



# RESEARCH ACCOMPLISHMENTS AND RECOMMENDATIONS 2009



NAVSARI AGRICULTURAL UNIVERSITY



DIRECTORATE OF RESEARCH  
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NAVSARI - 396 450 (GUJARAT)

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### **MESSAGE**

Due to consistent increase in the cost of inputs, agriculture is becoming less and less remunerative and profit margin of the farmers is declining. Therefore, there is urgent need to evolve strategies to make agriculture truly globalized, emphasizing on pro-poor techniques and technology to meet the challenges of small farmers and also take advantage of opportunities and challenges of post WTO regime. Moreover, to be globally competitive, cost efficiency and production efficiency in agriculture need to be enhanced. I am extremely happy that our Scientists have worked hard and evolved technologies which will help enhance profitability of the farmers by improving productivity with superior quality in demand.

I take this opportunity to convey my heartiest appreciations and congratulate them for evolving need based relevant cost effective technologies and Director of Research and his team for compiling the recommendations in the form of a booklet. I am sure, this will serve as a ready reference for the officials of line Department, scientists, students and planners.

**(H.C. Pathak)**  
**I/c Vice-Chancellor &**  
**Director of Research**

Navsari  
January 27, 2010





## **RESUME**

The meetings of different Sub-committees of Agricultural Research Council of NAU were held during February-April, 2009 to discuss the proposals of the recommendations to the farmers and to formulate new research programmes. The Joint Agresco of Navsari Agricultural University was held on 7 April, 2009 wherein proposed recommendations were presented by the concerned Convener/Scientist and after thorough discussion, the recommendations for farming community were finalized.

The details of different Sub-committees, conveners and dates of meeting held are as under :

<b>Sr. No.</b>	<b>Name of the Sub-committee</b>	<b>Name of the Convener</b>	<b>Meeting held on</b>
1.	Crop Improvement	Dr. B.D. Jadhav	17-18 March, 2009
2.	Natural Resource Management	Dr. R.G. Patil	5-6 April, 2009
3.	Horticulture & Agro-forestry	Dr. N.S. Patil	3-4 March, 2009
4.	Plant Protection	Dr. M.B. Patel	3-4 March, 2009
5.	Agricultural Engineering	Prof. S.P. Shukla	17-18 March, 2009
6.	Basic Science	Dr. V. Kumar	5-6 April, 2009
7.	Social Science	Dr. R.D. Pandya	12-13 Feb., 2009
8.	Animal Science & Fisheries	Dr. V.B. Kharadi	12-13 Feb., 2009



The recommendations for farmers and scientific communities were approved in the Fifth Combined Joint Agresco meeting of SAUs held at SDAU, Sardarkrushinagar during 20-22 April, 2009.

### Recommendations approved for Farmers and Scientific Community

Sr. No.	Discipline	No. of Recommendations	
		Farmers	Scientific community
1.	Crop Improvement	1	-
2.	Natural Resource Management	14	4
3.	Horticulture & Agro-forestry	9	-
4.	Plant Protection	3	4
5.	Agricultural Engineering	1	-
	<b>Total ...</b>	<b>28</b>	<b>8</b>

## Recommendations for Farmers

### CROP IMPROVEMENT

#### 1. Nagli : Gujarat Nagli-5

The variety GN-5 has been developed through selection from local germplasm collected from Dangs district. It registered 24.89% and 18.92% yield superiority over, GN-3 and GN-4, respectively. It has white and bold grains with superior nutritional value. This variety is less



susceptible to pests and diseases. It is moderately resistant to leaf blast and resistant to neck and finger blast. The variety Gujarat Nagli-5 is recommended for hilly regions of Dangs and Valsad districts of South Gujarat.



## II NATURAL RESOURCE MANAGEMENT

### [A] Cultural practices

#### 1. Feasibility of SRI method of paddy cultivation in monsoon season

The farmers of South Gujarat Heavy Rainfall Zone (AES-III) growing *kharif* paddy are advised to transplant 20 days old seedlings at a spacing of 20 cm x 25 cm for securing higher yield and net profit.

#### 2. Effect of land configuration and methods of sowing on performance of salicornia (*Salicornia bigelovii* Torr) - vegetable purpose



The farmers of coastal areas of South Gujarat Heavy Rainfall Zone (AES-IV) having waste land in the vicinity of sea are advised to cultivate salicornia. They are recommended to

broadcast salicornia seeds on dry raised bed for getting higher yield and net profit.

