RESEARCH ACCOMPLISHMENTS AND RECOMMENDATIONS

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FOREWORD

It is my immense pleasure to put forward the publication on "Research Accomplishments and Recommendations 2010" containing technologies developed and recommended by scientists of all the faculties of Anand Agricultural University for farming as well as scientific communities.

The technologies developed by the scientists of this university will provide better socio economics welfare to the farming community by helping them in cutting off the cost of cultivation and reaping higher profit in agricultural business.

At this juncture I congratulate to all the scientists, conveners of respective AGRESCO sub committees and co-workers of Anand Agricultural University for their sincere efforts and hard work for generating new technologies in the field of agricultural sciences.

(Shekh A. M.)
DIRECTOR OF RESEARCH & DEAN
FACULTY OF P.G.STUDIES

PREFACE

Scientific work in the different fields of agricultural science for developing technologies which are practical and applicable for farming community is basic and important duty of scientists of this fields. As on today in India ; agriculture is still important source of employment and livelihood as around 65% of national population depends on agriculture for their livelihood.

Sincere, dedicated and hard efforts of our scientists resulted into valuable recommendations for farmers, scientific communities, entrepreneurs and stake holders which have been discussed, churned and confirmed through exhaustive, critical, meaningful and healthy deliberations in various research sub-committees which were met during March-April, 2010.

The Research work carried out in different fields of agricultural science during the year 2009-10 has been very well discussed by different AGRESCO Sub-committees for bringing out useful and beneficial recommendations for farmers, scientific community, entrepreneurs and stake holders.

The recommendations made by different committees for adoption by the farmers in agriculture are listed below.

Name of the Sub-committee	No. of recommendations	
	For farmers	For scientific community and entrepreneurs
Crop Improvement	05	-
Crop Production	17	01
Plant Protection	09	02
Basic Science	-	01
Dairy Science, Agri. Engineering & Processing	03	06
Animal Production	06	10
Animal Health	01	14
Social Science	-	01

Recommendations for farming community

I CROP IMPROVEMENT

1. Rice: Gujarat Anand Rice 1 (GAR 1)

The variety Gujarat Anand Rice 1(GAR 1) is the first mid early duration aromatic, maturing in about 120 to 125 days, early by 22 to 25 days than the checks. This variety revealed an overall yield advantage of 23.9, 15.4, 13.1 and 3.0 per cent over GR–101, Narmada, GR-11 and GR-104, respectively. It also showed superiority in per day productivity (kg/day/ha) to the tune of 44.4, 30, 18.2 and 18.2 per cent respectively over GR–101, Narmada, GR-11 and GR-104. The variety also possesses inbuilt resistance to major biotic constraints viz,. blast and BLB in diseases and LF, SB and WBPH in insects. The variety was recommended for all the transplanted rice growing areas of the Gujarat State. (Agro climatic Zone I, II & III).

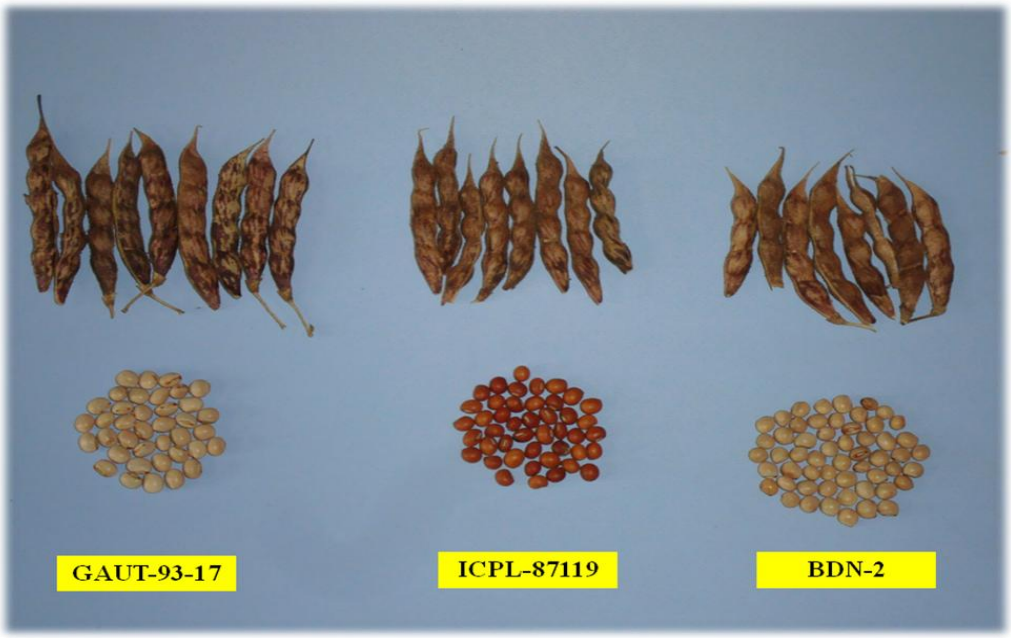
(Research Scientist (Rice), Main Rice Research Station, AAU, Nawagam)

2. Ridge Gourd: Gujarat Anand Ridge Gourd 1 (GARG 1)

The variety Gujarat Anand Ridge Gourd 1 (GARG 1) showed 39.5 per cent higher fruit yield than the check Pusa Nasdar. The fruits of this variety are medium sized and elliptical shape with green fruit skin color. The variety had less mosaic and downey mildew disease reaction and infestation compared to the check variety Pusa Nasdar. The variety also exhibited better quality of carbohydrate, fiber, protein, chlorophyll-a and total soluble solids compared to the check variety. The variety was recommended for Middle Gujarat under kharif cultivation in open field conditions.

