JUNAGADH AGRICULTURAL UNIVERSITY

RESEARCH RECOMMENDATIONS FOR FARMERS COMMUNITY

II. PLANT PROTECTION

Total 121 farmers' recommendations/new technologies developed by plant protection disciplines are described below:

Agricultural Entomology

Year: 2004-05

Management of *Halicoverpa armigera* through different antifeedants in chickpea

For the eco-friendly management of *Halicoverpa armigera* in chickpea in South Saurashtra Agro-climatic Zone, two spraying of kadvi mehadi leaf extract (ICBR 1:5.12) or mamejva leaf extract (ICBR 1:4.67) or Jatropha leaf extract (ICBR 1:4.41) or five per cent neem leaf extract (ICBR 1:4.12) at 15 days interval from the date of pest infestation is recommended.

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

Integrated pest management in coriander

Integrated pest management module for coriander aphid comprising of sowing of coriander in 1st week of October and releasing coccinellid predators @ 400 adults/ha (ICBR 1:8.10) at ETL of 1.0 aphid index / plant (ICBR 1:5.00) is recommended for South Saurashtra Agro-climatic Zone.

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

Chemical control of sucking pests of summer okra through seed treatment

For the control of sucking pests (jassid and aphid) in summer okra, seed treatment of thiamethoxam @ 2.8 g/kg seeds (ICBR 1:12.28) or imidacloprid @ 5 g/kg seed (ICBR 1:11.51) is recommended for South Saurashtra Agro-climatic Zone.

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

Groundnut

The farmers of North Saurashtra Agro-climatic Zone are advised to apply karanj cake (ICBR 1:6.86) or castor cake (ICBR 1:5.62) @ 250 kg/ha in furrow at the time of sowing for the management of pod borer (*Penthicoides seriatoporus* Fairmaire) in groundnut under dry farming condition.

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

Pigeonpea

The farmers of North Saurashtra Agro-climatic Zone are advised to adopt the bio-intensive module consisting of the first spray of HaNPV @ 250 LE/ha at ETL of 10 larvae/20 plants followed by second spray of neem seed kernel extract 5 per cent after 15 days of first spray (ICBR 1:1.95).

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

Cotton

For the control of pink bollworm in cotton, farmers of Saurashtra region are advised to spray spinosad 45 SC @ 50 g a.i./ha (ICBR 1:3.10) as and when pest crosses the ETL (10 male moths/pheromone trap/day).

(*Cotton Research Station, JAU, Junagadh*)

IPM – Cotton

For the management of insect pests of cotton, the following IPM strategies are recommended for farmers of South Saurashtra Agro-climatic Zone (ICBR 1:5.70).

1. Seed treatment with imidacloprid @ 10 g/kg seeds.
2. Collection of infested shoots of spotted bollworm in the early stage.
3. Installation of pheromone trap @ 5/ha one week after germination.
4. Early three releases of *Chrysoperla* @ 10,000 eggs/1st instar larvae/ha.
5. Spraying of neem formulation (Azadirachtin 0.0035 %) or NSKE 5 per cent.
6. Four times releases of *Trichogramma* @ 1.5 lakh/ha with the initiation of egg laying of the pest.
7. Spraying of HaN PV @ 450 LE/ha for *Helicoverpa armigera*.
8. Hand collection of eggs and larvae of *Helicoverpa armigera*.

9. Planting of maize as intercrop (10:1), marigold and castor as trap crops in and around the cotton field.
10. Need based application of insecticides for sucking pests and bollworms based on ETL.

(*Cotton Research Station, JAU, Junagadh*)

Chemical control of mustard aphid (*Lipaphis berysimi* Kalt.)

The farmers of South Saurashtra Agro-climatic Zone growing mustard crop are advised to apply first spray of insecticide imidacloprid 17.8 SL 0.005 per cent (ICBR 1:7.68) or methyl-o-demeton 25 EC 0.03 per cent (ICBR 1:5.92) at appearance of aphids and second spray after 15 days of first spray.

(*Main Oilseeds Research Station, JAU, Junagadh*)

Year: 2005-06

Coriander seeds

The farmers of South Saurashtra Agro-climatic Zone are advised to store the well dried coriander seeds in plastic coated jute bag (ICBR 1:11.57)or high density polyethylene (HDPE) bag 35 micron (ICBR 1:7.23) to protect from the infestation of cigarette beetle (*Lasioderma serricorne* Fab.) up to 10 months of storage after harvesting.

(*Department of APE, CAET, JAU, Junagadh*)

Year: 2006-07

Sesame

The farmers of North Saurashtra Agro-climatic Zone growing sesame are advised to take plant protection measures from 28 days after sowing (DAS) for the control if leaf roller and 42 DAS for gall fly. Moreover, the farmers are further advised to take care that the leaf roller infestation is found more when there is more rainfall/rainy days and gall fly infection is more when there is low rain/dry period.

(*Main Pearl Millet Research Station, JAU, Jamnagar*)

Year: 2007-08

Tomato

Seed treatment with thiamethoxam 70 % WS @ 4.2 g/kg seed is recommended under South Saurashtra region for effective management of whitefly and leaf miner attacking tomato nursery and thereby to obtain higher numbers of transplantable seedlings.

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

Groundnut (*kharif*)

For effective and economical management of white grubs in *kharif* groundnut, seed treatment with chlorpyriphos 20EC @ 25 ml/kg seed (CBR1:11.00) or furrow application of phorate 10G @ 25 kg/ha (CBR 1:7.69) at the time of sowing or drenching of chlorpyriphos 20EC (0.1 %) (50 ml/10 lit water) in plant row after 15 days of germination (CBR 1:4.67) is recommended under South Saurashtra region.

Note: General treatments of spraying of carbaryl 0.2 % on host trees *viz*., babul, neem and ber trees surrounding the field within three to four days of pre-monsoon rain, spraying of crop with monocrotophos 0.05 % and installation of light trap are to be followed.

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

Castor

For effective and economical management of thrips in castor, spraying of dimethoate, 0.03 %, (CBR 1:14.01) at appearance of pest is recommended.

(*Main Oilseeds Research Station, JAU, Junagadh*)

Castor

The farmers of North Saurashtra Agro-climatic Zone cultivating castor under rainfed condition are advised to apply granulosis virus @ 300 LE/ha at ETL (4 larvae/plant) for control of semi looper. The spray should be done in late evening hours and wetting agent (Sandovit) @ 10 ml and UV protectant (Ranipal) 1 g should be mixed in 10 lit of spray solution.

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

Year: 2009-10

Development of low cost protection technology for sorghum shoot fly, *Atherigona soccata*

The farmers of North Saurashtra Agro-climatic Zone growing sorghum for fodder purpose in *kharif* season are advised to give seed treatment with imidacloprid 70 WS @ 5 g/kg seeds and two sprays of Neem Seed Kernel Extract 5% at 7 and 14 days after germination for the management of shoot fly.

(*Grass land Research Station, JAU, Dhari*)

Testing of newer molecules if pesticides against sucking insect pests if groundnut

The farmers of North Saurashtra Agro-climatic Zone cultivating groundnut under rainfed condition are advised to apply imidacloprid 17.8 SL 0.007%(4 ml/10 l) at ETL of aphid (1.5 aphid index/plant) and jassid (3 nymphs/3 top leaves) for effective and economical control of these pests.

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

Integrated management of insect pests and diseases of groundnut under rainfed condition

The farmers of North Saurashtra Agro-climatic Zone cultivating groundnut under rainfed condition are advised to spray the tank mixture of insecticides and fungicides in schedule i.e. thiamethoxam 25 WG @ 4 g + hexaconazole 5 EC @10ml/10 l at 35 DAS, acetamiprid 20 SP@ 2 g + chlorothalonil 75 WP @ 25 g/10 l at 50 DAS and imidacloprid 17.8 SL@ 4ml + carbendazim 50 WP @ 5 g + mancozeb 75 WP@ 26 g/10 l at 65 DAS for effective and integrated management of the sucking insect pests i.e. aphid, jassid and thrips and diseases i.e. tikka and rust.

