



PROCESSING OF BLACK PEPPER



AATMANIRBHAR BHARAT

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

- ▶ Black pepper (*Piper nigrum* L.) known as the “King of spices”, is the most widely used spice in the world.
- ▶ Black pepper is the dried berries of the perennial evergreen climbing vine *Piper nigrum* (Family Piperaceae)
- ▶ India has the largest extent of area under pepper cultivation in the world (1, 95, 000 ha) followed by Indonesia (1, 16,000 ha). In India, black pepper is grown mainly in humid tropics such as Kerala, Karnataka in large extent and limited extent in Tamil Nadu, Maharashtra and other states.

Black pepper-Statistics

State	Area (ha)	Production (MT)	Productivity (kg/ha)
Karnataka	41400	21000	500
Kerala	84786	17900	200
Tamil Nadu	5360	3000	600

Source: NHB (2019)



Climate and soil

- ▷ Pepper requires a warm and humid climate.
- ▷ The plant tolerates a minimum temperature of 10°C and maximum of 40°C, the optimum being 20- 30°C
- ▷ Annual rainfall of 250 cm is ideal for the proper growth of the crop
- ▷ It can be grown from sea level up to an altitude of 1200 m



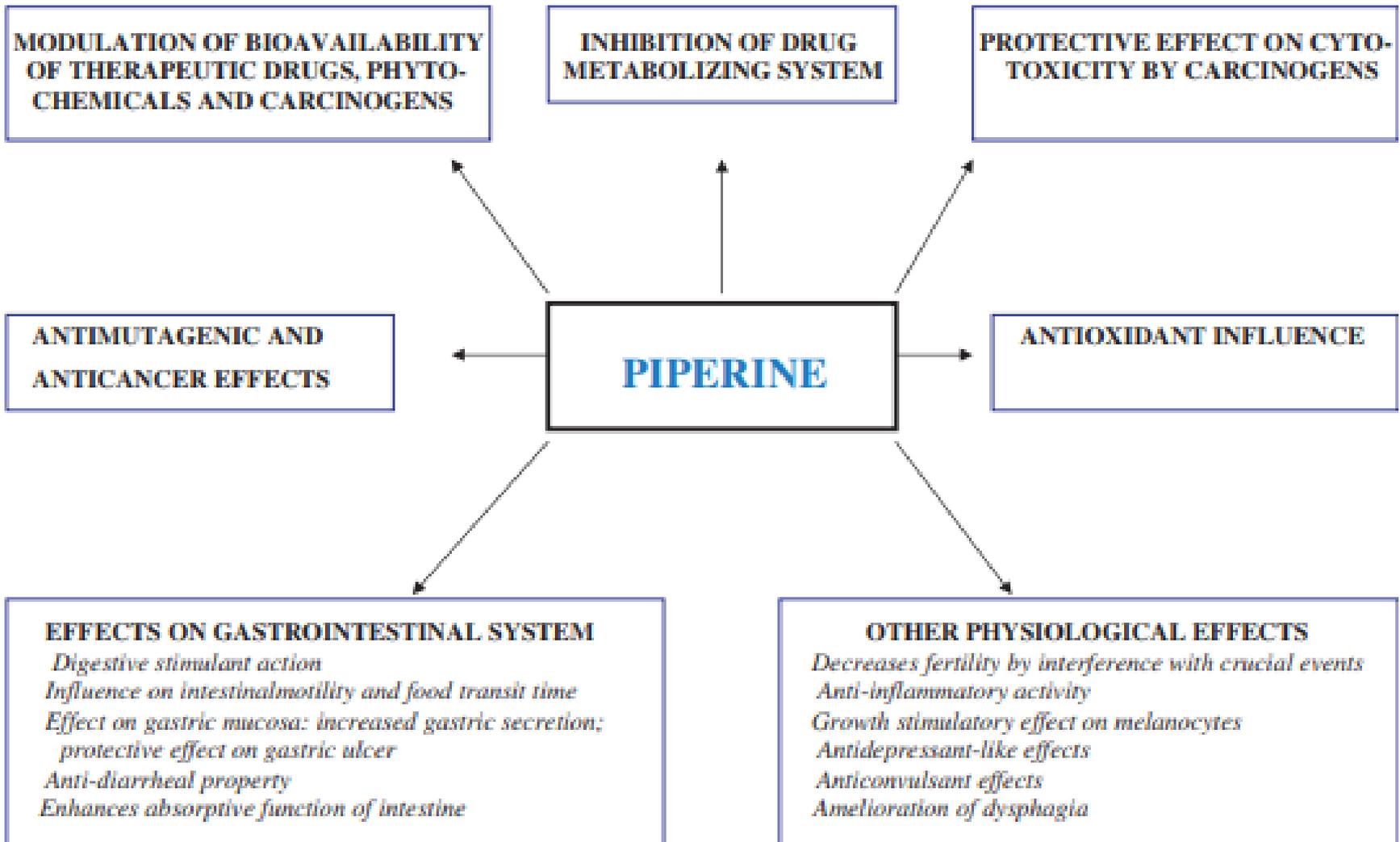
Medicinal Value

- ▷ Anthelmintic
- ▷ Carminative
- ▷ Alterant
- ▷ Antiperiodic
- ▷ Diuretic
- ▷ Digestive
- ▷ Rubefacient
- ▷ Stimulant
- ▷ Stomachic
- ▷ **Treatment of Fever**
- ▷ Asthma
- ▷ Cough and sore throat



- ▷ Dyspepsia
- ▷ Fatulence
- ▷ Arthritis
- ▷ Skin diseases
- ▷ Snake and scorpion bites,
- ▷ Tremors
- ▷ Delirium
- ▷ Migraine
- ▷ Cholera
- ▷ Alopecia
- ▷ Rectal prolapse, gonorrhoea
- ▷ Paralysis of tongue

Medicinal properties



Value added products of Pepper

- ▷ **Black pepper and white pepper based products**
- ▷ **Black pepper**
- ▷ **Ground pepper**
- ▷ **Cryo-ground pepper**
- ▷ **Oleoresin**
- ▷ **Oil**
- ▷ **Micro-encapsulated flavour**
- ▷ **White pepper**
- ▷ **White pepper powder**

- ▷ **Green pepper based products**
- ▷ **Dehydrated green pepper**
- ▷ **Freeze dried green pepper**
- ▷ **Green pepper in brine**
- ▷ **Canned tender green pepper**
- ▷ **Pepper by-products**
- ▷ **Sauce**
- ▷ **Pickle**

Flow Chart of Processing Black Pepper



Product Stage of maturity at harvest