(Research Scientist (Veg.), Main Vegetable Res. Station, AAU, Anand)

3. Pigeon Pea: AGT 2



The variety Anand Grain Tur 2 (AGT 2) recorded 23.5 and 23.2 per cent higher grain yield over check variety BDN-2 and ICPL-87119, respectively. The variety showed less pod borer and pod fly infection and less incidence of sterility mosaic disease. Due to attractive white grain colour with bold grain size, the variety was recommended for pigeon pea growing area of Gujarat in *kharif* season.

(Associate Research Scientist, Pulse Research Station, AAU, Vadodra)

4. Napier Grass: Co 3

The variety Napier Hybrid Grass Co 3 was recommended and released in 1996 by Tamil Nadu state. This variety showed overall superiority in Green Forage Yield (GFY) to the tune of 19.2 and 34.3 per cent over the local check APBN-1 and national check NB-21 respectively. Further, the variety revealed 29.5 and 33.8 per cent higher dry matter yield (DMY), 18.3 and 40.8 per cent higher crude protein yield (CPY), respectively over the local and national check varieties. This variety is highly palatable having good quality fodder with less serration of leaf margin compared to the local check variety APBN-1. It was endorsed for the rainfed and irrigated areas of Gujarat State.

(Research Scientist, Forage Research Station, AAU, Anand)

5. Maize: HQPM 1

Gujarat Makai-2 (GM-2) | High Quality Protein Maize (HQPM-1)

The variety HQPM 1 a high quality protein maize single cross hybrid bred at HAU, Karnal, was endorsed for pre release due to its superiority in lysine and tryptophan content besides its grain yield superiority in *rabi* season to the tune of 135.8 and 15.5 per cent over check varieties GM-3 and Shaktiman-1, respectively. The variety also revealed 8.4 per cent higher grain yield over check GM-2 under rainfed conditions in Middle and North Gujarat Agro-climatic Zones. Due to its resistant reaction to Maydis leaf blight and tolerance to stem borer it was endorsed as a pre release hybrid across the state in *kharif* and *rabi* season.

(Research Scientist (Maize), Main Maize Research Station, AAU, Godhra)

II CROP PRODUCTION

[A] CULTURAL PRACTICES

1. Crop weather relationship of *kharif* groundnut

The farmers of Middle Gujarat Agro-climatic Zone–III (AES-II) growing *kharif* groundnut are advised to sow groundnut (GG 2) on onset of monsoon and give irrigation, if 7 to 8 days dry spell prevails during flowering, pegging and pod formation stages for higher production and profit.

(Prof. & Head, Dept. of Agril. Meteorology, BACA, Anand)

2. Effect of date of sowing and seed rate on root yield of Aswagandha (*Withania somnifera* L)

Farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) are advised to sow *Aswagandha* by broadcasting between 15th October to 30th October with seed rate of 8 kg/ha for obtaining higher yield and net profit.

3. Effect of different dates of sowing on yield of dry aerial biomass of *Shankhpushpi* (*Convolvulus microphyllus*)

Farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) are advised to sow *Shankpuspi* during second week of June to obtain higher dry bio-mass yield (without root) and net profit.

4. Effect of different spacings and harvesting time on biomass yield of *Dodi (Leptadenia reticulata)*

Farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) are advised to plant *Dodi* with spacing of 60 x 60 cm and harvest thrice at an interval of 90 days after planting to obtain higher dry bio-mass yield (without root) and net profit.

(Research Scientist, M & AP, AAU, Anand)

5. Production potential of wheat cultivars with different seed rates under irrigated condition for *Bhal* region

Farmers of *Bhal* and Coastal Zone-VIII are advised to prefer wheat cultivar GW 1 with seed rate of 120 kg/ha to obtain higher grain yield and net return. The crop needs to be irrigated at CRI and flowering stages.

(Research Scientist, ARS, AAU, Arnej)

6. Evaluation of "SIRA" and other crop establishment methods in transplanted Paddy (*Oryza sativa* L.) under Middle Gujarat conditions

The small and marginal farmers of Middle Gujarat Agro-climatic Zone-III (AES II) having irrigation facilities are advised to grow rice variety Gurjari in *kharif* or summer season by adopting SIRA method for obtaining higher yield and net return.

Savant's Integrated Rice Agro-technology (SIRA)

- Seedling should be raised by applying black-gray ash of rice husk @ 0.5-1.5 kg/m^2.
- Paddy straw (2 t/ha) and green gliricidia leaves (5 t/ha) should be incorporated into soil before transplanting.

- Planting the rice seedling in square (15 x 15 x 25 cm).
- Fertilizers (57 kg N + 29 kg P_2O_5/ha) should be applied through Urea-DAP (60:40) briquettes (2.7 g briquette i.e. 170 kg/ha) to be placed in every four hill square at 7 to 10 cm soil depth on the same day of transplanting.