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

Testing of new insecticides against sucking pests in groundnut

The farmers of South Saurashtra Agro-climatic Zone growing *kharif* groundnut are advised to give seed treatment with imidacloprid 600 FS @ 3 g/kg seed **or** thiamethoxam 70 WS @ 1 g/kg seed for effective and economical management of thrips and jassid.

(*Main Oilseeds Research Station, JAU, Junagadh*)

Bio-efficacy of insecticides against thrips in groundnut

The farmers of South Saurashtra Agro-climatic Zone growing *kharif* groundnut are advised to spray imidacloprid 17.8 SL 0.005 % (2.8 ml/10 l) **or** methyl-o-demeton 25 EC 0.025 % (10 ml/10 l) at the initiation of the pest for effective and economical management of thrips.

(*Main Oilseeds Research Station, JAU, Junagadh*)

Year: 2010-11

Management of eriophyid in coconut cv. T x D (Mahuva)

For effective and economical management of eriophyid mite in coconut, root feeding application of azadiracatin 2.5% @ 15 ml with equal water quantity per palm at two months interval throughout the year is recommended under South Saurashtra Agro-climatic Zone.

(*Agricultural Research Station, (FC), JAU, Mahuva*)

Year: 2011-12

Efficacy of newer insecticides against cabbage aphid

For effective and economical management of cabbage aphids under South Saurashtra Agro-climatic Zone, two spray of acetamiprid 20 SP 0.004% (2 g/10 liter water) at 15 day interval starting from aphid infestation are recommended. The waiting period of acetamiprid 20% SP (15 g. a.i./ha) should be maintained 7 days between last spray and harvesting of the crop.

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

Monitoring of bajra worm *Helicoverp aarmigera* (Hubner) through sex pheromones during *kharif*

The farmers of North Saurashtra Agro-climatic Zone growing *kharif bajra* are advised to install sex pheromone traps for monitoring of adult male moths of ear head worm (*Helicoverpa armigera* Hubner) @ 5 traps/ha at 1 ft height above ear head after the formation of ear head.

(*Main Pearl Millet Research Station, JAU, Jamnagar*)

Management of eriophyid mites in coconut cv. D x T with nutrient and fertilizers

For the effective and economical management of eriophyid mite in hybrid coconut (D x T Mahuva), application of half dose of recommended chemical fertilizers (NPK-0.750: 0.375: 0.750 kg/palm/year) with 50 kg FYM, 1.5 kg gypsum and 0.075 kg borax/palm/year in June and remaining half dose of recommended chemical fertilizers (NPK 0.750:0.375:0.750 kg/palm/year) in October is recommended under South Saurashtra Agro-climatic Zone.


(*Agricultural Research Station (Fruit Corps), JAU, Mahuva*)

Year: 2012-13

Ecofriendly management of sesame leaf webber, *Antigastra catalaunalis* Duponchel under rainfed condition

The farmers of North Saurashtra Agro-climatic Zone, cultivating sesame under rainfed condition are advised to give two sprays of Neem Seed Kernel Extract 3% (300 g / 10 lit water) for effective and economic control of the leaf webber. The first spray should be applied when the pest population reach at 5 larvae / 20 plants (ETL) and second spray at 15 days after the first spray.

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

Chemical control of sucking pests through foliar application of new insecticides in cotton

Farmers of South Saurashtra Agro-climatic Zone, growing cotton are advised to apply three sprays of imidacloprid 200 SL @ 40 g a.i. /ha (4 ml/10 litre water) or thiamethoxam 25 WG @ 25 g a.i./ha (2 g/ 10 litre water) or acephate 75 SP @ 750 g a.i./ha (20 g / 10 litre water) for effective and economic control of sucking pests (jassids and whitefly) at 15 days interval starting from the pest infestation. The waiting period of thiamethoxam 25 WG @ 25 g a. i/ha should be maintained 21 days between last spray and harvesting of the crop. The residue of

imidacloprid 200 SL @ 40 g a.i. /ha and acephate 75 SP @ 750 g a.i./ha after first and second picking was found below detection level in the cotton lint and seeds.

The pre-harvest interval of 104 days is recommended for imidacloprid, thiamethoxam and acephate.

(*Cotton Research Station, JAU, Junagadh*)

Year: 2013-14

Testing Bio-efficacy of insecticides against sucking pest in summer groundnut

The farmers of South Saurashtra Agro-climatic Zone growing summer groundnut are advised to spray imidacloprid 17.8 SL 0.005 % (3 ml/ 10 litre water; 25 g a.i./ha) twice at 15 days interval starting after initiation of pest for effective and economical management of sucking pests in groundnut. The pre harvest Interval (PHI) of this insecticide is 40 days.

(*Main Oilseed Research Station, JAU, Junagadh*)

Efficacy of new molecules against *Helicoverpa armigera* in chickpea

For effective and economic control of pod borer *(Helicoverpaarmigera*) in chickpea crop, farmers of South Saurashtra Agro-climatic Zone are advised to apply two sprays of chlorantraniliprole 20 SC 0.003% (1.5 ml/ 10 liter water; 15 g a.i./ha) or emamectin benzoate 5 SG 0.001% (2 g/ 10 liter water; 5 g a.i./ha). First spray should be applied at 50% flowering and second at 15 days after first spray. The PHI for these insecticides is 27 days.

(*Pulse Research Station, JAU, Junagadh*)

Testing bio-efficacy of certain insecticides against pod borer complex on pigeonpea

The farmers of South Saurashtra Agro-climatic Zone are advised to apply two sprays of spinosad 45 SC 0.009% (2 ml/ 10 litre water; 45 g a.i/ha) or thiodicarb 75 WP 0.075% (10 g/ 10 litre water; 375 g a.i/ha) or flubendiamide 48 SC 0.0096% (2 ml/ 10 litre water; 48 g a.i/ha) or chlorantraniliprole 20 SC 0.003% (1.5 ml/ 10 liter water; 15 g a.i./ha) starting from 50 per cent flowering and second spray at 15 days after first spray for the control of pod borer complex in pigeonpea. The PHI for these insecticides is 30 days.

(*Pulse Research Station, JAU, Junagadh*)

Year: 2014-15

Management of sucking pests through insecticides in brinjal

For effective and economical control of brinjal whitefly, three sprays of chlorantraniliprole 18.5 SC, 0.002 %, 1.08 ml/10 litre water at 15 days interval starting from the pest infestation are recommended under South Saurashtra Agro-climatic Zone. The PHI for chlorantraniliprole 18.5 SC, 0.002 % is one day.

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

Storage potential of bio-agent under refrigerator conditions

Farmers are advised to store the field collected ladybird beetles (*Coccinella septempunctata* (L.)) in jar containing folded papers under domestic refrigerator conditions (6.0 to 7.5^{0}C) up to 120 days with the survival rate of 84 per cent without hampering their longevity and fecundity. These stored predatory beetles can be released in field crops for biological control of insect pests.

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

Storability of HaNPV and SNPV under refrigerator condition

Farmers are advised for biological control of *Helicoverpa armigera* and *Spodoptera litura* through Nuclear Polyhedrosis Virus (NPV) to store the field collected NPV infected larvae under domestic refrigerator conditions (6.0 to 7.5^{0}C). These NPV infected larvae can be stored up to 8 months of storage period with 100 per cent virulence, which can be utilized for the biologicalmanagement of respective pest.

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

Studies on effect of drip v/s flood irrigation on the incidence of important mango pests

Mango growers of South Saurashtra Agro-climatic Zone are informed that the lower incidence of gall midge, hopper and thrips is found in drip irrigated orchard as compared to flood irrigated orchard.

