

Research



Chapter-IV





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 members of Agricultural Research Council during 2010-11 were as under.

No.	Name	Designation
1.	Dr. N.C. Patel	Vice Chancellor (Chairman)
2.	Dr. H.J. Vyas Dr. C.J. Dangaria	Director of Research & Dean, P.G. Studies (Secretary)
3.	Dr. R.L. Savalia Dr. A.M. Parakhia	Director of Extension Education
4.	Dr. I.U. Dhruj	Associate Director of Research
5.	Dr. H.J. Vyas	Associate Director of Research
6.	Dr. D.R. Padmani	Associate Director of Research
7.	Dr. P.G. Butani Dr. A.V. Barad	Dean, Agricultural Faculty
8.	Prof. A.H. Memon Prof. J.B. Savani	Dean, Agril. Engineering & Technology Faculty
9.	Dr. A.Y. Desai	Dean, Fisheries Science Faculty
10.	Dr. P.U. Gajbhiye Dr. R.R. Shah	Dean, Veterinary Science and Animal Husbandary Faculty
11.	Dr. D.B. Kuchhadiya Dr. K.A. Khunt	Principal, PG Institute of Agri-Business Management
12.	Dr. M. S. Pithia	Research Scientist (Chick pea)
13.	Dr. K.L. Dobaria	Research Scientist (Groundnut)
14.	Dr. K.L. Raghvani	Research Scientist (Millet)
15.	Dr. P.H. Vataliya	Research Scientist (Animal Genetics)
16.	Dr. K.L. Jetani	Research Officer (Fisheries)
17.	Prof. B.A. Kunadia	Research Scientist (Wheat)
18.	Prof. J.B. Savani	Research Scientist (Agril. Engg.)
19.	Dr. B.A. Golakiya	Professor & Head (Biochemistry)
20.	Dr. V.P. Chovatia	Professor & Head (Agril. Botany)
21.	Dr. N.B. Babaria	Professor & Head (Soil Sci. & Agril. Chem.)
22.	Dr. N.K. Gontia	Professor & Head (Soil & Water Engg.)
23.	Dr. R.L. Shiyani	Professor & Head (Agricultural Economics)



4.2 Brief Report of Research Activities

The Junagadh Agricultural University comprises of seven districts covering 32.82 per cent area of the Gujarat state. The university is functioning in a typical Arid and Semi-arid situation where frequent droughts, erratic rainfall, low fertility and salinity ingress are the major constraints for productivity and prosperity of agriculture in this region. The university represents mainly two Agro-climatic Zones *viz.*, North and South Saurashtra Agro-climatic Zones.

Junagadh Agricultural University has five colleges, 30 research stations which include multidisciplinary main research stations, research stations on various crops and research stations/testing centers spread over the 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, live stock holders, fishermen and rural masses for their upliftment. At these research stations, scientists are working hard with sincere efforts for development of high yielding varieties, new improved agronomical practices and eco-friendly strategies for pest & diseases management. The research work is also undertaken on natural resource management (bio-diversity, land & water uses), improved farm equipments, post harvest processes protected cultivation and renewable energy. Research efforts are continuing for improvement of cattle breeds, nutritive cattle feeds, fisheries and allied industries. Apart from this, the agricultural information related to latest technology and techniques are disseminated for end users through five Krishi Vigyan Kendras of

University. The research activities, research accomplishments and recommendations, achievements made by the Junagadh Agricultural University during 2010-11 are given here under.

I. Crop Improvement

Six new varieties/hybrids, of different crops *viz.*, Groundnut GJG-17 and GJG-22; Indian Bean GJIB-11; Okra GJOH-3; Soybean GJS-3 and Pearl millet GHB-732 were recommended for cultivation to the farmers of the state during 2010-11.

1. Groundnut: Gujarat Junagadh Groundnut-17 (GJG-17)

The variety Gujarat Junagadh Groundnut-17 (GJG-17) is recommended for cultivation during *kharif* rainfed condition in the spreading groundnut growing areas of the state. The variety yielded 38.3, 20.4 and 13.7 per cent higher pod yield (1798 kg/ha) over the check varieties M-335 (1332 kg/ha), GG-11 (1493 kg/ha) and GG-13 (1581 kg/ha), respectively. It also has higher shelling out turn, higher kernel yield and oil yield than the checks. It is also tolerant to stem rot.



2. Groundnut: Gujarat Junagadh Groundnut-22 (GJG-22)

The variety Gujarat Junagadh Groundnut-22 (GJG-22) is recommended for cultivation in *kharif* groundnut growing semi-spreading areas of Saurashtra and South Gujarat. This variety recorded 37.2 and 15.1 per cent higher pod yield (1770 kg/ha) than

the checks Kadiri-3 (1290 kg/ha) and GG-20 (1538 kg/ha), respectively. The recommended variety possesses rose coloured uniform kernels with better shelling out turn (72.5%). It also showed resistant reaction to collar rot.



