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PROCESSING OF BYADGI CHILLI



AATMANIRBHAR BHARAT

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



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INTRODUCTION

- ❑ Byadgi or Byadagi chilli is a famous variety of chilli in Karnataka state.
- ❑ It is a long (12-15 cm) and thin variety of chilli. The fruits have characteristic red colour and wrinkles on the surface.
- ❑ This variety of chilli is extensively grown and marketed in Byadgi, a town in the Haveri district of Karnataka state. Hence, the name of the variety is Byadgi chilli





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GENERAL CHARACTERISTICS OF BYADGI CHILLI

- ❑ Byadgi chillies are famous for its aroma and deep red colour.
 - Colour: 150000 - 250000 CU (Colour Units) or 80 - 130 ASTA
- ❑ Bydagi chillies have mild pungency and moderate seed content.
 - The capsaicin content: 0.8 - 1.3%, Oleoresin: 12 – 15%
 - Pungency: 8000 - 15000 SHU (Scoville Heat Units).
- ❑ Byadgi chillies are the Geographical Indication product of Karnataka.

BYADAGI CHILLI



- ❑ Grown in Dharwad, Gadag, Haveri , Bellary, Raichur and Gulbarga districts of Karnamataka and Karnool and Adhoni districts of Andhra Pradesh
 - Yield: 0.5-1.25 MT/ha (rain-fed), 3.75-5.00 MT/ha (Irrigated)



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VARIETIES OF BYADGI CHILLI



Byadgi Kaddi



Byadgi Dabbi

Other varieties

Dyavanur Delux

Noolvi Dabbi

Kubhsi Dabbi

Antur Bentur Dabbi



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CULTIVATION OF BYADGI CHILLIES

❑ Soil

- Well drained loamy soils
- Black and red lateritic soils rich in potash having a pH of 5.5-6.5

❑ Climate

- 20-38°C with warm humid conditions during the growth of plant
- Dry weather conditions during maturity of fruits.

❑ Sowing : May-June month

- Transplanting 30-45 days old seedlings on raised beds of 1 m width.
- Seed rate: 1.0 - 1.25 kg/ha, 40 - 45 days seedlings

❑ Harvesting

- November - January months
- Fruits are picked when they turn bright red colour.
- The number of pickings: 6-10 over 3-4 months



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HARVESTING OF BYADGI CHILLIES

- ❑ Chillies being perishable in nature, they require more attention during harvest, storage and transportation.
- ❑ Harvesting should be done at the right stage of maturity, and it depends on the market need.
 - Fully grown immature chillies - Selling in fresh form in local market.
 - Fully mature red chillies - Canning purpose.
 - Fully matured ripe dry fruits - Making chilli powder.





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POST-HARVEST OPERATIONS OF BYADGI CHILLIES

- Primary processing of Byadgi chillies to obtain clean dried chillies with stem

Freshly harvested chillies





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POST-HARVEST OPERATION – SUN Drying

- ❑ Moisture content during harvesting of Byadgi chillies : 65-80% (w.b.).
- ❑ For development of Uniform colour - Kept in heaps for 2 or 3 days.
- ❑ Desired moisture content : 10-11% (w.b.)
- ❑ **Sun drying** : 3 weeks of drying
 - Results in bruising and splitting





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POST-HARVEST OPERATION - SOLAR DRYING

❑ Improved CSIR - CFTRI method

- 4 -tier system of wire-mesh trays or a single tray of perforated aluminium.
- 14 days to for drying Byadgi chillies to the moisture content of about 6%..

❑ Solar tunnel drying

- Temperature 56°C
- Duration: 39 hours
- Aflatoxin content of chillies lower than that dried in sun drying





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POST-HARVEST OPERATION – FLUIDISED BED DRYING

❑ CSIR - NIIST method

- Use of high pressure steam as heating medium.
- Byadgi chillies are washed, cut, dried in the fluid bed drier and then de-seeded.
- Contact time in the dryer is less than 15 minutes.
- Entire drying operation is automated.
- High thermal efficiency.
- Output capacity: Drying 20 MT of fresh red Byadagi chilli /day
- Cost: Rs. 2.5 crore (approx.) for a processing unit.