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

Testing of efficacy of different newer insecticides against shoot fly and stem borer in pearl millet

Farmers of North Saurashtra Agro-climatic Zone growing *kharif* pearl millet are advised to treat the seeds with imidacloprid 600 FS, 8.75 ml/kg seeds, 4.20 g a.i./kg seeds at the time of sowing

followed by spray with imidacloprid 17.8 SL, 0.009 % (5.0 ml/10 liter water, 45.39 g a.i./ha) at 35 days after germination of the crop for effective management of shoot fly and stem borer. The PHI for these insecticides is 42 days.

(Main Pearl Millet Research Station, JAU, Jamnagar)

Storage study of wheat harvested by combine harvester

The farmers storing wheat are advised that wheat harvested by combine harvester (up to 6 % mechanically damaged grain) to be stored with the treatment of castor oil (15 ml/1.0 kg grain) and can be kept in GI bin container to keep safe against lesser grain borer up to eight months of storage as it reduces pest population, grain damage, weight loss as compared to untreated wheat kept in jute bags.

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

Testing bio-efficacy of certain insecticides against pod borer complex on urdbean

Farmers of South Saurashtra Agro-climatic zone are advised to apply two sprays of chlorantraniliprole 18.5 SC, 0.006 % (3 ml/ 10 litre water) or flubendiamide 48 SC, 0.0096 % (2 ml/ 10 litre water), first spray at 50 per cent flowering and second at 15 days interval for the control of pod borer complex in urdbean.

The PHI for chlorantraniliprole 18.5 SC is 20 days, whereas 11 days for flubendiamide 48 SC.

(Pulses Research Station, JAU, Junagadh)

Year: 2016-17

Field efficacy of different insecticides against citrus pests

The farmers of South Saurashtra Agro-climatic Zone growing citrus are advised to apply two sprays of imidacloprid 17.8 SL 0.0072% (4 ml/10 lit. water), first spray at starting of pests infestation and second15 days after the first spray for effective management of leaf miner and black fly.

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

Evaluation of botanicals, bio-pesticides and insecticides against gram pod borer

The farmers of South Saurashtra Agro-climatic Zone growing chickpea are advised to apply alternate spray of *HaNPV* 2 x 10^9 POBs/ml (5 ml/10 lit. water) and chlorantraniliprole 18.5 SC 0.004 % (2 ml/10 lit. water) for effective and economic control of pod borer (*Helicoverpa armigera*) in chickpea crop. First spray to be started at 50% flowering and second at 15 days after first spray.

The PHI for Chlorantraniliprole 18.5 SC is 11 days.

(Pulse Research Station, JAU, Junagadh)

Integrated cotton crop management with emphasis on biotic stress

The farmers of South Saurashtra Agro-climatic Zone growing cotton are advised to apply the following Integrated Pest Management module for control of mealy bug and conservation of lady bird beetle. However, IPM module also reduced the population of aphids, jassid, thrips, whitefly, mite, mirid bug and maintain population of predators i.e. chrysopa and spider as compared to CFP module but they were non-significant.

1. Seed treatment with *Pseudomonas fluorescens* @ 10g / kg of seed
2. Sowing of castor as a trap and maize as a border crop (10:1)
3. Sowing of black gram as intercrop
4. Fertilizer application of FYM 10 t/ha + 180-37.50-112.50 NPK kg/ha in three split at basal, 30 DAS and 60 DAS
5. Need based application of insecticides in sequence *viz.*,acephate 75 SP (0.113%) 750g a.i/ha (20g /10 lit. water), flonicamid 50 WG (0.015%) 75g a.i/ha (3g /10 lit. water), fipronil 5 SC (0.008%) 40g a.i/ ha (16ml /10 lit. water) and buprofezin 25 SC (0.05%) 250g a.i/ha (20ml /10 lit. water).
6. Pre-emergence application of pendimethalin 30 EC (0.20%) @ 1000 g a. i./ha(67 ml/10 lit. water) and quizalofop ethyl 5 EC (0.01%) @ 50g a. i./ha (20 ml/10 lit. water) 30 DAS forweed control.
7. Installation of yellow sticky trap @ 5 traps/ha for monitoring of white fly.
8. Installation of pheromone traps @ 5 traps/ha for monitoring of all bollworms.
9. Need based application of copper oxychloride 50%WP 0.2% (40g/10 lit. water) and carbendazim 50%WP (0.05%) (10g /10 lit. water) for disease control.

(Cotton Research Station, JAU, Junagadh)

Year: 2017-18

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 x 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 formu-lation	Dosage				Total Quantity of Chemical suspension required/ha	Appli-cation schedule	Waiting period/ PHI (days)	Remark (s)
				a.i. g/ha	Quantity of formulation ml or kg/ha	Con (%)	Dilution in water (10 lit.)				
201	Cotto	Aphid,	Dinotefuran	50	0.250 kg	0.01	5 g	500 lit	First	15	-

7-18	n	Jassid, Thrips and White fly	20 SG						spray at pest appearance and subsequent four sprays at 10 days interval after first spray		
			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	--
			Beauveria bassiana 1.15 WP	2 x 10^6 cfu/g	3.0 kg	0.007 (Min. 2x10^6 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 x 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 x 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 formu-lation	Dosage				Total Quantity of Chemical suspension required/ ha	Application schedule	Waiting period/ PHI (days)
				a.i.g/ ha	Quantity of form-ulation ml, kg/ha	Con. (%)	Dilution in water (10 lit.)			
2017-18	Groundnut	White grub	Chlorpyrifos 20 % EC (ST) + *Beauveria bassiana* 1.15 WP (SA and drenching) **OR** Chlorpyrifos 20 % EC (ST) *Metarhizium anisopliae* 1.15 WP (SA and drenching)	600 + 57.50 + 57.50	3.0 lit + 5.0 kg + 5.0 kg	-- 0.006 (Min. 2 x 10^6 cfu/ g)	NA 50 g	-- 1000 lit (Drenching)	ST and soil application before sowing and drenching after 30 days of germination	-
				600 + 57.50 + 57.50	3.0 lit + 5.0 kg + 5.0 kg	-- 0.006 (Min. 2 x 10^6 cfu/ g)	NA 50 g			
			Beauveria bassiana 1.15 WP (SA and drenching) **OR** *Metarhizium anisopliae* 1.15 WP (SA and drenching)	57.50 + 57.50	5.0 kg + 5.0 kg	0.006 (Min. 2 x 10^6 cfu/ g)	50 g	1000 lit (Drenching)	Soil application before sowing and drenching after 30 days of germination	-
				57.50 + 57.50	5.0 kg + 5.0 kg	0.006 (Min. 2 x 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 *B. bassiana* (Yes/No)	Conc. (%)	Dose (ml/g)/10 lit.	Farmer are advise to mix the insecticides with *B. bassiana* (Yes/No)	Conc. (%)	Dose (ml/g)/ 10 lit.	Farmer are advise to mix the insecticides with *B. bassiana* (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	Chlorpyriphos 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	Chlorantranilipro le 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	Acetamiprid 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 *B. bassiana* (Yes/No)	Conc. (%)	Dose (ml/g)/ 10 lit.	Farmer are advise to mix the fungicides with *B. bassiana* (Yes/No)	Conc. (%)	Dose (ml/g)/ 10 lit.	Farmer are advise to mix the fungicides with *B. bassiana* (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	Metalaxyl 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 x 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 formu-lation	Dosage				Total Quantity of Chemical suspension required/ ha	Application schedule	Waiting period/ PHI (days)
				a.i.g/ ha	Quantity of formu-lation ml, kg/ha	Con. (%)	Dilution in water (10 lit.)			
2017-18	Cotton	Pink bollworm	*Beauveria bassiana* 1.15 WP	46.00	4.0 kg	0.009 (Min. 2 x 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. Lamda 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.i./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 *Ha*NPV @ 450 LE/ha (10 ml/10 lit. water) **or** *Bacillus thuringiensis*5 WP (2 x 10^8 cfu/g) @ 1.0 kg/ha (20 g/10 lit. water) or *Beauveria bassiana* 1.15 WP (2 x 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)	*Helicoverpa armigera*	*Ha*NPV 450 LE/ha	--	500 ml	450 LE/ ha	10 ml	500 litre	Single spray at the appearance of *H. armigera* larva on ear head	--
			Bacillus thuringiensis 5 WP	50	1.0 kg	0.01 (2 x 10^8 cfu/g)	20g			
			Beauveria bassiana 1.15 WP	23	2.0 kg	0.0046 (2 x10^6 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 chlorpyriphos 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 formu-lation	Dosage				Total Quantity of Chemical suspension required/ ha	Appli-cation schedule	Waiting period/ PHI (days)	Remark (s)
				a.i g/ha	Quantity of formu-lation ml or kg/ha	Con. (%)	Dilution in water (10 lit.)				
2017	Mustard	Leaf webber	Chlorpyriphos 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)