3. Okra: Gujarat Junagadh Okra Hybrid-3 (GJOH-3)

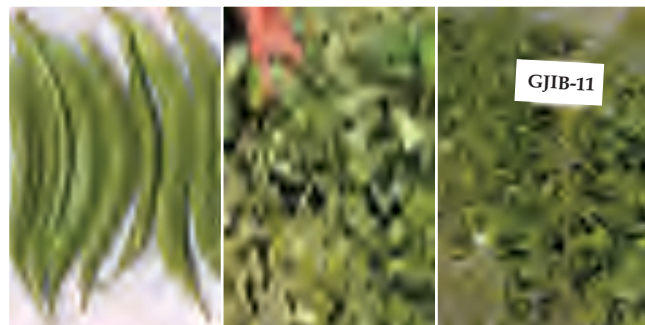
The hybrid Gujarat Junagadh Okra Hybrid-3 (GJOH-3) is recommended for endorsement for cultivation in *kharif* okra growing area of Gujarat state due to its yield superiority (137.44 q/ha) to the tune of 19.9, 26.2, and 29.8 per cent over the checks GOH-1 (114.65 q/ha), Parbhani Kranti (108.87 q/ha) and Pusa Sawani (105.87 q/ha), respectively. The fruit is dark green colour and tender with higher protein (1.15%) and ascorbic acid content (6.3 mg/100g). The hybrid showed lesser incidence of YVMV (24.2%). The hybrid has already been released under AICRIP programme for zone V, VI and VII of India.



4. Indian Bean: Gujarat Junagadh Indian Bean-11 (GJIB-11)

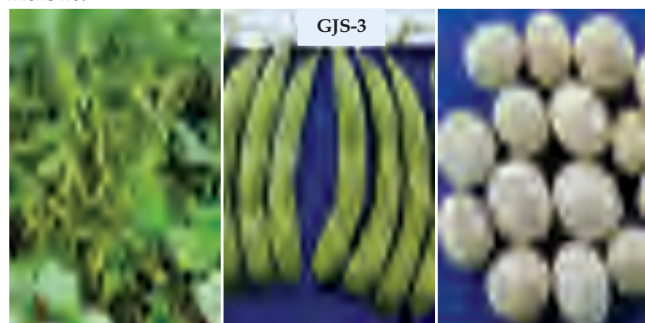
The variety Gujarat Junagadh Indian Bean-11(GJIB-11) recorded 31.2 and 32.1 per

cent higher green pod yield (95.39 q/ha) over Virpur local (72.7 q/ha) and Dantiwada local (72.22 q/ha), respectively. This variety being semi-spreading in nature is easier to harvest. The Gujarat Junagadh Indian Bean-11 is recommended for cultivation in late *kharif* growing areas of Saurashtra and Middle Gujarat. The pods of this variety are medium length in size with green colour.



5. Soybean: Gujarat Junagadh Soybean-3 (GJS-3)

The variety Gujarat Junagadh Soybean-3 (GJS-3) is recommended for cultivation under *kharif* rainfed condition for Saurashtra region, as it out-yielded (1860 kg/ha) the local checks GS-1(1490 kg/ha) and GS-2 (1277 kg/ha) to the tune of 24.8 and 43.7 per cent, respectively. It has also recorded 18.02 and 28.63 per cent higher yield than zonal checks JS-335 (1576 kg/ha) and PK-472 (1446 kg/ha), respectively. Consequent upon its higher oil content (19.2%), it gave 30.7, 49.6, 20.2 and 32.6 per cent higher oil yield per hectare than GS-1, GS-2, JS-335 and PK-472, respectively. It is determinate type, with dark green foliage and yellowish brown seeds coupled with non-shattering habit.



6. Pearl Millet: Gujarat Hybrid Bajra-732 (GHB-732)

The hybrid Gujarat Hybrid Bajra-732 (GHB-732) is recommended for endorsement for summer pearl millet growing area of Gujarat state as a medium late maturity hybrid. The hybrid revealed 15.0, 13.0 and 22.0 per cent higher grain yield (5037 kg/ha) over GHB-538 (4389 kg/ha), GHB-558 (4449 kg/ha) and GHB-526 (4140 kg/ha), respectively. It has synchronous tillering, appealing ear head with bold seeds. It showed resistance to lodging with good quality fodder (8150 kg/ha).



II. Crop Production

This group has released 16 farmers' and five scientific recommendations which are briefed below.

Recommendation for the Farming Community

1. Nutrient Management

Effect of foliar application of nutrients on growth, yield & quality of onion

The farmers of AES-VI of South Saurashtra Agro-climatic Zone growing onion for bulb production (Var. Gujarat White Onion-1) during *rabi* season are recommended to apply NPK (19:19:19) @ 0.5 per cent as foliar spray at 30, 45 and 60 days after planting in addition to recommended dose of fertilizer (75:60:50 NPK kg/ha) for higher yield and net return.