(Research Scientist, MRRS, AAU, Nawagam)

7. Evaluation of pigeonpea varieties in *rabi* season under different geometry

The farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) who are interested to cultivate Semi –*rabi* pigeon pea are advised to grow pigeon pea (GT 1) or BDN 2 at 75 cm row spacing for getting higher yield and net return.

(Research Scientist, Pulses Research Station, AAU, Vadodara)

8. Effect of tied ridges on soil moisture conservation and yield of maize under rainfed condition

The farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) growing rainfed maize are advised to make tied ridges at 60 cm width and 30 cm deep at every 2 m distance across the furrow for securing higher yield and net return.

(Research Scientist, M.M.R.S., AAU, Godhra)

[B] CROPPING SEQUENCE

9. Studies on cotton based cropping system in *goradu* soil of middle Gujarat

The farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) are advised to adopt cotton (*kharif*) - vegetable cluster bean (*summer*) cropping system to get higher yield and net profit.

(Assoc. Res. Scientist, A.R.S.I.C., AAU, Thasra)

10. To study the feasibility of inter cropping in cotton under rainfed conditions

The farmers of North-West Agro-climatic Zone-V (AES-VIII) growing cotton (G Cot 21) are advised to sow the crop at 2.4 m row spacing and 0.3 m intra row spacing. The farmers are advised to take green gram (GM 4) or black gram (T 9) as a inter crop at a row ratio of 1:1 to get higher yield and net realization.

(Assistant Research Scientist, R.C.R.S., AAU, Viramgam)

[C] NUTRIENT MANAGEMENT

11. Integrated nutrient management in rabi sweet corn

The farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) growing *rabi* sweet corn are advised to apply castor cake @ 2.0 t/ha along with 75% recommended dose of fertilizer (90 : 37.5 kg NP/ha) to get higher green cob yield and net income. Out of total quantity of fertilizer, 30 kg N and 37.5 kg P_2O_5 should be applied at the time of sowing and remaining quantity of N in two equal splits at knee high and tasseling stages.

12. Effect of vermicompost and fertilizers on yield of summer groundnut

The farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) growing groundnut (GG 2) during summer are advised to apply vermicompost @ 1.0 t/ha along with 75 % of recommended dose of fertilizer (18.75:37.5 kg NP/ha) as basal to get higher yield and net realization.

(Research Scientist, RRS, AAU, Anand)

[D] WEED MANAGEMENT

13. Weed management in *kharif* groundnut

The farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) growing *Kharif* groundnut are advised to carry out interculturing and hand weeding at

20 and 40 days after sowing or apply pre-emergence application of pendimethalin @ 0.75 kg/ha followed by HW at 40 DAS or post emergence application of quizalofop-ethyl or fenoxaprop-p-ethyl @ 100 g/ha at 15 DAS followed by HW at 40 DAS for efficient weed control in groundnut.

(Agronomist, DWSR, AAU, Anand)

14. Weed management in pigeonpea

The farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) growing pigeon pea in *kharif* season are advised to carry out interculturing and hand weeding three times at 20, 40 and 60 DAS in order to get higher yield and net return.

(Research Scientist, Pulses Research Station, AAU, Vadodara)

[E] WATER MANAGEMENT

15. Irrigation management in onion

The farmers of Middle Gujarat Agro-climatic Zone-III (AES–II) growing onion are advised to give ten irrigations (0.8 IW/CPE) through mini sprinkler to save 26 % water over surface irrigation. The crop should be fertilized @ 100 % recommended dose of N (75 kg/ha). The farmer should apply 50 % of the total N as basal and remaining 50 % in five equal splits at 10 days intervals through mini sprinkler. The fertigation should be started after 30 days of transplanting (DATP).

Irrigation scheduling should be as under:

- 1st irrigation of 80 mm at transplanting.
- 2nd irrigation of 50 mm at 6 to 7 DATP.
- Subsequent six irrigations at 12-15 days interval.
- Remaining two irrigations at 8-10 days interval.

The mini sprinkler system should be laid out at spacing of 2.5 X 2.5 m and operated at a pressure of 1.75 kg/cm^2 for 5 hrs 30 min. (50 mm of water).

(Research Scientist, RRS, AAU, Anand)

16. Irrigation scheduling in Rabi maize (sweet corn) under drip system

The farmers of Middle Gujarat Agro-climatic Zone-III (AES-II) are advised to adopt drip method of irrigation in maize (Sweet corn var. Madhuri)

to get higher green cob yield and income. The drip system should be laid out at a lateral distance of 0.90 m and dripper (4.0 lph) spacing of 0.60 m. The system should be operated for 2 hours at a pressure of 1.2 kg/cm^2 on alternate day during the crop period.

(Assoc. Res. Scientist, A.R.S.I.C., AAU, Thasra)

17. Effect of methods of irrigation and nitrogen levels on growth and yield of G.Cot 21

The farmers of North-West Agro-climatic Zone-V (AES-VIII) growing cotton (G Cot 21) are advised to give two irrigations through alternate furrow at flowering and boll formation stage and fertilize with 80 kg N/ha in two equal splits at 25-30 and 50-60 DAS to get higher seed cotton yield and net realization.