Plant Pathology

Year: 2004-05

Groundnut

The farmers of South Saurashtra Agro-climatic Zone are advised to use tebuconazole @ 1.25 g/kg as seed treatment (ICBR 1:51.12) to reduce the collar rot disease of groundnut.

(*Main Oilseed Research Station, JAU, Junagadh*)

Management of early blight disease in tomato

For the management of early blight of tomato in South Saurashtra Agro-climatic Zone, seed treatment with captan @ 3 g/kg seeds, application of carbofuran @ 1kg a.i./ha in seed bed and covering of nursery with nylon net (400 mesh) after sowing and after transplanting four sprays of mancozeb @ 0.3 per cent (ICBR 1:7.09) during *rabi* season at 15 days interval starting from initiation of early blight disease are recommended.

(*Vegetable Research Station, JAU, Junagadh*)

Year: 2006-07

Effect of phosphate solubilizing microorganisms on growth and yield in chickpea

The farmers of South Saurashtra Agro-climatic Zone are advised to apply phosphate solubilizing microorganism cultures either PBA-13 (*Bacillus coagulans*) (CBR 1:28.79) or PBA-20 *(Aspergillus* spp.*)*(CBR 1:22.95) or PBA-10 (*B.coagulans*) (CBR 1:21.60) (10^8 viable cells/g) as seed treatment @ 30 g/kg seed in gram crop in place of phosphatic fertilizer.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Groundnut-Castor relay crop

The farmers of South Saurashtra Agro-climatic Zone are advised to sow groundnut with castor as relay crop (Row ratio of 2:1) along with soil application of carbofuran 3 G @ 1 kg a.i./ha (Furadan 3G @ 33 kg/ha) to reduce the root knot nematode disease (*Meloidogyne arenaria*)and to get higher yield (CBR 1: 2.35).

(*Main Oilseed Research Station, JAU, Junagadh*)

Year: 2007-08

Fenugreek

The farmers of South Saurashtra Agro-climatic Zone are advised to sow fenugreek in third or fourth week of October for maximum yield and minimum powdery mildew disease incidence.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Year: 2008-09

Efficacy of fungicides for the control of powdery mildew of cumin

The farmers of South Saurashtra Agro-climatic Zone are advised to apply three sprays of difenoconazole 25 EC 0.025 per cent (10 ml/10 lit) at 15 days interval starting from initiation of disease for effective and economical control of powdery mildew of cumin.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Effect of sowing period on the occurrence of powdery mildew of cumin

The farmers of South Saurashtra Agro-climatic Zone are advised to sow cumin in third or fourth week of October for keeping low incidence of powdery mildew disease and better seed yield.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Management of stem rot of groundnut through oil cakes

The farmers of North Saurashtra Agro-climatic Zone are advised to apply castor cake @ 750 kg/ha in furrow before sowing for effective and economical management of stem rot of groundnut.

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

Year: 2009-10

Chemical control of powdery mildew of mango

The farmers of South Saurashtra Agro-climatic Zone cultivating mango are advised to apply three sprays of hexaconazole 5 EC 0.005% (10 ml/10 l) at 20 days intervals from initiation of flowering for effective and economical management of powdery mildew.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Management of stem rot of groundnut (*Sclerotium rolfsii*) by different methods of application of *Trichoderma sp*.

The farmers of South Saurashtra Agro-climatic Zone cultivating groundnut are advised to treat the seed with talc based *Trichoderma viride* @ 10 g/kg seeds **or** apply T.*viride* @ 2.5 kg/ha as soil drenching at 30 days after sowing **or** *T. viride* @ 2.5 kg along with either castor cake **or** FYM @100 kg /ha in furrow at the time of sowing to reduce stem rot incidence.

(Main Oilseeds Research Station, JAU, Junagadh)

Management of *Meloidogyne arenaria* and *Sclerotium rolfsii* complex in groundnut

The farmers of South Saurashtra Agro-climatic Zone cultivating groundnut are advised to treat the seed with talc based *Pseudomonas fluorescens* @ 20 g/kg seeds followed by the application of *Pseudomonas fluorescens* in furrow @ 2.5 kg/ha for effective management of root knot nematode and stem rot diseases.

(*Main Oilseeds Research Station, JAU, Junagadh*)

Year: 2011-12

Integrated management of major diseases of groundnut

The farmers of South Saurashtra Agro-climatic Zone growing groundnut are advised to treat the seeds with tebuconazole 2% DS @1.5 g/kg and spray tebuconazole 25 EC @ 10 ml/ 10 l water at 45 and 60 days after sowing.

OR

Apply talc based *Trichoderma* @ 10 g/kg seed and @ 4 kg/ha with 250 kg castor cake in furrow at the time of sowing and spray hexaconazole 5 EC @ 10 ml/10 l water twice at 45 and 60 days after sowing for economic and effective control of soil borne (collar rot & stem rot) and foliar (tikka& rust) diseases. The waiting period of tebuconazole 25 EC (125 g a.i./ha) and hexaconazole 5 EC (100 g a.i./ha) should be maintained 49 and 30 days, respectively between last spray and harvesting of the crop.

(*Main Oilseed Research Station, JAU, Junagadh*)

Wilt management in chickpea

The farmers of the South Saurashtra Agro-climatic Zone growing irrigated chickpea during *rabi* season are advised to adopt seed treatment of carbendazim 1g+thiram 2 g/kg seed along with soil application of *Trichoderma viride* (10^6cfu/g) @ 2.5 kg mixed in 250 kg either castor cake or FYM/ha at the time of sowing in furrow for management of wilt and to get higher seed yield.

(Pulses Research Station, JAU, Junagadh***)***

Year: 2014-15

Assessment of *Trichoderma* population in the field under groundnut cultivation

Farmers of North and South Saurashtra Agro-climatic Zone are advised to apply *Trichoderma* every year for the management of stem/pod rot disease in groundnut.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Compatibility of *Trichoderma* with different seed dressing agrochemicals used for the management of diseases and pest in groundnut

Farmers of South Saurashtra Agro-climatic Zone are advised that the agrochemicals used for seed treatment in groundnut *viz.*, carbendazim 12 % + mancozeb 63 % - 75 WP @ 3.0 g/kg seed or mancozeb 75 WP @ 4.0 g/kg seed or carboxin 37.5 % + thirum 37.5 % - 75 WP @ 3.0 g/kg seed or tebuconazole 2 DS @ 2.0 g/kg seed or imidacloprid 600 FS @ 3.0 ml/kg seed against seed and soil borne diseases/sucking pests do not reduce the soil population of *Trichoderma*, hence they are compatible with *Trichoderma harzianum.*

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Effect of spawn rates on sporophore production of Oyster mushroom (*Pleurotus sajor-caju*)

Mushroom growers are advised to use 3.0 per cent spawn rate in polyethylene bags (18 × 24 inch) of oyster mushroom (*Pleurotus sajor-caju*) to get the optimum sporophore production with higher biological efficiency.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Effect of substrate rates on sporophore production of Oyster mushroom (*Pleurotus sajor-caju*)

Mushroom growers are advised to use 3 kg wheat straw substrate with 3 per cent spawn rate in polyethylene bags (18 × 24 inch) for the optimum sporophore production with higher biological efficiency of oyster mushroom (*Pleurotus sajor-caju*).

