



NAVSARI AGRICULTURAL UNIVERSITY

YEAR : 2023



RESEARCH ACCOMPLISHMENTS AND RECOMMENDATIONS

DIRECTORATE OF RESEARCH
NAVSARI AGRICULTURAL UNIVERSITY
NAVSARI - 396 450 (GUJARAT)





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Navsari Agricultural University
Navsari - 396 450



:: MESSAGE ::

Navsari Agricultural University extends its excellence in tripartite activities *viz.* education, research and extension in agricultural and allied science. As per the mandate of SAUs, the University undertakes research based on the feedback from farmers of seven districts of South Gujarat. Scientists of NAU have achieved success in developing sustainable technologies to enhance productivity and to improve quality of produce which would play a pivotal role towards Doubling the Farmers Income.

NAU has constituted 9 AGRESCO Research Sub-Committees to review, monitor and supervise research work annually and thereafter, approved research outline and progress is scrutinized at state level in the presence of experts from all SAUs of Gujarat (Combined AGRESCO) before taking varieties/ recommendations/ technologies to farmers.

It is my pleasure to present “Research Accomplishments and Recommendations-2023” covering nine new varieties and 80 need-based recommendations/ technologies developed by scientists for the farming and scientific communities during the year 2022-23.

I appreciate the efforts of scientific faculty members and supporting staff of university and congratulate them for developing useful varieties/ recommendations/ technologies for benefitting farming community. I heartily congratulate Director of Research and Dean P.G. Studies and his team for compiling and publishing this booklet.

Date : 06/09/2024
Place : Navsari


(Z. P. Patel)
Vice- Chancellor



NAVSARI AGRICULTURAL UNIVERSITY



Navsari Agricultural University
Navsari - 396 450



:: FOREWORD ::

It is a matter of immense pleasure for me to put forth the publication of “Research Accomplishments and Recommendations-2023”. The prestigious booklet contains new varieties and technologies developed by the scientists of various Research Sub-Committees of Navsari Agricultural University. These varieties/ technologies were critically discussed at length and approved in the 19th Combined AGRESO meeting hosted by Anand Agricultural University, Anand during April 25 to May 17, 2023 in virtual mode.

I congratulate all the scientists of NAU for their continuing efforts to improve the research output of the University and developing new varieties and technologies for the benefit of farming and scientific community. I am also thankful to all the conveners of various sub-committees of Agricultural Research Council of Navsari Agricultural University for their enthusiastic contribution.

I express my sincere thanks to Hon'ble Vice Chancellor, Dr. Z. P. Patel for his constant guidance and useful inputs in improving the research outcome of NAU. I also take this opportunity to appreciate the efforts made by technical staff of Directorate of Research for publishing farmer centric booklet.

Date : 06/09/2024
Place : Navsari

(T. R. Ahlawat)

Director of Research & Dean
Faculty of P.G. Studies



NAVSARI AGRICULTURAL UNIVERSITY



RESEARCH RESUME

The research work carried out in different fields of agricultural sciences during the year 2022-23 were deliberated upon and discussed in detail by different AGRESKO sub-committees of Navsari Agricultural University, Navsari for bringing out useful and beneficial recommendations for farmers and scientific community. Finally, 47 and 33 recommendations for farmers and scientific communities, respectively were approved in the 19th Combined AGRESKO meeting of SAUs and Kamdhenu University hosted by Anand Agricultural University, Anand during April 25 to May 17, 2023 in virtual mode.

In the Crop Improvement group, total 9 high yielding varieties were identified for release from NAU including 2 varieties of rice (GR 25, GR 26) and 1 each from Grain sorghum (Gujarat Jowar-102), Fenugreek (GM 4), Desi cotton (G Cot. 31), Tannia (G. Tannia 1), Adenium (GAd 5), Turfgrass (GTG 1) and Endorsement cotton (GN. Cot. 44) .

Location specific and economically viable production technologies were recommended by NRM sub-committee that covered various aspects *viz* . fertigation, land levelling, mulching, weed management, integrated nutrient management and irrigation in different crops.

The achievements of Plant Protection group include efficacy of biorational insecticides against rice yellow stem borer, chemical control of die-back of mango, evaluation of different insecticides against sucking pests in Bt cotton etc.

In the pursuit of increasing fruits, vegetables, flower and forest tree production, recommendations which emerged out were related to effect of growth regulators, effect of organic spray, pruning in the Horticulture & Forestry sub-committees.

In Agricultural Engineering group, evaluation of tillage practices conservation practices for agricultural crops as well as design and development of battery operated NSKE sprayer.

The details of different sub-committees, conveners and number of approved recommendations for farmers and scientific communities and approved new technical programmes are as under.



S. N.	Name of the Sub-Committees	Name of Convener	No. of Recommendations		N T P
			Farmers	Scientific	
1.	Crop Improvement	Dr. Bharat K. Davda	09	00	00
2.	Natural Resource Management	Dr. Sonal Tripathi	18	02	24
3.	Plant Protection	Dr. Hemant Sharma	08	10	20
4.	Horticulture	Dr. Dev Raj	14	03	13
5.	Forestry	Dr. Sumankumar Jha	01	03	08
6.	Agril. Engineering	Dr. Parag Pandit	03	05	09
7.	Basic Science	Dr. Rajkumar Katagi	03	03	06
8.	Social Science	Dr. Narendra Singh	00	06	24
9.	Animal Science	Dr. Sanjay Pradhan	00	01	00
Total			56	33	104

RECOMMENDATIONS FOR FARMERS

I CROPIMPROVEMENT

1. Sorghum: GJ-102 (Surat Goti)

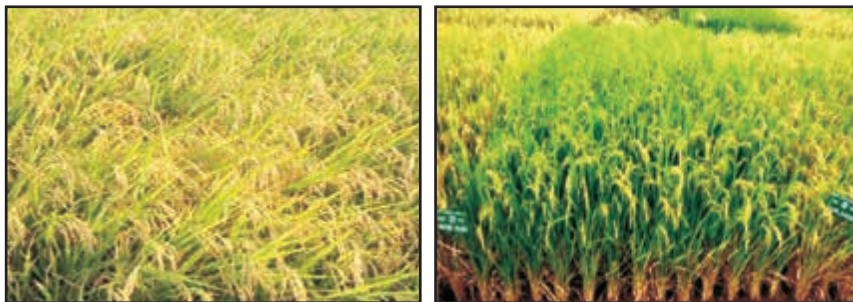
The farmers of Gujarat state are recommended to grow grain sorghum variety Gujarat Jowar-102 (GG 102: Surat Goti) during *Rabi* and *Kharif* seasons. The proposed genotype recorded average grain yield of 2731 kg/ha and dry fodder yield of 7390 kg/ha during *Rabi* season with grain yield increment of 12.4 %, 12.9 % and 21.0 % over *Rabi* check varieties GJ-101 (Madhu Moti), Phule Revati and CSV-29R, respectively. While during *Kharif* season, this variety produced 2535 kg/ha grain yield and 13937 kg/ha dry fodder yield with grain yield superiority of 6.2 %, 11.2 % and 14.5 % over *Kharif* checks GJ-44 (Madhu), GNJ-1 and CSV 20, respectively. The proposed variety exhibited moderate resistance disease reaction and low incidence of stem borer and shoot fly as compared to susceptible check.



(Research Scientist, MSRS, NAU, Surat)

2. Rice: GR-25 (Mahatma)

The farmers of Gujarat state are recommended to grow long bold rice variety Gujarat Rice 25 (GR 25: Mahatma) in transplanted condition during *kharif* season. The proposed variety recorded average grain yield of 6301 kg/ha in Gujarat, which was 26.0 and 34.7 per cent higher over the check varieties GNR-3 and Jaya, respectively. Rice variety GR 25 contains high head rice recovery (58.3%) and high 1000 grain weight (33.8 g). The proposed variety showed moderate resistance against leaf blast, stem borer, sheath mite and leaf folder.



(Associate Research Scientist, RRRS, NAU, Vyara)

3. Rice: GR-26 (Navsari Lalmoti)

The farmers of Gujarat state are recommended to grow early maturing, non-lodging rice variety GR 24 (Navsari Parimal) in transplanted condition during *kharif* season. The proposed variety recorded average grain yield of 5038 kg/ha in Gujarat, which was 21.8 and 9.0% higher over the check varieties GR 7 and GAR 3, respectively. Long slender grain rice variety, GR 24 contains intermediate amylose (24.8%) and high head rice recovery (58.2%). The proposed variety showed moderate resistance against leaf blast disease, brown plant hopper and white backed plant hopper pests.



(Associate Research Scientist, MRRC, NAU, Navsari)

4. Fenugreek: GM-3 (Supriya)

The farmers of Gujarat state are recommended to grow fenugreek variety Gujarat Methi 4 (GM 4: Supriya). The bold seeded fenugreek variety GM 4 recorded 1586 kg/ha mean seed yield in Gujarat. It has exhibited overall 15.9, 23.5 and 24.3 per cent seed yield superiority over check varieties GM 2, Hissar Sonali and RMT 361, respectively. It possesses indeterminate "V" shaped growth pattern coupled with tall plant height (60.26 cm), less number of primary branches (5.95) as well

as secondary branches (2.63) per plant, which makes it more suitable for dense planting. It is also having higher number of pods per plant (39.22), medium long pod length (11.65 cm), more number of seeds per pod (15.78) along with higher 1000 seed weight (17.39 g) which makes it more productive. The higher seed protein content (29.75 %) and higher crude fiber (22.01 %) as well as comparable diosgenin content (317.00 mg/100 g) are the value-added traits in the proposed variety. This variety gave moderate resistant reaction to powdery mildew and root rot diseases.