(Assistant Research Scientist, R.C.R.S.AAU, Viramgam)

III PLANT PROTECTION

[A] PLANT PATHOLOGY

1. Management of yellow vein mosaic of Okra and its vector

The farmers of middle Gujarat are advised to treat the seeds of okra with thiamethoxam (70 WS) @ 5 g /kg **or** imidacloprid (70 WS) @ 7.5 g /kg and subsequently apply three

sprays of acephate (50%) + imidacloprid (1.8%) 51.8% SP @ 0.026 % [5 g of acephate (50%) + imidacloprid (1.8%) in 10 liters of water] at 40, 55 and 70 days after sowing for effective and economical management of yellow vein mosaic of okra and its vector.

(Professor & Head, Department of Plant Pathology, BACA, AAU, Anand)

[B] AGRICULTURAL ENTOMOLOGY

2. Bio-efficacy of neem based formulation against aonla leaf roller, *Gracillaria acidula*

The aonla growers are advised to apply one spray of neem oil 0.5% (50 ml neem oil + 10 g detergent powder in 10 litres of water) at the appearance of leaf roller, *Grecillaria acidula* for its effective and economical suppression.

3. Field evaluation of bio-efficacy of insecticides against aonla aphid, *Cerciaphis emblica*

The aonla growers are advised to apply one spray of imidacloprid 0.005% (3 ml of imidacloprid 17.8 SL in 10 litres of water) at the appearance of aphid, *Cerciaphis emblica* for its effective and economical suppression.

(Professor & Head, Department of Entomology, BACA, AAU, Anand)

4. Assessment of habitat manipulation on the population of natural enemies of insect pests in *Bt* cotton

The farmers of middle Gujarat growing *Bt* cotton are advised to intersperse maize with cotton @ 10 per cent **or** sow cowpea in between two rows of cotton for suppression of sucking pests i.e. leaf hopper and whitefly by enhancing their natural enemies.

(Principal Research Scientist, Biological Control Res. Lab., AAU, Anand)

5. Biological control of root-knot nematodes in pomegranate

The farmers of North Gujarat region cultivating pomegranate are advised to apply talc based formulation of *Pochonia chlamydosporia* (10^8 spores /g) **or** *Paecilomyces lilacinus* (10^8 spores /g) @ 100 g /plant + mustard cake @ 1.5, 2.0 and 2.25 kg/plant in first, second and third year, respectively, two times i.e. first during November and second during April for the effective management of root-knot nematodes.

6. Biological control of cyst nematode in redgram

Farmers of Agro-climatic Zone-II growing red gram are advised to apply talc based mixture of *Trichoderma harzianum* (10^8 spores/g) @ 5 kg /ha + *Pochonia chlamydosporia* (10^8 spores /g) @ 20 kg /ha in furrows at the time of sowing for effective and economical management of cyst nematode, *Heterodera cajani*.

(Principal Research Scientist, Biological Control Research Laboratory and Prof. of Nematology, BACA, AAU, Anand)

7. Studies on the effectiveness of various botanicals against rove beetle, *Bledius latiusculus* in tobacco nursery

The bidi tobacco growers of Gujarat are advised to drench tobacco nursery with 10 per cent neem leaf extract (1 kg neem leaves in 10 liters of water) @ 2 liters /m^2 at 7 days after seeding for the control of rove beetle, *Bledius latiusculus.*

(Research Scientist (Ento.), BTRS, AAU, Anand)

8. Integrated pest management in seed crop of Lucerne

For the effective management of *Helicoverpa armigera* in lucerne grown for seed production, the following IPM module is recommended:

i. Spraying of *Bacillus thuringiensis* @ 1 kg /ha at flowering.

ii. Release of *Trichogramma chilonis* wasps @ 1,00,000 per hectare synchronizing with the appearance of *H. armigera* eggs.

iii. Installation of bird perches @ 15 per hectare for attracting predatory birds.

(Research Scientist (Ento.), Main Forage Research Station, AAU, Anand)

9. Standardization of number of pheromone traps for mass trapping of Helicoverpa armigera in chickpea

The farmers of Bhal and Coastal Agro-climatic Zone-VIII are advised to install pheromone traps with *Helicoverpa armigera* lure @ 40 traps /ha for effective and economical management of pod borer in chickpea. The traps should be installed 15 days after sowing at height of one ft. above the crop canopy covering the whole field uniformly. The lures should be changed at 21 days intervals.

(Research Scientist (Ento.), Agricultural Research Station, AAU, Arnej)

IV DAIRY SCIENCE, AGRIL. ENGINEERING AND PROCESSING

AGRICULTURAL ENGINEERING

1. Technology for production of Basil leaf powder

The farmers and the agro-processing entrepreneurs interested in the production of dehydrated basil leaves/powder, are recommended to use the "Technology for production of dehydrated Basil leaves/powder" developed by Anand Agricultural University. The technology produces superior quality product with higher eugenol content, high chlorophyll content, longer shelf life and sensory score as compared to product obtained by traditional drying.

2. Standardization of pre cooling protocol to maximize self life of mango fruit

The orchard owners and agro-processing entrepreneurs handling mango fruits are recommended to use " The Pre-cooling protocol for mango fruits", developed by Anand Agricultural University to pre cool mango for delaying the ripening of fruits and extending its shelf life by about 30% over non pre-cooled fruits.