POST-HARVEST OPERATION – GRADING

- ❑ Graded at 3 points in the primary processing line
 - Farmers’ level: Manual sorting. Discoloured, white and spoiled chillies are separated.
 - Regulated market: Graded based on size, colour, taste etc.
 - Traders’ level: Based on moisture, seed and fruit (pod) ratio, seed size and hardness, thickness of the skin of the pod, pungency .
 - **Common method: Seeing the lots / heaps, picking hand full of pods, analyzing them and assessing the prices**

General specifications of dried Byadgi chilli

Length	10-12 cm max	Broken chillies	2% maximum
Breadth	1.0-1.5 cm max	Loose Seeds	2% maximum
Pungency in SHU	8000-15000 (Heat)	Damaged & Discoloured pods	2% maximum
Colour in ASTA	80-130 Max	Foreign Material	1% maximum
Capsaicin content	0.8-1.3% max	Moisture	14% maximum
Pods with Stalks	1% maximum	Appearance	Fully Wrinkled

POST-HARVEST OPERATION - CLEANING

- ❑ **Cleaning:** Dried chillies are cleaned to remove sand, small stones, dust particles, leaf, seeds, stems, broken pods



Vibrating sieve



Rotary centrifugal screens

POST-HARVEST OPERATION - PACKAGING

- ❑ Packaging at the producers' level and wholesalers' level



- ❑ Consumer unit packs



- 3000 gauge low density polyethylene film pouches
- 200 gauge low and high density polyethylene films
- Dried Byadgi chilli is available in market in the packs of 5, 10, 15, 20, 25 and 40 kg.

Capacity of jute bags = 20-40 kg



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POST-HARVEST OPERATION – TRANSPORTATION AND STORAGE

- ❑ Transport of chillies is done in 2 phases
 - from farm to assembling market : Head loads, cartloads, tractor trolley and truck loads
 - from assembling market to consuming markets / places : Trucks
- ❑ Storage
 - Cold storage units with vapour compression refrigeration system
 - Temperature 4-6°C
 - Relative humidity 60-70%
 - Colour and purity retention for 8-10 months
 - Increase of Oleoresin extraction by 30-40%
 - Dried chillies in shops of Commission agents and farmers' house
 - Stored for 5-30 days



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MARKETING OF DRIED BYADGI CHILLIES

❑ Market forms of dried Byadgi chillies

- Byadgi chilli with stem
- Byadgi chilli without stem

❑ Marketing channels

- Channel 1: Producer → Village Merchant → Middle Men → Commission agent → Wholesaler → Retailer → Consumer
- Channel 2: Producer → Retailer → Consumer
- Channel 3: Producer → Pre harvest contractor → Wholesaler → Retailer → Consumer
- Channel 4: Producer → Commission agent/ Wholesaler → Retailer → Consumer
- Channel 5: Producer → Commission agent → Retailer → Consumer



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EXPORT POTENTIAL OF BYADGI CHILLIES

- ❑ Driven by Oleoresin content and its demand for application as natural red colour in foods
 - Byadgi chilli as substitute for Paprika in Sri Lanka, Bangladesh, America, Europe, Nepal, Indonesia, Mexico.
 - 50 L Oleoresin can be extracted from 1 MT of dried Byadgi chillies
- ❑ Locations of leading exporters of Oleoresin from Byadgi chillies
 - Cochin (Kerala), Tamil Nadu, West Bengal
- ❑ **Inspection**
 - Mandatory sampling and testing of chillies for Sudan dye and aflatoxin
 - Authorised sampling agencies / officials of Spices Board at Kochi, Kerala



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PROCESSING AND MACHINERY

- ❑ Processed products of Byadgi chilli
 - Byadgi chilli with stem
 - Byadgi chilli without stem
 - Crushed dried red chilli flakes
 - Dried red chilli powder
 - Chilli paste
 - Chilli chutney
 - Chilli seeds
 - Chilli oil (oleoresin)

- ❑ Clean and dried Byadgi chillies with stem obtained after post-harvest processing is used as the raw material for the production of all the products



BYADGI CHILLI WITHOUT STEM

- ❑ Manual removing of stem using knife.
- ❑ Mechanical removing of stem using chilli stem cutting machine



Chilli stem cutting machine



Cylinder and knife of chilli stem cutting machine

- Dried Byadgi chillies are fed inside a rotary drum.
- The rotary drum has the holes. The stems of dried chillies enter into the holes.
- The stems projecting through the holes of rotary drum are cut by stationary knives.





