

Overview of Pulses:

Pulses are the edible seeds of legumes. Pulse crops include Mung bean, lentil, peas and chickpea etc. They comprise a small, but very important part of the 1800 species in the legume family. The word "pulse" is derived from the Latin words "puls, or pultis", meaning thick soup.

The use of pulses dates back more than 20,000 years ago and spans the globe. Records of their use were also found in the Egyptian pyramids.

Global Production of Pulse Crops:

Pulses are an important source of protein, especially in developing countries because they provide about 10% of the total dietary protein in the world. Pulses have twice the protein content of most cereal grains. Bean is the most important pulse crop in terms area and production. Pea is the second most important pulse crop in terms of production and third in terms of area. Chickpea is the second most important pulse crop in terms of area and third in terms of production.

Pea is produced mainly in developed countries such as France and Canada, and chickpea is produced and consumed mainly in India. Lentil is produced mainly in India, Turkey and Canada. Beans of various types are produced in many countries around the world.



Importance of Pulses:

The population of Pakistan is increasing very rapidly, hence, there is a dire need of increasing the production of food grains as well as other agricultural commodities, such as sugar, pulses, vegetables and fruits, needed for human consumption.

The quantity and quality of dietary protein are a major problem in most of the food deficient countries, including Pakistan. The scientists are engaged day and night, to solve the problem and find out the ways for growing more proteineous food. In this regard, animals and different pulse crops have drawn attention of human beings since long time. Nowadays, the meat, fish and eggs as well as pulses and vegetables are common in use, to fulfill the protein requirements. The beef, wheat and potatoes contain 16, 6.9 and one percent proteins. Whereas, the pulses viz. gram or chickpea, moong bean or green gram, lentil, black gram or urd bean (mash), red gram or pigeon pea (arhar) and cowpea vary from 11-28 percent proteins according to variety.



Protein %age in different pulse crops which are grown in Pakistan:

CROP	PROTEIN	CARBOHYDRATES	FAT
Gram	21.1	61.5	4.5
Lentil (Masoor)	25.0	60.0	-
Moong bean	20-26	-	0.5-1.5
Mash	24.0	60.0	1.3
Red gram (Arhar)	28.0	-	-
Cowpea	23.4	60.3	1.8

The pulses are called "poor man's meat", due to their protein value. Pulses are also known as short duration crops. All pulses require very little amount of water, hence are termed as dry crops. Another advantage in the cultivation of pulses is that, all pulses play an important role in crop rotation, due to help in maintaining soil fertility, through atmospheric nitrogen fixing bacteria.

The major pulse crops of Pakistan are gram, peas, Moong (green gram), lentil, black gram etc.

Mung (Moong) Bean

Introduction:

Mung bean (*Vigna radiate*) is a member of the Fabaceae (pea) family.

The 18 to 36 inch tall moong bean plants produce clusters of 2 to 8 slender, 3-4 inch long, black, slightly fuzzy pods with very small green seeds. Each pod may contain as many as 15 small oval seeds depending on cultural conditions. The moong bean is an ancient crop of Asia, where there are many seed sizes, shapes and colors.

Moong Beans are small 1/4 inch, round, olive green bean. Moong beans When husked and split, the Green Moong Bean becomes known in India & Pakistan as the Moong Dal. Moong Beans are used in a variety of forms; whole, peeled, split or Dal.

Common Names:

Mung Bean, Green Bean, Sabut Moong, nga choy (Chinese), Mungo bean, Habichuela mungo, Oorud bean, Bundo, Mash bean, Golden gram, Green gram, Chinese bean sprouts.

Whereas, in the Philippines, it is called munggo or monggo.

Visual Characteristics:

Small plump cylindrical beans with a bright green skin.



Growing Characteristics:

Moong bean is grown in warm climate. In Pakistan Moong is cultivated during the month of March. Moong gives good results if it is cultivated in the first week of March. Its early cultivation gives good results that land will be available for kharif crop on the proper time and its harvesting will be completed before the start of rainy season. It is widely cultivated for its edible seeds and pods. It is the chief source of bean sprouts.

Recommended Varieties:

Moong 6601, Moong 88, Chakwal Moong 97, NM-92, NM-98 etc.

History of Plant:

Moong bean is native to India and then it was introduced to China & too many other countries of the world. Now it is most common beans to be sprouted in Asia, Europe and America.

The Chinese have been growing moong bean sprouts (nga choy or nga choi) for approximately 3,000 years.

