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Legume crop cultivation status in Punjab with reference to problems faced by farmers during its production

Anirudh and Sandeep Menon

Abstract

Punjab predominantly follows the rice and wheat farming system. At present this farming system is facing a serious crisis as according to renowned researchers' wheat and rice cropping system have either stagnated or declined. The researchers are also planning to shift the area from paddy and wheat to legume crops. Cultivation of legume crop also provides an opportunity for the third crop in a year and also introduces diversification in the typical conventional farming system. Farmers can sow high-yielding short-duration varieties of pulses in between rice and wheat cropping systems to generate additional income. Moreover, the diversification in the farming system of Punjab will control the overexploitation of natural resources by the farmers as it will maintain the sustainability of the system by maintaining soil fertility and by providing Nitrogen and organic matter. In order to enhance the pulse production National Food Security Mission- Pulses Programme was started in Punjab from 2007-08. NFSM was helpful to increase the production and area of sample farms in different districts of Punjab. The study shows that the cultivation of pulses is profitable but the lack of government procurement and unstable productivity of pulses as compared to cereal crops act as a barrier in increasing the area under pulses in Punjab. It is recommended that government should provide the minimum supporting price like rice and wheat, high yielding varieties on the specific location-based for the legume crops to increase its productivity in Punjab. This will encourage the farmers to grow pulses in the rice-wheat cropping system.

Keywords: Legumes, benefits and constraints, NFSM-pulses, legume production, cultivation status, crop diversification, Punjab

Introduction

In India, people are vegetarian by large and require a vegetative source to meet their protein requirement. India is a global leader in both the consumption and production of pulses. Pulses have an important place in Indian agriculture as pulses are leguminous and therefore increase the fertility of the soil. In India, people fulfill their 20 to 30 percent of requirements from pulses as it is the cheapest source of protein. India is a leader in importing pulses, the production of legume crops is not increasing over the years. The per capita pulses availability is very less as compared to that is recommended by diet experts. The intake of pulse recommended by the Indian Council of Medical Research is 60 gram/day. Per capita availability of pulses is decreasing every passing decade.

There is a wide difference between demand and supply. 20% demand of the pulses is met only by imports. Legume crops help to fix the readily available form of Nitrogen for the succeeding crops. If the legumes are sown with some non-leguminous crop then that crop also gets benefited by nitrogen transfer from the roots of leguminous crops. It also improves the chemical, physical and biological properties of the soil and contributes to the sustainable production system.

All three seasons are suitable for growing pulses. In Kharif, different crops can be grown such as Urd (black gram), Arhar (Tur), Lobia (Cowpea), Moong (Green gram), Moth, and Kulthi (Horse gram). In Rabi Season- Lentil, Rajmash, Gram, Lathyrus, and Pea. In summer Black gram, Green gram, Cowpea, and Black gram are grown. In legume crops, the seed replacement rate is lower than the cereal crops like rice and wheat. Gram or Chickpea and Tur or Pigeon pea which together make 61% of the total production of pulses are major legumes grown, the suitable season for growing chickpeas is October to March that is post rainy season and the rainy season is optimum for growing pigeon peas. Other legumes of post rainy season are Grass pea, peas, and lentils, a warmer climate is most suitable for growing post rainy season crops but if irrigation is available it can also be grown in both seasons Whereas, black gram,

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Green gram, and cowpea are suitable to grow in both the seasons. Other rainy season legume crops with less regional importance are Sweet moth bean (*Vigna acantifolia*), beans (*Lablab purpureus L.*), soybean (*Glycine max*), and cluster beans (*Cyamopsis tetragonolobus*). Groundnuts are the major legume crop in oilseed.

The wheat- rice cropping system of Punjab is an agriculturally advanced state that has contributed to food self-sufficiency, enhancing food production and food security. At present Punjab, agriculture is facing a serious crisis time because according to a study total factor productivity of the Rice wheat cropping system has either stagnated or declined. Therefore planners and scientists of Punjab are shifting the area from wheat and paddy to other crops like pulses and oilseeds and advocating crop diversification because legume crops maintain the sustainability of the system by providing organic matter, nitrogen and therefore it makes the soil more fertile for the succeeding crops in that field. Pulses have an important place in the farming system in Punjab, but production, productivity and have declined over the years. This led to a continuous decline in the per capita pulses availability in Punjab. Pulses, being an integral part of the human diet and rich protein sources are known to form the diversifying crop pattern in Punjab.

