

Objectives

The main aim of the department is to impart education to the students admitted in Horticulture and Forestry, with following specific objectives:

- ✓ To impart education regarding basics of natural resources to the students
- ✓ To make the students aware about activities of watershed management
- ✓ To promote and use of Remote Sensing and GIS in natural resource management
- ✓ To educate the students regarding Environmental Conservation and impending threats of Climate Change

Courses offered at B.Sc. (Forestry) level

Course code	Title of Course	Credits
NRM 1.1	Fundamentals of Geology & Soil Science	2+1
NRM 1.2	Environmental Studies and Disaster Management	2+1
NRM 2.3	Forest Protection	2+1
NRM 2.4	Soil Biology & Fertility	2+1
NRM 3.5	Forest Survey & Engineering	2+1
NRM 5.6	Agrometeorology and Climate Change	2+1
NRM 5.7	Forest Management	2+1
NRM 5.8	Principles of Economics and Marketing	2+1
NRM 5.9	Restoration of Degraded Lands	1+1
NRM 6.10	Forest Laws, Legislation and Policies	2+0
NRM 6.11	Geomatics-Remote Sensing & GIS	1+1
NRM 6.12	Forest Hydrology and Watershed Management	2+1

Courses offered at M.Sc. (Forestry) level

Course code	Title of Course	Credits
NRM 521	Watershed concepts, project formulation and planning	2+1
NRM 522	Applications of Remote Sensing and GIS in Watershed Management	1+1
NRM 523	Watershed Hydrology and Resources Conservation	2+1
NRM 524	Production Systems and Biodiversity in Watershed	3+1
NRM 525	People's Participation and Impact Analysis in Watershed Management	2+1
NRM 526	Introduction to Environmental Science	2+0
NRM 527	Environmental Analytical Techniques	2+1
NRM 528	Environmental Impact Assessment	2+1
NRM 529	Forest Resource Analysis	3+0
NRM 530	Production Management of Nursery and Plantation Forestry	2+1
NRM 531	Project Planning, Monitoring and Evaluation	2+1
NRM 532	Farm Management	3+0

M.Sc. (Forestry) passed out students

Sr. No	Student'sName	MajorGuide	Thesis Title	Specialization	Year
1.	Surendra Kumar	Dr. P K Shrivastava	Evaluation of farm pond constructed in campus, watershed	Watershed Management	2012
2.	Revale Amit Ankush	Dr. K G Patel	Natural resource characterization of Vanarasi area	Watershed Management	2012
3.	Surve Nilam Vijay	Dr. P K Shrivastava	Evaluation of changes in micro watersheds of NAU campus during last decade	Watershed Management	2013
4.	Rahul Kumar Patel	Dr. P K Shrivastava	Evaluation of micro-watershed of Navsari taluka	Watershed Management	2016
5.	Bhavin Bhandari	Dr. P K Shrivastava	Study of coastal micro-watersheds near Dandi	Watershed Management	2016
6.	Haripriya S.	Dr. P K Shrivastava	Feasibility of <i>Schizostachyum pergracile</i> in gravity drip irrigation in water scarce forested watersheds of South Gujarat	Natural Resource Management	2021

Research Project of the Department

Ongoing Projects

Sr. No.	Title of project	Type	Agency
1.	Strategies to Mitigate the Impact of Climate Change, Navsari (Merge with Establishment of Center on Environmental Studies)	Plan	GoG
2.	Demonstration of site specific water conservation technologies for improving deteriorating soil and water quality in the coastal south Gujarat.	Other Agency	DST, GoI

Completed Projects

3.	Development of methodology for identification and discrimination of biotic stress in <i>Tectona grandis</i> L. (CoPI: Dileswar Nayak)	Other agency	DST, GoI
4.	Forest Resource Survey of Rajpipla Forest Division (CoPI: Dileswar Nayak)	Other Agency	GFRI, Gandhinagar

On going research studies of Department

Sr. No.

