

Green Chilli

Green chilli is an important spice crop in India. Green chilli is predominantly consumed as fresh fruit as it is a common cooking ingredient in Indian households. Fresh green chillies are also exported to middle-east and Europe. Its processed products such as paste, sauce and pickle are also consumed.

S. No.	Business Opportunity	Brief description
1	Fresh green chilli – Direct to market	Harvested green chilli sold on same day after basic value add such as washing and sorting
2	Fresh green chilli – Temporary store and sell	Harvested green chilli can be stored in cold storages for few days to tide over price crisis
3	Green chilli paste	Green chilli can be processed to paste that can be sold B2B to hotels, restaurants or for further processing
4	Green chilli pickle	Green chilli can be processed into pickle that can be marketed in the surrounding geography either B2C or B2B

Other business opportunities include ready to green chilli sauce and green chilli powder. These business opportunities are not detailed in this document as they may not be suitable for FPOs due to high investment costs, significant volume of green chilli required around the year for business viability, difficulties in marketing due to competition and limited market potential.

1 Fresh Green Chilli – Direct to market

Green chilli has a very short shelf-life in ambient conditions. It should be marketed within 24 hours to final consumers to retain its freshness. Post 48-72 hours from harvest shrinks appear on it affecting its marketability.

Oranges can be sold directly to market with basic post-harvest value addition such as washing, sorting, and packing in corrugated fibre boxes. Oranges have good shelf life, nearly 10 days, at ambient temperature.

Technology	Type	Eligible for Matching Grant
Packhouse	Civil construction	Yes
Bubble washer	Equipment	Yes
Grading and Sorting - Conveyor line OR - Stainless Steel table	Equipment	Yes

Technology	Type	Eligible for Matching Grant
Packaging: - Vented corrugate fibre board boxes (or) - 150-200 gauge perforated polyethylene bags	Consumable	No
Plastic crates	Implement	Yes

Process:

- Green chilli is placed in plastic crates post washing to minimize field dirt and damage
- Harvested green chilli can be washed in bubble washer to remove field dirt. It can also be washed with chlorinated water
- Washed green chilli are air dried to remove surface water
- Conveyor lines or SS tables can be used for grading and sorting. Grading and sorting is done manually. They can also be used for packaging process
- Green chillies are packed in perforated corrugated boxed of standard sizes (such as 3.8 kgs) to be sent to market
- They can also be packed in 150-200 gauge perforated polyethylene bags in case they are marketed directly to retail outlets. These bags help in increasing the shelf-life of the chillies.

Advantages:

- Immediate sale post harvesting reduces price risk, i.e., market price falling in the coming days
- There is no significant machinery investment required

Disadvantages / Challenges:

- Green chillies face frequent price crashes during the harvest season. Hence, having no appropriate storage facilities will force FPOs to sell produce at low / unviable prices

2 Fresh Green Chilli – Temporary store and sell

Green chillies can be stored temporarily (up to 20 days) in cold storage at 10°C and 85-95% relative humidity.

Technology	Type	Eligible for Matching Grant
Packhouse	Civil construction	Yes
Bubble washer	Equipment	Yes
Grading and Sorting: - Conveyor line	Equipment	Yes

Technology	Type	Eligible for Matching Grant
(or) - SS table		
Vented corrugate fibre board boxes	Consumable	No
Pre-cooling chambers	Equipment	Yes
Cold storage: - Container cool rooms (or) - Cold storages	- Civil construction (or) - Equipment	Yes
Reefer trucks	Vehicle + equipment	Yes
Plastic crates	Implement	Yes

Process:

- Harvested green chilli can be washed in bubble washer to remove field dirt. It can also be washed with chlorinated water
- Washed green chilli are air dried to remove surface water
- Conveyor lines or SS tables can be used for grading and sorting. Grading and sorting is done manually
- Green chillies are packed in perforated corrugated boxed of standard sizes (such as 3.8 kgs). They can also be packed in larger cartons or plastic crates
- Packed green chillies are kept in pre-cooling chamber for forced air cooling to bring down the temperature to 10°C. Pre-cooling is essential for shifting the chillies to cold storage. Pre-cooling of nearly 8 hours is required to remove field heat
- Cold storage can either be pre-fabricated container cold room or regular cold storages (civil construction fitted with refrigeration system)
- Pre-cooled green chillies are then kept in cold storages (preferably at 10°C) at 85-95% relative humidity. Lower temperatures lead to chilling injury in the fruit. In case the cold storages are not equipped to control humidity, humidifiers can be installed
- Many container cold rooms come with pre-cooling facility. In such cases, separate setting up of separate pre-cooling chambers are not required
- Passive evaporative coolers can also be used for temporary storage of green chillies. They can keep green chillies fresh for 2-4 days
- Green chillies that have been cold stored should be transported through reefer trucks as shelf life post moving to ambient temperature is limited (2-5 days)
- Green chillies that are being transported to distance markets need to pre-cooled and transported in reefer trucks

Advantages:

- Ability of FPOs to store the chilli, even if it is for few days, can make a significant impact on price realized. Price crashes are frequent during chilli season and storage facilities can help FPOs overcome them
- Pre-cooling facility and reefer trucks can help FPOs to supply to distant markets (Delhi, Mumbai, etc.) and for direct exports
- FPOs can rent cold storage facilities to farmers via a subscription fee or usage charge

Disadvantages / Challenges:

- The cost of establishment and operating the cold storage facilities are high
- Price risk – the market price of chilli may go further down forcing the FPOs to sell at lower prices in spite of incurring storage costs
- Chilli is harvested seasonally. This would affect the utilization of the cold storage, pre-cooling, and reefer facilities

3 Green Chilli Paste

Green chilli (paste) is a common ingredient in Indian cooking across different cuisines. Green chilli in paste form is a convenient form of using chilli in cooking for restaurants and hotels.