Farmers grow them often with little machinery & with little application of water. Today China and India are the main producers of moong beans, it is also grown in Australia. The mung is also popular in the Philippines where they call it Munggo. Pakistan is also a main producer of this pulse.



Nutritional Values:

Moong beans are easily digested, containing very few oligosaccharides which cause flatulence, and therefore are suitable for children or those with delicate digestive systems. It is a good source of Vitamins A, B, C & E, and amino acids. Moong beans contain between 19-25 percent protein, 60 percent carbohydrate, 4 percent fibre and also good source of foliate & dietary fiber. They are also rich in lysine and also supply appreciable amounts of potassium, calcium, magnesium, iron and traces of thiamine, riboflavin and niacin.

Medicinal Uses:

In Chinese medicine bean sprouts are considered to be a yin or cooling food. They also have anticancer qualities. It is also used by Oriental herbalists for all hot, inflammatory conditions, ranging from systematic infections to heat stroke to hypertension. Remedies for Antipyretic, antihypertensive, antidote to toxic poisonings and a nutritive tonic.



Uses of Moong Beans:

Moong Beans have a sweet flavor, soft texture, and are easy to digest. Whole moong bean is known as 'sabat moong'. Whole moong dal are small yellowish green beans fairly used in Pakistan, India, China, Thailand and Japan. Its green pods are also eaten as a vegetable.

Sprouted moong beans they are used in salads or stir fries with lemon juice or vinaigrette. These beans are sprouted to produce bean sprouts, which contain vitamin C, not found in the dry bean.



"In Pakistan , Moong dal (Whole or split) is used to make delicious dals and curries. The dal may be cooked with a variety of spices and other vegetables.

Moong dal in particular is very easy to digest. Dals take on seasonings and spices very well. Dal is a very comforting food just like chicken soup. In Malaysia a sweet porridge served warm has moong beans as its base, then palm sugar and coconut milk are added. In Sri Lanka, moong beans are roasted and ground, mixed with palm sugar, spread out thinly and cut into squares or diamond shapes. Thin slabs of it are dipped in rice flour batter and fried to make 'mung kavum', a favourite sweet snack. The starch from moong beans is used to make bean thread noodles, cellophane noodles and spring rain noodles.



How to sprout Moong Beans

In Pakistan the moong pulse is mostly used in the form of Dal, split form, and sometime as a whole. The use of its sprouted form is not so common in Pakistan. While, In world, the primary use of moong beans is for the production of bean sprouts, sprouting quality determines marketability. Whole seed of bright green color is a surface indicator of good sprouting potential. Harvest damage, prolonged standing in the field, and molding associated with rain damage deteriorates seed coat color and impairs sprouting quality, and may make a seed lot unusable and unsalable. Early planting and timely harvest often improve opportunities for high quality seed and sprouts. The sprouted beans contain vitamin C, which is not found in the dry bean.



The main requirements for successful sprouting are moisture, warmth, and (in most cases) some indirect sunlight. Provided a few guidelines are followed, it is remarkably easy to obtain good results requiring very little time, effort or space. Initially a small handful of seeds should be run under a tap, then left at room temperature (between 13 and 21 degrees Celsius) in the sprouting vessel. Although a number of items can be utilized for this task ranging from a jam jar with a piece of net curtain secured over its rim by an elastic band. It is highly important that the vessel is free draining, for waterlogged sprouts will quickly rot. The seeds will soon swell, and within a day or two begin germination. They should then be rinsed at least twice a day, possibly even three or four times in hot weather, or they may quickly sour. After around four to five days they will have grown to around two or three inches in length and will be suitable for use. If left much longer they will begin to develop leaves and can become bitter tasting, although the growth process can be halted by placing them in the fridge until needed. Although sprouting of mung beans is generally successful once a routine has been developed, it is not uncommon for beginners to experience failures, although these are often due to the following causes which can be easily remedied once recognized;

- Seeds being allowed to dry out
- Seeds being waterlogged
- Temperature too high or too low
- Insufficient rinsing
- Dirty equipment
- Insufficient air flow



Moong beans can be sprouted either in light or dark conditions, e.g. an airing cupboard. Those sprouted in the dark will be crisper in texture and whiter, but have less nutritional content. Growing in full sunlight however should be avoided as this may cause the beans to overheat or dry out. Subjecting the sprouts to pressure, for example, by placing a weight on top of them in their sprouting container, will result in larger, crunchier sprouts.