3. Development of on farm post harvest activity hut

The farmers of Hot and Dry Climatic regions of Middle Gujarat are advised to establish the "Post Harvest Activity Hut" developed by Anand Agricultural University. The system maintains comfortable temperature of about 10-15^{o} C below the ambient temperature during the peak summer days. The hut is suitable for carrying out different on- farm post harvest activities and for intermediate storage of perishable commodities.

(Professor & Head, Post Harvest Engineering and Technology Department, College of FPT & BE, AAU, Anand)

V ANIMAL PRODUCTION

1. Non-conventional feeds for growing calves

There will be a reduction of 35.27 per cent in daily feed cost and 15.21 per cent in cost per kilo of weight gain in crossbred calves by feeding non-conventional concentrate mixture (containing tomato industry waste 23 per cent, babul pod chuni 16 per cent, karanj cake 10 per cent, piludi cake 10 per cent, guar bhardo 10 per cent, molasses 13 per cent and mineral mixture 3 per cent) as compared to conventional concentrate mixture.

(Professor & Head,Dept. of LPM, Vety. College, AAU, Anand)

2. Nutritional survey of Sabarkantha district

In Sabarkantha district, the crossbred cows yielding 6-8, 9-12 and 13-14 kg milk per day respectively, on an average get daily 3.7, 4.4 and 5.4 kg concentrate mixture during summer. In order to fulfill their requirement, the farmers are advised to feed additional compound concentrate mixture 0.6 kg to cows yielding 6-12 kg and 1.0 kg/day to that yielding daily 13-14 kg milk.

3. Nutritional survey of Sabarkantha district

In Sabarkantha district buffaloes yielding 5-7, 7-9 and 10-12 kg milk/day respectively, on an average get daily 3.2, 3.7 and 5.3 kg concentrate mixture. In order to fulfill their nutrient requirement, the farmers are advised to feed additional compound concentrate mixture 0.6, 1.25 and 1.70 kg to buffaloes yielding daily 5-7, 7-9 and 10-12 kg milk during summer and 0.6, 0.8 and 1.0 kg during monsoon, respectively.

4. Improvement of feed resources

Supplementation of 1.0 kg of formaldehyde treated *Guar* meal (bypass protein) replacing 2.5kg concentrate in the ration of buffaloes yielding 7-8 kg milk increased milk fat (0.68%) and fat yield (21%) and resulted in Rs.27.0 more daily return per buffalo.

5. Improvement of feed resources

Supplementation of bypass fat (calcium salts of long chain fatty acids) @ 200 g daily in concentrate mixture to early lactating buffaloes yielding 9-10

kg milk per day increases milk production (4.72 %) and fat (0.75 %) and resulted in Rs.21.0 more daily return per buffalo

6. Use of probiotics in bovines

The inclusion of live yeast (*Saccharomyces cerevisae*) @ 5 g/day in concentrate mixture of growing Kankrej calves resulted in 16% higher growth without any increment in the feed cost.

(Research Scientist, ANRS, Vety. College, AAU, Anand)

VI ANIMAL HEALTH

1. Infertility in cattle

Para-veterinarians and inseminators involved in the breeding activities at the field level should exercise extreme care in location of the external os while performing inseminations, intra-uterine medications and handling of distocia problems to minimize cervical lacerations leading to distortion of cervix.

(Professor & Head, Gynaec. & Obstetrics,Vety College, A.A.U., Anand)

Recommendations for scientific community and entrepreneurs

I CROP PRODUCTION

1. Crop weather relationship of kharif groundnut

i. Robut 33-1 and Cv. GG-2 require total 2225 and 2211 ^{0}C thermal time during *Kharif* season respectively.

ii. The pod development phase (10th WAS in GG-2 and 9th WAS in the Cv Robut 33-1) was found most important for moisture stress. Water stress during this stage had an adverse effect on pod yield of groundnut.

iii. Flowering, pegging and pod development phase of groundnut crop were found to be the most critical for moisture stress under rainfed condition.

iv. Pod yield of groundnut was found most sensitive to temperature during pod development phase of the crop.

(Prof. & Head, Dept. of Agril. Meteorology, BACA, Anand)

II PLANT PROTECTION

PLANT PATHOLOGY

1. Effect of non host crops/resistant varieties on population dynamics of root-knot nematodes in vegetable based cropping system

For the management of root-knot nematodes in sick soil the following rotations were found effective:

First year **:** Okra in *kharif* and tomato in *rabi.*

Second year **:** Root-knot resistant cowpea variety in *kharif* and Root knot resistant tomato variety in *rabi.*

Third year **:** Okra in *kharif* and tomato in r*abi.*

(Professor & Head, Department of Nematology, BACA, AAU, Anand)

2. Screening of promising genotypes of rice for multiple resistance against bacterial blight, blast and sheath rot diseases

Rice entries *viz*., IET-19795, TTB-303-3-2-1, CB-04-08 and IET-18483 have shown multiple resistance against bacterial blight (*Xanthomonas oryzae* pv. *oryzae*), blast (*Pyricularia grisea*) and sheath rot (*Sarocladium oryzae*) diseases under artificial inoculation and high disease pressure conditions in the field. They can be used in breeding program for developing resistant varieties.