Title of project

1. Climate change impacts on livestock and adaptation strategies for sustainable production
2. Study of Trends of Emission of GHGs in Teak Plantation
3. Evaluation of Ailanthus based agroforestry systems in South Gujarat
4. Seasonal and Diurnal variation of Surface Ozone at NAU
5. Effect of drip irrigation scheduling on *Ailanthus excelsa* species in South Gujarat
6. Impact of short term water logging on Ailanthus species
7. Effect of Eucalyptus on soil productivity
8. Impact of tree densities on growth and yield of Ardu (*Ailanthus excelsa* Roxb.),
9. Tree selection, evaluation and clonal propagation of Ardu (*Ailanthus excelsa* Roxb.) germplasm.
10. Assessment of different water salinity levels on Albizia species
11. Air pollution tolerance index (APTI) of few trees of Navsari city
12. Removal of Chromium ions from aqueous solutions by Bamboo wastes

Important Research Articles published

- A. V. Sonawane and P. K. Shrivastava (2022). Partial root zone drying method of irrigation: A review; *Irrig. and Drain.* 1-15.
- Bhandari B N, Shrivastava, P. K., D. Nayak and Patel D.P. (2022). Detection of land use changes in micro watersheds through RS & GIS, *The Pharma Innovation Journal*,11(2), 949-953 .
- D.R. Prajapati, N.S. Thakur*, V.R. Patel , R.P. Gunaga, Lalit Mahatma and D.P. Patel (2022). Influence of Spatial Configurations on Quantitative *Melia dubia* and Qualitative Performance of Hybrid Napier (*Pennisetum purpureum* x *P. americanum*) and Soil Biota Status. *Indian Journal of Ecology*, 49(1): 9-20.
- Mevada, R. J., Nayak, D., Patel, D. P., & Tandel, M. B. (2021). Potential of tasar silkworm (*Antheraea mylitta*) excreta as fertilizer on growth, yield and quality of rice. *Journal of Environmental Biology*, 42(4), 1070-1
- Dwivedi, D.K. and Shrivastava, P.K. (2021). Assessment of roof water harvesting potential of Navsari city of Gujarat State, India by Remote Sensing and Geographic Information System (GIS), *Journal of Applied and Natural Science*,13(3),1143-1150.
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- Bhandei, B.N., Shrivastava, P.K., Dileswar Nayak and Patel, D.P. (2020). Evaluation of Micro Watersheds of Coastal Navsari, *Int. J Curr. Microbiol. App.Sci.*, 11, 28-43.
- Shrivastava, P. K., Nayak, D., Patel, D. P., Viyol, S. V., & Thakare, H. S. (2020). Integrated Rainwater Resource Management (iRaM) Model for Coastal South Gujarat. *Current Journal of Applied Science and Technology*, 39(17), 1-12.

Important Research Articles published

- Shedage Swati, Shrivastava, P. K. and Behara, L. K. (2019). Carbon Rich Mangrove Forests: Overview for Strategic Management and Climate Change Mitigation. *Advances in Research*,18 (2),1-9.
- Shedage Swati, Shrivastava, P. K. and Narendra Singh. (2019). Influence of Regional Weather Changes on Major Fruit Production and Productivity of Navsari District of Gujarat State, India , *Current Journal of Applied Science and Technology*, 35(3),1-8.
- Dwivedi D. K. and Shrivastava P. K. (2019). Rainfall and runoff estimation of micro watersheds of coastal Navsari, *Journal of Soil and Water Conservation*, 8(1), 43-51.
- Shrivastava P. K., Patel D. P., Dileswar Nayak, Satasiya K. F. and Patel D. C. (2019). Harvesting and Potable Use of Rooftop Rain Water to Tackle Imminent Drinking Water Crisis in Coastal Gujarat, India, *Current Journal of Applied Sciences and Technology*, 35(6),1-10.
- Dwivedi D K and Shrivastava P. K. (2019). Time series modeling of monthly temperature and reference evapotranspiration for Navsari (Gujarat), India, *Current Journal of Applied Sciences and Technology*, 35(6),1-13.
- Thakur, N. S., Suvera, A. H., Jha, S. K., & Patel, D. P. (2019). Growth Performance, Essential Oil Recovery and Financial Flows of *Ocimum* spp. Under *Pongamia pinnata*-*Ocimum* spp. Based Silvi-Medicinal Agroforestry Systems. *Agroforestry for Climate Resilience and Rural Livelihood*, 335.
- Bhalawe, S., Nayak, D., & Jadeja, D. B. (2019). Carbon sequestration potential of agroforestry systems in South Gujarat conditions. *Green Farming*, 10(1), 35-40.
- Nongmaithem Raju Singh, A. Arunachalam, D.P. Patel and S. Viyol (2019). Seasonal Dynamics of Litter Accumulation in Agroforestry Systems of Navsari District, Gujarat. *Climate Change and Environmental Sustainability*, 7(2):123-129.