#### 3. Performance of *rabi* castor hybrids under different dates of sowing

The farmers of AES-III of South Gujarat Heavy Rainfall Zone growing castor after paddy are advised to prefer castor hybrid GCH-5 and sow the crop during second fortnight of October to first fortnight of November to secure higher yield and net income.

#### 4. Effect of depth of tillage and land configuration on yield of G.Cot.Hy-12 under rainfed conditions

The farmers of South Gujarat (Zone-II) growing rainfed cotton (G.Cot.Hy-12) are advised to plough their field 20 cm deep before monsoon and to adopt ridges and furrow method of sowing for getting higher seed cotton yield.

### [B] Nutrient management

#### 1. Effect of NPK levels on green fodder yield of hybrid Napier Cv. Co-3

Farmers of South Gujarat Heavy Rainfall Agro-climatic Zone (AES-III) growing fodder hybrid Napier grass (Cv. Co-3) are advised to apply 900 kg N/ha along with 60 kg/ha each of  $P_2O_5$  and



$K_2O$  every year for getting higher green fodder yield of Napier grass. They are advised to apply full dose of P and K along with 100 kg N/ha as basal dose. The remaining N is to be applied in eight equal splits after each cutting, besides the application of FYM @ 20 t/ha every year as common practice.

#### 2. Enrichment of FYM (cattle dung)

Farmers of South Gujarat can prepare enriched FYM of different grades within 45-50 days through microbial



consortium composting process using dung, waste/by-products of wheat, pigeonpea and Indian bean, leaves/twigs of gliricidiya, subabul and sunhemp, rock phosphate, animal urine, castor cake,



FYM and soil by adopting following ratio of raw materials.

Quality of enriched FYM	Ratio and Raw materials	C:N ratio
First grade	50:25:5:10:5:3:2 {Dung : (leaves/twigs of Subabul + Sunhemp) : Rock phosphate : animal urine : castor cake : FYM : soil}	12.5
Second grade	50:25:5:10:5:3:2 {Dung : (waste/by-product of Pigeonpea + Indian bean) : Rock phosphate : animal urine : castor cake : FYM : soil}	14.7
Third grade	50:25:5:10:5:3:2 {Dung : (waste/by-product of wheat straw) : Rock phosphate : animal urine: castor cake : FYM : soil}	22.5
Fourth grade	100% Dung (control)	26.0

#### **Procedure for preparation of enriched FYM from dung :**

Enrichment of dung can be done in pit-cum-heap method maintaining a ratio of raw materials given as above. Make a pit-cum-heap of approximately 3 m length x 2 m width x 1 m height size. The entire pit should be sufficiently moistened with water. Then raw materials (chopped to about 2-3 cm size) are to be spread in layer form right from the bottom of the pit. Each layer of raw material should be of about 5 cm height. After spreading each layer, material should be properly moistened with water taking sufficient

time to allow the material to soak water. Subsequently, active Effective Microorganism-1 (EM-1) spraying solution [EM-1 stock solution is to be prepared by mixing in 1 litre EM-1 mother solution with 2 kg jaggery and 17 litres water in 20 litres capacity plastic container. The container is to be filled completely with water so that no air is left inside and is to be kept in dark for 7 to 10 days till whitish yeast starts appearing. Spraying solution of EM-1 can be prepared by taking 170 ml stock solution with 100 g jaggery and making up to 10 litres] is to be sprayed on the material thoroughly so as to moisten the whole material properly. Then, second and other layers are to be imposed following the same procedure. Throughout the composting period, 50-55% moisture level is to be maintained. Normally 4-6 such layers can serve the purpose of making enriched material. Pit-cum-heap should be covered with gunny bags to avoid nutrients losses. Material (dark brown to black in colour) becomes ready for harvesting after 45-50 days.

#### **3. Integrated nutrient management in cotton (G.Cot.Hy-12)**

The farmers of South Gujarat (Zone-II) growing cotton (G.Cot.Hy-12) are advised to apply 75% RDN (180 kg N through urea) + 25% N through castor cake (1.2 t/ha) to obtain higher seed cotton yield and maintain soil fertility.

#### **4. Phosphorus management in green manure-sugarcane cropping sequence**

The farmers of AES-I of South Gujarat (Zone-II) following green manure-sugarcane sequence are advised to apply either pressmud @ 15 t/ha alone or rock phosphate @ 0.5 t/ha + PM @ 10 t/ha prior to green manuring with *dhaincha* for getting 24% higher cane yield and 14% net



return as compared to without green manuring. Further, they are recommended to apply 50% RD of P + phosphorous solubilizing bacteria culture (PSB) for getting higher yield and net return.