Past status of legume crop in Punjab

- In the past, it was decided and suggested that Pulses Development Project should be present in the entire state of Punjab and certified seeds that are inadequate quantity along with the culture of Rhizobium should be available to the farmers who are interested in sowing the pulses well before the sowing time.
- From 1988 onwards the secondary data on productions, area, yields, procurements scenario, and irrigated area were collected. The data of Rabi pulses helped to know that area under production and area under gram and lentil declined in almost all the districts except few districts. Yield trends helped to know that productivity increased in the case of a gram and declined in the case of lentil. Trends in the production and area of Kharif crops indicated that in the case of arhar and mash it declined and in moong crops, production and area increased in the past years.
- The National Food Security Mission for pulses started in Punjab from 2007-08 which helps to promote pulses cultivation in Punjab.
- For the comparison of the economics of pulse production, one non- NFSM and one NFSM district namely Moga and Ferozpur were selected to know the pulses acreage
- NFSM pulses were helpful to increase the production and area of pulses in the sample farms like Ferozpur and showed more impact.
- The pulses acreage did not augment due to the absence of any procurement support or government market. Pulses are risky in terms of profitability and productivity so, adequate insurance cover should be provided to the grower so that they can compensate for the damage done to the pulse crop in case of natural calamities and unseasonal rainfalls.
- The data of the Punjab government showed that in 1980-81 there were 1,38,320 acres under pulses. In 2000-01 the production was 42,003 tonnes which increased to 74,470 ha and production of 56,300 tonnes. In the past two decades, a major decline is seen.

Present status of legume crop in Punjab

- Punjab is known as the breadbasket of India. Punjab has the highest contribution in paddy and wheat to the national pool but has declined trend in pulses cultivation.
- From 2010-11 to 2019-20 that is the latest decade showed a further decline of the pulses.
- In the current year, the area under pulses is 11,700 hectares that is a 27% decreased from the previous decade.
- The area under agriculture land of Punjab does not contribute to be even one percent. According to the sources Punjab fails to grow even 3% of pulse against the total pulse required by the state. The annual production of Punjab in pulses is around 10,000 tonnes whereas according to the Agriculture Department estimate, Punjab requires around 6 lakh tonnes of pulse production annually.
- Most of the farmers are under crisis and the growing of pulse crops can boost their income. Punjab leads in the production of rice and wheat but lags in pulses and dependent on other states for the requirement. Now the Punjab Agriculture Department wants to increase their self-dependence in the cultivation of pulses and wants to increase the farmer's income.
- Moong provides a farmer an opportunity of the third crop in a year and it also helps in maintaining the fertility of the soil.
- In Punjab, the appropriate time for pulses cultivation is the spring/summer months (March to May). Cultivation of pulses also occupies the vacant land that is left after the potato and wheat harvesting for 2 months. The crop duration of moong mash dal is less and it can be easily harvested before the sowing of rice by the third week of June as the crop is for 65 days only.
- To increase the area under legumes government took the initiative and distributing 4- kg kits to the farmers who are interested in the cultivation of pulses free of cost to multiply the seed. It also helped in the awareness of farmers. The government also organized training camps to demonstrate the latest sowing techniques of pulses. The kits will help the farmers to get the yield that can be used for the next cultivation of legumes around 20 acres

Area under different legume crops

Moong

During 2018- 19 moong occupied 3.2 thousand hectares and 2.7 thousand tonnes was the total production of the crop in Punjab. 8.34 quintals per hectare were the average yield.

Recommended varieties of moong in Punjab are

SML 134 during summer, ML 5, ML 818, SML 1827, ML 613, SML 134, Ganga 1, ML 131.

Mash

In the year 2018-19 mash was cultivated on 2.0 thousand hectares and 1.1 thousand tonnes was the total production in Punjab. 5.5 quintals per hectare were the average grain yield.

Recommended varieties of mash in Punjab are

- Mash 114 (2008) - It is an improved variety and recommended for every district of the Punjab state. The duration of the crop is 83 days. Each pod of this variety is filled with 6-7 seeds, which are black, bold, and have very good culinary properties. The average grain yield of

this variety is 3.6 quintals per acre. It is also resistant to diseases like bacterial leaf spot, Cercospora leaf spot, and yellow mosaic virus

- Mash 338 (1993): This variety is recommended in every district of Punjab state. Plants are compact, dwarf, and erect. Its duration is 90 days. Podding is profuse in nature and each pod consists of 6 seeds approx, which are black, bold, and have good culinary properties. 3.5 quintals are the average grain yield of this variety. It is tolerant to bacterial leaf spots, Cercospora leaf spots, and yellow mosaic virus.