Important Research Articles published

- Jules Christian Zekeng, Reuben Sebego, Wanda N. Mphinyane, Morati Mpalo, Dileswar Nayak, Jean Louis Fobane, Jean Michel Onana, Forbi Preasious Funwi and Marguerite Marie Abada Mbol (2019). Land use and land cover changes in Doume Communal Forest in eastern Cameroon: implications for conservation and sustainable management. *Modeling Earth Systems and Environment*, 5:1801–1814.
- P. K. Parmar, S. C. Mali, L. K. Arvadiya, D. P. Patel, S. V. Viyol and Vyas Pandey (2019). Calibration and validation of CANEGRO model for sugarcane in south Gujarat region. *Journal of Agrometeorology*, 21(3) : 388-391.
- Mevada, R. J., Nayak, D., & Patel, D. P. (2018). Impact of Terminalia arjuna (Roxb.) leaf litter and hosted tasar silkworm excreta on quality of paddy and soil properties. *Int. J. Curr. Microbiol. App. Sci.*, 7(5), 3781-3789.
- Shedage Swati and Shrivastava P. K. (2018). Mangroves for protection of coastal areas from high tides, cyclones and Tsunami, *International Journal of Plant & Soil Science*, 23(4),1-11.
- Kirti Bardhan, Dipika S. Patel, and Dhiraji P. Patel (2018). Revealing the Effects of Potassium on Rice Roots under Moisture Stress, *Better Crops*, 102(4): 28-31.
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- Lakkad, A.P., Dileswar Nayak, Patel G.R. and Shrivastava, P. K. (2017). Micro watershed prioritization for effective soil conservation planning of sub watershed, *Research in Environment and Life Science*,10 (3), 275-279.

Important Research Articles published

- Mali S.C., Swati Shedge and Shrivastava. P.K. (2017). Economic evaluation of sugarcane based Agro forestry systems, *Journal of Tree Sciences*, 36(1), 34 -37.
- Lakkad, A.P., Shrivastava, P. K., Sondarva, K.N. and Varma M. G. (2017). Estimation of sediment delivery ratio at sub watershed level using ArcSWAT Model, *Current Advances in Agricultural Sciences*, 9(1): 29-35.
- Dileswar Nayak, Surve Nilam and Shrivastava, P.K. (2017). Land Use Land Cover Changes Using Remote Sensing and GIS Technique: A Case Study of Navsari District, Gujarat, *Journal of Tree Sciences*, 36(2) : 20 -27.
- Nayak, D., Thakare H.S., Shrivastava, P.K. and Patel, D.P. (2016). Irrigation Scheduling of Teak (*Tectona grandis*) Seedling at Nursery Stage, *Journal of Tree Sciences*, 35(2):54-57.
- A.P. Lakkad, D.P. Patel, K.N. Sondarva, K.F. Satashiya and P.K. Shrivastava (2016). Estimation of soil erodibility factor for soils of dediapada taluka of narmada district in gujarat. *International Journal of Science, Environment and Technology*, 5(6): 3765 – 3773.
- D. Nayak, D.P. Patel, H.S. Thakare, K. Satasiya and P.K. Shrivastava (2015). Assessment of air pollution tolerance index of selected plants. *Indian Forester*, 141 (4) : 372-378.
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Important Research Articles published

