Recommendations for Farmers

Year: 2015-16

1. Integrated weed management in summer sweet corn

The farmers of South Saurashtra Agro-climatic Zone growing sweet corn in summer season are recommended to apply atrazine 500 g/ha (50% WP 20 g/10 L) as pre-emergence followed by one interculturing and hand weeding at 40 DAS for effective weed management along with higher yield and net realization.

2. Development of organic farming packages for system based high value crops (Groundnut-Onion)

The farmers of South Saurashtra Agro-climatic Zone adopting groundnut (*kharif*)-onion (*rabi*) cropping sequence are recommended to apply 50% RDF (6.25-25 N-P_2O_5 kg/ha) for groundnut and 37.5-60-50 N-P_2O5-K_2O kg/ha for onion + 50% RDN as FYM to groundnut (1250 kg/ha) and onion (7500 kg/ha) for securing higher groundnut equivalent yield and net realization along with maintenance of soil fertility.

Farmers interested in adopting Groundnut (*kharif*) – Onion (*rabi*) cropping sequence under organic farming are recommended to follow nutrient management system as 50% RDN as FYM (1250 and 7500 kg FYM/ha for groundnut (*kharif*) and onion (*rabi*), respectively) + biofertilizer (*Rhizobium* / *Azotobacter* @ 1250 ml/ha) for N + rock phosphate to meet P requirement of crops (100 kg/ha in groundnut and 600 kg/ha in onion) + PSB (1250 ml/ha) for higher groundnut equivalent yield and net income along with maintenance of soil fertility.

3. Effect of sowing time and spacing on summer clusterbean

The farmers of South Saurashtra Agro-climatic Zone growing summer cluster bean are recommended to sow the crop in second week of February at 45 cm x 15 cm spacing for obtaining higher yield and net realization.

4. Evaluation of potentiality of organic farming for groundnut (*kharif*)-chickpea (*rabi*) cropping sequence

The farmers of South Saurashtra Agro-climatic Zone adopting groundnut (*kharif*)-chickpea (*rabi*) cropping sequence under organic farming are recommended to apply FYM (1.25 t/ha) + castor cake (139 kg/ha) to groundnut and vermicompost (667 kg/ha) + castor cake (222 kg/ha) to chickpea in furrow before sowing for securing higher net realization and maintaining soil fertility.

Year: 2016-17

1. Response of cumin to drip irrigation and integrated nutrient management

The farmers of South Saurashtra Agro-climatic Zone growing cumin are advised to irrigate the crop with drip system at 0.6 PEF for getting higher yield and net return which saves 12.4% water. Farmers are also advised to apply 75% recommended dose of fertilizer (22.5-11.2-0 kg NPK/ha) along with FYM @ 5 t/ha for getting higher yield and net return. The system details are as under:

System details	**Operating time**	
	Month	**Minutes**
Lateral spacing: 60 cm	Dec. - Jan.	20
Dripper spacing: 45 cm	Feb.- March	30
Dripper discharge rate: 4 LPH		
Operating pressure: 1.2 kg/cm^2		
Operating frequency: Alternate day		

2. Drip irrigation and fertilizer in drilled *rabi* fennel

The farmers of South Saurashtra Agro-climatic Zone growing *rabi* drilled fennel are advised to irrigate the crop with drip system at 0.8 PEF and apply 120-45-0 NPK kg/ha out of which full dose of phosphorus and 25% nitrogen as basal and remaining 75% nitrogen in three equal splits at 20 DAS interval after sowing through drip for getting higher yield and net return. The system details are as under:

System details	Operating time	
	Month	Minutes
Lateral spacing: 120 cm (45-75-45 cm paired row)	December	58
Dripper spacing: 45 cm	January	62
Dripper discharge rate: 4 LPH	February	75
Operating pressure: 1.2 kg/cm^2	March	95
Operating frequency: Alternate day	April	120

3. Integrated weed management in organically grown groundnut

The farmers of South Saurashtra Agro-climatic Zone growing *kharif* groundnut under organic farming are advised to adopt stale seedbed technique (pre-sowing irrigation + killing of weed flush by harrowing) and kept weed free condition throughout the crop growth period or carry out hand weeding and interculturing at 15, 30 and 45 days after sowing for effective control of weeds and securing higher net realization.

