

## Approved Package of Practices for Cotton: Rajasthan State

### Recommended Varieties/ Hybrids of Cotton

| <b>American Cotton</b> |  |
|------------------------|--|
| <b>Varieties</b>       | <ul style="list-style-type: none"> <li>• RS 2013</li> <li>• RS 810</li> <li>• RST 9</li> <li>• RS 875</li> <li>• Ganganagar Ageti</li> <li>• Bikaneri Narma</li> </ul> |
| <b>Hybrids</b>         | <ul style="list-style-type: none"> <li>• Maru Vikas</li> <li>• LHH 144</li> </ul>  |
| <b>Desi Cotton</b>     |  |
| <b>Varieties</b>       | <ul style="list-style-type: none"> <li>• RG 8</li> <li>• RG 18</li> </ul>  |
| <b>Hybrids</b>         | <ul style="list-style-type: none"> <li>• RAJDH 9</li> </ul>  |

### PRODUCTION TECHNOLOGIES

| <b>Package</b>                     | <i>Desi cotton</i>  | <b>American cotton</b>  |
|------------------------------------|---|---|
| <b>Land &amp; land preparation</b> | <ul style="list-style-type: none"> <li>○ Sandy loam to clay loam</li> <li>○ One deep ploughing followed by 2-3 harrows</li> </ul> | <ul style="list-style-type: none"> <li>○ loam</li> <li>○ One deep ploughing followed by 2-3 harrows</li> </ul>                            |
| <b>Sowing time</b>                 | 1 April to 15 May   | 1 May To 30 May   |
| <b>Seed rate kg/ha</b>             | 12.0  | 16.0 for variety<br>4.0 for hybrid  |
| <b>Sowing method</b>               |   |   |
| Row to row spacing                 | 67.5 cm   | 67.5 cm   |
| Plant to plant spacing             |   |   |
| Varieties                          | 30 cm   | 30cm  |
| Hybrids                            | 60cm  | 60cm  |
| Sowing depth                       | 4-5 cm  | 4-5 cm  |
| <b>Thinning</b>                    | 25-30 DAS to maintain plant to plant distance at 30 cm for varieties and 60 cm for hybrids  | 25-30 DAS to maintain plant to plant distance at 30 cm for varieties and 60 cm for hybrids  |
| <b>Fertilizer</b>                  |   |   |
| FYM                                | 8 tones/ha 20-25 days before sowing   | 8 tones/ha 20-25 days before sowing   |
| Nitrogen kg /ha                    | 90 (50% basal & remaining in the first fortnight of August along with irrigation)   | 80 for varieties & 150 for hybrids (50% basal, 25% at 1 <sup>st</sup> irrigation and remaining at the time of square formation along with |

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| Phosphorus kg/ha<br>Potash kg/ha<br>Zn (On soil test basis) | 20 for varieties & 40 for hybrids (Basal)  | irrigation)<br>40(Basal)<br>20 (basal)<br>12 kg/ha ZnSO <sub>4</sub>   |
| <b>Weeding</b>  |  |  |
| <b>Cultural</b>   | First hoeing after first irrigation & thereafter 2-3 interculturing with <i>Triphali</i> /cultivator depending upon growth | First hoeing after first irrigation & thereafter 2-3 interculturing with <i>Triphali</i> /cultivator depending upon growth |
| <b>Chemical</b>   | Pre-plant or pre emergence application of trifluralin @1.5kg/ha or pendimethalin @1 kg/ha                                  | Pre-plant or pre emergence application of trifluralin @1.5kg/ha or pendimethalin @1 kg/ha                                  |
| <b>Irrigations</b>  | 4 -5 (First at 35-40 DAS and than at the interval of 25-30 days)   | 5 -6 (First at 35-40 DAS and than at the interval of 25-30days)  |