(Research Scientist (Plant Pathology), MRRS, AAU, Nawagam)

III BASIC SCIENCE

1. Orobache management in Bidi Tobacco

Fluchloralin or Pendimethalin weedicides @ 1 kg ha^{-1} along with irrigation just before the emergence of Orobanche in the month of December though decreased Orobanche infestation up to 20 per cent, could not help to increase the cured leaf yield of bidi tobacco.

(Research Scientist, B.T.R.S. & Department of Biochemistry, AAU, Anand)

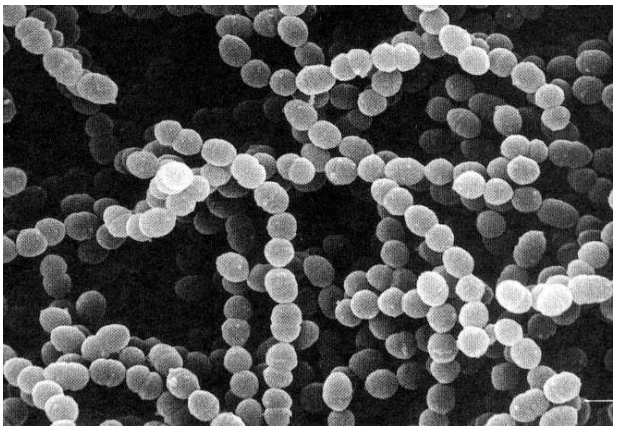
IV DAIRY SCIENCE

1. Standardization of process for manufacture of annatto butter colour

Use of ground nut oil and coconut oil blend in the proportion of 9:1 (w/w) is recommended for manufacture of oil soluble annatto colour for butter.

(Professor & Heas, Dept. of Dairy Chemistry,DSC, AAU, Anand)

2. Standardizing the conditions for freeze drying of dahi cultures



Streptococcus thermophilus MTCC 5460 and 5461 could be preserved with viability above 90% and in active form if freeze dried in presence of glycerol as a cryoprotective agent. Further, it executes sufficient activity up to 9 months at 5± 2°C either in ampoules, laminated pouches or vials.

3. Development of a symbiotic whey drink

Synbiotic paneer whey drink added with orange juice and prebiotic inulin is developed by fermentation of whey with probiotic culture Lb. rhamnosus MTCC 5462 with shelf-life of 28 days at 4±1°C with viable count of the culture above 10^8 cfu/ml.

4. Development of oat based functional fermented product containing probiotic culture and pineapple fruit

A milk based functional fermented probiotic product with oat flour and pineapple fruit is developed by fermentation with probiotic culture Lb. rhamnosus MTCC 5462 with shelf life of 28 days at 4±1°C having viable count of probiotic bacteria above 10^8 cfu/ml.

5. Development of symbiotic lassi with carrot juice

Synbiotic lassi added with carrot juice and oligofructose as prebiotic and fermented by Lactobacillus rhamnosus MTCC 5462 was standardized. The product could be stored in acceptable form up to 28 days at 4 ± 1 °C with viable count of probiotic organism well above 10^8 cfu/ml.

6. Development of probiotic herbal lassi

An acceptable quality herbal probiotic lassi is developed, which could be prepared by incorporating 1% safed mushli (Chlorophytum borivillianum) powder with other ingredients in milk during heat processing and fermenting with mixed culture of Str. thermophilus MTCC 5460 and probiotic Lb. rhamnosus MTCC 5462 with shelf-life of 21 days at 5 ±1 C and probiotic lactobacilli above 10^7 cfu/ ml.

(Professor & Heas, Dept. of Dairy Microbiology,DSC, AAU, Anand)

V ANIMAL PRODUCTION

1. Non-conventional feeds in growing calves

Feeding of non-conventional concentrate mix consisting of tomato industry waste 23 per cent, babul pod chuni 16 per cent, karanj cake 10 per cent piludi cake 10 per cent, rice polish 15 per cent, guar bhardo 10 per cent, molasses13 per cent and mineral mixture 3 per cent has no adverse effect on growth and health of calves.

(Professor & Head, Dept. of LPM, Vety. College, AAU, Anand)

2. Improvement of feed resources

Supplementation of 1.0 kg of formaldehyde treated *Guar* meal (bypass protein) replacing 2.5 kg concentrate alone or with bypass fat (calcium salts of long chain fatty acids) @ 10g /kg milk yield in the ration of

buffaloes yielding 7-8 kg milk for 150 days during early lactation resulted in 2.5 and 16 times reduction in body weight loss, respectively compared to animals kept on farm feeding schedule.

3. Improvement of feed resources

Supplementation of 1.0 kg of formaldehyde treated *Guar* meal (bypass protein) replacing 2.5 kg concentrate in the ration of buffaloes yielding 7-8 kg milk reduces service period (29 days) and number of services per conception (0.84).

4. Improvement of feed resources

Supplementation of bypass fat (calcium salts of long chain fatty acids) @ 200 g daily in concentrate mixture to early lactating buffaloes yielding 9-10 kg milk/day increases unsaturated fatty acids, monounsaturated fatty acids and polyunsaturated fatty acids by 39.56, 37.14 and 90.1 %, respectively in milk fat.