Year: 2017-18

1. 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.

2. 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 combined 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.

3. 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.

4. 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.

Kharif	***Rabi***	**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
OR		
Cluster bean (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

5. 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.

Year: 2018-19

1. Integrted weed management in Indianbean

The farmers of south Saurashtra Agro-climatic zone growing Indianbean in *rabi* season are advised to do hand weeding at 15, 30 and 45 DAS for effective weed management and achieving higher seed yield and net realization

2. Post-emergence weed management in wheat

The farmers of South Saurashtra Agro-climatic Zone growing wheat are recommended to carry out hand weeding at 15 DAS *fb* either ready-mix sulfosulfuron + metsulfuron 32 g/ha (75 + 5% WDG 0.8 g/10 L water) or readymix clodinafop + metsulfuron 64 g/ha (15 + 1% WP 8 g/10 L water) at 30 DAS or hand weeding at 15 and 30 DAS as per availability of labourers for effective weed management along with higher yield and net returns.

3. Herbicidal control of purple nutsedge

The farmers of South Saurashtra Agro-climatic Zone are recommended to spray either tank-mix glyphosate 1230 g/ha (41% SL 60 ml/10 L water) + halosulfuron-methyl 33.75 g/ha (75% WG 0.9 g/10 L water) or halosulfuronmethyl 67.5 g/ha (75% WG 1.8 g/10 L water) at 30 days after emergence for effective control of purple nutsedge under non-cropped condition during summer season. These herbicides have no residual effect on the succeeding *kharif* crops (groundnut, pearlmillet, cotton and sesame) grown 90 days after spray.

4. Evaluation of groundnut + sweet corn mix/inter cropping systems

The farmers of South Saurashtra Agro-climatic Zone growing *kharif* groundnut are recommended to adopt paired row (45-75-45 cm) groundnut + sweet corn (2:1) or groundnut + sweet corn (3:1) additive intercropping system for achieving higher net returns as compared to sole groundnut.

5. Response of Bt cotton to high density planting and nitrogen levels through fertigation

The farmers of South Saurashtra Agro-climatic Zone growing Bt cotton (Cv. G.Cot.Hy.-8 BG-II) under high density planting are advised to sow the crop at 30-60-30 cm x 30 cm in paired row and fertilized with 125% RDN (300 kg N/ha) in eight equal splits at 15 days interval through drip fertigation for getting higher yield and net return.

Details of drip system

Particular		Detail	Duration of irrigation
Later spacing (cm)	:	90 cm	Oct.: 1 hour 30 minutes
Dripper distance (cm)	:	40	Nov.: 1 hour 20 minutes
Dripper discharge rate (L/hr)	:	4	Dec.: 1 hour 15 minutes
Operation pressure (kg/cm^2)	:	1.2	
Irrigation interval	:	Alternate day	

Year: 2019-20

1. Evaluation of some cow-based bio-enhancers and botanicals for organic cultivation of summer groundnut

The farmers of South Saurashtra Agro-climatic Zone growing summer groundnut under organic farming are advised to apply FYM @ 5 t/ha for achieving higher yield and net realization. The farmers interested in cow-based farming are recommended to spray Panchagavya @ 3% at 30, 45 and 60 DAS.

2. Response of *rabi* onion to levels and application schedule of soluble fertilizers under drip irrigation

The farmers of South Saurashtra Agro-climatic Zone growing rabi onion (Cv. Pilipatti) are advised to apply 75% RDF (i.e. 56.25-45.00-37.50 kg N-P_2O_5-K_2O/ha) in water soluble form through drip fertigation in six equal splits at 10 days interval for getting higher net return

3. Integrated weed management in soybean

The farmers of south Saurashtra Agro-climatic zone growing soybean are advised to apply pre-mix pendimethalin + imazethapyr 800 g/ha (30 + 2% EC 50 ml/10 L water) as pre-emergence *fb* IC & HW at 40 DAS or IC & HW at 20 & 40 DAS for effective weed management and achieving higher seed yield and net realization.

4. Evaluation of some cow-based bio-enhancers and botanicals for organic cultivation of summer groundnut

The farmers of south Saurashtra Agro-climatic zone growing summer groundnut under organic farming are advised to apply FYM @ 5 t/ha for achieving higher yield and net realization. The farmers interested in cow-based farming are recommended to spray Panchagavya @ 3% at 30, 45 and 60 DAS.