Response of tomato to foliar application of micronutrients

The farmers of AES-VI of South Saurashtra Agro-climatic Zone growing tomato crop (Var. Gujarat Tomato-1) during *rabi* season are recommended to apply micronutrient mixture of boric acid, zinc sulphate, copper sulphate, ferrous sulphate and manganese sulphate each @ 100 ppm, and ammonium molybdate @ 50 ppm at 40, 50 and 60 days after planting in addition to recommended dose of fertilizer (75:37.5:62.5 kg NPK/ha) for getting higher fruit yield and net return.

Integrated nutrient management in tomato

The farmers of AES-VI of South Saurashtra Agro-climatic Zone growing tomato crop (Var. Gujarat Tomato-1) during *rabi* season are advised to apply NPK @ 120:60:80 kg/ha + FYM @ 10 t/ha + S @ 25 kg/ha + *Azotobactor* @ 5 kg/ha as soil application at the time of planting and foliar spray of micronutrient mixture of boric acid, zinc sulphate, copper sulphate, ferrous sulphate and manganese sulphate each @100 ppm, and ammonium molybdate @ 50 ppm at 50 days after planting for getting higher fruit yield and net return.

Fertilizer management in cotton + sesame (1:1) intercropping system under dry farming condition

The farmers of AES-IV of North Saurashtra Agro-climatic Zone adopting hybrid cotton (G. Cot. Hy.-8) + sesame (1:1) intercropping system are advised to apply 80 kg nitrogen/ha to cotton and 100 per cent RDF on half of the area basis 25 kg nitrogen and 12.5 kg phosphorus/ha to sesame crop for getting higher yield and net return under dry farming condition.



Balanced use of fertilizer in pearl millet based crop sequence (Pearl millet-Mustard)

The farmers of AES-II of North Saurashtra Agro-climatic Zone following pearl millet (*khariif*)-mustard (*rabi*) crop sequence are advised to apply 5 t FYM/ha and 100% RDF (80:40 kg N:P₂O₅/ha) to pearl millet crop and apply 100% RDF (50:50 kg N:P₂O₅/ha) + K₂O 30 kg + gypsum 100 kg + ZnSO₄ 10 kg + FeSO₄ 10 kg/ha to mustard crop for obtaining higher net return.

Integrated nutrient management in summer pearl millet

The farmers of AES-II of North Saurashtra Agro-climatic Zone growing hybrid pearl millet during summer season in Zn deficient soil are advised to apply recommended dose of fertilizer (120:60:0 NPK kg/ha) along with 20 kg ZnSO₄ per hectare (basal) to obtain higher yield and net return.

Nitrogen management in summer pearl millet

The farmers of AES-II of North Saurashtra Agro-climatic Zone growing hybrid pearl millet during summer are advised to apply nitrogen @ 120 kg/ha in three splits i.e., 1/3 as basal, 1/3 at tillering stage (25-30 DAS) and 1/3 at boot stage (40-45 DAS) to obtain higher yield and net return.

Response of sesame (*Sesamum indicum* Linn.) to potassium fertilization under rainfed condition

The farmers of AES-VIII of North Saurashtra Agro-climatic Zone growing sesame (G.Til-3) in *khariif* are advised to apply 40 kg K₂O/ha in addition to the recommended dose of fertilizer (50:25 NP kg/ha) for getting higher yield and net return.

Effect of foliar spray on seed yield and economics of sesame

The farmers of AES-VIII of North

Saurashtra Agro-climatic Zone growing sesame (G.Til-2) in *khariif* are advised to apply recommended dose of fertilizer (50:25:00 NPK kg/ha) with two foliar sprays of urea @ 2% at flowering and capsule formation stages for getting higher yield and net return. Foliar spray of DAP was not found beneficial.

Nutrient management in onion under salt stress condition

The farmers of South Saurashtra Agro-climatic Zone growing white onion under saline irrigation water (EC 6.00 dSm⁻¹) are advised to apply FYM @ 20 t/ha + Gypsum 7 t/ha (50% GR) + 75 kg K₂O/ha in addition to recommended dose of fertilizer (75 kg N + 60 kg P₂O₅ /ha) to obtain higher yield and net income.

Development of technology for rapid composting of cotton residues under rainfed agriculture

The farmers are advised to recycle cotton stalk (which are either burned or wasted) by chopping into small pieces of 5-6 cm using cotton shredder and composting with addition of compost culture @ 500 g per tonne, urea (N @ 0.5%) and cow dung @ 20% as well as 500 g each of *Azotobacter* and PSM per tonne during first turning to get enriched compost within 120 days having higher content of all the plant nutrients.