### PROTECTION TECHNOLOGIES

| Disease Control   | American /Desi cotton   |
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| <b>Root rot</b>   | <ul style="list-style-type: none"> <li>○ Summer deep ploughing</li> <li>○ Use proper crop rotation</li> <li>○ Application of ZnSO<sub>4</sub>@24kg/ha helps in combating the root rot disease</li> <li>○ Seed treatment with <i>Tricoderma</i> @ 4g/kg seed or Bavistine 0.2% solution or bio-agent <i>Pseudomonas flurescens</i> @ 10g/ kg seed and chemical Vitavax (carboxin) 200 WP @ 3g/ kg</li> <li>○ Soil drenching with <i>Tricoderma</i>@10kg/ha mixing with 50 200kg moist FYM(in the fields where root rot is sever )</li> </ul> |
| <b>Black arm<br/>(in <i>hirsutum</i> cotton)</b>                  | <ul style="list-style-type: none"> <li>○ Seed soaking in the solution of either Streptocyclin @1g/liter of water or Plantomycin @10g/liter of water for 8-10hrs( not more than 2 hrs in case of delinted seed)</li> <li>○ Spray Streptocyclin 5-10 g or Plantomycin 50-100 g or Copper oxy chloride (0.3%) 300 gm in 100 liters of water</li> </ul>   |
| <b>Cotton leaf curl<br/>Virus<br/>(in <i>hirsutum</i> cotton)</b> | <ul style="list-style-type: none"> <li>○ Use resistant varieties RS 2013, RS 810, all the varieties of desi cotton are free from CLCV disease</li> </ul>  |
| <b>Insect control</b>   | <b>American /Desi cotton</b>  |

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| <p><b>Termites</b></p>   | <p>Soil treatment with 24 kg /ha dust of either</p> <ul style="list-style-type: none"> <li>• Quinalphos 1.5% or</li> <li>• Methyl parathion 2% or</li> <li>• Endosulphan 4%</li> </ul>  |
| <p><b>Jassids</b><br/><b>ETL(2-3 nymph/leaf)</b><br/>Cultural control<br/>Biological control</p> | <ul style="list-style-type: none"> <li>○ Use of resistant varieties RS 2013, RS 810, BN, RST 9</li> <li>○ Use Chrysopa predator @ 40000/ha and repeat it at flowering stage(ETL) if required</li> </ul>   |
| <p>Chemical control</p>  | <ul style="list-style-type: none"> <li>○ Seed treatment with Imidacloprid 70WS @5g/kg or thiomithoxam 70WS @4g/kg delinted seed</li> <li>○ Foliar spray of either <ul style="list-style-type: none"> <li>○ Imidacloprid 200 SL @ 0.2 ml/ l water or</li> <li>○ Monocrotophos 36SL @ 2.0 ml/ l water or</li> <li>○ Acephate 70SP @ 2.0 ml/ l water or</li> <li>○ Dimethioate 30EC @ 2.0 ml/ l water or</li> <li>○ Thiomthoxam 25WG @0.5ml/l water</li> </ul> </li> </ul> |

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| <p><b>White fly</b><br/><b>ETL(6-8 adults/leaf)</b></p> <p>Cultural control</p> <p>Biological control</p> <p>Chemical control</p> | <ul style="list-style-type: none"> <li>○ Early sowing(15 April – 15May) harbored less population</li> <li>○ Use of resistant varieties RS 2013, RS 810, BN,</li> <li>○ Use <i>Crysopa</i> predator @ 40000/ha and repeat it at flowering stage if required</li> <li>○ Seed treatment with Imidacloprid 70WS 5g/kg or thiomithoxam 70WS @4g/kg delinted seed</li> <li>○ Foliar spray of either <ul style="list-style-type: none"> <li>• Neem oil + liquid soap @ (5ml+1ml) l of water or</li> <li>• Trizophos 40EC @ 2.5 ml/ l water or</li> <li>• Imidacloprid 200SL @ 0.3 ml/ l water or</li> <li>• Methyl demeton @ 2.0 ml/ l water or</li> <li>• Acetamiprid 20SP @ 0.4 ml/ l water or</li> <li>• Thiochlorid @ 1.0 ml/ l water or</li> <li>• Thiomithoxam 25WG @ 0.5 ml/ l water</li> </ul> </li> </ul> |
| <p><b>Spotted boll worm</b><br/><b>ETL(1 boll worm/plant)</b></p> <p>Biological control</p> <p>Chemical control</p>               | <ul style="list-style-type: none"> <li>○ Use 5-7 pheromone traps/ha to catch male moths</li> <li>○ Use <i>Crysopa</i> predator @ 50000/ha and repeat it at flowering stage if required</li> <li>○ Use <i>Tricogramma</i> parasitoid @ 160000/ha in the evening time and repeat it 3 times at the interval of 7 days</li> <li>○ Foliar spray of either <ul style="list-style-type: none"> <li>• Monocrotophos 36 SL @ 2.0 ml/ l water or</li> <li>• Fenvalarate 20EC @ 1.0 ml/ l water or</li> <li>• Endosulphan 35 EC @ 2.5 ml/ l water or</li> <li>• Chlorpyriphos 20EC @ 5.0 ml/ l water or</li> <li>• Deltamethrin 2.8 EC @ 1.0 ml/ l water or</li> <li>• Quinalphos 25EC @ 2.0 ml/ l water or</li> <li>• Indoxocarb 14.5SC @ 1.0 ml/ l water</li> </ul> </li> </ul>                                     |
| <p><b>American boll worm</b><br/><b>ETL</b><br/><b>(5% floral damage)</b></p> <p>Biological control</p> <p>Chemical control</p>   | <ul style="list-style-type: none"> <li>• Use 5 pheromone traps/ha to catch male moths</li> <li>• Use <i>Crysopa</i> predator @ 50000/ha and repeat it, if required, at the flowering stage</li> <li>• Use <i>Tricogramma</i> parasitoid @ 160000/ha in the evening time on the appearance of eggs on the crop</li> <li>• Use of NPV @0.75ml(LE)/lit of water</li> </ul> <p>Chemical control</p> <ul style="list-style-type: none"> <li>• Use NPV @ 0.75 ml(LE)/l water</li> </ul>   |

