

# Enhancing Productivity on Sustainable Basis of Major Farming Systems

## Crop Sector

### Rice-wheat System

- Improve productivity of the rice-wheat system by identifying gene sources, developing transgenic, and open pollinated cultivars to enhance yield potential and to control wheat diseases including karnal bunt & rusts and bacterial leaf blight in rice.
- Reduce time conflict between rice & wheat by developing early maturing Basmati varieties, and management practices.
- Improve salt tolerance in rice and wheat.
- Improve sustainability of the rice-wheat system through crop rotation.
- Develop economically viable labour saving technologies for rice and wheat

### Cotton-wheat System

- Improve productivity of the cotton-wheat system by identifying gene sources, developing transgenic, and open pollinated cultivars to enhance yield potential and to control/manage rusts, karnal bunt and high temperature at maturity in wheat and Cotton Leaf Curl Virus disease, bollworms, & mealybug in cotton.
- Reduce time conflict between cotton & wheat by developing early maturing cotton varieties, and management practices.
- Improve sustainability of the cotton-wheat system through developing early maturing cotton varieties, and management practices.

### Mixed-cropping System

- Develop high yielding varieties of sugarcane having high sucrose and good ratooning
- Develop appropriate management practices for weed control in sugarcane and maize
- Develop genotypes of wheat and sugarcane tolerant to salinity and sodicity
- Improve productivity in maize by developing high-yielding hybrids with heat & drought tolerance
- Develop appropriate and economically viable labour saving technologies in sugarcane and maize
- High yield/multi-cut and improved quality fodder for summer under irrigated environment

### Low-input Intensity and Rainfed System

- Develop high-yielding, and low input responsive varieties of wheat and maize
- Develop high-yielding, disease resistant, (blight in chickpea and lentil and wilt in chickpea, yellow mosaic virus in mungbean) varieties of Pulses
- Developing high yielding, drought tolerant, low input responsive and herbicide resistant groundnut varieties

- Develop high-yielding varieties of sorghum and millet
- Crop rotation research for rainfed areas
- High yield/ multi-cut and improved quality fodder
- Protocol for establishment of certified mother plants of fruits (Olive, Peaches, Grapes, Stone fruits, etc)
- Fodder preservation techniques like hay, silage, etc.
- Research on forages fortification for better production
- Develop economically viable labour saving technologies for groundnut and wheat

## Peri-urban production system

- Develop high yielding vegetables hybrids/varieties (especially in tomatoes, potatoes and chillies) tolerant to heat and frost Integrated pests control methods including resistant varieties for vegetables grown in peri-urban areas especially in:

<b>Crop</b>	<b>Insects</b>	<b>Diseases</b>
Potatoes	Mites, whitefly, jassid, armyworm, aphids	Viruses, late blight, Rhizoctonia, common scab, Fusarium wilt, Mycoplasma
Onions	Thrips	Downy mildew, purple blotch
Cucurbits	Red pumpkin beetle, fruit fly	Powdery and downy mildews, anthracnose, wilt
Peas	-	Wilt and powdery mildew
Chillies	Helicoverpa, sucking pests	Root and collar rot, viruses
Tomatoes	Helicoverpa, sucking pests	Phytophthora blight, viruses, wilt
Okra	Earis sp. Sucking pests, shoot borer	Wilt, viruses, Meloidogyne sp
Brinjal	Fruit and shoot borer, sucking pests, red mites	Root and collar rot, Meloidogyne sp. Leaf spots
Bittergourd	Fruit fly	Myrothecium leaf spot and seed borne diseases
Cabbage	Cabbage top borer, armyworm, cabbage butterfly and semi looper	Cabbage stem and head rot, downy mildew

- Develop suitable technologies for enhancing food quality and reducing seasonality through tunnel and green house cultivation
- Documenting food quality such as pesticide(s) residue, heavy metal contamination and mycotoxins in major fruits and vegetables, and develop remedial technologies and measures.
- Develop technologies for safe use of sewerage water and biosolids.

## Livestock Sector

### Productivity enhancement of Milk in large ruminants

- Development of cost effective, good quality feed/total mix ration, and feed supplements
- Determination of nutritional requirements at different physiological stages

- Development of management and nutrition schemes and other measures for the purpose of
  - Reduction in puberty age of animals
  - Reducing inter-calving interval
  - Increasing production life of dairy animals
  - Reduction of disease(s) incidence
  - Reduction in birth related problems
- Epidemiology and control of important diseases especially Foot and Mouth Disease,
- Haemorrhagic septicemia, Black quarter, Mastitis, Brucellosis, Endo and Ecto- parasites,
- Hemo-parasites etc.
- Development and improvement of semen preservation techniques
- Hormonal management and manipulation of summer (low productivity period) avestrus especially in buffalo though, nutrition, management, etc.
- Research on determination of timing of ovulation and optimal timing of insemination to increase conception rate
- Determination of better techniques for determination of heat period especially in buffalo to increase production
- Development of effective control of Protozoa diseases causing abortions and reproductive problems especially in cow using breeding, reproductive, nutrition, or management approaches
- Development of milk replacers and early weaning diets for calves
- Studies on the cause and control/management of early calf mortality
- Selection and characterization of different breeds of camel for milk

### Productivity enhancement of meat in large ruminants

- Development of cost effective, balanced, and good quality feed/ Total Mix Ration, and feed supplements for fattening
- Studies on identification of appropriate age of calves of buffalo and cattle for optimum beef production under different plans of nutrition
- Research on growth hormones/enzymes for better growth and fattening of animals
- Development of better specific breeds for meat

### Productivity enhancement in small ruminants

- Improving the productivity and reducing the cost of rearing of small ruminant by:
  - Specifying feeding requirements for enhanced meat and milk (specially in goat) production
  - Specifying appropriate mineral requirements and feed supplements for grazing animals
  - Identifying optimum age for optimum meat production
  - Identifying cost-effective non-conventional feeds
- Control of following diseases through balanced nutrition, appropriate management practices, and/or developing appropriate breed
  - Enterotoxaemia
  - Contagious caprine pulmo-pneumonia
  - Sheep pox
  - Parasites associated with grazin
- Research on increasing fecundity of goat and sheep through different techniques like balanced nutrition, appropriate management practices and/or improving/developing better breeds etc.
- Research on control of early mortality of lambs/kids by using balanced nutrition and control of diseases
- Grazing/pastures management for better production