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Year: 2015-16

Management of alternaria leaf blight of groundnut

The farmers of south Saurashtra growing summer groundnut are advised to apply three sprays of mancozeb 75 WP 0.2% (27 g/10 litre of water) at 35, 50 and 65 days after sowing for effective and economical management of alternaria leaf blight of groundnut.

(Main Oilseeds Research Station, JAU, Junagadh)

Refining integrated disease management in groundnut

The farmers of south Saurashtra growing *kharif* groundnut are advised to apply seed treatment with tebuconazole 25 WG @1.5 g/kg seed or seed treatment with *Trichoderma viride* 1% WP10 g/kg seed, furrow application of *T. viride* at the time of sowing and broadcasting at 40 DAS @4 kg enriched in 50 kg FYM and two sprays of tebuconazole 25.9 SC @10 ml/ 10 lit at 15 days interval from initiation of foliar disease for effective and economical management of collor rot, stem rot, tikka and rust disease.

(Main Oilseeds Research Station, JAU, Junagadh)

Efficacy of seed dressing chemicals against wilt and root rot complex of cotton

The farmers of south Saurashtra are advised to treat the cotton seeds with a ready mixture of carboxin 37.5% + thiram 37.5% DS @ 3.5 g/kg seeds before sowing for economical and effective control of wilt and root rot complex and to improve seed cotton yield.

(Cotton Research Station, JAU, Junagadh)

Year: 2016-17

Biological control of soil borne diseases of sesame

The farmers of North Saurashta Agro-climatic Zone growing sesame are advised to treat seed with *Trichoderma harzianum*1 % WP 5 g/kg seed or *Pseudomonas fluorescens* 1 % WP 5 g/kg along with soil application of *Trichoderma harzianum* 1 % WP 2.5 kg/ha with 300 kg FYM or castor cake at the time of sowing were found effective and economical for management of soil borne diseases (*Macrophomina* stem rot and *Phytophthora* blight) of sesame.

(Agril. Research Station, JAU, Amreli)

Year: 2017-18

Management of fungal foliar diseases of cotton

The farmers growing cotton are recommended to apply three spray of pyraclostrobin 5WG + metiram 55WG 0.18 % @ 30 g/10liter 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* ($2x10^8$ 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	Appli-cation schedule	Waiting Period/PHI (days)	Remark
				g.a.i./ha	Quantity of formu-lation g, ml, kg or l/ha	Concen tration (%)	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	20 g	500	First spray at initiation of diseases & next sprays at interval of 15days	BDL	-
			Pyreclostobin 5WG+ Metiram55 WG	900	1.5kg	0.18	30 g	500		45	Registered in CIB-RC
			Pseudomonas fluorescens	25 2x 10^8 cfu/ml	2.5 l	0.005 $2x10^8$ cfu/ml	50 ml	500		--	--

(Cotton Research Station, JAU, Junagadh)

Following farmers' recommendations made in the past (2005 to 2014). However, they do not confirm the guideline of Central Insecticides Board & Registration Committee for pesticides.

Agricultural Entomology

Year: 2004-05

Management of *Halicoverpa armigera* through different antifeedants in chickpea

For the eco-friendly management of *Halicoverpa armigera* in chickpea in South Saurashtra Agro-climatic Zone, two spraying of kadvi mehadi leaf extract (ICBR 1:5.12) or mamejva leaf extract (ICBR 1:4.67) or Jatropha leaf extract (ICBR 1:4.41) or five per cent neem leaf extract (ICBR 1:4.12) or cartap hydrochloride 0.1 per cent (ICBR 1:1.93) at 15 days interval from the date of pest infestation is recommended.

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

Fenugreek

For the control of pest complex (jassid, thrips and leaf-miner) of fenugreek in South Saurashtra Agro-climatic Zone, two sprays of dimethoate 0.03 per cent (ICBR 1:7.97) or methyl-o-demeton 0.03 per cent (ICBR 1:5.68) at 15 days interval starting from pest infestation are recommended.

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

Bio efficacy of some synthetic and botanical insecticides against fruit borer of pomegranate

For the control of fruit borer (*Virachola isocrates*) of pomegranate in South Saurashtra Agro-climatic Zone, two sprays of dichlorvos 0.05 per cent or monocrotophos 0.04 per cent or malathion 0.05 per cent at 15 days interval starting from pest infestation are recommended.

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

Cotton

For the control of pink bollworm in cotton, farmers of Saurashtra region are advised to spray quinalphos 25 EC @ 500 g a.i./ha(ICBR 1:3.18) spinosad 45 SC @ 50 g a.i./ha (ICBR 1:3.10) as and when pest crosses the ETL (10 male moths/pheromone trap/day).

(*Cotton Research Station, JAU, Junagadh*)

Chemical control of mustard aphid (*Lipaphis berysimi* Kalt.)

The farmers of South Saurashtra Agro-climatic Zone growing mustard crop are advised to apply first spray of insecticide cypermethrin + profenofos 44 EC 0.04 per cent (ICBR 1:9.65) or acephate 75 WP 0.05 per cent (ICBR 1:8.92) or imidacloprid 17.8 SL 0.005 per cent (ICBR 1:7.68) or methyl-o-demeton 25 EC 0.03 per cent (ICBR 1:5.92) or carbosulfan 25 EC 0.03 per cent (ICBR 1:5.17) at appearance of aphids and second spray after 15 days of first spray.

(*Main Oilseeds Research Station, JAU, Junagadh*)

Year: 2006-07

Coriander

For effective and economical management of aphid in coriander, farmers of South Saurashtra region are advised to apply seed treatment with thiamethoxam 70 WS @ 4.2 g/kg seed (CBR 1:4.94).

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

Fenugreek

For effective and economical management of jassid in fenugreek, farmers of South Saurashtra region are advised to treat the seed with thiamethoxam 70 WS@ 2.8 gm/kg seed (CBR 1:2.12).

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

Chickpea

For effective and economic management of gram pod borer in chickpea, farmers of South Saurashtra Agro-climatic Zone are advised to apply three sprays of profenophos @ 750 g a.i./ha.(1.5 litre/ha) (CBR 1:2.47) or go for alternate spray of NSKE 5 %, Bt 1 kg/ha and profenophos 750 g a.i./ha (1.5 litre/h) (CBR 1:1.98) at 10 days interval stating from 50 per cent flowering.

(*Pulse Research Station, JAU, Junagadh*)

Year: 2007-08

Dillseed

For effective and economical management of aphid in dillseed, seed treatment with thiamethoxam 70 % WS @ 4.2 g/kg seed (CBR 1:5.29) orimidacloprid 70 % WS @ 10 g/kg seed (CBR 1:1.69) is recommended under South Saurashtra region.

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

Cumin

For effective and economical management of thrips in cumin, seed treatment with thiamethoxam 70 % WS @ 4.2 g/kg seed (CBR 1:9.22) or imidacloprid 70 % WS @ 10 g/kg seed (CBR 1: 2.58) is recommended under South Saurashtra region.

