In pulse crops, gram has an important place. Attention should be given on following points to take more yields:

Land:

For cultivation of gram, loam or heavy loam, maar and pandua soil in which proper arrangement for water drainage is available are suitable.

Preparation of Land

First plough, 6 cm deep, should be done by disc harrow followed by 2 plough by local plough or cultivator and use leveler to prepare the field.

Description of Species of Gram:

SN	Variety	Production capacity (quintal/ hectare)	Time taken for ripening	Suitable areas	Characteristics
A.	**Native species : timely sowing**				
1	Gujarat gram – 4	20-25	120-130	Eastern UP	Plants are medium in size, uktha resistant, suitable for irrigated and non irrigated area.
2	Resistant	25-30	145-150	Whole of UP	Plants are medium in height (semi erect), kernels are brown in color and ukatha resistant.
3	Pusa – 256	25-30	135-140	Whole of UP	Plants are medium in height, wide leaves, kernels are brown in color and prone to escho chita disease.
4	K.W.R.-108	25-30	130-135	Whole of UP	Brown colored grain, plant is medium in height, Ukatha resistant.
5	Radhe	25-30	140-150	For Bundelkhand	Big size grains
6	J.G – 16	20-22	135-140	For Bundelkhand	Ukatha resistant
7	K.-850	25-30	145-150	Whole area of plains	Big size grains, ukatha infested
8	D.C.P. 92-3	20-22	140-145	Whole of UP	Ukatha resistant, small yellow grains.
9	Aadhar (R.S.G.-963)	19-20	125-130	Western UP	Ukatha resistant

10	W.C.G.-1	25-30	135-145	Western UP	Big size grains
11	W.C.G-2	20-25	130-135	Western UP	Small size grains
12	K.G.D 1168 (Alok)	25-30	150-155	Whole of UP	Ukatha resistant
B.	**Late Sowing**				
1	Pusa-372	25-30	130-140	Whole of UP	Prone to ukatha, blight and root rot disease.
2	Uday	20-25	130-140	Whole of UP	Brown colored grain, plants of medium height, prone to uktha.
3	Pant G- 186	20-25	120-130	Whole of UP	Plants of medium height, prone to uktha.
C.	**Kabuli**				
1	Pusa-1003	20-22	135-145	Eastern UP	Medium to large sized grains, prone to ukatha
2	H.K.-94-134	25-30	140-145	Whole of UP	Big size grains, prone to Ukatha
3	Chamtkar (V.G – 1053)	15-16	135-145	Western UP	Big size grains
4	J.G.K.-1	17-18	110-115	For Bundelkhand UP	Big size grains, prone to Ukatha
5	Shubra	18-20	125	For Bundelkhand	Ukatha resistant
6	Ujjwal	18-20	125	For Bundelkhand	Ukatha resistant

Seed Rate

For grains of small size, 75-80 kg and large size 90-100 kg seed per hectare is required.

Seed Treatment

A- Seed treatment by Rhizobium Culture

For different pulse crop, different Rhizobium culture is used. For gram, mesorhizobium siseri culture is used. One packet (200 gm) culture is sufficient for treatment of 10 kg seed. Pour 10 kg seed in a bucket and mix well so that culture is applied on every seed. The seeds so mixed with rhizobium culture should be dried in shade for some time.

B- Must use P.S.B culture

Precaution

Do not dry seeds in sun light after treatment and as for as possible, the seeds should be treated in after noon so that the seed can be sown in the evening or next morning.

Seed Treatment

From protection from seed borne disease, treat the seed with thiram 2 gm or mancozeb 3gm or trichoderma 4 gm or thiram 2gm+carbandzim 1 gm per kg before sowing. Seed should be treated before its treatment with culture.

Sowing

In case of non irrigated condition, gram should be sown till second or third week of October. In case of irrigated condition, the gram should be sown till 2nd week of November and late crop can be sown up to 1st week of December. The seed should be sown at a depth of 6-8 cm in furrows behind the plough. Furrows to furrows distance should be 30 cm in case of non irrigated and late sown condition where as it should be 45 cm in irrigated and kabar or maar soil.