(Prof. & Head, Dept. of GPB, NMCA, NAU, Navsari)

5. Desi cotton: Gujarat Cotton 31 (Narmada Gold)

The farmers of Gujarat state are recommended to grow desi cotton variety Gujarat cotton 31 (G Cot. 31: Narmada Gold) under rainfed conditions. The Desi Cotton variety G Cot. 31 recorded 1353 kg/ha average seed cotton yield which was 31.8 and 29.3 per cent higher than checks G. Cot. 23 and GN. Cot. 25, respectively under rainfed condition of South Gujarat. It exhibited 451 kg/ha average lint yield and 33.2% average ginning out turn. The GBhv 356 showed disease resistant reaction against Wilt, Alternaria leaf spot as well as Bacterial leaf blight diseases. The proposed variety recorded below ETL



population of sucking pests. The bollworms damage in G Cot. 31 was also found comparable to checks.

(Associate Research Scientist, RCRS, NAU, Bharuch)

6. Tannia: Gujarat Tannia 1 (Navsari Pari)

The farmers of Gujarat state are recommended to grow Gujarat Tannia 1 (G. Tannia 1: Navsari Pari) during *kharif* season. The proposed variety recorded average green leaves yield of 7.96 t/ha and after 270 days of planting, corm and cormel yield 10.02 t/ha in south Gujarat which was 31.1 and 14.8 per cent higher over national check variety Konkan Haritparni, respectively. The variety also has higher starch (8.15%) and low fibre content (1.65%) with value added traits. This variety showed lower population of aphids as well as less prevalence of phytophthora leaf blight and corm rots as compared to check



(Professor, Dept. of Veg. Sci., ACH, NAU, Navsari)

7. Adenium: Gujarat Adenium 5 (Shashaank)

The nursery men dealing with ornamental plants, landscape designers and plant lovers are recommended to grow adenium variety Gujarat Adenium 5 (GAd 5: Shashaank) under polyhouse for higher commercial value as well as in garden and house plant. Adenium variety GAd 5 is novel that it bears white coloured flowers having multipetalous flower form with dual whorls of petals (10) in each flower along with more flowers per cluster and flowering duration. It can be propagated by grafting on local pink root stock.

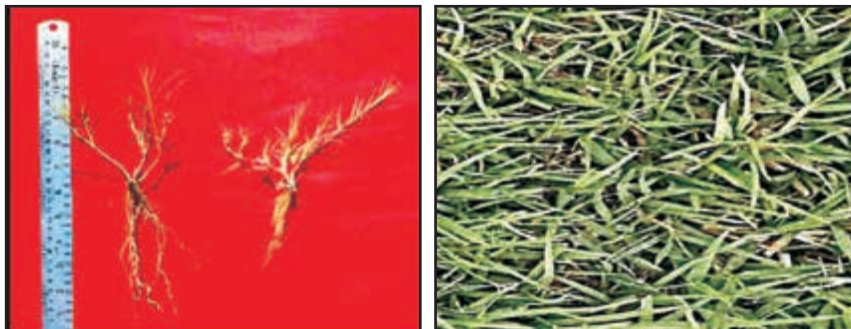


(Prof., Dept. of Flori. and Landscape Archi. ACH, NAU, Navsari)

8. Turfgrass: Gujarat Turf Grass 1 (Arna)

The farmers, nurserymen and professional landscapers of the

Gujarat state are advised to grow turf grass (Lawn) variety Gujarat Turf Grass 1 (GTG 1: Arna) with early establishment rate (minimum days taken for 90% coverage), high turfing ability, root depth and lower shoot- root ratio than the check Selection 1. The proposed variety has good aesthetic appearance, require less number of mowing and less incidence of pest and disease in proposed variety.



(Prof.,Dept. of Flori. and Landscape Archi. ACH, NAU, Navsari)

9. Endorsement Cotton: GISV 312 (GN. Cot. 44)

The farmers of Gujarat state are recommended to grow hirsutum cotton variety GISV 312 (GN. Cot. 44) under rainfed conditions for high density planting”. The hirsutum cotton variety GISV 312 recorded average seed cotton yield of 2534 kg/ha in Gujarat under rainfed condition where it exhibited seed cotton yield advantage of 26.7, 18.7 and 63.6 per cent over check varieties G.Cot.16, Suraj and G.Cot.42, respectively with narrow spacing at 60 x 15 cm. The average lint yield in GISV 312 was 997 kg/ha. It has 41.7 per cent ginning outturn. GISV 312 (GN. Cot. 44) showed resistant reaction for bacterial leaf blight and alternaria leaf spot as well as resistant to moderately resistant for grey mildew. It showed moderate to lower population of whitefly, thrips and aphids, whereas boll worm damage was found below ETL.



(Research Scientist, MCRS, NAU, Surat)

II NATURAL RESOURCE MANAGEMENT

1. Effect of fertigation on vegetable okra in clay soils of South Gujarat

The farmers of South Gujarat growing summer okra under drip irrigation system are recommended to apply 5 t/ha biocompost as basal and recommended dose of fertilizer (100-50-50 kg N-P₂O₅-K₂O/ha). Apply either N in form of urea through fertigation and P in form of single super phosphate and K in form of muriate of potash as basal or apply N in form of urea and K in form of muriate of potash through fertigation and P in form of single super phosphate as basal for getting higher yield and net income.

Or

Apply 5 t/ha biocompost as basal and fertigate RDF of N, P and K through water soluble fertilizers, 17:44:00 urea phosphate for N and P and remaining N through urea and K in the form of muriate of potash or 25% RDF as basal soil application through urea, SSP and MoP and fertigate 75% RDF of N, P and K through water soluble fertilizers, 17:44:00 urea phosphate for N and P and remaining N through urea and K in the form of muriate of potash for getting higher yield and net income. Fertigation schedule:

Fertigation schedule:

Growth period (Week)	No. of splits	% of total
		N & K / P
2 to 3	2	10 / 40
4 to 7	3	50 / 30
8 to 12	3	40 / 30

System details:

Lateral spacing	:	1.20 m
Dripper spacing	:	0.60 m
Dripper discharge	:	4 lph
Operating pressure	:	1.20 kg/cm ²

Operating time (alternate day):

March : 120-140 min., April: 140-160 min., May: 160-180 min.

(Research Scientist, SWMRU, NAU, Navsari)

2. Effect of land leveling on crop water requirement and growth of sugarcane

Farmers of South Gujarat growing sugarcane (plant and ratoon crop) are recommended to make 0.1 per cent slope along the field slope by laser leveler for furrow irrigated sugarcane crop for achieving higher cane yield and net profit along with 15 per cent water saving as compared to non-uniform slope of field.

3. Effect of methods and levels of irrigation on sweet potato under South Gujarat conditions

The farmers of South Gujarat growing sweet potato during *rabi* season are recommended to adopt drip method of irrigation and place drip line between two rows on raised bed (100 cm top width and 60 cm furrow width) at a spacing of 80 cm x 30 cm for achieving higher tuber yield, net profit and good quality tubers along with 39 per cent water saving.

System details :

Lateral spacing	:	1.60 m
Dripper spacing	:	0.60 m
Dripper discharge	:	4 lph
Operating pressure	:	1.20 kg/cm ²

Operating time (alternate day):

December: 60-85 min, January: 70-100 min, February: 80-110 min, March: 120-150 min

(Research Scientist, SWMRU, NAU, Navsari)

4. Response of Bt. Cotton to gypsum, organic manure and nitrogen levels under partially reclaimed coastal salt affected soils

Farmers growing Bt. Cotton hybrids in partially reclaimed coastal salt affected soil of South Gujarat are recommended to apply 50% of gypsum requirement with 10 t biocompost/ha during land preparation. Further, they are advised to apply nitrogen (240 kg/ha) in 5 equal splits at 30, 60, 75, 90, 105 DAS along with phosphorus (40 kg/ha) as basal for getting higher seed cotton yield and net income. Application of gypsum was also found to reduce soil sodicity.

(Research Scientist, SWMRU, NAU, Navsari)

5. Effect of irrigation and mulching on productivity of brinjal under coastal salt affected soils

The farmers of coastal areas of South Gujarat growing late kharif

season brinjal following ridge and furrow method are recommended to use silver black plastic mulch (50 μ thick) on the ridges and give irrigation at 18- 20 days after cessation of monsoon and remaining irrigations at 12-14 days interval for getting higher fruit yield and net income.

(Research Scientist, SWMRU, NAU, Navsari)

6. Sustainable weed management in aerobic rice system

The farmers of South Gujarat growing aerobic rice are recommended to use mechanical hand weeder, first at 20 days after sowing and subsequent two at 15-20 days interval for efficient weed management, getting higher grain yield and net income.

(Research Scientist, SWMRU, NAU, Navsari)

7. Assessment of planting geometry for single eye budded settling on sugarcane under South Gujarat condition

The farmers of South Gujarat planting sugarcane through single eye bud settling are recommended to plant the settling at 120 cm row spacing or with pair row of 60-120-60 cm. Further, it is also recommended to keep plant to plant distance 45 cm for getting higher yield and net return.

(Research Scientist, SWMRU, NAU, Navsari)

8. Optimization of sowing time and row spacing for Indian bean var. GNIB-22

The farmers of South Gujarat growing Indian bean (GNIB-22) during *kharif* season are recommended to sow the crop during first to third week of August with spacing of 60 cm x 30 cm for getting higher and profitable yield.

(Nodal Officer (Megaseed) and Unit Head, PCRS, Navsari)

9. Optimization of inter and intra row spacing for pigeon pea var. GT 104

The farmers of South Gujarat growing Pigeon pea var. GT-104 during *kharif* season are recommended to sow the crop at the spacing of 150 cm x 60 cm for getting higher yield and net returns.

(Nodal Officer (Megaseed) and Unit Head, PCRS, Navsari)

10. Performance of Arborium cotton to nitrogen levels and planting density under rainfed condition

Farmers growing Arborium cotton (Desi) under rainfed condition are recommended to sow the crop at 60 x 15 cm spacing in South Gujarat heavy rainfall zone and 60 x 30 cm spacing in South Gujarat

zone and apply 150 kg Nitrogen/ha in two equal splits (75 kg N/ha each) at 30 and 60 days after sowing for achieving higher seed cotton yield and net income.