- Surve Nilam, Patel, D. P., Shrivastava, P. K. and Satasiya K. F. (2014). Impact of different cropping systems on properties of soil and water in different micro watersheds, *Journal of Applied and Natural Science*, 6(2) : 524 – 529.
- Darshana Patel, P.K. Shrivastava and D.P. Patel (2014). Economical solution to remove microbes from harvested roof water. *Eco. Env. & Cons.*, 20 (Suppl.); S143-S148.
- Patel Darshana, Shrivastava, P. K., and Patel D. P. (2013) Study on Noise pollution in Navsari city of South Gujarat, *Journal of Environmental Research and Development*, Vol. 8(2) : 291 – 298.
- Shailendra Bhalawe, M.U. Kukadia and Dileswar Nayak (2013). Nutrient release pattern of decomposited leaf litter in different multipurpose trees, *Indian Forester*, 139(3) : 212-217.
- Shailendra Bhalawe, D. Nayak, MU Kukadia and Paresh Gaykwad (2013). Leaf litter decomposition pattern of trees. *Bioscan*, 8(4): 1135-1140.
- M. K. Yadav, N. L. Patel, B. R. Parmar and D. Nayak (2013). Evaluation of physiological and orgaleptic properties of mango cv. Kesar as influenced by ionizing radiation and storage temperature. *SAARC J. Agri.*, 11(2): 69-80.
- VM Prajapti, Sushil Kumar, D. Nayak and MR Parmar (2012). Toxicity of various *Bacillus thuringiensis* (Bt.) doses on teak defoliator (*Hyblea puera*) under laboratory conditions. *Annals of Forestry*, Vol. 20 (2): 175-179.
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- Parmar V. R. and Shrivastava, P. K., (2009). Variability of temperature in South Gujarat coast, *Journal of Agrometeorology*, Vol. 11 (Special Issue) : 204-207.

Recommendations

Sr. No.	Recommendation				AGRESKO
1	<p>Pitcher irrigation in young mango plants</p> <p>The farmers of AES– II of South Gujarat heavy rainfall zone are advised to adopt pitcher method of irrigation in newly planted mango orchard. They are recommended to fill either 1 pitcher of 10 L capacity or 2 pitchers of 7 L capacity per week, resulting in 50 % and 30 % water saving respectively, as compared to ring method of irrigation.</p>				III, Combined Joint AGRESKO, 2007
2	<p>Percolation pit for clay soils of South Gujarat</p> <p>The farmers of coastal areas of South Gujarat are recommended to construct a percolation pit near their bore well, in the available natural depression/monsoon drain. The pit of size 4.0 m x 3.0 m x 2.0 m (for a field of about 2 ha) along with 200 mm PVC strainer pipe, inserted before digging the pit upto first aquifer (about 12 m depth) for improving the ground water quality. The pipe should be about 0.6 m above ground with cap on top.</p>				VI, Combined Joint AGRESKO, 2010
3	<p>Rain Water Harvesting for sustaining ground water quality in coastal South Gujarat</p> <p>Farmers of the South Gujarat coastal region are recommended to harvest as much rain water as possible to maintain ground water quality below (EC=2 dS/m) as per catchment area as tabulated below. The suggested modes of harvesting in decreasing order of preference could be Pond, Check dam, Percolation pit, Percolation well, Trenches and Sub soiling, as per availability of land, catchment area, water demands, financial capacity, topography, rainfall pattern, soil type, vegetative cover and nearness to sea</p>				VIII, Combined Joint AGRESKO, 2012
		Sr. no	Area (ha)	Mode of Harvesting	
		1	> 2	Pond & Check Dam	
		2	2 to 1	Percolation pit	
		3	1 to 2	Percolation well	
		4	< 0.5	Trenches & Sub soiling	
4	<p>Time series analysis of weather parameters in relation to crop productivity Scientific Community</p> <p>The monsoon onset is delayed by a week and recedes a week early. Higher evaporation of 8 % and 18 % were observed during summer and rabi seasons respectively Therefore, scientists are recommended to Evolve shorter duration crop varieties suitable for delayed monsoon and re assess the crop water requirements for South Gujarat region.</p>				VIII, Combined Joint AGRESKO, 2012