5. Response of rabi onion (Allium cepa L.) to levels and application schedule of soluble fertilizers under drip irrigation

The farmers of South Saurashtra Agro-climatic zone growing rabi onion (Cv. Pilipatti) are advised to apply 75% RDF (i.e. 56.25-45.00-37.50 kg N-P2O5-K2O/ha) in water soluble form through drip fertigation in six equal splits at 10 days interval for getting higher net return.

6. Integrated weed management in soybean

The farmers of south Saurashtra Agro-climatic zone growing soybean are advised to apply pre-mix pendimethalin + imazethapyr 800 g/ha (30 + 2% EC 50 ml/10 L water) as pre-emergence fb IC & HW at 40 DAS or IC & HW at 20 & 40 DAS for effective weed management and achieving higher seed yield and net realization.

Year: 2020-21

1. Evaluation of various green manure crops under different time of sowing

The farmers of South Saurashtra Agro-climatic Zone interested in green manuring are advised to sow sunnhemp or dhaincha during June-July and incorporate in soil at initiation of flowering for adding higher quantity of green biomass, N, P and K in soil.

2. Weed management in coriander

The farmers of Saurashtra region growing coriander are advised to keep weed free condition up to 45 DAS by hand weeding as and when required for effective weed management and to obtain higher seed yield and net realization.

3. Weed management in chickpea

The farmers of Saurashtra region growing irrigated chickpea are advised to keep weed free condition up to 45 DAS by interculturing and hand weeding as and when required for effective weed management and to obtain higher seed yield and net realization.

4. Weed management in summer guar

The farmers of Saurashtra region growing summer guar are advised to keep weed free condition up to 45 DAS by interculturing and hand weeding as and when required for effective weed management and to obtain higher seed yield and net realization.

5. Integrated nutrient management in soybean

The farmers of South Saurashtra Agro-climatic Zone growing kharif soybean are advised to apply either Biocompost 2 t/ha + FYM 2.5 t/ha + Rhizobium 2 L/ha + PSB 2 L/ha or Biocompost 4 t/ha or FYM 5 t/ha as soil application to obtain higher yield and net realization along with maintenance of soil fertility.

6. Weed management in green gram

The farmers of South Saurashtra Agro-climatic Zone growing kharif green gram are advised to do interculturing and hand weeding at 20 and 40 days after sowing for effective weed management and to obtain higher seed yield and net realization.

7. Weed management in black gram

The farmers of South Saurashtra Agro-climatic Zone growing kharif black gram are advised to do interculturing and hand weeding at 20 and 40 days after sowing for effective weed management and to obtain higher seed yield and net realization.

8. Effect of tillage and post-emergence herbicides on growth and yield of soybean

The farmers of South Saurashtra Agro-climatic Zone growing kharif soybean are advised to prepare the field by rotavator and apply pendimethalin 0.9 kg/ha (30% EC @ 60 ml/10 L water) as pre-emergence fb pre-mix sodium acifluorfen + clodinafop propargyl 245 g/ha (16.5% + 8% EC @ 20 ml/10 L water) as post-emergence at 30 DAS for effective weed management and to obtain higher seed yield and net realization.

Year: 2021-22

1. Development and evaluation of microbial consortia enriched vermicompost formulation in wheat

The farmers of South Saurashtra Agro-climatic Zone growing wheat organically are recommended to apply FYM 5 t/ha along with vermicompost 2 t/ha enriched with *Azotobacter* (2 L), PSB (2 L), KSB (2 L), *Trichoderma harzianum* (3 kg), *Pseudomonas fluorescens* (3 L) and *Beauveria bassiana* (3 kg) to obtain higher yield and net return as well as to improve soil health. For enrichment of vermicompost, *Azotobacter* (2 L), PSB (2 L), KSB (2 L), *Trichoderma harzianum* (3 kg), *Pseudomonas fluorescens* (3 L) and *Beauveria bassiana* (3 kg) should be mixed with vermicompost 2 tonne with little water sprinkled (Moisture content 20%) and apply 10 days after incubation in the field.

