



# RESEARCH ACCOMPLISHMENTS AND RECOMMENDATIONS 2016



Navsari Agricultural University  
**DIRECTORATE OF RESEARCH**  
**NAVSARI AGRICULTURAL UNIVERSITY**  
NAVSARI - 396 450 (GUJARAT)



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**NAUROJI**  
**NOVEL**  
**Banana Pseudostem Based**  
**Organic Liquid Fertilizer**

નોનોરોજી  
**નોવેલ**  
**ફળનાં યડમાંથી બનાવેલ સેન્ટ્રિય પ્રવાહી ખાતર**

**ADVANTAGES**

- It is pure organic product.
- It contains NPK as well as micro nutrients.
- It contains naturally occurring growth promoters.
- It is a growth promoter, it is very helpful in nursery plants.
- It enhance total plant growth, number of flower, maximum conversion of flowers into fruits and pods
- Enhance vigorous root development and growth

**ફાયદાઓ**

- સંપૂર્ણ સેન્ટ્રિય પ્રવાહી ખાતર છે.
- નાઈટ્રોજન, ફોસ્ફરસ, પોટાશ ઉપરાંત શુદ્ધ તત્વો પણ ધરાવે છે.
- કુદરતી રીતે પેદા થતાં વૃદ્ધિવર્ધક ધરાવે છે.
- જુદા જુદા પાકમાં ફુલ, ફળ અવરથાએ છંટકાવ કરવાથી ઉત્પાદન વધે છે.
- વૃદ્ધિવર્ધક હોય નર્સરી તબક્કા માં છોડને વૃદ્ધિ અને વિકાસ ઝડપી થાય છે.

**ઉત્પાદક અને વિહેતા**  
**બનાના સ્યુડોસ્ટેમ પ્રોસેસીંગ યુનિટ**  
**જળ અને જમીન વ્યવસ્થાપન સંશોધન એકમ**  
**નવસારી કૃષિ યુનિવર્સિટી, નવસારી. ફોન : ૦૨૬૩૭-૨૯૨૧૦૩**



**NAUROJI SEEDS** **NAUROJI SEEDS**

**યુનિવર્સિટી દ્વારા બહાર પાડવામાં આવેલ જુદા જુદા પાકોની નવી જાતોની ઉપલબ્ધતા**  
**Availability of new varieties seeds of different crops produced by the University**

<p>૧. ડાંગર :- એન.એ.સુ.આર.-૧, જી.એન.આર.-૨, જી.એન.આર.-૩, જી.એન.આર.-૪, પુર્વા          ૨. સુભાર :- જી.સી.-૩૮, જી.સી.-૩૯, સી.એચ.વી-૨૧ એક (સાચવાર માટે)          ૩. નાનાલી :- જી.એન.-૩, જી.એન.-૫, જી.એન.એન.-૬          ૪. વરી :- જી.વી.-૧, જી.વી.-૨,          ૫. ખરસાણી :- જી.એન.-૨          ૬. તુવેર :- વૈશાલી, જી.ટી.-૧૦૨, સી.ડી.એન.-૧૧૧          ૭. અમ :- સી.એ.-૪, જી.વી.એમ.-૧          ૮. પાપડીલાલ :- જી.એન.આઈ.વી.-૨૧, જી.વાલ-૧, જી.વાલ-૨,          ૯. સપાસ :- જી.સી.દ. હાઈલીક-૬, જી.સી.દ. હાઈલીક-૮, જી.સી.દ. હાઈલીક-૧૦,          જી.સી.દ. હાઈલીક-૧૨(વી.જી.-II), જી.સી.દ.-૨૦, જી.એન.સી.દ.-૨૫          ૧૦. હળદર :- જી.એન.ટી.-૧          ૧૧. શેરડી :- જી.એસ.-૪, જી.એસ.-૫, જી.એસ.-૬, જી.એસ.-૭, જી.એસ.-૮</p>	<p>1. Paddy:- NAUR-1, GNR-2, GNR-3, GNR-4, Purna          2. Sorghum:- GI-38, GI-42, CSV-21-F          3. Finger millet:- GN-4, GN-5, GNN-6          4. Little millet:- GV-1, GV-2          5. Niger:- GN-2          6. Pigeonpea:- Vaishali, GT-102, BDN-711          7. Mungbean:- CO-4, GBM-1          8. Indainbean:- GNIB-21, G.Wal-1, G.Wal-2          9. Cotton:- G.Cot.Hy.-6, G.Cot.Hy.-8, G.Cot.Hy.-10, G.Cot.Hy.-12(BG-II),          G.Cot.-20, G.N.Cot-25          10. Turmeric:- GNT-1          11. Sugarcane:- GS-4, GS-5, GS-6, GS-7, GS-8</p>
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**ખાસિયતો** જાતીનીક શુદ્ધ અને ઉચ્ચ ગુણવત્તાયુક્ત બિયારણ  
 વૈજ્ઞાનિક અભિગમથી તૈયાર કરેલ પ્રમાણીત બિયારણ

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**" Our Mission is accelerating Agricultural productivity and production for improving the viability of agriculture "**

**ઉત્પાદક અને વિહેતા**  
**નવસારી કૃષિ યુનિવર્સિટી**  
**નવસારી - ૩૯૬ ૪૫૦**  
 ફોન નં :- (ઓ). ૦૨૬૩૭-૨૯૨૧૦૩

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## **MESSAGE**

Research is one of the important mandatory work of the University. As we all know that presently whole world faces the problems of climate change and other global warming effects. The new technologies needs to be promoted in a big way in coming years to sustain against these global challenges. To sustain agriculture against global changes we require to develop new technologies especially new varieties which perform well in changing environment and other technologies like water management, nutrient management, crop sequencing, pest management drought resistant etc. Scientists of the Navsari Agricultural University have been continuing their research work on this direction to sustain agriculture against global challenges. I appreciate the efforts made by the Scientists of the University who contributed significantly for developing new technologies.

Compilation of these technologies in the form of a booklet "Research Accomplishments and Recommendations-2016" would serve as a ready source of information to guide the extension agencies, scientists, entrepreneurs and farmers of the region.

I heartily congratulate Dr. A. N. Sabalpara, Director of Research and Dean P.G. Studies, N.A.U., Navsari and his team for nicely compiling and publishing this booklet.

**Navsari**

**(C. J. Dangaria)  
Vice- Chancellor**



Navsari Agricultural University

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## **FOREWORD**

It is a matter of great pleasure for me to highlight the research work carried out by scientists of the University during 2015-16. This booklet contains latest technologies developed by the NAU scientists for the benefit of farmers, scientists, veterinary/ dairy professionals, extension workers and entrepreneurs through inputs of agricultural and related technologies. I congratulate all the scientists who directly or indirectly involved in generating the new high yielding varieties, economically viable production technologies for various field crop and horticulture crops as well as in the field of agricultural engineering, post harvest and veterinary science. I am also thankful to all the conveners of respective sub-committees of Agricultural Research Council of Navsari Agricultural University and staff members of Directorate of Research, N.A.U., Navsari for preparation of this booklet.

I express my sincere thanks to the Hon'ble Vice Chancellor Dr. C. J. Dangaria, for his constant guidance and useful inputs in improving the research outcome of NAU.

I hope that this booklet will be highly useful for those associated with agriculture and its allied fields. The technologies developed will definitely help to improve the agricultural production and welfare of the farming community of the state.

**Navsari**

**(A. N. Sabalpara)  
Director of Research**



**Navsari Agricultural University**



## RESEARCH RESUME

The research work carried out in different fields of agricultural sciences during the year 2015-16 has been very well discussed by different AGRESKO sub-committees of Navsari Agricultural University, Navsari for bring out useful and beneficial recommendations for farmers and scientific community. Finally, 60 and 23 recommendations for farmers and scientific communities, respectively were approved in the 12th Combined Joint AGRESKO meeting of SAUs and Kamdhenu University held at NAU, Navsari during on 11-13 April, 2016.

Location specific and economically viable production technologies were recommended by NRM group that covered various aspects like intercropping, cultural practices, nutrient management, and water management in different crops.

In the pursuit of increasing fruits, vegetables and flower production, recommendations emerged out were nutrients management, effects of organic manures for organic cultivation, Macro propagation technique for banana, Fertigation method, relay cropping, effect of bio fertilizers, value addition of different products, intercropping.

The achievements of plant protection group include biological control and chemical control of disease and pest management, residue analysis of different pesticides etc.

Design development of low cost solar solar still, effect of lesser land leveling on crop water requirement, effect of drainage on banana production and method of preparation of RTS (beverage from banana) has been recommended by Argil. Eng. Group of NAU for the benefit of farmers.

Bypass fat supplementation effect on lactating buffalo; effect of rubber mat bedding on crossbreed cow; effect of supplementation of yeast on average daily growth, feed conversion ratio and cost economics in Surti goat kids;

medical and surgical management of corneal affections in canines were recommended by Animal production and fisheries / Animal health group for achieving better growth and more economical returns.

The details of different sub-committees, conveners, date of meeting held and number of approved recommendations for farmers and scientific communities are as under.

Sr. No.	Name of the Sub-Committees	Name of Convener	Date of meeting	No. of Recommendations	
				Farmers	Scientific community
1.	Crop Improvement	Dr. B. G. Solanki	4-5/03/2016	14	0
2.	Natural Resource Management	Dr. J. G. Patel	16-17/03/2016	15	3
3.	Horticulture and Agro-forestry	Dr. B. R. Parmar	10-11/03/2016	18	2
4.	Plant Protection	Dr. Z. P. Patel	29/02/2016 & 01/03/2016	03	13
5.	Agril. Engineering	Dr. N. M. Shah	23/02/2016	4	1
6.	Basic Science	Dr. R. M. Patel	20/02/2016	0	0
7.	Social Science	Dr. NarendraSingh	17/02/2016	0	0
8.	Animal Production and Fisheries Science	Dr. V. B. Kharadi	15/02/2016	5	3
9.	Animal Health	Dr. R. M. Patel	16/02/2016	1	1
10.	Joint AGRESCO		22/03/2016		
11.	Combined Joint AGRESCO		11-13/04/2016		
		<b>Total</b>		<b>60</b>	<b>23</b>

## RECOMMENDATIONS FOR FARMERS

### CROP IMPROVEMENT

#### 1. Cotton: Gujarat Cotton Hybrid-10 (G.Cot.Hy.10 BG-II)

##### (Endorsement)

Cotton hybrid G.Cot.Hy-10 (BG-II) recorded 2109 kg/ha seed cotton yield which was 92.1 % and 10.7 % higher over its non Bt counterpart and zonal check RCH-2 (BG-II), respectively. The hybrid possesses staple length of 28.8 mm with good uniformity (48), average fineness (4.2 mv), medium fibre strength (22.6 g/tex) and good maturity (0.84). G.Cot.Hy-10 (BG-II) recorded below

ETL population for major sucking pest. Hybrid was found moderately resistant to bacterial leaf blight and alternaria leaf spot diseases and free from grey mildew. Hybrid G.Cot.Hy-10 (BG-II) is recommended for irrigated and rainfed areas of Gujarat.

