



4.1 Agricultural Research Council

The Agricultural Research Council was constituted according to the provision of the Gujarat Agricultural Universities Act-2004 in exercise of the power vested under Section 62(1) in pursuance of Section 17(5).

The first meeting was held on 18.06.2005 in the Conference Hall, College of Agriculture, Junagadh Agricultural University, Junagadh. The members of Agricultural Research Council during 2005-06 were as under.

No.	Name	Designation
1	Dr. B.K. Kikani	Vice Chancellor (Chairman)
2	Dr. D. B. Kuchhadiya	Director of Research & Dean, PG Studies (Secretary)
3	Dr. R.L. Savaliya	I/c Director of Extension Education
4	Dr. I.U. Dhruj	Associate Director of Research
5	Dr. M.K. Khistaria	Associate Director of Research
6	Dr. Ashok Mishra	Dean, Agriculture Faculty
7	Dr. N.C. Patel	Dean, Agril. Engg. & Tech. Faculty
8	Dr. A.Y. Desai	I/c Dean, Fisheries Science Faculty
9	Dr. V.K. Poshiya	Research Scientist (Chickpea)
10	Dr. R.L. Savaliya	Research Scientist (Groundnut)
11	Dr. C.J. Dangaria	Research Scientist (Millet)
12	Dr. K.V. Kalathia	Research Scientist (Onion-Garlic)
13	Dr. B.A. Golakiya	Research Scientist (Agril. Chemistry)
14	Dr. P.U. Gajbhiye	Research Scientist (Animal Genetics)
15	Prof. R.H. Ghaghada	Research Scientist (Agril. Engg.)
16	Dr. P.G. Butani	Professor & Head, Agril. Entomology
17	Dr. V.D. Khanpara	Professor & Head, Agronomy
18	Dr. N.N. Gajipara	Professor & Head, Horticulture
19	Dr. R.L. Shiyani	Professor & Head, Agril. Economics
20	Dr. D.N. Vakharia	Professor & Head, Biochemistry



4.2 Brief Report of Research Activities

The Junagadh Agricultural University represents Saurashtra region, which accounts for 27 per cent of the total population and about 1/3 of the total geographical area of Gujarat state. The region comprises of seven districts viz., Rajkot, Jamnagar, Porbandar, Junagadh, Amreli, Bhavnagar and Surendranagar.

Junagadh Agricultural University has three colleges, seven multi-disciplinary main research stations, five main research stations on various crops and 11 sub research stations/testing Centres spread over in North Saurashtra Agro-climatic Zone and South Saurashtra Agro-climatic Zone. These research stations are working in the field of Agriculture, Agricultural Engineering, Animal Sciences and Fisheries for catering the needs of farmers, artisans, livestock holders, fishermen and rural masses for their upliftment. At these research stations, scientists are working hard with sincere eco-friendly efforts for development of high yielding varieties, new improved agronomical practices and pest & diseases management strategies. The research work is also undertaken on natural resource management (Bio-diversity, Land & Water), improved farm equipments, post harvest processes and renewable energy. The region is endowed with 788 km. long sea coast. Research efforts are continuing for improvement of cattle breeds, nutritive cattle feeds, fisheries and allied industries. Apart from this, agricultural information is disseminated through five Krishi Vigyan Kendras of the University. The research activities, research accomplishments and recommendations, achievements made by the Junagadh Agricultural University during 2005-06 are given herein.

I. PLANT BREEDING

The plant breeding group had taken up the seed multiplication programme for Virginia runner, Virginia and Spanish bunch groundnut cultivar and HPS type bold seeded variety. In castor crop, work continued on development of medium duration hybrids, male monoecious and pistillate lines. Development of high yielding varieties and testing of vegetables new lines; early maturing with high yield and oil content varieties development in sesame; development of rust resistant and breeding for thermo tolerant varieties suitable for early sowing in wheat crop are in progress. Work has been done on development of early maturing high yielding and resistant variety against biotic and abiotic stress with better grain quality in chickpea at state and national level. In bajra crop, development, maintenance & conservation of cytoplasmic male sterile lines (CMS) and different hybrids were evaluated after performance of grain yield. Different varieties of cotton at state & national level and somaclonal variation in callus culture in medicinal plants were tested.

