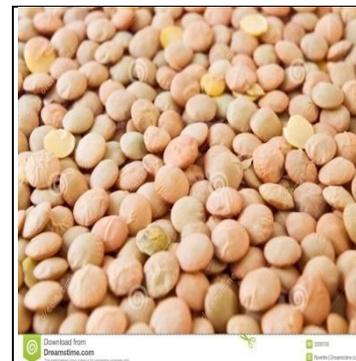# LENTIL

Botanical Name   - *Lens culinaris Medikus subsp. culinaris*
Synonym   - Masur, Malka (bold seeded), lentil
Origin   - Turkey to South Iran

Introduction

It is a valuable human food, mostly consumed as dry seeds (whole decorticated, seed decorticated and split). In Indian sub-continent mostly consumed as 'Dal' by removal of outer skin and separation of cotyledons, snacks and soup preparation etc. It is easy to cook and easily digestible with high biological value, hence also referred to patient. Dry leaves, stems, empty and broken pods are used as valuable cattle feed.

Nutritive value

Protein	- 24-26%	Carbohydrate	- 57 – 60%
Fat	- 1.3%	Fibre	- 3.2%
Phosphorus	- 300 mg/100 g	Iron	- 7 mg /100 g
Vitamin C	- 10-15 mg/100 g	Calcium	- 69 mg/100g
Calorific value	- 343 Kcal/100 g	Vitamin A	- (450 IU)

Crop Status

India ranked first in area and second in the production with 39.79% and 22.79% of world area and production respectively. The highest productivity was recorded in Croatia (2862 kg/ha) followed by New Zealand (2469 kg/ha). Canada rank first in production (41.16%) due to very high level of productivity (1633 kg/ha) as compared to India (611 kg/ha). *(FAO State., 2014).*

During Twelfth Plan (2012-15) the country's area under Lentil was 14.79 lakh hectares with a production of 10.38 lakh tonnes. Madhya Pradesh ranks I[st] in acerage i.e., 39.56% (5.85 lakh ha) followed by UP 34.36 % and Bihar 12.40%. While in terms of production UP ranks I[st] at 36.65% (3.80 lakh tonnes) followed by Madhya Pradesh (28.82%) and Bihar (18.49%).The highest yield was recorded by the state of Bihar (1124 kg/ha) followed by W.B. (961 kg/ha) and Jharkhand (956 kg/ha). The National yield average was (753 kg/ha). The lowest yield was observed in the state of Maharashtra (379 kg/ha), C.G. (410 kg/ha) followed by and M.P. (634 kg/ha) *(DES., 2015-16).*

State –wise recommended varieties

S.No.	States	Recommended Varieties
1.	Bihar	Pant L 406, PL 639, Mallika (K-75), NDL 2, WBL 58, HUL 57, WBL 77, Arun (PL 777-12)
2.	M. P. & C.G.	Malika (K-75), IPL-81 (Nuri), JL-3, IPL-406, L-4076, IPL-316, DPL 62 (Sheri)
3.	Gujarat	Malika (K-75), IPL-81 (Nuri), L-4076, JL-3
4.	Haryana	Pant L-639, Pant L-4, DPL-15 (Priya), Sapna, L-4147, DPL-62 (Sheri), Pant L-406
5.	Maharashtra	JL 3, IPL 81 (Nuri), Pant L 4
6.	Punjab	PL-639, LL-147, LH-84-8, L-4147, IPL-406, LL-931, PL 7

7.	Uttar Pradesh	PL-639, Malika (K-75), NDL-2, DPL-62, IPL-81, IPL-316, L-4076, HUL-57, DPL 15
8.	Rajasthan	IPL 406 (Anguri), Pant L-8 (PL-063), DPL-62 (Sheri)
9.	Uttarakhand	VL-103, PL-5, VL-507, PL-6, VL-129, VL-514, VL-133,
10.	Jammu & Kashmir	VL 507, HUL 57, Pant L 406, Pant L 639, VL 125, VL 125

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 31%. The potential yield level could be obtained by adoption of improved package of practices.