(Research Scientist (Cotton), MCRS, NAU, Surat)

#### 2. Cotton : Gujarat Cotton Hybrid-12 (G. Cot. Hy. 12 BG-II)

##### (Endorsement)

Cotton hybrid G.Cot.Hy-12 (BG-II) recorded 2115 kg/ha seed cotton yield which was 46.6 % and 11.1% higher over its non Bt counterpart and zonal check RCH-2 (BG-II), respectively. The hybrid had comparatively bigger boll size (4.4 g) with good opening and stay green character. Hybrid had staple length of 28.1 mm with good uniformity (47), average fineness (4.2 mv), medium fibre strength (21.7 g/tex) and good maturity (0.84). G.Cot.Hy-12 (BG-II) recorded below ETL population

of major sucking pest and moderately resistant to bacterial leaf blight and alternaria leaf spot diseases and free from grey mildew. Hybrid G.Cot.Hy-12 (BG-II) is recommended for irrigated and rainfed areas of Gujarat.

(Research Scientist (Cotton), MCRS, NAU, Surat)



### 3. Rice : Gujarat Navsari Rice-5 (GNR-5)

The new variety of rice was derivatives of Jaya x GR-6. It has recorded grain yield of 5791 kg/ha which was 13.5 % and 21.4 % higher than checks Dandi and NAUR-1, respectively. GNR-5 possessed easy threshability compared to checks. GNR-5 performed very well in the coastal salt affected soils of Umbharat - Danti in South Gujarat and inland saline areas of middle Gujarat. The new variety was superior over check Dandi with respect to pest and



disease reaction. It was also found better in quality traits including HRR % than Dandi. The new variety GNR-5 possess 6.83 mm kernel length (long) with the kernel width of 1.72 mm having the L/B ratio of 3.97 categorizing as long slender grain. Rice variety GNR-5 recommended for salt affected rice growing areas of Gujarat.



(Assoc. Res. Scientist, MRRC, NAU, Navsari)

### 4. Rice: Gujarat Navsari Rice-6 (GNR-6)

Rice variety GNR-6 (NVSR-2031) developed from cross IR-28 x NAUR-1 which recorded 4046 kg/ha grain yield which was 8.5% higher than check IR 28 in overall performance. The variety has recorded 4152 kg/ha grain yield which was 12.5% higher than check IR 28 in South Gujarat condition. The variety is moderately resistant to major pest and diseases and better than check IR-28. Variety GNR-6 has long slender grain with better HRR %. Variety GNR-6



recommended for South Gujarat very specific rainfed transplanted (RFTP) condition.

(Assoc. Res. Scientist, RRRS, NAU, Vyara)

### 5. Rice: Gujarat Navsari Rice Hybrid-1 (GNRH-1)

GNRH-1 (NVSR-H-1003) is the first rice hybrid of Gujarat. The proposed hybrid has recorded 5077 kg/ha grain yield, which was 10.1% and 17.1 % higher over GR 7 and a popular hybrid Suruchi 5629, respectively. GNRH-1 is moderately resistant against bacterial leaf blight, grain discoloration and sheath rot whereas tolerant reaction against insect pest. The hybrid also found superior in quality traits including HRR% over hybrids US 312, suruchi 5629 and NAUR-1. Rice Hybrid GNRH- 1 recommended for transplanted rice growing areas of Gujarat.



(Assoc. Res. Scientist, RRRS, NAU, Vyara)

### 6. Sugarcane: Gujarat Navsari Sugarcane-9 (GNS-9)

Variety GNS-9 (CoN 09072) of sugarcane is an early maturing gave yield of 129.05 t/ha which is 27.3 %, 11.7 % and 16.6 % higher than CoC 671, GS-5 and GNS-8, respectively. GNS-9 has also recorded higher sugar yield (16.2 t/ha) and it is moderately resistant to red rot and wilt and resistant to whip smut. It is also a good ratooner and having non flowering habit.



(Research scientist, MSRS, NAU, Navsari)

### 7. Castor: Gujarat Navsari Castor Hybrid-1 (GNCH-1)

The castor hybrid GNCH-1 (NCH-1) yielded 2444 kg/ha resulting 21.2%, 46.2% and 44.5% higher seed yield than hybrid checks GCH-7, DCH-519 and DCH-177, respectively. The hybrid having medium plant height and long primary





as well as secondary spikes. The hybrid is resistant to wilt disease and tolerant to various larval and sucking pest of castor. The hybrid GNCH-1 is recommended for late-kharif and rabi season in South and Middle Gujarat in irrigated conditions under rice based cropping system.



(Asso. Res. Sci., Pulse and Castor Project, NAU, Navsari)

### 8. Pigeon pea: Gujarat Navsari Pigeon pea-2 (GNP-2)

Pigeon pea variety GNP-2 (BP-06-33) is the first dual purpose (grain and vegetable) variety in the state. This variety recorded green pod yield of 3394 kg/ha which was 19.5 %, 47.8 % and 16.0 % higher than checks GT-1, AVPP-1 and Vaishali, respectively. Similarly it gave grain yield of 1255 kg/ha which was GNP-2DrySeed GNP-2 Dry pod 17.2%, 49.5% and 20.9% higher than checks GT-1, AVPP-1 and Vaishali, respectively. It is moderately tolerant for pod fly and pod borer and moderately resistant to wilt and SMD. The genotype is with indeterminate growth habit having dark green foliage. The pods are green in colour with 4 to 5 grains with prominent constriction compared to GT-1. GNP-2 is recommended for Kharif pigeon pea cultivating areas of South and North Gujarat.



(Asso. Professor, NARP, Bharuch)

### 9. Finger Millet: Gujarat Navsari Nagli-7 (GNN-7)

The finger millet culture WVN-25 (GNN-7) was found superior in grain yield (2477 kg/ha) by 19.48% over local check GN-5 and 18.41% over national check variety VL-149. It has bold grain size, medium duration and synchronous in maturity (120-130 days) and non-lodging type. It is moderately resistant to leaf, neck and finger blast and foot rot disease. GNN-7 is recommended for Zone-I, II and III i.e., finger millet growing region of Gujarat.



(Assoc. Res. Sci., HMRS, NAU, Waghai)

### 10. Little Millet: Gujarat Navsari-3 (GNV-3)

The variety GNV-3 found superior in grain yield (2864 kg/ha) by 8.77 % and 43.92 % over the existing checks i.e. GV-2 (LC) and CO-2 (NC), respectively. It is early and synchronous in maturity (107-118 days) and multi-tillering and non-lodging type. It showed resistant reaction to diseases like blast (Leaf, neck and panicle) and moderately resistant to grain smut (%) and sheath blight. It is recommended for Zone- I, II and III i.e., littet millet growing region of Gujarat.



(Assoc. Res. Sci., HMRS, NAU, Waghai)



**11. Sorghum: Gujarat Navsari Jowar-1 (GNJ-1)**

The sorghum genotype SR-2917 (GNJ-1) recorded 3431 kg/ha which was 33.8%, 16.4% and 21.1% higher than checks GJ-38, GJ-42 and CSV-20, respectively. GNJ-1 found grain mold resistant, less incidence of ergot disease and stem borer. GNJ-1 having desirable characteristics like well peduncle exertion resulted in disease resistance. It

has long panicle and tall stature suitable for dual purpose. This variety is recommended for rainfed areas of Gujarat.



(Res. Scientist, MSRS, NAU, Surat)

**12. Niger: Gujarat Navsari Niger-3 (GNNIG-3)**

Niger variety GNIG-1 (NRS-1304) has recorded higher seed yield of 406 kg/ha which was 35.8% and 31.4% increase over the national check IGPN-2004-1 (299 kg/ha) and local check GN-2 (309 kg/ha) respectively. It recorded oil yield of 132 kg/ha which was 53.5% and 36.1% higher over the national check IGPN-2004-1 (86 kg/ha.) and local check GN-2 (97 kg/ha). GNIG-1 also found resistant to the Alternaria and Cercospora leaf spot diseases and moderately

resistant to semilooper and caterpillar. It is recommended for South Gujarat region.

(Asst. Res. Scientist, NRS, NAU, Vanarasi)

**13. Turmeric: Gujarat Navsari Turmeric-2 (GNT-2)**

A turmeric culture NVST-64 (GNT-2) yielded 28.7 t/ha with yield increment of 22.5 % and 26.5 % over checks GNT-1 and Pratibha. It contains more number of mother rhizomes (4-5) per plant, fingers per rhizome (30-34), higher curcumin content (4.10 %), dry weight recovery (20.70%), powder recovery (87.0%) and medium reddish yellow powder colour. This variety also show resistant against rhizome rot and moderately resistance against leaf blotch diseases. This variety is recommended for South Gujarat region.

(Prof. and Head, Dept. of GPB, NAU, Navsari)

**14. Brinjal: Gujarat Navsari Round Brinjal-1 (GNRB-1)**

The brinjal culture, NSRP-1 (GNRB-1) recorded 308.6 q/ha fruit yield which was 22.6 % and 18.0 % higher over standard checks GJB-3 (251.6 q/ha) and GOB-1 (261.5 q/ha), respectively. Under



South Gujarat condition, GNRB-1 registered 23.0 and 22.7% higher fruit yield over GJB-3 and GOB-1 respectively. The fruits of variety are round, dark purple in colour and has purple green leaves. GNRB-1 had low incidence of little leaf disease reaction (3.90

%) and shoot borer (3.35 %). GNRB-1 is recommended for general cultivation in brinjal growing areas of South Gujarat.

(Assoc. Professor, ACHF, NAU, Navsari)

## NATURAL RESOURCE MANAGEMENT

### 1. Effect of irrigation and sulphur levels on yields of cluster bean under

#### South Gujarat condition

The farmers of South Gujarat Heavy Rainfall Agro climatic Zone (AES- III) intended to grow cluster bean (GG 2) during summer season are recommended to give six irrigations (60 mm depth) i.e., first irrigation just after sowing, second at 7 to 10 DAS and remaining 4 irrigations at an interval of 13 to 15 days. Farmers are also advised to fertilize their crop at 20-40-00-30 NPKS kg/ha through urea and SSP or 20-40-00-40 kg NPKS/ha, through DAP, urea and gypsum (300 kg/ha) for getting higher yield and net return.

(Research Scientist, SWMRU,NAU, Navsari)



### 2. Effect of irrigation and fertilizer levels on yield and quality of sugar beet grown on clay soils of South Gujarat

The farmers of South Gujarat Heavy Rainfall Agro climatic Zone (AES III and IV) interested to grow sugarbeet (PAC 60008) crop are recommended to irrigate their crop with drip method [raised bed (40 cm X 20cm (three row) x 70cm), 110 cm top bed width and 40 cm furrow width] and fertilize with 120-60-60 kg N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O/ha. The full dose of P and 12 kg N/ha (10% RDN) and 6 kg K<sub>2</sub>O/ha (10% RDK) should be applied as basal and remaining 90% i.e., 108 kg N and 54 kg K<sub>2</sub>O/ha should be applied in 10 equal splits at an interval of 8 to 10 days starting from 15 DAS for getting higher yield and net return.

### System details

Lateral spacing	:	1.5 m	
Dripper spacing	:	1m	
Dripper discharge	:	8 lph	
Operating pressure	:	1.2 kg/cm <sup>2</sup>	
Operating frequency	:	Alternate days	
Operating time	:		Navsari                      Danti
		Nov. and Dec.	1hr : 30 minutes      1hr : 40 minutes
		Jan. and Feb.	1hr : 40 minutes      1hr : 50 minutes



(Research Scientist, SWMRU,NAU, Navsari)

### 3. Comparative performance of water soluble and routinely used fertilizer in banana (cv. Grand Naine) under drip irrigation

The banana (cv. Grand Naine) growing farmers of South Gujarat Heavy Rainfall Agro climatic Zone (AES III) are recommended to apply 80 per cent of recommended fertilizers in the form of urea (522 g/plant) + orthophosphoric acid (85 ml/plant) + MoP (267 g/plant) through drip system (0.6 PEF) for getting higher income. Although, use of WSF gave higher yield, it has not been found economically viable at present.

