf	110
Butter Head	110
Romaine	110
Kale	280
Rocket leaves	200
Mint	100
Coriander	250
Baby Spinach	250
Basil	220
Parsley	180
Cucumber	50
Cherry Tomato	165
Color Capsicum	130
Tomato	40

Summer Data

Plants	Price (INR)
Pok Choy	110
Lollo Rosso	85
Red Oak leaf	85
Butter Head	85
Romaine	85
Kale	200
Rocket leaves	110
Mint	100
Coriander	200
Baby Spinach	180
Basil	130
Parsley	110
Cucumber	50
Cherry Tomato	165
Color Capsicum	130
Tomato	25

Winter Data

Note:

- **The mentioned data is only based on random surveyed data and is subject to change.**
- **The most preferable crops are LETTUCE, BASIL, KALE.**
- **The AVG price of crop is taken to be 120/- INR, which is highly changeable according to local market conditions.**

BENIFTS YOU CAN AVAIL

Agri Loans

Agriculture is the backbone of Indian economy and it definitely comes as no surprise to see financial institutions offer monetary aid to farmers all across the country. Agricultural loans are available for different kinds of farming-related activities.

Types of Agricultural Loans in India

One can avail a loan for the following activities related to agriculture:

- Running day to day operations
- Buying farm machineries such as tractors, harvesters, etc
- Purchasing land
- Storage purposes
- Product marketing loans
- Expansion

Moreover, these financial aids can be offered in the form of grants and subsidies too, which are usually meant to protect the farmer in the event of crop damage or loss of crops.

Agricultural loans in India are not only offered to farmers working towards the cultivation of food crops, but they are available to anyone who is engaged in other agriculture-related sectors like horticulture, aquaculture, animal husbandry, silk farming, apiculture and floriculture.

National Bank for Agriculture and Rural Development (NABARD)

In India, all premier banking and financial organizations, at all levels, offer a great deal of financial help to farmers. However, this trend of boosting the rural economy and agriculture through financial credit was started by the National Bank for Agriculture and Rural Development (NABARD) back in the early 1980s. When it comes to credit in the field of agriculture, all other banks throughout the country fall under the purview of the NABARD.

This financial institution is working in conjunction with the Government of India to boost the agriculture sector. It is credited with several innovative schemes that have immensely aided the farmers throughout the country. The most notable scheme launched by the NABARD is the Kisan Credit Card (KCC).

Kisan Credit Card Scheme

The Kisan Credit Card is a scheme launched by the Indian banks back in 1998, as a way to fulfill the financial necessities of the agricultural sector. This is done by giving monetary support to farmers, which in turn comes with various features and benefits. The quantum of the loan depends on several factors like cost of cultivation, farm maintenance cost, etc.

This has been particularly beneficial for those farmers who are not aware of the banking practices. Moreover, it is meant to protect farmers from harsh and informal creditors, which may land them in a massive debt.

The farmers can use the KCC card to withdraw funds for the purpose of crop production and domestic requirements.

Applying for the KCC is a simple, hassle-free process that requires minimal documentation. It also offers crop insurance coverage, along with subsidies on interest payments. Speaking of interest, farmers applying for loans under the KCC scheme can borrow funds at 7 percent per annum, for amounts up to Rs. 3 lakhs.

The Kisan Credit Card is linked to the farmer's savings account and all the transactions are done under a single account. Additionally, any credit balance in the KCC account earns interest. All farmers can apply for a KCC and if you are looking to apply for one, then visit your nearest bank for more information.

Poly House Subsidy

Several states Govt's proposes 50% subsidy for the poly house development only if it is agricultural land and in the name of the owner applying for Subsidy. There are several other monetary benefits provided by the NATIONAL HORTICULTURE BOARD to promote modern farming.

As you have gone through the project cost and profit metrics, Write us back to show your interest or if you have any further queries.

The next step of project construction is as follows.

A- We give a further detailed project Report/ Proforma Invoice

B- Site visit of experts after Token Amount

C- Material sourcing and commencement of construction after project audit.

END OF REPORT

THANKYOU!

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