Agri. Infrastructure, Value addition and Related Technology

- International Exhibition & Conference on

FOOD PROCESSING

(29th August-2nd September,2007 at Jaipur)

N.S.Ranawat,
NIAM, Jaipur.

WHY IS THE DEMAND FOR PROCESSED FOOD INCREASING ?

- Changes at the macro level:
  - Rapid growth of urban population
  - Increased literacy & Sophistication
  - Expansion of middle class households
  - Growth of children & teen-age markets
  - Growing national tourism
  - Proliferation of hotels & restaurants
  - Butter transport & distribution infrastructure
  - Increasing raw material availability, (So costs also remain low)

CHANGES IN THE HOUSE HOLD

- More disposable income, lenient parents & increased tendency to spend (Social pressure &/or less insecurity feelings).
- More working couples with more money, less time, less energy
- Widespread possession of refrigerators, food-mixers & other kitchen gadgets encourage storage, use consumption of processed, instant & convenience foods.
- Smaller households find it cheaper to buy than make; also have less space to make and keep; also can balance budget more easily.
- Increasing difficulty in getting servants

CHANGES IN FOOD TECHNOLOGY

- Product life extension to non-seasonal period (e.g fruit juice, frozen peas)
- Some processed foods are more nutritious, healthier, more hygienic & of consistently superior quality.
- Technologies available for complete utilization of raw material & its waste also
- Packaging technology innovations leading to greater appeal, increased shelf life etc.

CHANGES IN MARKET STRUCTURE

- More advertising media available to create greater product & brand awareness

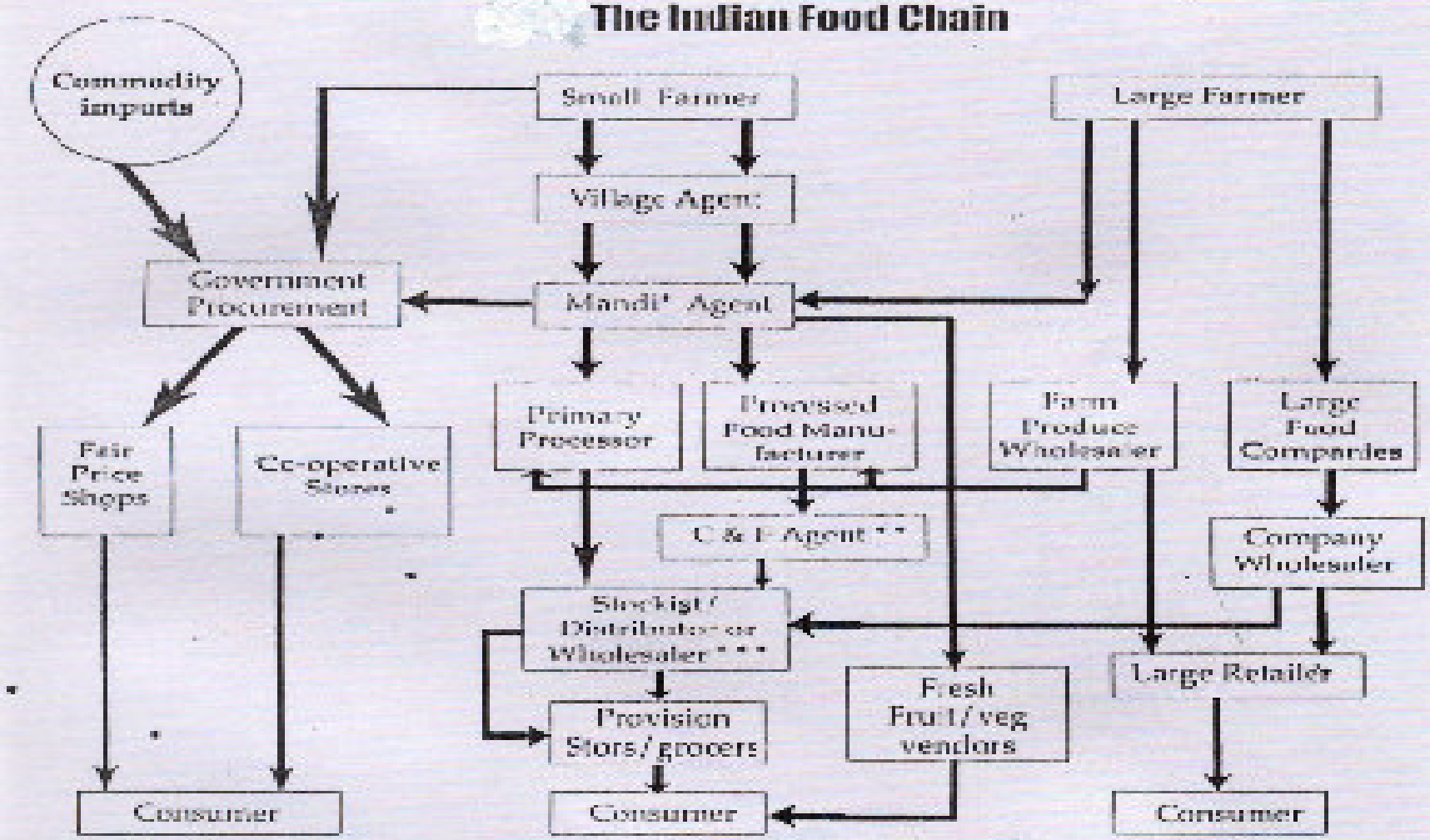
- More universal appeal & greater desire created by sustained advertising and product familiarity.