The operating frequency of drip system and fertigation schedule should be as follows:

Drip system detail:

Lateral distance	:	2.4 m
Dripper distance	:	0.6 m
Dripper discharge	:	4 lph
Operating pressure	:	1.2 kg/cm <sup>2</sup>
Operating frequency	:	Alternate day
Operating period	:	1.5 to 2.0 hrs during winter and 2.5 to 2.75 hrs during summer

Frequency of fertigation : twice a week



P application should be started 21 days after planting in 32 equal splits and it should be completed within 4.5 months.

N and K application should be started 35 days after planting in 44 equal splits and complete it within 6.5 months.

Recommended dose (300-90-200g NPK/Plant)(%)	Splits requirement of						
	Fertilizer			or	Water Soluble fertilizer		
	Urea (g/plant)	Orthophosphoric acid (ml/plant)	MoP (g/plant)		Urea (g/plant)	12;61;00 (g/plant)	13;00;45 (g/plant)
80% RDF	11.86	2.65	6.06		8.85	3.69	8.08

(Research Scientist, SWMRU,NAU, Navsari)

**4. Study on effect of land configuration and integrated nutrient management on productivity of different varieties of sorghum (rabi) in coastal area of South Gujarat**

Farmers of coastal areas of South Gujarat Heavy Rainfall Agro climatic Zone (AES-IV) interested to grow sorghum during rabi season are recommended to prefer variety GJ 38 to sow on raised bed (bed width- 60 cm and furrow width 30 cm) and apply 100% RDF (80:40:00 NPK kg/ha + 10 t FYM/ha) for getting higher yield and net return.



(Research Scientist, SWMRU,NAU, Navsari)

**5. Effect of irrigation and date of sowing on seed yield and components of Salicornia (S.brachiataRoxb.)**

The farmers of coastal area of South Gujarat Heavy Rainfall Agro climatic Zone (AES-IV) having waste land adjoining sea coast are recommended to sow salicornia by broad casting on raised bed (120 cm top bed



width and 30 cm furrow width) during the 3rd week of June with 12 irrigation of sea water/saline ground water at an interval of 11 to 13 days after cessation of monsoon till February for getting higher seed yield and net return.

(Research Scientist, SWMRU,NAU, Navsari)

**6. Effect of manuring in organically grown garlic in coastal area of South Gujarat**

Farmers of coastal areas of South Gujarat Heavy Rainfall Agro climatic Zone (AES-IV) growing garlic (GG 1) organically during rabi season are recommended to apply biofertilizer (Azotobacter + PSBeach at 1.25 l/ha) along with 50 kg N/ha through bio-compost ( 6.5 t/ha) as basal and 50 kg N/ha through castor cake (1.1 t/ha) at 40 DAS. Adoption of organic nutrient management systems also improves soil properties.



(Research Scientist, SWMRU,NAU, Navsari)

**7. Effect of land leveling by laser leveler on yield of wheat crop**

The farmers of South Gujarat Heavy Rainfall Agro climatic Zone (AES-III) growing wheat under irrigated condition are recommended to adopt precision





land leveling technique with laser leveler device to prepare their land maintaining a slope of 0.15% to obtain higher yield of wheat along with additional water saving through application of six irrigations each of 50 mm depth over those under traditionally leveled fields require six irrigations each of 60 mm depth. Further, once the sloppy land is developed it will be effective for three years.

(Research Scientist, Soil Science, NAU, Navsari)

### **8. Effect of method and levels of FYM and Bio-compost application on the yield of pigeon pea cv.Vaishali and soil aggregates under rainfed condition in South Gujarat**

The farmers of South Gujarat Heavy Rainfall Agro climatic Zone (AES-II) growing pigeon-pea under rainfed condition are recommended to apply the recommended dose of fertilizer (20-40 kg NP/ha) along with FYM /bio compost @ 7.5 t/ha before monsoon through band placement for higher yield and net return.

(Research Scientist, Soil Science, NAU, Navsari)

### **9. Spacing and nutrient management with and without AM fungi for greengram cv. Co-4 during rabi season**

Farmers of South Gujarat Heavy Rainfall Agro climatic Zone(AES-III), growing greengram (Co 4) during rabi season, are recommended to sow the crop at 45 cm x 10 cm spacing and apply 20-40 kg NP/ha as basal for getting higher yield and net return.

(Research Scientist, Pulse & castor Research Satiation, Navsari)



### **10. Effect of integrated nutrient management in rice-green gram cropping sequence under South Gujarat condition**

The farmers of South Gujarat Heavy Rainfall Agro climatic Zone (AES-III) are recommended to fertilize kharif rice with 100-30-00 kg NPK/ha + 10 t FYM and 20-40-00 kg NPK/ha to succeeding rabi green gram for getting higher system profitability of rice-green gram cropping sequence.

(Professor & Head, Dept. of Agronomy, NMCA, Navsari)



### **11. Effect of cutting management and nitrogen levels on seed production and nutritional value of Lucerne (*Medicago sativa L.*)**

The farmers of South Gujarat Heavy Rainfall Agro climatic Zone (AES-III) growing lucerne for seed purpose are recommended to take three cuts at 60,100 and 130 days after sowing and leave the crop for seed production and fertilized the crop with basal application of 30 kg nitrogen along with 50 kg P<sub>2</sub>O<sub>5</sub> and 50 kg K<sub>2</sub>O per hectare for getting higher yield and net return.

(Professor & Head, Dept. of Agronomy, NMCA, Navsari)



### **12. Permanent plot experiment on integrated nutrient supply system in a cereal based crop sequence**

The farmers of South Gujarat Heavy Rainfall Agro climatic Zone (AES-III) are recommended to integrate 100% RDF (100-30-00 NPK kg/ha) as 50% RDF from inorganic fertilizers and 50% N from FYM (10 t/ha) or Green manure in



rice and apply 100% RDF (120-60-00 NPK kg/ha) in wheat under rice-wheat crop sequence for securing similar paddy equivalent yield and maintain soil fertility status. Combined use of 75% RDF from inorganic fertilizers and 25% N from FYM (5 t/ha) or Green manure in rice saves 25% RDF in succeeding wheat.



(Professor & Head, Dept. of Agronomy, NMCA, Navsari)

### **13. Management of cropping systems for resource conservation and climate change**

The farmers of South Gujarat Heavy Rainfall Agro climatic Zone (AES-III) are recommended to adopt rice-sorghum-greengram crop sequence without mulch/residue incorporation with 25% higher dose of respective crops' RDF under conventional tillage for securing higher paddy equivalent yield and net return.



(Professor & Head, Dept. of Agronomy, NMCA, Navsari)

### **14. Development of organic farming package for system based high value crops**

The farmers of South Gujarat Heavy Rainfall Agro climatic Zone (AES-III) interested to grow organically rice-summer groundnut cropping sequence are recommended to apply recommended dose of fertilizer on N equivalent basis

to both the crops in equal proportion from FYM, vermicompost and castor cake, i.e., FYM 6 t + vermicompost 4 t + castor cake 700 kg/ha in rice and FYM 1.5 t + vermicompost 1 t + castor cake 170 kg/ha in summer groundnut for getting similar paddy equivalent yield, higher net profit and improving organic carbon content of soil under organic nutrient management system.



(Professor & Head, Dept. of Agronomy, NMCA, Navsari)

### **15. Priming of cane node for accelerating germination**

Sugarcane growers of South Gujarat Heavy Rainfall Agro climatic Zone (AES-III) are recommended to plant sugarcane setts after priming with desi cow dung, cow urine and water in 1:2:5 ratio for 15 minutes to enhance and increase the germination and consequently for higher yield and net return.

(Research Scientist, MSRS, Navsari)

## **PLANT PROTECTION**

### **[A] Agricultural Entomology**

#### **1. Waiting period of fenazaquin in/on chilli**

To avoid fenazaquin residue in chilli, farmers are recommended to observe 12 days waiting period when fenazaquin 10 EC is applied twice 0.01 per cent (10 ml /10 l water) at 15 days interval starting from 50 per cent flowering stage.

Year	Crop	Pest/ Diseases	Pesticide with Formulation	Doses			PHI Waiting Period (days)
				Quantity of Formulation	Conc. (%)	Dilution in Water	
2016	Chilli	Mites	Fenazaquin 10EC	1250 ml or 125 g a.i./ha	0.01%	2016	Chilli

(Asstt. Prof. Pesticide Residue, FQTL, Navsari)

**[B] PLANT PATHOLOGY****2. Biological control of Pigeon pea wilt**

Pigeon pea growers of South Gujarat are advised to apply *Trichoderma viride* 1 per cent WP @ 10 g/kg (1×10<sup>8</sup>cfu/g) as seed treatment and @ 2.5 kg /500 kg FYM /ha in furrow at the time of sowing for effective management of wilt and to get higher grain yield and net profit.



(Assoc Prof.(PI Path), College of Agri., NAU, Bharuch)

**3. Chemical control of rice grain discoloration**

The Paddy growers are advised to apply three sprays of propiconazole 25 EC 0.025 per cent @ 125 g a.i./ ha (10 ml/10 litre) or trifloxystrobin 25 per cent + tebuconazole 50 per cent (75 WG) 0.03 % @ 150 g a.i./ ha (4 g/10 litre) for effective control of grain discoloration and to harvest higher healthy grain and straw yield. The first spray should be given at boot leaf stage and the remaining two sprays thereafter at 10 days interval.



Year	Crop	Diseases	Pesticide with Formulation	Doses			PHI Waiting Period (days)
				Quantity of Formulation	Conc. (%)	Dilution in Water	
2016	Paddy	Grain/glu me discoloration	Propiconazole 25EC	125 g a.i./ha	0.025	500 1	30
			Trifloxystrobin 25% + Tebuconazole 50% (75 WG)	125 g a.i./ha	0.03	500 1	21

(Asstt. Res. Sci. (PI Path), Main Rice Res. Centre, NAU, Navsari)

**HORTICULTURE AND FORESTRY****1. Effect of heading back and training on growth, flowering, yield and quality in old orchard of mango cv.Rajapuri**

The farmers of South Gujarat Heavy Rainfall Agro-climatic Zone are advised to head back their above 30 years old mango trees cv. Rajapuri at 4 to 5 m height from ground level and maintain 6 newly emerged tertiary limbs to get higher yield with quality production.

**Note:**

1. Rejuvenation should be done after completion of monsoon in month of October.
2. For rejuvenation slant cut should be made and cut portion should be treated with copper fungicide paste (100 g lit<sup>-1</sup>) and frequently visit to rejuvenated orchard for controlling stem borer.

(Assoc. Res. Sci. RHRS, NAU, Navsari)

## **2. Standardization of organic nutrient schedule in banana cv. Grand Naine**

The farmers of South Gujarat Heavy Rainfall Agro-climatic Zone-I (AES-III) growing banana cv. Grand Naine under organic farming are recommended to apply 10 kg FYM and 1.25 kg Neem cake at planting, Bio fertilizers 50 ml each Azospirillum and PSB, 50 g Trichoderma harzianum and 25 g AM at one month after planting, 5 kg Vermicompost after three months of planting and 1.75 kg Wood ash after five months of planting per plant. This gives higher yield with higher return.