2. Package of Practices

Effect of date of sowing and weather parameters on growth and yield of wheat under South Saurashtra Agro-climatic Zone

On the basis of the results obtained using heat unit concept, it is recommended to the farmers of AES-VI of South Saurashtra Agro-climatic Zone interested for early sowing of wheat i.e., during first fortnight of November (Minimum temperature 12 to 13° C and Maximum temperature 30 to 31° C) should

prefer variety GW-366 for getting higher yield and net profit.

Identification of innovative Bt. cotton based cropping systems (Irrigated)

The farmers of AES-VI of South Saurashtra Agro-climatic Zone, who are growing irrigated Bt. cotton, are recommended to sow fodder sorghum or maize in *rabi* and sesame or groundnut (bunch) in summer after Bt. cotton to get higher net return.

Performance of sesame varieties to paired row sowing under rainfed condition

The farmers of AES-VIII of North Saurashtra Agro-climatic Zone are advised to grow *khari* sesame var. G Til-10 or G. Til-3 and adopt paired row sowing at 30:60 cm for getting higher yield and net return.

3. Water Management

Drip irrigation studies in onion crop (seed production)

The farmers of AES-VI of South Saurashtra Agro-climatic Zone growing onion for seed production (Var. Pilipatti) during *rabi* season are recommended to grow bulbs under drip irrigation with 4.0 LPH dripper at 0.5 m spacing on lateral with 1.45 m lateral spacing for getting higher seed yield. The system should be operated daily at 75 % PEF for 47 minutes.

4. Soil Health

Evaluation of crop sequence and nutrient management in respect to sustain agriculture and soil health under rainfed condition

The farmers of AES-X of North Saurashtra Agro-climatic Zone are recommended to adopt cotton-cotton rotation with integrated nutrient management practices (25% RDF + compost @ 5 t/ha + castor cake @ 500 kg/ha + *Azotobacter* and PSM @ 5 g/kg of seed) or cotton-groundnut rotation with RDF

for each crop (12.5:25 N:P for groundnut and 40 kg N for cotton/ha) for getting higher yield and net realization along with maintaining soil fertility under rainfed condition.

Recommendation for the scientific community Soil test based fertilizer recommendation for targeted yields of onion crop

The fertilizer prescription equations of N ($FN = 0.84 \times T - 0.45 SN$), P ($FP_2O_5 = 0.72 \times T - 2.21 SP$) and K ($FK_2O = 0.43 \times T - 0.17 SK$) is fit up to yield target of 225 q/ha in onion. The yield targeting approach is also found effective in economic return and soil fertility build up for cultivation of onion in Saurashtra region.



Soil test based fertilizer recommendation for targeted yields of garlic crop

The fertilizer prescription equations of N ($FN = 3.73 \times T - 0.52 SN$), P ($FP_2O_5 = 2.10 \times T - 2.36 SP$) and K ($FK_2O = 2.90 \times T - 0.45 SK$) is fit up to yield target of 70 q/ha in garlic. The yield targeting approach is also found effective in economic return and soil fertility build up for cultivation of garlic in Saurashtra region.



Establishment of critical limit of potassium for cotton variety G. Cot. Hybrid-10 in medium black calcareous soils

The critical limit for cotton variety G. Cot. Hybrid-10, available K_2O (ammonium acetate-K) was obtained 152.0 kg K_2O /ha in medium black calcareous soil, while the critical value of K content in plant was observed 1.72 per cent at 30 DAS.



Relative salt tolerance of different wheat genotypes in simulated saline soil condition

The wheat varieties GW-322 and KRL-119 were found salinity tolerant up to EC_e 4 dS/m.

Potassium supplying power of soils of Rajkot district

- ❖ The soils of Rajkot district were neutral to moderately alkaline reaction, non calcareous to highly calcareous, low to medium in organic carbon content. The 33.6, 1.8, 32.1, 20.7, 36.4 and 3.9 per cent soils were found low in availability of P, K, S, Fe, Zn and Mn, respectively.
- ❖ The maximum and minimum values of various potassium fractions were recorded in soils of Malia-Miyana and Paddhari Taluka, respectively.
- ❖ The higher and lower values of various potassium fractions were recorded with

cotton-cotton and cotton-rabi crops sequences, respectively.

- ❖ Availability of K and values of different K fractions were increased with increase in soil depth.
- ❖ The different K fractions and availability of K were lower in irrigated conditions as compared to un-irrigated conditions.

III. 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 two from Plant Pathology group were released.

Recommendation for the Farming Community Agricultural Entomology

Efficacy of newer insecticides against sucking pests of coriander

For effective and economical management of aphids in coriander, one spray of acetamiprid 20% SP 0.004 % (2 g/10 l water) or imidacloprid 17.8 % SL 0.005% (2.80 ml/10 l water) or dimethoate 30 % EC 0.03 % (10 ml/10 l water) at the appearance of aphid infestation is recommended under South Saurashtra Agro-climatic Zone.