Harvesting of Moong Bean

Its harvesting required a special attention because it is a critical stage in moong bean production, slightly mistake at this stage will affects its quality & pre-harvest loss can be increased. Its harvesting should start at the time when more than 95% of pods are mature and dry.

Harvesting too early results in the loss of immature pods while harvesting too late can also result in losses as pods are shaken from the plant during the harvest operation. A desiccant is often used to kill green leaf and the few remaining green pods before harvest. Beans are easily split or damaged during heading but this can be minimized by harvesting at the correct seed moisture content (14-16%), avoiding harvest during the middle of the day, and careful attention to header settings. Small cracks in the seed coat that are not readily visible can occur with incorrect header settings or rough handling and can cause downgrading of a seed lot due to a high over soak level.



After harvesting, beans are graded by proper cleaning, graded and bagged as soon as possible. Then it can be sold to Dal factories or to the commission agents in the grain market.

Storage of pulse

Pulses are also more sensitive to storage conditions than cereals. High temperature, high relative humidity, high seed moisture content, light exposure and an extended storage period have all been found to adversely affect quality and increase the storage losses. These factors may cause more



pest attack and hard-to-cook defect in pulses. The hard to cook defect is characterized by increased energy requirements for cooking and reduced quality of protein.

Poor handling and storage of pulses will also adversely affect grain kept for seed. Similarly, poor handling can damage the seed before its end use.

Effective handling and storage of pulse grains on farms must consider the following points:

- Special care during Loading and Unloading
- Store only dry and clean grain which contains no foreign seeds or other material.
- Moisture content of grain should be checked by moisture meters. Grains should be stored at dry places which are safe with the problem of moisture migration.
- Store/ Godown should be properly fumigated. The grain temperature must be above 15 °C before it can be effectively fumigated. Below 15°C insects may not be controlled by the fumigation.
- If possible then it should stored in cool or low temperature places.
- Proper aeration of stored grains. This improves the quality of the grain & maintains the temperature.



Processing of pulse:

In pulse processing the following steps are necessary to adopt;

- Selection of normal pulse, the best bold quality of raw pulse should be selected for processing in to split Pulse.
- Proper filtration, all the impurities, dust particles, etc., should be removed / filtered.
- De-Hydration, the pulse should be heated up to 70 degree c by dryers and kept for 48 hours.
- Crushing
- De-Husking Final de-husking of pulse and should be well dried by natural sunlight heating system.
- Splitting & grading: after natural drying of pulse, the pulse should be split by very natural system. Split pulse is now ready for sorting and grading.
- Cleaning: all impurities should be removed like immature rains and foreign substances from pulse & should make the product 100 % cleaned, hygienic and ready to cook.
- Proper Weighment
- Proper Packing



Production of pulses in Pakistan:

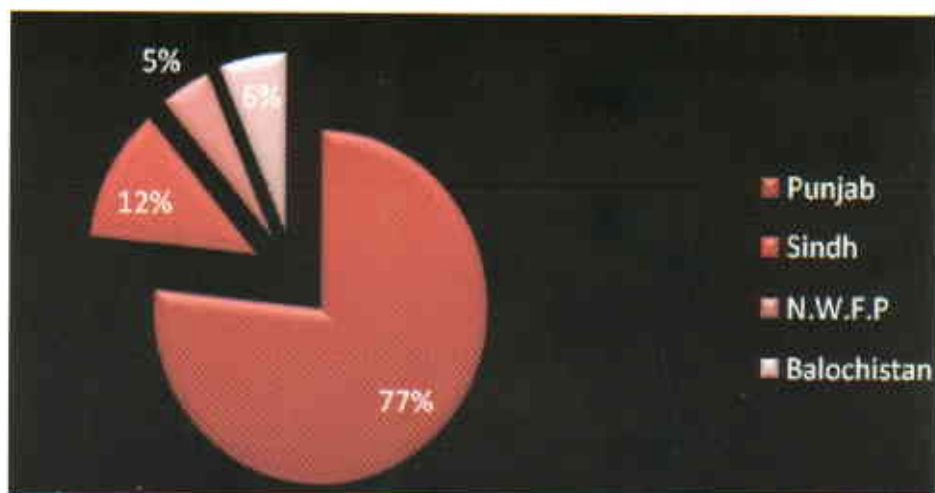
In terms of area and production, Punjab is a major pulse-growing province, followed by Sindh and NWFP. Overall, Punjab is producing about 77 percent of the total pulse production.