- Convenient & fast product availability

CHANGES IN PEOPLE'S HABITS

- More emphasis on enjoying life
- Higher standards of living
- Desire for familiar food while travelling
- Growing intolerance to inconsistent & poor & unhygienic quality
- Weceernized habits e.g. meat, ice cream, chocolate, confectionery, etc
- Cosmopolization of consumption
- People's tastes are becoming increasingly alike and yet simultaneously varied and with multiple preferences i.e. consumption preferences are driven simultaneously towards both standardization and pluralization standardization in the sense that these preferences now appear everywhere & pluralization that everywhere, & pluralization that every where people want the same variety.

The Indian Food Chain



* *Mandis are wholesale agricultural markets regulated by the government*

** *Carrying and forwarding agents*

*** *Stockists/distributors deal primarily with processed and packaged foods, while wholesalers deal primarily with basic processed grains and other crops*

Status of Agriculture in Rajasthan

- Rajasthan has jumped to 7th position in total food grain production among the states of the country.
- State ranks first in the production of Mustard, Bajra and Rabi oilseeds.
- State ranks second in production of Gram, Barley, Castor, Kharif pulses and third in Soya bean and Garlic.
- It ranks fourth in Maize, fifth in Wheat, Chillies and seventh in the production of Cotton.
- The state has been producing vide variety of products right from arid fruit Plum to the scented rice, the aroma of which has attracted business entrepreneurs from all over the world.
- Establishment of Terminal Market near Jaipur shall prove a mile stone in the international trading of commodities. Proposed conversion of Jaipur airport into international Airport would be an added advantage.

Export Potential of Rajasthan

A. Cereals

- Wheat – Wheat Products like semolina, Flour, Maida, Pasta products – Vermicelli etc.
- Rice – Non Basmati
- Sorghum – white and red Jowar
- Maize Products – Cornstarch, Enzymes ete.
- Barley – Malt, beer, Alcohol
- Bajra

B . Pulses :

- Bengal gram, Mung, Moth etc. – Dal, Roosted/ salted snack – Snack foods, Papars, mangories etc

C.Oilseeds (Edible)

- Sesamum -- (Til) – Bleached & Dehusked Seeds, oil
  Snackfoods
- Mustard (Rai) – Seeds, oil
- Soyabean – Deoiled Cake, Soyaproteins, Soya products.
- Groundnut – HPS Groundnut kernels, Roasted, Salted, Coated Kernels of groundnut, Snack foods, Peanut butter.

D. Oil seeds (Non edible)

- Neem oil, Castor oil, Tumba oil, Pelu oil,
- Jatropha oil

E. SPICES

- Red Chillies, Dill Seeds, Coriander, Poppy Seeds, Cumin, Ginger, Fenugreek, Fennel and Mustard. Seeds, Ajwain and Garlic

HERBS & MEDICINAL PLANT PRODUCE

- Mint
- Curry leaves
- Basil leaves
- Dill
- Parsley
- Coriander leaves
- Fenugreek leaves
- Safed Musli
- Senna
- Satawar
- Isabgol
- Mehandi – Henna
- Aswahagandh
- Aloe vera
- Marygold
- Neem
- Pilu
- Rose

Spices & Condiments:

The state produces about 5 lakh tonnes of spices and condiments. At present there is negligible organized sector processing in the state and the entire produce is exported raw to the neighboring states.