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| Chemical control  | <ul style="list-style-type: none"> <li>• Alphamethrin 10EC @ 0.5 ml/lit of water or</li> <li>• Thaiodicarb 75 SC @ 1.75g/ lit of water</li> <li>• Quinalphos 25 EC @ 0.5 ml/ lit of water or</li> <li>• Endosulphan 35 EC @ 2.5 ml/ lit of water or</li> <li>• Deltamethrin 2.8 EC @ 1.0 ml/ lit of water or</li> <li>• Ethion 50 EC @ 3.0 ml/ lit of water or</li> <li>• Beta syfluthrin2.5 EC @ 0.75 ml/ lit of water or</li> <li>• Chlorpyriphos 20EC @ 5.0 ml/ lit of water or</li> <li>• Alfamethrin 10 EC @ 0.5 ml/ lit of water or</li> <li>• Spinosed 45 EC @ 0.33 ml/ lit of water or</li> <li>• Indoxacarb14.5 SC @ 1.0 ml/ lit of water</li> </ul> |
| <b>Pink boll worm<br/>ETL(1 larva/plant or<br/>10% floral damage)</b> |   |
| Chemical control  | <ul style="list-style-type: none"> <li>○ Use 5 pheromone traps/ha to catch male moths</li> <li>○ Seed fumigation with either Aluminum Phosphide or EDB ampule @ 3g/40 kg seed</li> <li>○ Foliar spray of either <ul style="list-style-type: none"> <li>• Cypermethrin 10EC @ 1.0 ml/ lit of water or</li> <li>• Cypermethrin 25EC @ 0.4 ml/ lit of water or</li> <li>• Carbaryl 50WP @ 4.5g/ lit of water or</li> <li>• Trizophos 40 EC @ 2.5 ml/ lit of water or</li> <li>• Endosulphan 35 EC @ 2.5 ml/ lit of water or</li> <li>• Deltamethrin 2.8 EC @ 1.0 ml/ lit of water or</li> </ul> </li> </ul>  |

### **INTEGRATED PEST MANAGEMENT IN COTTON (IPM) :-**

An IPM Module was developed at Agriculture Research station, Sriganaganagar for this zone. The components of module are

- Deep summer ploughing,
- Use crop rotation
- Use of tolerant varieties,
- Planting of bio-agents conservation crop (maize + cowpea + bajra) two rows around the field at the time of first irrigation,
- Remove weeds in and around the field
- Excess use of nitrogenous fertilizers should be avoided
- Use of chemicals should strictly on the basis of ETL
- Use of pheromone traps
- Hand picking & killing of larvae of *Heliothis* and *Spodoptera*
- First two spray of *nem* based insecticide should be done
- One spray of each Trizophos and Indoxacarb at boll formation stage
- Use of synthetic parathyroid for the control of whitefly and American bollworm should be avoided

## INSECTICIDE RESISTANCE MANAGEMENT:-

Insecticide resistance management is a component of integrated pest management. By following IRM activities, building of resistance in the insects against insecticides can be checked and insecticides can be made effective against insects for longer period. Following recommendations (window system) were included in package and practices.

