

## PACKAGE OF PRACTICES

### **BLACKGRAM**

#### **Selection of varieties:**

##### **Varieties suitable for all seasons:**

LBG-20 (Teja), T-9, LBG-623, WBG-26 (Usha), PBG-1, LBG-752, MBG-207, PU 31  
(These varieties are suitable for all seasons cultivation viz., kharif, rabi, summer I.D. and rice fallows).

##### **Varieties suitable for only rabi under I.D:**

LBG-402, LBG-17, LBG-22, LBG-645 and LBG-685.

##### **Varieties suitable for rabi rice fallows:**

LBG-648, LBG-402, LBG-22, LBG-611.

##### **Varieties suitable for summer rice fallows:**

LBG-20, WBG-26, LBG-623 & PU-31.

##### **Wilt resistant varieties:**

LBG-402, LBG-648, LBG-611, LBG-22, LBG-645 & LBG-685.

##### **Powdery mildew resistant variety: LBG-17.**

##### **YMV resistant/tolerant varieties: PU-31, LBG-20, T-9, LBG 752.**

##### **Corenospora leaf spot & rust resistant: LBG-648.**

#### **Soils and field preparation:**

Blackgram can be grown in moisture retentive, well-drained (Preferably black/alluvial) soil with a P<sup>H</sup> of 6 to 7. Saline/alkali soils are not suitable. Blackgram should not be grown on light soils. Prepare the land well for sowing.

**Seed treatment** : Captan or Thiram or Mancozeb or Carbendazim @ 2.5 g per kg seed; Carbosulfan @ 30g or Imidacloprid 600 FS @ 5 ml or Thiamethoxam 70 WS@ 5g /kg seed to protect the crop from sucking pests and diseases up to 15-20 days after sowing. First treat the seed with fungicide and allow to dry for 30 – 60 min, then treat the seed with insecticide and dry them in shade. Later treat the seed with Rhizobium @ 2 g/kg seed before sowing.

#### **Sowing time:**

##### **Optimum sowing time limits for different seasons:**

Kharif : June 15<sup>th</sup> – July 15<sup>th</sup>.  
Rabi (ID) : 15th October to 15th November  
Rabi rice fallows : 15th November to 15th December  
Summer rice fallows : March.  
Summer (ID) : February – March 15<sup>th</sup>.

Sowing of blackgram soon after the onset of monsoon was found ideal during *kharif* season. The progressive delay in sowing resulted in steady decline in yields. A reduction in yield up to 80% was recorded when sowing was delayed by three weeks from the onset of monsoon mainly due to biotic and abiotic stresses.

**Soils/Areas:** Medium to deep black soils with good moisture retentive capacity. Avoid cultivation of blackgram on light soils and in areas of uncertain rainfall, as it is sensitive to moisture stress.

**Land preparation :** Land should be prepared to fine tilth with 1 or 2 ploughings followed by a harrowing.

**Seed rate & spacing:**

Kharif	–	15-20 kg/ha; 30 x 10 cm.
Rabi (ID)	-	15-20 kg/ha; 30 x 10 cm.
Rabi (Rice Fallows)	-	40-45 kg/ha; Broadcasting (40 Plants /m <sup>2</sup> )
Summer (Rice fallows)	-	40-45 kg/ha; Broadcasting (40 Plants /m <sup>2</sup> )
Summer (ID)	-	18-20 kg/ha; 22.5 x 10 cm.

A 25% higher than the normal population (3.3 lakhs/ha) should be maintained under late sown conditions

**Fertilizer management :**

20:50:0 N:P:K kg/ha. is required for optimum yields. Integrated nutrient management is necessary. Seed treatment with rhizobium culture @ 200g/acre. If the seed is treated with fungicide / insecticide the dose will be 400g/acre. Application of rhizobium can save 20 to 25% of required nitrogen. Along with nitrogen farmers can use phosphorous solubilising bacteria (PSB @ 2 kg /acre) can be applied which can convert the unavailable phosphorous into available form.