(Associate Res. Sci., FRS, Gandevi)

## **3. Macro propagation technique for Banana**

Banana growing farmers and nurserymen are advised to produce lower cost quality planting material through macro propagation technique. This technique saves cost of planting material. A sucker treated with each AM and Trichoderma viride @ 30 g/sucker produces maximum 20 plants per sucker within 5-6 months.



## **Methodology**

- Selection of good quality suckers weighing 500-1000g.
- Suckers are detopped just above the juncture of the aerial shoot (Decortications).
- Removal of apical meristem to a 4 cm depth and 2 cm width (Decapitation).
- 6-8 cross wise cuts given to sucker.
- Sucker placed in net house at 1 X 1 feet distance and covered with sawdust.
- Application of 30g each AM and Trichoderma viride around each sucker.
- Removal of juvenile meristem of primary and secondary buds to produce tertiary buds.
- Plants produced from tertiary buds having 4-5 leaves separated and planted in plastic bag in media containing Red soil : Sand : FYM in ratio of 1 : 1 : 1.
- Plants kept in net house for hardening.
- Regular watering by water can during entire procedure.

(Associate Res. Sci. FRS, Gandevi)

## **4. Standardization of fertigation and methods of training in cucumber under naturally ventilated polyhouse**

Farmers cultivating parthenocarpic cucumber in naturally ventilated polyhouse (1000 m<sup>2</sup> area) are advised to train plants to single stem system and fertigate the crop with 9.0:7.5:7.5 kg NPK (as per the table given below) along with application of 0.5 kg Trichoderma viride, 0.5 litre Pseudomonas fluorescens, 2.0 t FYM





or 0.4 t vermicompost and 5.0 kg micro-nutrients (Grade-5) at the time of sowing for higher net returns.

Crop Duration	Distribution pattern fertilizers			Remark
	N(kg)	P(kg)	K(kg)	
First Growth Period (Up to 30 days)	4.50 kg	3.21 kg	1.07 kg	<ul style="list-style-type: none"> <li>Fertigation should be started at the appearance of 2nd true leaf stage.</li> <li>Fertigation should be carried out twice a week.</li> </ul>
Second Growth Period (30-60 days)	2.25 kg	2.15 kg	3.22 kg	
Third Growth Period (60-90 days)	2.25 kg	2.14 kg	3.21 kg	

**Note:**

Training of cucumber plants to single stem system can be achieved by removing all the laterals arising from the axils of leaves, commonly known as suckers at the attainment of 10-12 cm length and only main stem should be allowed to grow vertically along the supporting string.

(Research Sci. (Veg.) ACHF, NAU, Navsari)

### 5. Site specific nutrient management study of Elephant foot Yam

The peasantry of south Gujarat Heavy Rainfall Agro-climatic Zone-I (AES III), growing elephant foot yam cv. Gajendra in the soil having deficient N and sufficient P and K are advised to apply 100 : 45 : 75 NPK kg/ha in two splits. Apply first dose of 50 : 45 : 37.5 NPK kg/ha at 45 days after planting and second dose of 50 : 00 : 37.5 NPK kg/ha one month after application of first dose for obtaining higher income. At the time of planting application of 25 tonne FYM per hectare is advisable.



(Research Sci. (Veg.) ACHF, NAU, Navsari)

### 6. Feasibility of Papaya banana sugarcane relay cropping under organic farming

The farmers of south Gujarat Heavy Rainfall Agro - climatic Zone- I (AES III) growing papaya (variety Red Lady 786)-banana (variety Grand Naine)-sugarcane (variety CoN 07072) under relay system are advised to apply 25 per cent N through biocompost, 40 per cent N through vermicompost and 15 per cent N<sub>2</sub> through castor cake to supply recommended nitrogen on N equivalent basis and also advice to apply banana pseudostem sap @ 2 l/plant to papaya-banana and 4000 l/ha for sugarcane or 50 per cent N through biocompost and 40 per cent N<sub>2</sub> through vermicompost to supply recommended nitrogen on N equivalent basis and also advice to apply banana pseudostem sap @ 1 l/plant for papaya-banana and 4000 l/ha for achieving higher yield as well as net income.



#### Detail management for papaya

- i.** Planting: Prepared the pits at 1.5 m x 2.4 m distance. Sow plant by applying 1.7 kg biocompost, 3.1 kg vermicompost and 0.341 kg castor cake per plant along with PSB and Azatobactor @ 5kg/ha.
- ii.** 3 & 6 MAP: Apply 0.8 kg biocompost, 1.6 kg vermicompost and 0.17 kg castor cake per plant.
- iii.** After one months of planting, apply banana pseudostem sap @ 200ml/plant in 5 equal splits at one month interval.
- iv.** In summer green manuring should be followed in wider space.
- v.** Drench 500 ml 0.5% each of Trichoderma and Pseudomonas at the time of planting.
- vi.** Spray 0.5 % neem based solution.

#### Detail management for banana

- i.** Planting: Prepared the pits at 1.2 m x 1.5 m x 3.3 m distance (paired row). Sow plant by applying 2.5 kg biocompost, 4.6 kg vermicompost and 0.5 kg castor cake per plant alongwith PSB and Azatobactor @ 5kg/ha.



- ii. 3 & 6 MAP: Apply 1.25 kg biocompost, 2.3 kg vermicompost and 0.25 kg castor cake per plant.
- iii. After one months of planting, apply banana pseudostem sap @ 200ml/plant in 5 equal splits at one month interval.
- iv. In summer green manuring should be followed in wider space.
- v. Drench 500 ml 0.5% each of *Trichoderma* and *Pseudomonas* at the time of planting.

#### Detail management for sugarcane

- i. At planting, treat two eye budded setts with biofertilizer *i.e.* *Acetobacter* and PSB and biopesticide *i.e.* *Trichoderma* and *Pseudomonas* @ 100ml each/ 50 litre of water for 20 minutes.
- ii. Planting: Apply 4.15t biocompost and 3.85t vermicompost per hectare as basal.
- iii. 3 & 6 MAP: Apply 2.1t biocompost and 1.9t vermicompost per hectare.
- iv. After one months of planting, apply banana pseudostem sap @ 800 l/ha in 5 equal splits at one month interval.
- v. In summer green manuring should be followed in wider space.
- vi. Drench 0.5% each of *Acetobacter*, *Trichoderma* and *Pseudomonas* at the time of earthing up.

(Assoc. Professor (NRM), ACHF, NAU, Navsari)

#### 7. Evaluation of *in situ* farm residue management on quality and productivity of banana cultivated under organic farming

The farmers of South Gujarat Heavy Rainfall Agro-climatic Zone-I (AES III) growing banana, variety Grand Naine, organically are advised to apply 10 tonnes farm residue along with 400 litres, 2% banana pseudostem sap per hectare for achieving higher net income.



#### Detail management

- Prepared the pits at 1.5 m x 1.2 m x 2.4 m distance and apply the 2.0 kg NADEP compost in each pit along with *Azotobacter* and PSB each @ 5.0 kg/ha.
- Add the farm residue @10t/ ha. in equal two splits at the time of two and four months after planting.
- Apply 400l/ha 2% banana pseudostem sap on residue and covered the residue by thin layer of soil.
- Drench 500 ml (0.5% ) per plant each of *Trichoderma* and *Pseudomonas* at the time of planting

(Assoc. Professor (NRM), ACHF, NAU, Navsari)

#### 8. Effect of Land configuration and integrated nutrient management on growth, quality and yield of tuberose (*Polinathes tuberosa* var. Prajwal)

The farmers of South Gujarat Heavy Rainfall Agro-climatic Zone - I AES-III cultivating tuberose var. Prajwal are advised to grow bulbs on raised bed of 90 cm width and 15 cm height in 3 rows along with 15 ton FYM/ha per year + RDF 300-200-100 kg N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O / ha. (application of nitrogen in four equal splits 3 months interval per year) for qualitative as well as quantitative spike production up to three years after planting.



(Assoc. Res. Sci. (Flori.), ACHF, NAU, Navsari)

#### 9. Effect of bio-fertilizers and chemical fertilizers on growth and yield of gladiolus cv. Psittacinus Hybrid.

The farmers of the South Gujarat Heavy Rainfall Agro-climatic Zone I, AES-III, growing gladiolus cv. Psittacinus Hybrid are advised to dip gladiolus corms in microbial consortium solution (10 ml /l water) for one hour and dry under shade then use for planting. Apply 75% of RDF (150-150-150 kg



NPK / ha.), P and K as basal and N in two equal splits, 15 days and 45 days after planting which reduced 25% fertilizers cost and gives higher realization.

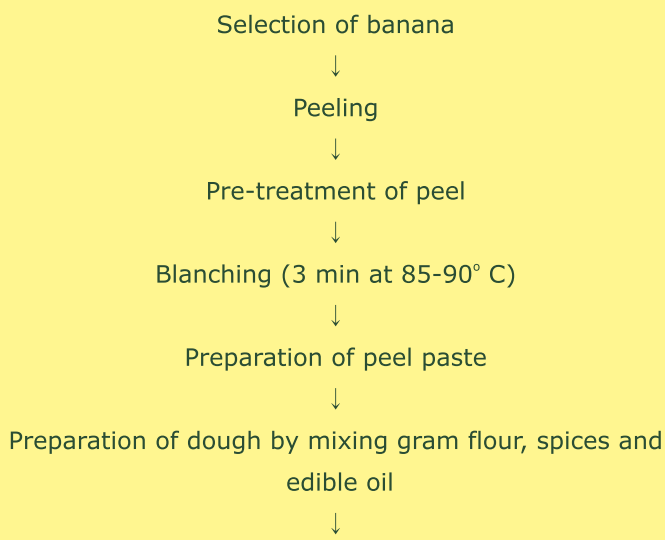
(Principal, Horti. Polytechnic., Navsari)

**10. Development of technology for utilization of banana peel for preparation of sev**

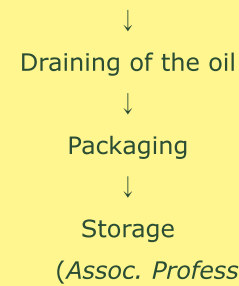
Home-makers, processors and entrepreneurs are recommended to utilize ripe banana peel for preparation of sev. Ripe banana peel must be pre-treated immediately to prevent enzymatic browning by dipping in 2% salt (NaCl) solution along with 100 ppm ascorbic acid for 30 min. After pre-treatment, banana peel must be blanched, grind to make paste and mixed(30% ripe banana peel paste) with gram flour (70%) for preparation of fibre rich sev. The recipe for the preparation of ripe banana peel based sev comprised of 30 g ripe banana peel paste, 70 g gram flour, 2.5 g common salt, 1.5 g chilli powder, 0.75 g white pepper powder, 1.0 g turmeric powder, 2.5 g coriander powder and 5 ml edible oil.