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

Tomato

Seed treatment with thiamethoxam 70 % WS @ 4.2 g/kg seed or imidacloprid 70 % WS @ 7.5 g/kg seed is recommended under South Saurashtra region for effective management of whitefly and leaf miner attacking tomato nursery and thereby to obtain higher numbers of transplantable seedlings.

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

Castor

For effective and economical management of wireworm in castor, seed treatment of carbaryl 50WP @ 5 g/kg seed (CBR 1:507) or carbosulfan 25 DS @ 5 g/kg seed (CBR 1:118) or imidacloprid 70WS @ 5 g/kg seed (CBR 1:37) is recommended under South Saurashtra region.

(*Main Oilseeds Research Station, JAU, Junagadh*)

Castor

For effective and economical management of thrips in castor, spraying of acephate, 0.05 %, (CBR 1:17.86) or dimethoate, 0.03 %, (CBR 1:14.01) or profenophos 40 % + cypermethrin 4 %, 0.044 %, (CBR 1:12.24) at appearance of pest is recommended.

(*Main Oilseeds Research Station, JAU, Junagadh*)

Year: 2008-09

Management of thrips in onion (bulb purpose) through newer insecticides

The farmers of South Saurashtra Agro-climatic Zone growing onion for bulb purpose in *rabi* season are advised to apply two sprays of profenophos 40 % + cypermethrin 4 % EC 0.044 per cent (10 ml/10 lit.) or profenophos 0.05 per cent (10 ml/10 lit.) or carbosulfan 0.05 per cent (20 ml/10 lit.) at 10 days interval starting from initiation of thrips infestation for its effective and economical management.

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

Chemical control of stem borer *Chilo partellus* (S) of pearl millet

The farmers of North Saurashtra Agro-climatic Zone growing bajra crop are advised to spray fenvalerate 10 EC 0.01 per cent (10 ml/10 lit.) or cypermethrin 10 EC 0.01 per cent (10 ml/10 lit.) or indoxacarb 14.5 SC 0.0075 per cent (5 ml /10 lit.) at 20 and 40 days after germination for the effective management of stem borer (*Chilo partellus*).

(*Main Pearl Millet Research Station, JAU, Jamnagar*)

Year: 2009-10

Field efficacy of bio-pesticides against thrips in onion (bulb purpose)

The farmers of South Saurashtra Agro-climatic Zone are advised to apply two sprays of *Beauveria bassiana* @ 2.0 kg/ha **or** *Metarhizium anisopliae* @1.5 kg/ha at 10 days intervals starting from pest infestation for effective and economical bio-pesticide based management of thrips in *rabi* onion (bulb purpose).

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

Management of shoot fly and stem borer in *bajra* crop

The farmers of North Saurashtra Agro-climatic Zone growing *bajra* crop are advised to apply two sprays of profenophos 50 EC 0.05% (10 ml/10 l) or fenobucarb 50 EC 0.1% (20 ml/10 l) at 20 and 40 days after germination for the control of shoot fly and stem borer.

(*Main Pearl Millet Research Station, JAU, Jamnagar*)

Testing of newer molecules if pesticides against sucking insect pests if groundnut

The farmers of North Saurashtra Agro-climatic Zone cultivating groundnut under rainfed condition are advised to apply imidacloprid 17.8 SL 0.007 % (4 ml/10 l) **or** thiamethoxam 25 WG 0.01 % (4 g/10 l) **or** acetamiprid 20 SP 0.004 % (2 g/10 l) at ETL of aphid (1.5 aphid index/plant) and jassid (3 nymphs/3 top leaves) for effective and economical control of these pests.

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

Testing of new insecticides against sucking pests in groundnut

Thefarmers of South Saurashtra Agro-climatic Zone growing *kharif* groundnut are advised to give seed treatment with imidacloprid 600 FS @ 3 g/kg seed **or** thiamethoxam 70 WS @ 1 g/kg seed **or** dimethoate 30 EC 0.06% (20 ml/10 l) as foliar spray at 15 and 30 days after sowing for effective and economical management of thrips and jassid.

(*Main Oilseeds Research Station, JAU, Junagadh*)

Bio-efficacy of insecticides against thrips in groundnut

The farmers of South Saurashtra Agro-climatic Zone growing *kharif* groundnut are advised to spray profenophos 40 % + cypermethrin 4 % 0.044 % (10 ml/10 l) **or** thiamethoxam 25 WG 0.006 % (2.4 g/10 l) **or** imidacloprid 17.8 SL 0.005 % (2.8 ml/10 l) **or** methyl-o-demeton 25 EC 0.025 % (10 ml/10 l) at the initiation of the pest for effective and economical management of thrips.

(*Main Oilseeds Research Station, JAU, Junagadh*)

Year: 2010-11

Efficacy of newer insecticides against sucking pests of coriander

For effective and economical management of aphids in coriander, one spray of acetamiprid 20% SP 0.004 % (2 g/10 l water) or imidacloprid 17.8 % SL 0.005% (2.80 ml/10 l water) or dimethoate 30 % EC 0.03 % (10 ml/10 l water) at the appearance of aphid infestation is recommended under South Saurashtra Agro-climatic Zone.

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

Testing efficacy of bio-pesticides for the control of sesame leaf webber/capsule borer (*Antigastra catalaunalis*)

For effective and economical bio-pesticide based management of leaf webber/capsule borer in *kharif* sesame, three sprays of *Beuaveria bassiana* (2 x 10^8cfu/mg), 5 g/l or neem seed kernel extract 5 % (500 g/ 10 l water) at 15 days interval starting from the pest infestation are recommended for the farmers of North Saurashtra Agro-climatic Zone.

(*Agricultural Research Station (Ag. Botany), JAU, Amreli*)

Year: 2012-13

Field efficacy of newer acaricides for the management of mites in garlic

For effective and economical management of mite in garlic under South Saurashtra Agro-limatic Zone, two sprays of abamectin 1.9 EC @ 0.003 % (16 ml / 10 litre water) or carbosulfan 25 EC @ 0.05 % (20 ml/ 10 litre water) or difenthiuron 50 WP @ 0.07 % (14 g /10 litre water) at 15 days interval starting from mite infestation are recommended.

The pre-harvest interval of 27 days is recommended for abamectin, carbosulfan and difenthuron.

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

Field efficacy of bio-pesticides against pest complex of okra

For effective and economical bio-pesticide based management of *Kharif* okra pests*viz.*, jassid and fruit and shoot borer, two sprays of *Metarhiziumanisopliae*(cfu 1 x 10^7/g) @ 4 g/lit 15 days interval starting from the pest infestation are recommended under South Saurashtra Agro-climatic Zone.

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

Bio efficacy of newer miticides against mites in cluster bean

For effective and economical management of mites in cluster bean under South Saurashtra Agro-climatic Zone, two sprays of difenthiuron 50 WP @ 0.07 % (14.0 g/10 lit water) or abamectin 1.9 EC @ 0.003 % (16 ml/ 10 litre water) or buprofezin 25 EC @ 0.025% (10 ml/ 10 litre water) at 15 days interval starting from mite infestation are recommended.

The pre-harvest interval of 10, 1, 10, 1 day (s) is recommended for difenthiuron, abamectin, buprofezin and dicofol, respectively.

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

Field efficacy of bio-pesticides against inflorescence pests of mango

For higher fruit setting and effective management of inflorescence sucking pests *viz.* hopper, thrips and flower bug in mango orchard under South Saurashtra Agro-climatic Zone, two sprays of bio-pesticides, *Beauveria bassiana* (cfu 1x10^7/g) @ 20 g/ 10 lit water or *Verticillium lecanii* (cfu 1 x10^7/g) @ 20 g/ 10 lit water at 15 days interval starting from pests infestation are recommended.