2. Evaluation of microbial consortia enriched vermicompost in kharif groundnut

The farmers of South Saurashtra Agro-climatic zone growing *kharif* groundnut organically are recommended to apply FYM 5 t/ha along with vermicompost 2 t/ha enriched with *Rhizobium* (2 L), PSB (2 L), KSB (2 L), *Trichoderma harzianum* (3 kg), *Pseudomonas fluorescens* (3 L) and *Beauveria bassiana* (3 kg) to obtain higher yield and net return as well as to improve soil health. For enrichment of vermicompost, *Rhizobium* (2 L), PSB (2 L), KSB (2 L), *Trichoderma harzianum* (3 kg), *Pseudomonas fluorescens* (3 L) and *Beauveria bassiana* (3 kg) should be mixed with vermicompost 2 tonne with little water sprinkled (Moisture content 20%) and apply 10 days after incubation in the field.

3. Response of Rabi castor based intercropping systems to drip irrigation

The farmers of South Saurashtra Agro-climatic Zone growing *rabi* castor based intercropping system are recommended to irrigate the castor and intercrops through drip irrigation at 0.8 PEF to obtain higher castor seed equivalent yield and net realization along with higher WUE. Farmers are also recommended to sow gram as an intercrop with *rabi* castor sown at 180 cm spacing in 1:3 row proportion to obtain higher castor seed equivalent yield and net realization.

System details

Details	Operating Time	
	Month	**Minutes**
Lateral spacing: 60 cm	November	270
Dripper spacing: 40 cm	December	
Dripper discharge rate: 4 lph	January	216
Operating pressure: 1.2 kg/cm^2	February	
Operating frequency: Alternate day	March	300

4. Evaluation of land configuration and intercropping system in Bt. Cotton

The farmers of South Saurashtra Agro-climatic Zone adopting Bt. Cotton based intercropping system are recommended to sow cotton under broad bed and furrow system (Broad bed 210 cm wide, furrow 30 cm wide & 20 cm deep) to obtain higher seed cotton equivalent yield and net return along with soil moisture conservation. The farmers are also recommended to sow cotton + green gram or black gram in 1:2 row proportion for getting higher seed cotton equivalent yield and net realization.

Year: 2022-23

1. Effect of NPK levels on growth, yield and nutrient uptake by isabgol

The farmers of South Saurashtra Agro-climatic Zone growing isabgol are recommended to apply 30 kg nitrogen, 30 kg phosphorus and 30 kg potash/ha along with FYM 5 t/ha at the time of sowing and remaining 30 kg N at as top dressing at 45 DAS for getting higher seed yield and net realization.

2. Weed Management in *Kharif* Maize

The farmers of south Saurashtra Agro-climatic zone growing kharif maize are recommended to apply atrazine 500 g/ha (50% WP 20 ml/10 L water) as pre-emergence fb Topramezone 25 g/ha (33.6% SC 1.488 g/10 L water) as post-emergence at 30 DAS **OR**

Atrazine 500 g/ha (50% WP 20 ml/10 L water) as pre-emergence fb Tank-mix halosulfuron 30 g/ha (75% WG 0.8 g/10 L water) + Topramezone 12.5 g/ha (33.6% SC 0.744 g/10 L water) as post-emergence at 30 DAS (T7) **OR**

HW at 15 and 30 DAS for effective weed management and achieving higher grain yield and net realization.

For effective management of purple nutsedge, farmers of south Saurashtra Agro-climatic zone growing *kharif* maize are recommended to apply atrazine 500 g/ha (50% WP 20 ml/10 L water) as pre-emergence fb halosulfuron-methyl 60 g/ha (75% WG 1.6 g/10 L water) as post-emergence at 30 DAS OR Atrazine 500 g/ha (50% WP 20 ml/10 L water) as pre-emergence fb Tank-mix halosulfuron 30 g/ha (75% WG 0.8 g/10 L water) + Topramezone 12.5 g/ha (33.6% SC 0.744 g/10 L water) as post-emergence at 30 DAS OR HW at 15 and 30 DAS.

Year: 2023-24

1. Evaluation of some cow-based bio-enhancers and botanicals for organic cultivation of rabi onion

The farmers of South Saurashtra Agro-climatic Zone growing rabi onion under organic farming are recommended to apply FYM 10 t/ha to obtain higher yield and net realization.