Exportable spices	**Surplus (Tones per Annum)**
Coriander	1,20,000
Cumin	40,000
Fenugreek	20,000
Chillies	40,000
Garlic	25,000
Fennel	3,000

- **FRUITS**

Kinnow
Musk melon
Orange
Custard apple
Amla
Seedless
Lemons
Ber
Strawberries
Water melon
Papaya

- **VEGETABLES**

Brinjal
Potatoes
Cole crops
Tomato
Carrots (Continental)
Green
Peas
Chillies
Pumpkin
Capsicum
Gourds
Beans
Lettuce

Comparison of Horticultural V/s Cereals Crops

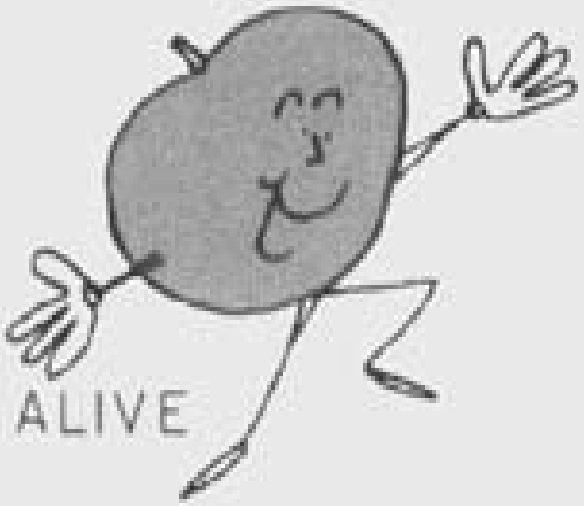
Cereals and oil seeds

- **Low Moisture Content - Typically 10% to 20%**
- **Small unit size typically Large unit Size typically less than 1 gm**
- **Very Low respiration rate with very small. Heat generation of heat. Heat Produced is typically 0.05 mega joules / tan /day for dry grains**
- **Hard texture**
- **Stable, natural shelf life is one year to several**
- **Losses are mainly due to molds & insects.**

Horticultural Crops

- **High Moisture Content - Typically 70% to 95%**
- **Large unit Size typically less than 5 gm to 5.0 kgs.**
- **High to very High respiration rate. Heat Produced is typically 0.5 to 10 mega joules/ tan/day at 0'C to 5-to 70 mega joules /tan/ day at 20C**
- **Soft texture, easily bruised**
- **Natural shelf life is few hours to few days**
6. **Losses usually caused by rotting, senescence, sprouting and bruising**

