

minutes at alternate day.

5. Operating pressure = 1.2 kg/cm²

Cotton

The critical limit of DTPA extractable Zn content in soil is worked out to be 0.89 ppm. The critical Zn content in 4th developed leaf of cotton at 30 DAS is worked out to be 57.50 ppm.

III. HORTICULTURE AND AGRO FORESTRY

This group has released following two farmers' and one scientific recommendations which are briefed below.

Mango

Nurserymen of Gujarat state interested to prepare mango grafts are advised to use the stone of variety Kesar as a root stock for vigorous growth and better survival against salt stress up to EC 2.0 dSm⁻¹ of water.

Acid lime cv. Kagzi lime

Kagzi lime growers of South Saurashtra Agro-climatic Zone are recommended that 20 years old rejuvenated tree through medium pruning (2.00 m height at ground level) should apply the half recommended dose of fertilizer (25 kg FYM, 450g N, 375g P₂O₅ & 250 g K₂O) in which 25 kg FYM with half dose of nitrogen i.e. 225 g N, 375 g phosphorus and 250 g potassium per tree should be at the onset of monsoon and remaining half dose of nitrogen i.e. 225 g N in the month of March for getting higher net return along with higher yield and quality of fruits.

Recommendation for Scientific Community Kesar Mango

Scientists are advised to keep freshly

harvested mature mango fruits cv. Kesar in a small cool chamber at 14 °C with 90 per cent RH to maintain the fruit quality up to 25 days.

IV. PLANT PROTECTION

The research work carried out by plant protection group is to develop the economically viable technology for increasing production of agricultural commodities without any adverse effect on the environment and livelihood of the people. Three recommendations from Agricultural Entomology group and five from Plant Pathology group were released.

1. Agricultural Entomology

Onion

Farmers of South Saurashtra Agro-climatic Zone growing onion for bulb purpose in *rabi* season are advised to apply two sprays of profenophos 40 % + cypermethrin 4 % EC 0.044 per cent (10 ml/10 lit.) or endosulfan 0.07 per cent (20 ml/10 lit.) or profenophos 0.05 per cent (10 ml/10 lit.) or carbosulfan 0.05 per cent (20 ml/10 lit.) at 10 days interval starting from initiation of thrips infestation for its effective and economical management.

Okra

Considering the effectiveness and economics of different IPM modules for okra under South Saurashtra region, IPM module comprising seed treatment with thiamethoxam 70% WS @ 2.8 g/kg seed, clipping of the infested shoots, installation of 20 pheromone traps with Erias pheromone lures and spraying of endosulfan 35 EC 0.07 per cent (20 ml/10 lit.) on need base is recommended to manage the major insect pests of okra.



Pearl millet

Farmers of North Saurashtra Agro-climatic Zone growing bajra crop are advised to spray fenvalerate 10 EC 0.01 per cent (10 ml/10 lit.) or endosulfan 35 EC 0.07 per cent (20 ml/10 lit.) or cypermethrin 10 EC 0.01 per cent (10 ml/10 lit.) or indoxacarb 14.5 SC 0.0075 per cent (5 ml /10 lit.) at 20 and 40 days after germination for the effective management of stem borer (*Chilo partellus*).

2. Plant Pathology

Coriander

Farmers of South Saurashtra Agro-climatic Zone are advised to apply three sprays of hexaconazole 5 EC 0.005 per cent (10 ml/10 lit) or propiconazole 25 EC 0.025 per cent (10 ml/10 lit) or difenoconazole 25 EC 0.025 per cent (10 ml/10 lit) at 15 days interval starting from initiation of disease for effective and economical control of powdery mildew of coriander.

Cumin

Farmers of South Saurashtra Agro-climatic Zone are advised to apply three sprays of hexaconazole 5 EC 0.005 per cent (10 ml/10 lit) or propiconazole 25 EC 0.025 per cent (10 ml/10 lit) or difenoconazole 25 EC 0.025 per cent (10 ml/10 lit) at 15 days interval starting from initiation of disease for effective and economical control of powdery mildew of cumin.

Cumin

Farmers of South Saurashtra Agro-climatic Zone are advised to sow cumin in third or fourth week of October for keeping low incidence of powdery mildew disease and better seed yield.

Groundnut

Farmers of North Saurashtra Agro-climatic Zone are advised to apply castor cake @750 kg/ha in furrow before sowing for effective and economical management of stem rot of groundnut.

Sesamum

Farmers of North Saurashtra Agro-climatic Zone are advised to apply two sprays of hexaconazole 5 EC 0.005 per cent (10 ml/10 lit) or carbendazim 50 WP 0.05 per cent (5g/10 lit) first spray at initiation of the disease and second spray at 15 days after first spray for effective and economical management of powdery mildew of sesamum.