The farmers who are interested in cow-based farming are recommended to apply FYM 5 t/ha alongwith Panchagavya 3 % spray at 30, 45 and 60 DAS OR FYM 5 t/ha alongwith Jivamrut 500 l/ha with irrigation at sowing, 30 and 45 DAS.

Year: 2024-25

1. Real time nitrogen fertilization using leaf colour chart in wheat

The farmers of South Saurashtra Agro-climatic Zone growing wheat are recommended to apply either 60 kg N/ha as basal + 30 kg N/ha when LCC ≤ 3 + 30 kg N/ha when LCC ≤ 3 or 40 kg N/ha as basal + 40 kg N/ha when LCC ≤ 3 + 40 kg N/ha when LCC ≤ 3 besides FYM 5 t/ha for securing higher yield and net realization. Take LCC observation at weekly interval for LCC value.

2. Effect of drip irrigation schedules and plastic mulch on yield of *Rabi* sweet corn

The farmers of South Saurashtra Agro-climatic Zone growing *Rabi* sweetcorn sown at 40-80-40 cm x 20 cm in paired row planting are recommended to irrigate the crop with surface irrigation at 1.0 IW/CPE with wheat straw mulch (5 t/ha) (15-20 DAS) for securing higher yield and net realization.

3. Effect of levels and schedules of nitrogen fertigation on growth and yield of summer sesame

The farmers of South Saurashtra Agro-climatic zone growing summer sesame are recommended to apply basal dose of fertilizer (10-25-0 kg N-P_2O_5-K_2O/ha) at time of sowing and then N fertigation with 50 kg/ha in water soluble form through drip fertigation (one week after sowing) in six equal splits at 10 days interval for getting higher yield and net returns.

Particulars	**Details**	**Particulars**	**Details**
Lateral Spacing	90 cm	Opereting pressure	1.2 kg/cm^2
Dripper Spacing	60 cm	Opereting frequency	Alternate day
Dripper discharge rate	4 lit./hr.	Irrigation schedule	1.0 PPF

4. Effect of NPKS levels on growth, yield and nutrient uptake by *Kharif* soybean

The farmers of South Saurashtra Agro-climatic Zone growing *Kharif* soybean are recommended to apply 30 kg nitrogen, 60 kg phosphorus and 30 kg sulphur at the time of sowing besides FYM 5 t/ha for getting higher seed yield and net realization.

5. Bio-efficacy evaluation of pre-mix herbicides in summer soybean

The farmers of south Saurashtra Agro-climatic zone growing summer soybean are recommended to apply pendimethalin 30% EC (60 ml/10 L water) 900 g/ha as pre-emergence fb pre-mix propaquizafop 2.5% + imazethapyr 3.75% ME (40 ml/10 L water) 50+75 g/ha as post-emergence at 30 DAS OR pre-mix pendimethalin 30%+ imazethapyr 2% EC (50 ml/10 L water) 750+50 g/ha as pre-emergence fb pre-mix fluazifop-p-butyl 11.1%+ fomesafen 11.1% SL (20.3 ml/10 L water) 125+125 g/ha as post-emergence at 30 DAS OR pre-mix pendimethalin 30%+ imazethapyr 2% EC (50 ml/10 L water) 750+50 g/ha as pre-emergence fb IC & HW at 30 DAS OR pendimethalin 30% EC (60 ml/10 L water) 900 g/ha as pre-emergence fb pre-mix imazamox 35% + imazethapyr 35% WG (2 g/10 L water) 35+35 g/ha as post-emergence at 30 DAS for effective weed management and achieving higher seed yield and net realization.

6. Dynamics of soil weed seedbank in Kharif groundnut

The farmers of south Saurashtra Agro-climatic zone growing Kharif groundnut are recommended to use following practices for effective management of wheat residue, weeds, better management and reduction of soil weed seedbank along with profitable cultivation of groundnut and for sustaining of soil health;

Wheat residue incorporation fb reduced tillage (Rotavator) and application of waste decomposer 75 ml/ha with pre-sowing irrigation and Trichoderma viride 5 kg/ha + 20 kg N/ha and suicidal germination (Application of Ethylene 2 L/ha + KNO3 2 kg/ha with pre-sowing irrigation fb Killing the weed flush by subsequent light harrowing) along with Inter-culturing and hand weeding at 15, 30 & 45 DAS according to availability of labourers.