Five new varieties were recommended for cultivation to the farmers during 2005-06. The groundnut varieties released are GG-8 (Spanish bunch) for Zone-III (Northern Maharashtra and Madhya Pradesh) and GG-16 (Virginia runner) for Zone-V (Tamil Nadu, Andhra Pradesh, Karnataka, Kerala and South Maharashtra). Til variety Gujarat Til-3 was released for cultivation in Saurashtra region except Vallabhipur area. The seeds of this variety are white and bold. The brinjal variety Junagadh Brinjal Green Round-1 was released for cultivation in the Saurashtra and Middle Gujarat. The Coconut variety Coconut Hybrid TxD (Mahuva) was released for cultivation in the coastal area of Gujarat State.



II. AGRONOMY AND SOIL SCIENCE

The Agronomy and Soil Science group accomplished the study on micronutrients mixture or sea weed fertilizer for higher groundnut yield. The cotton, castor and sesame growing farmers were advised for proper doses of farm yard manure and fertilizer for higher yield and return. They have recommended the drip irrigation for brinjal and mini sprinkler for coriander crops. Bio-fertilizer inputs were advised for groundnut and pearl millet crops. Weed control practices for groundnut using organic material were recommended. The farmers of dry land agriculture were advised for alley cropping and use of organic manure for groundnut and pasture legume.

1. Nutrient Management

Groundnut (Kharif)

The farmers of North Saurashtra Agro-climatic Zone growing kharif groundnut (GG-2) on Zn and Fe deficient soils are advised to spray the crop with sea weeds liquid fertilizer (SLF) @ 3.5 per cent at 15, 30 and 45 days after sowing to get higher groundnut yield and net realization.

Groundnut (summer)

The farmers of Middle Gujarat Agro-climatic Zone growing summer groundnut (GG.2) on soils having marginal status of Zn and Fe are advised to spray 1.0 per cent of multi micronutrients mixture (Fe 2%, Mn 0.5%, Zn 4.0%, Cu 0.3% and B 0.5% equivalent to Govt. notified general Grade-I) or sea weed liquid fertilizer (SLF) @ 1.5 per cent at 15, 30 and 45 days after sowing to get higher groundnut yield and profit.

Castor

Farmers of South Saurashtra Agro-climatic Zone growing hybrid castor GCH - 6 under

irrigated condition are advised to fertilize castor crop with 40 kg P₂O₅ ha⁻¹ besides the recommended dose of N for getting maximum castor seed yield and net return.

Sesame

Farmers of North Saurashtra Agro-climatic Zone are advised to apply 20 kg S/ha in addition to recommended dose of chemical fertilizer (50-25-0 NPK kg/ha) for getting higher return.

Cotton

The farmers of North Saurashtra Agro-climatic Zone growing hybrid Cotton-8 in kharif season under dry farming condition are advised to adopt 30 cm deep tillage every year for the highest seed cotton yield, net return and moisture conservation. They are also advised to apply FYM @ 10 t/ha for higher yield, net return and moisture conservation. Recommended dose (80-0-0 NPK kg/ha) of fertilizer should be applied to the crop.

2. Water management

Brinjal (summer)

The farmers of South Saurashtra Agro-climatic Zone growing brinjal (*Lila gota*) in summer season are advised to irrigate the crop with drip system at 1.0 PEF laying lateral at 90 cm distance in each row and drippers of 4.0 LPH at 60 cm distance on each lateral and operate the system at an alternate day with a pressure of 1.2 kg/cm² for one hour and 50 minutes on alternate day for getting more net realization with higher water use efficiency.

Under constraint of irrigation water, they are advised to adopt drip irrigation at 0.8 PEF to save 20 per cent water and bring about 0.21 ha additional area of this crop under irrigation.