#### 5. Integrated nutrient management in Nagli GN-4 (WN-228) under rainfed condition

The farmers of AES-I of South Gujarat Heavy Rainfall Zone growing nagli, GN-4 (WN-228) are advised to apply N @ 40 kg/ha + FYM @ 10 t/ha along with *Azotobacter* @ 4 kg/ha besides basal application of  $P_2O_5$  @ 20 kg/ha for higher production.

### [C] Water management

#### 1. Response of graded levels of fertilizer in presence and absence of gypsum by garlic under mini sprinkler irrigation



The farmers of South Gujarat Heavy Rainfall Zone (AES-III) growing garlic after *kharif* paddy are advised to adopt minisprinkler method of irrigation and apply N as urea @ 80% RD (80 kg / ha ) through minisprinkler in five equal splits at an interval of 10-12 days starting from 15 days after sowing. They are further recommended to apply gypsum @ 2 t/ha for improving soil physical conditions. Adoption of this technology enables farmers to save 20% irrigation water and gives higher bulb yield.

The system details are :

Minisprinkler spacing	=	2.5 m x 2.5 m
Application rate	=	12.8 mm/hr
Operating pressure	=	1.4 kg/cm <sup>2</sup>
Operating time	=	4 hr/irrigation
Irrigation depth	=	50 mm
Irrigation interval	=	▪ November to January 10 days ▪ February to harvest 8 days
Coefficient of uniformity	=	76.4%

#### 2. Study on saline water usage in brinjal (*rabi*)-paddy (*kharif*) sequence



Brinjal with Mulch



Paddy followed by Brinjal

The farmers of AES-III of South Gujarat Heavy Rainfall Zone growing brinjal in paired row during *rabi* season using saline water (up to 4 dS/m) for irrigation through drip are advised to mulch their crop either with sugarcane trash or black plastic (25 micron, 50% coverage) for getting higher fruit yield (17%) and net profit (10-11%) as compared to no



mulch treatment. Irrigation with saline water should be started at 30 or 45 days after transplanting of brinjal. After brinjal, they should grow transplanted paddy during *kharif* for minimizing deleterious effects of saline water usage on soil salinity/sodicity parameters. However, it is advisable to apply gypsum @ 50% of gypsum requirement once in 2 to 3 years to minimize rise in ESP.

### 3. Irrigation and planting management in *rabi* castor

The farmers of South Gujarat Zone-II (AES-I) are advised to grow *rabi* castor in paired row planting (60 cm x 60 cm x 120 cm). They should adopt drip method of irrigation (0.4 PEF) along with mulching with black plastic (56% coverage) for getting higher seed yield and net profit besides 39% saving in water.

The system details are :

Lateral spacing	=	1.8 m
Dripper spacing	=	1.2 m
Dripper discharge	=	8 lph
Operating pressure	=	1.2 kg/cm <sup>2</sup>
Operating time	=	▪ November to January : 40 to 60 minutes at alternate days ▪ February to harvest : 60 to 100 minutes at alternate days

### [D] Weed management

#### 1. Response of *rabi* green gram (*Vigna radiata* L.) to weed management under South Gujarat condition

The farmers of South Gujarat Heavy Rainfall one (AES-III) are advised to keep *rabi* green gram crop weed free by two hand weedings at 20 and 40 days after sowing

to obtain higher yield of *rabi* green gram (Cv. Co-4). Under the situation of shortage of labourers, they can adopt pre-emergence application of pendimethalin @ 0.75 kg/ha coupled with one hand weeding and hoeing at 40 days after sowing.

#### 2. Weed management in mango seedling nursery

The farmers of South Gujarat Heavy Rainfall Zone (AES-III) raising mango seedlings are advised to apply either atrazine or pendimethalin @ 2 kg/ha as pre-emergence in 500 litres of water/ha or mulching with paddy straw @ 10 t/ha or interculturing at 30, 60 and 90 days after sowing to keep mango seedling nursery weed free thereby fetching higher returns and healthy seedlings.

## III HORTICULTURE AND AGRO-FORESTRY

### [A] Fruit crops

#### 1. Effect of biofertilizers on growth, yield and quality of banana Cv. Grand Nain

The farmers of South Gujarat Heavy Rainfall Zone-I, AES-III growing banana Cv. Grand Nain under clay loam soils are recommended to apply 50 g *Azospirillum* per plant at two months of planting along with 100% recommended dose of fertilizers (10 kg FYM + 200 g nitrogen + 90 g phosphorus + 200 g potash) to get 16.86% higher yield over control.