7. Bio-efficacy evaluation of different herbicides in Bt cotton

The farmers of south Saurashtra Agro-climatic zone growing Bt. cotton are recommended to do IC & HW at 20, 40 and 60 DAS OR apply tank-mix pendimethalin 30% + pyrithiobac sodium 10% EC (30 + 7.5 ml/10 of water) 450 +37.5 g/ha as pre-emergence fb pre-mix pyrithiobac sodium 6% + quizalofop-ethyl 4% EC (25 ml/10 of water) 75+50 g/ha as post-emergence at 30 DAS fb IC & HW at 60 DAS OR tank-mix pendimethalin 30% + pyrithiobac sodium 10% EC (30+7.5 ml/10 of water) 450 + 37.5 g/ha as pre-emergence fb IC & HW at 30 & 60 DAS OR pendimethalin 30% EC (60 ml/10 of water) 900 g/ha as pre-emergence fb IC & HW at 30 & 60 DAS as per availability of labours for effective weed management and achieving higher seed cotton yield and net realization**.**

8. Response of castor to subsoiling and furrow irrigation

The farmers of South Saurashtra Agro-climatic zone are recommended to sow the castor in in-row subsoiling (by subsoiler at 45 cm depth) prepared before sowing and irrigate the crop through furrow irrigation at 15 days interval (0.8 IW/CPE ratio) after cessation of monsoon for getting higher yield and net realization.

Information for Scientific Community

Year: 2015-16

1. Weed management in pre-monsoon groundnut

The effective weed management along with higher yield and net return from pre-monsoon groundnut can be achieved by pre-plant incorporation of pendimethalin 38.7% CS @ 0.75 kg a.i./ha followed by interculturing and hand weeding at 40 DAS under South Saurashtra Agro-climatic Zone.

Year: 2017-18

1. Integrated weed management in okra

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

2. Weed management in *kharif* groundnut

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

3. Integrated weed management in *rabi* fennel

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

Year: 2018-19

1. Integrated weed management in Indianbean

Under South Saurashtra Agro-climatic Zone, effective weed management along with higher yield and net returns from rabi Indianbean can be achieved by pre-emergence application of either pendimethalin 30% EC 900 g a.i./ha as pre-emergence or pendimethalin 37.8% CS 900 g a.i./ha as pre-plant incorporation followed by interculturing and hand weeding at 45 DAS.

Year: 2020-21

1. Weed management in coriander

Under Saurashtra region, effective weed management along with higher seed yield of coriander can be achieved by application of tank-mix pendimethalin 450 g/ha + oxadiargyl 30 g/ha as pre-emergence fb HW at 30 DAS or paraquat 500 g/ha as early post-emergence at 7 DAS fb HW at 30 DAS or pendimethalin 750 g/ha as pre-emergence fb HW at 30 DAS.

2. Weed management in chickpea

Under Saurashtra region, effective weed management along with higher seed yield of chickpea and net return can be achieved by application of pendimethalin 750 g/ha as pre-emergence fb IC & HW at 30 DAS or pre-mix pendimethalin + imazethapyr 750 g/ha as pre-emergence fb IC & HW at 30 DAS.

3. Weed management in summer guar

Under Saurashtra region, effective weed management along with higher seed yield of guar and net return can be achieved by application of tank-mix pendimethalin 450 g/ha + oxadiargyl 30 g/ha as pre-emergence fb IC & HW at 30 DAS or pre-mix pendimethalin + imazethapyr 750 g/ha as pre-emergence fb IC & HW at 30 DAS.

4. Weed management in green gram

Under South Saurashtra Agro-climatic Zone, effective weed management along with higher seed yield of kharif green gram and net return can be achieved by application of pre-mix pendimethalin + imazethapyr 750 g/ha as pre-emergence fb IC & HW at 40 DAS or pendimethalin 900 g/ha as pre-emergence fb IC & HW at 40 DAS.

5. Weed management in black gram

Under South Saurashtra Agro-climatic Zone, effective weed management along with higher seed yield of kharif black gram and net return can be achieved by application of pre-mix pendimethalin + imazethapyr 750 g/ha as pre-emergence fb IC & HW at 40 DAS.