Farmers are also advised to apply wheat straw mulch @ 5 t/ha for getting more net realization.



Coriander

The farmers of South Saurashtra Agro-climatic Zone growing coriander are advised to irrigate the crop with mini sprinkler at 0.8 PEF with laying lateral at 1.8 m distance in paired row (30-60-30 cm) and mini sprinkler of 35 LPH at 2.5 m distance on each lateral, and operating the system at an alternate day with a pressure of 1.2 kg/cm² for getting higher net realization.

3. Biofertilizers

Groundnut

The farmers of coastal area of South Saurashtra Agro-climatic Zone growing groundnut crop are advised to apply half recommended dose of NPK (12.5-25-0 kg/ha) in the form of urea and rock phosphate with seed inoculation of bacterium EBKH-3 (*Azotobacter sp.*) @ 25 ml/kg seed of groundnut to obtain higher net return.

Pearl millet

The farmers of coastal area of South Saurashtra Agro-climatic Zone growing bajra crop are advised to apply half recommended dose of fertilizer in the form of urea and rock phosphate with seed inoculation of bacterium EBKH-1 (*Azotobacter sp.*) @ 25 ml/kg seed to obtain higher net return.

4. Weed control

Groundnut (*kharif*)

Among different organic materials tested for weed management in *kharif* groundnut, wheat straw incorporated in soil @ 5 t/ha before sowing was found comparable to pre emergence application of fluchloralin @ 0.9 kg/ha. Hence, farmers of South Saurashtra Agro-climatic Zone can incorporate wheat straw in place of fluchloralin as a component of integrated weed management.

5. Dry farming

Groundnut - alley cropping

The farmers of North Saurashtra Agro-climatic Zone are advised to grow groundnut GG 20 with *Glyricidia* at the alley width of 9.6 m along with an application of FYM @ 5 t/ha for getting higher yield of groundnut and net return in the alley cropping system under dry farming condition.

Groundnut - organic manure

The farmers of North Saurashtra Agro-climatic Zone are advised to carry out ploughing up to 20 cm depth in alternate furrows in alternate year and apply FYM @ 5 t/ha and recommended dose of NPK (12.5-25-0 kg/ha) for getting higher yield of groundnut and net return under dry farming condition.

Pasture legumes in combination of grasses

The farmers of North Saurashtra Agro-climatic Zone growing grasses are advised to grow Clitoria (*Clitoria ternatea*) with Marvel grass (Zinzvo) (*Dichanthium annulatum*) in 1:2 row ratio for obtaining economically maximum green biomass and dry matter yields under rainfed condition.

III. HORTICULTURE

The horticulture group worked out the drip irrigation schedule for coconut. They have also advised the doses of fertilizer for coconut hybrid. The trials on extending shelf life of mango, effect of manures and fertilizers on fruits bearing in sapota, evaluation of pruning treatment in *Cordia sp.*, varietal screening in custard apple and chrysanthemum and fertilizer management in drum sticks crop are in progress. Applications of chemical fertilizers through drip irrigation in guava, citrus and coconut were also studied. The varietal screening, papain production in relation to



fruit age, effect of organic and inorganic fertilizers and uniform fruits with extended shelf life trials in papaya crop were carried out. The studies on low cost green house, use of different nets in net house, leafy vegetables' cultivation and coconut seedling raising in net house are progressing. The investigation on effect of mulching in coconut and sapota is also continued.

Coconut (cv. D x T)

Farmers of South Saurashtra Agro-climatic Zone growing coconut hybrid (D x T) are advised to apply 270 g urea/plant at monthly interval through drip irrigation. The drip system should be operated for one & half hour daily during October to February and two & half hour from March onwards with four drippers, each having 8 litres discharge/hour (1.1 kg/cm² pressure), keeping drippers 1.0 m away from palm trunk to save 47 per cent irrigation water without affecting yield.

Coconut hybrid (D x T)

The coconut hybrid (D x T) growers of coastal area of South Saurashtra Agro-climatic Zone are advised to apply 2 kg nitrogen, 1 kg phosphorus, 2 kg potash per plant/year in two equal splits i.e., June and October for getting higher nut yield and higher net return in saline (14 EC) irrigation water.

