

# RESEARCH ACCOMPLISHMENTS AND RECOMMENDATIONS 2018



**DIRECTORATE OF RESEARCH  
JUNAGADH AGRICULTURAL UNIVERSITY  
JUNAGADH-362 001(Gujarat)**

## Visit of Dignitaries at JAU



**Dr. Ivelaw Lloyd Griffith, Hon'ble Vice Chancellor & Principal, the University of Guyana visited at JAU on March 14, 2018**



**Dr. Peter S. Carberry, DDG (Research), ICRISAT, Telangana visited at JAU Research Projects on October 07, 2017**



**14<sup>th</sup> Meeting of Combined Joint AGRESCO of SAUs and Kamdhenu University of Gujarat held at Junagadh Agricultural University on April 03-05, 2018**

**RESEARCH ACCOMPLISHMENTS  
AND  
RECOMMENDATIONS  
2018**



**DIRECTORATE OF RESEARCH  
JUNAGADH AGRICULTURAL UNIVERSITY  
JUNAGADH-362 001(Gujarat)**

**Citation:**

Research Accomplishments and Recommendations-2018  
Junagadh Agricultural University, Junagadh (Gujarat)

**Edited & Published by:**

Director of Research & Dean, PG Studies

"University Bhavan"

Junagadh Agricultural University,

Junagadh-362001(Gujarat)

Phone: (0285) 2670131

Fax: (0285) 2674064

E-mail: dr@jau.in

**Compiled by:**

Dr. V. P. Chovatia

Dr. V. V. Rajani

Dr. Pramod Mohnot

Dr. S. T. Sanandia

Dr. K. B. Parmar

Dr. S. P. Kachhadiya

Er. D. B. Barad

Sh. S. J. Vekariya

**Publication No.:** 3 - 1 - 6

**Year of Publication:** July-2018

**Copies:** 500

**Printed at:**

Metro Offset

Dolatpara, Junagadh.

Ph. : 0285 - 2661254



Dr. A. R. Pathak  
Vice-Chancellor,  
Junagadh Agricultural University,  
Junagadh-362 001  
Phone : (Office) +91-285-2671784  
Fax : +91-285-2672004  
E-mail : vc@jau.in

## MESSAGE

Junagadh Agricultural University was carved out of Gujarat Agricultural University under GAU Act-2004 and came in to existence from 1<sup>st</sup> May, 2004 and since then excelling in teaching, research and extension education related to agriculture and allied sciences, especially for 10 districts of Saurashtra in Gujarat state.


Junagadh Agricultural University has 31 research stations including multidisciplinary main research stations, sub centres on various crops and testing centres spread over in whole North Saurashtra & South Saurashtra Agro-climatic Zones and part of North-west and Bhal & Coastal Area Agro-climatic Zones of Gujarat. The research carried out on various issues related to different mandated crops and disciplines based on the feedback received from farmers and line departments.

The research programmes and results are being discussed at zone level meeting during ZREACs of *kharif* and *rabi*. The same were also presented at concerned different research sub-committees followed by Joint AGRESCO and Combined Joint AGRESCO of SAUs and Kamdhenu University of Gujarat, before finalizing the recommendations for the year 2017-18.

I appreciate the contribution made by different scientists involved in the releasing seven crop varieties and 46 recommendations for farmers as well as 41 for scientific community, as an outcome of their sincere efforts. I heartily congratulate the Director of Research and his team for nicely compilation and publication of **“Research Accomplishments and Recommendations-2018”**. I hope content of this Booklet will be useful to farmers, scientists and planners for sustainable development and future course of action in doubling the farmers' income by the year 2022.

Place: Junagadh

Date: July 18, 2018

  
(A. R. Pathak)



Director of Research &  
Dean, P. G. Studies  
Junagadh Agricultural University  
Junagadh 362001  
Phone No. (O): +91-285-2670131  
Fax No.: +91-285-2674064  
E-mail: dr@jau.in

## PREFACE

It is a matter of great pleasure for me to highlight the research work carried out during 2017-18 in the University. The recommendations and new technical programmes were critically discussed and approved in respective 14<sup>th</sup> AGRESCO meetings of various sub-committees of Junagadh Agricultural University. Same will be presented in 14<sup>th</sup> Combined Joint AGRESCO meeting going to be held at Junagadh Agricultural University, Junagadh, during April 03-05, 2018.

The Junagadh Agricultural University represents ten districts and about 32.74 per cent area of the state. There are eight colleges, seven polytechnic colleges and 31 research stations, which include multidisciplinary main research stations, sub research stations for various crops as well as testing centers in the University. The eight different sub-committees have been constituted and conveners were nominated to plan and monitor of the research work. All the sub-committees have successfully completed their responsibilities. The University has also arranged 15<sup>th</sup> Research Council meeting on January 15, 2018 for approval of new research projects and research activities are being undertaken during this year.

Total 17 new projects worth of Rs. 292.98 lakh were sanctioned from Government of India, ICAR and Private sectors in the University. The main sanctioned projects are:

1. River Flow Simulations Integrating Satellite Data in Forested Catchment.
2. Seed infrastructure under NMOOP.
3. Seed Replacement Rate Enhancement (RKVY).

The breeder seeds of different crops to fulfill the demand of private and public sectors as per the national and state indents were successfully produced. The required nucleus seeds of different crops were also produced for the breeder seed production in the ensuing seasons.

Under the HRD component of the University, 156 scientist/teachers were

deputed to attend winter/summer school training, 316 attended different seminar/symposium/ conference at state and national level, 146 attended the workshops & group meet of their respective projects and 141 scientist/teachers were deputed to attend monitoring, academic work, visit *etc.* The University has also organized seven national level programmes like short course, winter school, conference & workshops as well as one state level seminar.

In the 14<sup>th</sup> Combined Joint AGRESCO Meeting, Seven varieties *viz.*, Groundnut [Gujarat Groundnut-HPS 2 (GG HPS 2)], Cotton [Gujarat Junagadh Cotton 102 (GJ. Cot 102) and Gujarat Cotton Hybrid 22 (G. Cot. Hy. 22)], Brinjal [Gujarat Round Brinjal 5 (GRB 5)], Tomato [Gujarat Tomato 6 (GT 6)], Okra [Gujarat Okra 6 (GO 6)] and Sesame [Gujarat Til 6 (GT 6)] were recommended for release in the state. Besides 46 technologies/recommendations were made for farmers and 41 recommendations were made for Scientific Community. In addition, as many as 119 new technical programmes were formulated for the solutions of the applied and basic problems of agriculture and allied fields. The new varieties were also released in 49<sup>th</sup> meeting of State Seed Sub-Committee held on July 07, 2018 at Gandhinagar.

Place: Junagadh

Date: July 18, 2018



(V. P. Chovatia)

## Summary of new released varieties and developed agro technologies during the year 2017-18

Sub-Committee	No. of Recommendations finalized for		Approved New Technical Programmes
	Farmers	Scientific Community	
Crop Improvement	07*	-	-
Crop Production	15	07	25
Plant Protection	12	10	21
Horticulture & Agro Forestry	02	01	06
Agricultural Engineering	10	03	13
Social Science	-	03	26
Basic Science	01	07	10
Animal Science	03	09	13
Fisheries Science	03	01	05
Total...	7*+46	41	119

\* Varieties released

### RECOMMENDATIONS FOR FARMERS

#### I. CROP IMPROVEMENT

Seven varieties viz., Groundnut [Gujarat Groundnut-HPS 2 (GG HPS 2)], Cotton [Gujarat Junagadh Cotton 102 (GJ. Cot 102) and Gujarat Cotton Hybrid 22 (G. Cot. Hy. 22)], Brinjal [Gujarat Round Brinjal 5 (GRB 5)], Tomato [Gujarat Tomato 6 (GT 6)], Okra [Gujarat Okra 6 (GO 6)] and Sesame [Gujarat Til 6 (GT 6)] were recommended for farmers of the state during the year 2017-18.

#### Groundnut: Gujarat Groundnut-HPS 2 (GG HPS 2)

Farmers of Gujarat state growing groundnut during *kharif* season are advised to grow large seeded confectionery type groundnut variety Gujarat Groundnut HPS 2 (GG HPS 2). This variety





recorded pod yield of 2835 kg/ha, which was 13.2 and 14.4 % higher over the check varieties; GJG HPS 1 (2505 kg/ha) and ICGV 86564 (2478 kg/ha), respectively. It is superior to check varieties in respect to tikka and rust disease.

(Main Oilseeds Research Station, JAU, Junagadh)

### **Cotton: Gujarat Junagadh Cotton 102 (GJ. Cot 102) (Endorsement)**

The farmers of Gujarat state growing Non Bt cotton (*Gossypium hirsutum* L.) under irrigated condition are advised to grow



variety Gujarat Junagadh Cotton-102 (GJ.Cot 102). This variety has recorded seed cotton yield of 2215 kg/ha, which was 15.9, 24.9, 20.1, 13.2 and 51.8 % higher than the check varieties, G.Cot-10, G.Cot-18, G.Cot 20, GN.Cot 22 and CNHO 12 as a zonal check, respectively. The lint yield in GJ.Cot-102 was 769 kg/ha, which was 12.7, 30.8, 20.3, 13.6 and 49.1 % higher than check varieties G.Cot 10, G.Cot 18, G.Cot 20, GN.Cot 22 and CNHO 12, respectively. It has 35.1 per cent ginning outturn and 18.32 % oil content. This variety is medium late in maturity.

(Cotton Research Station, JAU, Junagadh)

### **Cotton: Gujarat Cotton Hybrid 22 (G. Cot. Hy 22)**

The farmers of Gujarat state growing Non Bt cotton (*Gossypium hirsutum* L.) under irrigated condition are advised to grow hybrid variety Gujarat Cotton Hybrid 22 (G. Cot. Hy 22). The hybrid has recorded 2865 kg/ha seed cotton yield which was 20.4, 48.7, 36.7 and 45.9 % higher than the checks, G.Cot.Hy 10, G.Cot.Hy 12, GN.Cot.Hy 14 and Ankur 651, respectively. The lint yield in G.Cot.Hy 22 was 1010



kg/ha, showing yield increment of 26.0, 55.0, 42.2 and 37.3 % over hybrid checks, respectively. It has 34.7 % ginning outturn and 18.37 % oil content. The hybrid is medium late in maturity.

(Cotton Research Station, JAU, Junagadh)

### **Brinjal: Gujarat Round Brinjal 5 (GRB 5)**

The farmers of Gujarat state growing brinjal crop during late *kharif-rabi* season are advised to grow brinjal variety Gujarat Round Brinjal 5 (GRB 5). The variety has recorded 395.04 q/ha mean fruit yield, which was 10.12 and 24.38 % higher over check varieties; GAOB-2 and GJB-3, respectively. The fruits of GRB 5 are medium in size with round shape, light green in colour with purple shadow strip and good shining. The variety was found superior against insect-pests and disease.



