

Department of Agronomy

College of Agriculture, NAU, Campus Bharuch

FIVE-YEAR PLAN FOR AGRONOMICAL RESEARCH

OBJECTIVES OF THE FIVE-YEAR PLAN

The objective of five-year plan will be to enhance productivity, profitability, stability and sustainability of the agricultural systems so that the quality of life among every segment of current and future generations could be improved. The plan has to lay a strong foundation for second Green Revolution in Indian Agriculture. To achieve this major objective, the following specific objectives are proposed:

- ✓ Conservation, planned enhancement and utilization of agro-biodiversity.
- ✓ Research on diversification and quality improvement, post-harvest technology
- ✓ Sustaining enhanced productivity of rainfed and irrigated agriculture and judicious development and use of energy, especially renewable sources of energy.
- ✓ Characterization and development of sustainable land-use models for rainfed agriculture in low to medium rainfall areas.
- ✓ Development of the Integrated Weed Management (IWM) and Integrated Nutrient Management System (INMS) approaches and systems for sustainable agriculture.
- ✓ Fostering excellence in relevant basic and strategic research.
- ✓ Generating research and technologies geared to promote equity among regions, sectors of society and gender.
- ✓ Optimization of resources through planning, prioritization and co-ordination

Perspective

Agriculture continues to be the backbone of the Indian economy. The future of country's economic and social development is largely dependent upon the technological improvements in agriculture. A massive application of science and technology can enable the Indian agriculture to face the serious challenges of poverty and malnutrition by ensuring a food security system, and ensure an enviable place for Indian agricultural product-mix globally by enhancement of value-addition processes.

The country has made substantial progress in agriculture in terms of increased production and productivity. Despite its achievements in the past, the Indian agriculture continues to face

serious challenges due to ever-increasing population, limited land and water availability, degradation of natural resources, and shrinking non-renewable energy sources.

ISSUES IDENTIFIED

The decline in growth rate of agriculture could be because of many factors, but we need introspection about agriculture research and education, the important factors providing knowledge base to agriculture. The following issues were identified:

- a) Identify reasons for declining in productivity and growth rates in agriculture sector, either of individual crops or cropping systems if any. Assess the efforts of AGRICULTURE COLLEGE to meet the above problems, the latter particularly in the region of their operation.
- b) Degradation of natural resources — land, water, air, biodiversity *etc.* Assess the present status and research objectives for future for overcoming the degradation processes while maintaining productivity of crops, livestock and fisheries.
- c) Integration of disciplinary research for a common objective (Research Mission) such as improvement in productivity of pulses, oil seeds, rainfed, cropping and farming system research - present status and future plans.
- d) Assessment of losses caused by biotic and abiotic stresses in crops and cropping system, control/reduction of losses with/without chemical pesticides and natural products, biopesticides and other means. Measures for research application and plans for monitoring losses.
- e) Research for identification of seasons and regions for quality improvement/control.
- f) Critical assessment of IWM (Integrated Weed Management) in individual crops and various cropping systems. Identify factors that limit its spread, research, production, education or transfer of technology mechanism.
- g) Critical assessment of INM (Integrated Nutrient Management) with or without water. What progress has been made in reproducibility of results of biofertilisers in field (Rhizobium, growth promoting bacteria, phosphate solubilizing bacteria, Blue green algae or any other). Assess area covered by biofertilisers, reasons for limited use if any.