Technology	Type	Eligible for Matching Grant
Shed for unit	Civil construction	Yes
De-stemmer	Equipment	Yes
Chilli cutter	Equipment	Yes
Wet Grinder	Equipment	Yes
Blending tank	Equipment	Yes
Bottle washer	Equipment	Yes
Bottle filling machine	Equipment	No
Hand-held induction sealer	Equipment	Yes

Green chilli paste unit should be combined with the equipment suggested in any one of the above two business activities. Chillies of lower grades can be utilized for processing to paste, as higher grade chillies fetch better prices when sold fresh.

Process:

- Washed chillies is be destemmed through a de-stemmer. They can further be cut into smaller pieces through a chilli or vegetable cutter
- Cut chilli is then grind into a paste using an industrial grinder
- Paste-like chilli is then added to a blending tank where necessary ingredients are added and blended
- Chilli paste can be packed in bottles either manually or through a paste filling machine. Bottle washer can be used to wash the bottles or alternatively they can be washed manually
- As air tight measure and to preserve shelf life, hand-held induction heater are used to seal the bottle before capping

Advantages:

- FPOs can earn higher margins through green chilli paste than through the above mentioned business opportunities
- Manufacturing green chilli paste is a viable alternative during prolonged subdued market prices, with minimal equipment set-up requirement

Disadvantages / Challenges:

- Among processed green chilli products, its sauce is more widely consumed / used than paste
- Selling paste to businesses such as hotels and restaurants provides lesser margin in comparison to selling to consumers
- FPO should maintain good utilization of the unit to breakeven and get profits on the product sold

Additional processes:

- Green chilli paste can be further processed by pasteurizing the paste and aseptic packaging. This will require additional investments and higher utilization of machinery (more quantity of chilli supplied round the year) require supply of green chilli for processing for majority of the year to have maximum utilization
- Shrink tunnel can be used for wrapping brand label around the paste bottles
- **Green chilli sauce:** Green chilli paste can be further processed to green chilli sauce. Manufacturing green chilli sauce will require additional investments for equipment and will also require higher supply of chilli round the year for increasing the utilization and thus making the business profitable. Green chilli sauce market is also dominated by established brands, and hence competing both in terms of brand recognition and pricing will be difficult. Brief process for manufacturing green chilli sauce from paste is as follows:
 - The green chilli pulp is fed to a steam jacketed kettle, where additional ingredients are added and the mixture is heated
 - Mixture is then fed to a continuous evaporator to remove excess water in the pulp

- It is then pasteurized, through table pasteurizer or other suitable pasteurizing methods, to eliminate pathogens
- Final sauce is to be filled in bottle through aseptic bottling machine

4 Green Chilli Pickle

Green chilli pickle is a common dish consumed in India. Chilli is also an important ingredient in making different types of pickle. While there are many established and national / regional brands in pickles, pickle manufacturing is also a common cottage industry.

Technology	Type	Eligible for Matching Grant
Shed for unit	Civil construction	Yes
De-stemmer	Equipment	Yes
Chilli cutter	Equipment	Yes
Fermentation tank	Equipment	Yes
Blending tank	Equipment	Yes

Green chilli pickle unit should be combined with the equipment suggested in any one of the first two suggested business activities. Chillies of lower grades can be utilized for processing to pickle, as higher grade chillies fetch better prices when sold fresh.

Green chilli pickle can be manufactured without much equipment. The critical factor in producing chilli pickles is on the ingredients that suit the market the FPO intends to sell the pickles in.

Process:

- Chillies' stem is cut followed by cutting the chilli into smaller pieces
- Chilli is fermented using different ingredients such as salt, oil, and vinegar
- Fermented chilli is then blended with other required ingredient in the blending tank
- Chilli pickle is then hand packed, either in bottles
- Labels, done through third-party, is wrapped around the bottles

Advantages:

- Pickle is widely consumed, and it is possible to build a strong local brand through consistent quality and market-suited product
- Multiple types of pickles can be manufactured with green chilli as the base ingredient
- Green chilli pickle can be supplied B2B to hotels and restaurants. It can be customized as per customer requirement

Disadvantages / Challenges:

- Investments required in building a brand in terms of establishing trade supply chains
- Year-round supply to market is required if the FPO wants to build a B2C brand

Additional Process:

- Bottle washer can be used for washing of the packaging bottles. Shrink tunned can be used to wrap labelling around the bottle