

PROCESSING OF RED CHERRY PEPPER



AATMANIRBHAR BHARAT

**PM Formalisation of Micro Food Processing
Enterprises Scheme (PM FME Scheme)**

RED CHERRY PEPPER

- **Scientific name:** *Capsicum annum var. cerasiforme*
- **Local name:** *Dalley Khorsani*
- **Family:** *Solanaceae*
- **Major producing states :** Sikkim and West Bengal (Darjeeling)
- **Production area:** about 248 hectares in Sikkim
- Small, round shaped, fleshy and heavily seeded
- They are green in colour in early stage of fruiting
- Turn to red when fully matured
- The yield varies from 2-2.5 kg fruit/plant
- **Size:** 2 to 7 centimetres in both diameter and length



- **LOCAL VARIETIES**

- Nagey
 - Sanu dalley
 - Thullo dalley
- One of the hottest peppers in the world
 - **Hotness (Scoville Heat Units):** 100,000 to 350 000
 - **Capsaicin** is responsible for pharmaceutical properties of chillies
 - **Capsaicin content** in fresh red cherry pepper: 1 g/100g in dry weight.
 - **Moisture content:** 84-88% wb
 - **Vitamin C content:** about 1000-1010 mg/100 g dry matter
 - **Rich in** vitamin B, iron, thiamine, niacin, magnesium and riboflavin.

USES OF RED CHERRY PEPPER

- Red cherry pepper is crunchy and juicy
- It is a favourite side-dish with the usual 'daal-bhaat' in the Nepal-Sikkim belt.
- Commonly used for chutneys and sauces along with momos
- It is regularly consumed in winters as it keeps the body warm
- It is used for making **pickle, sauce, paste, powder and dry chilli.**
- The most commonly used form of it is the *Dalley* pickle.



MARKET INSIGHTS

- Owing to the sweet-tingly taste, *Dalley* is a widely used chilli in the North-Eastern regions of India
- It is also very popular with foreign tourists coming to Sikkim.
- Sikkim Government is encouraging the growth of *Dalley* for exports
- Sikkim has been declared as Agri-Export Zone for cherry pepper
- Sikkim has been declared as an '*organic state*'
- Increasing demand for organic products due to increased health concerns and awareness
- Chilli powders have their niche market both in India and globally.
- Pickles are most suitable for small-scale manufacturers.
- Pickles can be made using relatively simple equipment that is readily available in most places.

HARVESTING OF RED CHERRY PEPPER

- Harvesting is done when the cherry pepper pods are well ripened.
- At maturity, the skin colour of the pods should be at least 50% red.
- Gentle picking/harvesting without any mechanical damage to the stem.
- Harvesting should be done during early mornings.
- It should be avoided during rains or just after rains.
- The harvested pods are kept in heaps or in bamboo baskets either indoor or in shade away from direct sun light for 2 or 3 days
- This helps in developing uniform red colour.

PROCESS FLOW CHART FOR RED CHERRY PEPPER POWDER AND FLAKES



PRE-SORTING

- Pre-sorting is the first operation cherry pepper powder and flakes processing
- Refers to the removal of unmarketable material.
- Handling of unwanted plant material that cannot be sold is costly.
- This is performed prior to sorting.
- It involves the removal of stones, leaves, over mature, too small, severely damaged, deformed or rotting units.
- All discarded material should be quickly hauled away from the processing area.
- Bruised, rotted, off-shaped units, wilted or yellow leaves are usually removed by hand.

SORTING

- Colour is the foremost criteria for sorting.
- Manual visual sorting can be done for selection of fully ripen uniform red cherry peppers.
- Sorting can be done on a grading table/floor or on a moving conveyor
- Colour sorters can also be used for sorting.
- However, colour sorter are costly.



Sorting on table/floor



Colour sorter



Sorting on conveyor

DESTEMMING

- Destemming refers to removal of the stems from the selected cherry pepper.
- It is essential to reduce the drying load of the dryer.
- Manual destemming by hand is currently practiced for cherry pepper.