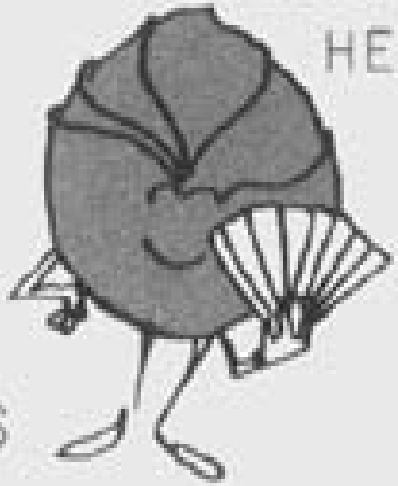
FRESH PRODUCE



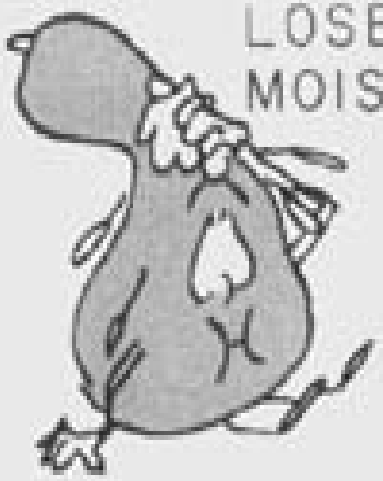
IS ALIVE

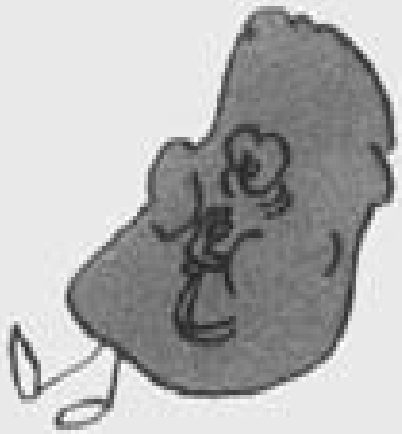
BREATHES

RELEASES HEAT



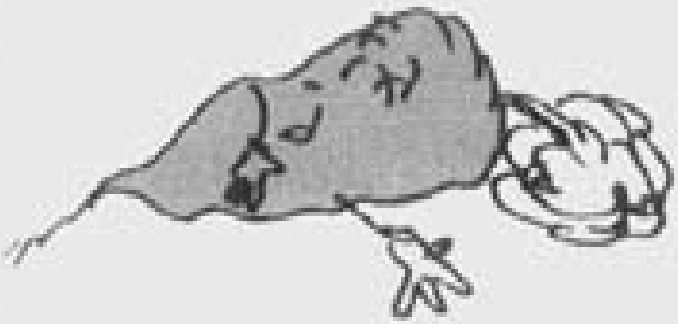
LOSES MOISTURE





CAN GET SICK

CAN EVEN DIE



Value Added Products From Fruits

FRUITS PRODUCTS

- Cereal flakes
- Powders
- Canned Products
- Juice Concentrates
- Juice Fruit bars
- Preserves and Candies
- Jams, Jellies and Marmalades
- Osmo-air dried products
- Dehydrated fruits

Value Added Products from Vegetables

VEGETABLES PRODUCTS

Dried & Dehydrated Vegetables- Cole crops, Potato, Peas, Onion, Garlic etc.

Frozen Vegetables- Cole Crops, Peas,Beans etc.

Canned Vegetables

Instant Pickles/ Pickles and Salt stocks

Thermally processed Vegetables in retort pouches (Ready to Serve)

Methods of Food Processing

- Use of Low Temperature- Referization / Freezing
- **Exclusion of Moisture-** Drying / Dehydration
- **Use of High Temperature-** Pasteurized / Sterilized OR Commercial Sterilized Products.
- **Aseptic Packaging-**
- **Use of Preservatives-**
- **Use of Irradiation Techniques**

Strategies for boosting Agri. / Horti. exports

- **Setting up of export oriented farms or specific reason/area for selected agriculture or horticulture particularly for fruits, vegetables, flowers, spices and medicinal plants.**
- **Huge investment in agriculture to boost up productivity as present productivity is low in case of many commodities and there is enough room for improvement even in short run.**
- **Adopt modern technology for high tech production to meet international quality standards and to meet pricing competency.**
- **Establishing the creditability of foreign importers.**
- **Setting up of air cargo handling facilities at international airport of the state.**
- **Sufficient scientific warehousing facilities at appropriate places should be developed to improve credibility in the market.**

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MAJOR CONSTRAINTS - FRUITS AND VEGETABLES

AVAILABILITY AND POST HARVEST MANAGEMENT.

- Low productivity and poor quality raw material.
- Non-availability of quality planting material/seeds of im-proved varieties.
- Lack of extension education about Horticultural crops.
- Season bound production.
- In consistent supply due to insufficient production and low productivity.
- Lack of quality production of uniform grades and harvest maturity knowledge of fruits & vegetables.

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Conti- MAJOR CONSTRAINTS - FRUITS AND VEGETABLES

- Insufficient production and low yields, resulting in high cost of production and inconsistent supply affecting reliability and dependence of Market.
- In adequate market intelligence and production forecast infor-mation.
- Lack of post harvest handling infrastructure besides in adequate information on post harvest handling technology.
- Over dependence on a few crops mainly, Onion, Potatoes, Tomatoes and Okra etc.
- Absence of linkages and collaboration between Research, Farmers, Consumer and Industry

FUTURE DIRECTIONS & NEEDS

- Extensive survey of production reasons/areas.
- Development of continuous area of production.
- Linkage of price with the quality of raw materials.
- Research break up for the Horticultural crops.
- Development of quality planting materials and making it available during the season to the growers.
- Extension education for the Horticultural crops to the farmers.
- Development of infrastructure facilities.
- Development of post harvest technology & management and HRD facilities.
- Waste utilization of Horticultural crops.