(Research Scientist, MCRS, Surat)

11. Integrated nitrogen management in *kharif* grain sorghum

The farmers of South Gujarat growing *kharif* sorghum are recommended to apply 20 kg N/ha through Neem cake (803 kg/ha) + 20 kg N/ha through Castor cake (463 kg/ha) well mixed with soil during land preparation along with recommended basal application of phosphorus (40 kg P₂O₅/ha) and top dressing of 40 kg N/ha through urea at 30 DAS to achieve higher yield and net return.

(Associate Research Scientist, CRSS, Achhalia)

12. Effect of organic manures on soil health and nutrient requirement of *kharif* and summer rice crop sequence (IF-1)

The farmers of South Gujarat growing long term *kharif* rice-summer rice crop sequence are recommended to apply 5.0 t Biocompost/ha + 25.0 kg N/ha and 25 kg P₂O₅/ha as basal, 12.5 N/ha at 25 DAS and 12.5 N/ha at 50 DAS or 1.0 t castor cake/ha + 25.0 kg N/ha and 25 kg P₂O₅/ha as basal, 12.5 N/ha at 25 DAS and 12.5 N/ha at 50 DAS to *kharif* and summer rice for getting higher yields, net returns and sustain the soil health.

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

13. Integrated nutrient management in summer fodder pearl millet (*Pennisetum glaucum* L.) under South Gujarat condition

The farmers of South Gujarat growing fodder pearl millet in summer season are recommended to apply bio compost 5.0 t/ha and 125 kg N/ha (62.5 kg N/ha as basal and remaining 62.5 kg N/ha at 30 DAS) with bio-fertilizer (Azotobacter + PSB) as seed treatment for getting higher yield and net returns with better quality.

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

14. Integrated nutrient management in seed production of fodder cowpea (*Vigna unguiculata* L.) under South Gujarat condition

The farmers of South Gujarat growing fodder cowpea for seed production during summer season are recommended to apply Bio compost 2.0 t/ha along with 15 kg N/ha and 30 kg P₂O₅ as basal for getting higher yield and net returns

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

15. Effect of boron and zinc application on growth, yield and quality of sugarcane (*Saccharum officinarum* L.) under south Gujarat condition

The farmers of South Gujarat growing plant and ratoon sugarcane are recommended to apply 2 kg boron/ha (20 kg Borax/ha) if soil is deficient in boron or 10 kg Zn/ha (50 kg Zinc sulphate/ha) if soil is deficient in zinc or if soil is deficient in both then apply 2 kg boron/ha (20 kg Borax/ha) and 10 kg Zn/ha (50 kg Zinc sulphate/ha) at the time of planting in plant crop only along with recommended dose of chemical fertilizer to plant and ratoon cane for getting higher yield, quality and net return of plant and ratoon sugarcane.

(Professor & Head, Dept. of SSAC, NMCA, NAU, Navsari)

16. Effect of row and plant spacing on pigeon pea

Farmers of South Gujarat cultivating rainfed pigeonpea (GNP 2) are advised to sow the crop at 120 cm x 20 cm spacing for producing higher and profitable yield.

(Professor of Agronomy, CoA, Bharuch)

17. Effect of land configuration and drought mitigating strategies in pigeonpea under rainfed condition

Farmers of south Gujarat growing rainfed pigeonpea are recommended to sow pigeonpea either on broad bed furrow system (150 cm bed & 30 cm furrow) or on ridges and furrow system with 5 t/ha FYM. Further, Pusa Hydrogel 2.5 kg should be applied in sowing rows mixed with FYM or 1% KNO₃ spray after cessation of rainfall to increase pigeonpea production.

(Professor of Agronomy, CoA, Bharuch)

18. Response of pigeonpea to spacing and fertility levels under rainfed condition of south Gujarat

Farmers of South Gujarat growing rainfed pigeonpea (GNP 2) crop are recommended to apply bio-compost 2 t/ha + seed treatment with rhizobium and PSB bio-fertilizer (each 10 ml/kg seeds) or Bio-compost 2 t/ha + 1 % foliar spray of Banana pseudostem stem enriched sap at bud initiation and flowering stage for producing higher and profitable yield of pigeonpea crop and to improve the nitrogen and phosphorus availability in soil.

(Professor of Agronomy, CoA, Bharuch)

III PLANT PROTECTION

[A] Agricultural Entomology

1. *In vitro* compatibility of *Metarhizium anisopliae* with insecticides

The farmers are advised to refer the following table for mixing *M. anisopliae* with different insecticides

Sr. No.	Insecticides	0.5 X RD			1 X RD			2 X RD		
		% Conc.	Dose (ml/g) per lit.	Farmer are advised to mix the insecticides with <i>M. anisopliae</i> (Yes/No)	% Conc.	Dose (ml/g) per lit.	Farmer are advised to mix the insecticides with <i>M. anisopliae</i> (Yes/No)	% Conc.	Dose (ml/g) per lit.	Farmer are advised to mix the insecticides with <i>M. anisopliae</i> (Yes/No)
1.	Profenophos 50EC	0.0500	1.00	No	0.100	2.00	No	0.200	4.00	No
2.	Quinalphos 25EC	0.0250	1.00	Yes	0.050	2.00	Yes	0.100	4.00	No
3.	Dimethoate 30EC	0.0150	0.50	Yes	0.030	1.00	Yes	0.060	2.00	No
4.	Cypermethrin 10EC	0.0050	0.50	Yes	0.010	1.00	Yes	0.020	2.00	Yes
5.	Deltamethrin 2.8EC	0.0014	0.50	Yes	0.003	1.07	Yes	0.006	2.14	No
6.	Lambda cyhalothrin 5EC	0.0013	0.26	Yes	0.003	0.60	No	0.005	1.00	No
7.	Spinosad 45SC	0.0068	0.15	No	0.014	0.31	No	0.027	0.60	No
8.	Indoxacarb 14.5SC	0.0036	0.25	No	0.007	0.48	No	0.015	1.03	No
9.	Fipronil 5SC	0.0050	1.00	No	0.010	2.00	No	0.020	4.00	No
10.	Diafenthiuron 50WP	0.0250	0.50	Yes	0.050	1.00	Yes	0.100	2.00	No
11.	Flubendiamide 39.35SC	0.0059	0.15	No	0.012	0.30	No	0.024	0.61	No
12.	Chlorantraniliprole 18.5SC	0.0028	0.15	Yes	0.006	0.32	Yes	0.011	0.59	No
13.	Cyantraniliprole 10.26OD	0.0062	0.60	No	0.012	1.17	No	0.025	2.44	No
14.	Emamectin benzoate 5SG	0.0013	0.26	No	0.003	0.60	No	0.005	1.00	No
15.	Imidacloprid 17.8SL	0.0027	0.15	Yes	0.005	0.28	No	0.011	0.62	No
16.	Acetamiprid 20SP	0.0040	0.20	Yes	0.008	0.40	Yes	0.016	0.80	No
17.	Thiamethoxam 25WG	0.0050	0.20	Yes	0.010	0.40	Yes	0.020	0.80	Yes
18.	Chlorfenapyr 10SC	0.0100	1.00	Yes	0.020	2.00	No	0.040	4.00	No
19.	Fenpyroximate 5EC	0.0025	0.50	No	0.005		No	0.010	2.00	No

(Professor & Head, Deptt. of Entomology, NMCA, NAU Navsari)

2. Survey of pollinator fauna and floral diversity under South Gujarat

Conditions

A) The farmers and policymakers of Gujarat state are recommended to grow fruit trees and vegetations of forest/aesthetic values like; amali, amla, arjun, ashok tree, bottle brush, flemingia, garmalo, jamun, kamini, limado, nagod, papaya, parda vel, simalo, supari, tamravruksh, and Tecoma gaudichaudi on field boundary, wasteland as well as social forestry and save it to conserve native pollinators.



B) The farmers and policy makers of Gujarat state are recommended to grow trees/plants like; ber, bottle brush, cordia, flemingia, hamelia, jamun, jatrophha, kamini, karen, limado, madhumalti, nagod, naliyeri, papaya, parda vel, sitafal, supari, and tagar on field boundary, waste land as well as social forestry and save it to conserve stingless bees.



C) The beekeepers of Gujarat state are recommended to follow the flower calendar mentioned in below table for the migration of their bee hives in different vegetations during respective periods for their conservation.

Flower calendar (For beekeeper of Gujarat)															
Type of flower resources	Month	No. of vegetation with flora during the particular month												Locations*	
		JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC		
Ajwain															Jamnagar, Surendranagar, Morabi, Junagadh, Ahmedabad, Banaskantha
Babul (Acacia)															Saurashtra, Kutch, North & Middle Gujarat
Ber															Morbi, Rajkot, Jamnagar, Vadodara
Coriander															Junagadh, Rajkot, Jamnagar, Porbandar
Coconut															Gir Somnath, Bhavnagar
Fennel															Surendranagar, Morbi, Junagadh, Patan, Sabarkantha, Panchmahal,
Jamun (Ravana)															Junagadh, Chhotaudepur, Anand
Lucern															Banaskantha, Patan, Bhavnagar
Mustard															Banaskantha, Patan, Mahisagar, Sabarkantha
Nilgiri															Panchmahal, Chhotaudepur, Dahod
Sesamum															Morbi, Junagadh, Anreli, Rajkot

* Small area of respective crops in the adjoining district is involved in the mentioned district

(Professor & Head, Dept. of Entomology, NMCA, NAU Navsari)

3. Efficacy of biorational insecticides against rice yellow stem borer, *Scirpophaga spp* and leaf folder, *Cnaphalocrosis spp*.