V. AGRICULTURAL ENGINEERING

The Agricultural Engineering group of Soil Water Engineering, Agril. Process Engineering, Farm Power & Machinery, Renewable Energy and Rural Engineering, Agril. Engg. Extension Education and Research, Testing & Training Centre accomplished the studies on design, development and fabrication of agricultural machinery, equipments, tools and processing. Agricultural Engineering group has released following three implements, two recommendations for farmers and two recommendations for Govt. agencies, NGOs & planners.



JAU Tractor drawn groundnut digger cum shaker

The farmers and manufacturers are recommended to use “JAU Tractor Drawn Groundnut Digger cum shaker” for groundnut harvesting, as it saves 30 per cent of operational cost and 15 per cent time as compared to traditional blade harrow.



JAU Tractor drawn groundnut pod exposer

The farmers and manufacturers are recommended to use Tractor Drawn “JAU Groundnut Pod Exposer” for exposing left out groundnut pods after harvesting, as it exposes about 93 per cent pods on surface in one pass and saves 12 per cent time as compared to 2 to 3 harrowing with traditional equipment.



JAU vertical conveyor harvesting unit

The farmers and manufacturers are recommended to use mini tractor front mounted “JAU Vertical Conveyor Harvesting Unit” for harvesting of cereals as well as fodder crops as it saves about 30 per cent cost of harvesting, compared to manual harvesting.

Drying and storage study on seed quality of groundnut

Farmers of South Saurashtra Agro-climatic Zone are advised that after shade drying of summer groundnut having about 8.00 to 8.50 per cent moisture content (WB), considering the minimum weight loss in pods (4.86 %) and kernels (4.92 %), higher germination (81.04 %), minimum pod damage (10.66 %) and higher vigour index, the groundnut variety GG-7 followed by GG-2 were found better for four months storage period.

Also, in *kharif* groundnut having about 8.00 to 8.50 per cent moisture content (WB), considering the minimum weight loss in pods (2.06 %) and kernels (4.28 %), higher germination (81.66 %), minimum pod damage (9.22%) and higher vigour index, the groundnut variety GG-7 followed by GG-2 were found better for six months storage period.

Rainfall analysis for planning soil and water conservation structures and for drought occurrence in Rajkot district

In the North Saurashtra Agro-climatic Zone minimum drought observed in 26th to 31st (25th June to 5th August), 34th (20th to 26th August) and 39th (24th to 30th September) meteorological standard week. Hence, these meteorological standard weeks are better for storing the excess runoff water during monsoon period, which can be used as supplementary irrigation to save the crops during moisture deficit period.



Recommendation for Govt. Agencies, NGOs & Planners

Ground water recharge estimation in and around Junagadh and Ghed area

It is recommended to Govt. agencies, NGOs & planners that in Junagadh and Ghed area, the empirical methods are giving annual groundwater recharge in the range of 15 to 18 per cent of the annual rainfall. In these areas by measuring rainfall, pre-monsoon water table and using artificial neural network (architecture 2-5-1), the post groundwater table could be predicted well.

Impact analysis of a watershed management project

The farmers of the watershed area (North Saurashtra Agro-climatic Zone) shifted the cropping pattern in favour of high yielding varieties and cash crops due to implementation of Watershed Development Programme which has increased annual income from agriculture and livestock. Also the Gini concentration ratio, coefficient of variation and standard deviation of agricultural income were reduced. This implies that the Watershed Development Programme played a major role in increasing income, irrigation facilities and income disparity among farmers.

VI. BASIC SCIENCE

This group has released one recommendation for scientific community.

Yield assessment of some promising bunch groundnut genotypes with fresh seed dormancy

It is recommended to the groundnut breeders to utilize genotypes DRT-2004-6, DRT-2004-17, INS-I-2003-2, INS-I-2003-4, ISK-II-2003-1, ISK-II-2003-19 as donor

parents for incorporation of fresh seed dormancy of about 15 days without compromising yield in breeding programmes.

VII. SOCIAL SCIENCE

Agricultural economists worked on the farm cost studies of important crops in Gujarat state. An economic assessment of kagzi lime (*Citrus aurantifolia*) and profitability and financial viability of sapota orchards in Saurashtra region. This group imparts training to the farmers, trainees from different institutions, deputy collectors, officers of T & V schemes of agricultural department, etc. as and when such programmes are arranged. Radio and TV talks are also broadcasted by the scientists. Extension educationists conducted study on distinctive features of Bt. cotton cultivation as perceived by cultivators.

