

BLACK GRAM

Botanical Name	-	<i>Vigna mungo</i>
Origin	-	India
Synonym	-	Urd, Biri, Mash



Introduction

Black gram is one of the important pulse crops grown throughout India. It is consumed in the form of 'dal' (whole or split, husked and un-husked) or perched. It is used as nutritive fodder specially for milch animals. It is also green manuring crop. High values of lysine make urdbean an excellent complement to rice in terms of balanced human nutrition.

Nutritive value

Protein	- 24%	Calcium	- 154 mg/100 g
Fat	- 1.4%	Phosphorus	- 385 mg/100 g
Minerals	- 3.2%	Iron	- 9.1 mg/100 g
Fiber	- 0.9%	Calorific value	- 347 Kcal/100 g
Carbohydrate	- 59.6%	Moisture	- 10.9%

Crop Status

During the twelfth Plan (2012-2015) the total production was 18.29 lakh tonnes on an area of 31.29 lakh hectares. As regards the total contribution from states, Madhya Pradesh stand first in respect of area (19.40%) followed by U.P. (17.88%) and Andhra Pradesh (11.69%), whereas in production U.P. stands first (16.98%) followed by Andhra Pradesh (16.75%) and Madhya Pradesh (15.07%). The highest yield was recorded by the state of Bihar (898 kg/ha) followed by Sikkim (895 kg/ha) and Jharkhand (890 kg/ha) the National yield average was (585 kg/ha). The lowest yield was recorded in the state of C.G. (309 kg/ha) followed by Odisha (326 kg/ha) and J&K (385 kg/ha) (*DES, 2015-16*).

State-wise recommended varieties

State	Varieties		
	Kharif	Rabi	Spring/Summer
Andhra Pradesh	Pant Urd-31, IPU 2-43, LBG 685, LBG 625	TU 94-2, LBG 623, LBG 709, LBG 611	TU 94-2, LBG 623, LBG 709, LBG 611
Assam	PU-30, WBU -108, IPU 94-1 (Uttara)	-	-
Bihar & Jharkhand	Pant Urd 31, WBU 108, IPU 94-1 (Uttara), Birsa Urd 1, PU-30	-	Pant Urd 31, WBU-109, KU 91-2 (AZAD Urd 1)
Gujarat	Ku 96-3, TPU-4, AKU-4 (Melghat), GU-1, KUG-479, UH 01, Mash-414	-	-
Haryana	KU-300 (Shekhar 2), IPU 94-1 (Uttara)	-	-
H.P.	Pant Urd 31, Pant Urd 40	-	-
Karnataka	IPU 02-43, WBU-108, KU-301, LBG 402	IPU 2-43, WBU-108, KU-301	-
M.P. & C.G.	Pant Urd-30, JU-3, KU 96-3, TPU-4, JU-2, Khargone-3	Pant Urd 31	Pant Urd 31
Maharashtra	KU 96-3, TPU 4, AKU-4 (Melghat), AKU-15	-	-
Odisha	IPU 02-43, WBU-108, KU 301	B-3-8-8, OBG-17, Mash 338	B 3-8-8, OBG 17, Mash 338

Punjab	WBU 108, IPU 94-1 (Uttara), Mash 338, Mash 414	-	KU 300 (Shekhar 2), KUG 479
Rajasthan	Pant Urd-31, WBU 108, IPU 94-1 (Uttara)	-	KU 300 (Shekhar 2), KUG 479
U.P. & Uttarakhand	Pant Urd-40, WBU-108, IPU 94-1 (Uttara)	-	KU 300, WBU 109, KU 91 (Azad Urd 2) KUG-479, Narendra Urd 1
Tamil Nadu	IPU 02-43, Vamban-4, Vamban-7	Vamban-3, TU 94-2	Vamban 3, TU 94-2, Vamban 5, Vamban 2
West Bengal	Pant Urd 31, WBU 108, IPU 94-1 (Uttara)	Pant Urd-31, WBU-190, KU-92-1 (Azad Urd-1)	Pant Urd 31, WBU 109, KU 91-2 (AZAD Urd 1)

Source: Seednet GOI, Min. of Agri. & FW, & ICAR-IIPR, Kanpur

Potential Yield (FLD Result)

It is observed that in general average potential yield gap between FLD and farmer's local check yield is about 22%. The potential yield level could be obtained by adoption of improved package of practices.