**Inter-cultivation and Weed management :**

Spray pendimethalin @ 1-1.5 lt/acre in 200 L of water within 48 hours after sowing (as a pre emergence). Intercultivation with gorru and guntaka at 20 and 40 DAS wherever possible. If it is not possible, application of Imazithapyr @ 200 ml/acre to control post emergence weeds at 25 - 30 DAS. If the broad leaved weeds are dominant. Use quizalofop-ethyl @ 400 ml/acre, if the grassy weeds are dominant

**Water management :**

- Blackgram need life saving irrigation when there is a long dry spell.
- Light irrigations are always beneficial.
- Each irrigation should be followed by hoeing for promoting aeration.
- In rice fallows give 1 or 2 irrigations at 30 and 50 days after sowing for better yields.

**Rice fallows:**

- As there is no field preparation for sowing, the weed growth is severe and highly competes with the crop.
- Varieties like LBG-402, LBG-611, LBG-685 and LBG-645 grow quickly and smother weeds and were found best suited in rice fallows

- Quizalofop ethyl at 50 g ai/ha, Fenoxoprop ethyl at 56.5 g a.i/ha and Clodino fop propargyl at 52 g a.i/ha and Cyhalo fop butyl at 100g a.i./ha were found effective in controlling the dominant weed *Echonochoa colonum* and other annual grasses only. Results indicated that all these chemicals were found to be selective to blackgram when applied at 14-28 days after sowing, though Imazitapyr at 62.5 gm.a.i/ha had caused initial damage to crop yield.

### **Pest management :**

**Stemfly :** Seed treatment as above. Spray Acephate 1.0 g/lit or Monocrotophos 1.6 ml/lit or Dimethoate 2.0 ml/lit twice at weekly intervals from 10 days after sowing

**Flea beetles :** Seed treatment as above. Spray quinalphos 2 ml/lit or acephate 1.0 g/lit or monocrotophos 1.6 ml/lit if the incidence is more severe

**Thrips :** Spray either acephate 1.0 g/lit or fipronil 1.0 ml/lit or dimethoate 2 ml/lit

**Whitefly :** Foliar application of 5 % NSKE at 20 DAS as prophylactic spray against whitefly that transmits YMV.

Spray monocrotophos 1.6 ml/lit or Triazophos 1.5 ml/lit or acetamiprid @ 0.2 g/lit.

**Aphids:** Spray either acephate 1.0 g/lit or monocrotophos 1.6 ml/lit or dimethoate 2 ml/lit

### **Maruca Pod borer :**

- Monitor the occurrence of adult moths at flower bud initiation stage of blackgram/greengram (i.e at 35-40 DAS).
- Application of 5% NSKE or neem oil @ 5 ml/lit should be taken up before flower bud initiation to avoid egg laying by Maruca adults.
- Spray Acephate 1.0 g or chlorpyriphos 2 ml or Thiodicarb 1.5 g at the time of flowering initiation. Add Dichlorovos 1.0 ml/lit to the above chemicals if more number of webbings were observed in the crop.
- In case of severe incidence, spray either novaluron 1.0 ml or spinosad 0.3 g or emamectin benzoate 0.4 g or chloranthraniliprole 0.3 ml or flubendiamide @ 0.2 ml/lit
- First spray should be given one week before flowering initiation as and when the adult population is noticed in the crop.
- Use 500 liters of spray fluid per hectare with hand compression sprayer
- Use 150-170 liters of spray fluid per hectare and increase the insecticide dose three times while using power or Taiwan sprayer,
- Repeat the spray twice at 7 days interval by changing the insecticide depending on the intensity of the pest.
- Do not spray the crop during early morning hours until the dew on leaf surface dries off

### **Tobacco caterpillar:**

Adoption of IPM practices such as

- Erection of Pheromone traps @ 10/hectare
- Growing of castor as trap crop to monitor egg laying and hatching,
- Collection and destruction of skeletonised leaves along with first instar larvae,

- Spraying of SNPV @ 500 LE/ha.
- Spray either chlorpyrifos 2.5 ml/lit or acephate 1g/lit or quinalphos 2 ml/lit against early instars.
- Apply poison bait containing rice bran, jaggery and insecticide (Carbaryl /Chlorpyrifos / Monocrotophos) @ 10:1:1 ratio against grown up caterpillars at the evening hours.

### **Disease management :**

**Collar rot :** Seed treatment as above.

**Anthracnose, Cercospora and Alternaria leaf spots :** Spray twice Carbendazim (0.1%) or Thiophanate methyl (0.1%) or Mancozeb (0.25%) at 15 days interval.