Management of eriophyid mites in coconut cv. T x D

For effective and economical management of eriophyid mite in coconut, root feeding application of azadiractin 2.5% @ 15 ml with equal water quantity per palm at two months interval throughout the year is recommended under South Saurashtra Agro-climatic Zone.



Testing efficacy of bio-pesticides for the control of sesame leaf webber/capsule borer (*Antigastra catalaunalis*)

For effective and economical bio-pesticide based management of leaf webber/capsule borer in *kharif* sesame, three sprays of *Beauveria bassiana* (2 x 10⁸ cfu/mg), 5 g/l or neem seed kernel extract 5 % (500 g/ 10 l water) at 15 days interval starting from the pest infestation are recommended for the farmers of North Saurashtra Agro-climatic Zone.

Plant Pathology

Integrated management of downy mildew of cucurbit (Ridge gourd)

For economical and effective management of downy mildew disease and to get higher ridge gourd fruit yield, the farmers of South Saurashtra Agro-climatic Zone are advised to adopt bower system with seed treatment of combi product of metalaxyl 8 % + mancozeb 64 % WP @ 4 g/kg seeds followed

by three times removing of old leaves in the morning and three sprays of mancozeb 75 % WP 0.2 % (27 g/10 l of water) in the afternoon at 50, 60 and 70 days after sowing or bower system with seed treatment of metalaxyl 8 % + mancozeb 64 % WP @ 4 g/kg seeds followed by two sprays of fosetyl-Al 80 % WP 0.1 % (12.5 g/10 l of water) at 50 and 65 days after sowing.



Chemical control of leaf/stem/capsule spots (*Alternaria alternata*) of sesame

Farmers of North Saurashtra Agro climatic Zone growing *kharif* sesame are advised to apply three sprays of propiconazole 0.025 % (10 ml/10 l water) or hexaconazole 0.005 % (10 ml/10 l water) or carbendazim 12 % WP + mancozeb 63 % WP 0.15 % (20 g/10 l water) at 12 days interval starting from 40 days after sowing for effective and economical management of leaf/stem/capsule spots.

IV. Horticulture & Agro-forestry

This group has released four farmers and one scientific recommendation which are briefed below.

Recommendation for the Farming Community

Comparison of open and low cost net house nursery for seed germination and dynamic growth of coconut seedling cv. D x T (Mahuva)

The nursery growers of South Saurashtra Agro-climatic Zone producing coconut seedlings are advised to grow coconut seedling in the month of June under low cost net house (50 % shed net) to get higher quality seedling of cv. DxT (Mahuva) and net return as compared to open field.



Effect of soil amendments with organic materials on yield and quality of onion cv. Talaja Red under sodic soil and brackish water condition

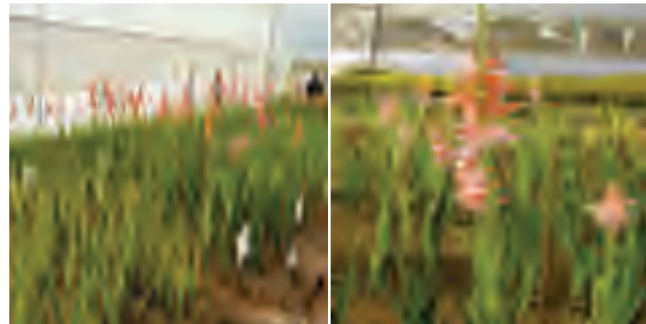
Onion growers of South Saurashtra Agro-climatic Zone having sodic soil and brackish irrigation water condition are advised to apply Gypsum 5 t/ha with 50 per cent recommended dose of chemical fertilizer (N:P:K 37.5:30:25 kg/ha) and Neem Cake 900 kg/ha to get maximum yield and net return of onion cv. Talaja Red.



Effect of plant growth regulators on gladiolus cv. American Beauty in protected condition for spikes

Farmers of South Saurashtra Agro-climatic Zone who are interested to grow

gladiolus cv. American Beauty under poly house are advised to treat the corms of gladiolus with Thiourea 1g/litre for 10 hrs before planting for getting maximum number of spikes with good quality and vase life and to get highest net return



Effect of plant growth regulators on gladiolus cv. American Beauty in protected condition for corms

Farmers of South Saurashtra Agro-climatic Zone who are interested to grow gladiolus cv. American Beauty under poly house are advised to treat the corms of gladiolus with GA₃ 0.05 g/l for 10 hrs before planting for getting maximum number of corms and highest net return.



Recommendation for the Scientific Community Characterization of different accessions of jamun (*Syzygium cumini* Skeels) from Saurashtra region

The different accessions like VR-1, VM-1, JAU-6, VMA-1 and VB-1 of black jamun identified from Junagadh region were observed better in different characteristics.