(Vegetable Research Station, JAU, Junagadh)

### **Tomato: Gujarat Tomato 6 (GT 6)**

The farmers of Gujarat state growing tomato crop during late *kharif-rabi* season are advised to grow tomato variety Gujarat Tomato 6 (GT 6). The variety has recorded 316.05 q/ha fruit yield as against 240.84 kg/ha of Anand Tomato 3, 246.94 q/ha of Junagadh Tomato 3 and 248.26 q/ha of National check DVRT 2, which was 31.23, 27.99 and 27.31 % higher over checks, respectively. The fruits of GT 6 are medium in size, flat round in shape with attractive red color and 3 to 4



locules with high T.S.S. It was found superior against leaf curl and fruit borer to all the checks varieties.

(Vegetable Research Station, JAU, Junagadh)

### Okra: Gujarat Okra 6 (GO 6)

The farmers of Gujarat state growing okra crop during *kharif* season are advised to grow okra variety Gujarat Okra 6 (GO 6). This variety recorded a mean fruit yield of 125.77 q/ha, which was 13.36, 21.89 and 15.46 per cent higher over check varieties; GJO 3 (110.95 q/ha), GAO 5 (103.18 q/ha) and Pusa Sawani (108.93 q/ha). The fruits of this variety was smooth, tender, dark green in colour and attractive with green base. The YVMV incidence was found less in this variety as compared to all the check varieties at Junagadh and GJO-3 and Pusa Sawani at Anand. Looking to the pest incidence the proposed entry was found superior against fruit borer, jassids and white fly to all the checks at Junagadh, while at Anand, the variety was found superior against fruit borer whereas, against jassids and white fly, it found comparable to all the check varieties.



(Vegetable Research Station, JAU, Junagadh)

### Sesame: Gujarat Til 6 (GT 6)

The farmers of Gujarat state growing sesame in *kharif* rainfed condition are advised to grow sesame variety Gujarat Til 6 (GT 6). The variety recorded the

seed yield of 1010 kg/ha which was 16.62 % higher over the check variety G. Til 4 (866 kg/ha). It contains 49.68 % oil and yielded 502 kg/ha oil which was 17.60 % higher than G. Til 4 (427 kg/ha). The variety possessed white and bold seeds.



(Agricultural Research Station, JAU, Amreli)

## II. CROP PRODUCTION

### (A) Nutrient Management

#### Comparative efficacy of PSB and bio-phos on the performance of castor

The farmers of South Saurashtra Agro-climatic Zone growing irrigated castor are recommended to apply PSB in soil @ 2.0 L/ha and 40 kg P<sub>2</sub>O<sub>5</sub>, along with recommended dose of N and K (120-50 kg/ha) for obtaining higher seed yield and net return.



(Main Oilseeds Research Station, JAU, Junagadh)

#### Effect of multi-micronutrient formulations on brinjal

The farmers of South Saurashtra Agro-climatic Zone growing late *kharif* brinjal in medium black calcareous soil



are recommended to apply micronutrients as per soil test value as basal OR apply foliar spray of multi-micronutrient formulation Grade IV (Fe-Mn-Zn-Cu-B, 4.0-1.0-6.0-0.5-0.5 %) @ 1% at 45, 60 and 75 DATP in addition to recommended dose of fertilizers (100 - 37.5 - 37.5 N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O kg/ha) to brinjal for getting higher yield and net return.

(Department of Agril. Chem. & Soil Sci. and Vegetable Research Station, JAU, Junagadh)

#### Nitrogen management in wheat crop

The farmers of South Saurashtra Agro-climatic Zone growing wheat in medium black calcareous soil are recommended to apply nitrogen @



120 kg/ha in three splits ( $\frac{1}{4}$  as basal +  $\frac{1}{2}$  at 20 to 25 DAS +  $\frac{1}{4}$  at 35 to 40 DAS) instead of two splits in addition to recommended dose of N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O (60 - 60 kg

ha<sup>-1</sup>) for getting higher yield, net return and improve nutrient use efficiency.

(Department of Agril. Chem. & Soil Sci. and Wheat Research Station, JAU, Junagadh)

### **Effect of soil amendments on different varieties of soybean (*Glycine max* L.) under sodic soil**

The farmers of South Saurashtra Agro-climate Zone growing soybean in sodic soil during *kharif* season are recommended to grow soybean variety NRC-37 and apply FYM @ 10 t ha<sup>-1</sup> + Gypsum @ 50 % GR along with recommended dose of 30:60:00 kg N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ha<sup>-1</sup> for obtaining higher yield and net realization.

(Department of Agril. Chem. & Soil Sci. and Agril. Research Station (FC), JAU, Mahuva)

### **Effect of nutrients management modules for minimizing drought impact and groundnut yield maximization in rainfed region**

The farmers of North Saurashtra Agro-climatic Zone growing semi spreading groundnut crop are recommended to spray urea @ 2% at 30 to 35 DAS along with recommended dose of 12.5-25 N-P kg/ha for obtaining higher yield and maximum net return.

(Main Dry Farming Research Station, JAU, Targhadia)

### **Effect of zinc fertilization on wheat yield in sandy loam**

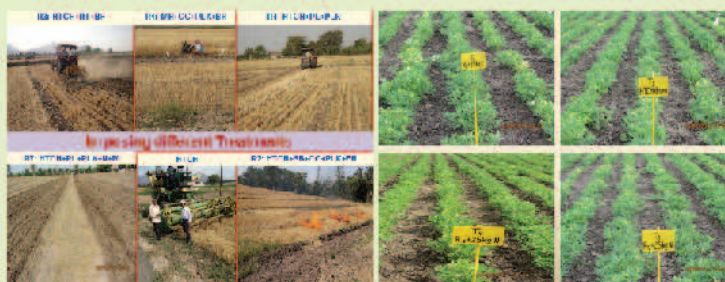
The farmers of North Saurashtra Agro-climatic Zone (AES-10) growing wheat are recommended to apply ZnSO<sub>4</sub> @ 20 kg ha<sup>-1</sup> as basal along with two foliar sprays of ZnSO<sub>4</sub> @ 0.5 % (50 g/10 lit. water) at heading and milking stages with recommended dose of fertilizer (120-60-60 NPK kg/ha) for obtaining higher yield and net realization.

(Main Dry Farming Research Station, JAU, Targhadia)

## **(B) Cultural Practices**

### **Tillage practices for residue management in groundnut-wheat cropping sequence**

The farmers of South Saurashtra Agro-climatic Zone who are adopting wheat (*rabi*)-fallow-groundnut (*kharif*) crop sequence are advised to harvest the wheat crop



by combine harvester and incorporate the wheat straw in the soil with rotavator and blade harrowing + application of 12 kg N/ha (26 kg urea/ha) + Madhyam culture @ 5 kg/ha and give a light irrigation to the soil through sprinkler irrigation system to secure higher production and profitability of *kharif* groundnut as well as to sustain the soil health.

(Department of Agronomy, CoA, JAU, Junagadh)

### Cropping system diversification and/or intensification

The farmers of South Saurashtra Agro-climatic Zone adopting groundnut (*kharif*) - wheat (*rabi*) cropping system are recommended to replace the system with any one of the following intensified cropping systems to secure higher yield and net profit.



<i>Kharif</i>	<i>Rabi</i>	Summer
Two rows of groundnut (semi spreading) at 60 cm + one row of sweet corn.	Two rows of coriander (seed) at 45 cm + one row of vegetable pea.	Two rows of sesame at 45 cm + one row of vegetable cowpea.
<b>OR</b>		
Clusterbean (seed) at 45 cm.	Paired row of fennel at 60 cm + eight rows of garlic at 15 cm.	Two rows of sesame at 45 cm + two rows of fodder sorghum at 22.5 cm.

(Department of Agronomy, CoA, JAU, Junagadh)

### Groundnut based cropping system under rainfed condition

The farmers of North Saurashtra Agro-climatic Zone adopting bunch groundnut based intercrop system under rainfed condition are recommended to grow groundnut with cotton in 2:1 row ratio for getting higher yield and net return.

(Main Dry Farming Research Station, JAU, Targhadia)

### Moisture stress management in sugarcane

The farmers of South Saurashtra Agro-climatic Zone interested to grow spring planted sugarcane under water deficit condition during formative stage are



recommended to apply trash mulch @ 5 t/ha at 4-6 days after planting and foliar spray of urea + muriate of potash both @ 2.5 % (2.5 kg urea + 2.5 kg KCl in 100

litres of water) at 60, 80 and 100 days after planting for securing higher cane yield and net return.

(Main Sugarcane Research Station, JAU, Kodinar)

### (C) Irrigation Management

#### Evaluation of precision land levelling in wheat

The farmers of South Saurashtra Agro-climatic Zone growing wheat in *rabi* season are recommended to apply 10 irrigations, first immediately after sowing and remaining 9 irrigations at 8-10 days interval (at 0.9 IW/CPE ratio) for securing higher yield and 10 per cent water saving.



(Department of Agronomy, CoA, JAU, Junagadh)

#### Effect of different irrigation scheduling and irrigation interval through drip on chickpea

The farmers of South Saurashtra Agro-climatic Zone growing chickpea under drip irrigation system are recommended to irrigate the crop with drip system at 0.8 ETc at 5 days interval through drip after two flood irrigations for getting higher yield, net return and 27 % saving of irrigation water. The system details are as under:



Lateral spacing: 90 cm Dripper spacing: 45 cm Dripper discharge rate: 4 LPH Operating pressure: 1.2 kg/cm <sup>2</sup> Operating frequency: every 5 <sup>th</sup> day irrigation	<b>Operating time</b>	
	Month	Minutes
	December	57
	January	104
	February	65

(Pulses Research Station, JAU, Junagadh)

#### Irrigation management through critical stages of chickpea

The farmers of South Saurashtra Agro-climatic Zone interested to grow

chickpea under water crisis condition are recommended to irrigate the chickpea crop at four critical stages like branching, flowering, pod initiation and grain filling apart from two common irrigations, first immediately after sowing and second at 6-7 days after sowing for getting higher yield and saving 17 per cent of irrigation water.



(Pulses Research Station, JAU, Junagadh)

## (D) Weed Management

### Integrated weed management in okra

The farmers of South Saurashtra Agro-climatic Zone growing okra in *kharif* season are recommended to carry out hand weeding at 15, 30 and 45 DAS for effective weed management and achieving higher fruit yield and net realization.

(Department of Agronomy, CoA, JAU, Junagadh)



### Integrated weed management in *rabi* fennel

The farmers of South Saurashtra Agro-climatic Zone growing fennel in *rabi* season are recommended to carry out two hand weeding and inter culturing at 20 and 40 DAS for effective weed management and achieving higher seed yield and net realization.