**Corynespora leaf spot :** Spray twice Copper oxychloride (0.3%) or Mancozeb (0.25%) at 10 days interval.

**Powdery mildew :** Spray twice Carbendazim (0.1%) or Thiophanate methyl (0.1%) at 10 days interval soon after the appearance of the disease.

**Rust :** Spray twice Karathane (0.1%) + Mancozeb (0.25%) or Tridemorph (0.1%) twice at weekly intervals at 50-55 DAS.

**Yellow mosaic virus :** Grow YMV resistant varieties such as LBG 752,T9 and Pant U 31 and follow seed treatment with Carbosulfan 30 g or Imidacloprid 5 ml or Thiomethoxam 5g per kg of seed

### **Plant Protection Schedule in rice fallows:**

- |            |   |   |
|------------|---|---|
| 30-35 days | : | First spray with Copper oxychloride @ 3 g or Mancozeb @ 2.5 g/lit to control Corynespora leaf spot.                                 |
| 45-50 days | : | Second spray with Dinocap @ 1 ml + Mancozeb @ 2.5 g/lit to control Powdery mildew and Corynespora leaf spot                         |
| 60-65 days | : | Third spray with Tridemorph @ 1 ml or Dinocap @ 1 ml +Mancozeb @ 2.5g/lit to control rust, Corynespora leaf spot and Powdery mildew |

## **II. CRITICAL INTERVENTIONS**

1. Adoption of line sowing in uplands and maintenance of optimum plant population @ 30-35 plants/sq.m
2. Seed treatment Imidacloprid @ 5 ml/kg or Thiomethoxam @ 5g/kg or Carbosulfon @ 30g/kg seed at the time of sowing
3. Pre emergence application of herbicides for suppression of weeds upto 20-30 days
4. Timely pest and disease management
  - a. Plant protection measures should be taken up at flower bud initiation stage for effective management of Maruca pod borer.

**I. Selection of suitable varieties:****varieties suitable for all seasons viz., kharif, rabi & summer:**

LGG-407, LGG-460, LGG-450, MGG-295, MGG-348, WGG-2, WGG-37, ML-267 & PUSA-105.

**varieties suitable for rabi/rabi rice fallows:**

LGG-410, TM-96-2, LGG-460, MGG-348 and LGG-407.

**varieties suitable for synchronus maturity:**

PDM-54, LGG-407, PUSA-105, WGG-37, LGG-460 & MGG-348.

**varieties tolerant to pre harvest sprouting:**

LGG-450, K-851, PS-16

**varieties tolerant to drought :**

K-851, PDM-54, LGG-407, MGG-348.

**varieties tolerant to YMV :**

LGG-407, ML-267, LGG-460 & WGG-37.

**varieties tolerant to ABLs:**

MGG-295, WGG-2, LGG-407 & LGG-450.

**varieties suitable for preceding paddy:**

LGG-460, LGG-407, ML-267.

**Soils and field preparation:**

Greengram can be grown in moisture retentive, well-drained (Preferably black/alluvial) soil with a P<sup>H</sup> of 6 to 7. Saline/alkali soils are not suitable. Greengram should not be grown on light soils. Prepare the land well for sowing.

**Sowing time:**

Optimum sowing time limits for different seasons:

Kharif	: June 15 <sup>th</sup> – July 15 <sup>th</sup> .
Rabi (ID)	: 15th October to 15th November
Rabi rice fallows	: 15th November to 15th December
Summer rice fallows	: Up to March. 15 <sup>th</sup> .
Summer (ID)	: February – March 15 <sup>th</sup>

**Seed rate & spacing:**

Kharif	–	15-20 kg/ha; 30 x 10 cm.
Rabi (ID)	-	15-20 kg/ha; 30 x 10 cm.
Rabi (Rice Fallows)	-	30-35 kg/ha; Broadcasting (40 Plants /m <sup>2</sup> )
Summer (Rice fallows)	-	30-35 kg/ha; Broadcasting (40 Plants /m <sup>2</sup> )
Summer (ID)	-	15-20 kg/ha; 22.5 x 10 cm.

A 25% higher than the normal population (3.3 lakhs/ha should be maintained under late sown conditions

**Fertilizer management, weed management and plant protection measures are similar to blackgram**

## REDGRAM:

### I. Package of Practices:

**Varieties :** LRG 41, LRG 30, LRG 38, ICP 8863, ICPL 332, ICPL 87119,  
(Medium duration) MRG 66, ICPL 85063, PRG 100, WRG 27, PRG 158, MRG 1004,  
WRG 53.