The following table indicates that the area under pulses is being declined gradually and production of pulses in Pakistan is almost stagnant. Presently, a wide gap is existed between our national demand of the pulses and the total production of pulses. With the existing gap the demand for pulses is further increasing. Unfortunately, pulses are still treated as minor crops. This negligence is being imposed serious threats to our economy by raising the import bill. The import bill of pulses is increasing day by day and during the year 2006-07 Pakistan imports the pulses of 225,192 (000 US Dollars) which is 43.03 percent more in value than the import of pulses last year 2005-06. This unnecessary import is raising the trade deficit of our country whereas on the other side, this situation has created severe problems of protein deficiency in the rural population, as well for the poor community which is living in the cities.



In the Production of pulses Punjab is a main contributor and its share was about 77 percent in the total production of pulses during the year 2005-06.

Percentage share of provinces in the production of Pulses during the year 2005-06



Area under all pulses:

(Gram, Mung, Mash, Masoor, Mattar, Other Kharif & Rabi Pulses) produces in Pakistan

(Area under all pulses in 000 hectares)

Year	Punjab	Sindh	N.W.F.P	Balochistan	Pakistan
1995-96	1208.8	216.5	138.9	34.8	1599.0
1996-97	1220.2	213.0	119.3	22.3	1574.8
1997-98	1199.3	216.2	119.6	29.5	1564.6
1998-99	1170.3	222.7	11.3	26.2	1530.5
1999-00	1096.1	210.9	86.6	25.3	1418.9
2000-01	1074.6	149.2	83.9	21.6	1329.3
2001-02	1140.6	127.6	86.3	25.6	1379.5
2002-03	1207.3	115.3	73.2	28.2	1424.0
2003-04	1187.9	153.8	85.1	29.8	1456.6
2004-05	1245.5	120.7	73.9	51.8	1491.9
2005-06	1163.2	122.2	60.6	58.5	1404.5

Source: Government of Pakistan, Ministry of Food, Agriculture & Livestock (Economic wing) Islamabad.

Production of all pulses:

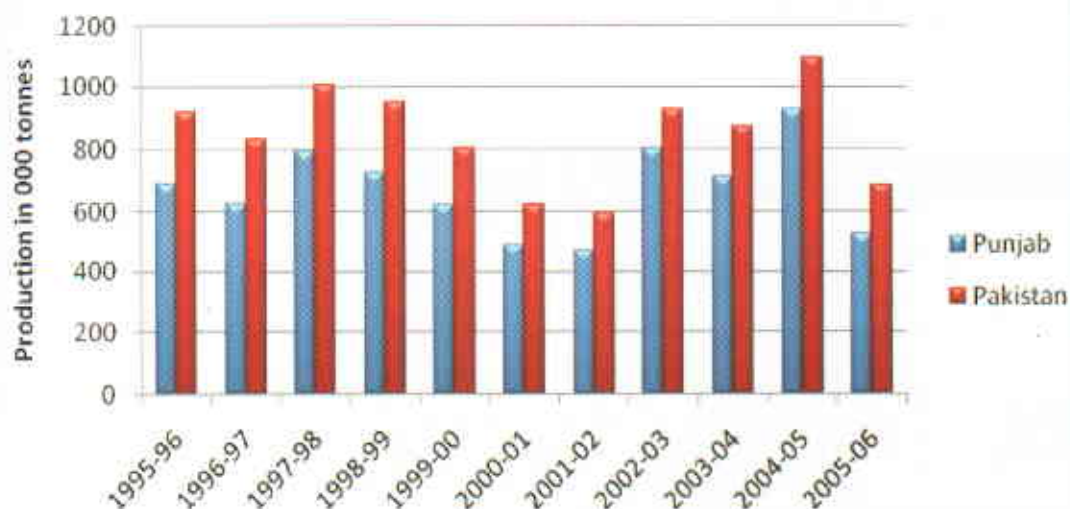
(Gram, Mung, Mash, Masoor, Mattar, Other Kharif & Rabi Pulses) produces in Pakistan

(Area under all pulses in 000 hectares)