(Department of Agronomy, CoA, JAU, Junagadh)

## III. PLANT PROTECTION

### (A) Agricultural Entomology

#### Bio-efficacy of *Beauveria bassiana* in combination with different insecticides against sucking pests of Bt cotton (Bollgard-II)

For effective and economical management of aphid, jassid, whitefly and thrips in cotton, the farmers of South Saurashtra Agro-climatic Zone are recommended to apply five spray of any one of the following

1. Dinotefuran 20 SG 0.01 % (5.0 g/10 litre of water).
2. Diafenthiuron 50 WP 0.05% (10.0 g/10 litre of water).



3. Flonicamid 50 WG 0.015% (3.0 g/10 litre of water).
4. Spiromesifen 22.9 SC 0.011% (5.0 ml/10 litre of water).
5. Spinosad 45 SC 0.018% (4.0 ml/10 litre of water).



For ecofriendly management, apply *Beauveria bassiana* 1.15 WP (Min.  $2 \times 10^6$  cfu/g) 0.007% (60 g/10 litre of water), first spray at pest initiation and subsequent four spray should be given at 10 days interval after first spray.

Year	Crop	Pest	Pesticides with formulation	Dosage				Total Quantity of Chemical suspension required/ha	Application schedule	Waiting period/ PHI (days)	Remark (s)
				a.i. g/ha	Quantity of formulation ml or kg/ha	Con (%)	Dilution in water (10 lit.)				
2017-18	Cotton	Aphid, Jassid, Thrips and White fly	Dinotefuran 20 SG	50	0.250 kg	0.01	5 g	500 lit	First spray at pest appearance and subsequent four sprays at 10 days interval after first spray	15	-
			Diafenthiuron 50 WP	250	0.500 kg	0.05	10 g	500 lit		21	-
			Flonicamid 50 WG	75	0.150 kg	0.015	3 g	500 lit		25	-
			Spiromesifen 22.9 SC	57.25	250 ml	0.011	5 ml	500 lit		10	--
			<i>Beauveria bassiana</i> 1.15 WP	$2 \times 10^6$ cfu/g	3.0 kg	0.007 (Min. $2 \times 10^6$ cfu/g)	60 g	500 lit		--	--

(Department of Entomology, CoA, JAU, Junagadh)

### Evaluation of new pheromone based mating disruption technology for pink bollworm in cotton

The farmers of South Saurashtra Agro-climatic Zone growing Bt cotton are recommended to give three application of Sawaj Pheromone based Mating Disruption Paste (Sawaj MDP) technology @ 400g paste per application per hectare (uniformly distributed in 1000 dots between two branches) against pink bollworm, first at initiation of pest infestation (flowering stage) and subsequent two applications at an interval of 30 days for effective, economical and ecofriendly management.

Year	Crop	Pest	Pesticides with formulation	Dosage				Total Qty. of water required/ ha	Application schedule
				g.a.i./ha	Qty. of formulation g/ha	Conc (%)	Dilution in water (10 lit.)		
2018	Cotton	Pink boll worm	Sawaj MDP technology	-	1200 g/ha (400 g paste per application per hectare)	-	-	-	First application at pest infestation (flowering stage), while second and third at 30 days interval after first application.



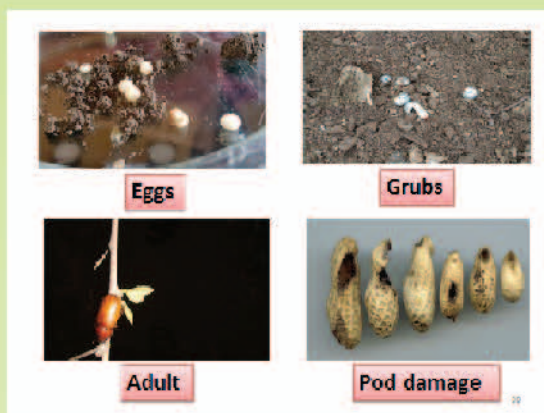
(Department of Entomology, CoA, JAU, Junagadh)

### Microbial management of white grubs in groundnut

The farmers of South Saurashtra Agro-climatic Zone growing *kharif* groundnut are recommended to give seed treatment with chlorpyrifos 20 EC @ 25 ml/kg seed and soil application of *Beauveria bassiana* or *Metarizium anisopliae* 1.15 WP @ 5 kg/ha (Min.  $2 \times 10^6$  cfu/g) along with castor cake (300 kg/ha) before sowing and drenching in plant row after 30 days of germination.

For organic farming, soil application of *Beauveria bassiana* or *Metarizium anisopliae* 1.15 WP @ 5 kg/ha (Min.  $2 \times 10^6$  cfu/g) along with castor cake (300 kg/ha) before sowing and drenching in plant row after 30 days of germination for effective and economical management of white grub.

Year	Crop	Pest	Pesticides with formulation	Dosage				Total Quantity of Chemical suspension required/ ha	Application schedule	Waiting period/ PHI (days)	
				a.i.g/ ha	Quantity of formulation ml, kg/ha	Con. (%)	Dilution in water (10 lit.)				
2017-18	Groundnut	White grub	Chlorpyrifos 20 % EC (ST) + <i>Beauveria bassiana</i> 1.15 WP (SA and drenching)	600 + 57.50 + 57.50	3.0 lit + 5.0 kg + 5.0 kg	-- 0.006 (Min. $2 \times 10^6$ cfu/ g)	NA 50 g	-- 1000 lit (Drenching)	ST and soil application before sowing and drenching after 30 days of germination	-	
			OR	Chlorpyrifos 20 % EC (ST) + <i>Metarhizium anisopliae</i> 1.15 WP (SA and drenching)	600 + 57.50 + 57.50	3.0 lit + 5.0 kg + 5.0 kg	-- 0.006 (Min. $2 \times 10^6$ cfu/ g)				NA 50 g
			OR	<i>Beauveria bassiana</i> 1.15 WP (SA and drenching)	57.50 + 57.50	5.0 kg + 5.0 kg	0.006 (Min. $2 \times 10^6$ cfu/ g)	50 g			1000 lit (Drenching)
			OR	<i>Metarhizium anisopliae</i> 1.15 WP (SA and drenching)	57.50 + 57.50	5.0 kg + 5.0 kg	0.006 (Min. $2 \times 10^6$ cfu/ g)	50 g			



(Department of Entomology, CoA, JAU, Junagadh)

### Effect of insecticides on growth of *Beauveria bassiana*

For mixing Sawaj Beauveria with different insecticides, farmers are advised to refer the following table (Yes/No).

Sr. No	Insecticide	At lower dose			At recommended dose			At higher dose		
		Conc. (%)	Dose (ml/g)/10 lit.	Farmer are advise to mix the insecticides with <i>B. bassiana</i> (Yes/No)	Conc. (%)	Dose (ml/g)/10 lit.	Farmer are advise to mix the insecticides with <i>B. bassiana</i> (Yes/No)	Conc. (%)	Dose (ml/g)/10 lit.	Farmer are advise to mix the insecticides with <i>B. bassiana</i> (Yes/No)
1	Methomyl 40 SP	0.040	10.00	Yes	0.080	20.00	Yes	0.12	30.00	Yes
2	Lambda cyhalothrin 5 EC	0.00125	2.50	Yes	0.0025	5.00	Yes	0.00375	7.50	Yes
3	Thiodicarb 75 WP	0.075	10.00	Yes	0.15	20.00	Yes	0.225	30.00	Yes
4	Chlorpyrifos 20 EC	0.020	10.00	Yes	0.040	20.00	Yes	0.060	30	No
5	Profenophos 50 EC	0.037	7.50	No	0.075	15.00	No	0.112	22.50	No
6	Quinalphos 25 EC	0.025	10.00	Yes	0.050	20.00	No	0.075	30.00	No
7	Spiromesifen 22.9 SC	0.011	5.00	Yes	0.023	10.00	Yes	0.033	15.00	Yes
8	Bifenthrin 10 EC	0.0025	2.50	Yes	0.005	5.00	Yes	0.0075	7.50	Yes
9	Diflubenzuron 25 WP	0.012	5.00	Yes	0.025	10.00	Yes	0.037	15.00	No
10	Novaluron 10 EC	0.005	5.00	Yes	0.010	10.00	Yes	0.015	15.00	Yes
11	Fipronil 5 SC	0.005	10.00	Yes	0.010	20.00	Yes	0.015	30.00	Yes
12	Indoxacarb 14.5 EC	0.0036	2.50	Yes	0.007	5.00	Yes	0.0108	7.50	Yes
13	Chlorantraniliprole 18.5 SC	0.003	1.50	Yes	0.006	3.00	Yes	0.009	4.50	Yes
14	Spinosad 45 SC	0.007	1.50	Yes	0.014	3.00	Yes	0.021	4.50	Yes
15	Imidacloprid 17.8 SL	0.0026	1.50	Yes	0.005	3.00	Yes	0.008	4.50	Yes

16	Acetamidrid 20 SP	0.003	1.50	Yes	0.006	3.00	Yes	0.009	4.50	No
17	Thiamethoxam 25 WG	0.005	2.00	Yes	0.010	4.00	Yes	0.015	6.00	Yes
18	Chlorfenpyr 10 EC	0.0075	7.50	Yes	0.015	15.00	Yes	0.0225	22.50	No
19	Diafenthiuron 50 WP	0.025	5.00	Yes	0.050	10.00	Yes	0.075	15.00	Yes
20	Flubeniamide 480 SC	0.072	1.50	Yes	0.144	3.00	Yes	0.216	4.50	Yes
21	Cartap hydrochloride 50 SP	0.025	5.00	Yes	0.050	10.00	Yes	0.075	15.00	No
22	Emamectin benzoate 5 SG	0.00125	2.50	Yes	0.0025	5.00	Yes	0.00375	7.50	Yes
23	Carbosulfan 25 EC	0.025	10.00	Yes	0.050	20.00	Yes	0.075	30.00	Yes
24	Buprofezin 25 EC	0.025	10.00	Yes	0.050	20.00	Yes	0.075	30.00	No
25	Polytrin 44 EC	0.022	5.00	Yes	0.044	10.00	Yes	0.066	15.00	Yes
26	Dinotefuran 20 SG	0.005	2.50	Yes	0.010	5.00	Yes	0.0152	7.50	Yes
27	Flonicamide 50 SG	0.0075	1.50	Yes	0.015	3.00	Yes	0.0225	4.50	No
28	Acephate 75 SP	0.037	5.00	Yes	0.075	10.00	Yes	0.112	15.00	No
29	Dimethoate 30 EC	0.015	5.00	Yes	0.030	10.00	Yes	0.045	15.00	Yes
30	Azadirachtin 0.15 EC	0.0003	25.00	Yes	0.0007	50.00	Yes	0.0011	75.00	Yes

(Department of Entomology, CoA, JAU, Junagadh)

### Effect of fungicides on growth of *Beauveria bassiana*

For mixing Sawaj Beauveria with different fungicides, farmers are advised to refer the following table (Yes/No).