Year	Crop	Pest	Pesticide with Formulation	Doses			Waiting period (days)	Remark Residue
				Quantity of Formulation per ha	Conc. (%)	Dilution in water		
2023	Rice	Stem borer, Leaf folder	Chlorantraniliprole 0.4 % GR	10 kg	0.04	-	53 As per CIB	BQL
			Chlorantraniliprole 18.5 % SC	150 ml	0.006	500 L	47 As per CIB	BQL

BQL:- Below Quantification Limit.

Below Quantification Limit of chlorantraniliprole 0.4 % GR and chlorantraniliprole 18.5 % SC is 0.001 mg/kg.

(Research Scientist, Main Rice Res. Center, SWMRU, NAU, Navsari)

4. Evaluation of different insecticides against sucking pests in *Bt* cotton

Farmers of Gujarat cultivating *Bt* cotton are recommended to spray flonicamid 50 WG at 0.015% (3 g/10 litre water) at initiation of any sucking pests (Aphid, leafhopper, thrips and mealybug) and subsequent two sprays at 15 days interval from first spray for effective and economical management.

Recommendation for PHI as per CIBRC format:									
Year	Crop	Pests	Pesticides with formulation	Dosage/ha				Application schedule	Waiting period (days)*
				g a.i.	Conc. (%)	Quantity of formulation (or ml)	Dilution in water (L)		
2023	Cotton	Sucking pests (Aphid, leafhopper, thrips and mealybug)	Flonicamid 50 WG	75	0.015	150	500	First spray at initiation of sucking pests and subsequent two sprays at 15 days interval from first spray	25

*As per the CIBRC

(Research Scientist, Main Cotton Res. Station, NAU, Surat)

5. Evaluation of insecticides against sorghum stem borer

The grain sorghum growers of south Gujarat are recommended to spray chlorantraniliprole 18.5 SC @ 4.0 ml/10 lit of water or emamectine benzoate 5 SG @ 6.25 g/10 lit of water at 25 and 45 DAG (days after germination) of the crop for effective and economical management of sorghum stem borer.

As per CIBRC format

Year	Crop	Pest	Pesticides	Dosage /ha			Application Schedule	Waiting Period
				a.i.	Quantity (g or ml)	Dilution in water (L)		
2023	Sorghum	Stem borer	Chlorantraniliprole 18.5 SC	40 g.a.i./ha	400 ml	500	1 st spray 25 DAE of crop	--
			Emamectine benzoate 5 SG	200 g a.i./ha	625 g	500	2 nd spray 45 DAE of Crop	--

(Research Scientist, Main Sorghum Res. Station, NAU, Surat)

[B] Plant Pathology

1. Management of leaf and flower blight of Marigold

The marigold growers are recommended to apply three sprays of hexaconazole 4 + zineb 68 WP, 0.072 % (10 g/ 10 litre of water) or mancozeb 75WP, 0.225 % (30g/10 litre of water) or tebuconazole 50 + trifloxystrobin 25WG, 0.03 % (4g/ 10 litre of water) for effective management of leaf and flower blight. The first spray should be given after initiation of disease and subsequent two sprays at 15 days interval.

Note: Farmer recommendation for non-medicinal purpose.

As per CIBRC format:

Crop	Disease	Fungicides	Concentrations (a. i %)	Quantity g or ml/ 10L	Dilution in water (liter)	Waiting period
Marigold (Not included in CIBRC)	Leaf and flower blight	Hexaconazole 4 + Zineb 68 WP	0.072	10 g	10	-
		Mancozeb 75WP	0.225	30 g	10	-
		Tebuconazole 50 + trifloxystrobin 25WG	0.03	4.0g	10	-

(Prof. & Head, Deptt. of Plant Protection, ACH, NAU, Navsari)

2. Evaluation of bioagents against cotton disease

Cotton growing farmers of South Gujarat are recommended to follow the seed treatment of *Pseudomonas fluorescens* 0.5% WP (10^8 cfu/g) 10g per kg of seeds before sowing and two applications of *Pseudomonas fluorescens* 0.5% WP (10^8 cfu/g) 2.5 kg/ha mixed in 250 kg of vermicompost at 30 and 60 days after sowing for the effective and economical management of bacterial leaf blight.

Year	Crop	Pest/ disease	Pesticides/ Biocontrol with formulation	Dosage			Application schedule	Waiting period/ PHI (days)
				g. a. i. /ha	Conc. (%)	Dilution in water (10 lit)		
2023	Cotton	Bacterial leaf blight	<i>Pseudomonas fluorescens</i> 0.5% WP	10 g/kg of seed	-	-	Seed Treatment	-
Remark: <i>Pseudomonas fluorescens</i> 0.5% WP -CICR strain 10^8 cfu/g yet to register in CIBRC								

(Research Scientist, Main Cotton Res. Station, NAU, Surat)

3. Management of collar rot disease of chickpea (*Cicer arietinum*) caused by *Sclerotium rolfsii*

Farmers of South Gujarat growing chickpea crop are recommended to treat seeds with *Pseudomonas fluorescens* 1.5% AS (1×10^8 cfu/ml) 10 ml/kg or *Trichoderma viride* 1.5% WP (2×10^6 cfu/g) 10 g/kg (25 ml water used to coat the seeds uniformly) + soil application of *T. viride* 2.5 kg/hectar (mixed in 250 kg FYM) at the time of sowing to manage collar rot disease.

As Per CBRC format							
Year	Crop	Name of Disease	Pesticides with formulation	a.i. (g)	Formulation (g/ml) %	Dilution in Water	Waiting period
2023	Chickpea	Collar rot (<i>S. rolfsii</i>)	<i>Pseudomonas fluorescens</i> (1×10^8 CFU/ml)	-	10 ml/kg seeds	Sufficient to coat the seeds uniformly	NA
2023	Chickpea	Collar rot (<i>S. rolfsii</i>)	<i>Trichoderma viride</i> (2×10^6 cfu/g) 1.5% WP	-	10 g/kg seeds	Sufficient to coat the seeds uniformly	NA

(Research Scientist, RRRS, NAU, Vyara)

IV HORTICULTURE

1. Effect of growth regulators on flowering and yield of sapota cv. Kalipatti

The farmers of South Gujarat agro climatic zone growing sapota cv. Kalipatti are recommended to apply foliar spray of CCC 100 mg l⁻¹ (10 g in 100 L water) in April month and GA₃ 50 mg l⁻¹ (5 g in 100 L water) in September and November month on adult tree along with RDF (100 kg FYM + 1000 : 500 : 500 NPK g/plant) for obtaining higher yield and net returns.

(Res. Scientist, RHRS, ACH, NAU, Navsari)

2. Alleviation of soil moisture deficit stress in banana

The farmers of South Gujarat agro climatic zone cultivating banana are recommended foliar application of Acetyl Salicylic Acid (18 mg/lit) at floral primordial initiation stage in banana plant (5 month after planting) under probability of water stress condition up to one month. The treatment reduced the effect of water stress and gave satisfactory growth, yield and increased net profit of banana.

(Associate Res. Scientist, FRS, NAU, Gandevi)

3. Fertigation scheduling for quality fruit production of mango

Farmers of South Gujarat agro climatic zone having adult orchard of Kesar mango are recommended to apply dose of fertilizers (750-160-750 g N-P-K per tree) through fertigation for getting higher yield and net realization.

Schedule of fertilizer application		
Splits	Fertilizers quantity per tree	Application Stage
N-40%, P-60%, K-20%	650 g Urea, 112 g Phosphoric acid, 250 g MOP	After harvest
N-40%, P-40%, K-20%	650 g Urea, 76 g Phosphoric acid, 250 g MOP	During fruit set
N-20%, K-60%	325 g Urea, 750 g MOP	At marble stage

Schedule of drip irrigation	
Number of dripper per tree	4
Dripper discharge	4 litre/hour
Operating pressure	1.20 kg/cm ²
Operating time	6 hour /day (two days at each stage)

(Research Scientist, AES, NAU, Paria)

4. Influence of sett size and spacing on growth and yield of greater yam (*Dioscorea alata* L.)

The farmers of South Gujarat agro climatic zone growing greater yam (Hemlata) are recommended to use 250 g tuber size and planting the greater yam at 90 cm x 60 cm spacing to get higher yield and net realization.

(Prof. (Pl. Breeding), Dept. of Veg. Sci., ACH, NAU, Navsari)

5. Effect of organic spray on growth, yield and quality of tomato (*Solanum lycopersicum* L.) under South Gujarat condition

Farmers of South Gujarat Agro-climatic Zone are recommended to spray Novel Organic Liquid Nutrients 1% (100 ml/10 liter of water) at 25, 50, 75 & 100 DATP along with recommended dose of fertilizer (100-50-50 N-P-K kg/ha) for higher yield and net realization in tomato cv. GT-7.

(Prof. (Pl. Breeding), Dept. of Veg. Sci., ACH, NAU, Navsari)

6. Effect of different bio-stimulants on growth, quality and yield of Dendrobium orchid under NVPH

Farmers of Gujarat growing dendrobium orchid under naturally ventilated polyhouse are recommended to spray Novel Prime @ 2% (20 ml in 1 L water) at every 15 days interval to obtain higher cut flower yield and better quality.

(Prof. & Head, Dept. of FLA, ACH, NAU, Navsari)

7. Studies on phenophase based nutrient scheduling on flower yield and quality in China aster

Farmers of South Gujarat agro climatic zone growing China aster are recommended to apply 180:120:60 kg NPK/ha. Wherein, 25% should be applied as basal dose and remaining 75 % through drip system in three splits in the following manner for higher yield as well as net realization.