State	Varieties		Yield kg/ha		% Increased over Local
	Improved	Farmers Local Check	Improved	Farmers Local Check	
Bihar	Pant U-406	Local	1720	1150	49.6
	Arun	-	1683	1156	45.6
	HUL-57	-	1530	1270	30.76
Madhya Pradesh	JLS-1	Local	850	610	39.3
	IL-1	-	989	765	29.3
	JL-3	-	941	715	31.6
Jammu & Kashmir	Shalimar M-1	Local	763	581	31.3
	PL-4	-	340	300	13.3
	DPL-15	-	357	301	18.6
Punjab	LL-931	LL-699	1162	1060	9.6
Rajasthan	Sapna	Local	1383	1257	10.0
Uttar Pradesh	KSL-218	Local	1591	1341	18.6
	WBL-1	-	1643	1385	18.6
	KPMR-522	-	1737	1317	31.8
	HUDP-15	-	1795	1311	36.9
Uttaranchal	VL Masoor-125	Local	778	460	69.1
West Bengal	WBL-58	Local	1465	1145	27.9
	WBL-81	-	1554	1071	45.0

Source: ICAR-IIPR, Kanpur, Average of 2007-08 to 2011-12

Climate requirement

Lentil requires cold climate. It is very hardy and can tolerate frost and severe winter to a great extent. It require cold temperature during its vegetative growth and warm temperature at the time of maturity. The optimum temperature for growth is $18-30^0C$.

Soil Type and Field Preparation

Well drained, loam soils with neutral reaction are best for lentil cultivation. Acidic soils are not fit for growing lentil. The soil should be friable and weed free so that seeding could be done at uniform depth. On heavy soils, one deep ploughing followed by two to three cross harrowing should be done. After harrowing, the field should be levelled by giving a gentle slope to ease irrigation.

Sowing Time
Recommended sowing time for *Rainfed:* First fortnight of October in Central and South India and second fortnight of October in North India; *Under irrigated conditions-* First fortnight of November in North India and for *Late sowing***:** First week of December in rice fallows of NEPZ or on fields vacated very late by kharif crops under irrigated condition.

Seed Rate and Sowing
For small seeded: 40-45 kg/ha; *Bold seeded*: 45-60 kg/ha; *Late sown condition*: 50-60 kg/ha; *Utera cropping:* 60-80 kg/ha seed is recommended. Sowing should be done in rows 30 cm. apart and it should be sown at a lower depth (3-4 cm). This could be done either by using a Ferti-seed-drill or by seeding behind desi plough.

Seed treatment
Fungicide: Thirum (2 gm) + Carbendazim (1gm) or Thirum @ 3 gm or Carbendazim @2.5 g per Kg. of seed; *Insecticide:* Chlorpyriphos 20E.C. @8 ml./Kg. of seed; *Culture:* Rhizobium + PSB, one packet each for 10 kg seed.

Cropping systems
Sequential cropping: The most common rotations under sequential cropping are:

i) Kharif fallow	- Lentil (Rainfed areas)	ii) Paddy	- Lentil
iii) Maize	- Lentil	iv) Cotton	- Lentil
v) Bajra	- Lentil	vi) Jowar	- Lentil
vii) Groundnut	- Lentil		

Intercropping: Most common inter cropping systems are:
  i. Lentil + Sugarcane (Autumn) with two rows of lentil at 30 cm row spacing in between two rows of sugarcane
  ii. Lentil + Linseed (2:2)
  iii. Lentil + Mustard (2:6)

Irrigation
First irrigation should be given at 40-45 days of planting and second at pod filling stage. Most critical stage for moisture stress is pod formation followed by flower initiation. In absence of winter rains and where contribution of soil moisture is negligible viz. in Central India, two light irrigations may be applied for significant yield improvement. More irrigation may affect the crop performance adversely.

Plant nutrient management
Generally Nitrogen 20 kg. Phosphorus 40 kg. and 20 kg. Sulphur per hectare in medium to low fertile soils as basal dressing.

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.**Boron**: In lentil grown in calcareous alluvial soils, apply 1.6 kg of B ha^{-1} (16 kg borax/ 11 kg di-sodium tetra borate penta-hydrate) as basal to each crop.

Weed Control

Two manual weeding, one at 25-30 days and another 45-50 days after sowing should be done. Weedicide like Pendimethalin 30 EC @ 0.75-1 kg *a.i.* per hectare may be used as a pre-emergence treatment. A weed-free period of early 45-60 days is important.

Plant Protection Measures

Disease

Seedling Mortality

Symptoms: It is caused by fungi. It appears within a month of sowing when the seedlings start drying up. The drying is mainly two types. (Seedling wilt)- Seedling first turn yellow and dry up. Collar rot- The seedling collapse while still green and then dry out.