Manual Destemming

- Blanching is a thermal treatment
- **Objective:** to inactivate enzymes responsible for quality degradation such as browning and colour changes
- Hot water or steam blanching
- **Hot water blanching:** 100°C for 3 minutes
- **Equipment:** Electrical hot water blanchers or large stainless steel containers
- Cooling with cold water or cold air for better quality retention



Hot water blancher

DRYING

- Red cherry peppers contain 84-88% wb moisture content.
- This moisture content needs to be reduced to less than 8-10% wb for longer shelf life through drying.

Various drying methods

- Traditional sun drying
- Solar drying
- Hot air drying
- Vacuum drying

SUN DRYING

- Cherry peppers are dried in sun by spreading on clean dry polythene sheets, cemented / concrete drying yards or even on the roofs of houses etc.
- Frequent stirrings to get uniform drying and prevent mould growth.
- Drying time: 10-15 days depending on prevailing weather condition.
- Yield of dried cherry peppers: about 15-20 kg from 100 kg fresh chillies



Sun drying

- **Solar dryer:** Chillies are placed in wire mesh trays in a transparent enclosure of glass or plastic painted black on the inside.
- Ventilation holes in the base and upper parts of side walls maintained a natural air circulation.
- **Solar tunnel dryer** is a tunnel like semi cylindrical in shape, poly house made up of acrylic polythene sheet.
- Cherry pepper is spread on the floor on a polythene sheet or in wire mesh trays in racks.
- The dryer can be easily constructed on floor or above terrace.
- **Capacity:** 50 kg to 1000 kg
- **Drying time:** 2-3 days



Solar dryer



Solar tunnel dryer

- Hot air drying is carried out in electric hot air tray dryers
- Consists of an insulated cabinet fitted with shallow mesh or perforated trays
- Hot air is blown through a blower at 0.5–5 m/s
- **Temperature of air:** 60°C
- **Capacity:** 50 kg to 200 kg
- **Drying time:** 14-16 h



Hot air dryer

VACUUM DRYING

- Dryer consists of hollow shelves in a vacuum chamber
- Cherry peppers are placed in thin layers on flat metal trays
- **Pressure:** 1–30 mm Hg using a vacuum pump.
- Hot water is passed through the shelves to dry the food.
- **Temperature of air:** 60°C
- **Capacity:** 50 kg to 100 kg
- **Drying time:** 8-9 h



Vacuum dryer

GRINDING

- Grinding of dried cherry peppers to suitable size is referred to as milling.
- Dried cherry peppers are ground to fine powder
- Dried products can be coarsely ground to produce dried cherry pepper flakes.
- **Equipment:** Hammer mills/grinders
- **Cherry pepper powder size:** $< 500\mu$



Grinder

- *Dalley* powder and flakes are packed in laminated polythene pouches for long term storage.

Equipment:

- Form-fill-seal (FFS) packaging machines
- Hand sealer



Hand sealer



FFS packaging machine

QUALITY OF RED CHERRY PEPPER POWDER AND FLAKES

- **Moisture content:** 8-10% wb for safe storage
- **Colour:** red
- **Pungency:** 50000 – 73000 SHU
- **Powder particle size:** < 500 μ
- 100% natural without adulterants and aflatoxin