Fertilizer

For all varieties, use 20 kg nitrogen, 60 kg phosphorous, 20 kg potash and 20 kg sulphur per hectare in furrows. Use of fertilizer on the basis of recommendations is more beneficial. Spray 2% urea solution at the time of flowering in non irrigated and late sown conditions.

Irrigation

Apply first irrigation after 45-60 days (before flowering) as per need and second at the time of grain formation in the pods. If there is rain in winter season, second irrigation is not required. Do not irrigate at the time of flowering otherwise it may harm instead of profit.

Crop Protection

(A) Main Insects

- **Katua Insect**
  Brown colored maggot of this insect comes out in the night and cuts the plant at the surface as a result the plants fall.
- **Semi Looper Insect**
  The maggot of this insect is green in color which walks in loop. The maggots eat the leaves, soft twigs, buds, flowers and pods and harm them.
- **Fruit Borer Insect**
  The maggot of this insect is green or brown in color. Generally, a long line on the back and thin long line is found on both the sides. In early stage, the infant maggots scratch the soft leaves and eat them and when they become adult, bore the pods and eat the pod. A maggot can affect 30-40 grains in his life span. In case of intense menace, the pods become hollow and production is heavily affected.

Economic Loss Level

SN	Insect	Stage of Crop	Economic Loss Level
1	Katua Insect	Vegetative Stage	One maggot per meter
2	Semi Looper	At the time of flowering and pod formation.	2 maggot per 10 plants
3	Fruit Borer Insect	At the time of flowering and pod formation.	2 small and 1 big maggots per 10 plants or 4-5 male insect per trap found continuously for 2-3 days.

Control Measures

- Deep plough in summer.
- Sow in time.
- Keep small heaps of dry grass in the field. The maggots of insect hide in the day in the heap. Collect in the morning and destroy them.
- Mix cropping of gram with alsi, mustard and coriander reduces the damages caused by insect.
- Use marigold flower around the field as trap crop.
- Keep 50-60 bird pirchur per hectare area so that the birds can sit on it and eat the maggots of the insect.
- Keep watching the crop. Keep 5 trap per hectare in the field at the time of flowering and pod formation for fruit borer insects.
- If the insect menace has crossed economic loss level, use any one of the following insecticides:
- For control of Katua insect, mix chlorpyrifos 20% EC at the rate of 2.5 liter per hectare in the soil before sowing.
- For control of fruit bore insect, spray NPV (H) 250 LE per hectare dissolved in 250-300 liter water in the evening.
- For control of fruit borer and semi looper insect, spray any one of the following insecticides chemical dissolved in 500-600 liter water per hectare:

    - Bacillus thuringiansis(B.T), 1.0 kg of kirst key variety.
    - Azadirechtin 0.03 WSP 2.5-3.0 kg.
    - NPV of halco verpa armijera 2% AS 250-300 ml.
    - Fenvalrate 0.4% DP 20-25 kg.
    - Fenvalrate 20% EC 1 liter.
    - Quinolfos 25% EC 2.0 liter.
    - Malathion 50% EC 2.0 liter
    - Novaluran 10% 750 ml.

    Keep watching the field and spray again at an interval of 15 days. Do not use 1 insecticide twice.

- Bacillus thuringiansis(B.T), 1.0 kg of kirst key variety.
- Azadirechtin 0.03 WSP 2.5-3.0 kg.
- NPV of halco verpa armijera 2% AS 250-300 ml.
- Fenvalrate 0.4% DP 20-25 kg.
- Fenvalrate 20% EC 1 liter.
- Quinolfos 25% EC 2.0 liter.
- Malathion 50% EC 2.0 liter
- Novaluran 10% 750 ml.

Keep watching the field and spray again at an interval of 15 days. Do not use 1 insecticide twice.