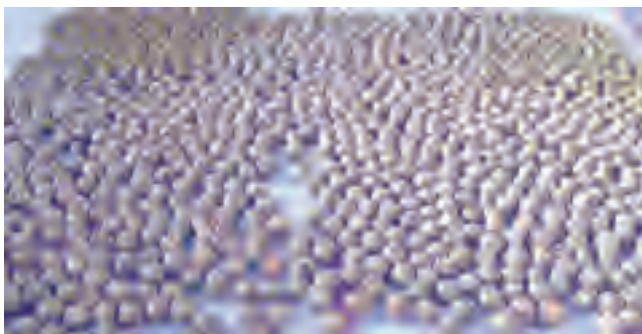


V. Agricultural Engineering

The Agricultural Engineering group accomplished the studies on design, development and fabrication of agricultural machinery, equipments, tools, processes and soil & water management. Agricultural Engineering group has five farmers and one scientific recommendation.

Recommendations for the Farming Community Modified atmosphere packaging technique for sapota

The farmers, processors and exporters are recommended to adopt modified atmosphere packaging technique developed by JAU for increasing the shelf life of *sapota* fruit by packing in 25 μ LDPE bag with a combination of 5% O₂ +10 % CO₂ gas concentration and stored at 6^oC temperature. The shelf life of *sapota* fruits can be increased up to 49 days by using this technique.



Modified atmosphere packaging technique for mango

The farmers, processors and exporters are recommended to adopt modified atmosphere

packaging technique developed by JAU for increasing the shelf life of mango fruit by packing in 25 μ LDPE bag with a combination of 6 % O₂ + 5 % CO₂ gas concentration and stored at 10^oC temperature. The shelf life of mango fruits can be increased up to 35 days by using this technique.



Lime harvester

The farmers having *kagzi* lime orchards are advised to use the JAU-Lime harvester to reduce losses like impact damage and immature lemon fall-up.



Application of *murrum* in groundnut

The farmers of North Saurashtra Agro-climatic Zone growing bunch groundnut (GG-5) are advised to apply *murrum* @ 40 t/ha or FYM @ 10 t/ha along with recommended dose of fertilizer for obtaining higher yield of groundnut and net returns under dry farming conditions.



Mulching in dripped guava orchard

The farmers of North Saurashtra Agro-climatic Zone growing Guava under drip irrigation system are advised to apply black plastic (50 micron) or groundnut shell or wheat straw mulch @ 7.5 kg/plant (0.5 m around the plant) for obtaining maximum plant growth, fruit yield and net return.



Recommendation for the Scientific Community

Drying air variables of tomato slices

The influence of drying air variables i.e. drying air temperature and velocity on drying rate constant "k" of tomato slices is recommended in the form of Arrhenius-type model, given below, for describing the thin layer drying behaviour of 5.0 ± 0.5 mm thick tomato slices. The value of constant "c" did not show any regular dependence on drying air variables and recommended to be equal to mean value of 1.005.

$$k = 587.83 v^{0.36} \exp(3487.79/T_{ab})$$

(COD, $r^2 = 0.998$, $\chi^2 = 9.541 \times 10^{-8}$ for $0.25 \text{ m/s} \leq v \leq 1 \text{ m/s}$ and $50^\circ\text{C} \leq T \leq 80^\circ\text{C}$).

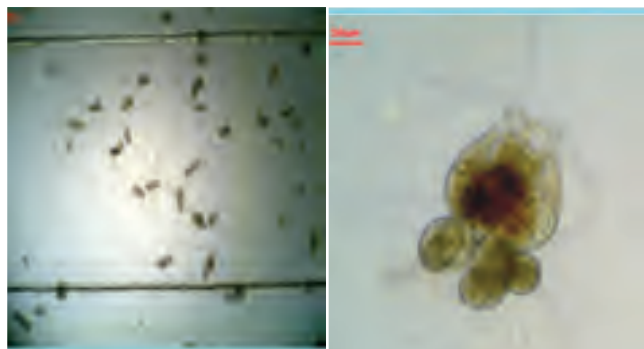
VI. Fisheries Science

This group has released two fish farmers' and one scientific recommendation which are briefed below.

Recommendation for Fish Farmers

Population growth of rotifer *Brachionus rotundiformis* Tschugunoff in varying salinity

Finfish/crustacean hatchery entrepreneurs are recommended to use 15 to 20 ppt saline water at 25°C to achieve higher production of rotifer, *Brachionus rotundiformis* in 10 days



Study of location specific growth rate in marine macro algae *Kappaphycus alvarezzi*

It is recommended that carrageenan yielding marine algae *Kappaphycus alvarezzi* can be grown profitably in Okha mandal region and five fold growths can be achieved in 45 days from January onwards.



Information for Scientific Community

Study on seasonal variation in iodine content of promising iodine yielding red saw-weeds of Gulf of Kutch

Among the available red sea-weed (*Rhodophyceae*) species of Gulf of Kutch, maximum iodine content is found in *Asperogopsis entestinalis* (555 mg/100g DW) followed by *Rhodomenia australis* (151 mg/100 DW).