Sr. No.	Insecticide	At lower dose			At recommended dose			At higher dose		
		Conc. (%)	Dose (ml/g)/ 10 lit.	Farmer are advise to mix the fungicides with <i>B. bassiana</i> (Yes/No)	Conc. (%)	Dose (ml/g)/ 10 lit.	Farmer are advise to mix the fungicides with <i>B. bassiana</i> (Yes/No)	Conc. (%)	Dose (ml/g)/ 10 lit.	Farmer are advise to mix the fungicides with <i>B. bassiana</i> (Yes/No)
1	Sulphur 80 WP	0.100	12.50	Yes	0.200	25.00	Yes	0.300	37.50	Yes
2	Copper oxychloride 50 WP	0.100	20.00	Yes	0.200	40.00	Yes	0.300	60.00	Yes
3	Dinocap 48 EC	0.024	5.00	Yes	0.048	10.00	Yes	0.072	15.00	Yes
4	Metalaxy1 4 + Mancozeb 64 WP	0.102	15.00	No	0.204	30.00	No	0.306	45.00	No
5	Zineb 75 WP	0.100	13.30	No	0.200	26.60	No	0.300	40.00	No
6	Fosetyl-Al 80 WP	0.080	10.00	Yes	0.160	20.00	Yes	0.240	30.00	No
7	Chlorothalonil 75 WP	0.100	13.40	Yes	0.200	26.70	Yes	0.300	40.10	Yes
8	Mancozeb 75 WP	0.093	13.40	No	0.187	26.70	No	0.280	40.10	No

9	Benomyl 50 WP	0.025	5.00	Yes	0.050	10.00	No	0.075	15.00	No
10	Hexaconazole 5 EC	0.0025	5.00	No	0.005	10.00	No	0.0075	15.00	No
11	Carbendazim 50 WP	0.025	5.00	No	0.050	10.00	No	0.075	15.00	No
12	Propiconazole 25 EC	0.013	5.00	No	0.025	10.00	No	0.038	15.00	No
13	Thiophanate methyl 70 WP	0.035	5.00	No	0.070	10.00	No	0.105	15.00	No
14	Thiram 75 SP	0.100	13.40	No	0.200	26.70	No	0.300	40.10	No
15	Carboxin 37.5 + Thiram 37.5 DS	0.038	5.00	No	0.075	10.00	No	0.113	15.00	No
16	Metalaxyl 8 + Mancozeb 64 WP	0.0748	10.40	No	0.1497	20.80	No	0.2246	31.20	No
17	Tabucanazole 25 EC	0.013	5.00	No	0.025	10.00	No	0.038	15.00	No
18	Propineb 70 WP	0.070	10.00	No	0.140	20.00	No	0.210	30.00	No
19	Tridimefon 25 WP	0.013	5.00	No	0.025	10.00	No	0.038	15.00	No
20	Mancozeb 63 + Carbendazim 12 WP	0.075	10.00	No	0.15	20.00	No	0.225	30.00	No
21	Azoxystrobin 23SC	0.012	5.00	No	0.023	10.00	No	0.035	15.00	No

(Department of Entomology, CoA, JAU, Junagadh)

### Bio-efficacy of different bio-pesticides and insecticides against pink bollworm in Bt cotton (Bollgard-II)

The farmers growing cotton are recommended to apply five spray of *Beauveria bassiana* 1.15 WP (Min.  $2 \times 10^6$  cfu/g) 0.009 % (80 g/10 litre of water), first spray at 5 % appearance of rosette flower and subsequent four spray at 10 days interval after first spray for effective and economical management of pink bollworm.

Year	Crop	Pest	Pesticides with formulation	Dosage				Total Quantity of Chemical suspension required/ha	Application schedule	Waiting period/ PHI (days)
				a.i./ha	Quantity of formulation ml, kg/ha	Con. (%)	Dilution in water (10 lit.)			
2017-18	Cotton	Pink boll worm	<i>Beauveria bassiana</i> 1.15 WP	46.00	4.0 kg	0.009 (Min. $2 \times 10^6$ cfu/ g)	80 g	500 lit	First spray at 5% rosette appearance of flower and subsequent four spray at 10 days interval after first spray	-



(Department of Entomology, CoA, JAU, Junagadh)

### Bio-efficacy of selected insecticides against pink bollworm in Bt cotton

The farmers of South Saurashtra Agro-climatic Zone growing Bt cotton are recommended to apply any one of the following insecticides, first spray at 75 days after sowing and second at 15 days of first spray for effective and economical management of pink bollworm.



1. Lambda cyhalothrin 2.5 EC, 0.0025% (10 ml/10 lit. of water) or
2. Deltamethrin 2.8 EC, 0.0028% (10 ml/10 lit. of water).

Year	Crop	Pest	Pesticides with formulation	Dosage					Application schedule	Waiting period/ PHI (days)
				g. a.l./ha	Quantity of formulation ml/ha	Con. (%)	Dilution in water (10 lit.)	Total Quant. of water lit /ha		
1	2	3	4	5	6	7	8	9	10	11
2017	Cotton	PBW	Lambda cyhalothrin 2.5 EC	12.5	500	0.0025	10 ml	500	First spray at 75 days after sowing and second after 15 days of the first spray for effective control of pink bollworm.	21
			Deltamethrin 2.8 EC	14	500	0.0028	10 ml	500		-

(Cotton Research Station, JAU, Junagadh)

### Management of ear head worm, *Helicoverpa armigera* (Hub.) infesting bajra crop with bio-pesticides

Farmers of North Saurashtra Agro-climatic Zone growing *kharif* pearl millet are recommended to spray *HaNPV* @ 450 LE/ha (10 ml/10 lit. water) or *Bacillus thuringiensis* 5 WP ( $2 \times 10^8$  cfu/g) @ 1.0 kg/ha (20 g/10 lit. water) or *Beauveria bassiana* 1.15 WP ( $2 \times 10^6$  cfu/g) @ 2.0



kg/ha (40 g/10 lit. water) on appearance of *Helicoverpa armigera* at ear head stage for effective and economical management of pest.

Year	Crop	Pest	Pesticides with Formulation	Dosage				Total qty. of water required /ha	Application schedule	Waiting period / PHI (days)
				g. a.i. / ha	Qty. of formu g, ml, kg or l/ha	Conc. (%)	Dilution in water (10 lit.)			
1	2	3	4	5	6	7	8	9	10	11
2018	Pearl millet (bajra)	<i>Helicoverpa armigera</i>	<i>HaNPV</i> 450 LE/ha	--	500 ml	450 LE/ha	10 ml	500 litre	Single spray at the appearance of <i>H. armigera</i> larva on ear head	--
			<i>Bacillus thuringiensis</i> 5 WP	50	1.0 kg	0.01 (2 x 10 <sup>8</sup> cfu/g)	20g			
			<i>Beauveria bassiana</i> 1.15 WP	23	2.0 kg	0.0046 (2 x 10 <sup>6</sup> cfu/g)	40g			

(Main Pearl Millet Research Station, JAU, Jamnagar)

### Effect of intercrop on the incidence of major insect pests of sesame

Farmers of North Saurashtra Agro-climatic Zone growing sesame in *kharif* are recommended to grow black gram as an intercrop (2 line sesame + 1 line black gram) at the spacing 60 x 10 cm to reduce pest infestation, increase predator activity and to get higher net realization.



(Agricultural Research Station, JAU, Amreli)

### Testing bio-efficacy of insecticides against leaf webber (*Crocidolomia binotalis* Zell) of mustard

The farmers of South Saurashtra Agro-climatic Zone growing mustard in *rabi* season are recommended to apply two spray of chlorpyrifos 20 EC 0.05 % @ 250 g a.i./ha (25 ml/10 liter water) or quinalphos 25 EC 0.05 % @ 250 g a.i./ha (20 ml/10 litre water) at 7 days interval starting from the initiation of pest infestation for effective and economical management of mustard leaf webber.



Year	Crop	Pest	Pesticides with formulation	Dosage				Total Quantity of Chemical suspension required/ ha	Application schedule	Waiting period/ PHI (days)	Remark (s)
				a.i g/ha	Quantity of formulation ml or kg/ha	Con. (%)	Dilution in water (10 lit.)				
2017	Mustard	Leaf webber	Chlorpyrifos 20 EC	250	1.25 lit	0.05	25	500 lit	First spray at initiation of leaf webber damage and second at 7 days after first spray	-	Registered under CIB Approved list
			Quinalphos 25 EC	250	1.0 lit	0.05	20	500 lit			

(Main Oilseeds Research Station, JAU, Junagadh)

### Evaluation of different storage bags against the groundnut bruchid beetle (*Caryedon serratus*) in storage

The farmers of South Saurashtra Agro-climatic Zone are recommended to store fumigated groundnut pods in high density polythene (HDPE) bags or polythene layered gunny bags for effective and economical management of bruchid pest.

(Main Oilseeds Research Station, JAU, Junagadh)



### (B) Plant Pathology

#### Management of fungal foliar diseases of cotton

The farmers growing cotton are recommended to apply three spray of pyraclostrobin 5 WG + metiram 55 WG 0.18 % @ 30 g/10 liter of water, first spray at initiation of diseases and subsequent two spray at 15 days interval after first spray for effective and economical management of fungal foliar diseases.

The farmers those interested in organic cotton production are recommended to apply three spray of to *Pseudomonas fluorescens* ( $2 \times 10^8$  cfu/g) 50 ml/10 liter of water, first spray at initiation of diseases and subsequent two spray at 15 days interval after first spray for effective and economical management of fungal foliar and bacterial blight diseases.



Year	Crop	Disease	Fungicide with formulation	Dosage				Total Quantity of Chemical suspension required / ha	Application schedule	Waiting Period/PHI (days)	Remark
				g.a.i./ha	Quantity of formulation g, ml, kg or l/ha	Concentration (%)	Dilution in water (10 lit)				
1	2	3	4	5	6	7	8	9	10	11	12
2018	Cotton	Foliar diseases	Mancozeb 63WP + Carbendazim 12 WP	750	1.0kg	0.15	20g	500	First spray at initiation of diseases & next sprays at interval of 15days	BDL	-
			Pyrethoobin 5WG+ Metiram55WG	900	1.5kg	0.18	30g	500		45	Registered in CIB-RC
			<i>Pseudomonas fluorescens</i>	25 2x 10 <sup>8</sup> cfu/ml	2.5 l	0.005 2x10 <sup>8</sup> cfu/ml	50ml	500		--	-

(Cotton Research Station, JAU, Junagadh)

#### IV. HORTICULTURE & AGRO-FORESTRY

##### Evaluation of tomato varieties under poly house and net house condition

Farmers of Saurashtra region interested to grow tomato in protected condition are advised to grow indeterminate variety in 60 % white shade net house for getting higher yield and net return.



(Department of Horticulture, CoA, JAU, Junagadh)

##### Effect of organic manures in sapota [*Manilkara achras* (Mill)] cv. Kalipatti under saline water irrigation condition

Farmers of Saurashtra region interested to organic cultivation of sapota are advised to apply FYM @ 90 kg/tree (8 year) per year during June-July under saline irrigation water (EC 10-14 dSm<sup>-1</sup>) for obtaining higher yield with net return and for improving soil fertility and microbial status of soil.