Arhar

It occupied 2.3 thousand hectares in the year 2018- 19 in Punjab state. The total production of Arhar crop was 2.4 thousand tonnes. 10.47 quintals per hectare were the average yield.

Recommended varieties of Arhar in Punjab are

AL 882 (2018), AL 201(1993) and PAY (2007)

Soybean

Soybean is an important crop with multiple feed, food, and

uses in industries. It is considered as a high value. Soymilk, edible oil, antibiotics, and fresh beans are their major uses. It is important for the diversification of the crop system in the Punjab state.

Improved Varieties

SL 744 (2010), SL 958 (2014), SL 525 (2003)

Groundnut

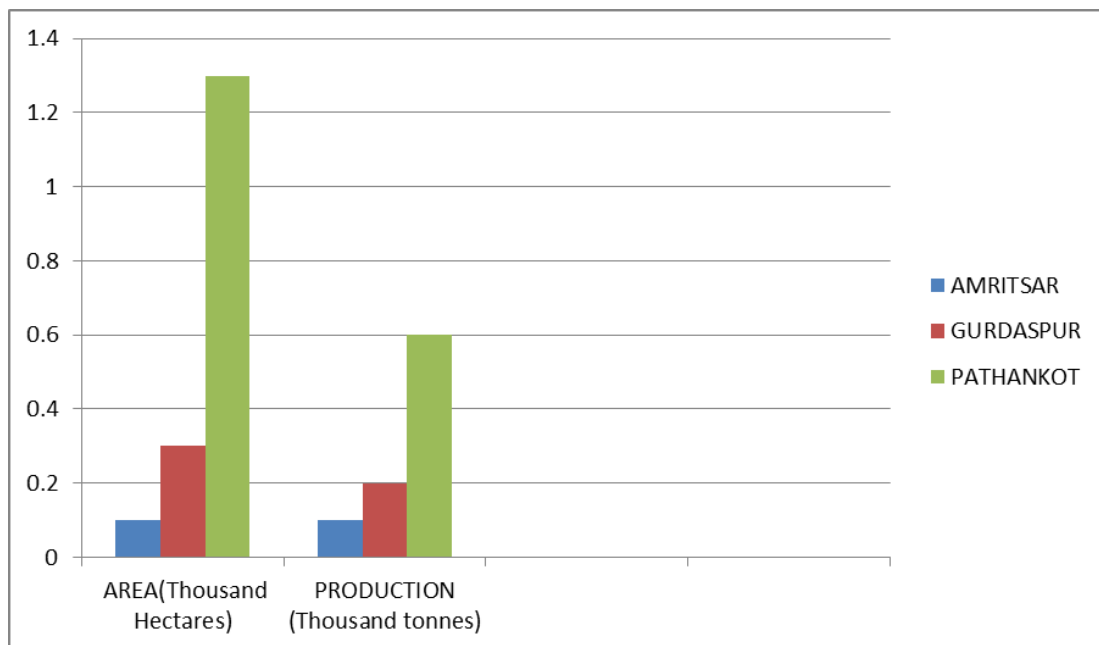
Groundnut occupied 1.3 thousand ha. of land during 2018-19 in Punjab state. The average yield was about 19.8 quintals per hectare and 2.6 thousand tonnes was the total production.