5	<p>Roof top rain water harvesting for potable use</p> <p>Roof top rain water harvesting for potable use is recommended. Storage capacity of tank should be approximately 1000 L/ capita/yr., constructed in such a way that no light or air enters inside to prevent bacterial growth and the tank may at least 0.5 m above ground level to prevent direct entry of runoff water. Water from the tank could be pumped out by means of hand pump or electric operated self priming shallow lift pump.</p> <p>Precautions to be adopted are:</p> <ul style="list-style-type: none"> ➤ Roof tops and conveyance pipes should be thoroughly cleaned at the time of onset of monsoon. First flush of rain water should be allowed to bypass the storage tank, as well as during long gaps between two rainy events. ➤ Roof water may be allowed to pass through gravel – sand filter, consisting of layers (30 -50 cm) of coarse sand, 25 mm gravel, 50 mm gravel to remove organic impurity. ➤ Calcium Carbonate powder kept in earthen pots (7 L capacity / 5000 L), tied with muslin cloth on the mouth may be submerged into the storage tank. ➤ Walls of tank could be white washed with lime solution. ➤ Anaerobic bacteria may develop with time which could be removed by boiling / adding 0.5 g tablet of chlorine in 20 L of water / storage of water in copper vessel for 8 – 10 hrs / by using commercially available UV filter. 	X Combined Joint AGRESCO, 2014
6	<p>Disinfecting drinking water against any microbial activity by storing water in a copper vessel</p> <p>To disinfect drinking water against any microbial activity, water could be safely stored in a copper vessel for 12 hrs and 24 h to reduce Total Coliform by 85% and 90 % and total bacterial count by 67 and 81 % respectively.</p>	X Combined Joint AGRESCO, 2014
7	<p>Study on influence of different temperature regimes on growth and yield of rice</p> <p>On the basis of two season experiment in controlled environmental conditions, it is recommended that there is need to develop new rice varieties in context of future global warming. The significant yield reduction was recorded in all the three rice varieties viz. Jaya, Gurjari and GNR-2. The yield reduction was up to the tune of 18% and 36.6% when rice crop experienced rise of only 1.3°C and 2.7°C respectively, in average daily temperature above 10 years of average temperature.</p>	X Combined Joint AGRESCO, 2014
8	<p>Rainfall based crop planning for Dediapada</p> <ol style="list-style-type: none"> 1) Farmers of Dediapada taluka are recommended to proceed for sowing operations from 27th SMW. 2) Farmers are advised for in-situ moisture conservation and runoff collection in ponds for providing supplemental irrigation at the critical stages of rainfed crops after withdrawal of rainfall i. e. 36th SMW to get maximum production form rainfed crops. <p>Scientific Community: 27th SMW receives 24 mm, 26 mm and 35 mm rainfall amount at 75 %, 71 % and 60% probability respectively. The length of monsoon season is 112, 105 and 70 days at 50 %, 60 % and 75 % probability respectively. Rainfall is withdrawn after 39th, 38th and 36th SMW at 50 %, 60 % and 75 % probability respectively. There are 60 and 75 % probability to get sufficient rainfall for rainfed crops (> 10 mm) for continuous 11 SMW (77 days) from 27th to 37th week and 10 SMW (70 days) from 27th to 36th week respectively.</p>	X Combined Joint AGRESCO, 2014

9	<p>Assessment of pollution tolerance index of some plants</p> <p>In industrial areas of tropical region, it is recommended to plant Forest specie <i>Cassia fistula</i>, as it showed maximum APTI value as compared to other species. In addition, species <i>S. indica</i> and <i>S. cumini</i> are also found to be tolerant for plantation in industrial areas.</p>	X Combined Joint AGRESCO, 2014
10	<p>Investigation on Tree ring analysis of Teak</p> <p>Recommendation for Scientific Community: 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.</p> <p>Recommendation for Farmers: To enhance the radial growth in teak (<i>Tectona grandis</i> 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.</p>	XII Combined Joint AGRESCO, 2016
11	<p>Estimation of Green House Gases (GHGs) emission from paddy fields</p> <p>The rice grown under SRI method with 100 % RDN through urea retards the emission of CH₄ as well as total GHGs (CH₄ + N₂O as CO₂ eq.) which increases rice productivity. However, this superiority does not exist with respect to emission of N₂O. Rice cultivation with normal transplanting and direct seeded methods emitted the CH₄ gas to a greater extent and emission was more pronounced when Farm Yard manure added to the soil. Application of organics alone or in combination with inorganic fertilizers improves the rice yield and soil properties but favored more emission of GHGs from the rice field.</p>	XIII Combined Joint AGRESCO, 2017
12	<p>Effect of 75% green agro-net on production, reproduction and stress parameters in Surti buffaloes</p> <p>Farmers of South Gujarat region are recommended to use 75% green agro shed-net at 10 feet height to reduce 10-150C floor temperature of the open paddock between 2- 5 PM in hot-dry season (April end to first week of June) and also to reduce heat stress by lowering THI in hot-humid season (mid June to July end) for the comfort of Surti buffaloes”.</p>	XIII Combined Joint AGRESCO, 2017
13	<p>Evaluation of Eucalyptus Clones for growth and physiological characters</p> <p>Farmers of south Gujarat heavy rainfall zone-1 are recommended to harvest Eucalyptus (Nilgiri) clone G 283 (at 2 X 2 m spacing) after four years for better biomass production or pulp wood.</p>	XIII Combined Joint AGRESCO, 2017
14	<p>Development of integrated rainwater resource management (iRaM) module for coastal areas of South Gujarat</p> <p>Farmers of South Gujarat coast are recommended to construct ponds in lower depressions of their field, to harvest rain water for improving ground water quality along with rearing of fresh water fish (Grass carp, Catla, Rohu and Mrigal). The pond may be constructed in 10 % area with 3.0 m depth including 0.5m free board. They may rear fresh water fish even by collecting rain water or excess canal water by adopting “iRaM” (Integrated rainwater resource management) model.</p>	IVX Combined Joint AGRESCO, 2018