#### 2. Intercropping trial in banana Cv. Grand Nain

The farmers of South Gujarat heavy rainfall zone-I, AES-III growing banana Cv. Grand Nain at 1.8 m x 1.8 m





spacing under clay loam soil are recommended to grow cabbage Cv. Golden Acre planted at 45 cm x 30 cm as an intercrop, at early growth stage of banana planted in late *kharif*, to get higher income.

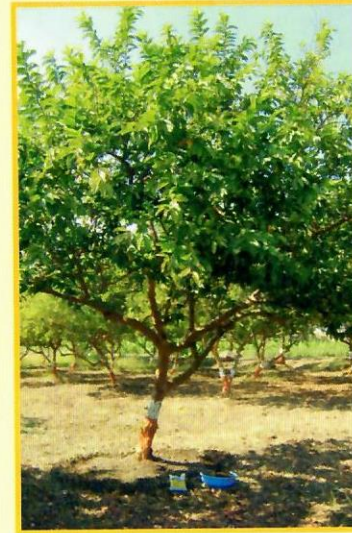
### 3. Mixed planting with other mango varieties in Alphonso



The farmers of South Gujarat Heavy Rainfall Zone-I, AES-III desiring to establish new orchard of mango Cv. Alphonso are advised to plant a filler tree of Cv. Neelphonso in the centre of regularly planted four Alphonso

trees at 10 m x 10 m spacing upto 12 years of age for getting higher net realization and BCR.

### 4. Feasibility of organic farming in guava (*Psidium guajava* L) Cvs. Allahabad Safeda and Sardar



The farmers of South Gujarat Heavy Rainfall Zone-I, AES-III desiring to grow guava organically are advised to grow Sardar (L-49) variety. They are advised to apply FYM @ 60 kg/tree (equal to 500 g Nitrogen/tree) alongwith bio-fertilizer 100 g/tree each of Azatobacter and PSB after mrig bahar treatment for getting higher net realization.

### 5. Induction of early flowering in mango through chemicals

The farmers of South Gujarat Heavy Rainfall Zone-I, AES-III are advised to drench Paclobutrazol at 5 g a.i./tree (Cultar 20 ml/tree) in mid of July in more than 35 years old mango Cvs. Alphonso, Kesar and Rajapuri to obtain early flowering, higher net realization and BCR.





## 6. Effect of post shooting treatments on yield, quality and maturity of banana (*Musa paradisiaca* L.) cv. Grand Nain

The farmers of South Gujarat Heavy Rainfall Zone-I, AES-III growing banana Cv. Grand Nain, are advised to spray GA<sub>3</sub> (100 mg/litre) on banana bunch after complete opening and covering the bunch with blue polyethylene sleeve (50 micron) for better quality, higher production and net return.



## 7. Performance study of newly released mango hybrids



Amrapali Mallika

The farmers of South Gujarat Heavy Rainfall Zone-I, AES-II are advised to include regular bearer mango hybrids Amrapali and Mallika in their new orchards to get higher net return after Kesar and Alphonso.

## 8. Testing of promising mango hybrids

The farmers of South Gujarat Heavy Rainfall Zone-I, AES-II are advised to include regular bearer mango hybrids Sonpari and Neelphonso in their new mango orchards to get higher net return after Kesar and Alphonso.



Sonpari Neelphonso

## [B] Flower crops

### 1. Effect of different harvesting stages and chemical preservatives on vase life of Golden rod (*Solidago canadensis* L.)



The flower growers of Gujarat are advised to harvest Golden rod panicles at fully mature unopened stage to obtain better vase life. Further, the vase solution treatment of 0.02% 8-HQ (200 mg/litre) with 2% sucrose (20 g/litre) can be used to further improve the over all flower quality and vase life upto to 11 days.

## IV PLANT PROTECTION

### [A] Agricultural Entomology

#### 1. Monitoring of resistance levels in *Tetranychus macferlanei* on okra to dicofol by dip method

Farmers of South Gujarat Heavy Rainfall Zone (AES I to IV) are advised to avoid use of dicofol 18.5 EC to control okra mite (*Tetranychus macferlanei*) as this mite species has developed



resistance against it. The farmers may use other recommended acaricides to control okra mite.