Splits of NPK	Phenophase	75% RDF through fertigation (kg/ha)			Remarks
		Urea	12:61:00 (MAP)	00:00:50 (K ₂ SO ₄)	
First (40:20:20 %)	Vegetative phase	109.49	29.52	18.00	Three equal splits of fertilizers at weekly interval

Second (30:40:40 %)	Bud phase	72.51	59.04	36.00	Two equal splits of fertilizers at weekly interval
Third (30:40:40 %)	Flowering phase	72.51	59.04	36.00	Two equal splits of fertilizers at weekly interval

Note:

- 25% of RDF (Urea: 97.65 kg, SSP:187.50 kg and KCl:25.05 kg/ha) should be applied as basal dose
- Paddy straw @ 7.5 t/ha as mulch should be applied on raised beds.

(Prof.& Head, Dept. of FLA, ACH, NAU, Navsari)

8. Collection and evaluation of fillers (*asparagus*)

The farmers of South Gujarat agro climatic zone growing asparagus (*Asparagus densiflorus Sprenger*) as cut greens are recommended to grow in pot under 50 % green shade net house for higher cut foliage production and net profit

(Prof.& Head, Dept. of FLA, ACH, NAU, Navsari)

9. Collection and evaluation of fillers (*Dracaena*)

Farmers of South Gujarat agro climatic zone growing dracaena (*Dracaena fragrans 'Massangeana'*) as cut foliage are recommended to grow in pot under 50 % green shade net house to obtain higher production and net realization.

(Prof.& Head, Dept. of FLA, ACH, NAU, Navsari)

10. Collection and evaluation of fillers (*Ferns*)

Farmers of South Gujarat agro climatic zone growing fern (*Nephrolepis exaltata*) as cut foliage are recommended to grow in pot under 50 % green shade net house to obtain higher production and net realization.

(Prof.& Head, Dept. of FLA, ACH, NAU, Navsari)

11. Effect of cycocel, GA3 & saline irrigation water on African marigold (*Tagetes erecta*) cv. Pusa Narangi Gainda

The farmers of South Gujarat Agro climatic zone are recommended to grow marigold cv. Pusa Narangi Gainda by dipping 30 days old

seedling roots in 1.0 ml/l cycocel (50 % v/v) solution for 10 seconds before transplanting and irrigate with $< 2 \text{ ds m}^{-1}$ EC water for better flower production, quality and higher net realization.

(Prof. & Head, Dept. of Hort, NMCA, NAU, Navsari)

12. Effect of IBA and seasons on rooting of marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda cutting under poly tunnel

The farmers and nurserymen of the Gujarat growing marigold are advised that the lower portion of tip cuttings treated with IBA 1500 mg/L for 5 (five) seconds and insert in slanting position in sand under poly tunnel gave higher number of rooted cuttings, number of roots per rooted cutting and higher survival percentage of marigold in all the seasons.

(Prof. & Head, Dept. of Hort, NMCA, NAU, Navsari)

13. Standardization of method for extraction of passion fruits (*Passiflora edulis*) juice.

Processors and entrepreneurs are recommended to extract passion fruit juice by treating scooped pulpy seeds with combination of 0.05% pectinase and 0.05% cellulase for 2 hours to get higher juice recovery of 29.33% in comparison to control (20.15%). The juice after extraction is filtered, pre-heated (96°C), packed in glass bottles and thermally processed 213 for 30 min at 96+1 °C. The packed juice has storage stability for 6 months at ambient temperature.

(Prof. & Head, Dept. of PHT, ACH, NAU, Navsari)

14. Development of value added blended spiced squash using passion (*Passiflora edulis*) and bael (*Aegle marmelos* L.) fruits.

It is recommended to the processors, and entrepreneurs that passion and bael fruits can be blended for preparation of spiced squash using 25 per cent pulp (5:20 pulp proportion of passion: bael fruits) by maintaining with 45°Brix TSS and 1 per cent acidity along with spices and salts (salt 2 g, black salt 10 g, black pepper 4 g, cumin 2.5 g, large cardamom 2 g, mint juice 10 ml and ginger juice 10 ml per liter squash). The potassium metabisulphite @700 ppm should be added at the end of pasteurization (96°C for 15 minutes) followed by hot filling (72°C) in PET bottles. The blended spiced squash can be stored for 9 months at ambient temperature.

(Prof. & Head, Dept. of PHT, ACH, NAU, Navsari)

V. FORESTRY

1. Effect of windbreak (*Casuarina equisetifolia* L.) on productivity of paddy in South Gujarat

The Farmers of South Gujarat heavy rainfall zone-I are recommended that paddy grown under single line windbreak of *Casuarina* (*Casuarina equisetifolia* L.) planted at 1 m spacing in north-south direction having average of height of 20 m and DBH of 28 cm on the farm boundary reduced the lodging damage and improved the paddy yield as well as soil quality as compared to paddy grown in open plot (without any windbreak).

(PI & HOD, Silviculture and Agroforestry Dept., CoF, ACHF, NAU, Navsari)

VI. AGRICULTURAL ENGINEERING

1. Evaluation of tillage practices for green gram

The farmers of South Gujarat growing green gram (CO-4) in *rabi* season are recommended to use mini tractor operated seed drill having capacity of 0.21 ha/h for sowing at *vaspa* condition of soil which save 85% and 40% of labour and time, respectively, along with higher yield and net income.

(Head, Dept. of Ag. Engg, COA, NAU, Waghai)

2. Effect of different conservation practices on yield and water use efficiency of linseed

Farmers of South Gujarat growing linseed are recommended to adopt sunhemp green manuring during *kharif* season and ploughing at *vaspa* condition of soil followed by planking and rice straw mulching after sowing as conservation practices for improving yield, 8.15 kg/ha/mm water use efficiency and higher net realization.

(Head, Dept. of Ag. Engg, NMCA, NAU, Navsari)

3. Efficacy of drip irrigation on Malabar neem (*Melia composita wild*)

Farmers of South Gujarat Zone II, who intend to grow Malabar Neem (*Melia composita* Wild.), are recommended to grow at 2 m x 2 m spacing, for industrial Agro-forestry, should follow check basins method of irrigation. The dimensions of check basins should be 2m top width, 1.7m bottom width and 0.15m height, for getting higher biomass production from 5 years old tree plantation, with 6.97 BCR. The irrigation schedule to be adopted at weekly interval in various months is as follows:

Month	February	March-April	May	October-November	December-January
Depth (mm)	50	70	80	50	30

(Head, Dept of SWCE, CAET, NAU, Dediapada)

VII. Basic Science

1. Response of different chemicals under rainfed conditions in cotton

Farmers of South Gujarat growing Bt cotton (G.Cot.Hy-10 BG-II) under rainfed conditions are recommended to apply four foliar sprays of 2% KNO₃ (13:00:45) (20g/l) at weekly intervals after 30 days of rain cessation for higher seed cotton yield and net return.

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

2. Effect of fertilizer and growth regulator on physiology of cotton under High Density Planting System

Farmers of South Gujarat growing compact variety of cotton (GISV-272 and GSHV-180) under high density planting system (HDPS) at 60 x 15 cm spacing are recommended to apply 280 kg nitrogen/hectare in five equal splits at 30, 60, 75, 90, and 105 days after sowing to achieve higher seed cotton yield and net return. In addition, it is advised to apply 5% mepiquat chloride at a rate of 20g a.i/hectare (8.5ml/10L) at 60 and 75 days after sowing to control vegetative growth of cotton plants under high density planting system.

(Research Scientist, MCERS, NAU, Surat)

3. Evaluation of different methods for manure preparation from straw and threshing waste of rice

Farmers are recommended to use *Bacillus licheniformis* X6 (104 cfu/ml) and *Aspergillus terreus* XF9 (104 cfu/ml) to reduce 13 to 18 days manure preparation time and to get good quality manure by NADEP method from paddy straw/waste in 118-123 days.

Detail Method for Manure Preparation:

- Prepare 15-20 cm thick paddy straw and threshing waste layer (60 – 70 kg of paddy waste). Sprinkle 25 L of 30 % cow dung slurry containing 0.1 % of *Bacillus licheniformis* X6 (104 cfu/ml) and *Aspergillus terreus* XF9 (104 cfu/ml) over paddy waste layer. 319.
- Fill the NADEP as per its capacity by repeating above mentioned paddy waste layers.
- Periodically sprinkle water to maintain moisture during manure preparation time.

(HOD, FQTL, NMCA, NAU, Navsari)

RECOMMENDATIONS FOR SCIENTIFIC COMMUNITY

I NATURAL RESOURCE MANAGEMENT

1. Bio-chemical changes in leafy vegetables grown on contaminated and non-contaminated soils

- The concentration of Pb, Ni and Cd in contaminated soils was found above the permissible limit (value set by Indian/WHO/agencies) in most of the soils samples. The non-contaminated soils samples contained heavy metals and that too within permissible limits.
- The accumulation of Ni, Cd and Pb were much higher than the permissible level in the edible portion of leafy vegetables (Fenugreek, Coriander, Dill leaves, Spinach and Amaranthus) grown on contaminated soils. But the metal ions of vegetables grown with non-contaminated soils were below threshold value.
- However, biochemical composition of these vegetables are hampering due to the polluted soils

(Professor, SSAC, CoA, Bharuch)

2. Persistence and dissipation studies of some registered herbicides in sugarcane

2,4-D Dimethyl amine salt 58% SL, 2,4-D Sodium salt 80% w/w) and Halosulfuron methyl 75% WG are readily degradable in the soil under sugarcane cultivation under South Gujarat as their dissipation half-life (DT50) is less than 20 days as per FAO. Further, the residues of halosulfuron methyl 75 % WG and 2,4 –D dimethyl amine 58% SL as well as 2,4-D sodium salt 80% W/W were not detected in sugarcane when these were applied on 60 days after planting at the rate of 67.5 g, 3.5 kg and 2 kg a.i./ha, respectively .