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Conti.-FUTURE DIRECTIONS & NEEDS

- Wide publicity of Horticulture crops with regards to their nutritional importance.
- Development of packaging technology for Horticultural crops.
- Establishment of Horticulture based industries in the state.
- Development of tissue culture, Apiculture & Green house cultivation Technology.
- Primitive method of farming and at present lack of high-tech cultivation Technology & Management.
- Lack of credit facility and Minimum Support Price (MPS).
- Minimizing high cost of transportation and Problems of Truck unions.
- Introduction of drip & Micro irrigation system for fruits and vegetables cultivation and management

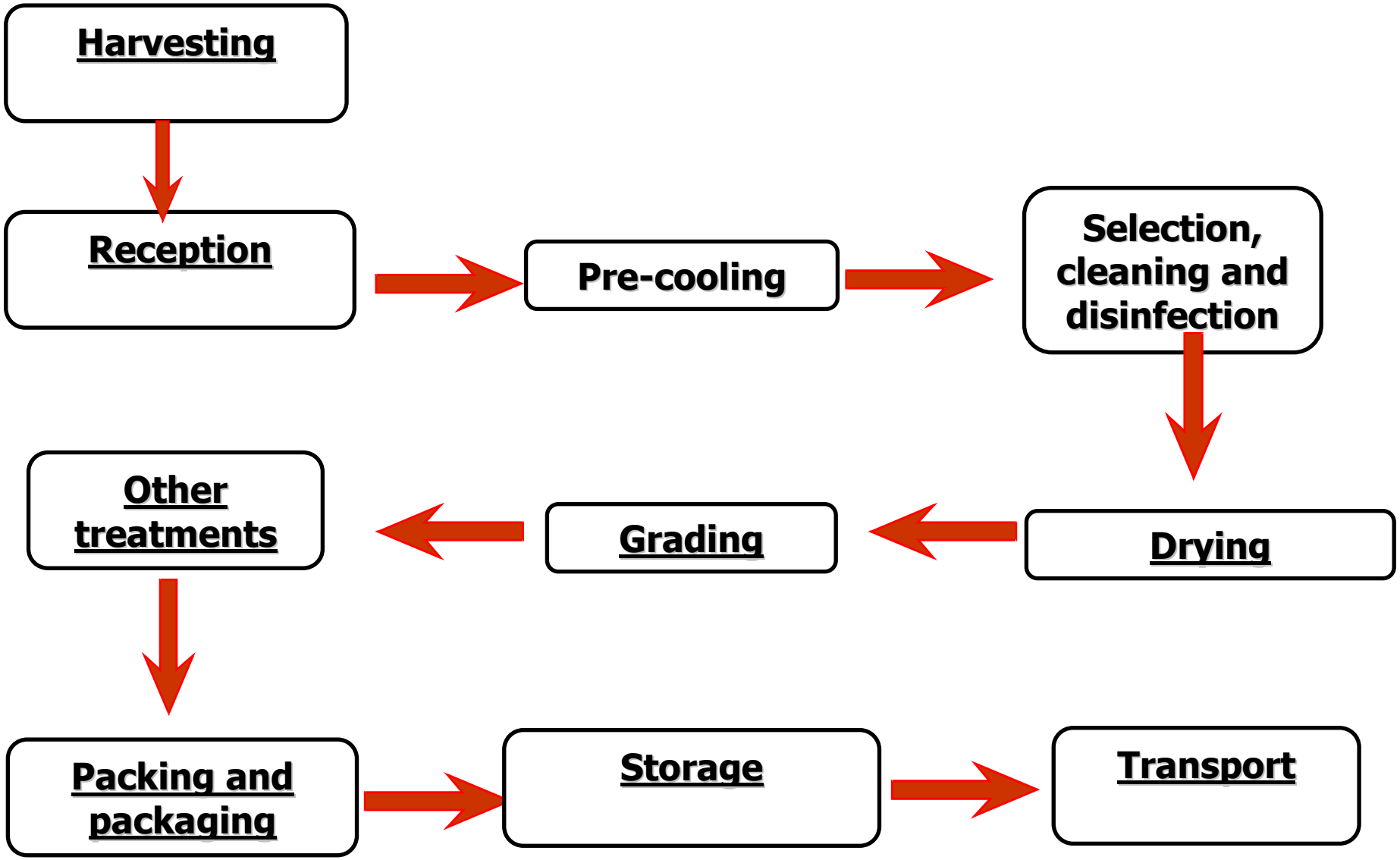
Conti.-

- Identification and development of cultivable area most suitable for cultivation of raw materials for processing into exportable products.
- The state is land lock. Therefore, financial incentives can be considered for inland haulage.
- Promotion of farmers organization for specific export oriented agro commodities.
- Creation and development of promotional efforts by the state.
- Effective development of market intelligence/information.
- A common brand name for promotion of all agricultural products and individual logo for specific commodity/product is highly necessary.