Kharif

State	Varieties		Yield (kg/ha)		% Increased over Local
	Improved	Farmers Local Check	Improved	Farmers Local Check	
Uttar Pradesh	Ajad U-2	Local	760	610	24.59
	Shekhar-1		753	641	17.47
Andhra Pradesh	LVG-20	Local	1010	725	39.31
Gujart	GU-1	Local	671	526	27.56
Karnataka	DU-1	Local	653	578	12.97
	VBN-4		811	762	6.43
	LBG-685		764	683	11.85
Maharashtra	TPU-4	Local	627	560	11.96
Punjab	Mas-114	Mas-338	811	659	23.06
Rajasthan	Pant U-31	Local	794	643	23.48
	KU- 96-3		1071	898	19.26
	IPU-94-1		862	760	13.42
Tamil Nadu	VBN-4	Local	732	422	73.45
	VBN-5		935	735	27.21
Rabi					
Andhra Pradesh	LVG-752	Local	1343	1204	11.54
	PU-31	-	1146	1034	10.83
Tamil Nadu	VBN-4	Co-5	935	780	19.87
	VBN-5	VBN-2	844	702	20.22
	VBN-3	Co-5	847	679	24.74
	LBG-685		676	574	17.77
Karnataka	LBG-685	Local	723	628	15.12

Source: ICAR-IIPR, Kanpur, Average of 2007-08 to 2002-13

Climate requirement

Being a crop of tropical region, it requires hot and humid climate for best growth. It is basically a warm weather crop. In North parts of the country where the temperatures during winter are quite low, it is cultivated generally during rainy and summer season. In

the eastern states, it is also grown during winter. In Central and Southern states, where there is not much variation in the climate, it is cultivated during winter and rainy seasons.

Soil & Land Preparation

Black gram can be grown on variety of soils ranging from sandy soils to heavy cotton soils. The most ideal soil is a well drained loam with pH of 6.5 to 7.8. Black gram cannot be grown on alkaline and saline soils. Land is prepared like any other kharif season pulse crop. However during summer it requires a thorough preparation to give a pulverized free from stubbles and weeds completely.

Sowing Time & Method

Kharif : In kharif season sowing is done with the onset of monsoon in later part of June or early part of July.

Rabi : Second fortnight of October (upland) second fortnight of November (Rice fallow)

Summer : The sowing could be done from the third week of February to first week of April. Sowing should be done in furrows opened at a distance of 20-25 cm. seed drill could be used for this purpose.

Seed rate & Spacing

i) **Kharif**: During kharif season 12-15 kg seed/ha.. The crop should be sown at a distance of 30-45 cm. with 10 cm. plant spacing.

ii) **Rabi**: About 18-20 kg seed/ha for upland and 40 kg/ha for Rice fallows with a crop geometry of 30 cm x 15 cm. Higher seed rate in rice fallow is used due to delayed in sowing.

iii) **Summer**: About 20-25 kg seed is required per ha. Plant to plant spacing should be kept at 5-8 cm depending upon sowing time and varietal behaviour.

Seed Treatment

Treat the seed with Thirum (2g) + Carbendazim (1g) or Carbendazim @2.5 g/kg seed to control the soil & seed germinated disease. For sucking pest control seed treatment with Imidacloprid 70 WS @ 7g/ kg seed . It is also desirable to treat the seed with Rhizobium & PSB culture (5-7 gm/kg seed).