(Assistant Professor, FQTL, NMCA, NAU, Navsari)

II PLANT PROTECTION

[A] Agricultural Entomology

1. Survey of pollinators fauna in different cucurbit vegetables in South Gujarat

Insect pollinators belongs to order Hymenoptera (08) [*Apis*

dorsata (Fabricius), *Apis cerana indica* (Fabricius), *Apis florea* (Fabricius), *Tetragonula* spp., *Megachile* spp., *Xylocopa enestrata* (Fabricius), *Lasioglossum* (Ctenonomia) *serenum* (Cameron), *Sphecodes fumipennis* (Smith)]; Lepidopteran (04) [Common Crow (*Euploea core* Cramer), Common Grass Yellow (*Eurema hecabe* Linnaeus), Blue butterflies (*Lampides boeticus* Linnaeus) and Small Branded Swift (*Pelopidas mathias* Fabricius)] and Dipteran (01) [*Syrphid flies*] were noticed in cucurbit vegetable crops in South Gujarat.

(Professor & Head, Deptt. of Entomology, NMCA, NAU Navsari)

2. Survey of natural enemies of *Spodoptera frugiperda* (J. E. Smith) in maize

Egg masses of maize fall armyworm (*Spodoptera frugiperda*) were naturally parasitized by *Telenomus remus* (Nixon) and larvae were naturally parasitized by four parasitoids viz., *Exorista xanthaspis* (Wiedemann), *Chelonus* sp., *Campoletis* sp. and *Apanteles* sp. as well as by one entomopathogenic fungi, *Metarhizium rileyi* (Farlow) and one parasitic nematode, *Hexameris* sp. in the Dangs district of South Gujarat. Among, *E. xanthaspis* was most abundant

(Principal, College of Agriculture, NAU, Waghai)

3. Survey of natural enemies of *Helicoverpa armigera* (Hubner) in Gram

Larvae of gram pod borer (*Helicoverpa armigera*) were naturally parasitized by two parasitoids viz., *Carcelia illota* (Curran) and *Campoletis chlorideae* (Uchida) as well as by predatory spiders in the Dangs district of South Gujarat.

(Principal, College of Agriculture, NAU, Waghai)

4. Survey of major insect pests, diseases and their natural enemies in brinjal, okra and chilli in tribal belt of Surat district

A. The highest population of sucking pests viz., whitefly, aphid and leaf hopper in brinjal was found during first fortnight of October, first fortnight of December and second fortnight of September, respectively in tribal belt of Surat district. The highest fruit damage in brinjal by shoot and fruit borer was found during second fortnight of December. Maximum incidence of brinjal diseases viz., fusarium wilt and little leaf was observed during mid October

to mid December and December, respectively. The highest population of natural enemies viz., lady bird beetle and *Chrysoperla* spp. in brinjal was found during second fortnight of September and November, respectively.

- B. The highest population of sucking pests viz., jassid, whitefly and mite in okra was found during first fortnight of October, second fortnight of October and first fortnight of October, respectively in tribal belt of Surat district. Maximum incidence of okra diseases viz., powdery mildew and yellow vein mosaic was observed during December and mid September to mid November, respectively. The highest population of lady bird beetle was found during second fortnight of October.
- C. The highest population of thrips in chilli was found during first fortnight of October in tribal belt of Surat district. Maximum incidence of chilli diseases viz., powdery mildew and leaf curl was observed during November-December. The highest population of lady bird beetle in chilli was found during second fortnight of November.

(Sr. Scientist & Head, KVK, NAU, Surat)

5. Assessment of yield losses due to major insect pest in cashew

Per cent avoidable loss due to cashew major insect pest (Tea mosquito bug and Thrips) infestation was recorded in the range of 23.30 to 28.10 with an average 25.08 per.

(Principal, Polytechnic in Horticulture, NAU, Paria)

6. Management of mango hoppers and thrips on mango by oil based formulation of *Metarhizium anisopliae*

The mango growers of South Gujarat are recommended to apply first spray of *Metarhizium anisopliae*: oil based formulation (1×10^9 cfu/ml) @ 10ml/10 lit water at panicle stage and subsequent four sprays at 10 days intervals for effective non-chemical management of hoppers and thrips.

Note : Add sticker @ 10ml/10lit water during spray.

7. Screening of cashew germplasm against major pest

Seven cashew germplasm were screened against major pests and categorized as a susceptible (V3) and less susceptible (V1, V2, V4, V5,

V6 and V7) against TMB. The damage of Tea mosquito bug (TMB) was initiated from the month of November till June on cashew tree. The maximum damage was noticed in the month of February. So, farmers are advised to follow the TMB damage grade calendar for taking appropriate measure to reduce TMB damage during these month.



(Principal, Polytechnic in Horticulture, NAU, Paria)

[B] Plant Pathology

1. Diversity of fungal endophytic communities from paddy (*Oryza sativa* L.) and their antagonistic activities in *in vitro*

To study the fungal endophytic diversity in different parts of paddy and at different growth stages A total 13 fungal endophytes were isolated from leaf, root and grains at tillering, booting, milky stage and dough stage from healthy GNR-3 variety. Endophytes were coded by using three letters and number as PNE-1 to PNE 13. P for paddy, N for Navsari and E for endophytes. The endophytes isolated are described in the Table.

Growth stage	Plant part	Fungal endophytes	No. of endophyte s/ plant part	Total no. of endophytes/stage
Tillering	Leaf	PNE-1, PNE-2, PNE-3, PNE-4, PNE-5 and PNE-6	06	8
	Root	PNE-7 and PNE-8	02	
Booting	Leaf	PNE-1, PNE-2, PNE-3, PNE-4, PNE-5, PNE-6 and PNE-7	07	10
	Root	PNE-7, PNE-8, PNE-9 and PNE-10	04	

Milky Stage	Leaf	PNE-1, PNE-2, PNE-4, PNE-7, PNE-11, PNE-12 and PNE-13	07	13
	Root	PNE-7, PNE-8, PNE-9 and PNE-10	04	
	Grain	PNE-3, PNE-5, PNE-6, PNE-10, PNE-12 and PNE-13	06	
Dough Stage	Leaf	PNE-1, PNE-2, PNE-4, PNE-5 and PNE-11	05	13
	Root	PNE-7, PNE-8, PNE-9, PNE-10 and PNE-13	05	
	Grain	PNE-3, PNE-6, PNE-8, PNE-11 and PNE-12	05	

(Professor & Head, Deptt. of Plant Pathology, NMCA, NAU, Navsari)

2. Chemical control of fenugreek powdery mildew

For effective management of fenugreek powdery mildew, three sprays of hexaconazole 5 EC (0.005%) @ 10 ml/ 10 lit. or propiconazole 25 EC (0.025%) @ 10 ml/10 lit or Sulphur 80 WP (0.2%) @ 25 g/10 lit of water. The first spray should be given after initiation of the disease and subsequent two sprays at 15 days of interval.

As per CIBRC format

Crop	Disease	Fungicides	Concentrations (a. i %)	Quantity g or ml/ l	Dilution in water (liter)	Waiting period	Residue in the seed sample
Fenugreek (Not included in CIB-RC)	Powdery	Hexaconzole 5% EC	0.005	10.0 ml	10	30 (Another Crops)	BQL
		Propiconazole 25 % EC	0.025	10.0 ml	10	30 (Another Crops)	BQL
		Sulphur 80 % WP	0.2	25 g	10	--	---

(Professor & Head, Deptt. of Plant Pathology, NMCA, NAU, Navsari)

3. Management of collar rot disease of groundnut caused by *Aspergillus niger*

Seed treatment with thiophanate methyl 450 g/l + pyraclostrobin 50 g/l w/v FS @ 1.5ml/kg seed was found effective to manage collar rot disease in *kharif* groundnut.

(Research Scientist, RRRS, NAU, Vyara)

III HORTICULTURE

1. Effect of seed soaking and time of sowing on germination and seedling vigour on Sapota

Sowing of sapota seeds can be done after soaking in cow dung slurry (250g cow dung per liter water) for 24 hours during January for higher seed germination, growth and survival of seedlings.

(Res. Scientist, RHRS, ACH, NAU, Navsari)

2. Validation of customized fertilizers in sweet potato

Soil application of “customized fertilizer” (325 kg/ha) two times as basal and 1 month after planting as well as foliar application of “micronol sweet potato”(5 ml/lit) three times on 15, 30 and 45 days after planting should be done for higher yield in sweet potato.

Customized Fertilizer (%):

N	P	K	Ca	Mg	Zn	B
11	7	11	6	3	0.4	0.1

Micronol sweet potato (%):

Zn	Cu	B	Fe	Mn
2	0.6	0.2	0.5	0.25

(Prof. (Pl. Breeding), Dept. of Veg. Sci., ACH, NAU, Navsari)

3. Integrated weed management in African marigold (*Tagetes erecta* L.) var. Pusa Narangi Gainda

Spray of early post emergence pendimethalin 30 % EC@ 0.75 kg a.i./ha (3.33 L/ha) within 24 hours of transplanting followed by mulching of paddy straw (5 cm thickness layer) and one hand weeding at 50 days after transplanting effectively controls weed and gives higher yield in African marigold var. Pusa Narangi Gainda during *Kharif* season.

(Prof. & Head, Dept. of FLA, ACH, NAU, Navsari)

IV FORESTRY

1. Phenological study of Lesser known and Threatened tree species of South Gujarat

Among 15 tree species studied, nine tree species such as *Semicarpus anacardium*, *Sterculia urens*, *Sterculia villosa*, *Dalbergia lanceolaria*, *Oroxylum indicum*, *Soymida febrifuga*, *Dalbergia latifolia*, *Stereospermum chelonoides* and *Albizia procera* are deciduous in nature; however, species such as *Bauhinia malabarica*, *Pterocarpus marsupium*, *Ougeinia dalbergioides* and *Miliusa tomentosa* showed leaf fall and leaf renewal events but did not show leafless condition. Further, *Mallotus philippensis* was found to be typical evergreen species. Vegetative phenology and reproductive phenology like flowering, fruiting and fruit/ seed fall information can be used for collection of seeds for nursery practice (as in the given table). This information can also be useful for conservation and management of these species.

