**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:**

**Wilt resistant varieties:**

**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 $P_{H}$ 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:
  - Rabi (ID): 15th October to 15th November
  - Rabi rice fallows: 15th November to 15th December
  - Summer rice fallows: March.
  - Summer (ID): February – March 15th.

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/m²)
- **Summer (Rice fallows)**
  - 40-45 kg/ha; Broadcasting (40 Plants/m²)
- **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 fallsows:**

- 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 follows
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 *Echonochloa 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/lt or Monocrotophos 1.6 ml/lt or Dimethoate 2.0 ml/lt twice at weekly intervals from 10 days after sowing

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

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

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

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

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

**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/lt 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/lt 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/lt

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 chlorpyriphos 2.5 ml/lt or acephate 1g/lt or quinalphos 2 ml/lt against early instars.

Apply poison bait containing rice bran, jaggery and insecticide (Carbaryl /Chlorpyriphos / Monocrotophos) @ 10:1:1 ratio against grown up caterpillers 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 Thiometoxam 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/lt to control Corynespora leaf spot.

45-50 days: Second spray with Dinocap @ 1 ml + Mancozeb @ 2.5 g/lt to control Powdery mildew and Corynespora leaf spot.

60-65 days: Third spray with Tridemorph @ 1 ml or Dinocap @ 1 ml + Mancozeb @ 2.5 g/lt 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 Thiometoxam @ 5g/kg or Carbosulfan @ 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:**

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

**varieties suitable for synchronus maturity:**

**varieties tolerant to pre harvest sprouting:**
LGG-450, K-851, PS-16

**varieties tolerant to drought:**

**varieties tolerant to YMV:**

**varieties tolerant to ABLS:**

**varieties suitable for preceding paddy:**

Soils and field preparation:
Greengram can be grown in moisture retentive, well-drained (Preferably black/alluvial) soil with a $\text{pH}$ 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 15th – July 15th.
- **Rabi (ID):** 15th October to 15th November
- **Rabi rice fallows:** 15th November to 15th December
- **Summer rice fallows:** Up to March 15th.
- **Summer (ID):** February – March 15th

**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$^2$)
- **Summer (Rice fallows)** - 30-35 kg/ha; Broadcasting (40 Plants /m$^2$)
- **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:

(Medium duration) LRG 41, LRG 30, LRG 38, ICP 8863, ICPL 332, ICPL 87119, 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 15th – August 15th.

Rabi: 20th September – 20th 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 P2O5 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/1 or Repelin @ 10 ml/1 or NSKE @ 50 g/1

V. SYNTHETIC PESTICIDES
- Follow need based application
- Avoid cocktail mixtures.
- Aim the sprayings at early instars
- Apply chlorpyriphos @ 2.5 ml/lt or quinolphos @ 2 ml/lt or acephate @ 1 g/lt or flubendiamide @ 0.2 ml/lt or spinosad @ 0.3 ml/lt or chlorantraniliprole @0.3 ml/lt 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 chlorpyriphos 2.5 ml /lt or acephate 1gm/lt or novoluron 0.75ml/lit + nuvan 1ml/lit or flubendamide @0.2ml/lit or Spinosad @ 0.3 ml/lit or chlorantraniliprole @0.3 ml/l.  
Pod fly : monocrotophos 1.6 ml/lit or acephate 1 g/lt or dimethoate @ 2 ml/lit or profenophos @ 2 ml/lit, 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 P₂O₅, 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 Chlorpyriphos 2.5 ml/lt or Quinolphos 2 ml/l 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 KNO3 @ 10g/lt in saline soils
6. Light irrigation at 30-35 days after sowing will increase the yield.