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

Field efficacy of different insecticides against the leaf webber of mango

For effective management of leaf webber in mango orchard under South Saurashtra Agro-climatic Zone, two sprays of profenophos 50 EC @ 0.05 % (10 ml/10 litre water) or novaluron 10 EC @ 0.01 % (10 ml /10 litre water) or spinosad 45 SC @ 0.015 % (3 ml /10 litre water) or quinalphos 25 EC @ 0.05 % (20 ml /10 litre water) or carbaryl 50 WP @ 0.2 % (40 g/10 litre water) at 15 days interval starting from leaf webber infestation are recommended.

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

Eco friendly management of sesame leaf webber, *Antigastra catalaunalis* Duponchel under rainfed condition

The farmers of North Saurashtra Agro-climatic Zone, cultivating sesame under rainfed condition are advised to give two sprays of cartap hydrochloride 50 SP 0.075 % (15 g/10 lit water) or Neem Seed Kernel Extract 3% (300 g / 10 lit water) for effective and economic control of the leaf webber. The first spray should be applied when the pest population reach at 5 larvae / 20 plants (ETL) and second spray at 15 days after the first spray.

The residue of cartap hydrochloride in sesame seeds at 30 days after second spray was found below detection limit.

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

Year: 2013-14

Management of shoot fly and stem borer in *bajra* crop

The farmers of North Saurashtra Agro-climatic Zone growing *kharif* pearl millet are advised to treat the seeds with thiamethoxam 35 FS @ 9.0 ml/kg (3.15 g a.i./kg) or imidacloprid 600 FS @ 8.75 ml/kg (5.25 g a.i./kg) seed at the time of sowing followed by spray of either profenophos 40% + cypermethrin 4.0%, 44 EC 0.044% (10 ml/10 litre water; 220 g a.i./ha) or cartap hydrochloride 50 SP 0.05% (10 g/ 10 litre water; 250 g a.i./ha) or thiodicarb 75 WP 0.015% (2 g/10 litre water; 75 g a.i./ha) at 30 days after germination of the crop for the effective management of shoot fly and stem borer. The PHI for these insecticides is 61 days.

(*Main Pearl Millet Research Station, JAU, Jamnagar*)

Chemical control of thrips (*Thrips tabaci* L.) in onion through newer insecticides

For effective and economical management of thrips in onion, two sprays of spinosad 45 SC 0.009% (2 ml / 10 litre water; 45 g a.i./ha) or chlorfenapyr 10 EC 0.008% (7.5 ml /10 litre water; 37.5 g a.i./ha) or fipronil 5 SC 0.007% (14 ml / 10 litre water; 35 g a.i./ha) at 10 days interval starting from thrips infestation are recommended under North Saurashtra Agro-Climatic Zone.The PHI for spinosad, chlorfenapyr and fipronil is 34 days.

(*Grassland Research Station, JAU, Dhari*)

Management of sucking pests of *kharif* groundnut through newer insecticides

For effective and economical management of sucking pests in *kharif* groundnut, two sprays of imidacloprid 17.8 SL 0.005% (2.8 ml/10 litre water; 25 g a.i./ha) or fipronil 5 SC 0.007% (14 ml / 10 litre water; 35 g a.i./ha) or difenthiuron 50 SP 0.05% (10 g/10 litre water; 250 g a.i./ha) at 15 days interval starting from the pest infestation are recommended under North Saurashtra Agro-climatic Zone . The PHI for imidacloprid, fipronil and difenthiuron is 27 days.

(*Grassland Research Station, JAU, Dhari*)

Efficacy of new molecules against *Helicoverpa armigera* in chickpea

For effective and economic control of pod borer *(Helicoverpa armigera*) in chickpea crop, farmers of South Saurashtra Agro-climatic Zone are advised to apply two sprays of chlorantraniliprole 20 SC 0.003% (1.5 ml/ 10 liter water; 15 g a.i./ha) or emamectin benzoate 5 SG 0.001% (2 g/ 10 liter water; 5 g a.i./ha) or profenophos 50 EC 0.1% (20 ml/ 10 liter water 500 g a.i./ha). First spray should be appliled at 50% flowering and second at 15 days after first spray. The PHI for these insecticides is 27 days.


(*Pulse Research Station, JAU, Junagadh*)

Plant Pathology

Year: 2004-05

Pearl millet

For the control of blast disease of pearl millet, two sprays of carbendazim 0.05 per cent (ICBR 1:3.85) at 15 days intervals starting from the initiation of the disease are recommended.

(*Main Pearl Millet Research Station, JAU, Jamnagar*)

Year: 2006-07

Garlic

The farmers of South Saurashtra Agro-climatic Zone growing garlic are advised to apply three sprays of thiophanate methyl 70 % WP @ 0.05 % (CBR 1: 7.85) or hexaconazole 5 % EC @ 0.008 % (CBR 1:6.48) at 10 days interval starting from initiation of powdery mildew (*Leveillula taurica*) disease during *rabi*season for it's economic and effective management. However, those who are interested in organic farming can use *Wettable sulphur* 80 WP @ 0.30 % (ICBR 1 : 8.67).

(*Vegetable Research Station, JAU, Junagadh*)

Year: 2007-08

Green gram

The farmers of North Saurashtra Agro-climatic Zone are advised to apply three sprays of carbendazim 0.025 % (CBR 1:7.37) or hexaconazole 0.005 % (CBR 9.16) or *Wettable sulphur* 0.2 % (CBR 1:15.99) or for organic farming, neem seed kernel extract 5 % (CBR 1:2.89) starting from the initiation of the disease and subsequent at 15 days interval for effective and economical management of powdery mildew of *kharif* green gram.

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

Black gram

The farmers of North Saurashtra Agro-climatic Zone are advised to apply two sprays of hexaconazole 0.005 % (CBR 1:24.42) or carbendazim 0.05 % (CBR 1:22.84); first spray at initiation of disease and second spray at 20 days after first spray for effective and economical management of powdery mildew of black gram.

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

Onion (*kharif*)

The farmers of South Saurashtra Agro-climatic Zone, growing *kharif* onion nursery are advised to adopt any one of the following treatments in the raised bed nursery after 15 days of soil solarization to get maximum transplantable seedlings at economical cost.

Seed treatment with thiram 75 % SD (3 g/kg seed) and drenching with thiram 75 % WP (0.2 %) @ 3 litre/m^2 after 10 days of seed sowing (CBR 1:3.94).

OR

Seed treatment with thiram 75 % SD (3 g/kg seed) and drenching with copper oxychloride (0.2 %) @ 3 litre/m^2 after 10 days of seed sowing (CBR 1:3.10).

OR

Seed treatment with *Trichoderma harzianum* (2 x 10^6 cfu) @ 5 g/kg seed and drenching of *T. harzianum* (0.5 %) @ 3 litre/m^2 after 10 days of seed sowing (CBR 1:3.70).

OR

Seed treatment with carbendazim 50 % WP (3 g/kg seed) and drenching of carbendazim 0.1 % @ 3 litre/m^2 after 10 days of seed sowing (CBR 1:3.12).

(*Vegetable Research Station, JAU, Junagadh*)

Year: 2008-09

Chemical control of powdery mildew of coriander

The farmers of South Saurashtra Agro-climatic Zone are advised to apply three sprays of hexaconazole 5 EC 0.005 per cent (10 ml/10 lit) or propiconazole 25 EC 0.025 per cent (10 ml/10 lit) or difenoconazole 25 EC 0.025 per cent (10 ml/10 lit) at 15 days interval starting from initiation of disease for effective and economical control of powdery mildew of coriander.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Efficacy of fungicides for the control of powdery mildew of cumin

The farmers of South Saurashtra Agro-climatic Zone are advised to apply three sprays of hexaconazole 5 EC 0.005 per cent (10 ml/10 lit) or propiconazole 25 EC 0.025 per cent (10 ml/10 lit) or difenoconazole 25 EC 0.025 per cent (10 ml/10 lit) at 15 days interval starting from initiation of disease for effective and economical control of powdery mildew of cumin.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Management of powdery mildew of sesamum through triazole fungicides

The farmers of North Saurashtra Agro-climatic Zone are advised to apply two sprays of hexaconazole 5 EC 0.005 per cent (10 ml/10 lit) or carbendazim 50 WP 0.05 per cent (5g/10 lit) first spray at initiation of the disease and second spray at 15 days after first spray for effective and economical management of powdery mildew of sesamum.