Sr. No.	Tree Name	Leaf fall period	Leaf renewal period	Leafless period	Flowering period	Fruiting period	Fruit fall period
1.	<i>Semicarpus anacardium</i>	Nov-Apr	May-Jul	Apr-May	Jun-Sept	Sept-Feb	Feb-Mar
2.	<i>Sterculia urens</i>	Sept-Dec	May-Jul	Jan-Apr	Dec-Feb	Jan-Mar	Mar-May
3.	<i>Sterculia villosa</i>	Nov-Feb	May-Jul	Feb-May	Jan-Mar	Mar-Apr	Apr-May
4.	<i>Dalbergia lanceolaria</i>	Nov-Mar	May-Jul	Apr	Apr-May	May-Jul	Jan-Mar
5.	<i>Oroxylum indicum</i>	Nov-Mar	May-Jul	Apr	Jul-Oct	Nov-Feb	Mar-Apr
6.	<i>Soymida febrifuga</i>	Jan-Mar	May-Jul	Apr	Mar-Apr	Apr-May	Jun
7.	<i>Dalbergia latifolia</i>	Nov-Mar	May-Jun	Apr	Apr-May	Apr-Jun	Dec-Mar
8.	<i>Stereospermum chelonoides</i>	Nov-Mar	Apr-Jun	April	Mar-May	May-Aug	Nov-Dec

9.	<i>Albizia procera</i>	Nov-Mar	Apr-July	Mar-Apr	Jul-Aug	Sept-Oct	Mar-May
10.	<i>Bauhinia malabarica</i>	Nov-Mar	Apr-Jun	-	Sept-Oct	Nov-Feb	Mar-May
11.	<i>Pterocarpus marsupium</i>	Nov-Apr	Apr-Jun	-	Oct-Dec	Nov-Feb	Feb-Apr
12.	<i>Ougeinia dalbergioides</i>	Jan-Mar	Apr-Jun	-	Feb-Apr	Apr-May	May
13.	<i>Miliusa tomentosa</i>	Jan-Mar	Mar-Jun	-	Apr-May	May-Jun	Jun-Jul
14.	<i>Hardwickia binata</i>	Nov-May	Dec-Jul	-	-	-	-
15	<i>Mallotus philippensis</i>	Aug-May	Feb-July	-	Nov-Jan	Jan-Mar	Mar-May

(PI & HOD, Silviculture and Agroforestry Dept., CoF, NAU, Navsari)

2. Assessment of physical and anatomical properties of different bamboo species

After harvesting, bamboo can be identified mainly at genus level by knowing the types of vascular bundle in cross-section based on its size, shape and distribution patterns as per Liese classification. However, it can be identified at species level by measuring the important physico-anatomical properties such as basic density, fibre length, cell wall thickness, vessel element length and vascular bundle frequency.

Physico-anatomical key for identification of 20 important bamboo species

1	Vascular bundle II & III	2
1	Vascular bundle type III alone	3
1	Vascular bundle type III & IV	4
1	Vascular bundle type I, III & IV	5
2	Thin wall bamboo having basic density more than 0.600 g/cc, fibre length varies from 3000 µm to 4000 µm and cell wall thickness more than 10 µm.	<i>Melocanna baccifera</i>
2	Thin-wall bamboo having basic density less than 0.600 g/cc, fibre length varies from 2000 µm to 3000 µm and cell wall thickness less than 10 µm.	<i>Oxytenanthera parvifolia</i>

3	Medium thick-wall bamboo having basic density more than 0.550 g/cc, vascular bundle frequency 3/mm ² , fibre length varies from 3000 µm to 3500 µm and cell wall thickness more than 10 µm.	<i>Dendrocalamus giganteus</i>
3	High thick-wall bamboo having basic density less than 0.500 g/cc, vascular bundle frequency 1/mm ² , fibre length varies from 2000 µm to 3000 µm and cell wall thickness less than 10 µm.	<i>Dendrocalamus hamiltonii</i>
3	Medium thick-wall and long internode bamboo having basic density less than 0.500 g/cc and vessel element length varies between 500 to 600 µm.	<i>Schizostachyum pergracile</i>
3	Thin-wall and long internode bamboo having basic density ranged from 0.500 to 0.600 g/cc and vessel element length varies between 700 to 900 µm.	<i>Schizostachyum dulloa</i>
3	High thick-wall bamboo with basic density of 0.600 to 0.700 g/cc having vessel element length more than 1000 µm and vascular bundle frequency 2/mm ² .	<i>Bambusa vulgaris</i> var. <i>vulgaris</i>
3	High thick-wall bamboo, fibre length varies from 2500 to 3500 µm and vascular bundle frequency ranged from 3 to 4/ mm ² .	<i>Bambusa pallida</i>
3	Very high thick-wall to solid bamboo, fibre length varies from 2000 to 2500 µm and vascular bundle frequency 1/ mm ² .	<i>Bambusa nutans</i>
1	Vascular bundle II & III	2
1	Vascular bundle type III alone	3
1	Vascular bundle type III & IV	4
1	Vascular bundle type I, III & IV	5
4	Medium thick-wall bamboo, basic density ranges from 0.600 to 0.800 g/cc, cell-wall-thickness more than 10 µm and vascular bundle frequency varies from 2 to 3/ mm ² .	<i>Dendrocalamus longispathus</i>
4	Medium thick-wall bamboo, basic density ranges from 0.500 to 0.550 g/cc, vessel element length varies from 400 to 600 µm.	<i>Dendrocalamus brandisii</i>
4	Medium thick-wall bamboo, basic density less than 500 g/cc, cell wall thickness varies from 5 to 7 µm and vascular bundle frequency ranged from 2 to 4/mm ² .	<i>Dendrocalamus sikkimensis</i>

4	Very high thick-wall to solid bamboo, basic density ranged from 0.550 to 0.650 g/cc, fibre length varies from 2500 to 3000 μm and vessel element length ranged from 500 to 700 μm	<i>Dendrocalamus strictus</i>
4	Solid bamboo, basic density ranged from 0.650 to 0.750 g/cc, fibre length varies from 3000 to 3500 μm and vessel element length ranged from 700 to 1000 μm .	<i>Dendrocalamus stocksii</i>
4	High thick-wall bamboo basic density ranged from 0.550 to 0.700 g/cc.	<i>Bambusa balcooa</i>
4	High thick-wall bamboo basic density ranged from 0.400 to 0.550 g/cc.	<i>Bambusa bambos</i>
4	High thick-wall bamboo with hollowness proportion 10%	<i>Bambusa polymorpha</i>
4	High thick-wall bamboo with hollowness proportion 30%	<i>Thyrsostachys oliveri</i>
4	Medium thick-wall bamboo, fibre length 4000 μm	<i>Gigantochloa atroviolacea</i>
5	High thick-wall bamboo, basic density ranges from 0.450 to 550g/cc, fibre length varies from 2500 to 3000 μm and vascular bundle frequency 3/mm ²	<i>Guadua angustifolia</i>

(PI & HOD, Forest Products and Utilization Department, CoF, NAU, Navsari)

3. Air pollution tolerance index (APTI) of selected tree species of Navsari

Air pollution tolerance index (APTI) values of selected trees from highest to lowest was observed as follows: *Ficus religiosa* L. > *Azadirachta indica* A. Juss > *Acacia auriculiformis* A. Cunn. > *Kigelia pinnata* Roxb. > *Cassia fistula* L. > *Syzygium cumini* L. > *Ficus benghalensis* L. > *Sterculia foetida* L. > *Saman samem* Jacq. Trees showing intermediate tolerance i.e *Ficus religiosa* along with *Azadirachta indica* A. Juss and *Acacia auriculiformis* can be promoted for plantation by local municipal corporation at Navsari.

(PI & HOD, Natural Resource Management Dept., CoF, NAU, Navsari)

V. AGRICULTURAL ENGINEERING

1. Estimation of wet and dry spells in Sagbara region using stochastic analysis of long-term weather data

The table for estimation of dry and wet spell of Sagbara, Navsari and Waghai region is as under.

Sr. No.	Particular/Detail	Sagbara region	Navsari Region	Waghai region
1.	Probability of occurrence of two successive wet days	6 to 25%	12 to 20%	5 to 25%
2.	Probability of occurrence of four successive dry days	20 to 60%.	10 to 50%.	20 to 60%.
3.	Probability of occurrence of dry day followed by dry day	65 to 75%	60 to 75%	65 to 75%
4.	Probability of occurrence of dry day followed by two wet days	60 to 75%.	65 to 70%	60 to 75%.
5.	Weeks of the year having maximum probability of occurring two consecutive wet weeks	20 th to 30 th	20 th to 30 th	20 th to 30 th
6.	Maximum temperature range having highest probability of occurrence	33-35°C	33-35°C	33-35°C
7.	Weeks of the year having 90% probability of getting 250 mm rainfall	30 th to 32 nd	25 th to 32 nd	32 nd to 35 th

(Head, Dept of IED, CAET, NAU, Dediapada)

2. Evaluation of CERES- Rice model for the crop performance of various rice genotypes under different environment

Scientists are informed to use following calibrated genetic coefficients with definitions for simulation of the rice yield under South Gujarat condition with 'CERES-Rice' model.