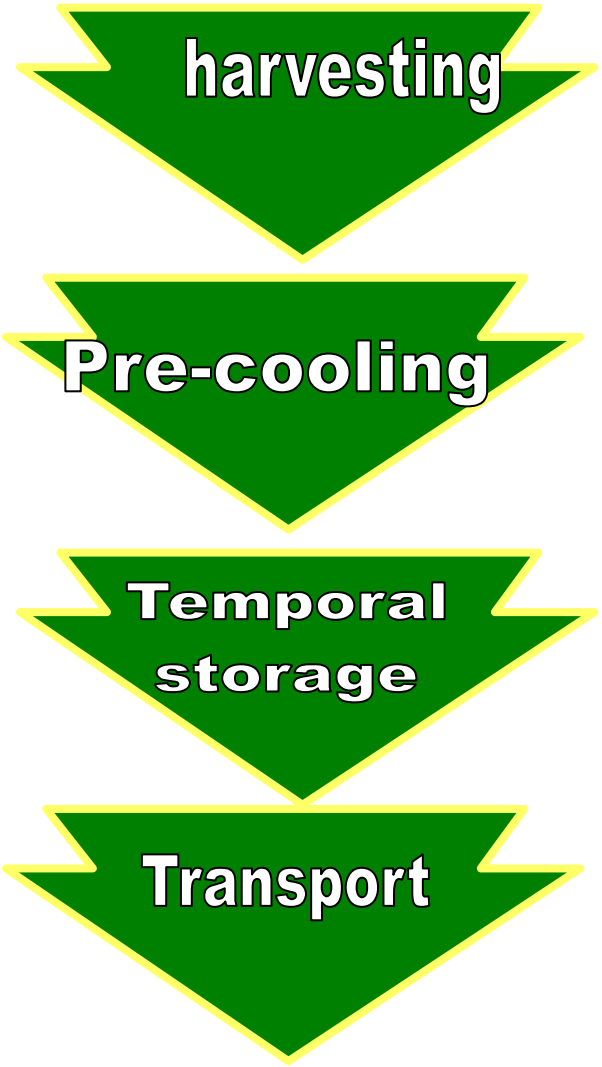
RECOMMENDATIONS

- The state should set up agri export corporation/agency.
- The state should also have agri export policy.
- Establishment of facilities for testing, packaging *etc* to exporters.
- Prompt availability of “Phyto-sanitary certificate”
- Transfer of post harvest technology, market information and services for growers, end users .
- Exposure of global/ international market to exporters/farmers/processors/traders to become familiar with the global trading.
- Prevent leakage of produce to neighbaring States through financial incentives, processing facilities

Post-harvest procedures



Cold chain

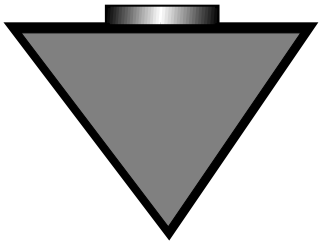


To protect the product from direct sun light.
Quick transport to the packaging.

Minimize delays before pre-cooling.
Uniform product's cooling.

Store the product at optimum temperature conditions .
Practice first in first out rotation.
Ship to market as soon as possible.

Use refrigerated loading area.
Cool truck before loading.
Load pallets towards the center of the truck.
Avoid delays during transport.
Monitor product temperature during transport.



reducing transpiration rates

- Adding moisture (sprays, steam)
- Adding polyethylene liners in containers and using perforated polymeric films for packaging.