Year: 2023-24

1. Calibration and validation of CERES model (DSSAT 4.6) for different cultivars of wheat under different sowing time

CERES-Wheat model of DSSAT family was calibrated and validated for GW 499, GW 451 and GJW 463 cultivars of wheat. The model simulations of grain yield of wheat were validated with less

than 10 percent error. The genetic coefficients are recommended for use in optimization for crop management and yield prediction of wheat crop as under

Symbol	Description	GW 499	GW 451	GJW 463
PHINT	Phyllochron interval (^{0}days)	73.4	71.2	72.8
P1V	Vernalization coefficient	0.5	0.4	0.5
P1D	Photoperiodism coefficient	1.80	1.90	2.00
P5	Grain filling duration coefficient	3.25	3.15	3.10
G1	Kernel number coefficient	5.55	5.60	5.50
G2	Kernel weight coefficient	4.20	4.35	4.25
G3	Spike number coefficient	5.25	5.35	5.30

DSSAT model can be used for predicting wheat grain yield and 73tat re73ical events under various agro-climatic conditions. The model may also be used to improve and evaluate the current practices of wheat growth management to increase the crop production.

2. Calibration and validation of CERES model (DSSAT 4.6) for different cultivars of wheat under different sowing time

It is informed to the scientific community that wheat crop under South Saurasthra Agro-climatic condition can be sown around 15th November (Minimum temperature 15 to 17 0C and Maximum temperature 32 to 34 0C) and prefer varieties GW 499, GW 451 and GJW 463 for getting higher yield and net return.

3. Dynamics of weed flora in major rabi crops

It is informed to scientific community that information on weed dynamics in wheat, chickpea and coriander during *Rabi* season is as below:

- Total sixteen existing weed species of eleven different families were identified and observed during *Rabi* season. From total sixteen species of weeds, the families constituted as Amaranthaceae (02), Asteraceae (03), Chenopodiaceae (01), Cyperaceae (01), Euphorbiaceae (01), Leguminosae (01), Liliaceae (01), Poaceae (03), Portulacaceae (01), Solanaceae (01) and Tiliaceae (01).
- Total weeds in floristic composition were *Cyperus rotundus*, *Asphodelus tenuifolius*, *Echinochloa colona*, *Eluropus villosus*, *Dactyloctenium aegyptium*, *Digera arvensis*, Eclipta *alba*, *Euphorbia hirta*, *Parthenium hysterophorus*, *Indigofera glandulosa*, *Portulaca oleracea*, *Corchorus olitorious*, *Tridax procumbens*, *Physalis minima*, *Amaranthus spinosus* and *Chenopodium album*.
- Highest weeds were observed of families; *Asteraceae* ≥ *Poaceae* > *Amaranthaceae*.
- *Cyperus rotundus*, *Asphodelus tenuifolius*, *Chenopodium album*, *Echinocloa colona*, *Physalis minima*, *Digera arvensis*, *Eluropus vilosus*, *Indigofera glandulosa*, *Eclipta alba* and *Euphorbia hirta* were found to be the most common weed species in *Rabi* season.
- The most dominant succession of *Cyperus rotundus*, *Asphodelus tenuifolius* and *Echinochloa colona* and *Digera arvensis* were noted throughout season.
- *Echinochloa colona* with wheat, *Asphodelus tenuifolius*, *Indigofera glandulosa* and *Physalis minima* with chickpea and coriander; *Cyperus rotundus* with all crops throughout *Rabi* season were associated than other weed species.
- Dry weight of weeds increased over time. The lowest weed dry weight was registered in wheat, followed by coriander and the highest weed dry weight at all the stages was recorded in chickpea.
- Among the crops, monocots > dicots > sedges in wheat, monocots > sedges > dicots were observed in chickpea and coriander. Among weed management practices, monocots > dicots > sedges in unweeded, monocots in weed free, monocots > sedges in HW and monocots > sedges > dicots order in herbicidal treatment was observed.
- The weed late to emerge was observed *i.e.*, *Eluropus villosus* up to 15 DAS.
- Uprooting of weeds at 15 days interval decreased periodical weed dry weight, followed by two hand weeding and application of pre- & post-emergence herbicides. Whereas, the undisturbed weedy condition progressively increased weed dry weight.