- 15 Irrigation scheduling of teak seedlings grown in nurseries
It is recommended to farmers/state forest department raising teak stump in net house nurseries to irrigate the seedlings on every alternate day, for getting seedlings with superior growth. The approximate quantity of water application (ml) in poly-bags of 10 kg size, during different months should be as follows:

Nov	Dec	Jan	Feb	Mar	Apr	May	June
300	200	200	300	300	400	400	300

- 16 Assessment of land use / land cover changes in South Gujarat using remote sensing and geographical information system
It is observed, from 2000 to 2010, that Surat district recorded major shift (18.25 %) from forest area to Orchards, plantations and gardens. Marshy lands have increased in Navsari (28.90 %) and Bharuch (2.38 %) district. Built up areas significantly increased in Navsari (69.09 %) followed by Narmada (44.40 %) district. The barren land may be planted with suitable forest / fruit species which will provide environmentally sustainable economic growth of the region. Therefore, policy makers, state Agriculture and Forest departments are suggested to utilize the technique of Remote Sensing and GIS for assessing the changes in land use, at regular basis, to maintain the vegetative cover, essentially required to sustain the ecological balance of the region.

- 17 Effect of different salinity levels of irrigation water on young teak plants
Scientific community is hereby informed that the critical limit of irrigation saline water for teak clones viz., CPT-262, CPT-266 and local is EC 4.0 dSm⁻¹.

- 18 Effect of different salinity levels of irrigation water on clones of *Casuarina equisetifolia*
Scientific community is hereby informed that, *Casuarina equisetifolia* cuttings could be grown successfully up to the EC 8.0 dSm⁻¹ saline irrigation water, without any remarkable reduction in biomass. Among the tested clones, IFGTBCE-1 clone is found to be more salt tolerant and could be grown up to EC 12.0 dSm⁻¹ of saline irrigation water. The critical limit of salinity of irrigation water, for *Casuarina equisetifolia* is recorded EC 16.0 dSm⁻¹.

- 19 Evaluation of Eucalyptus Clones for growth and biomass
It is recommended that Eucalyptus camaldulensis clone T15 (IFGTBEC-1) grown in south Gujarat Heavy Rainfall Agro-climatic Zone-1, (AES II)I can be used for further breeding/ improvement programme for better productivity at 3 m x 1.5 m spacing.

Effect of heat ameliorative measures (fans, foggers and green net) on physiological, haematological, biochemical and productive performance of lactating Surti buffaloes: Surti buffalo keepers of South Gujarat region are recommended to house Surti 191 buffaloes in shed having fans, foggers and rooftop whitewashed with lime for decreasing heat stress during summer season from 9 am to 5 pm (temperature decreases upto 3°C) which is beneficial in sustaining milk production.

- 20 Calibration and validation of DSSAT model for sugarcane crop for South Gujarat region: Calibrated genetic coefficients of two sugarcane cultivars (Co 86032 and Co 99004) furnished in the following table* can be used to run DSSAT model to simulate sugarcane yield under south Gujarat condition.