(Fruit Research Station, JAU, Mangrol)

#### V. AGRICULTURAL ENGINEERING

##### Enzymatic pre-treatment in the processing of pigeon pea

The pulse processing entrepreneurs are recommended to give enzymatic pre-

treatment at specific concentration, time and temperature to get higher recovery and to reduce the *dhal* making time.



(Department of Processing & Food Engg., CAET, JAU, Junagadh)

### Irrigation scheduling of wheat under high discharge drip irrigation

Farmers of South Saurashtra Agro-climatic Zone growing wheat in medium black soil are recommended to adopt the drip irrigation system



having spacings of 1.8m lateral to lateral and 1m emmitter to emmitter of 14 liters per hour to irrigate at 150 cbar soil moisture tension to get higher net return with 21.04 % water saving and 4 % energy saving. For this, farmers are advised to irrigate the crop with following schedule.

Month	Number of Irrigation	Time of Operation	Irrigation Interval
November	1	Flood irrigation	Post sowing
December	3	4 hours and 45 minute	10 Days
January	5	3 hours and 40 minute	6 Days
February	3	5 hours and 40 minute	9 Days

(Department of Soil & Water Conservation Engg., CAET, JAU, Junagadh)

### Evaluation of on stream check dam groundwater recharge technique for Junagadh region

It is recommended to farmers, NGOs and line departments of Government on-stream check dam groundwater recharge technique is a cost effective groundwater

recharge technique. In Junagadh region, it results 0.15 cum groundwater recharge per square meter of catchment area at the cost of ₹ 1.02 per cum as per prevailing cost.

*(Department of Soil & Water Conservation Engg., CAET, JAU, Junagadh)*

### **Evaluation of groundwater recharge basin technique for Junagadh region**

It is recommended to farmers, NGOs and line departments of Government that recharge basin is a cost effective recharge technique. In Junagadh region, it results in recharge about 0.13 cum. groundwater per square meter of catchment area at the cost of ₹ 0.27 per cum.



*(Department of Soil & Water Conservation Engg., CAET, JAU, Junagadh)*

### **Evaluation of roof water harvesting recharge technique for Junagadh region**

It is recommended to citizens, farmers, NGOs and line departments of Government that roof water harvesting is an effective groundwater recharge technique. In Junagadh region, it results in groundwater recharge of 0.22 cum out of potential runoff of 0.73 cum per sq. m of roof area, which may be done through tube well recharge and remaining 0.51 cum may be stored in a sump with a cost of ₹ 34 per cum at prevailing cost. The annual runoff coefficient of 0.71 for roof top is recommended for designing the roof water harvesting system.



*(Department of Soil & Water Conservation Engg., CAET, JAU, Junagadh)*

### **Estimation of irrigation demand for different crops of ozat river basin using remote sensing and GIS**

The irrigation department and planners of Ozat river basin are recommended that based on remote sensing technology, 9 irrigations should be applied for wheat crop in basin apart from pre sowing irrigation at 16, 31, 40, 50, 62, 72, 80, 89 and

96 days after sowing with irrigation depths of 33, 38, 32, 37, 45, 43, 37, 44 and 35 mm, respectively.

*(Department of Soil & Water Conservation Engg., CAET, JAU, Junagadh)*

### **In-situ moisture conservation in rainfed stressed regions for increasing productivity of cotton crop**

The farmers of North Saurashtra Agro-climatic Zone growing Bt. cotton G. Cot Hy-8 (BG-II) at the distance of 120 x 45 cm are advised to prepare

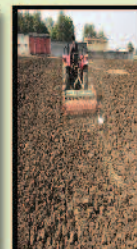


ridge and furrow OR broad bed with 2 rows(180 cm width) and furrow (60 cm) at 20 days after sowing and apply plastic mulch (25 micron) OR straw mulch @ 5 t/ha at withdrawal of monsoon in the month of September (38 to 39 Std. week) for obtaining higher productivity and maximum net returns as well as maximum in-situ moisture conservation and rain water use efficiency under dry farming conditions.

*(Main Dry Farming Research Station, JAU, Targadia)*

### **Development and performance evaluation of tractor drawn cultivator cum spiked roller**

The farmers of South Saurashtra Agro-climatic Zone and manufacturers are recommended to use Junagadh Agricultural University developed tractor drawn cultivator cum spiked roller for seed bed preparation. It saves 68.31 per cent cost of operation as compared to traditional method.



*(Department of Farm Engineering, CoA, JAU, Junagadh)*

### **Effect of coloured plastic mulches on cultivation of tomato crop**

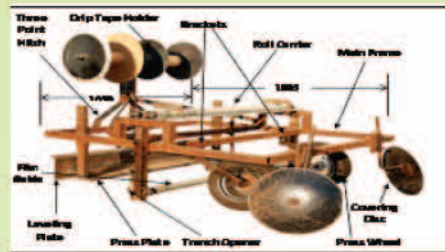
Farmers of South Saurashtra Agro-climatic Zone are recommended to adopt silver/black or red/black plastic mulch (20  $\mu$ m) with drip irrigation and raised bed for cultivation of tomato during *rabi* season. This plastic mulch diminishes the infestation of insects/pests and diseases in the crop, controls weeds and results higher crop yield and income.



(Department of Renewable Energy Engg., CAET, JAU, Junagadh)

## Development and performance evaluation of low cost plastic mulch cum drip lateral laying machine

Tractor mounted plastic mulch cum drip lateral laying low cost machine (₹60,000) developed by Junagadh Agricultural University is recommended for



farmers' use and for farm machinery manufacturers. It can be used for laying plastic film with width ranging from 900 to 1500 mm (3 to 5 ft.) along with two lines of drip lateral at a time. It saves about 97.23 % time and 46.03 % cost of laying plastic mulch and drip lateral as compared to conventional manual laying method.

(Department of Farm Machinery & Power Engg., CAET, Junagadh)

## VI. BASIC SCIENCE

### Effect of growth regulator, organic and inorganic foliar nutrition on the growth and yield of blackgram (*Vigna mungo* L.) under rainfed condition

The farmers of North Saurashtra Agro-climatic Zone-VI growing blackgram in *kharif* under rainfed condition are advised to spray Gibberellic Acid ( $GA_3$ ) 1 g/10 litre water (100 ppm) at flowering (35-40 DAS) and pod development (55-60 DAS) stages for obtaining higher seed yield and net return.

(Main Dry Farming Research Station, JAU, Targhadia)

## VII. ANIMAL HEALTH & ANIMAL PRODUCTION

### Seroprevalence of Infectious Bovine Rhinotracheitis (IBR) in dairy animals with reproductive disorders

Seroprevalence of Infectious Bovine Rhinotracheitis (IBR) in dairy animals is

above 30%. Hence dairy farmers of Saurashtra region are recommended to vaccinate their animals against Infectious Bovine Rhinotracheitis (IBR).

*(Department of Veterinary Public Health, CVSc & AH, JAU, Junagadh)*

### **Clinical studies of foot affections in unsound working horses**

Horse rearers are informed that the prevalence of laminitis is higher during winter; hence they are advised to take appropriate care of the hooves.

*(Department of Veterinary Surgery and Radiology, CVSc & AH, JAU, Junagadh)*

### **Effect of fogger cooling on body comfort, milk yield and milk composition in Jaffrabadi buffaloes during summer season**

It is recommended to dairy farmers that fogger cooling system in loose housing buffalo shed is beneficial in sustaining milk production.



*(Cattle Breeding Farm, JAU, Junagadh)*

## **VIII. FISHERIES SCIENCE**

### **Effects of hurdle technology on biochemical, microbiological, and sensory quality of frozen cut crabs, *Portunus pelagicus***

Frozen cut crabs processors are recommended to apply hurdle technique of pasteurization process at 85 °C for 10 minutes prior to freezing of cut crabs at -40 °C for reduction of bacterial load, lowering drip loss, improvement of sensory quality attributes and shelf life expansion up-to 210 days under frozen storage at -18 ± 2 °C.

*(College of Fisheries Science, JAU, Veraval)*

### **Effect of stocking density on growth and survival of juvenile Pacific white shrimp, *Litopenaeus vannamei* (Boone, 1931)**

The brackish water shrimp growing farmers are recommended to stock *Litopenaeus vannamei* shrimp seeds



@ 25 pc/m<sup>2</sup> to obtain better survival, growth and economical return.

(Fisheries Research Station, JAU, Okha)

### **Effect of Aloe vera treatment on quality parameters of Indian mackerel (*Rastrelliger kanagurta*, Cuvier-1816) during chill storage**

The fisherman/suppliers are recommended to give 20 % Aloe vera gel extract dip treatment for 30 minutes before chill storage



of Indian mackerel (*Rastrelliger kanagurta*) for better quality up to 15 days shelf-life.

(Fisheries Research Station, JAU, Okha)

## **RECOMMENDATIONS FOR SCIENTIFIC COMMUNITY**

### **I. CROP PRODUCTION**

#### **Integrated weed management in okra**

Under South Saurashtra Agro-climatic Zone, effective weed management along with higher yield and net return in *kharif* okra can be achieved by pre-emergence application of pendimethalin 900 g/ha followed by hand weeding at 40 DAS.

(Department of Agronomy, CoA, JAU, Junagadh)



#### **Weed management in *kharif* groundnut**

Under South Saurashtra Agro-climatic Zone, effective weed management along with higher yield and net return in *kharif* groundnut can be achieved by application of pre-mix pendimethalin + imazethapyr 800 g/ha as pre-emergence *fb* HW and IC at 40 DAS or tank-mix pendimethalin 450 g/ha + oxyfluorfen 120 g/ha as pre-emergence *fb* HW and IC at 40 DAS.



(Department of Agronomy, CoA, JAU, Junagadh)

### **Integrated weed management in *rabi* fennel**

Under South Saurashtra Agro-climatic Zone, effective weed management along with higher yield and net return in *rabi* direct seeded fennel can be achieved by pre-emergence application of pendimethalin 30 EC 900 g/ha followed by interculturing and hand weeding at 40 DAS.

*(Department of Agronomy, CoA, JAU, Junagadh)*

### **Soil test based fertilizers application for targeted yield of summer groundnut in Saurashtra region of Gujarat**

The nutrients requirement for production of one quintal summer groundnut pod was estimated as 4.90, 0.90 and 1.73 kg; N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O, respectively. The fertilizer prescription equations are as: for FN (4.14 T - 0.37 SN - 0.17 FYM), FP<sub>2</sub>O<sub>5</sub> (3.04 T - 1.48 SP - 0.17 FYM) and FK<sub>2</sub>O (6.53 T - 0.43 SK - 0.38 FYM) with FYM and for FN (5.10 T - 0.44 SN), FP<sub>2</sub>O<sub>5</sub> (3.61 T - 1.70 SP) and FK<sub>2</sub>O (7.70 T - 0.48 SK) without FYM. Targeted yield concept could be effectively adopted to bring in site specificity in fertilizer use and achieve high yields of summer groundnut in medium black calcareous soils of Saurashtra region of Gujarat.