CRUSHED DRIED BYADGI CHILLI FLAKES

- ❑ Dried Byadgi chilli flakes are used in the preparation of snacks, seasoning of pizzas and casseroles, and sometimes used for garnishing

Clean dry Byadgi chillies



Roasting



Cooling



Grinding



Packaging



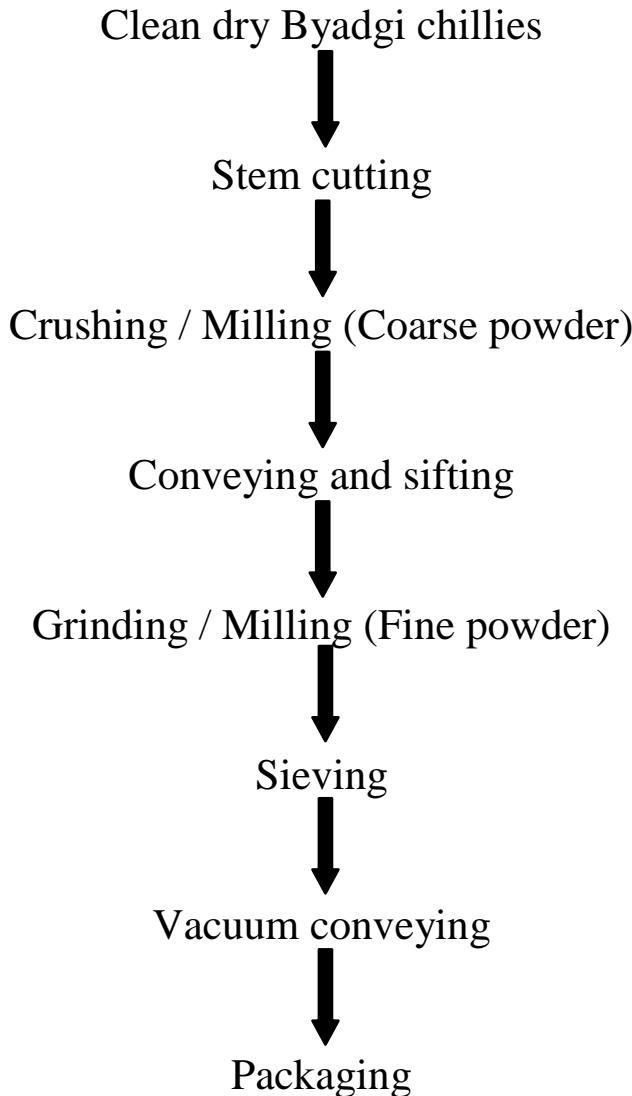
Hammer mill with centrifugal blower and cyclone separator

- Hammer mill is used for crushing and grinding.
- The centrifugal blower lifts the crushed and ground product to cyclone separator
- The chilli flakes gets separated from dust and falls through the cyclone separator



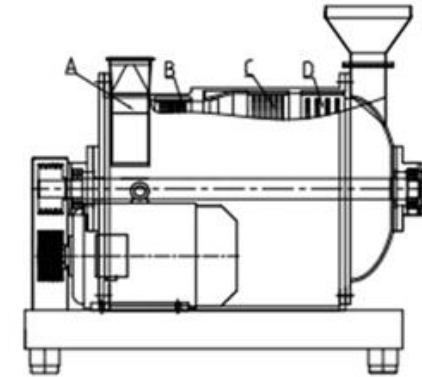
Byadgi chilli flakes 19

DRIED BYADGI CHILLI POWDER



Large hammer mill

A: fan; B: fine milling area;
C: middle fine milling area; D: coarse crusher area
(3-stage milling at one time)



- Hammer mill is used for crushing / milling.
- A large hammer mill can produce the powder in one pass. A small hammer mill requires the crushed material to pass 2-3 times to get fine powder.
- Kandap machine is used to get the traditional aroma and quality.