**Process**



Deep frying of the cold extruded sev



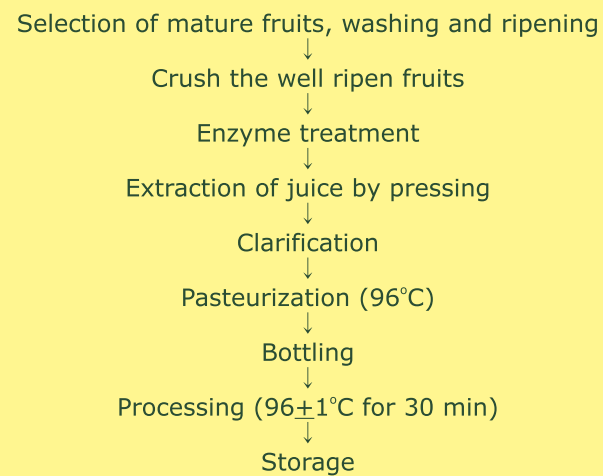
(Assoc. Professor (PHT) ACHF, NAU, Navsari)

**11. Standardization of method for extraction of Noni (Morinda citrifolia) fruit juice**

Processors and entrepreneurs are recommended to extract noni juice by treating crushed fruits with 0.1 % pectinase for 3 hours to get higher juice recovery. The juice after extraction must be filtered, pasteurized (96°C), packed in glass bottles followed by processing (96±1°C) for 30 min. The packed juice has storage stability for 12 months at ambient temperature.



**Process**



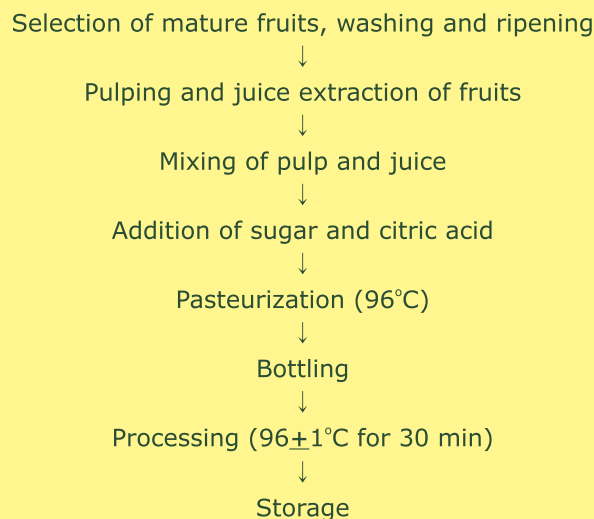
(Asso. Professor (PHT) ACHF, NAU, Navsari)

### **12. Standardization of formulations for preparation of noni mango nectar from Noni juice**

Processors and entrepreneurs are recommended to utilize noni juice for preparation of blended noni mango nectar to increase the acceptability of noni juice. For preparation of blended noni mango nectar, blend 5% noni juice with 15% mango pulp by maintaining 16° Brix TSS and 0.3% acidity. The nectar after blending, filtered, pasteurized (96°C), packed in glass bottles followed by processing (96+1°C) for 30 min. The packed nectar has storage stability for 6 months at ambient temperature.



#### **Process**



(Assoc. Professor (PHT) ACHF, NAU, Navsari)

### **13. Evaluation and modification of banana comb cutter**

The farmers growing banana are recommended to use banana comb cutter developed by ICAR – CIPHET with the NAU developed safety cover (340

mm x 220 mm) to separate comb from banana bunch.

(Assoc. Professor (PHT) ACHF, NAU, Navsari)

### **14. Investigation on tree ring analysis (Dendrochronology) to monitor radial growth responses of teak to climate in South Gujarat**

To enhance the radial growth in teak (*Tectona grandis* L.), the farmers of South Gujarat Heavy Rainfall Agro-climatic Zone-1 (AES-I & III) growing teak in their plantations may give light irrigation during March and normal irrigation during peak growth period from June to July, especially, when there is a moisture stress due to deficient rainfall.



(Principal, College of Forestry, NAU, Navsari)

### **15. Performance of turmeric (*Curcuma longa*) grown as an intercrop under different tree species in South Gujarat conditions**

The farmers of South Gujarat heavy rainfall zone – I (AES- III) growing *Mitragyna parvifolia* (Kalam), *Adina cordifolia* (Haldu) and *Gmelina arborea* (Sevan) at 10 X 2.5 m spacing are advised to grow Turmeric Variety – Sugandham planted at 30 x 15 cm spacing having 19 rows as an intercrop in plantation of *Gmelina arborea* (Sevan) for additional income.

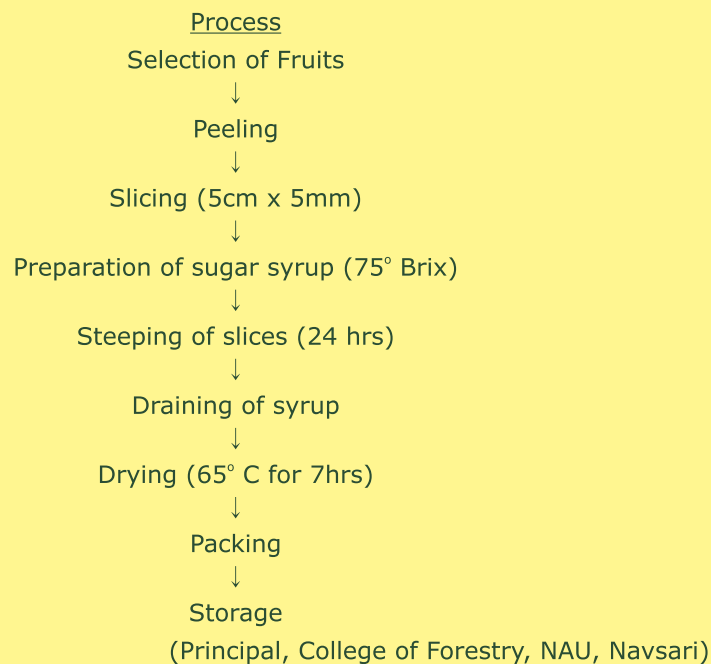


(Principal, College of Forestry, NAU, Navsari)

### **16. Standardization of the recipe for the preparation of candy from the fruits of Palmyra palm**

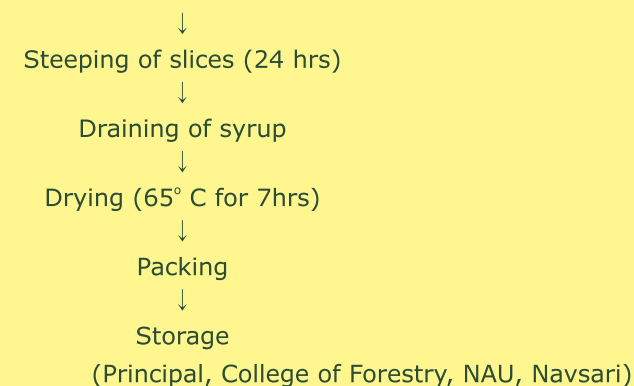
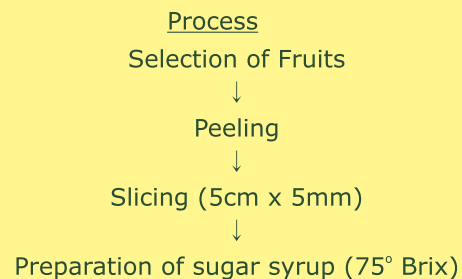
Home Makers, processors and entrepreneurs are recommended that, candy from the fruits of Palmyra palm can be prepared by steeping the slices

(5cm x 5mm) in sugar syrup having 65% TSS for 8 hours followed by drying of slices for 7 hours at 65°C and packed in PE pouches can be stored successfully up to six month at ambient storage.



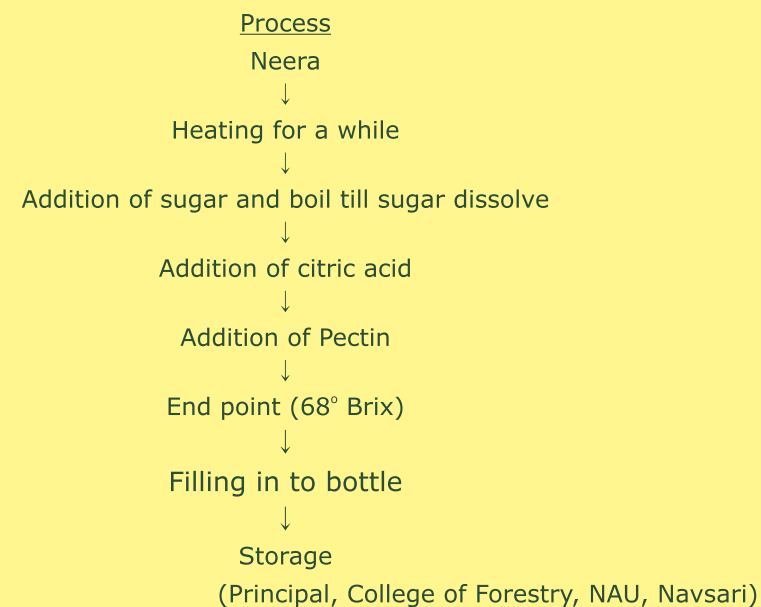
### **17. Standardization of the recipe for the preparation of jam from the fruits of Palmyra palm**

Home Makers, processors and entrepreneurs are recommended that jam from the tender fruits of palmyra palm can be prepared by using pulp:sugar ratio (1:1.2) and addition of pectin 16g/kg of pulp and it also can be stored for six months at ambient temperature in glass bottle.



### **18. Standardization of the recipe for the preparation of jelly from the Neera of Palmyra palm**

Home Makers, processors and entrepreneurs are recommended that jelly from the Neera can be prepared by using pectin 13 g/kg of Neera and can be safely stored for six months. Recipe should be Neera:sugar (1:1.1), 0.5% acidity (50 g citric acid per kg of jelly) and pectin. Boil the mixture till 68°Brix followed by hot filling in to glass bottle.





**AGRICULTURAL ENGINEERING****1. Preparation of Ready to Serve (RTS) beverage from banana pseudostem sap.**

Farmers and processors are recommended to utilize blend of banana pseudostem sap and aonla fruit juice having 3.5% and 8% TSS respectively with the ratio of 90:10 for the preparation of ready to serve drink. The drink packed in glass bottle after pasteurization at 87°C for 15 min followed by sterilization in bottles at  $96 \pm 1^\circ\text{C}$  for 25 min has storage stability for six month at ambient condition.



( Prof. and Head, Dept. of Agril. Engg., NMCA, Navsari)

**2. Study of effect of drainage on banana production in South Gujarat**

Farmers of South Gujarat Heavy Rainfall Zone (AES-III), growing banana are advised to follow 45cm deep open drainage system (bottom width 15cm and top width 105cm) spaced 12 m apart with 1:1 side slope and a bed slope of 0.05%, to achieve higher yield and maximum net return.



( Prof. and Head, Dept. of Agril. Engg., NMCA, Navsari)

**3. Effect of laser leveling on crop water requirement and growth of castor crop**

Farmers of South Gujarat Heavy Rainfall Zone (AES-III), growing irrigated castor (GCH-7) during rabi season are advised to adopt laser land leveling technique to provide 0.45 per cent longitudinal slope to castor field for getting higher castor yield, net return and water saving.



( Prof. and Head, Dept. of Agril. Engg., NMCA, Navsari)

**4. Development and evaluation of low cost of solar still**

A low cost roof top cement brick type solar still covered with 4mm thick toughened glass developed by NAU is recommended to get 2 l/m<sup>2</sup> - day distilled water for Dediapada area.