MAJOR RECOMMENDATIONS

a. *Climate and Agriculture*

1. Impact of climate variability and climate change on agriculture sector, for assessing response if the various components on the economic contribution of agriculture and allied sector.
2. Place a greater emphasis on integrated research programmes in different crops for identifying options for production, economic return and employment generation.

b. *Resource Management*

1. Research on restoration of the productivity of degraded lands by adopting conservation measures and check future degradation.
2. Integrate use of inorganic and organic fertilizers including legume based green manuring, biofertilizers and micronutrients for achieving sustainable individual crop and cropping system.
3. Emphasize and develop technologies for efficient recycling of agrowastes and crop residues in crop production system. Effort should be made to develop technologies

to avoid residue burning and environmental pollution by identifying and promoting and diversifying soil microbes.

c. *Water Management*

1. Improve ground water recharge by identifying agricultural systems and maintenance of water table.
2. Develop integrated technologies (crops and livestock, horticulture) for efficient water harvesting conservation and use in water shed based system in different agroclimates.
3. Generate water production functions to permit optional allocation among competing crops, horticulture and livestock systems so as to optimize the returns per unit of water.
4. Introducing agronomical (Summer ploughing, Ridges and Furrows, Contour farming, Ploughing across the slope, Vegetative barriers, Intercropping, Crop rotation, Strip cropping, Mulching, soil amendments application, (Land configuration, Board Bed Forrow, Compartmental bunding, Random Tied Ridging, Micro catchment, Farm ponds, Percolation ponds, Check dams) measures for soil and water conservation techniques under dry farming and rainfed farming
5. Conserve soil moisture by reducing evaporation and transpiration losses of water by: Mulches, Antitranspirants, Wind breaks, Weed control
6. Introduce micro irrigation techniques for efficient utilization of water resources

d. *Rainfed Agriculture Research*

1. Risk management is central to land management leading to sustainable rainfed agriculture (economically satisfying and ecologically benign) development. While the importance of all components of productivity and production is paramount the central issue is water (both deficit and excess).
2. Weeds, Disease and insect management should be important in crops.
3. Agriculture production systems including crops, horticulture, livestock *etc.* need to emphasize in relation to specification in different agroclimates. It is time to evaluate indigene biological systems for adaptation to temperature, rainfall and soil resource.
4. Evaluate and improve the traditional systems of production and consumption for sustainability of natural resources and economic returns.

Research Thrust

- Agronomic studies on major field crops and cropping systems for sustainable production and soil health.
- Resource management for sustainable crop production.
- Integrated farming system research

Research Projects

- Integrated crop and resource management for enhanced productivity and profitability
- Integrated nutrient management with other agro-inputs for enhancing nutrient-use efficiency, sustainable productivity, profitability and soil health

- Development of OF modules for sustainable production and quality for high value crops
- Nutrient management for improving *rhizospheric* environment in major cropping systems.
- Agro-techniques for efficient use of irrigation and rain water for enhancing water productivity in various cropping systems
- Conservation agriculture for enhancing productivity and resource-use efficiency
- Weed assessment and management in crops and cropping systems
- Evaluation of direct and residual effect of water soluble sources of nutrients on the productivity and nutrients use efficiency of major crops and cropping systems
- Management of solid waste through rapid composting
- Consortium Research on Conservation Agriculture: to develop CA practices in five crops (Pigeon pea, cotton, castor, sorghum and pulses) under irrigated and rainfed conditions.
- Adoption, impact and constraint analysis major crops of district & scope of chemical based weed management strategy
- Precision farming for enhanced input-use efficiency
- Agronomic evaluation of products of slow release N fertilizers

Proposed crops for PG research experiments (Main campus, RCRS, ARS-Hansot, Achhaliya and Tanchha)

1. Cereals including millets

- a. Sorghum
- b. Maize
- c. Wheat
- d. Pearl millets
- e. Drill paddy (Aerobic rice)
- f. Minor millets

2. Cash crops

- a. Castor
- b. Cotton
- c. Sugarcane

3. Oil seeds

- a. Soybean
- b. Sesame
- c. Ground nut
- d. Sun flower
- e. Niger

4. Pulses

- a. Pigeon pea
- b. Green gram
- c. Black gram
- d. Moth bean
- e. Cowpea
- f. Cluster bean
- g. Indian bean
- h. Chick pea
- i. Lentil

5. Miscellaneous crops

- a. Dills seeds
- b. Fodder crops
- c. Green manures