Cropping System

The important crop rotation with urd are as given below

i) Maize-Potato-Urd bean; ii) Maize-Toria-Urdbean; iii) Rice-Wheat-Urdbean; iv) Urdbean-Mustard-Mungbean/Urdbean; v) Potato-wheat- Urdbean

Intercropping

Kharif – Urdbea + Pigeonpea (1:1)

Spring – Urdbean+ Sugarcane (2:1); Urdbean + Sunflower (2:6)

Fertilizer

For sole crop 15-20 kg/ha Nitrogen, 40-50 kg/ha Phosphorus, 30-40 kg/ha Potash, 20 kg/ha Sulphur is should be applied at the time of last ploughing. However phosphatic and potassic fertilizer should be applied as per soil test value. Fertilizer should be applied by drilling either at the time of sowing or just before sowing in such a way that they are placed about 5-7 cm below the seed. Use of gypsum @ 100 kg/ha would ensures availability of calcium and sulphur at economical rates.

Secondary and Micro Nutrients

1. **Sulphur** - In medium black soils and sandy loam soils apply 20 kg S ha⁻¹ (equivalent to 154 kg gypsum/ phospho-gypsum/ or 22 kg bentonite sulphur) as basal to each crop.

If S deficiency is diagnosed red sandy loam soils, apply 40 kg S ha⁻¹ (equivalent to 300 kg gypsum/phospho-gypsum/or 44 kg bentonite sulphur) per hectare. This quantity is sufficient for one crop cycle.

2. **Zinc**- Quantity of Zinc requirement determined according to the soil type & it's availability or status in the soil. Therefore, the doses of zinc should be applied based on the soil type as follows:
 - **Red sandy and loamy soils** -2.5 kg Zn ha⁻¹ (12.5 kg zinc sulphate hepta hydrate/ 7.5 kg zinc sulphate mono hydrate) per hectare.
 - **Black soils** &1.5 to 2.0 kg Zn ha⁻¹ (7.5 to 10 kg zinc sulphate hepta hydrate/ 4.5 to 6.0 kg zinc sulphate mono hydrate) per hectare.
 - **Laterite, medium and alluvial soils** -2.5 kg Zn ha⁻¹ (12.5 kg zinc sulphate hepta hydrate/ 7.5 kg zinc sulphate mono hydrate) as basal along with 200 kg of farm yard manure.
 - **High organic carbon containing Tarai soils** -3.0 kg Zn ha⁻¹ (15 kg zinc sulphate hepta hydrate/ 9 kg zinc sulphate mono hydrate) as basal once in three year.
 - **Low organic carbon content and hilly sandy loam soil** - 2.5 kg Zn ha⁻¹ (12.5 kg zinc sulphate hepta hydrate/ 7.5 kg zinc sulphate mono hydrate) as basal in every alternate year.
3. **Manganese**-In manganese deficient sandy loam soils, Seed soaking with 2% manganese sulphate OR foliar spray of 1% manganese sulphate is recommended.
4. **Molybdenum** - In molybdenum deficient soils, application of 0.5 kg sodium molybdate ha⁻¹ as basal OR two foliar sprays of 0.1% sodium molybdate or seed treatment is recommended.

Water management

In kharif season irrigation not required, if rainfall is normal & if moisture deficit at pod formation stage irrigation should apply. In summer 3-4 irrigation required according to crop requirement. Generally, the crop should get irrigation at an interval of 10-15 days. From flowering to pod development stage, there is need of sufficient moisture in the field.

Weed control

One or two hand weedings should be done up to 40 days of sowing depending upon the weed intensity. Weeds can be controlled by the use of chemicals too. Use Pendimethalin 0.75-1.00 kg a.i. per ha in 400-600 liters of water as pre-emergence application.

Plant Protection Measures

There are several important disease of Urdbean, Yellow mosaic virus, Powdery mildew, leaf blight etc. are important one.