(Principal & Dean, CAET, Dediapada)

**ANIMAL PRODUCTION AND FISHERIES****1. Effect of bypass fat supplementation on production performance and economic on lactating buffalo**

The farmers of South Gujarat are recommended to supplement bypass fat @ 100 g/d for nearly 15 days pre-partum and 90 days post-partum to lactating Surti buffaloes to increase milk fat percentage and net profit.

Research Scientist, Livestock Research Station)

**2. Optimization of stocking density of *Labeo rohita* (Rohu) for the production of stunted yearlings in cage culture condition**

The fish farmers of Gujarat engaged with freshwater fish farming are recommended to rear 166 fingerlings/m<sup>3</sup> in cage farming system to obtain profitable stunted yearlings.



(Research Scientist, Soil and Water Management Research Unit)

**3. Effects of rubber mat bedding on the lying behavior, cleanliness and hock injuries of crossbred cows.**

The progressive farmers are recommended to use the rubber mat (6 feet

x 4 feet x 17 mm) on concrete floor to improve the comfort level and minimize the limb affections of crossbred cows.



(Professor and Head, Dept. of Livestock Production Management)

#### **4. Economics of growth performance due to dietary inclusion of tanniferous leaves (*Ficus benghalensis*) in kids infested with gastrointestinal helminths.**

The farmers of South Gujarat are recommended to include daily the fresh leaves of Banyan tree (120g/d) in the diet of Surti kids to control gastrointestinal worm load for better growth rate and income.

(Professor and Head, Dept. of Animal Nutrition)

#### **5. Effect of supplementation of yeast on average daily growth, feed conversion ratio and cost economics in Surti goat kids**

The Surti goat keepers are recommended to supplement daily 6-7 g of yeast (*Saccharomyces cerevesiae*) along with concentrate to 4-6 month kids for better growth rate at lower feed cost.

(Professor and Head, Dept. of Animal Science, NMCA)

### **ANIMAL HEALTH**

#### **1. Medical and surgical management of corneal affections in canines.**

Brachycephalic breeds of dogs (Pug & Boxer) should be subjected to routine ophthalmic check up by veterinarians at every four months.

(Professor and Head, Veterinary Surgery and Radiology)

## **Recommendations for Scientific Community**

### **NATURAL RESOURCE MANAGEMENT**

#### **1. Response of sugarcane to different plant nutrients in varied agro ecological situations**

Application of inorganic fertilizers based on soil test values before planting of sugarcane has been found effective for getting higher cane yield and net return under south Gujarat heavy rainfall zone (AES III).

Based on field soil analysis data N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O and micronutrient fertilizers to be applied as below:

If the available soil N is 0-140, 141-280, 281-420, 421-560, 561-700 and >700 kg/ha then 375, 312.50, 250, 250, 187.50 and 125 kg/ha N fertilizer respectively to be applied.

If the available soil P<sub>2</sub>O<sub>5</sub> is 0-10, 11-20, 21-30, 31-40, 41-55 and >55 kg/ha then 187.50, 156.25, 125, 125, 93.75 and 62.5 kg/ha P<sub>2</sub>O<sub>5</sub> fertilizer respectively to be applied.

If the available soil K<sub>2</sub>O is 0-100, 101-150, 151-200, 201-250, 251-300 and >300 kg/ha then 187.50, 131.25, 125, 125, 93.75 and 62.5 kg/ha K<sub>2</sub>O

fertilizer respectively to be applied.

In case of soil Available micro-nutrients:

Iron: for <5 ppm apply 50 kg/ha ferrous sulphate in every three years.

Manganese: for <5 ppm apply 10 kg/ha manganese sulphate in every three years.

Zinc: for <0.5 ppm apply 50 kg/ha zinc sulphate in every three years.

Copper: for <0.2 ppm apply 5 kg/ha copper sulphate in every three years.

(Research Scientist, MSRS, Navsari)

#### **2. Application of Mixed Statistical Distributions in Fitting Rainfall Data of South Gujarat**

Annual rainfall distribution modeling for Navsari district Lognormal distribution and for Bharuch district Weibull distribution should be used for taking decision about future precipitations over a certain period of time.

(Professor and Head, Dept. of Agril. Meteorology, NMCA, NAU, Navsari)

### 3. Natural resources characterization in relation to banana growing areas of South Gujarat .

#### Banana production constraints

Based on the characterization of soil, water and climatic resources vis-à-vis optimum requirement of banana, the crop production constraints related to banana were identified. The resource wise crop production constraints are reported as below:

#### Production constraints related to banana cultivation

Taluka	Soil	Water	Climate
Nandod	<ul style="list-style-type: none"> <li>High BD (1.47 g/cc)</li> <li>Shallow depth (83 cm)</li> <li>High pH (8.46)</li> <li>Fe (5.32 ppm deficient)</li> </ul>	Marginal quality of groundwater (EC 0.95 dSm <sup>-1</sup> )	Low rainfall (91 mm per month)
Jagadia	<ul style="list-style-type: none"> <li>High BD (1.50 g/cc)</li> <li>High pH (8.0)</li> <li>Fe (4.74 ppm deficient)</li> </ul>	Marginal quality of groundwater (EC 0.96 dSm <sup>-1</sup> )	Low rainfall (72.8 mm per month)
Bharuch	<ul style="list-style-type: none"> <li>High consistency</li> <li>High BD (1.54 g/cc)</li> <li>High pH (7.95)</li> <li>Low OC (0.31%)</li> <li>Fe (3.0 ppm deficient)</li> </ul>	Poor quality of ground water (EC 1.23 dSm <sup>-1</sup> )	Low rainfall (72.8 mm per month)
Kamrej	<ul style="list-style-type: none"> <li>High consistency</li> <li>Texture clay</li> <li>High BD (1.53 g/cc)</li> <li>Fe (5.48 ppm deficient)</li> </ul>	Poor quality of ground water (EC 1.16 dSm <sup>-1</sup> )	-
Bardoli	<ul style="list-style-type: none"> <li>Texture clay</li> <li>High pH (8.04)</li> <li>Fe (3.86 ppm deficient)</li> </ul>	-	-
Palsana	<ul style="list-style-type: none"> <li>Fe (4.50 ppm deficient)</li> </ul>	Poor quality of ground water (EC 1.04 dSm <sup>-1</sup> )	-
Navsari	<ul style="list-style-type: none"> <li>Texture clay</li> <li>High pH (8.89)</li> <li>Low OC (0.29%)</li> <li>Fe (3.34 ppm deficient)</li> <li>Zn (0.04 ppm deficient)</li> </ul>	Poor quality of ground water (EC 1.03 dSm <sup>-1</sup> )	-
Jalalpore	<ul style="list-style-type: none"> <li>High consistency</li> <li>High pH (8.47)</li> <li>Low OC (0.34%)</li> </ul>	Poor quality of ground water (EC 1.19 dSm <sup>-1</sup> )	-
Valsad	<ul style="list-style-type: none"> <li>Texture clay</li> <li>High BD (1.43 g/cc)</li> <li>Fe (3.34 ppm deficient)</li> </ul>	Poor quality of ground water (EC 1.04 dSm <sup>-1</sup> )	-

### Constraints based remedial measures for improving banana Productivity under south Gujarat condition

S.N.	Constraints' for banana	Deleterious effect on root growth	Remedial measures
1	High bulk density, low organic carbon, hard consistency	Restricted root growth due to difficulty in penetration of root	<ul style="list-style-type: none"> <li>Deep ploughing once in three years</li> <li>Addition of organic manures like FYM, biocompost, vermicompost etc</li> <li>Green manuring with dhaincha or sunn hemp</li> <li>In situ incorporation of crop residues</li> <li>Provide drainage</li> </ul>
2	High pH and ESP	Stunted growth of plant due to restricted soil air, moisture and nutrient movement, Apart from this, extremely high pH (>9), Nutrient availability decreases.	<ul style="list-style-type: none"> <li>Soil analysis bases gypsum application in conjunction with organic manures, green manuring etc</li> <li>Provide drainage facility</li> <li>Preference to sodicity tolerant variety of banana</li> </ul>
3	Low in organic carbon, Fe and in some samples Zn deficient	Poor plant growth and low yield due to inadequate supply of element in question	<ul style="list-style-type: none"> <li>Apply recommended doses of fertilizer as per soil value</li> <li>Soil test based application of Fe and Zn</li> </ul>
4	Marginal or poor quality of ground water	Stunted plant growth and poor yield of plant Mortality of plant in extreme cases Deterioration in soil health due to prolonged use of such water for irrigation purpose	<ul style="list-style-type: none"> <li>Adopt drip irrigation along with mulching for restricted upward movement of soluble salts</li> <li>Follow fertilization schedule using urea and MOP as a source of P</li> </ul>
5	Low rainfall (Unmanageable constraints)	-----	<ul style="list-style-type: none"> <li>Change date of planting in such a way that full growth stage of plant comes during monsoon season</li> </ul>

(Research Scientist, SWMRU,NAU, Navsari)



**PLANT PROTECTION****1. Chemical control of chiku moth**

For effective management of chiku moth in sapota, apply three sprays of either flubendiamide 39.35 SC @ 0.0096% (2.4 ml/10 litre) or emamectin benzoate 5 SG @ 0.0022% (4.4 gm/10 litre) at one month interval during fruiting stage for higher yield and better return. The residues of these insecticides remain below determination level in sapota fruits.

(Asstt. Prof. Agri Polytech, NAU, Bharuch)

**2. Population dynamics of major insect pests of sapota**

Chiku moth, bud borer, leaf miner, mid rib folder and fruit fly remain active round the year under Agro climatic zone- II, AES- V indicating their peak in 1<sup>st</sup> fortnight of September, 2<sup>nd</sup> fortnight of September, 1<sup>st</sup> fortnight of December, 1<sup>st</sup> fortnight of November and 2<sup>nd</sup> fortnight of July, respectively.

(Asstt. Prof. Agri Polytech, NAU, Bharuch)

**3. Monitoring of fruit fly in mango orchard**

The fruit flies remain active round the year under Agro climatic zone - II, AES- V in mango orchard with peak population during the 2<sup>nd</sup> week of July (28<sup>th</sup> SMW).

(Asstt. Prof. Agri Polytech, NAU, Bharuch)

**4. Screening of promising genotypes for multiple resistance against stem borer, leaf folder and brown plant hopper of rice.**

Rice genotypes viz., NVSR-6137, IRBB-2, IR 77498-47-2-6 2-3 and IR 11A334 are found to have multiple resistant reaction against stem borer, leaf folder and brown plant hopper under natural field conditions.

(Assoc.Res.Sci., Main Rice Research Centre, NAU, Navsari)

**5. Effect of non-ionizing (UV) radiation on the development of egg parasitoid, Trichogramma chilonis Ishii (Hymenoptera: Trichogrammatidae)**

Exposure period of 45 minutes (at 42 cm height from the target site with 30 W UV lamp) is found suitable to irradiate the eggs of factitious host, *Corcyra cephalonica* (Stainton) by enhancing effectiveness of *Trichogramma* without any detrimental effect of UV radiation (non- ionizing) under laboratory condition.