5. Improvement of feed resources

In Dahod district, the supplementation of mineral mixture with zinc and copper in chelated form to anoestrous and repeat breeder buffaloes @ 25g/day for 120 days resulted in incresed pregnancy rates. The concentration of Ca, P, Cu, and Zn in blood plasma improved due to supplementation. However, supplementation in ionic form is cheaper by 40 per cent compared to chelated form.

6. Use of enzymes in bovines and poultry

The inclusion of live yeast (*Saccharomyces cerevisae*) @ 5 g/day in concentrate mixture of growing Kankrej calves resulted in 16 per cent higher growth, improved rumen fermentation, digestibility of nutrients, and feed conversion efficiency without any increment in the feed cost and change in blood glucose, total protein and its fraction and profiles of Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT) and Alkaline Phoshphatase (AKP).

7. Density, diversity and dynamics of ruminal microflora in buffalo

The phylogenetic analysis of 18S rRNA gene sequences of buffalo rumen uncultured protozoa revealed *Entidinomorphs* (75 % colnes) and Holotrich (25 % clones) as major groups. Among *Holotrichs*, majority of clones showed similarity with *Dasytricha ruminantium* and *Isotricha prostoma*. The sequences are available at NCBI, USA with accession No EU345005--EU345176.

8. Density, diversity and dynamics of ruminal microflora in buffalo

Selenomonas ruminantium, Streptococcus bovis and *Anaerovibrio lipolytica* are major tannin tolerant bacteria in goats. Tannins exert detrimental effect on fibrolytic bacteria like *Fibrobacter succinigenes* and *Treponema bryantii.* Total bacterial population is not affected by dietary tannins.

9. Development of area specific mineral mixture

Area specific mineral mixture for Panchmahal district has been formulated to makeup the deficiency when fed @ 30g/head/day to dairy animals in addition to the current feeding practices.

(Research Scientist, ANRS, Vety. College, AAU, Anand)

10. Oocyte recovery from slaughtered buffaloes

In ovaries collected from slaughtered Surti buffaloes during peak breeding season (n=408) gave 0.82±0.04 good quality oocytes and ovaries collected without CL (n=183) gave 1.02±0.07 good quality oocytes, leading to 53.57 % fertilization rate *in-vitro.* For higher oocyte recovery and good quality oocyte for in vitro maturation and fertilization, buffaloes ovaries without CL should be collected during breeding season.

(Research Scientist, RBRU, Vety. College, AAU, Anand)

VI ANIMAL HEALTH

1. Antibactererial activity of extract of *Prosopis juliflora* leaves

Intra-mammary administration of 10 ml of 1 per cent aqueous solution (once a day for 5 days) of alkaloid obtained from chloroform extract of *Prosopis juliflora* leaves is effective in the treatment of sub-clinical mastitis in cattle based on somatic cell count (SCC) and bacteriological examination.

2. Pharmacokinetic interaction and safety of Moxiflaxacin, melaxicam and tolfenamic acid

Intramuscular co-administration of tolfenamic acid (4 mg/kg) or Meloxicam (0.5 mg/kg) along with Moxifloxacin (5 mg/kg) alters pharmacokinetics of each other in rats. Repeated intramuscular administration of Moxifloxacin (5 mg/kg) or Tolfenamic acid (4 mg/kg) and co-administration of Tolfenamic acid (4 mg/kg) with Moxifloxacin (5 mg/kg) once a day for 14 day, was found safe based on the hematological, biochemical and histopathological evaluation in rats.

3. Pharmacokinetic interaction and safety of Levoflaxacin in sheep

Pharmacokinetics of Levofloxacin (3mg/kg, I/V or S/C or Oral) gets altered during febrile condition and co-administration with Ketoprofen (3mg/kg, I/M). Repeated intravenous administration of Levofloxacin (3 mg/kg once a day for 5 days) is safe, however, its repeated co-administration with Ketoprofen (3mg/kg, I/M) causes hepato-nephrotoxicity in sheep.

(Professor & Head, Dept. of Pharmacology, Vety. College, AAU, Anand)

4. Indigenous therapy for Ascariasis in buffalo calves

An ayurvedic paste preparation containing *Indrajawa (Holarrhena antidysentrica)* 10 mg, *Triamana* (*Gentiana kuroo*)20 mg, *Ajwan* (*Carum capticum*)15 mg, *Wavadinga* (*Embelai ribes*)100 mg, Pure Asafoetida 20 mg, Indian aconite (*Aconitum charmanthum*), nagkesar, camphore, seed of *Butea monosperma*, Mushakarni (*Merremai gangetica*) and Brahmi (*Centella asiatica*) 10 mg each.) with excipient of creta preparata is effective against ascariasis affected buffalo calves at a single oral dose rate of 5 gm per 10 kg body weight.

5. Clinico-pathology of calf scour

The serotypes of *E. coli* around Anand area in diarrheic calves are O 56, O 82, O 8 and O 164. VT1 and VT2 are toxin genes of *E. coli* which are more frequent than LT and ST gene while the *E. coli* recovered from healthy calves were absent in the LT gene.

Long acting Enrofloxacin single injection @ 7.5 mg/kg IM is highly effective against these serotypes of *E. coli.*

6. Hepatoprotection in rats

Combination of methanolic extract of the *Phyllanthus niruri* (*Bhoiambli*) and *Eclipta alba* (*Bhangro*) in equal proportion at the dose rate of 100 mg/kg body wt. orally bid. for 14 days has hepatoprotective effect in paracetamol induced hepatotoxicity in rats.