VII. Basic Science

The research work carried out by Department of Agril. Botany on induction of somaclonal variation in *Allium sativum* by callus culture, micro-propagation in *mal-kankani*, low cost micro-propagation in banana, *in vitro* screening for salinity tolerance in onion (*Allium cepa* L.), effect of brassinolide on germination and biochemical parameters of chickpea, amelioration of simulated water stress by brassinolide application during germination and early seedling growth of groundnut, seed vigour as influenced by different seed priming in okra [*Abelmoschus esculentus* (L.) Moench], allelopathic effects of different weed extracts on seed germination and vigour in groundnut, cowpea and green gram.

The research work carried out by Department of Biochemistry and Department

of Biotechnology on quality differences in "kesar mango" of different location of Saurashtra, varietal identification of Onion and Garlic through molecular marker, bioactivity in cow urine, biochemical mechanism of *Trichoderma* spp. for inhibition of *Fusarium oxysporum* f. sp. *ciceri* causing chick-pea, effect of brassinolide on germination and biochemical parameters of chickpea, molecular characterization of indigenous mango cultivars through DNA finger printing, biochemical and physiological markers for wheat varieties against high temperature stress, estimation of pesticide residues from soil and water resources of Saurashtra region, estimation of pesticide residues in vegetable of Junagadh region and surface micro-flora and pathogenic bacteria analysis of fresh vegetable, amelioration of simulated water stress by brassinolide application during early seedling growth of groundnut and *in situ* detection of potassium status in cotton plants.

The research work carried out on screening for stay-green character in pearl millet, efficacy of foliar spray of growth substances under rainfed condition on yield potential of pearl millet, assessment of salinity tolerance in pearl millet and impact of induced dormancy on seed quality of bunch groundnut during storage.

VIII. Social Science

Agricultural economists worked on the different research projects like, farm cost studies of important crops in Gujarat state, economics of rose flower cultivation in Saurashtra region of Gujarat state, scheme for creating a permanent machinery for studying the cost of cultivation/production of principal crops in Gujarat state, visioning policy analysis



and gender (NAIP-V-PAGE), establishing and networking of agricultural market intelligence centres in India (NAIP-AMIC), regional disparity in growth and instability in area, production and yield of major crops of Gujarat state, harnessing opportunities for productivity enhancement (ICRISAT). Price forecasts of different crops *viz.*; groundnut, sesame, udad, cotton, castor, pigeonpea, chickpea, wheat, mustard and cumin were published for benefits of farmers in English and Gujarati news papers. Extension educationists have conducted study on crisis management practices adopted by the irrigated Bt. cotton growers of Saurashtra region. Post Graduate Institute of Agri-Business Management has conducted four studies *viz.*, future trading of cumin in Indian markets; economic analysis of production, processing and export marketing of sesame; evaluation and performance of Kisan Credit Cards (KCC) scheme and role of women in agriculture: A socio-economic study in Junagadh district.

IX. Animal Health & Animal Production

Total eighteen research 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 *Jaffrabadi* bovines and also through supply of frozen semen doses to field A. I. centres. Strengthening of livestock inspectors training centres and establishment of mobile ambulatory clinic at

Cattle Breeding Farm are operating for the benefits of farmers. This year, 31 livestock inspectors have been trained at LITC. About 1380 dairy farmers and farm women visited this research station and 33 group night meetings were arranged. The centre has supplied 26 *Gir* bulls and 29 *Jaffrabadi* bulls to various *Gram panchayats/Gaushalas/* Institutions.

This group conducts seven research study on management of sub-oestrus condition in *Jaffrabadi* buffaloes through hormonal therapy, studies on breeding attributes and semen characteristics of *Gir* and *Jaffrabadi* bulls, effect of probiotic supplementation to augment growth rate in *Gir* calves, biometrical studies in *Gir* and *Jaffrabadi* animals of different ages, effect of processing groundnut haulms and wheat straw based rations for maintenance in *Gir* and *Jaffrabadi* animals, study on incidence of clinical case of mastitis on farm and isolation & identification of causative organisms and effect of weaning on growth rate of calves born to primiparous *Gir* cows and their yield. During the year, five experiments were conducted on genetic improvement, animal nutrients, animal production and health.

X. Breeder Seed Production

The breeder seeds of different crops were successfully produced to fulfil the demand of private and public sectors as per the national and state indents are given in following table. The required nucleus seeds of different crops were also produced for the breeder seed production of next year.