Year	Punjab	Sindh	N.W.F.P	Balochistan	Pakistan
1995-96	688.6	137.1	67.0	25.9	918.6
1996-97	625.8	136.8	53.3	16.6	832.4
1997-98	793.9	139.4	52.2	21.9	1007.4
1998-99	727.3	157.2	47.8	19.1	951.4
1999-00	619.7	132.5	31.9	18.3	802.4
2000-01	487.8	94.1	23.5	16.0	621.4
2001-02	471.2	75.9	27.5	19.2	593.8
2002-03	804.0	72.7	32.3	21.2	930.2
2003-04	711.9	103.7	34.0	21.2	870.8
2004-05	927.5	79.7	47.3	39.7	1094.2
2005-06	524.7	83.5	33.0	43.6	684.8

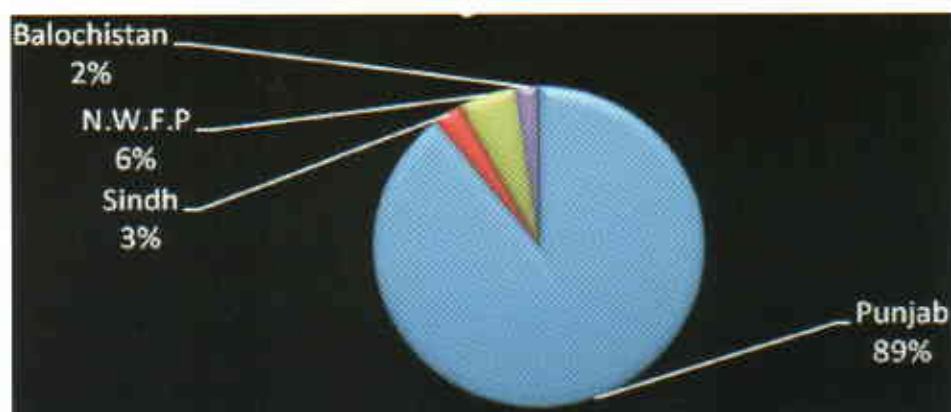
Source: Government of Pakistan, Ministry of Food, Agriculture & Livestock (Economic wing) Islamabad.

Production of Pulses:



Among these pulses Moong bean is a major summer pulse crop and is cultivated in Pakistan during Kharif season. It is mostly grown as an opportunity crop in rotation with cereals. Its main advantages are that, being a legume, it does not require nitrogen fertilizer application, and it has a short (75-90 days) growth duration which means that it requires less water than many other crops and is easily fitted into rotations. It is cultivated both in irrigated and rain fed (Barani) areas. In Moong production Punjab is a main producer which produces about 89 percent of the total Pakistan production of Moong pulse.

Share of Provinces in the production of Moong during the Year 2005-06



Area under Moong:

In Punjab during the Year 2002-03 Moong Pulse was cultivated on an area of 237.3 (000 Hectares) which was the maximum area cultivated under this crop in the last decade. But after that it start declining and attain the figure of 189.3 (000 Hectares) during 2005-06. This declining trend in area also affected the total production of Moong pulse in the Punjab.

(000 hectares)

Year	Punjab	Sindh	N.W.F.P	Balochistan	Pakistan
1995-96	174.1	9.8	8.1	7.1	199.1
1996-97	172.5	7.0	8.7	4.2	192.4
1997-98	166.3	9.3	9.2	10.6	195.4
1998-99	170.7	11.7	9.0	8.1	199.5
1999-00	179.6	8.1	8.6	6.4	202.7
2000-01	198.5	8.1	9.5	3.1	219.2
2001-02	215.8	11.1	9.3	3.0	239.2
2002-03	237.3	4.9	12.6	2.9	257.7
2003-04	231.0	10.3	11.6	3.0	255.9
2004-05	206.6	4.8	10.6	3.4	225.4
2005-06	189.3	5.5	9.9	3.8	208.5

Source: Government of Pakistan, Ministry of Food, Agriculture & Livestock (Economic wing) Islamabad.