(Prof. & Head, Dept. of Ento., NMCA., Navsari)

**6. Monitoring of mite associated with vegetable crop nurseries**

Two spotted spider mite, *Tetranychus urticae* Koch (Tetranychidae: Acari) remain active during nursery stage of brinjal and tomato, while yellow mite, *Polyphagotarsonemus latus* (Banks) (Tarsonemidae: Acari) remain active in chilli nursery.

Activities of mites remain higher in summer followed by *kharif* and *rabi* nurseries of brinjal, tomato and chilli.

(Prof. & Head, Dept. of Ento., NMCA., Navsari)

**7. Documentation of mite problems in major protected floricultural crops**

(1) Two spotted spider mite, *Tetranychus urticae* Koch (Tetranychidae: Acari) remain active round the year under greenhouse conditions on gerbera (cv Stenza) with peak population during April (15<sup>th</sup>SMW) and Mid September (38<sup>th</sup>SMW).

(2) Two spotted spider mite, *Tetranychus urticae* Koch (Tetranychidae: Acari) remain active round the year under polyhouse conditions on rose (cv Top Secret) with peak population during April (15<sup>th</sup>SMW) and Mid-October (42<sup>nd</sup>SMW).

(3) Tenupulpid mite, *Tenupalpus sp.* remain active round the year on dendrobium orchid cv Sonia-17 under polyhouse conditions with peak

population during last week of September (41<sup>st</sup> SMW).

( Prof. & Head, Dept. of Ento., NMCA., Navsari)

### **8. Screening of mango germplasm against pests of mango**

Mango accessions, viz., Bombai and Himsagar showed tolerant reaction against mango hopper whereas, Mahmud Vikarabad is found resistant against thrips.

(Asstt.Res.Sci. (Ento) AES, NAU, Paria )

### **9. Residue and dissipation pattern of fenazaquin in/on chilli under South Gujarat conditions**

Fenazaquin 10 EC applied twice @ 0.01% (10 ml /10 l water) at 15 days interval starting from 50% flowering stage in green chilli resulted in built up of residue in dried chilli powder by 5.22 to 5.79 times. Therefore, it is recommended to consider a processing factor of 5.64 (*i.e.* 6.0) for fenazaquin for dried chilli powder.

DAA	Control (Waterspray)	Mean Residues ( $\mu\text{gg}^{-1}$ applied at the rate of 125 g a.i./ha)	Residues( $\mu\text{gg}^{-1}$ ) in green chillies*	Processing Factor
0 (2 hrs )	–	13.19	2.53	5.22
5 day	–	8.27	1.40	5.92
10 day	–	2.94	0.53	5.61
30 day	–	0.35	0.06	5.79
			Mean	5.64
LOD ( $\mu\text{g/g}$ )	Fruit	0.01		
	Powder	0.02		
LOD ( $\mu\text{g/g}$ )	Fruit	0.04		
	Powder	0.06		

$$\text{Processing Factor} = \frac{\text{Residues in Chilli powder}}{\text{Residues in green chilli}}$$

(Asstt. Prof. (Pesticide Residue), FQTL, Navsari)

### **10. Status of pesticide residues in major seasonal fruits**

Residue analysis of fruit samples collected from different market places of south Gujarat revealed that 31.67 % out of 120 samples are positive for pesticide presence wherein 9.17 % are found above MRL. Maximum positive samples are detected from Surat market. Carbendazim was the most frequently detected pesticide followed by chlorpyrifos and tebuconazole. Most positive samples are detected in apple and least in sapota. However, banana had most positive samples above MRL. Total 52 pesticides detected in different fruits out of which 29 (55%) pesticides violated label claim fixed by the CIBRC.

(Asstt. Prof. (Pesticide Residue), FQTL, Navsari)

### **11. Screening of genotypes against insect pests of brinjal**

Among various brinjal genotypes screened, lowest shoot and fruit borer damage (3.35%) and lowest jassid (3.19/ leaf) population are recorded in genotype NSRP-1 whereas lowest whitefly population (2.27 / leaf) was recorded in GBL-1.

(Assoc. Prof. (Ento), ACHF, Navsari)

### **12. Screening of promising genotypes for multiple resistance against bacterial blight, sheath rot and grain discolouration diseases of Rice.**

Rice genotypes viz., IR-BB2, IR-BB11, IR-BB50, IR-BB62, IR 11A334 and NVSR-6137 are found to have multiple resistant reaction against bacterial blight and sheath rot diseases under artificial inoculation and high disease pressure conditions in field and grain discoloration under natural field condition.

(Asstt. Res. Sci. (PI Path), Main Rice Res. Centre, NAU, Navsari)

### **13. Screening of genotypes against little leaf of brinjal**

Among various brinjal genotypes screened, minimum little leaf infection (3.58%) was recorded in GJB-2.

(Assoc. Prof. (PI Path), ACHF, NAU, Navsari)

**HORTICULTURE AND FORESTRY****1. Investigation on tree ring analysis (Dendrochronology) to monitor radial growth responses of teak to climate in South Gujarat**

It is informed to the scientific community and state forest department that the mean ring-width-index chronologies of teak developed for Navsari from AD 1991-2015, Valsad from AD 1867-2012 and Dang from 1912-2012 of South Gujarat are useful in reconstruction of past climate mainly the rainfall patterns during drought years. Furthermore, it also indicates the major El Niño and drought years of India. These ring-width-index chronologies developed for the particular time periods at the three sites are also helpful in determining the unknown year in which the teak tree was felled.

(Principal, College of Forestry, NAU, Navsari)

**2. Effect of different tree species leaf leachate on germination and seedling growth of some vegetable crops**

The leaf leachates of various tree species reduced germination and growth parameters of different vegetable crops in laboratory as well as in nursery condition. The percentage of inhibition was maximum in Eucalyptus as compared to other tree species leaf leachates in laboratory as well as in nursery condition. Moreover the percentage of inhibition was minimum in Teak. The different vegetable crops have different mode of inhibition during the study. In both the growing conditions Brinjal (*Solanum melongena*), Okra (*Abelmoschus esculentus*) and Tomato (*Lycopersicon esculentum*) performed better for all parameters under study for the respective years of investigation while,  $V_5$ : Chilli (*Capsicum anum*) performed poor for all the parameters under study. In case of leachates concentration, all the parameters under study were decreased as the concentration of leaf leachates increased in both the growing conditions. This response showed concentration dependent phenomenon as highest inhibitory effects were observed with 20 % leaf leachate concentration of all the tree species.

(Principal, College of Forestry, NAU, Navsari)

**AGRICULTURAL ENGINEERING****1. Study relating to "Formulating long-term mechanization strategy for Dediapada taluka"**

The mechanization tool level (MTL), which indicates percentage of mechanization used for particular farming operation in Dediapada taluka was found to be tillage 40%, sowing 11%, transplanting 0%, interculture 18%, spraying 35%, weeding 22%, harvesting 14% and threshing 33%. Therefore design, development and popularization of small hand tools and implements suitable for sowing, transplanting and harvesting operations need to be done on priority basis in order to enhance mechanization index in selected operations and also to increase the income of farmers of Dediapada taluka.

(Principal & Dean, CAET, Dediapada)

**ANIMAL PRODUCTION AND FISHERIES****1. Effect of bypass fat supplementation on production performance and economics on lactating buffalo**

Dietary supplementation of bypass fat (calcium salt of palm fatty acid) @ 0.75 % of dry matter intake from 15 days pre-partum to 90 days post-partum to lactating Surti buffaloes (2-4 lactations) improves milk fat percentage (13%), feed efficiency in terms of FCM (29.24%) and serum triglyceride and cholesterol levels without affecting body condition score.

(Research Scientist, Livestock Research Station)

**2. Study of suckling behavior and mothering ability vis-à-vis production performance of Surti goat**

For early selection of breeding male Surti kids at 60 days of age more than 2.5 suckling and 1.0 maternal care scores are recommended.

(Professor and Head, Dept. of LPM)



### **3. Economics of growth performance due to dietary inclusion of tanniferous leaves (*Ficus benghalensis*) in kids infested with gastrointestinal helminthes**

Dietary inclusion of fresh leaves of *Ficus benghalensis* (Banyan tree) to supply 1.5% condensed tannin to the diet of non dewormed Surti kids (5-6 month) helps to alleviate the gastrointestinal helminthes load and improves growth rat.

(Professor and Head, Dept. of Animal Nutrition)

#### **ANIMAL HEALTH**

### **1. Diagnosis and management of Ascites in Canines**

The combination of loop diuretics and silymarin @ 30mg/kg/day along with vitamin B complex orally for 15 days can be used to manage ascites of hepatic origin in dogs.

(Professor and Head, Veterinary Medicine)

## **RESEARSH SUMMERY**

### **CROP IMPROVEMENT**

Cotton- G.Cot.Hy.10 BG-II Higher seed cotton yield, moderately resistant to bacterial leaf blight, alternaria leaf spot diseases and sucking pest.

Cotton- G. Cot. Hy. 12 BG-II - Higher seed cotton yield moderately resistant to bacterial leaf blight, alternaria leaf spot diseases and sucking pest.

Rice- GNR-5 - Higher yield, salt tolerant, long slender grain with quality.

Rice- GNR-6 - Higher yield, long slender grain, resistant to major pest and diseases, suitable for rainfed transplanted (RFTP) condition.

Rice- GNRH-1 - First rice hybrid of Gujarat, higher yield, long slender grain, moderately resistant against bacterial leaf blight, grain discoloration and sheath rot.

Sugarcane- GNS-9 - Early maturing, higher cane yield, higher sugar yield, moderately resistant to red rot and wilt and resistant to whip smut.

Castor- GNCH-1 - Higher yield, resistant to wilt disease, suitable for late-kharif and rabi season.

Pigeon pea- GNP-2 - Dual purpose, higher green pod yield and grain yield, moderately tolerant for pod fly and pod borer and moderately resistant to wilt and SMD.

Nagli- GNN-7 - Higher grain yield, bold grain size, medium duration and synchronous in maturity and non-lodging type moderately resistant to leaf, neck and finger blast and foot rot disease.

Vari- GNV-3- Higher grain yield, early and synchronous in maturity, multi-tillering and non-lodging.

Sorghum- GNJ-1 - Higher yield, grain mold resistant, long panicle and tall stature.

Niger- GNNIG-3 - Higher grain yield, resistant to the Alternaria and Cercospora leaf spot diseases, moderately resistant to semilooper and caterpillar.

Turmeric- GNT-2 - Higher yield, higher curcumin content, high powder recovery.

Brinjal- GNRB-1 - Higher fruit yield, low incidence of little leaf disease reaction and shoot borer.

### **NATURAL RESOURCE MANAGEMENT**

Give six irrigations (60 mm depth) and fertilize the crop at 20-40-00-30 NPKS kg/ha through urea and SSP or 20-40-00-40 kg NPKS/ha through DAP, urea and gypsum (300 kg/ha) for better growth in cluster bean.

Irrigate with drip method and fertilize with 120-60-60 kg NPK kg/ha to sugar beet for good yield in clay soils.

Apply 80 per cent of recommended fertilizers in the form of urea (522 g/plant) + orthophosphoric acid (85 ml/plant) + MoP (267 g/plant) through drip system (0.6 PEF) in the Banana.

For growing sorghum in rabi season prefer variety GJ 38 and sow on raised bed and apply 100% RDF (80:40:00 NPK kg/ha + 10 t FYM/ha).

Sow salicornia by broad casting on raised bed during the 3rd week of June with 12 irrigation of sea water/saline ground water in waste land adjoining sea coast.