*(Dept. of Agril. Chem. & Soil Sci. CoA & Main Oilseed Research Station, JAU, Junagadh)*

### **Establishment of critical limit of sulphur for soybean crop in medium black calcareous soils**

For sulphur application to soybean grown on calcareous soils of Saurashtra, critical limit 11.0 ppm in soil and 0.31 per cent in soybean plant at 60 DAS could be considered.

*(Department of Agril. Chem. & Soil Sci., CoA, JAU, Junagadh)*

### **Relative salinity tolerance of different castor varieties**

It is the information for scientific community, especially for plant breeder that castor variety GCH-7 and GC-3 recorded different salt tolerance criteria viz., higher mean salinity index (82.7 and 84.6), higher mean seed yield (275 and 260 g/plant), minimum yield decline (35.0





and 33.8 %) at  $8.0 \text{ dSm}^{-1}$  and 50 % yield reduction at EC 10.79 and  $10.77 \text{ dSm}^{-1}$ , respectively, as well as lower Na/K ratio in seed and stalk. Castor variety GCH-7 and GC-3 were found more salt tolerant as compared to GAUCH-1, GCH-2, GCH-4 and GCH-6 on the basis of salinity indices.

*(Department of Agril. Chem. & Soil Sci., CoA, JAU, Junagadh)*

### **To study micronutrients and sulphur status in soils of Saurashtra region**

The soils of Saurashtra region were found in 'High' categories for available Mn and Cu, while it was 'Low' to 'Medium' status for S, Fe and Zn. Available Fe, Zn, and S were deficient and deficiency was observed in 18, 22 and 36 per cent soils of the Saurashtra region.

*(Department of Agril. Chem. & Soil Sci., CoA, JAU, Junagadh)*

## **II. PLANT PROTECTION**

### **(A) Agricultural Entomology**

#### **Bio-efficacy of different bio-pesticides and insecticides against pink bollworm in Bt cotton (Bollgard-II)**

For effective and economical management of pink bollworm, five spray of spinosad 45 SC 0.014 % (3.0 ml/10 litre of water) or chlorantraniliprole 18.5 SC 0.006 % (3.0 ml/10 litre of water), first spray at 5 % appearance of rosette flower and subsequent four spray at 10 days interval after first spray found effective in cotton.

*(Department of Entomology, CoA, JAU, Junagadh)*

#### **Management of *Helicoverpa armigera* (Hubner) and *Spodoptera litura* (Fabricius) in groundnut through insecticides**

For effective and economical management of *Helicoverpa armigera* (Hubner) and *Spodoptera litura* (Fabricius), three spray of indoxacarb 14.5 SC 0.007 % (5.0 ml/10 litre of water) or spinosad 45 SC 0.014 % (3.0 ml/10 litre of water) or chlorantraniliprole 18.5 SC 0.006 % (3.0 ml/10 litre of water), first spray at the initiation of pest infestation and subsequent sprays at 15 days interval after first spray found effective in *kharif* groundnut.

*(Department of Entomology, CoA, JAU, Junagadh)*

#### **Management of ear head worm, *Helicoverpa armigera* (Hub.) infesting bajra crop with bio-pesticides**

Spray of DDVP 76 EC @ 0.05 % was found effective and economical for the

management of ear head worm, *Helicoverpa armigera* (Hub) in pearl millet at ear head stage.

(Main Pearl Millet Research Station, JAU, Jamnagar)

### **Testing bio-efficacy of insecticides against leaf webber *Crociodolomia binotalis* Zell) of mustard**

The scientific community is informed to apply two spray of ready mixture of profenophos 40 % + cypermethrin 4 %, 44 EC 0.044 % 220 g a.i./ha (10 ml/10 litre of water) or profenophos 50 EC 0.05 % 250 g a.i./ha (10 ml/10 litre of water) or novaluron 10 EC 0.005 % 25 g a.i./ha (5 ml/10 litre of water) at 7 days interval starting from pest infestation for effective and economical management of mustard leaf webber.

(Main Oilseeds Research Station, JAU, Junagadh)

### **Response of coconut varieties in relation to different seasons for the eriophyid mite damage**

The coconut eriophyid mite damage was higher in summer where as it was lower in winter. Higher damage was recorded in dwarf green variety and less damage in west coast tall (WCT), In hybrid variety, higher damage found in D x T as compared to T x D.



(Agril Research Station, JAU, Mahuva)

### **Efficacy of newer insecticides against diamond back moth infesting cauliflower**

In South Saurashtra Agro-climatic Zone growing cauliflower in *rabi* season are advised to apply two spray of chlorantraniliprole 18.5 SC 0.006 % (3.2 ml/10 litre of water) at 15 days interval starting from pest infestation for effective and economical management of diamond back moth.



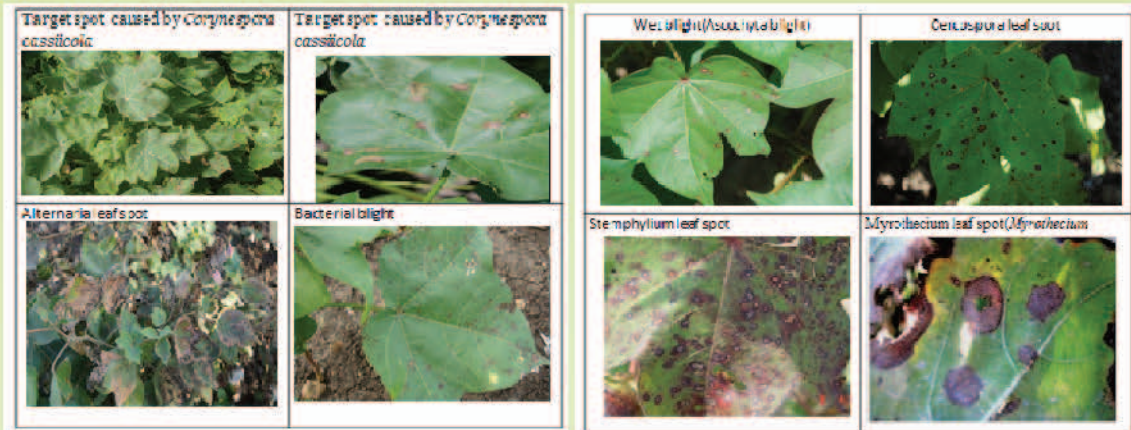
(Department of Entomology, CoA, JAU, Junagadh)

**Farmers' recommendation of agricultural entomology approved as scientific information as it is not fulfilling the CIB guide line.**

## **(B) Plant Pathology**

### **Management of fungal foliar diseases of cotton**

Three spray of mancozeb 63 WP + carbendazim 12 WP, 0.15 % (20g / 10 litre of water) first at initiation of disease and subsequent sprays at 15 days interval was found effective and economical for management of fungal foliar diseases of cotton.



*(Cotton Research Station, JAU, Junagadh)*

### **IDM Package for tomato diseases**

For effective and economical integrated management of major diseases of tomato viz., damping off, early blight, tomato leaf curl virus and tomato spotted wilt virus disease and to improve the marketable fruit yield following treatments should be adopted.

1. Seeds of tomato should be treated with seed pro @ 4 g per kg seeds at the time of sowing in nursery and after germination of the seeds soil drenching with seed pro @ 5 % should be carried out.
2. Tomato nursery should covered with 40 - 60 mesh white nylon net until transplanting and at the time of transplanting tomato seedling should be dip with 0.1 % (carbendazim 12 % + mancozeb 63 WP) solution.
3. Maize should be grown as border crop surrounding transplanted tomato field. The foliar sprayings of pesticides should be scheduled as acephate 75 WP @ 1.5 g / litre 10 days after transplanting, fipronil 5 SC @ 1.5 ml / litre 20 DAT, copper hydroxide 77 WP @ 2.0 g / litre 25 DAT and imidacloprid 70

WG @ 2g / 15 litre 40 DAT along with two to three spraying of Fenamidone 10 % + Mancozeb 50 WDG, 0.25 % from 45 DAT at 10 days intervals.

(Vegetable Research Station, JAU, Junagadh)

### Studies of weather parameters in relation to initiation and development of stem rot of groundnut

The infection of stem rot in groundnut was commenced in 28<sup>th</sup> std. week, which developed gradually and reached a peak in 33<sup>rd</sup> std. week. All the weather parameters viz., minimum temperature, maximum temperature, morning relative humidity, afternoon relative humidity, soil temperature @ 10 cm, rain fall and rainy days were found significantly co-related in building up the disease incidence in groundnut. The influence of all the weather parameters was found 39.10 per cent.

(Main Dry Farming Research Station, JAU, Targhadia)

### Developing IDM modules for the management of cotton diseases

Apply the following Integrated Disease Management Module (IDM) for management of cotton diseases and higher net return.

#### IDM Module-1:

1. Seed treatment with *Pseudomonas fluorescens* ( $2 \times 10^8$  cfu/g-JAU isolate) @ 10 g/kg seed.
2. Soil application of *Trichoderma harzianum* ( $2 \times 10^6$  cfu/g-JAU isolate) @ 2.5 kg/ha in 250 kg of FYM.
3. Foliar sprays with *Pseudomonas fluorescens* ( $2 \times 10^8$  cfu/g-JAU isolate) 1 % for alternaria leaf spot and copper oxychloride (0.2 %) + streptocycline (0.01%) for bacterial leaf blight on need basis.



OR

#### IDM Module- 2:

1. Seed treatment with *Pseudomonas fluorescens* ( $2 \times 10^8$  cfu/g- CICR isolate) @ 10 g/kg seed.
2. Soil application of *Trichoderma viride* ( $2 \times 10^6$  cfu/g-TNAU isolate) @ 2.5 kg / ha in 250 kg of FYM;



- Foliar sprays with kresoxim-methyl 44.3 SC @ 1ml/lit followed by captan 70 % + hexaconazole 5 % @ 1.5 g/lit for fungal diseases and copper oxychloride (0.3 %) + streptomycin (0.01 %) for bacterial blight.

(Cotton Research Station, JAU, Junagadh)

**Farmers' recommendation of Plant Pathology approved as scientific information as it is not fulfilling the CIB guide line.**

### III. HORTICULTURE & AGRO-FORESTRY

**Estimation of effect of growing degree days (GDD) on phenology, flowering and yield on different mango varieties under Saurashtra Agro-climatic condition**

It is observed that the growing degree days (GDD) have direct influence on BDS, flowering, fruit set and various fruit development stages, but not for the physical characters of fruits. The GDD requirements of different varieties were found unique and a mango variety Kesar requires low GDD for maturity with higher Heat Use Efficiency.