- ▷ Black pepper- Fully mature and 1-2 berries start turning yellow to red in each spike
- ▷ Pepper powder- Fully mature with maximum starch
- ▷ White pepper- Fully ripe
- ▷ Canned pepper- 4-5 months
- ▷ Dehydrated green pepper- 10-15 days before full maturity
- ▷ Oleoresin and essential oil- 15-20 days before maturity

Threshers



Cost-Rs.30,000/-
Efficiency-95%
Cost of operation-Rs.125/tonne
Capacity-320 kg/hr

Mechanical pepper Thresher

Cost-Rs.7500/-
Efficiency-96%
Cost of operation-175/tonne
Capacity-60 kg/hr



Hand operated pepper thresher

Post harvest processing equipments



Black pepper spiral separator

▷ **Solar cabinet dryer**



**Feed Hopper Capacity – 200 Kg per Hour
Efficiency - 88%**

Black pepper cleaner cum grader

Flow chart for black pepper processing

Harvesting

(Fully mature and 1-2 berries start turning yellow to red in each spike)

Threshing

(Manually/mechanical threshers)

Blanching

(Immersing in boiling water for 1 min)

Drying

(Solar drying for 3-5 days till the moisture content of berries get reduced to 10%/mechanical dryer)

Cleaning

(Winnowing, sieving, Inclined belt separator, spiral separator, cleaner cum grader)

Grading

(based on size and bulk density)

Packaging

(Double lined jute gunny bags, paper bags, polythene lined bags)

Storage

(Multi layer paper bags or woven polypropylene bags provided with food grade liners or in jute bags arranged on wooden pallets)



Ground pepper

Harvesting

(Fully mature and 1-2 berries start turning yellow to red in each spike)

Threshing

(Manually/mechanical threshers)

Blanching

(Immersing in boiling water for 1 min)

Drying

(Solar drying for 3-5 days /mechanical dryer)

Cleaning

Winnowing, sieving, Inclined belt separator, spiral separator, cleaner cum grader)

Grinding

(in hammer mill, pin mill or plate mill without adding foreign matter)

Packaging

Pepper Oil



Sun drying

Cleaning

Flaking/Grinding (Roller mills)

Steam distillation (huge stainless steel extractors)

Condensers

Separators

Oleoresin



Cleaning/Weighing

Flaking/Grinding (Roller mills)

Solvent extraction (using organic solvents in huge stainless steel extractors)

Separators (removal of solvent)