Cherry pepper flakes



Cherry pepper powder 19

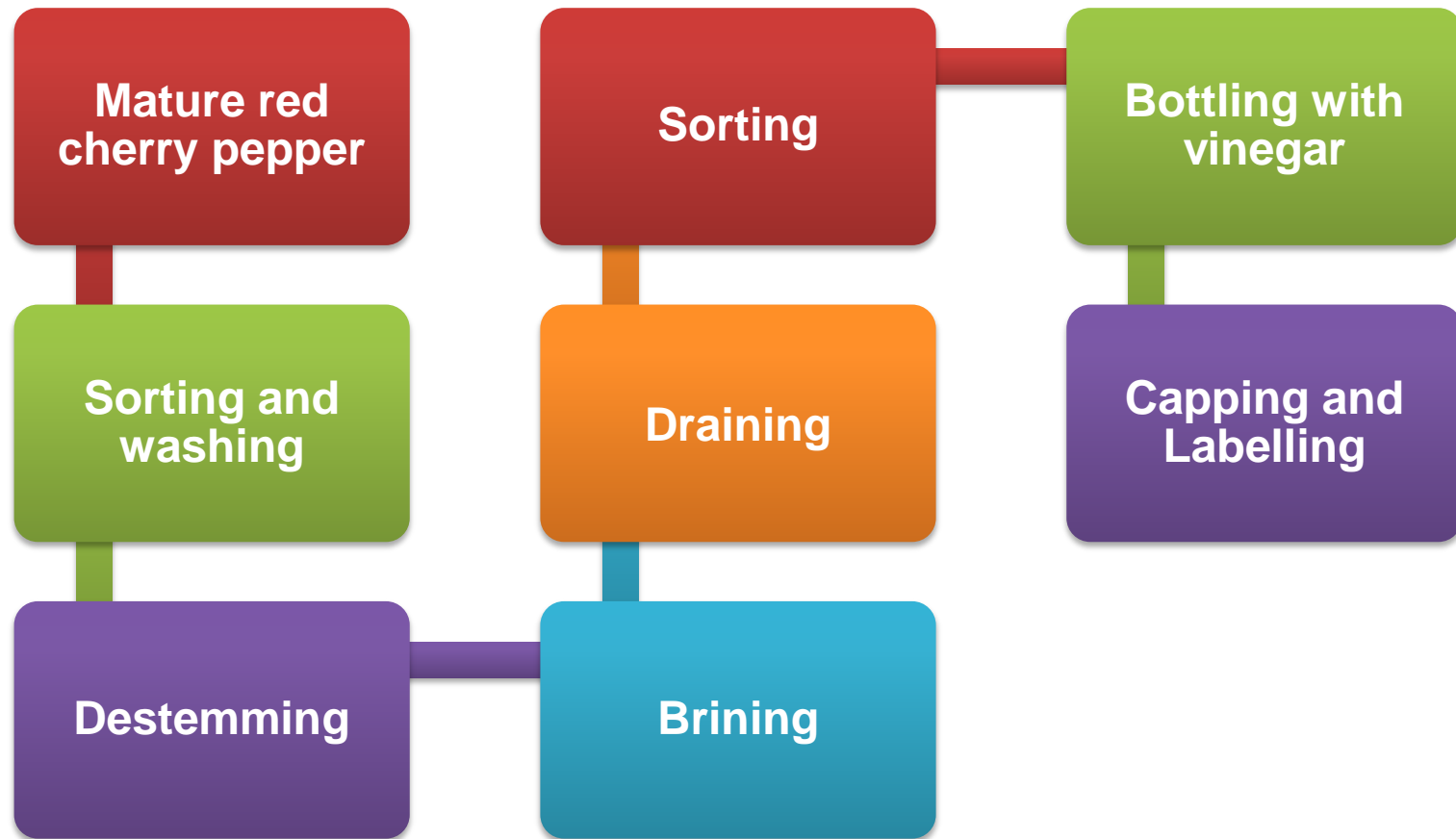
PICKLES

- Pickling is one of the oldest and most successful methods of food preservation
- Pickle quality depends on many factors:
 - Maintenance of proper acidity
 - Salt concentration
 - Temperature
 - Sanitary conditions
- They are eaten as a savoury, spicy accompaniment to a meal
- Pickles generally has a pungent, sweet-sour flavor
- Pickles serve as appetizers and help in digestion by aiding flow of gastric juices
- Pickles are preserved by a combination of increased acidity (reduced pH), added salt, reduced moisture and added spices.