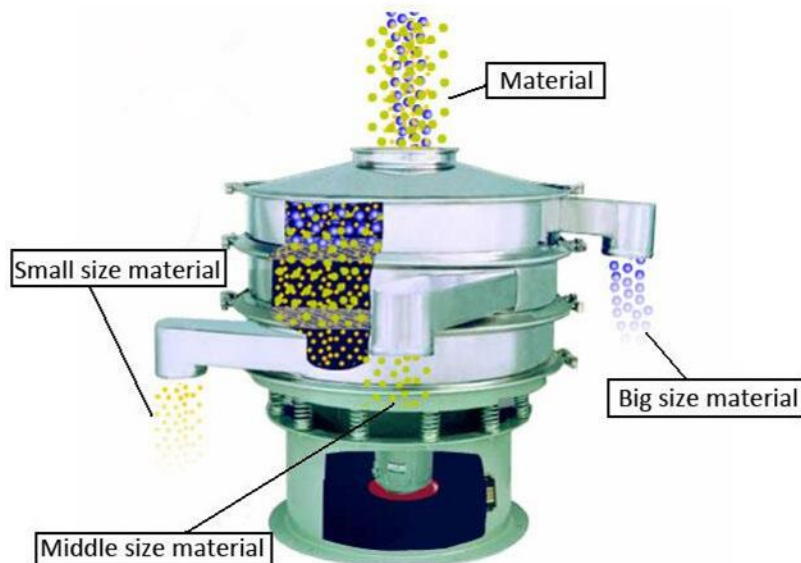
DRIED BYADGI CHILLI POWDER



Kandap machine for traditional milling



Round sifter for sieving



Nutrition value (per 100 grams approximately) of Byadgi chilli powder

Protein	16.75 g
Total fat	13.07 g
Total carbohydrate	39.73 g
Sodium	1.23 g
Salt	2.00 g
Energy	343.55 k Cal



Byadgi chilli powder²¹



BYADGI CHILLI PASTE AND CHUTNEY

Clean dry Byadgi chillies



Stem cutting



Soaking in hot water



Blending with vinegar and water



Addition of hot oil and mixing



Packaging

Byadgi chilli paste used in soups and sandwiches to add extra heat and flavour



Byadgi chilli paste

Clean dry Byadgi chillies



Stem cutting



Soaking in hot water



Blending with jeera seeds, tamarind, jaggery, salt and crushed garlic



Addition of hot oil along with spluttered mustard seeds and asafoetida



Mixing



Packaging

Byadgi chilli chutney is used in regular breakfast and meals²²



BYADGI CHILLI SEEDS



Chilli cutting and
deseeding machine

- The machine has the blades and sieves.
- The blades cut the chilli into pieces and pass them to the vibrating sieves.
- The chilli seeds pass through the sieves and fall to the bottom.
- The chilli pulp is sent for the extraction of oleoresin

- ❑ The chilli seeds are the best source of antioxidants.
- ❑ The consumption chilli seeds stimulates digesting system, lowers cholesterol level and help in losing weight