Cooling

Hydrocooling carrots

Shower-type hydrocooler

Thermfresh cooling unit

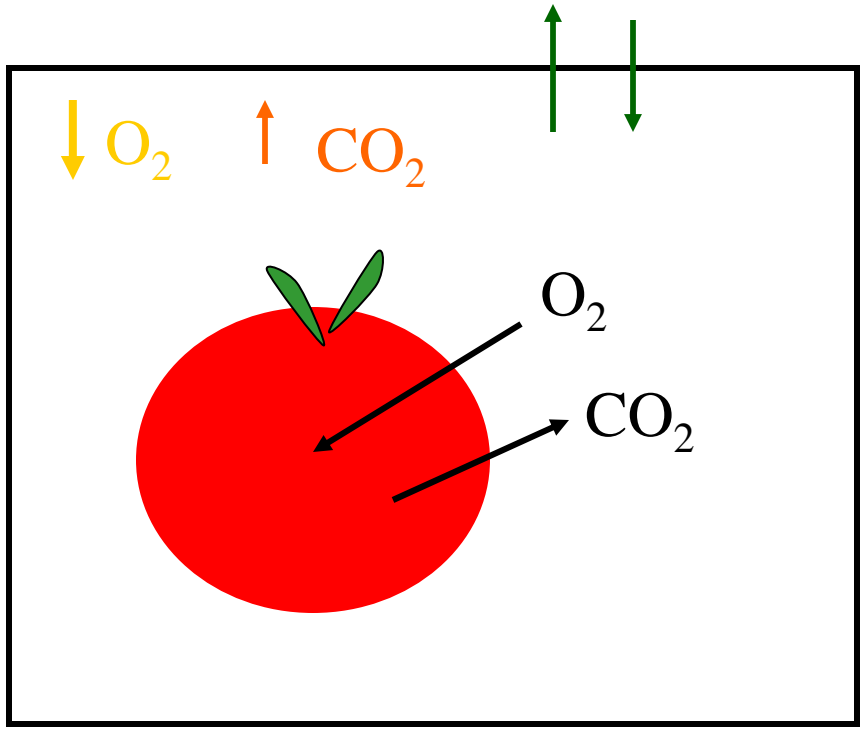
Objective: **to remove the field heat.**

Movement of the caloric energy from the product to the cooling substance.

Modified atmosphere (MAP)