TYPE OF CHERRY PEPPER PICKLES

- Pickles are generally of three types viz., **pickles in vinegar, citrus juice, brine and oil.**
- Besides the basic fruit/vegetable, the substances that are generally added to pickles are vinegar, sugar, salt, oil and spices.
- Mixed fruit/vegetable pickles may be prepared.
- **Most popular types of *Dalley* chilli pickle:**
 - ❖ **Cherry pepper vinegar pickle**
 - ❖ **Cherry pepper oil pickle**
 - ❖ **Cherry pepper -*bamboo shoot* oil pickle**
 - ❖ **Cherry pepper -*radish* oil pickle**

PROCESS FLOW CHART FOR RED CHERRY PEPPER VINEGAR PICKLE



- Washing is carried out to remove any dirt/dust

Equipment for cherry pepper washing:

- Spray type washer
- Immersion type washer
- Rotary drum washer



Spray type washer



Rotary drum washer



Immersion type washer

SORTING

- For preparation of cherry pepper vinegar pickle, sorting is done based on both size and colour
- Roller sorters can be used for size sorting.
- Colour sorter or visual inspection can be done for sorting based on color



Roller sorter

BRINING AND DRAINING

- It refers to soaking of cleaned cherry peppers in brine/salt solution
- Salt removes water from the chillies by osmosis
- Non-iodized common salt is suitable.
- The iodine in table salt darkens pickles.
- Salt that contains chemicals to reduce caking should be avoided as the chemicals will make the brine cloudy.
- Destemmed chillies are dipped in 5% brine solution for 2-3 days
- After 2-3 days, only plump and whole *dalley* are taken out from the brine.

FILLING, CAPPING AND LABELLING

- The cherry peppers are filled in pre-cleaned dry PET/glass bottles or jars.
- Vinegar/acetic acid is added @ 2-5%.
- **Acidity strength of vinegar: 5 %.**
- The pickling vinegar is white distilled vinegar.
- Colored vinegar should be avoided as it imparts colour to the pickle.
- The bottles can be filled, capped and labelled by hand manually or mechanically.
- For capping of glass jars lug capping machine can be used.