Production of Nucleus / Breeder seeds during year 2010-11

Sr. No.	Crop	Variety	Breeder Seed (q)		Nucleus Seed (q)	Total (q)
			National	State		
1.	Groundnut	GG-2	2.00	134.00	18.30	154.30
		GG-5	-	51.00	13.16	64.16
		GG-6	50.00	-	10.00	60.00
		GG-7	20.60	1.10	5.01	26.71
		GG-8	8.00	-	3.00	11.00
		GG-20	10.00	198.80	103.53	312.33
		GAUG-10	-	43.20	16.02	59.22
		GG-11	-	17.70	20.55	38.25
		GG-14	5.40	-	12.51	17.91
		GG-21	4.20	-	1.50	05.70
		GG-16	22.50	-	3.00	25.50
		GJGHPS-1	-	-	4.50	04.50
		GJG-9	-	-	4.00	04.00
		GJG-31	-	-	5.25	05.25
2.	Pearl millet	Parent Seed	-	19.99	-	19.99
3.	Chick pea	GG-1	-	44.77	-	44.77
		GG-2	2.50	40.50	0.07	43.07
		GG-3	-	9.75	-	09.75
		GG-4	24.25	-	1.79	26.04
4.	Sesame	G.Til-1	0.85	2.24	-	03.09
		G.Til-2	0.35	10.04	-	10.39
		G.Til-3	0.17	5.04	-	05.21
		G.Til-10	0.76	0.34	-	01.10
5.	Wheat	GW-496	133.20	188.00	-	321.20
		GW-366	188.40	442.00	05.30	635.70
Total			473.18	1208.47	227.49	1909.14

XI. Mega seed unit

At mega seed processing plant the crop seeds produced in the farms were processed. The processed good quality seeds were sold to

farmers under the brand name of "*Sawaj Beej*". Very good response was observed among the farmers to avail this facility at their door steps.



Production of truthful seeds of field crops under mega seed project during year 2010-11

Sr. No.	Crop	Production (q)
1	Groundnut	878.17
2.	Pearl millet	155.25
3.	Chick pea	469.06
4.	Sesame	177.10
5.	Wheat	8109.69
6.	Cotton	16.00
7.	Castor	21.68
8.	Cumin	52.10
9.	Coriander	95.82
10.	Soybean	208.54
11.	Mung bean	99.57
12.	Udad bean	83.56
13.	Pigeon pea	98.25
14.	Fenugreek	18.30
15.	Sugarcane	750.00
16.	Vegetable Seeds	33.02
17.	Ajwain	0.50
18.	Garlic	28.10
Total		11294.71

XII. Front line demonstration organized on farmers' field (2010-11)

Crop scientists have successfully

organized total 425 Front Line Demonstrations on farmers' fields in addition to the FLDs organized by KVKs of JAU.

Sr. No.	Name of Crop	No. of FLD
1.	Groundnut	72
2.	Chickpea	26
3.	Vegetable	28
4.	Sesame	25
5.	Castor	23
6.	Wheat	21
7.	Pearl millet	130
8.	Cotton	100
Total		425

XIII. Production of SAWAJ-Trichoderma

Department of Plant Pathology has produced and distributed 16,000 packets of bio-agent *Trichoderma harzianum* under the brand name of SAWAJ-Trichoderma at a very cheap rate of ₹ 70/- per kg for the management of various soil borne diseases especially stem and pod rot of groundnut in the Saurashtra region. The delegates from Zanzibar (Tanzania) visited Department of Plant Pathology, Junagadh Agricultural University during July 25-28, 2010. They also observed *Trichoderma harzianum*, a bioagent culture preparation.



XIV. MoUs

The University has signed following seven MoUs with different institutes/ organizations for collaborative work in research, education and extension education of Junagadh Agricultural University.

1. Sardar Patel Renewable Energy Research Institute (SPRERI), Vallabh Vidyanagar, Gujarat for P.G. Research and Teaching.

2. Mahindra & Mahindra Ltd., Mumbai for facilitation of innovative farming technology development & dissemination of technology to the farmers.
3. University of Venda, South Africa for the purpose of collaboration works and exchange technology of research, education and extension education.
4. KSKV Kachchh University, Bhuj for exchange of faculty, staff & students, explore joint research programmes & exchange experiences in education and research.
5. Bhavnagar University, Bhavnagar for exchange of faculty, staff & students, explore joint research programmes & exchange experiences in education and research.
6. Gujarat Livelihood Promotion Company Ltd., Gandhinagar for the purpose of exchange of information, innovation, knowledge, technological developments, management programmes and skills development for the livelihood of poor families of the rural areas.
7. Non-Exclusive License Agreement with Shakti Vardhak Hybrid Seeds Pvt. Ltd., Hisar for commercialization, production and marketing of Hy. Bajra GHB-538.

XV. New research programmes sanctioned during year 2010-11

Sr. No.	Agency	No. of Research Programmes	Amount (₹ in Lakhs)
1.	ICAR/GOI	03	46.68
2.	AICRP	02	10.50
3.	Other Agencies	17	95.16
4.	Govt. of Gujarat	02	378.00
5.	RKVY	05	544.81
	Total	29	1075.15