Diseases

Yellow Mosaic Virus

Symptoms

This disease is caused by the mung bean yellow mosaic virus (MYMV) belonging to Gemini group of viruses, which is transmitted by the whitefly (*Bemisia tabaci*). The tender leaves show yellow mosaic spots, which increase with time leading to complete yellowing. Yellowing leads to less flowering and pod development. Early infection often leads to death of plants.



Control Measures

i) Diseased plants should be rogued out to prevent further spread of the disease; ii) In order to prevent whitefly (*Bemisia* spp.) infestation spray with triazophos 40 EC @ 2.0 ml/lit. or malathion 50 EC @ 2.0 ml/lit. or oxydemeton methyl 25 EC @ 2.0 ml/lit. at 10-15 days intervals if required; iii) Grow tolerant/resistant varieties like IPU 94-1 (Uttara), shekhar 3(KU 309), Ujala(OBJ 17), VBN(Bg) 7, Pratap urd 1 etc.

Powdery Mildew

Symptoms

The disease appears on all the part of plants above soil surface. Disease initiates as faint dark spots, which develop into small white powdery spots, coalescing to form white powdery coating on leaves, stems and pods. At the advance stages, the color of the powdery mass turns dirty white. The disease induces forced maturity of the infected plant causing heavy yield losses and its intensity increases in stress condition.



Control Measures

i) Adopt clean cultivation by destroying diseased plant refuge; ii) Delayed sowing of mungbean and urdbean with wider spacings considerably reduce the disease severity; iii) Opt for resistant varieties as per recommendation of local agricultural authorities Urdbean: COBG10, LBG 648, 17, Prabha, IPU 02-43, AKU 15 and UG 301); iv) Spray with NSKE @ 50 g/liter of water or neem oil 3000 ppm @ 20 ml/lit. twice at 10 days interval from initial disease appearance. Spray with eucalyptus leaf extract 10% at initiation of the disease and 10 days later also if necessary; v) Spray with water soluble sulphur 80 WP @ 4 kg/liter or Carbendazin 50 WP @ 1 g/lit.

Leaf Blight

Symptoms: In pre-emergence stage, the fungus causes seed rot and mortality of germinating seedlings. In post emergence stage, seedling blight disease appears due to soil or seed-borne infection. The fungus attacks the stem at ground level, forming localized dark brown patches which coalesce and encircle the stem. Black dot like sclerotia are formed on the surface and below the epidermis on the outer tissue of the stem and root. The pathogen is most favoured at a temperature of 30°C and 15% moisture.



Control Measures

i) Basal application of zinc sulphate @ 25kg/ha or neem cake @ 150 kg/ha or soil application *P. fluorescens* or *T. viride* @ 2.5 kg/ha + 50 kg of well decomposed FYM at the time of sowing helps in prevention of the disease; ii) The diseased plants should be uprooted and destroyed so that the sclerotia do not form or survive; iii) Spray with Carbendazim 50 WP @ 1 g/liter of water at an interval of 15 days with the appearance of the symptoms.

Insect-Pest Management

Aphids

Nature of Damage: Nymphs and adults are seen in large numbers on young plants, leaflets, stem and pods. Young leaves of seedlings become twisted. Excretion of honey dew attracts sooty mold. The adults are black and shiny, upto 2 mm long and some are winged. Nymphs are covered with waxy coating that makes them grey and dull.



Control Measures

- i) Spray with 5% crude neem extract or 2% neem oil 3000 ppm;
- ii) Spray with Dimethoate 30 EC (1.7 ml/ lit.) or Imidacloprid 17.8 SL @ 0.2 ml/liter of water ;
- iii) Conserve coccinellid beetles, their grubs and Chrysoperla.