IV. PLANT PROTECTION

The research work carried out by plant protection group is to develop the economically viable technologies for increasing production of agricultural commodities without any adverse effect on the environment and livelihood of the people. They advised the control measures against leaf roller in sesame and pod borer in chickpea. Plastic coated jute bags or HDPE bags were recommended to store coriander

seeds to protect from cigarette beetle.

Sesame

Farmers of North Saurashtra Agro-climatic Zone cultivating sesame crop under rainfed condition are advised to initiate the control measures against leaf roller through adoption of alternate spray of endosulfan 0.07 per cent and monocrotophos 0.04 per cent, when the population reach at the ETL of 5 larvae/20 plants (ICBR,1:4.81).

Chickpea

Farmers of South Saurashtra Agro-climatic Zone are advised to apply low volume spray of endosulfan 0.21 per cent (Endosulfan 1.2 litre in 200 l water/ha) through power sprayer (ICBR,1:7.66) twice, starting from 50 per cent flowering and second at 15 days after first spray for effective and economic control of pod borer in chickpea.

Coriander seeds

Farmers of South Saurashtra Agro-climatic Zone are advised to store the well dried coriander seeds in plastic coated jute bag (ICBR 1:11.57) or high density polyethylene (HDPE) bag 35 micron (ICBR 1:7.23) to protect from the infestation of cigarette beetle (*Lasioderma serricorne* Fab.) up to 10 months of storage after harvesting.

V. AGRICULTURAL ECONOMICS, EXTENSION AND STATISTICS

Agricultural economists worked on cost of cultivation/production of important crops, problems and performance of regulated markets of Saurashtra region and economical analysis of contract farming in onion and relay cropping (Groundnut + Pigeon pea). Extension educationalists did an analysis of the training programmes organized by SSK, Junagadh. Statisticians studied on size and shape of plots for experimentation on black gram, sesame,



bajra, groundnut, cotton, castor and released the information for scientific community.

VI. AGRICULTURAL ENGINEERING

The Agricultural Engineering group accomplished the studies on design, development and fabrication of agricultural machinery, equipments, tools and processes. Two equipments viz., 1) tractor mounted mango positioner for mango harvesting and 2) engine operated portable post hole digger for making the pits; for use of farmers as well as to agro industries for fabrication were released. Two scientific recommendations were made on design of micro-tube emitter and Mathematical model “GREENHOUSE SOILTEMP” to predict the soil profile temperature.

1. Soil and Water Engineering

The main work carried out on watershed management technology in hot arid region, technology on skimming and recharging fresh water in saline ground water region, relationship for designing the small water harvesting structures, aquifer properties, sea water intrusion on the qualitative parameters of ground water, design and development of ground water recharge filter, evaluation of hydraulic of surge irrigation and development of dimensional analysis model for micro tube trickle irrigation system.

2. Agricultural Process Engineering

The major research work carried out were development of Agro-Processing Centre, design & development of cleaner-cum-grader for cumin, effect of different drying methods on seed quality of groundnut, storage and processing of custard apple, integrated pest management in coriander and products from groundnut, design &

development of sapota grader, studies on peanut blended exuded products, gel extraction from *Aloe vera* leaves, studies on physico-chemical & biological changes during ripening of custard apple and forced air ventilated storage of onion.

3. Farm Machinery & Power

In the farm machinery & power, works carried out were design & development of tractor operated hay rake cum loader, modification and evaluation of agricultural residue, shredder, status of farm mechanization in Saurashtra region, standardization of sub soiling technology using two bottom subsoiler, design and development of bullock drawn subsoiler, development and adoption of vertical conveying harvesting unit for mini tractor, development of tractor drawn groundnut digger cum shaker, groundnut pod exposure and development of bullock drawn pod exposure.