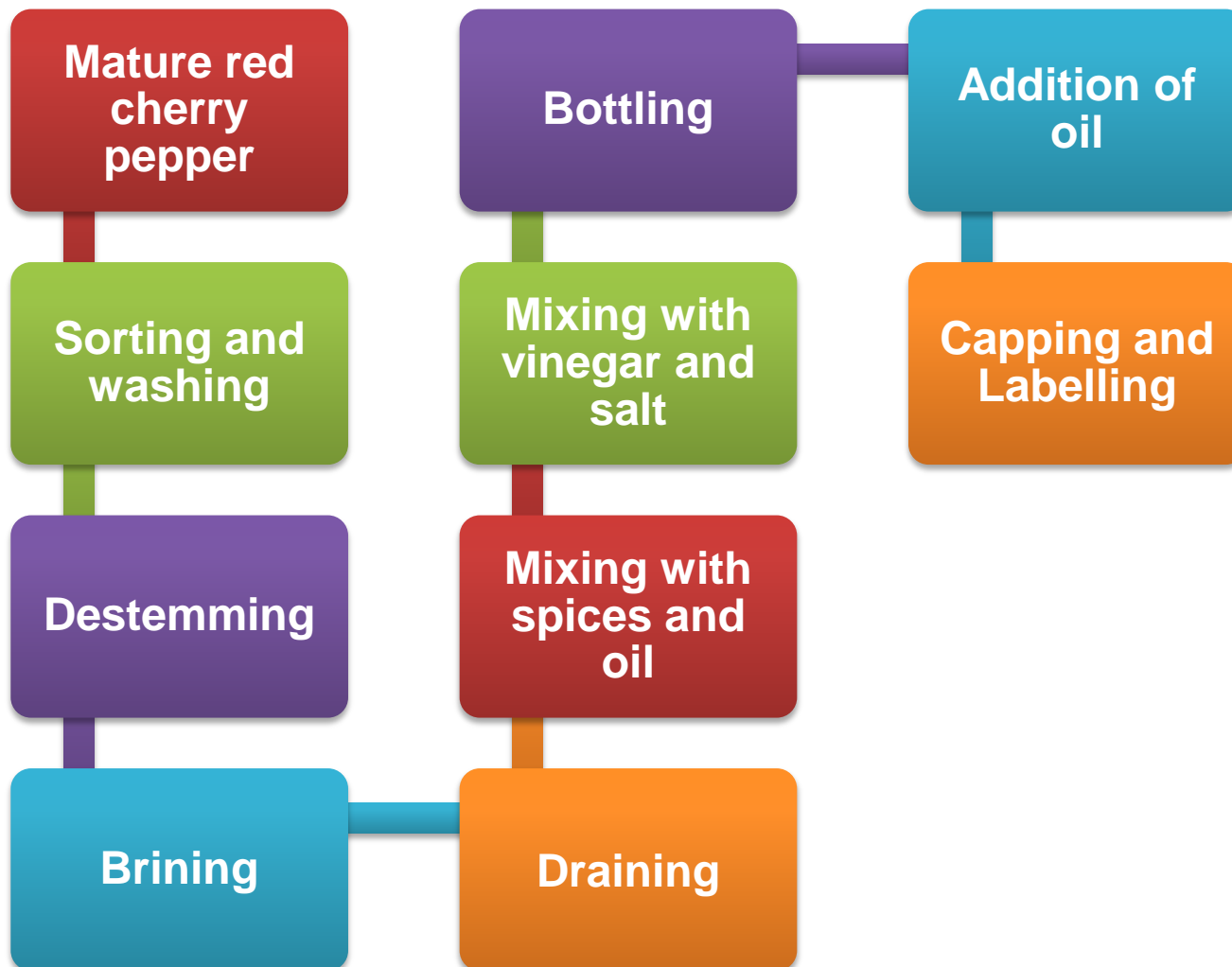


Lug capping machine



Manual labelling machine

PROCESS FLOW CHART FOR RED CHERRY PEPPER OIL PICKLE



- Brined peppers are drained and mixed with spices.
- **Commonly used spices are:**
 - Turmeric powder
 - Mustard seeds
 - Fennel seeds or *saunf*
 - Carom seeds or *ajwain*)
 - Oil
- Spices used should be good quality, clean and free of mould and insects.
- They can be roasted or fried before adding to the pickle mixture.
- Vegetable oil is added to the pickle.
- It is often mixed with the spices to make a paste.
- Top quality vegetable oil (mustard oil) is used.

- After mixing with spices, vinegar and salt are added to the pickle mix and mixed thoroughly.
- Mixing can be done manually or mixers can be used.
- Ribbon blenders are generally used.



Pickle Mixer

FILLING, CAPPING AND LABELLING

- The cherry pepper pickle is then filled in pre-cleaned dry PET/glass bottles or jars.
- Oil is also poured onto the top of pickles to form a barrier against oxygen.
- The bottles are then capped and labelled.

COMPOSITION OF CHERRY PEPPER VINEGAR PICKLE

| Ingredients | Quantity |
|---------------|----------|
| Cherry pepper | 100 kg |
| Salt | 1.7 kg |
| Water | 50 litre |
| Vinegar | 1 litre |

COMPOSITION OF CHERRY PEPPER OIL PICKLE

| Ingredients | Quantity |
|------------------------|----------|
| Cherry pepper | 100 kg |
| Salt | 10 kg |
| Mustard Oil | 4 litre |
| Mustard seeds | 3 kg |
| Carom seeds/ ajwain | 300 g |
| Turmeric powder | 300 g |
| Fennel seeds/saunf | 700 g |
| Vinegar | 800 ml |

QUALITY OF RED CHERRY PEPPER PICKLE

| Type of pickle | Parameters | Limits |
|----------------|--|----------------------------|
| Oil pickle | Drained Weight | Not less than 60.0 percent |
| | Fruit and Vegetable pieces shall be practically remaining submerged in oil | |
| Vinegar pickle | Drained Weight | Not less than 60.0 percent |
| | Acidity of vinegar as acetic acid | Not less than 2.0 percent |



Cherry pepper vinegar pickle



Cherry pepper oil pickle



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