Microencapsulated flavours



Extraction of oil/oleoresin

Preparation of emulsion

Atomization of emulsion (spray dryers)

Dehydration of atomized particles
(40-100 μ m)

Flow chart for white pepper processing

Harvesting

- (Fully mature red ripe berries)
- Threshing
- (Manually/mechanical threshers)



Packaging

- (Jute gunny bags)
- Retting
- (Soaking in running water for 7-10 days/dipping in fermentation tanks)

Decorticating

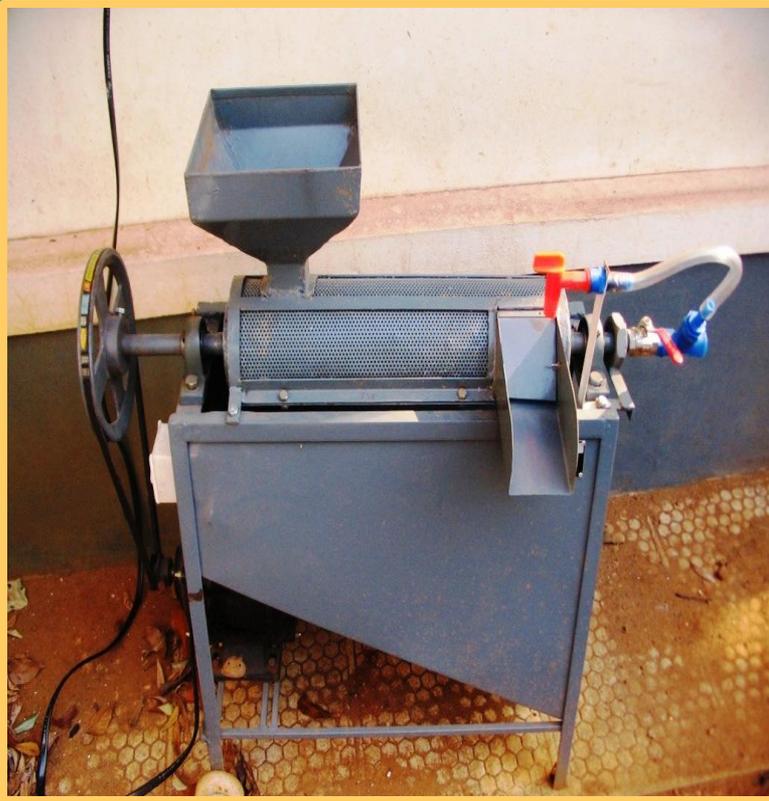
(Removal of loosened pericarp)

Washing

(based on size and bulk density)

Drying

- (Moisture content reduced to 10-12%)
- Storage
- (Multi layer paper bags or woven polypropylene bags provided with food grade liners or in jute bags arranged on wooden pallets)



Pepper decorticator



Dehydrated green pepper



Harvest mature berries (10-15 days prior)

Washing

Blanching

Sulphitation

Mechanical dehydrater
(60-65°C)



Dry recovery-20%

Pepper in brine

Harvest green berries (4-5 months)



Cleaning & Washing



Immerse in brine solution
($17 \pm 2\%$ salt and $0.6 \pm 0.02\%$ citric acid)



Washing
(an interval of 20, 30 and 35 days)



Packing



Freeze dried green pepper



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Half or $\frac{3}{4}$ mature berries



Wash



Blanch



2% salt, 0.25% citric acid



Deep freezing(-40°C)



Drying
(45% reduction in wt)



•Tetra pack

Canned green pepper

Green berries(3 months)



Chlorine water (30 min)



Wash



2% salt, 0.25% citric acid



HACCP protocol for pepper products

Critical control points at various steps of pepper processing line

	CCP1	CCP2	CCP3	CCP4
Product	All 4 products*	All 4 products*	All 4 products*	Pepper in brine
Process stage hazard	Reception Mycotoxin	Reception Chemical residue	Metal detection Metal	Brining Chemical Microbiological
Monitoring procedure	Vendor/Farmer selection, sample testing & analysis		Online inspection	
Pre requisite programme	Proper handling & storage	GAP	-	GMP,SSOP
Post occurrence control	No effective technique	-	Metal detector	No effective technique
Corrective action	Avoid entry to the processing line		Hold & review	Water quality testing

*Common for garbled pepper, white pepper, dehydrated green pepper & pepper in brine

Green pepper sauce



Green pepper pickle

Fresh green
pepper spikes



Washing



Weighing



Put into glass
bottles



Filling with
brine solution



Sealing



Packing





Thank you



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