(Department of Horticulture, CoA, JAU, Junagadh)

### IV. AGRICULTURAL ENGINEERING

**Ambient temperature trend analysis for the South Saurashtra region in view of climate change**

The Scientists/ Policy makers in the field of breeding/ climate change adaptation are advised to use the following mathematical models to predict the day maximum and day minimum temperature for future period in Junagadh region.

Season	Day Maximum Temperature (°C)		Day Minimum Temperature (°C)	
	Model	R <sup>2</sup>	Model	R <sup>2</sup>
Winter	$T_{\max} = 0.0209 * \text{Year} - 8.8495$	0.75	$T_{\min} = 0.0318 * \text{Year} - 49.781$	0.78
Summer	$T_{\max} = 0.0191 * \text{Year} - 0.1754$	0.84	$T_{\min} = 0.0321 * \text{Year} - 42.693$	0.84
Monsoon	$T_{\max} = 0.0211 * \text{Year} - 8.0849$	0.71	$T_{\min} = 0.0532 * \text{Year} - 81.855$	0.94

(Department of Soil & Water Constr. Engg., CAET, JAU, Junagadh)

## **Estimation of irrigation demand for different crops of ozat river basin using remote sensing and GIS**

The Planners, NGOs, Field Officers and Government Departments are recommended to use the following relationships to find out crop coefficients of wheat crop with remote sensing images (Landsat) based vegetation indices like Soil Adjusted Vegetation Index (SAVI) and Normalized Difference Vegetation Index (NDVI) for the estimation of crop water requirement.

$$K_c = 1.2588 \text{ SAVI} + 0.4347 \quad K_c = 1.6741 \text{ NDVI} + 0.5387$$

Where,  $K_c$  = Crop coefficient of wheat crop, NDVI = Normalized Difference Vegetation Index, SAVI = Soil Adjusted Vegetation Index.

*(Department of Soil & Water Conservation Engg., CAET, JAU, Junagadh)*

## **Evaluation of rainfall erosivity index and soil erodibility factor in medium black soil under different cropping systems**

Maximum runoff and soil loss was observed in sole cotton cropping system and cultivated fallow respectively, Minimum runoff with soil loss was observed in absolute fallow followed by sole groundnut cropping system. Soil erosivity factor (45.74) and soil erodibility factor (0.41) were observed in cultivated fallow in medium black soil.

*(Main Dry Farming Research Station, JAU, Targhadia)*

## **V. SOCIAL SCIENCE**

### **Export performance of marine products from India**

To overcome price risk and instability the export stabilization fund needs to be created in the marine sector. Sustained focus need to be given on value added marine products, which in turn can lead to diversification in products as well as of markets. For expanding growth and reducing instability in marine products, the exporters may be facilitated to enter into long term contracts with the international buyers. India's maritime export policy needs to be focused big on multilateral negotiations to check the disproportionate or biased use of SPS or TBT measures.

*(Department of Agril. Economics, CoA, JAU, Junagadh)*

### **Utilization pattern and trends in non-performing assets of crop loan in Junagadh district**

Farmers should be encouraged to adopt modern farm technology, mixed farming and micro irrigation system to enhance their repayment capacity. The banks

should strongly consider farmers' characteristics such as literacy index, size of farm, irrigation facilities and sources of other income for determining creditworthiness of farmers.

*(PG Institute of ABM, JAU, Junagadh)*

### **Weather based forecasting of wheat productivity in Junagadh district**

It is advised that to forecast wheat productivity in the Junagadh district before 6 weeks of harvest, the model based on week wise approach using original weather variables can be used with 12 weeks and 23 years data to have 93.00 % accuracy.

The variables affecting the productivity are  $X_{1W48}$ ,  $X_{1W49}$ ,  $X_{1W5}$  (Maximum Temperature) of 48<sup>th</sup> week, 49<sup>th</sup> week and 5<sup>th</sup> week, respectively,  $X_{2W49}$  (Minimum Temperature) of 49<sup>th</sup> week,  $X_{5W50}$ ,  $X_{5W52}$ ,  $X_{5W3}$  (Bright Sun Shine Hours) of 50<sup>th</sup> week, 52<sup>nd</sup> week and 3<sup>rd</sup> week.

#### **Recommended model is:**

Model with 12 weeks and 23 years data

$$Y = 12800.97 + 104.92 X_{1W48} + 84.98 X_{1W49} + 104.94 X_{1W5} + 53.92 X_{2W49} + 361.10 X_{5W50} + 139.47 X_{5W52} + 547.67 X_{5W3}$$

$$(R^2 = 0.93)$$

*(Department of Agril. Statistics, CoA, JAU, Junagadh)*

## **VI. BASIC SCIENCE**

### **Effects of 2, 3, 5-Triiodobenzoic Acid (TIBA) on seed cotton (*Gossypium hirsutum* L.) yield**

It is informed to scientific community that spray growth regulator TIBA 5g/ha/spray at 50, 60, 70, 80 & 90 DAS to achieve balanced growth and higher seed cotton yield in late maturing Bt cotton hybrids under irrigated condition in South Saurashtra Agro-Climatic Zone.



As TIBA is not listed by CIB.

*(Cotton Research Station, JAU, Junagadh)*

## Biochemical and molecular characterization of brinjal varieties and promising genotypes

It is informed to the scientific community that brinjal variety GOB-1 was found most distinct among 14 promising genotypes and varieties based on biochemical, nutritional and molecular analysis. It contains



higher protein, total soluble solids, soluble sugars, phenols, ascorbic acid, PPO activity, flavanoid contents; lower glycoalkaloids and acidity. The clustering pattern on the basis of biochemical parameters of brinjal varieties and genotypes correlates with molecular (SSR) based dendrogram depicting most distinct genotype GOB-1 out grouped from other genotypes with 48 per cent similarity.

*(Department of Biochemistry and Biotechnology, CoA, JAU, Junagadh)*

## Development of cultivar specific markers for the hybrids released by JAU in pearl millet

The scientific community involved in pearl millet improvement is informed to use below mentioned JAUB series of primers for identification of following hybrids.

Primer Name	Primer Sequence	Product Length	Hybrid
JAUB5F	CTGCTTCTTCTCGTAAT	941	GHB 538
JAUB5R	TTCGCCAGGAGGGCGT		
JAUB7F	ATCGCTACGTCTACGATG	527	GHB 558
JAUB7R	TCTCCGATTAGGTCGTTG		
JAUB17F	TACCTTTGTGTTGATGGTTT	415	GHB 577
JAUB17R	CTACTCTTGTTCCCTCCTCT		
JAUB10F	CAACATACCTCTCGTACGGT	1020	GHB 719
JAUB10R	TTTTCGGATAGTTCAAACAGT		
JAUB1F	TAGCTGGGTAGAGGCTGACT	249	GHB 526
JAUB1R	GCCTGTTGACAGTCCGTAGA		
JAUB22F	CGCAGTGGATTATCCCTCTC	354	GHB 732
JAUB22R	GGATGACCCTCGAAACCATA		
JAUB24F	GGCATCTCGTTGTACCTCGT	339	GHB 744
JAUB24R	AACAGCATCAGAGCGGACTT		
JAUB27F	CTTGTCCTTGGAGCTGTTT	550	GHB 757
JAUB27R	GTGGCTGTTGTCATGAATGC		
JAUB30F	TTAGCATTTTGCCTTTGTG	250	GHB 905
JAUB30R	GCATGAATCAGCCCATACAA		

*(Department of Biochemistry and Biotechnology, CoA, JAU, Junagadh)*



## Development of cultivar specific markers for the varieties released by JAU in groundnut

The scientific community involved in groundnut improvement is informed to use below mentioned JAUG series of primers for identification of following groundnut varieties.

Primer Name	Primer Sequence	Product Length	Variety
JAUG12F	CACCAAGTGGGAGAGGAAAA	352	GJG 22
JAUG12R	CCAACACTACCCCATCTGG		
JAUG13F	GTGGCCAAAGATTTACACA	1201	GJG 17
JAUG13R	GTCCGATGGCAGCTCTATGT		
JAUG1F	GTCGATGAGACGGCTAGTGG	348	GJG 31
JAUG1R	TCGTGACGAGGGTGATCTCT		
JAUG17F	TCGGGATGTGTTTATGTTGC	386	GJG 9
JAUG17R	GGAGTTCGCACATTGTGTTG		
JAUG20F	GCTGGTTAGTTGTGCGGATT	409	GJG HPS 1
JAUG20R	CTCCCCCTTATTGGATAGGC		
JAUG22F	CGAGTATCCCGAACCCCTACA	265	GJG 20
JAUG22R	AAAAGGGTTGGTTTCGCTTT		
JAUG4F	CGCACGCATGCCCTAAATAC	355	GG 5
JAUG4R	TTGGGTGCGGATGAGAAAGG		
JAUG26F	TGAGGATTGCCGTTTCTTT	405	GJG 7
JAUG26R	CCCGTCCCCAAATGATAGAT		
JAUG8F	AAACCGCTGTGTCTCTCTGC	329	GG 11
JAUG8R	GCCTGTTGACAGTCCGTAGA		

(Department of Biochemistry and Biotechnology, CoA, JAU, Junagadh)

## Genome sequencing of pathogenic *Macrophomina phaseolina* isolated from castor

It is informed to the scientific community involved in castor improvement that whole genome sequencing of plant pathogenic fungi *Macrophomina phaseolina* showed 98.6 Mb of genome size. The draft genome has 3061 contigs, 30756 genes, 183303 exons, 28096 SSRs and 13947 repeat regions. In this genome, 24.30 % of genes are involved in molecular functions, 34.27 % in cellular components and

Name	Primer 3'-5'	Product length	GC%	Tm
JAUMPF1	GGAGAGTTTTCGTC AAGTCC	202	55	59.85
JAUMPR1	ACTGTTCGGAGAAACCGAAGA		50	59.84
JAUMPF2	GCGAACTCAATCCCAACATC	226	50	60.47
JAUMPR2	TCGACCATGAGGGTTTTCTC		50	60.05
JAUMPF3	CGCCTAATAATCGGCCCTA	193	50	60.07
JAUMPR3	GTAAAAGTGCGTTGGCGTTT		45	60.17

41.43 % in biological processes. Pathogenicity related genes identified in this study have high relevance in future fungicide designing. The following primers can be used for identification of pathogenic fungi *Macrophomina phaseolina*.

(Department of Biochemistry and Biotechnology, CoA, JAU, Junagadh)

### **In situ detection of potassium status in cotton plants**

It is informed to scientific community/ industrialists that silver and carbon nanoparticles based portable nano-biosensor has been invented for detection of potassium directly from the leaf sap of cotton plant with precision. The nano-biosensor works on the basis of ion-selective mechanism to detect potassium ion in the range of 10 to 120 mM. The deficiency of potassium below threshold line of 40 mM from sap with the sensor display indicating the voltage output below (-ve) 15 mV will be signaled. The onetime cost of the invented nano-biosensor is about Rs. 2500-3000 and it works well to detect potassium deficiency level at any growth stage of cotton crop.