4. Renewable Energy and Rural Engineering

Works on development and performance evaluation of feasibility of utilizing cotton stalks for gasification, energy evaluation of forced convection solar assisted drying of tomato and green house for drying and dehydration of fruit & vegetables, utilizing bio filter in food industry and bio-degradable mulch film in onion production in comparison to normal plastic film were carried out in renewable energy and rural engineering.

Agricultural Engineering group has released following two implements for farmers.

Mango positioner

Mango growers are advised to use positioner for mango harvesting with uniform stalk length (1-2 cm) for maintaining white layer on the fruit and



with choice of matured fruit as the harvesting is done at a close distance. Using this machine, one can get economical advantage over local picker.

Post hole digger

The engine operated portable post hole digger is useful for making the pits for erecting fencing poles, plantation of fruits and forest saplings etc. This machine makes about 25 to 35 pits of 15 cm (6 inch) diameter and 45 cm (18 inch) depth in one hour. By this machine, the cost of making one pit (Rs. 2.16) is low as compared to manual digging (Rs. 5.60) and tractor operated digger (Rs. 4.10). Looking to the performance and application, this machine is recommended for farmers, manufacturer and other users.

VII. FISHERIES SCIENCE

The fisheries group is conducting the work on survival rate of shrimp, biomass availability and species diversity of sea weed in the region. Study of bioassay test on Industrial effluent released in marine coastal area, study of growth and survival rate of shrimp using probiotics, preliminary study of culture potentials of *Brachionus* sp. for live feed, feasibility of culture of marine red alga *Kappaphycus alvarezii* (Schmits) on the Saurashtra

region, West Coast of India, biomass available and species diversity of seaweed of un-exploited island of the Gulf of Kutchh - Bet Dwarka, resources survey of sea bass (*Lates calcarifer*) in Okha-Mandal region, survival and growth performance of mullet fish (*Mugil spp.*) using *Prosopis juliflora* pod powder incorporated feed.

VIII. ANIMAL PRODUCTION & HEALTH

In animal production & health discipline, 19 schemes are in operation at Cattle Breeding Farm, JAU, Junagadh. These schemes are aimed at genetic improvement in these bovines maintained at the farm and also in the field through supply of genetically superior bulls with breeding and improvement of Gir and Jaffarabadi bovines.

IX. BREEDER SEED PRODUCTION

The production of different breeder seeds for need of private and public sectors are given in the table. Moreover, as per the demand of the Agricultural Department of the State, 100 per cent nucleus seed was produced in the different crops. In collaboration of the scientists of state and the country, the nucleus and breeder seeds were inspected by different committees

New research programmes sanctioned during 2005-06

Sr. No.	Agency	No. of Research Programmes
1	ICAR	3
2	Government of India	5
3	Government of Gujarat	23
4	Other Agencies	10
	Total	41



Production of Nucleus / Breeder seed during year 2005-06

Sr. No.	Crop	Variety	Production (Qtls.)		
1	Groundnut	GG-2	190.90		
		GG-3	50.00		
		GG-5	166.75		
		GG-6	6.00		
		GG-7	124.95		
		SB-11	35.35		
		GG-20	450.00		
		GAUG-10	40.00		
		GG-11	10.00		
		GG-13	15.00		
		GG-14	55.00		
		2	Gram	Gujarat Gram-1	33.00
				Gujarat Gram-2	32.25
		3	Pearl millet	Parent Seed	1.50
4	Sesame	Gujarat Til-1	2.62		
		Gujarat Til-2	12.59		
		Gujarat Til-10	0.81		
5	Cluster Bean	Pusa Navbahar	1.42		
6	Cotton	G.Cot.-18	0.10		
		Deviraj Isolated	6.40		
		V-797 Isolated	7.89		
		G.Cot.-19	0.80		
		G.Cot.-15	0.90		
7	Wheat	GW-496	101.35		
		Lok-1	65.80		
8	Sunflower	Gujarat Sunflower-1	0.50		
		Modern	0.30		
9	Pigeon pea	BDN-2	4.70		
10	Cumin	Gujarat Cumin-4	5.30		
Total			1422.18		