| S.N. | Days after sowing/Insects        | Strategy   | Rationale  |
|------|----------------------------------|--|--|
| 1.   | Up to 60 days for sucking pests  | Sowing sucking pests resistance varieties<br>Use the Thiomethoxam /Imidacloprid for seed treatment.<br>Spray the Neem insecticide or Endosulfan  | To avoid early sprays.<br><br>To avoid disturbing beneficial insects (predator and parasite).  |
| 2.   | 60-90 days bollworm management   | On the basis of ETL, spray of Endosulfan.<br><br>Use Ha NPV/ NSKE at ETL basis.  | Safe for beneficial and low initial resistance.<br><br>Early broods are young & uniform and can be controlled with biorationals.                     |
| 3.   | 90-110 days bollworm management  | Use the Organophosphates/ Carbamates on ETL basis.<br><br>Use any of the following : (Quinolphos or Chlorpyrifos or Profenophos or Thiodicarb or Spinosad) spray once if ETL is reached    | Natural enemies population declines after 90 DAS.<br>Resistance to Organophosphates/ Carbamates is very low at this stage.                           |
| 4.   | 110-140 days bollworm management | Pyrethroids can be used for spotted & pink bollworms.<br><br>New Chemical: Indoxacarb and Spinosad once at ETL basis.<br><br>Whitefly Management: Use Trizophos or Ethion or Thiomethoxam. | Pyrethroid work best against bollworms.<br><br>Indoxacarb works best on Pyrethroids resistant larvae.<br>Never mix Indoxacarb with Organophosphates. |

## **Characteristics of prominent cultivars**

### **AMERICAN COTTON**

#### **RS 2013:**

The average plant height of this variety is 125-130 cm. Flowers are of yellow in color, and bolls are of medium size. Mean fiber length of this variety is 25 mm and ginning out turn 35 per cent. It matures in 165-170 days and gives 22-24 q seed cotton yield. The variety is resistant to cotton leaf curl virus disease and moderately tolerant to Jassids and American boll worms.

#### **RS 810:**

The average plant height of this variety is 130-140 cm. Flowers are of yellow in color. Bolls are of medium size, mean fiber length of 27mm and ginning out turn 35 per cent.. It matures in 170-180 days and gives 22-24 q seed cotton yield. The variety is resistant to cotton leaf curl virus disease.

#### **RST 9 :**

The average plant height of this variety is 130-140 cm. Foliage color is light green with light yellow flower. Number of monopods per plant varies from 4-6. The average boll weight in this variety is 3.5 g. It matures in 160 -200 days. Loss due to jassids on this variety is comparatively less and it has high ginning per cent. In this variety 1st irrigation can be delayed upto 50 days

#### **RS 875:**

The average plant height of this variety is 100-110 cm. Number of monopods per plant varies from 0-1. Bolls are of medium size (average boll weight 3.5 g). Mean fiber length in this variety is 27mm and oil content 27 per cent, which is higher than the other recommended varieties. It matures in 150-160 days so that normal sown crop of wheat can be taken after cotton.

### **Ganganagar Ageti**

The average plant height of this variety is 120-150 cm. Leaves are of medium size with dark green in color. Flowers are of light yellow color. Number of monopods per plant varies from 2-3. Bolls are of medium size (average boll weight 2.5 g). It matures in 170-180 days so that normal sown crop of wheat can be taken after cotton

### **Bikaneri Narma:**

The average plant height of this variety is 135-165 cm. Foliage color is light green with light yellow flower. Number of monopods per plant varies from 4-6. Bolls are of medium size (Average boll weight 2.0 gms). It matures in 160 -200 days.

**Maru Vikas:**

It is hybrid variety of American cotton. The average plant height of this variety is 135-145 cm. Leaves are of medium size with light green in color and flowers are of light yellow color. Bolls are of medium size (average weight 4.5g), mean fiber length of 27mm and ginning out turn 40 per cent. It matures in 170-180 days.

**DESI COTTON****RG 8 :**

In this variety leaves are narrow and deeply lobed. Flower are of light yellow in color with red spots on the inner side of petals. Boll are oblong in shape. This variety is comparatively early in maturity , average seed cotton yield is 20-25 q/ha and has high ginning percent.

**RG 18:**

It is a medium maturing (160-170 days) variety having sympodial branches. The average plant height of this variety is 130-140 cm. Leaves are violet in color with narrow lobed. Flowers are of pink color with dark red spots. Boll are medium in size (average weight 2.20 g). Ginning out turn in this variety is 38 per cent and average seed cotton yield is 24-26 q/ha This variety is tolerant to root rot disease.

**RAJDH 9:**

RAJDH 9 is genetically male sterility based hybrid of *arboreum* cotton released in the state in 2005. The height of plants is 140-145 cm and leaves are of green color. Flowers are yellow in colour with red spots on petals in side. Bolls are oblong in shape. Average seed cotton yield is 26-27 q/ha and ginning percent 39.0. The hybrid matures in 160-170 days.