(Professor & Head, Dept. of Vety Medicine, Vety. College, AAU, Anand)

7. Diagnosis of zoonotic diseases

Ampicillin Dextrin Agar (ADA) is having higher recovery rate as compared to Ampicillin Starch DNA Agar and Aeromonas Isolation Agar, hence ADA is recommended as selective agar for the isolation of *Aeromonas* spp. from meat samples.

(Associate Professor & Head, Dept. of VPH , Vety College, AAU, Anand)

8. Differentiation of Aeromonas species by polymerase chain reaction

The following pair of species specific primers can be used for the differentiation of *Aeromonas* species by polymerase chain reaction.

1	*Aeromonas hydrophila*, extracellular lipase gene	Forward: CGTCAAGCTGCCTTACTTCC
		Reverse: AGATTCAGGTACGGTGTCGG
2	*Aeromonas caviae* hemolysin gene	Forward: ATCGTACCCTGGTCAAGACG
		Reverse: CAGTTCCAGTCCCACCACTT
3	A. *sobria* DNA sequence for hemolysin gene	Forward: AGTACGACAAGGCCACCAAC
		Reverse: CCAGTCCCACCACTTCACTT

9. Diagnosis of zoonotic diseases

Dominguez Rodriguez Isolation Agar (DRIA) medium is superior to Polymixin Acriflavin Lithium Chloride Ceftazidime Aesculin Mannitol (PALCAM) agar and Oxford media and hence recommended for the isolation of *Listeria spp.* including *L. monocytogenes* from meat.

Composition of DRIA medium :

Ingredients	g/L
Proteose peptone(HiMedia)	15.00
Peptone(HiMedia)	12.50
Iron (III) ammonium citrate	2.00
Aesculin(HiMedia)	1.00
Sodium chloride	5.00
Disodium phosphate	2.50
Sterile defibrinated sheep blood	50.00 ml
Nalidixic acid (HiMedia)	0.04
Acriflavin hydrochloride (HiMedia)	0.006 g
Agar	15.00
Distilled water	1000ml

(Assoc. Professor, Dept. of VPH , Vety. College, AAU, Anand)

10. Infertility in cattle – Ultra sonography for pregnancy diagnosis

Pregnancy (45 days) in goats could be detected using USG based on observing anechoic fluid filled area, foetal heart beats, presence of cotyledons, presence of foetal parts like vertebral column / rib cage etc. with an accuracy of 91.00 % by 35 days and 100.00 % by 44 days. Therefore, it is recommended that ultra sonography can be used for early pregnancy diagnosis in goats with cent per cent accuracy by 45 days of gestation using 7.5 MHz rectal probe.

(Prof. & Head, Dept. of Gynaec. & Obstetrics, Vety College, AAU, Anand)

11. Research in surgical ailments of livestock

A modification in surgical technique for horn amputation in buffaloes is suggested by taking an additional incision in an oblique slicing fashion parallel to upper cutaneous edge which relaxes the upper skin edge and facilitates primary closure of the wound.

12. Research in surgical ailments of livestock

Indigenously manufactured polymethylmethacrylate (PMMA) lens of 41 Diopter, 6.5 mm optic and 17 mm haptic is compatible for clinical use during extra capsular cataract surgery in dogs.

13. Stent evaluation in rabbits

Ante grade/ transcarotid contra- lateral balloon injured external iliac artery rabbit model is suitable for stent evaluation.

14. Chemical immobilization of stray bulls

Chemical immobilization of stray bulls by blow pipe darting at an approximately 5 meters distance using Xylazine @ 0.2 mg/kg body weight is effective for its uneventful capture.

(Professor of Surgery and Radiology, Veterinary College, A.A.U., Anand)

VII SOCIAL SCIENCE

1. Scale to measure the risk orientation in agriculture and allied fields

In following table is recommended for the researchers of Social Science. The reliability during last year (2008-2009) was found 0.73. After lapse of one year (2009-2010) coefficient of reliability was measured on 30 respondents of Agriculture College, which was found 0.78 this year.

Sr.	Statements for final scale
1 +	I am confident on my ability to take challenges for any type of agricultural risk.
2 -	I don't like to use any agricultural risk creating methods.
3 +	I am ready to bear risk for high profit in agriculture.
4 +	I like to take challenge in adopting costly agricultural methods.
5 -	I like to follow only those methods which are successfully accepted by other farmers.
6 +	I feel people with intended risk bearing capacity are always stepping the top.
7 -	I feel fear that something unexpected might damage my plans of adopting new agricultural technology.
8 +	I can minimize the consequence of risk in agriculture by proper planning.
9 +	I can reduce the effect of any risk in agriculture by proper execution.
10 +	I feel that accepting realistic risk in agriculture is not always hazardous resolution.

Scoring Technique: The responses should be collected in the five continuums *viz.* strongly agree, agree, undecided, disagree and strongly disagree and scores of 5, 4, 3, 2 and 1 will be assigned for positive statements, respectively. The reverse scoring will be given for negative statements. To know the level of risk orientation score of each statement will be summed up.

(Professor & Head, Department of Ext. Education,BACA, AAU, Anand)