Control Measures

i) It can be reduced by delay planting until mid-November; ii) Treat the seed with systemic fungicide Carbendazim @ 2.5 g/kg of seed; iii) Plant resistant varieties like Pant L-406 etc.

Wilt

Symptoms: This is serious disease of lentil in which the growth of the plant is checked, the leaves start yellowing, plant start drying and finally die. The roots of affected plants remain under developed and look light brown in colour.

Control Measures

i) Keep the field clean and follow a three year crop rotation. This will help in reducing the disease incidence; ii) Use tolerant and resistant varieties like Pant Lentil 5, IPL-316, RVL-31, Shekhar Masoor 2, Shekhar Masoor 3 etc; iii) Seed treatment.

Rust

Symptoms: The disease symptoms start as yellowish pustules on the leaflets and pods. Later; light brown pustules appear on both the surfaces of the leaves and other aerial parts of the plant. The pustules finally become dark brown. The plants give dark brown or blackish appearance visible as patches in the field.

Control Measures

i) After harvest, the affected plant trash should be burnt; ii) In NEPZ, normal and early sowing reduces intensity of rust disease; iii) Grow resistant/tolerant varieties like DPL-15, Narendra Lentil-1, IPL 406, Haryana masur 1, Pant L-6, Pant L-7, LL-931, IPL 316 etc.; iv) Spray the crop with Mancozeb 75 WP @ 0.2 % (2g/liter). 1-2 spray at 50 days after sowing are good for controlling rust.

Insect-Pest

Pod borer

Nature of damage: The caterpillar defoliates the tender leaves and also bores the green pods and feeds upon the ripening grains. It damages almost all the pods in case of severe damage, but causes nearly 25-30% annual yield losses in India.

Control Measures

i) Spray neem seed extract (5%) @ 50 ml/ liter of water; ii) Spray of Profenphos 50 EC @ 2 ml/ liter or Emammectin benzoate 5 SG @ 0.2 g/ /liter of water.

Aphids

Nature of Damage: Aphids suck the sap and in case of severe damage the growth is suppressed.

Control Measures

i) Spray of Dimethoate 30 EC @ 1.7 ml/liter or Imidaclopid 17.8 SL @ 0.2 ml / liter of water.

Stemphylium Blight

Symptoms: The disease causes angular tan leaf lesions; when it is humid (early mornings or after rainfall events), diseased leaves may appear gray due to sporulation by the causal pathogen. Diseased leaves often fall from plants, leaving plants defoliated except for the youngest leaves at the top of the plant. Red lentils are generally more susceptible to the disease than green lentils.

Control Measures

i) After harvest, the affected plant trash should be burnt; ii) Spray the crop with Mancozeb 75 WP@ 0.2 % (2 g/liter). Two spray may be given at 15 days interval; ii) Grow resistant varieties like Pant L-639, DPL-15, Narendra Lentil-1 etc.

Harvesting, threshing, storage

Crop become ready for harvest when leaves begin to fall, stem and pod turn brown or straw in colour and seeds are hard and rattle with 15% moisture inside them. Over ripening may lead to fall of pods as well as shattering and seed cracking if seed moisture fall below 10% due to delay in harvesting.

The crop should be allowed to dry for 4-7 days on threshing floor and threshed by manually or bullock/power drawn thresher. The clean seed should be sun dried for 3-4 days to bring their moisture content at 9-10%. The seed should be safely stored in appropriate bins and fumigated to protect them from bruchids.

Yield- A well mange crop yields about 15-20 quintals of grain per hectare.

Recommendation to achieved higher production

1. Deep summer ploughing once in 3 years.
2. Seed treatment should be done before sowing.
3. Application of fertilizer should be based on soil test value.
4. Wilt resistant/ tolerant –RVL-31, IPL81 (Noori), IPL -316, Sekhar masoor-2, Sekhar masoor-2.
5. Rust resistant/ tolerant –IPL-406, WBL-77, Pant L-6, Pant L-7, Sekhar masoor-2, Sekhar masoor-2, IPL-316.
6. Adopt integrated approach for plant protection.
7. Weed control should be done at right time.
8. For technical information of crop production please contact to district KVK/ nearest KVK.
9. 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**

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