Tobacco Caterpillar

Nature of damage: Newly hatched tobacco caterpillar (*Spodoptera litura*) feed gregariously on the leaf surface for about 2-3 days and leave behind the whitish membranous leaf only. The larvae makes irregular holes on the leaf surface and in severe infestation, they skeletonize the foliage. They are voracious feeders of the foliage and remain hidden in cracks and crevices or plant debris in the soil during day time. The maximum damage is caused to the young plants, which are often totally destroyed



Control Measures

- i) Collection and destruction of egg masses and newly hatched larvae along with skeletonised leaves can reduce infestation;
- ii) Spray of microbial pesticides like SINPV [500 LE/ha or *Bacillus thuringiensis* formulations in synchrony with early larval instars is effective against the pest;
- iii) Spray Malathion 50 EC @ 2.0 ml/lit. or foliar application of Novaluron 10 EC @ 0.75 ml/lit., chitin synthesis inhibitor against eggs of *S. litura*;
- iv) Spray extract of custard apple as feeding deterrent against the pest.

Spotted Pod Borer

Nature of Damage: The larva webs the leaves, inflorescence and feed inside the flowers, flower buds and pods. Eggs are laid on or in the flowers (inserted between the petals). Young larvae feed inside the flowers before moving to developing pods when mid-sized. A larva may consume 4-6 flowers before larval development is completed. Third to fifth instar larvae are capable of boring into the pods and feeding the developing grains. Seeds in damaged pods are totally or partially eaten out by larvae.



Control Measures

- i) Spray *Bacillus thuringiensis* 5 WG @ 1.0 g/liter of water;
- ii) foliar spray of Profenophos 50 EC @ 2.0 ml/liter of water;
- iii) Spray of spinosad 45 SC @ 0.2 ml/liter of water is most effective in controlling this pest;
- iv) Physical shaking of the infested plants over the vessels of oil and water or oily cloth help reduce the population.

Pod Bug

Nature of Damage: Pod bug (*Clavgralla gibbosa*) adults and nymphs damage leaves, flower buds, stem and pods by sucking cell sap. Major damage is done to the green pods before the maturity of the crop. The attacked pods show pale yellow patches. The grains in the pods become shrivelled and small in size resulting in considerable yield losses.



Control Measure

- i) Physical shaking of the infested plants over the vessels of oil and water or oily cloth help reduce the population; ii) Spray Monocrotophos 36 SL @ 1.0 ml/liter water during flowering and at pod formation stage.

Harvesting , Threshing & Storage

Urd should be harvested when 70-80 % pods matured & most of the pods turn black. Over maturity may result in shattering. Harvested crop should be dried on threshing floor for few days and then threshed. Threshing can be done either manually or by trampling under the feet of bullocks. The clean seeds should be sun dried for 3-4 days to bring their moisture content at 8-10% to safely store in appropriate bins.

Yield

A well managed crop of Urd may produce 12-15 quintals grains/ha.

Recommendation to achieved higher production

- i) Deep summer ploughing once in 3 years.
 - ii) Seed treatment should be done before sowing.
 - iii) Application of fertilizer should be based on soil test value.
 - iv) In kharif season sowing should be done by ridge & furrow method.
 - v) Yellow mosaic resistant/ tolerant varieties IPU 94-1 (Uttara), shekhar 3(KU 309), Ujala(OBJ 17), VBN(Bg) 7, Pratap urd 1 etc choose as per suitability of region.
 - vi) Weed control should be done at right time.
 - vii) Adopt integrated approach for plant protection.
- For technical information of crop production please contact to district KVK/ nearest KVK.
- To avail benefit from Centrally and State Government running schemes for crop production (ploughing, fertilizers, micronutrient, pesticide, irrigation equipment), agricultural implements, storage infrastructure etc., please contact to your DDA/SADO office.

For more information also visit

- M- kisan portal - <http://mkisan.gov.in>
- Farmers portal - <http://farmer.gov.in>
- Kisan Call Centre (KCC)-Toll Free No.- 1800-180-1551