Environment

21% O_2 0.035% CO_2

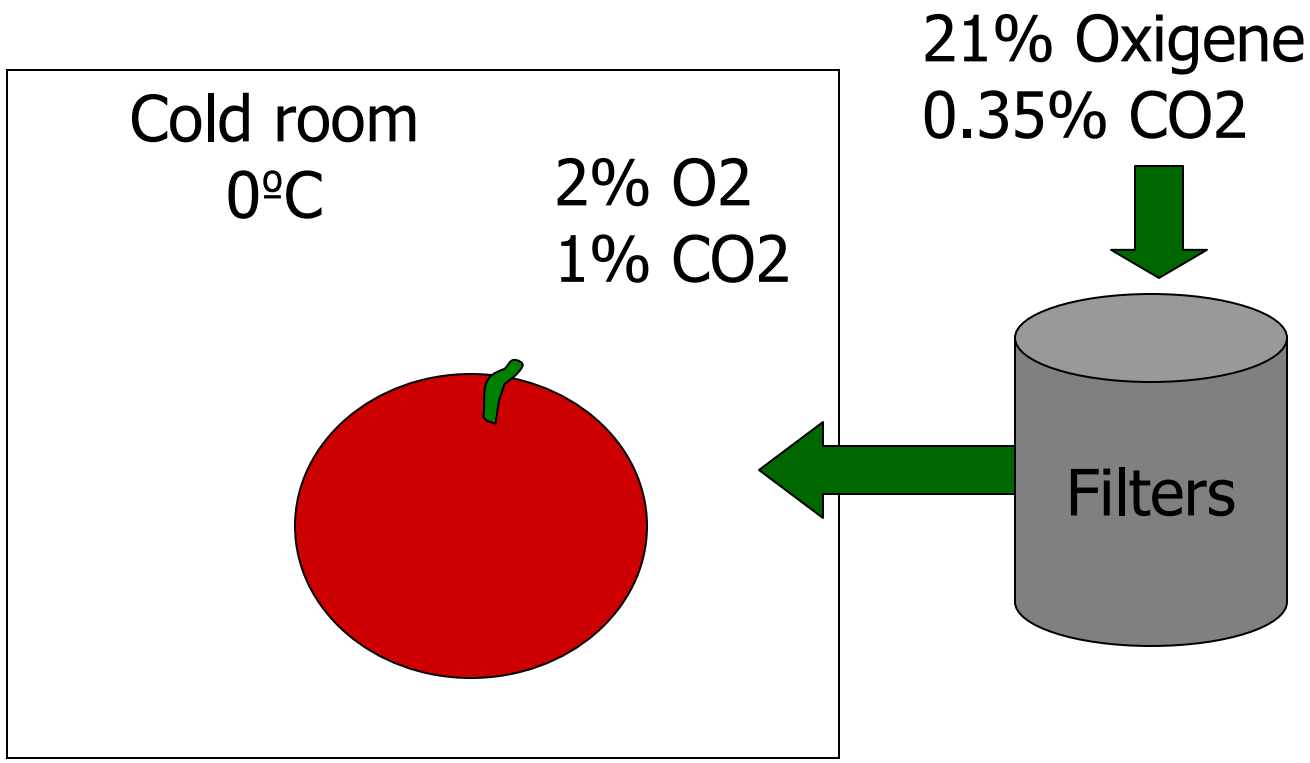


- Modify the concentration of gases in the produce packing.
- Reduce respiration rate.
- Reduce ethylene action.
- Delay ripening & senescence.
- Increase product's shelf life.

Environment

Controlled Atmosphere (CA)

Apples, as any living entities..breath



Environment

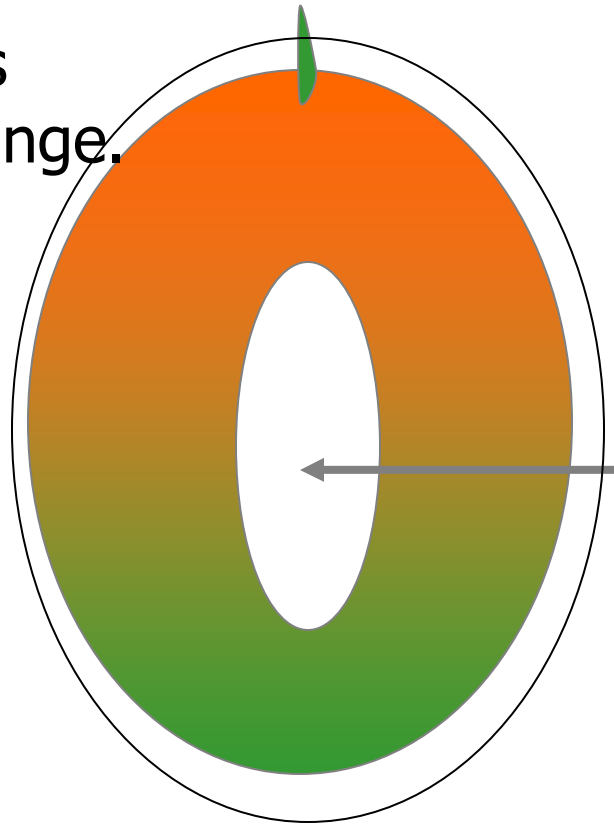
Manipulation of the environment around the produce

Innovations:

- Creation of nitrogen-on demand, using systems of Membrane systems or sieve beds.
- Use of low oxygen concentrations (0.7 a 1.5%) and monitoring of such concentrations.
- Ethylene free CA.
- Programmed atmosphere.
- Dynamic atmospheres- O_2 y CO_2 are modified through monitoring of produce quality attributes such as: ethanol concentration and chlorophyll fluorescence.

waxing fruits

Wax layer restricts
the gases interchange.



Air in the internal
Cavity

Packing carrots for export

JUICE/CONCENTRATE/JAM & PASTE PROCESS LINE(CAPACITY IN 15T/H)


AIR CARGO FACILITY CENTRE

Refrigerated shipping container


SeaLand
NTSW 6626
DO NOT HUMP
SEAU
425
SeaLand
SeaLand
SeaLand
NTSW 6626
SeaLand