Coefficients	Definition of Coefficients	GNR-3	GNR-7	Gujari
P1	Time period (expressed as growing degree days [GDD] in °C-d above a base temperature of 9°C) from seedling emergence during which the rice plant is not responsive to changes in photoperiod. This period is also referred to as the basic vegetative phase of the plant.	610.0	650.0	620.0

P2R	Extent to which phasic development leading to panicle initiation is delayed (expressed as GDD in °C-d) for each hour increase in photoperiod above P2O.	45.0	40.0	40.0
P5	Time period in GDD °C-d) from beginning of grain filling (3 to 4 days after flowering) to physiological maturity with a base temperature of 9°C.	120.8	150.8	120.8
P2O	Critical photoperiod or the longest day length (in hours) at which the development occurs at a maximum rate. At values higher than P2O developmental rate is slowed, hence there is delay due to longer day lengths.	12.0	12.0	12.0
G1	Potential spikelet number coefficient as estimated from the number of spikelets per g of main culm dry weight (less leaf blades and sheaths plus spikes) at anthesis.	60.8	50.8	60.8
G2	Single grain weight (g) under ideal growing conditions, i.e. nonlimiting light, water, nutrients, and absence of pests and diseases.	.0220	.0218	0.210
G3	Tillering coefficient (scalar value) relative to IR64 cultivar under ideal conditions.	1.00	1.00	1.00
PHINT	Phyllochron Interval (°C-d). Time interval in degree-days for each leaf-tip to appear under non-stressed conditions.	80.0	80.0	80.0
THOT	Temperature (°C) above which spikelet sterility is affected by high temperature.	30.3	30.3	30.3

TCLDP	Temperature (°C) below which panicle initiation is further delayed (other than P1, P2O and P2R) by low temperature	15.0	15.0	15.0
TCLDF	Temperature (°C) below which spikelet sterility is affected by low temperature.	15.0	15.0	15.0

(Head, Dept. of Ag. Engg, NMCA, NAU, Navsari)

3. Analysis of land cover changes in Dang district using remote sensing and GIS

Geospatial techniques should be used for assessment of change in LULC and to estimate the surface runoff potential in ungauged watersheds using SCS-CN method.

- a) Assessment of change in LULC of Dang district for 25 years period (1990 to 2015) indicated that, the area under forest was reduced from 1512.9 km² (85.77%) to 1192.4 km² (67.60%) resulting in increase in area under agriculture (6.04% to 19.59%), built-up land (3.83% to 6.37%) and barren land (0.43% to 2.11%).
- b) Estimation of surface runoff potential of Dang district for 32 years period (1982 to 2013) using SCS-CN method indicated the runoff coefficient of 24.40% (446.88mm) for Purna watershed and 22.80% (419.35mm) for Ambika watershed representing average annual rainfall of 1833mm. Runoff estimation is helpful in design and planning of the soil and water conservation structures in the watershed.

The following Runoff equations based on the average annual rainfall between 1062 mm to 3823 mm can be used to estimate runoff from Dang district:

	AMC-I	AMC-II	AMC-III
Purna Watershed	$Q = \frac{(P - 149.85)^2}{(P + 349.6)}$	$Q = \frac{(P - 65.65)^2}{(P + 153.17)}$	$Q = \frac{(P - 28.01)^2}{(P + 65.42)}$
Ambika Watershed	$Q = \frac{(P - 145.46)^2}{(P + 339.36)}$	$Q = \frac{(P - 63.75)^2}{(P + 148.74)}$	$Q = \frac{(P - 27.20)^2}{(P + 63.45)}$

Where, Q is runoff (mm) and P is rainfall (mm).

(Head, Dept. of Ag. Engg, NMCA, NAU, Navsari)

4. Study the effect of SPV roof top power plant on space cooling under the roof

Scientists are informed that during March to August, in Dediapada climate (latitude 21.66° N), use of Grid connected solar roof top system, having lower end of Polycrystalline solar module (with 20° tilt angle) installed at 12 cm height from roof surface, on the shadow free, flat RCC roof having china mosaic (at around 10 m from ground level), to minimize/reduce the electrical energy consumption upto 27.74 kWh per kW of SPV system for 1° C reduction in space cooling, with average 69% of rated power generation of the system.

(Head, Dept of RE, CAET, NAU, Dediapada)

5. Effect of land use/ land cover changes on groundwater resources of Dediapada block

Scientists are informed that,

1. Area under forest land reduced from 443.64 km² (43.18%) to 272.99 km² (26.57 %) while fallow land increased from 13.05 km² (1.27%) to 149.59 km² (14.56 %) during last 20 years duration (1999 to 2020) in Dediapada block.
2. The rate of deforestation was observed as 71.46 % during 1999 to 2009 while it was observed as 86.08% in the next decade, 2009 to 2020, which shows that the deforestation in study area increased with higher rate in second decade as compared to the first decade. It was observed that, shifting cultivation may be the main reason behind deforestation in this tribal region of Dediapada block.
3. The average annual groundwater recharge of Dediapada block is estimated as 75.71 MCM which is about 5.25 % of total annual rainfall for Dediapada block.
4. Out of total land of Dediapada block, 912.03 ha. (0.90 %) area have very good groundwater recharges potential followed by 17945.06 ha. (17.50 %) have good, 61777.91 ha. (60.10 %) have moderate and 22107.33 (21.50 %) have poor groundwater recharges potential. Soil conservation and water harvesting structures needs to be established to regenerate and restore the vegetative layer/forest cover in the Dediapada block which can protect the land against soil erosion and further land degradation.

(Head, Dept of SWCE, CAET, NAU, Dediapada)

VI. Basic Science

1. Phytochemical screening and determination of antioxidant activity of different mango cultivars

Mango cv. *Langra* has considerable amount of nutraceuticals with highest amount of total polyphenols and ascorbic acid in the pulp and peel. Maximum total flavonoids were found in Langra peel with highest antioxidant activities in pulp, peel and kernel. Majority of phenolic acids were found in Langra cultivar. Phytochemicals in their relative abundance make Langra superior than other selected cultivars and can be useful for further varietal improvement programme as well as for food purpose.

(HOD, Dept. of Fruit Science, ACH, NAU, Navsari)

2. Exploring cellulolytic bacteria as cotton stalk degrader

Bacterial isolates identified as *Pseudomonas putida* NAU-PP-2 and *Bacillus licheniformis* NAU-PP-9 at 1×10^8 CFU/ml were recorded with Carboxymethyl cellulase activity ($\mu\text{mol}/\text{min}/\text{ml}$) of 1.196 ± 0.003 and 1.511 ± 0.001 , Filter paper cellulase activity ($\mu\text{mol}/\text{min}/\text{ml}$) of 0.1897 ± 0.003 and 0.1888 ± 0.002 , cotton stalk weight loss (%) of 20.80 and 16.94 and moisture content (%) of 62.34 ± 0.026 and 65.35 ± 0.026 , respectively during cotton stalk degradation study

(Research Scientist, MCRS, NAU, Surat)

3. Biochemical changes associated with storage period in sweet potato

The sweet potato genotypes NSP2 for moisture, NSP 5 for starch, amylose, protein, antioxidant activity, NSP 18 for crude fiber, C-71 for ascorbic acid, are suitable for storage at average minimum room temperature of 11.92°C and maximum of 29.32°C due to their comparative lower nutrient loss during the storage period

(HOD, Dept. of SSAC Soil Sci & Agri Chem, NMCA, NAU, Navsari)

VII. Social Science

1. Time series analysis of cauliflower prices in the selected markets of Gujarat

It is suggested to use SARIMA model to develop dependable monthly wholesale price forecasts for cauliflower in selected markets of Gujarat i.e. Surat, Ahmedabad, Gandhinagar, Kheda and Vadodara as

it found to be more effective as compared to various seasonal and non-seasonal models (Viz.Simple Non- Seasonal, Holts Linear Trend, Brown's Linear Trend, Damped Trends, GARCH and EGARCH) on the basis of different model selection criteria like minimum Mean Absolute Percentage Error (MAPE), minimum Bayesian Information Criterion (BIC) & R^2 values.

(Prof. & Head. Dept. of Agril. Economics, NMCA, NAU, Navsari)

2. Climate Change Impacts on Livestock and Adaptation Strategies for sustainable production

The scientists can work on adaptation measures such as change in herd size, change in breed, feed and fodder management, disease management, supplementary feed, crop and livestock interaction, change in animal shed structure and heat stress management in order to reduce the impact of climate change.

(Prof. & Head. Dept. of Agril. Economics, NMCA, NAU, Navsari)

3. Role of Agricultural Infrastructure on Agricultural Efficiency in Gujarat

In order to achieve better agricultural efficiency, the government should target agricultural resource- based investments in the districts with poor agricultural efficiency such as Patan, Valsad, Dang, Dahod, Amreli and Navsari.

(Associate Prof. & Head. Dept. of Social Science, ACH, NAU, Navsari)

4. Estimating Total Factor Productivity of Banana in South Gujarat Region

A moderate TFP growth in the South Gujarat region suggests ample scope for increasing banana production through new technological breakthrough by means of augmenting investment in research, extension and natural resource management which were found to be important drivers of TFP growth

(Assistant Prof. Dept. of Agril. Economics, COA, NAU, Bharuch)

5. Estimation of Cotton Yield using Two-Phase Sampling approach

It is advised to adopt two phase sampling regression procedure under stratified two stage sampling design framework for more reliable and cost-effective estimates of average cotton yield than general crop estimation survey procedure.

(Assistant Prof. Dept. of Agril. Statistics, COA, NAU, Waghai)

6. Evaluation and development of yardstick of CV% for mango crop experiments for South Gujarat region

The yardstick of CV (%) for accepting the results of mango experiments in South Gujarat region is up to 29.00 per cent for yield character.

(Prof. & Head, Dept. of Social Science, ACH, NAU, Navsari)

VIII. Animal Science

1. Effect of boron supplementation through drinking water on performance in commercial broilers

Supplementation of boron at 50 ppm (Boric acid with 17.48 % elemental boron) through drinking water improves the body weight (4.5%), feed intake (3.17 %) and feed conversion ratio (1.6 %), whereas, 100 ppm of boron supplementation affects the performance indices in commercial broiler.

(PI through Head, Dept. of Animal Science, NMCA, NAU)

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