**Short duration :** ICPL 84031 (Durga), ICPL 85010, CORG 9701

**Wilt resistant varieties:** ICPL 87119, ICP8863.

**SMD resistant varieties:** ICPL 87119, BSMR 736, BSMR 853.

**Soils/areas:** All types of soils with good drainage. Saline soils are not suitable.

**Land preparation :** Land should be prepared to fine tilth by ploughing 2 to 3 times followed by a harrowing.

**Seed rate : Kharif:** Medium duration varieties : 5-10 kg/ha  
Short duration varieties : 15-18 kg/ha depending on type of soils

**Rabi:** 15-20 kg/ha.  
Avoid cultivation of short duration varieties in rabi

### Spacing :

**Kharif:** Medium duration varieties : 150 to 240 x 20 cm (depending on soil type)

Short duration varieties : 90 x 20 cm (black soils) or 60 x 20 cm (light soils)

**Rabi:** 45-90 cm between the rows depending on soil type and rainfall.

**Sowing/planting with cut off dates :** Kharif: June 15<sup>th</sup> – August 15<sup>th</sup> .

Rabi: 20<sup>th</sup> September – 20<sup>th</sup> October.

**Weed control:** Spray Pendimethalin @ 3.25 to 3.75 lt/ha. immediately after sowing

Spray Imazithapyr @ 750 ml/ha after 20-25 days if necessary

**Manures and fertilizers including bio-fertilizers and micronutrients etc. :**

Apply 20 N + 50 P<sub>2</sub>O<sub>5</sub> kg/ha as basal dose. Treat the seed with *Rhizobium* cultures.

**Irrigation:** Flowering and pod formation stages are most critical for moisture stress. Light irrigations at above stages enhance the yield.

### Inter-cultivation and other management practices, if any :

One or two hoeings to keep the crop free from weeds up to 60 DAS or application of Pendimethalin @ 1.5kg/ha as pre-emergence herbicide immediately after sowing will be effective in controlling the weeds..

## **INTERGRATED PEST MANAGEMENT OF *HELICOVERPA* ON REDGRAM**

### **I. CULTURAL**

- ❖ Summer ploughing
- ❖ Avoid mono-cropping
- ❖ Seed treatment with Rhizobium culture
- ❖ Follow crop rotation
- ❖ Adopt wider row spacing (more than 2 meters)
- ❖ Use recommended dose of fertilizers
- ❖ Cultivate tolerant/recouping varieties (LRG 41, ICPL 332, , LRG 38 and LRG 30)
  
- ❖ Grow intercrops  
(Kharif : Sorghum, Soybean, Gingelly, Greengram, Blackgram, Greengram, Dry paddy, Bajra)  
(Rabi) : Coriander, Cowpea, Greengram, Blackgram, Groundnut)
- ❖ Sow rabi redgram under irrigated conditions in September to escape Helicoverpa
- ❖ Cultivate short duration varieties in Telangana to escape Helicoverpa

### **II. MECHANICAL**

- ❖ Monitor with Pheromone traps @ 10/ha
- ❖ Dislodge the larvae by shaking the plants

### **III. BIOLOGICAL**

- ❖ Release of Trichogramma twice at weekly intervals @ 65000/ha
- ❖ Keep bird perches @ 50/ha
- ❖ Spray NPV and B.T. (NPV @ 500 LE/ha or B.T. @ 1 kg/ha)

### **IV. PLANT PRODUCTS**

- ❖ Use Neem oil @ 5 ml/l or Repelin @ 10 ml/l or NSKE @ 50 g/l

### **V. SYNTHETIC PESTICIDES**

- ❖ Follow need based application
- ❖ Avoid cocktail mixtures.
- ❖ Aim the sprayings at early instars
- ❖ Apply chlorpyrifos @ 2.5 ml/l or quinolphos @ 2 ml/l or acephate @ 1 g/l or flubendiamide @ 0.2 ml/l or spinosad @ 0.3 ml/l or chlorantraniliprole @0.3 ml/l alternatively during the flowering & pod formation stage.
- ❖ Ensure thorough coverage (500 l/ha)
- ❖ Use Hydraulic/Pneumatic hand compression sprayers
- ❖ Discourage synthetic pyrethroids
- ❖ Avoid sub-lethal dosage
- ❖ Adopt community approach

**Maruca Pod borer:** Spray a combination of chlorpyrifos 2.5 ml /lt or acephate 1gm/lt or novoluron 0.75ml/lt + nuvan 1ml/lit or flubendamide @0.2ml/lt or Spinosad @ 0.3 ml/lt or chlorantraniliprole @0.3 ml/lt.