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

Year: 2009-10

Chemical control of powdery mildew of mango

The farmers of South Saurashtra Agro-climatic Zone cultivating mango are advised to apply three sprays of hexaconazole 5 EC 0.005% (10 ml/10 l) **or** propiconazole 25 EC 0.025% (10 ml/10 l) at 20 days intervals from initiation of flowering for effective and economical management of powdery mildew.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Chemical control of colletotrichum and cercospora leaf spots of urdbean

The farmers of South Saurashtra Agro-climatic Zone growing urdbean are advised to apply three sprays of propiconazole 25 EC 0.025% (10 ml/10 l) **or** hexaconazole 5 EC 0.005% (10 ml/10 l) at 15 days intervals from the disease initiation for effective and economical management of Colletotrichum and Cercospora leaf spot.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Evaluation of fungicides for the control of downy mildew disease of bitter gourd

The farmers of South Saurashtra Agro-climatic Zone growing bitter gourd are advised to apply three sprays of metalaxyl MZ 72 WP, 0.1% (14 g/10 l) **or** chlorothalonil 75 WP, 0.1 % (13.3 g/10 l) **or** fosetyl-Al 80 WP, 0.1% (12.5 g/10 l) at 15 days intervals from the disease initiation for effective and economical management of downy mildew.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Biological control of angular leaf spot disease of cotton

The farmers of South Saurashtra Agro-climatic Zone growing cotton are advised to treat the seeds with talc based *Pseudomonas fluorescens* (Pf-1) @ 10 g/kg seed along with foliar sprays of *P. fluorescens* (Pf-1) @ 0.2 % (20 g/10 l) at 30, 50, 70 and 90 days after sowing for effective and economical management of angular leaf spot disease.

(*Cotton Research Station, JAU, Junagadh*)

Chemical control of Alternaria leaf spot of sesame

The farmers of North Saurashtra Agro-climatic Zone cultivating sesame are advised to apply three sprays of propiconazole 25 EC 0.025% (10 ml/10 l) **or** cymoxanil 8 WP + mancozeb 64 WP 0.1% (20 g / 10 l) **or** mancozeb 75 WP 0.2% (25 g/10 l), first at 40 days after sowing and subsequent sprays at 12 days intervals for effective and economical management of alternaria leaf spot disease.

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

Year: 2010-11

Integrated Management of downy mildew of cucurbit (Ridge gourd)

For economical and effective management of downy mildew disease and to get higher ridge gourd fruit yield, the farmers of South Saurashtra Agro-climatic Zone are advised to adopt bower system with seed treatment of combi product of metalaxyl 8 % + mancozeb 64 % WP @ 4 g/kg seeds followed by three times removing of old leaves in the morning and three sprays of mancozeb 75 % WP 0.2 % (27 g/10 l of water) in the afternoon at 50, 60 and 70 days after sowing or bower system with seed treatment of metalaxyl 8 % + mancozeb 64 % WP @ 4 g/kg seeds followed by two sprays of fosetyl-Al 80 % WP 0.1 % (12.5 g/10 l of water) at 50 and 65 days after sowing.

(*Vegetable Research Station, JAU, Junagadh*)

Chemical control of leaf/stem/capsule spots (*Alternaria alternata*) of sesame

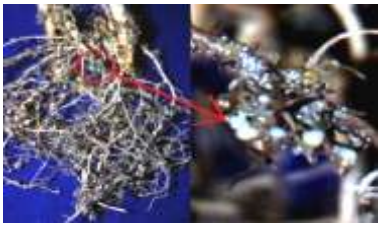
The farmers of North Saurashtra Agro-climatic Zone growing *kharif* sesame are advised to apply three sprays of propiconazole 0.025 % (10 ml/10 l water) or hexaconazole 0.005 % (10 ml/10 l water) or carbendazim 12 % WP + mancozeb 63 % WP 0.15 % (20 g/10 l water) at 12 days interval starting from 40 days after sowing for effective and economical management of leaf/stem/ capsule spots.

(*Agricultural Research Station, JAU, Amreli*)

Year: 2012-13

Management of root knot nematode, *Meloidogyne arenaria* in groundnut

The groundnut growing farmers of South Saurashtra Agro-climatic Zone are advised to apply talc based *Paecilomyces lilacinus*(cfu $1x10^6$/g) as seed treatment @ 10 g/kg seed or soil application of *Paecilomyces lilacinus*(cfu 1 x 10^6/g) @ 2.5 kg/ha for effective and economical management of root knot nematode.

(*Main Oilseed Research Station, JAU, Junagadh*)

Management of leaf blight disease in tomato

For economical and effective management of leaf blight disease *Alternaria solani* and to get higher tomato fruit yield, farmers of South Saurashtra Agro-climatic Zone, growing tomato in late *kharif* season are advised to apply three sprays of copper hydroxide 77 WP @ 0.2% (25 g/10 lit water) at 10 days interval starting from the initiation of the disease.

(*Vegetable Research Station, JAU, Junagadh*)

Year: 2014-15

Standardization of method and time of application of bio-controlagents for management of stem and pod rot of groundnut caused by *Sclerotium rolfsii*

Farmers of South Saurashtra Agro-climatic Zone are advised furrow application of *Trichoderma harzianum* 2 x 10^6 $cfug^{-1}$ @1.25 kg in 125 kg of castor cake/ha at the time of sowing as well as its broadcasting at plant base with same dose at one month after sowing for effective and economic control of stem and pod rot (*Sclerotium rolfsii*) of groundnut.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Management of cumin wilt (*Fusarium oxysporum f. sp. cumini*)

Farmers of South Saurashtra Agro-climatic Zone are advised to broadcast *Trichoderma harzianum* 2 x 10^6 $cfug^{-1}$ @ 5.0 kg mixed in 1000 kg of FYM/ha at the time of sowing for effective and economical control of cumin wilt.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Efficacy of different bio-control agents against cumin wilt caused by *Fusarium oxysporum f. sp. cumini*

Farmers of South Saurashtra Agro-climatic Zone are advised to broadcast mixture of *Trichoderma viride*@ 1.70 kg + *T. harzianum* @ 1.70 kg + *Pseudomonas fluorescens* @ 1.70 kg (2 x 10^7 $cfug^{-1}$) or *T. viride* @ 2.50 kg + *P. fluorescens* @ 2.50 kg (2 x 10^7 $cfug^{-1}$) mixed in 500 kg of castor cake/ha at the time of sowing for effective and economical control of cumin wilt.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Effect of foliar application of insecticides in cumin on *Trichoderma* applied in soil

Farmers of South Saurashtra Agro-climatic Zone are advised to apply *Trichoderma harzianum* (2×10^7 $cfug^{-1}$) @ 5 kg in 500 kg of castor cake/ha at the time of sowing as well as its broad-casting @ 5 kg/ha Trichoderma in 100 kg sand at one month after germination of crop for effective and economical control of cumin wilt.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)

Effect of foliar application of herbicides in cumin on *Trichoderma* applied in soil

Farmers of South Saurashtra Agro-climatic Zone are advised that the application of herbicides oxadiargyl 6 EC, 0.075 kg a.i./ha, 25 ml/10 litre at 7 days after sowing in cumin do not reduce the soil population of *Trichoderma harzianum*.

(*Department of Plant Pathology, CoA, JAU, Junagadh*)