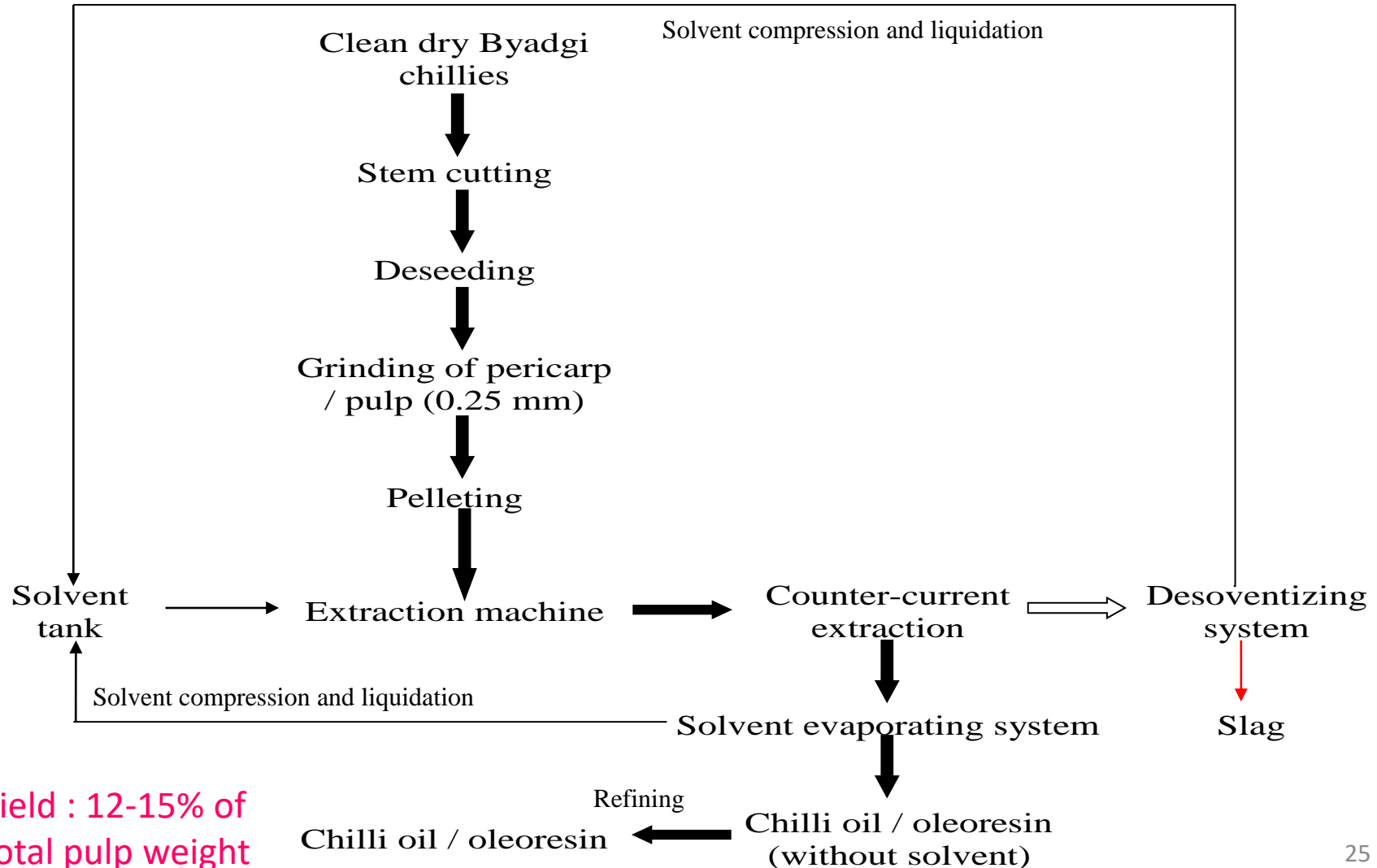
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BYADGI CHILLI OIL (OLEORESIN)

- ❑ Oleoresin is obtained by solvent extraction of pericarp (skin of chilli) or pulp.
- ❑ The oleoresin contains a major pungency principle, capsaicin and colouring principles of capsanthin and capsorubin.
 - The stems of the clean dry Byadgi chillies are removed and deseeded.
 - The pericarp or pulp of the chillies are ground to the size of 0.25 mm.
 - Pellets are prepared from the powder.
 - The chilli oil or oleoresin is extracted in a solvent extraction machine.
 - The main solvent used is liquid propane / butane / dimethyl ether / R134a / liquid ammonia.
 - After the extraction, the solvent is removed.
- ❑ The chilli oil or oleoresin is red viscous liquid with characteristic chilli odour.
- ❑ Oleoresin is used to obtain deep red colour in any food that has a liquid / fat phase.
 - The typical use levels are in the range of 10-60 mg/kg of finished food.



EXTRACTION OF OLEORESIN BY SOLVENT EXTRACTION METHOD



Yield : 12-15% of total pulp weight



EQUIPMENT FOR THE EXTRACTION OF OLEORESIN



Oscillator granulator



Sigma mixer



Desolventiser



Solvent distillation unit



Steam generator



National Institute of Food Technology and Entrepreneurship and Management

Ministry of Food Processing Industries

Plot No. 97, Sector-56, HSIIDC, Industrial Estate, Kundli, Sonipat, Haryana-
131028

🌐 Website: <http://www.niftem.ac.in>

✉ Email: pmfmecell@niftem.ac.in

☎ Call: 0130-2281089