(B) Critical Disease

- **Root Rot:**
  After 15-20 days of sowing, the plants start drying. If the plant is uprooted and seen, cotton like fungus is seen on the stem. This is called early root rot. The menace of this disease generally appears from October to November. In late root rot, the stem of the plants blacken and rot. The menace of this disease appears more from February to March.
- **Ukatha:**
  The plants slowly start wilting and dry. If the plant is uprooted and seen, its root and stem is found well. The bark becomes brown in color and if the root is cut vertically, black colored veins are seen. Ukatha can infest the plant at any stage.
- **Eschochita Leaf Blight Disease:**
  In this disease, dark grey colored spots appear on the leaves and pod. In favorable conditions, the spots join together as a result the whole leaf is burnt.

Control Measures

- **Cultivation Activity**
    - In summers, plough by disc harrow helps in control of soil borne diseases.
    - Do not take the gram crop in the field for 3-4 years which is often infested by Ukatha.
    - Sow in the second week of November for prevention of early root rot.
    - For protection from Ukatha disease, sow disease resistant and KWR 108 variety.

- In summers, plough by disc harrow helps in control of soil borne diseases.
- Do not take the gram crop in the field for 3-4 years which is often infested by Ukatha.
- Sow in the second week of November for prevention of early root rot.
- For protection from Ukatha disease, sow disease resistant and KWR 108 variety.
- **Seed Treatment**

  For control of seed borne diseases, sow the seed after treatment with thiram 75%+carbandasim 50%(2:1) 3.0 gm or trichoderma 4.0 gm per kg seed.

For control of seed borne diseases, sow the seed after treatment with thiram 75%+carbandasim 50%(2:1) 3.0 gm or trichoderma 4.0 gm per kg seed.

- **Soil Treatment**

  For control of seed and soil borne diseases, mix the bio pesticides trichoderma viridi 1% WP or trichoderma harzianum 2% WP at the rate of 2.5 kg per hectare with 60-75 kg decomposed dung manure, sprinkle light water on it and keep it for 8-10 days in the shade. Spread the mixture at the

time of last plough before sowing. This will help in control of seed/soil borne diseases in gram.

For control of seed and soil borne diseases, mix the bio pesticides trichoderma viridi 1% WP or trichoderma harzianum 2% WP at the rate of 2.5 kg per hectare with 60-75 kg decomposed dung manure, sprinkle light water on it and keep it for 8-10 days in the shade. Spread the mixture at the time of last plough before sowing. This will help in control of seed/soil borne diseases in gram.

- **Foliar Treatment**

For eschochita leaf blight disease, spray mancozeb 75% WP 2.0 kg or copper oxy chloride 50% WP 3.0 kg per hectare dissolved in approximately 500-600 liter water.

For eschochita leaf blight disease, spray mancozeb 75% WP 2.0 kg or copper oxy chloride 50% WP 3.0 kg per hectare dissolved in approximately 500-600 liter water.

(C) Important Weeds

Bathua, Santhi, Krishna neel, Hiran khuri, chatri-matri, Akra, forest carrot, gajri, pyaji, khartua, satyanaashi etc.

Control Measures

- For weed control by weed herbicide chemicals, spread fluchloralin 45% EC, 2.2 liter per hectare dissolved in approximately 800-1000 liter water before sowing or spray pendimethylene 30%, 3.30 liter or alochlor 50% EC uniformly at the rate of 4.0 liter per hectare dissolved in water as above through flat fan/nozzle within 2-3 days of sowing.
- If weed herbicides has not been used, hoe by hand hoe to control the weeds.

Harvesting and Storage

When the pods are ripened, harvest and thresh it. Since pulses are easily affected, store it when it is well dried. For protection from insects in storage, use 2 tablets of aluminium phosphide per hectare.

Important Point

- Use certified and pure seed by selecting variety as per regional adoptability.
- Use phosphorous bearing fertilizers in furrows as basal dressing as per recommendation.
- Proper control/treatment of diseases and fruit borer insects by taking timely knowledge.
- Supply sulphur in the form of pyrite/gypsum/single super phosphate.
- Must treat the seed.
- Do not irrigate at the time of flowering.
- For late sowing, use early ripening variety.
- Spray 2% borax in kabuli chana.
- Timely control of insects and diseases.

- Sow the gram from North to South.
- In non irrigated condition, spray of 2% urea at the time of flowering is beneficial.