## 2. Studies on varietal preference of mulberry in silkworm



**Larvae Feeding on Mulberry Leaves**

Farmers of South Gujarat Heavy Rainfall Zone (AES I to IV) are advised to rear silkworm race, Nistari x NB4D2 on mulberry varieties S-1635 or TR-10 or K-2 for higher production of silk.

## 3. Studies on preference of eri silk worm *Philosamia ricini* Hutt. to different varieties of castor

Farmers of South Gujarat Heavy Rainfall Zone (AES I to IV) are advised to rear eri silkworm on leaves of castor hybrids, GCH-5 or GCH-4 to obtain higher eri silk.



**Rearing  
on GCH-5**

**Rearing  
on GCH-4**

## V AGRICULTURAL ENGINEERING

### 1. Irrigation of new mango plantation through oozy pipe by low head solar pumping system

The farmers of South Gujarat Agro-climatic Zone (AES-III) growing mango (Kesar) young plantation are advised to adopt Oozy pipe irrigation system at 0.9 PEF for achieving better growth. The pipes (16 mm ID) should be placed at 2 m away from trunk, around the tree, at 20 cm below ground level and operated at 0.4 kg/cm<sup>2</sup>. During establishment stage of mango, i.e., 1, 2 and 3 years, apply 36, 140 and 160 litres of water on alternate day, respectively. During fruiting stage of mango (4, 5 and 6 years age), apply 156, 160 and 200 litres of water per tree on alternate day, respectively.



# Recommendations for Scientific Community

## I NATURAL RESOURCE MANAGEMENT

### 1. Nutrient, pseudo stem and sucker management in ratoon banana under drip irrigation

For obtaining higher fruit yield of ratoon banana, it is necessary to apply 100% of RDF along with retaining mother pseudostem as such and adopting chemical desuckering practice.

### 2. Economics of drip irrigation in sugarcane and banana - a survey

- The magnitude of net profit realized by the sugarcane and banana farmers empathetically proves the economic viability of DIS under farmers' fields situation.
- Some of the important suggestions given by the farmers based on their experiences may form basis for taking policy decisions by Government of Gujarat as well as Government of India.
- For enhancing know-how of the DIS, there is need to train the farmers.



### 3. Adoption of drip/sprinkler in potato - a survey

- In potato, sprinkler system is preferred over drip system in North Gujarat.



- There is need to maintain recommended plant population.
- There is need to train the farmers.
- This survey needs to be repeated after 2/3 years.

### 4. Impact of trainings given by SWMRU, Navsari

- There is need to train the farmers in depth about improved technologies to be adopted by them.
- In order to cover large number of farmers, there is need to do Human Resource Development, minimum at district level.
- The pattern of adoption of technology is drip > drainage > sprinkler > green house & mulching.
- The extent of adoption of technology in different zone after training is South Gujarat > Kutch > North Gujarat > Saurashtra > middle Gujarat.



## II PLANT PROTECTION

### [A] Agricultural Entomology

#### 1. Screening of mango germplasm against pests of mango

The mango hybrids viz., A.U. Rumani, Neelgoa, Arka Punit, Neleshan Gujarat and Mehmood Bahar, and cultivars viz., Calcutta Langra, Dilpasand, Dilrajan, Gandevi



Selection-I & II, Khandesi Borasio and Police have been found less susceptible to hopper, thrips, leaf miner, leaf gall midge, inflorescence midge, shoot borer and fruit fly.

## **[B] Plant Pathology**

### **1. Screening of banana varieties/germplasm against foliar diseases**

Banana cultivars viz., Karimni Kadali, Lalkel, Ladan, Bunkel, Abhar Velchi, Niyuran, Terabun, Nikhanka, Pocha Kunnan, Mutheli, Champa Dhati, Red Banana, and Poovan were found moderately resistant to leaf blight caused by *Deiightonella torulosum* whereas Terabun, Nikhanka, Pocha Kunnan, Mutheli, Champa Dhati and Red Banana, were found resistant and Karimni Kadali, Lalkel, Ladan, Bunkel, Abhar Velchi, Niyuran and Poovan were found moderately resistant to leaf spot disease caused by *Cercospora musae*.

### **2. Screening of sugarcane varieties/clones against wilt and red rot**

Sugarcane varieties/clones viz., CoS 767, 94-764, 2001 N 343 and CoM 0259 were found moderately resistant to red rot and wilt diseases.

### **3. Screening of mango germplasm against powdery mildew**

The mango cultivars viz., Totapuri, Totapuri Small Red, Mehmuda, Lohra and Olour were found resistant against powdery mildew disease.