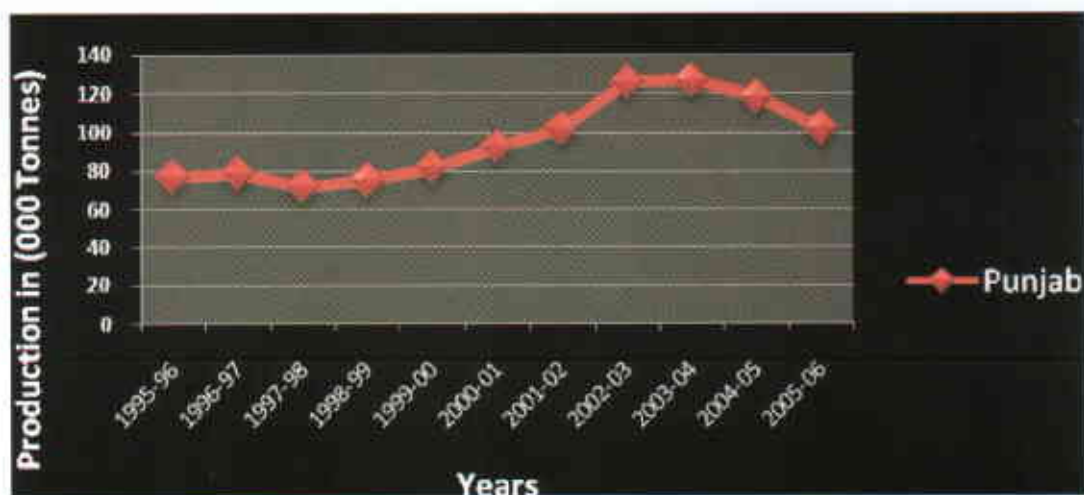
Area under Moong Pulse in Punjab:



Production of Moong:

In Punjab, the production trend of Moong pulses shows also diminish trend. But on the whole the production of moong pulse in Pakistan during last decade shows nominal increase. In 1995-96 the Pakistan produced 90.6 (000 Tonnes) which was increased and attained the figure of 113.9 (000 Tonnes) during 2005-06.

Production of Moong Pulse in Punjab:



(Production in 000 Tonnes)

Year	Punjab	Sindh	N.W.F.P	Balochistan	Pakistan
1995-96	77.2	4.0	4.6	4.8	90.6
1996-97	78.7	2.9	5.0	2.9	89.5
1997-98	72.0	3.9	5.5	7.5	88.9
1998-99	75.1	4.7	5.6	5.1	90.5
1999-00	82.0	3.2	5.5	4.1	94.8
2000-01	92.7	3.7	6.1	2.0	104.5
2001-02	102.0	5.5	5.9	2.0	115.4
2002-03	125.7	2.3	8.1	2.3	138.4
2003-04	126.8	4.4	7.5	2.0	140.7
2004-05	118.3	2.3	6.8	2.6	130.0
2005-06	101.8	3.2	6.4	2.5	113.9

Source: Government of Pakistan, Ministry of Food, Agriculture & Livestock (Economic wing) Islamabad.

Yield of Moong Pulse.

The comparison of last decade of per hectare yield of Moong pulse crop in Pakistan indicates not a remarkable increase.

(Yield in Kgs per hectare)

Year	Punjab	Sindh	N.W.F.P	Balochistan	Pakistan
1995-96	443	406	576	675	455
1996-97	456	412	578	674	465
1997-98	433	425	594	707	455
1998-99	440	401	627	631	453
1999-00	457	397	638	640	468
2000-01	467	457	642	645	477
2001-02	472	494	636	687	482
2002-03	530	469	646	807	537
2003-04	549	421	652	650	550
2004-05	573	481	644	752	577
2005-06	538	582	646	658	546

Source: Government of Pakistan, Ministry of Food, Agriculture & Livestock (Economic wing) Islamabad.

Moong pulse in Punjab is mainly produced in Bhakkar, Mianwali, Layyah, Jhang, Sargodha, Khushab and Bahawalnagar. In Sindh it produces in Sanghar, Tharparkar, MirpurKhas and Hyderabad districts, In NWFP Kurram, Dir lower, Haripur and Hangu are the major producers, Similarly in Baluchistan Nasirabad, Sabi, and Bolan etc are the main producing districts of Moong pulse.

In Punjab Bhakkar district contributes major portion of production, which is about 46 percent. Its detail is given as under;



District wise Area & Production of Moong in the Punjab for the Year 2005-06:

S.No.	District	Area (Hectares)	Production (Tonnes)	% age Share in Area	% age Share in Production
1	Bhakkar	80511	46808	42.54	45.99
2	Mianwali	44162	20656	23.33	20.30
3	Layyah	40323	22761	21.31	22.37
4	Jhang	4418	2037	2.33	2.00
5	Sargodha	2603	1321	1.38	1.30
6	Khushab	2781	1189	1.47	1.17
7	Bawalnagar	1234	854	0.65	0.84
8	Muzafar Ghar	1695	808	0.90	0.79
9	Other Districts	11538	5334	6.10	5.24

District wise Area & Production of Moong in Punjab for the Year 2005-06

