

# Contingent Measures

## *Monsoon's Late Onset/Mid Breaks/Early Withdrawal etc*

- Irrigation followed by interculture
- Repeat hoeing to conserve soil moisture
- Keep the crop weed free
- Apply the irrigation in alternate rows in case of furrowed crops
- Instead of flooding in rice crop, keep the soil merely wet to avoid cracks in the soil
- Frequent inter cultural operation in cotton crop to remove weeds and conserve moisture
- In the absence of irrigation spray the cotton crop with 2 per cent urea solution
- Thinning of crop must be done to maintain optimum plant stand
- Foliar spray of urea (2%) under rainfed conditions
- Mulching in crops to conserve soil moisture

## *Drought Management*

- Avoid mono-cropping
- Choose short duration low water requiring crops
- Drought resistant varieties should be sown
- Life saving irrigation
- Water harvesting
- Optimization of the fit between crop growth cycle and available moisture
- Economic use of water with sprinkler/drip irrigation
- Growing of low water requirement crops
- Growing of short duration cultivars
- **Mid Season Correction in Standing Crops**
  - *In situ* moisture conservation
  - Weed management
  - Alteration of crop density
  - Life saving irrigation
- **Avoid Mono-Cropping Diversification of Farming**
  - Spatial diversification
  - Crop diversification
  - Temporal diversification
- **Increase of rainfall activity through artificial cloud seeding**
- **Control of Soil Biotic Stress to Reduce Root Development**

## *Protection of Field Crops Against Frost*

- selection of resistant crops/varieties
- light and frequent irrigation in filed crops
- spraying or sprinkling of water in the evening to create foggy layer
- burning of crop residuals in the direction of light winds to create smoke clouds
- shelter belts and wind breaks in the perpendicular direction of north-west cold waves
- wind propeller machine to break inversion layer
- **Diversification of farming**
  - spatial diversification
  - crop diversification
  - temporal diversification
- microclimate modification using poly pack houses
- transplanting vegetables seedling on the sunny side of furrows

## *Protection of Vegetable Crops Against Frost*

- cover the vegetable nursery by insulating material/plastic sheets in the afternoon and remove in the morning
- grow the nursery and high value vegetables in poly pack houses
- sprinkle and furrow irrigation in vegetables
- light flood irrigation in non furrowed vegetables crops
- cover the space between rows with white plastic sheets
- produce smoke screen by burning the rubber tire and other materials
- adding sand in small quantities to the clay soils every few years
- wind breaks to protect the crops against advective frost
- agitate and mixing of air to break temperature inversion by propellers and fans
- artificial fog by injecting water into air
- erect stone walls in between rows to absorb and radiate heat in the plants

## *Protection of Fruit Orchard Against Frost*

- select frost free site for fruit plantation of frost sensitive fruits
- grow frost resistant cultivars of fruits trees
- natural air drainage should not be blocked by fence rows, heavy vegetation, earth fill etc
- proximity of fruit plantation to water body
- plantation on sunny site in hilly areas
- generate artificial clouds/fog by injecting water mist into air
- artificial smoke clouds or smoke screen by burning smudge pots, rubber tire, oil, crop residue, other materials etc
- hot caps of low emissivity and thermal conductivity material on small fruit plants in the afternoon and remove in morning
- non toxic protein based foam material is effective in radiation frost than advection frost e.g. ethyl alcohol
- wrap the lower branches and trunk of the fruit trees/commercial trees with insulating materials
- fruit trees are sprinkled in late winter and early spring for chilling to prevent early break in dormancy

## *Protection of Vegetables/Fruits Against Heat Wave 'Loo'*

- prepare the sunken beds for nursery sowing
- construct wind breaks of 1 meter height using crop residues or other materials preferably in western side of plot
- frequent irrigation of good quality ground water/canal water
- cover the small plants of nursery with material of low transmissibility of solar radiation during maximum heat load period (noon and afternoon)
- harden the nursery plants before transplanting into the field.
- sprinkle the water in nursery plots two times in the noon and afternoon.
- protect the fruits from direct sun shine by covering them with low transmissivity/opaque materials

## *Protection of **Animals** Against*

### *Heat Wave ‘Loo’*

- young calves should be protected from direct exposure to ‘loo’
- sprinkle the water on milch animals twice a day to regulate body temperature and excessive loss of water from body
- keep the animals in shade during day time
- direct exposure of animals to ‘loo’ should be avoided by the use of wind breaks/walls during day
- roof of animal houses should be of insulating opaque material
- animal shed should be airy to dissipate the metabolic heat released by the animals
- in case of ‘loo’ stroke consult the nearby veterinarian
- sufficient drinking water should be provided to the animals

### *Cold Wave*

- keep the young calves at a sunny site during winter days
- orient the animal house in such a way to give sufficient exposure of animals to sun shine
- protect the animals from cold winds by erecting wind break/walls of two meter height in open shed
- dry litter of chopped crop residue e.g. sarson tura, bajra bulbula etc should be maintained in the animal house to insulate cold ground surface
- bring the animals specially milch animals in the open site after sun rise
- avoid bathing of calves in windy days
- consult the nearby veterinarian in case of cold affect

**SAVE WATER**

**SAVE AGRICULTURE**

**SAVE LIFE**

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- Proper maintenance of water courses and field channels to avoid water conveyance losses which may account for 20-25% of water supply.
- Avoid the practice of field-to-field irrigation in paddy crop. Irrigate individual field strips directly from the field channels to minimize water losses.
- As far as possible irrigate during evening or night particularly in groundwater commands, to avoid evaporation losses.
- Keep your fields free from weeds as they compete for water.
- Keep soils covered with crops litter or other mulches to minimize evaporation of water from soil surface.
- Make mixed use of good quality canal water with saline water in areas underlain with poor quality groundwater.
- Use efficient methods of irrigation such as drip irrigation in vegetable, horticultural and widely spaced crops.
- Make smaller plots while irrigating by surface methods of irrigation to avoid deep percolation losses.
- Grow crops with low water requirement.
- Revitalize and maintain traditional water harvesting systems such as village and farm ponds.
- Avoid unnecessary watering and irrigate only when essentially required.
- Keep fields leveled and bunded for in-situ rain water harvesting.
- Plough up fallow agricultural fields as and when rainfall occurs to conserve moisture for rabi crops.
- Regulate water supply through provision of water taps in the rural areas. Avoid leakage losses.
- Keep away different sources of pollution from water supply system to avoid water borne diseases.