- Number of weeds decreased with time. The weed count at all the stages was more or less same in wheat, chickpea and coriander.
- Removal of existing weeds put forth the emergence of new weeds. HW at 15 & 30 DAS and application of pre- & post-emergence herbicides were almost equally effective in suppressing weed count. Whereas, undisturbed condition reduced weed count over time, but had the highest weed count at all the stages as compared to weed control methods.
- The most densely weeds *viz*., *Asphodelus tenuifolius, Echinochloa colona* and *Cyperus rotundus* and least densely were *Tridax procumbens, Chenopodium album* and *Corchorus olitorious*. Removal of weeds at 15 days interval increased yields of wheat, chickpea and coriander. Manual weeding and herbicidal weed control were found equally effective in increasing crop yield.
- Weed species vary according to crop and weed management practices.

4. Dynamics of weed flora in major *kharif* crops

The scientific community is informed that information on weed dynamics in groundnut, soybean and pearl millet during *Kharif* season is as below:

- From total nineteen weeds species, families constituted as Aizoaceae, Amaranthaceae, Asteraceae, Commelinaceae, Cyperaceae, Euphorbiaceae, Fabaceae, Lamiaceae, Lythraceae, Poaceae, Portulacaceae, Solanaceae and Tiliaceae. Highest weeds observed of families; Poaceae > Asteraceae > Euphorbiaceae.
- Total weeds in floristic composition were *Cyperus rotundus, Echinochloa colona, Eluropus villosus, Dactyloctenium aegyptium, Digitaria sanguinalis; Digera arvensis, Eclipta alba, Euphorbia hirta, Indigofera glandulosa, Tridax procumbens, Leucas aspera, Phyllanthus niruri, Corchorus olitorious, Commelina benghalensis, Portulaca oleracea, Ammannia baccifera, Parthenium hysterophorus, Physalis minima and Trianthema portulacastrum.*
- The most dominant succession of *Cyperus rotundus, Echinochloa colona, Commelina benghalensis, Leucas aspera* and *Digera arvensis* were noted throughout season.
- *Echinochloa colona* and *Eluropus villosus* with pearl millet, *Indigofera glandulosa* with groundnut and soybean; *Cyperus rotundus* throughout the *Kharif* season were associated.
- Among the crops, monocots > dicots > sedges in pearl millet, dicots > sedges > monocots were observed in soybean and groundnut. Among weed management practices, dicots > monocots > sedges in unweeded, monocots in weed free and HW and monocots > sedges > dicots order in herbicidal treatment was observed.
- The herbicidal treatments have lowest monocot weeds up to 30 DAS.
- Dry weight of weeds increased over time. Uprooting of weeds at 15 days interval decreased periodical weed dry weight, followed by hand weeding and herbicidal treatments. Whereas, the undisturbed weedy condition progressively increased weed dry weight.
- Number of weeds decreased with time. Weed species vary according periodical stages, crops and weed management practices.
- The most densely weeds *viz*., *Echinochloa colona and Cyperus rotundus* and least densely were *Tridax procumbens, Parthenium hysterophorus* and *Trianthema portulacastrum.*
- The weeds late to emerge were *Digitaria sanguinalis* up to 15 DAS, *Eluropus villosus* up to 30 DAS and *Ammannia baccifera* up to 45 DAS.
- Removal of existing weeds put forth the emergence of new weeds specially weed *i.e*., *Ammannia baccifera* and *Cyperus rotundus*.
- *Ammannia baccifera* found dominating around 45 DAS in weed free condition when the rainfall amount was more.
- The *Phyllanthus niruri* dominant only in earlier season, hence it has completed life cycle within 30-45 DAS.

Year: 2023-24

1. Dynamics and depletion of soil weed seedbank in wheat

It is informed to scientific community that for effective weed management along with weed seedbank depletion and achieving higher grain yield of wheat, apply ethylene 2 L/ha + KNO_3 2 kg/ha with pre-sowing irrigation as suicidal germination *fb* killing the weed flush by subsequent harrowing *fb* HW at 30 DAS. Further, the seed physical extraction method is more precise over the seed emergence method for proper estimation of soil weed seedbank.