VIII. FISHERIES SCIENCE

During the year, different technical programmes, viz., socio-economic profile of fisher-folk in coastal Saurashtra, effect of stocking density on survival rate of Indian major carp seed in nursery ponds, qualitative analysis of phytoplankton in freshwater culture pond, standardization of transportation methods for fresh water mussel *Lammellidens* Spp. and evaluation of stocking density of *Lammellidens* Spp. under captive holding conditions were continued by the College of Fisheries, Veraval.

At Fisheries Research Station, Okha technical programmes viz., study of bioassay test on industrial effluent in marine coastal area, artemina (*Artemia fransi-scana*) cyst production in varying salinity, study of location specific growth rate in marine alga



Kappaphycus alvarezii, preliminary investigation on the cultivation possibilities of marine alga *Gracilaria* Spp., population growth of rotifer *Brachionous* Spp., in varying salinity, preliminary study of culture potentials of *Brachionous* for live feed (Filler trial), study on induced breeding of grey mullet (*Mugil cephalus*) through hypophysation (filler trial), study of heavy metal deposition in cephalopod & fish landed at Dalda & Rupen landing centres were carried out..

At Fisheries Research Station, Sikka research work on breeding and culture of Pearl Oyster (*Pinctada fucata*) and green mussel (*Perna viridis*), study of growth rate of green mussel in hatchery & natural condition (cage), study of foulers & borers of Pearl Oyster in and around Sikka area, live feed culture of nano- plankton *Isocrysis galbana* & *Chaetoceros* algae were carried out.

IX. ANIMAL PRODUCTION & HEALTH

In animal production & health discipline, six non-plan, ten plan and one ICAR scheme (total 17 schemes) are in operation at Cattle Breeding Farm, JAU, Junagadh. These schemes are aimed at genetic improvement in the bovines maintained at the farm and also in the field through supply of genetically superior bulls with breeding and improvement of Gir and Jaffrabadi bovines.

The mobile ambulatory clinic and livestock inspector training centre are also operating in this research station. During the current year, 30 livestock inspectors completed training. About 1500 dairy farmers and farm women visited this

research station. Eighteen night group meeting were organized in which 150 farmers participated. The centre supplied 18 Gir bulls and nine Jaffrabadi bulls to various Gram Panchayats and Gaushalas. During the year eight experiments were conducted on genetic improvement, animal nutrients, animal production and health.

X. MEGA SEED UNIT

The mega seed project entitled seed production in agriculture crops and fisheries was started through 85 centres in India including SAUs and ICAR centres, with the objective of providing reliable quality seed directly to the farmers vis-à-vis stepping towards self sustenance. Independent mega seed unit was established in september-2008 and "Sawaj Beej" branded wheat seed was sold in farming communities and it was good responded by the farmers.

XI. BREEDER SEED PRODUCTION

The production of different nucleus/breeder seeds by the university to cater the need of private and public sectors are given in the table. Moreover, as per the demand of the Agriculture Department of the State, 100 per cent nucleus seed was produced in different crops by the joint collaboration of the scientists of state and the country. The nucleus and breeder seeds were inspected by different committees which were approved as per regulations.





Production of Nucleus / Breeder Seed during Year 2008-09

Sr. No.	Crop.	Variety	Production (Qtl.)		
			National	State	Total
	Groundnut	GG-2	-	138.01	138.01
		GG-5	73.20	41.65	114.85
		GG-6	30.45	2.00	32.45
		GG-7	21.70	2.00	23.70
		GG-20	62.00	282.90	344.90
		GAUG-10	-	64.20	64.20
		GG-11	17.00	34.20	51.20
		GG-14	51.00	-	51.00
		GG-21	15.13	-	15.13
		GG-8	20.00	69.00	89.00
	GG-16	8.63	-	8.63	
	Sub Total		299.11	633.96	933.07
	Pearl Millet	Parent Seed	0.08	10.29	10.37
	Chickpea	GG-1	36.50	38.50	75.00
		GG-2	13.60	39.13	52.73
		GG-4	6.25	-	6.25
	Sub-total		56.35	77.63	133.98
	Sesame	G.Til-1	0.40	5.08	5.48
		G.Til-2	0.70	8.84	9.54
		G.Til-10	0.25	0.26	0.51
	Sub-total		1.35	14.18	15.53
	Wheat	LOK-1	-	158.00	158.00
		GW-496	-	126.40	126.40
		GW-366	-	270.40	270.40
	Sub-total			554.80	554.80
	Cotton	G.Cot-12	-	1.92	1.92
		Deviraj	-	2.55	2.55
		Sub-total		4.47	4.47
	Grand Total		356.89	1295.33	1652.22

XII. New Research Programmes Sanctioned during Year 2008-09

Sr. No.	Agency	Research Programmes	Amount ₹ in Lakhs
1	ICAR	3	969.75
2	Gujarat State	11	224.35
3	Other Agencies	3	15.18
	Total	17	1209.28