21	<p>Influence of climate on the wood production and anatomical variations in teak trees</p> <p>Teak growing in dry and moist deciduous forests varied in terms of wood production and its quality, which are influenced by radial growth, basic density and anatomical properties viz., fibre length, cell wall thickness, vessel diameter and vessel density. Further, fibre length is positively influenced by rainfall, whereas cell wall thickness positively and vessel density negatively influenced by both rainfall and temperature. However, vessel diameter negatively influenced by temperature and positively influenced by rainfall.</p>	XV Combined Joint AGRESKO, 2019
22	<p>Effect of supplementary cooling on body temperature, behaviour, milk composition and haemato-biochemical changes in hot dry and hot humid season in lactating Surti buffaloes.</p> <p>Tympanic temperature is a non invasive and sensitive parameter that can be used for measurement of body temperature during heat stress in Surti buffaloes.</p>	XV Combined Joint AGRESKO, 2019
23	<p>Effect of supplementary cooling on body temperature, behaviour, milk composition and haemato-biochemical changes in hot dry and hot humid season in lactating Surti buffaloes</p> <p>Tumor necrosis factor-α can be used as an additional bio-marker of heat stress in Surti buffaloes.</p>	XV Combined Joint AGRESKO, 2019
24	<p>Study of carbon sequestration potential of important tree species</p> <p>Farmers are recommended to grow tree species such as Casuarina, Eucalyptus and Bijasal for obtaining higher biomass and carbon sequestration under South Gujarat.</p>	XV Combined Joint AGRESKO, 2019
25	<p>Determination of critical limit of water salinity for <i>Ailanthus</i> spp. (Arduso) seedlings</p> <p>Scientific community is hereby informed that <i>Ailanthus</i> species (i.e. <i>A. excelsa</i> and <i>A. triphysa</i>) are salt tolerant and the critical limit for irrigating with saline water is 8.0 dS/m. Further, it is advised that Na/K ratio could be used as an indirect indicator for salt tolerance in the <i>Ailanthus</i> species.</p>	XVI Combined Joint AGRESKO, 2020
26	<p>Mapping of degraded lands using Remote sensing and GIS technique in coastal south Gujarat</p> <p>Scientific community is hereby informed that, Policy maker, state agriculture and forest departments are suggested to utilize the technique of remote sensing and GIS for assessing the land degradation at regular basis to ascertain the land sustainability. The sustainable utilization of unutilized land may be done as per land capability classification essentially required for nourishing ecological balance and food security of the region.</p>	XVII Combined Joint AGRESKO, 2021

* Coefficients Table

Cali genetic coefficients	Description of parameter coefficients controlling development aspects	Co 86032	Co 99004
MaxPARCE	Maximum (no stress) radiation conversion efficiency expressed as assimilate produced before respiration, per unit PAR. (g/MJ)	9.88	9.90
APFMX	Maximum fraction of dry mass increments that can be allocated to aerial dry mass (t/t)	0.93	0.87
STKPFMAX	Fraction of daily aerial dry mass increments partitioned to stalk at high temperatures in a mature crop (t/t on a dry mass basis)	0.78	0.78
SUCA	Sucrose partitioning parameter: Maximum sucrose contents in the base of stalk (t/t)	0.62	0.55
TBFT	Sucrose partitioning: Temperature at which partitioning of unstressed stalk mass increments to sucrose is 50% of the maximum value	26	27
Tthalf	Thermal time to half canopy (oCd)	250	250
TBase	Base temperature for canopy development (oCd)	16	16
LFMAX	Maximum number of green leaves a healthy, adequately-watered plant will have after it is old enough to lose some leaves.	12	12
MXLFAREA	Max leaf area assigned to all leaves above leaf number MXLFARNO (cm2)	629	369
MXLFARNO	Leaf number above which leaf area is limited to MXLFAREA	15	15
PI1	Phyllocron interval 1 (for leaf numbers below Pswitch, oC.d (base TTBASELFEX))	94	107
PI2	Phyllocron interval 2 (for leaf numbers above Pswitch, oC.d (base TTBASELFEX))	199	218
PSWITCH	Leaf number at which the phyllocron changes.	18	17
TTPLNTEM	Thermal time to emergence for a plant crop (degree C days, base TTBASEEM)	450	500
TTRATNEM	Thermal time to emergence for a ratoon crop (degree C days, base TTBASEEM)	203	203
CHUPIBASE	Thermal time (baseTTBASEEM) from emergence to start of stalk growth	1050	1050