Apply biofertilizer (Azotobacter + PSBeach at 1.25 l/ha) along with 50 kg N/ha through bio-compost (6.5 t/ha) as basal and 50 kg N/ha through castor cake (1.1 t/ha) at 40 DAS for grown Garlic (GG 1) organically during rabi season in coastal area.

Adopt precision land leveling technique with laser leveler device to prepare their land maintaining a slope of 0.15% for growing wheat.

Apply the recommended dose of fertilizer (20-40 kg NP/ha) along with FYM /bio compost @ 7.5 t/ha before monsoon for pigeon-pea grown under rainfed condition.

Sow the greengram (Co 4) during rabi season at 45 cm x 10 cm spacing and apply 20-40 kg NP/ha as basal.

Fertilize kharif rice with 100-30-00 kg NPK/ha + 10 t FYM and 20-40-00 kg NPK/ha to succeeding rabi green gram.

Take three cuts at 60, 100 and 130 days after sowing and leave the crop for seed production and fertilized the crop with basal application of 30-50-50 NPK kg/ha for Lucerne grown for seed purpose.

Integrate 100% RDF (100-30-00 NPK kg/ha) as 50% RDF from inorganic fertilizers and 50% N from FYM (10 t/ha) or Green manure in rice and apply 100% RDF (120-60-00 NPK kg/ha) in wheat under rice-wheat crop sequence.

Adopt rice-sorghum-greengram crop sequence without mulch/residue incorporation with 25% higher dose of respective crops' RDF for securing higher paddy equivalent yield.

For growing organically rice-summer groundnut cropping sequence apply RDF of N equivalent basis to both the crops in equal proportion from FYM (6 t), vermicompost (4 t) and castor cake (700 kg/ha in rice and FYM (1.5 t) vermicompost (1 t) castor cake (170 kg/ha) in summer groundnut.

Plant sugarcane setts after priming with desi cow dung, cow urine and water in 1:2:5 ratio for 15 minutes to enhance and increase the germination.

## PLANT PROTECTION

### Agricultural Entomology

Observe 12 days waiting period when fenazaquin 10 EC is applied twice 0.01 per cent (10 ml /10 l water) at 15 days interval starting from 50 per cent flowering to avoid fenazaquin residue in chilli.

### PLANT PATHOLOGY

Apply *Trichoderma viride* 1 per cent WP @ 10 g/kg (1×10<sup>8</sup>cfu/g) as seed treatment and @ 2.5 kg /500 kg FYM /ha in furrow at the time of sowing for management of wilt in Pigeon pea.

Apply three sprays of propiconazole 25 EC 0.025 % @ 125 g a.i./ ha or trifloxystrobin 25 % + tebuconazole 50 % (75 WG) 0.03 % @ 150 g a.i./ ha for control of grain discoloration in Paddy.

## HORTICULTURE AND FORESTRY

Head back their above 30 years old mango trees cv. Rajapuri at 4 to 5 m height from ground level and maintain 6 newly emerged tertiary limbs.

For growing banana cv. Grand Naine organically apply 10 kg FYM and 1.25 kg Neem cake at planting, Bio fertilizers 50 ml each *Azospirillum* and PSB, 50 g *Trichoderma harzianum* and 25 g AM at 1 month, 5 kg Vermicompost at 3 months and 1.75 kg Wood ash at 5 months of planting per plant.

Nurserymen can produce lower cost quality planting material of banana through macro propagation technique which saves cost. In this, suckers are treated with each AM and *Trichoderma viride* @ 30 g/sucker which produces maximum 20 plants per sucker within 5-6 months.

Train plants to single stem system and fertigate with 9.0:7.5:7.5 kg NPK along with application of 0.5 kg *T. viride*, 0.5 litre P. fluorescens, 2.0 t FYM or 0.4 t vermicompost and 5.0 kg micro-nutrients (Grade-5) at the time of sowing in parthenocarpic cucumber growing in playhouse.

Apply 100 : 45 : 75 NPK kg/ha in two splits, first 50 : 45 : 37.5 NPK kg/ha at 45 DAP and second 50 : 00 : 37.5 NPK kg/ha one month after first dose for elephant foot yam cv. Gajendra in the soil having deficient N.

Apply 25 per cent N through biocompost, 40 % N through vermicompost and 15 % N through castor cake for papaya - banana - sugarcane under relay system.

Apply 10 tonnes farm residue along with 400 litres, 2% banana pseudostem sap per hectare for growing banana, (Grand Naine) organically.

Grow bulbs on raised bed of 90 cm width and 15 cm height in 3 rows along with 15 ton FYM/ha per year + RDF 300-200-100 kg N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O / ha for growing tuberose var. Prajwal.

Dip gladiolus corms in microbial consortium solution (10ml /l water) for 1 h and dry under shade then planting, and apply 75% of RDF (150:150:150 kg NPK/ha.) to grow gladiolus cv. Psittacinus.

Utilize the ripe banana peel for preparation of sev.

Extract noni juice by treating crushed fruits with 0.1 % pectinase for 3 hours to get higher juice recovery.

Utilize noni juice for preparation of blended noni mango nectar to increase the acceptability of noni juice.

Use banana comb cutter developed by ICAR – CIPHET with the NAU developed safety cover.

Give light irrigation during March and normal irrigation during peak growth period from June to July, especially, when there is a moisture stress due to deficient rainfall to enhance the radial growth in teak.

Grow Turmeric Variety – Sugandham as an intercrop in *Mitragynaparvifolia* (Kalam), *Adina cordifolia* (Haldu) and *Gmelina arborea* (Sevan) grows at 10 X 2.5 m spacing.

Prepare candy from the fruits of Palmyra palm by steeping the slices (5cm x 5mm) in sugar syrup having 65% TSS for 8 hours followed by drying of slices for 7 hours at 65°C.

Jam from the tender fruits of palmyra palm can be prepared by using pulp:sugar ratio (1:1.2) and addition of pectin 16g/kg of pulp.

Jelly from the Neera can be prepared by using pectin 13 g/kg of Neera and can be safely stored for six months.

## AGRICULTURAL ENGINEERING

Utilize blend of banana pseudostem sap and aonla fruit juice having 3.5% and 8% TSS respectively with the ratio of 90:10 for the preparation of ready to serve drink.

In banana follow 45cm deep open drainage system (bottom width 15cm and top width 105 cm) spaced 12 m apart with 1:1 side slope and a bed slope of 0.05%, to achieve higher yield.

For growing irrigated castor (GCH-7) during rabi season adopt laser land leveling technique to provide 0.45 per cent longitudinal slope to castor field.

Use the low cost roof top cement brick type solar still covered with 4mm thick toughened glass developed by NAU to get 2 l/m<sup>2</sup> - day distilled water.

## ANIMAL PRODUCTION AND FISHERIES

Give supplement bypass fat @ 100 g/d for nearly 15 days pre-partum and 90 days post-partum to lactating Surti buffaloes to increase milk fat percentage.

For freshwater fish farming rear 166 fingerlings/m<sup>3</sup> in cage farming system to obtain profitable stunted yearlings.

Use the rubber mat (6 feet x 4 feet x 17 mm) on concrete floor to improve the comfort level and minimize the limb affections of crossbred cows.

Include daily the fresh leaves of Banyan tree (120g/d) in the diet of Surti kids to control gastrointestinal worm load for better growth rate and income.

Supplement daily 6-7 g of yeast (*Saccharomyces cerevisiae*) along with concentrate to 4-6 month kids for better growth rate at lower feed cost to the Surti goat.

## ANIMAL HEALTH

Brachycephalic breeds of dogs (Pug & Boxer) should be subjected to routine ophthalmic check up by veterinarians at every four months.



## NAUROJI BIOFERTILIZERS

ઉચ્ચ ગુણવત્તા ધરાવતા સંશોધિત નૌરોજી જૈવિક ખાતરો

Azotobacter

Rhizobium

Acetobacter

Azospirillum

PSB

KMB



### Benefits of Biofertilizers

- ✓ 50% reduction in chemical fertilizers
- ✓ 20% increase in production
- ✓ 20-40 kg/ha increase phosphorous solubilization
- ✓ Improve soil texture and Increase soil fertility
- ✓ Eco-friendly
- ✓ Increase seed germination
- ✓ Improve plant growth by vitamins and growth hormones

### જૈવિક ખાતરો થી થતા ફાયદા

- ✓ ૫૦% રાસાયણીક ખાતરો ની બચત
- ✓ ઉત્પાદન માં ૨૦% વધારો
- ✓ પ્રતિ હેક્ટર ૨૦-૪૦ કિ.ગ્રા રાસાયણીક ફોસ્ફરસ ખાતરની લભ્યતા વધારે
- ✓ જમીનનું બંધારણ સુધારે અને તેની ક્ષમ્બુપતામાં વધારો
- ✓ કિસ્યતી તેમજ પર્ચાવરણ માટે સુરક્ષિત
- ✓ છોડના ઉગવાના દરને વધારે
- ✓ વિટામીન તેમજ વૃદ્ધિ વર્ધકો બનાવી છોડને પોષણ પુરું પાડે

### Manufactured and Marketed by

Biofertilizers Production Unit  
Department of Plant Pathology, N.M. College of Agriculture  
Navsari Agricultural University, Navsari-396450  
Contact No.: +91 9537294343

### ઉત્પાદન કરતાં તેમજ વિક્રેતા

બાયોકર્ટીલાઈઝસ પ્રોડક્શન યુનિટ  
વનસ્પતિ રોગશાસ્ત્ર વિભાગ, ન.મ.કૃષિ મહાવિદ્યાલય  
નવસારી કૃષિ યુનિવર્સિટી, નવસારી-૩૯૬ ૪૫૦  
સંપર્ક: +૯૧ ૯૫૩૭૨૯૪૩૪૩



## NAUROJI STONEHOUSE FRUITFLY TRAP

- ◆ To control the Fruit flies in mango, sapota and other fruits and in climber vegetables
- ◆ It prevents yield loss up to 85% and eco-friendly in nature
- ◆ Fruit Crops- Methryl Eugenol Block Vegetables- Caclure Block
- ◆ 10 Traps/ha
- ◆ Hang above 5 to 6 feet from the ground



## નૌરોજી સ્ટોન હાઉસ ફળમાખી ટ્રેપ

- ◆ કેરી, ચીકુ અન્ય ફળોમાં તથા વેલવાળા શાકભાજીમાં ફળ-માખીના નિયંત્રણ માટે
- ◆ ઉત્પાદનમાં ૮૫% સુધીના નુકશાન અટકાવે છે
- ◆ ફળ પાકો માટે- મિથાઈલ મેથાઈલ બ્લોક અને વેલવાળા શાકભાજી માટે- ક્લોલુર બ્લોક
- ◆ ૧૦ ટ્રેપ પ્રતિ હેક્ટર
- ◆ જમીનથી ૫ થી ૬ ફૂટ ઊંચે લટકાવો



### ઉત્પાદક અને વિક્રેતા:

ફૂડ કન્વર્સિટી ટેક્સ્ટા લેબોરેટરી  
ન. મ. કૃષિ મહાવિદ્યાલય  
નવસારી કૃષિ યુનિવર્સિટી  
નવસારી- ૩૯૬ ૪૫૦  
સંપર્ક. ફોન. નં. ૦૨૬૩૭ ૨૮૨૯૩૮