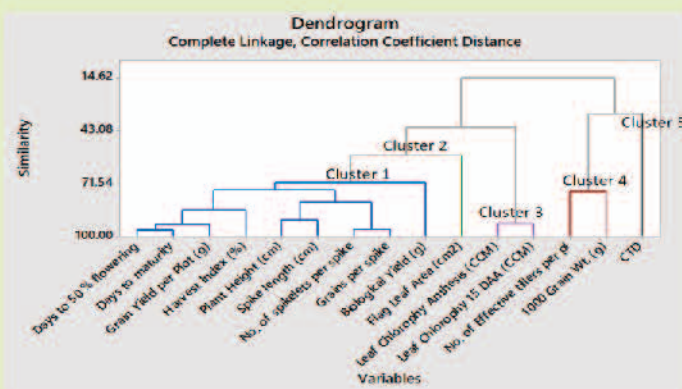


(Department of Biochemistry and Biotechnology, CoA, JAU, Junagadh)

### **Thermal stress tolerance in wheat (*Triticum aestivum* L.)**

It is informed to scientific community that genotypes J 2010-09 (GW 463) and J 2010-05 are good germplasm sources for wheat improvement for heat tolerance and yield.

(Department of Genetics and Plant Breeding, JAU, Junagadh)



## **VII. ANIMAL HEALTH & ANIMAL PRODUCTION**

### **Evaluation of in-vitro antibacterial, anti-inflammatory, antioxidant and anti-diabetic effects of medicinal plants**

Crude alkaloid fraction from *Cassia absus* has *in-vitro* antibacterial activity

against *Escherichia coli*, *Salmonella typhimurium*, *Streptococcus agalactiae* and *Staphylococcus aureus*.

(Department of Veterinary Pharmacology and Toxicology, CV Sci. & A.H., JAU, Junagadh)

### **Evaluation of *in-vitro* antibacterial, anti-inflammatory, antioxidant and anti-diabetic effects of medicinal plants**

Aqueous extract of *Operculina turpethum* leaves and hydro alcoholic extract of *Sphaeranthus indicus* fruit have *in-vitro* anti-inflammatory activity.

(Department of Veterinary Pharmacology and Toxicology , CV Sci. & A.H., JAU, Junagadh)

### **Evaluation of *in-vitro* antibacterial, anti-inflammatory, antioxidant and anti-diabetic effects of medicinal plants**

Aqueous, alcoholic and hydro alcoholic extracts of *Cressa cretica* leaves have *in-vitro* antioxidant activity.

(Department of Veterinary Pharmacology and Toxicology, CV Sci. & A.H., JAU, Junagadh)

### **Evaluation of *in-vitro* antibacterial, anti-inflammatory, antioxidant and anti-diabetic effects of medicinal plants**

Hydro alcoholic extract of *Luffa echinata* fruit, *Pterocarpus marsupium* bark and extracts of *Cressa cretica* leaves have *in-vitro* anti-diabetic activity.

(Department of Veterinary Pharmacology and Toxicology , CV Sci. & A.H., JAU, Junagadh)

### **Evaluation of healing potential of polyherbal formulation on full-thickness skin wounds in rabbits**

Polyherbal formulation containing gel of *Aloe vera* (1 %), defatted alcoholic extract of leaves of *Argyrea speciosa* (0.25 %), hydro alcoholic extract of bark of *Ficus racemosa* (0.25 %), aqueous extract of leaves of *Prosopis juliflora* (1.5 %) and *Tridax procumbens* (0.5 %) has wound healing effect in full-thickness skin excision wound in rabbits polyherbal formulation containing gel of *Aloe vera*, defatted alcoholic extract of leaves of *Argyrea speciosa*, hydro alcoholic extract of bark of *Ficus racemosa*, aqueous extract of leaves of *Prosopis juliflora* and *Tridax procumbens* has wound healing effect in full-thickness skin excision wound in rabbits

(Department of Veterinary Pharmacology and Toxicology, CV Sci. & A.H., JAU, Junagadh)

### **Effect of piperine pre-conditioning on pharmacokinetics of marbofloxacin following subcutaneous administration in rats**

Oral administration of piperine does not alter the pharmacokinetics of

subcutaneously administered marbofloxacin in rats.

*(Department of Veterinary Pharmacology and Toxicology, CV Sci. & A.H., JAU, Junagadh)*

### **Seroprevalence of Infectious Bbovine Rhinotracheitis (IBR) in dairy animals with reproductive disorders**

Due to high (more than 30 %) seroprevalence of IBR in Saurashtra region, it is advisable to take preventive & control measure.

*(Department of Veterinary Public Health, CV Sci. & A.H., JAU, Junagadh)*

### **Hematological and biochemical aspects associated with haemoprotozoan infection in cows, buffaloes and horses**

Hemoprotozoan infection in cows, buffaloes and horses causes anemia with significant increase in serum AST & ALT levels as well as significant change in SOD & MDA levels indicating oxidative stress and oxidative damage.

*(Department of Veterinary Public Health, CV Sci. & A.H., JAU, Junagadh)*

### **Effect of methyl ergometrine and PGF<sub>2</sub> $\alpha$ during puerperium period in Gir cows**

It is recommended that a single dose of PGF<sub>2</sub> $\alpha$  immediately after parturition in Gir cows enhances the process of placental separation, hastens the uterine involution, decreases the service period and increases the conception rate.

*(Cattle Breeding Farm, JAU, Junagadh)*



## **VIII. FISHERIES SCIENCE**

### **Comparison of EPA (Eicosapentaenoic Acid) and DHA (Docosahexaenoic acid) content of four marine micro algae culture**

*Isochrysis galbanais* recorded to have 14 % eicosapentaenoic acid while *Chaetoceros* species is recorded to have 3.65 % eicosapentaenoic acid and 11 % docosahexaenoic acid. Hence, scientific community is informed to promote the marine microalgae culture for omega 3 fatty acid.

*(Fisheries Research Station, JAU, Sikka)*

**Production of nucleus/ breeder/ truthful seeds, planting materials, bio-agent and bio-fertilizer (SAWAJ BRAND)**

SN	Name of Product	2017-18
1	Nucleus/ Breeder Seed (q)	3306
2	Truthful/ Foundation/ Certified Seeds (q)	5680
3	Fruit crop grafts (Nos.)	22985
4	Fruit crop sapling (Nos.)	26963
5	Seedlings (Nos.)	47635
6	Ornamentals & Medicinal plants (Nos.)	41681
7	Papaya seeds (kg.)	66.80
8	<i>Trichoderma</i> (tonne)	179
9	<i>Rhizobium</i> (Bottle-500 ml)	6566
10	<i>Azotobacter</i> (Bottle-500 ml)	4161
11	PSB (Bottle-500 ml)	5423
12	<i>Beauveria</i> (tonne)	175.78
13	HNPV(Bottle-250 ml)	1147
14	SNPV(Bottle-250 ml)	469
15	Trichocard (Nos.)	542
16	Fruit fly traps (Nos.)	2654
17	Fruit fly lure (For fruit and Vegetable crops) (Nos.)	3478
18	Pheromone Trap (Nos.)	60679
19	Pheromone Lure (Pink bollworm) (Nos.)	1,33,862
20	Pheromone Lure (Heliothis) (Nos.)	25333
21	Pheromone Lure (Prodenia) (Nos.)	4140
22	Pheromone Lure (Brinjal shoot and fruit borer) (Nos.)	496

**Production of Nucleus / Breeder seeds during the year 2017-18**

SN	Crop	Variety	Nucleus Seed (q)	Breeder Seed (q)		Total (q)
				National	State	
1	Groundnut	GAUG 10	0.50	5.00	87.80	93.30
		GG 2	-	5.00	33.10	38.10
		GG 11	0.90	-	107.40	108.30
		GG 20	2.10	70.00	1478.75	1550.85
		GG 4	0.10	-	0.90	1.00
		GG 5	0.90	-	59.40	60.30
		GG 6	0.60	-	4.20	4.80
		GG 7	0.60	-	21.60	22.20

		GG 21	-	8.00	-	8.00
		GJG HPS 1	1.00	-	8.00	9.00
		GJG 9	0.45	40.00	60.20	100.65
		GJG 31	0.40	30.00	7.10	37.50
		GJG 17	0.90	10.00	125.90	136.80
		GJG 22	1.50	-	513.99	515.49
		GJG 32	1.80	-	9.45	11.25
		<b>Sub Total...</b>	<b>11.75</b>	<b>168.00</b>	<b>2517.79</b>	<b>2697.54</b>
2	Pearl millet	ICMA 95444	-	2.50	1.00	3.50
		ICMB 95444	-	0.30	-	0.30
		ICMA 96222	-	0.40	0.33	0.73
		ICMB 96222	-	0.25	-	0.25
		ICMA 98444	-	0.50	0.20	0.70
		ICMB 98444	-	0.20	-	0.20
		<b>Sub Total...</b>	<b>-</b>	<b>4.15</b>	<b>1.53</b>	<b>5.68</b>
3	Sesame	G. Til 1	0.03	0.07	-	0.10
		G. Til 2	0.20	2.20	10.82	13.22
		G. Til 3	0.05	3.00	2.85	5.90
		G. Til 4	0.20	0.25	0.20	0.65
		GJTil 5	0.05	-	1.91	1.96
		G. Til 10	0.10	0.60	0.85	1.55
		<b>Sub Total...</b>	<b>0.63</b>	<b>6.12</b>	<b>16.63</b>	<b>23.38</b>
4	Chickpea	GG 1	0.35	--	16.50	16.85
		GG 2	2.53	--	28.32	30.85
		GJG 3	5.92	39.10	45.00	90.02
		GG 4	0.29	8.00	--	8.29
		GG 5	4.38	--	76.25	80.63
		GG 6	1.28	--	2.50	3.78
		<b>Sub Total...</b>	<b>14.75</b>	<b>47.1</b>	<b>168.57</b>	<b>230.42</b>
5	Pigeon pea	GJP 1	0.22	-	30.50	<b>30.72</b>
6	Wheat	GW 366	6.00	140.00	15.00	161.00
		GJW 463	2.00	-	20.00	22.00
		GW 496	-	-	70.00	70.00
		Lok 1	-	-	65.00	65.00
		<b>Sub Total...</b>	<b>8.00</b>	<b>140.00</b>	<b>170.00</b>	<b>318.00</b>
		<b>Grand Total</b>	<b>35.35</b>	<b>365.37</b>	<b>2905.02</b>	<b>3305.74</b>

**Products of Junagadh Agricultural University, Junagadh**



**SAWAJ Rhizobium**



**SAWAJ Kesar Mango Pulp**



**Seaweed**



**SAWAJ Beauveria**



**SAWAJ H-NPV & S-NPV**



**SAWAJ Trichoderma**



**JUNAGADH AGRICULTURAL UNIVERSITY**  
**JUNAGADH-362 001(Gujarat)**