**Pod fly :** monocrotophos 1.6 ml/lt or acephate 1 g/lt or dimethoate @ 2 ml/lt or profenophos @ 2 ml/lt, at the time of pod development on need basis.

#### **Disease management :**

**Wilt :** Grow resistant varieties - ICPL 87119, PRG 158 and ICPL 8863

**Sterility mosaic virus :** Grow resistant varieties - BSMR 853, BSMR 736, ICPL 87119.

**Macrophomina blight :** Grow resistant varieties - MRG 66, MRG 1004.

#### **Post harvest technology:**

Properly dried produce can be stored in nylon bag, polythene lined gunny bag or compactly knitted gunny bag up to a period of 180 days.

### **BENGALGRAM:**

**Varieties :** Desi:JG-11,Annegiri, NBeG 3, Vijay, JAK 9218

Kabuli:KAK-2,ICCV-2,PhuleG-95311,LBeG-7

**Sowing :** October 15th to end of November

**Soils :** Medium to deep black soils

**Seed rate :** 60-65 kg/ha

**Spacing :** 30 x 10 cm

**Fertilizers:** 20 kg N, 50 Kg P<sub>2</sub>O<sub>5</sub>, 40 kg S/ha as basal dose

**Inter-cultivation:** Twice at 20 and 30 DAS,

**Weed Control:** Spray Fluchloralin at 2.5 l/ha as pre-sowing herbicide or spray Pendamethalin at 3.0 to 4.0l/ha immediately within 24-48 hours after sowing.

**Irrigation :** Rainfed, but One or two light irrigations at flowering and pod formation stage will increase the yields

#### **Pest control:**

##### **IPM practices against Helicoverpa**

- a) Follow strip cropping of bengalgram with coriander ( 8:2 or 16:4)
- b) Sow 4 rows of sorghum all round the field as guard crop
- c) Transplant 50-100 marigold seedlings all round the field as trap crop for *Helicoverpa*.
- d) Monitoring with pheromone traps @ 10/ha to target the pest at right stages.
- e) Use bird perches (50/ha)
- f) Use neem formulations for insect repelling (NSKE 5%) soon after the pest occurrence.
- g) Use biocides like BT @ 1 kg/ha and NPV @ 500 LE/ha twice at an interval of 7-10 days in the evening hours.
- h) If necessary, spray Endosulfan 2 ml/lt or Chlorpyrifos 2.5 ml/lt or Quinolphos 2 ml/1 or Acephate 1 g/l, 700-800 lts of spray fluid per ha.

## **Disease Control**

**Wilt** : Seed treatment with Captan or Thiram 2.5 g/kg seed or Trichoderma (4g/kg).  
Grow resistant varieties like JG-11, JAKI-9218, ICCV-37, KAK-2, LBeG-7..

**Dry root rot:** Seed treatment with Captan or Thiram 2.5g or Rhizocin 2.5 g/kg seed.  
Grow resistant variety, ICCV 10.

**Stunt:** Destruction of diseased plants. Grow resistant variety Jyothi, Use optimum seed rate and maintain good population.

## **Post Harvest Technology:**

**Storage** : Properly dried un-infested produce can be safely stored in Nylon bag, polythene lined gunny bag or compactly knitted gunny bag even upto a period of 180 days.

## **Recommendations for bengalgram:**

1. Use higher seed rate (30 kg/ha) in late sown conditions under double cropping system in coastal districts.
2. Reduce the number of insecticide sprays during vegetative stage.

## **II. CRITICAL INTERVENTIONS**

1. Maintenance of optimum plant population(30-35 Plants/sq.mt.)
2. Seed treatment with captan or thiram @3gms/kg
3. Pre emergence application of herbicides for suppression of weeds upto 20-30 days
4. Timely pest and disease management
5. Foliar nutrition of KNO<sub>3</sub> @ 10g/lit in saline soils
6. Light irrigation at 30-35 days after sowing will increase the yield.