Improved Varieties

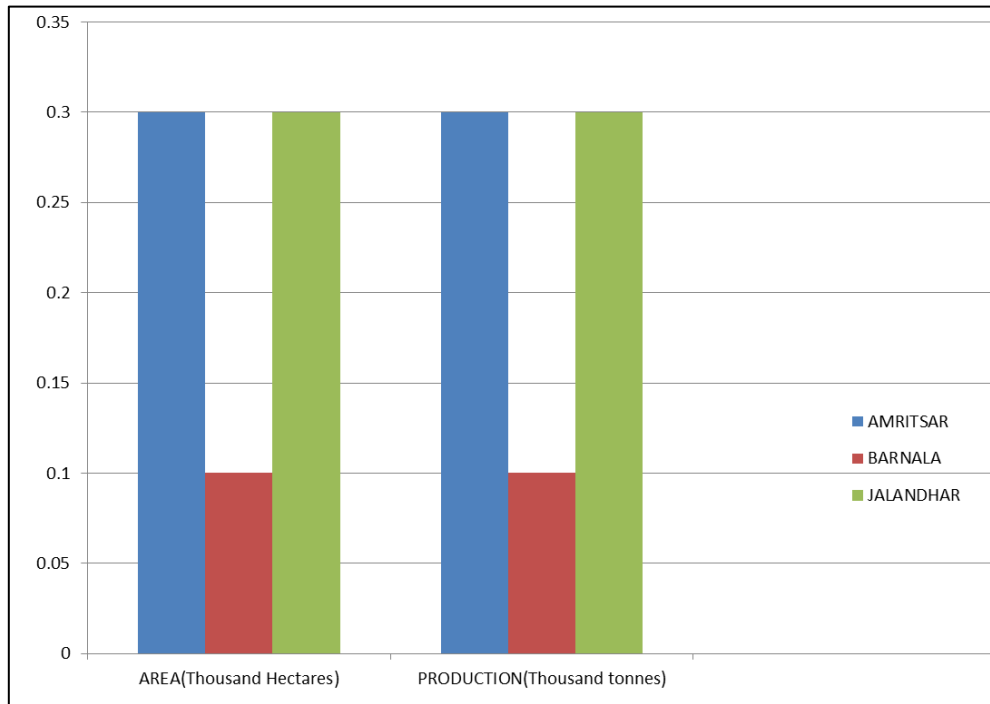
M 522 (1995), TG 37A (2018), J 87 (2020) SG 84 (1986), SG 99 (2004)

Sesame

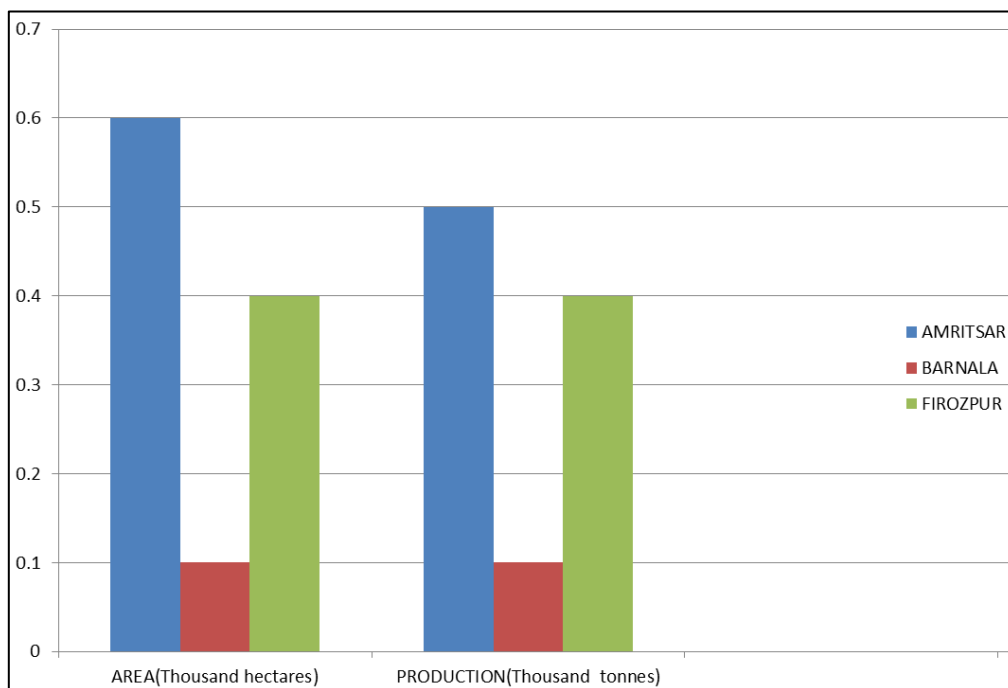
Sesame occupied 2.9 thousand hectares and the production was 0.8 thousand tonnes during 2018-19 in the Punjab state. 2.73 quintals were the average yield.



Graph 1: Graphical representation of MASH crop in terms of area and production in the different districts of Punjab during 2018-19.



Graph 2: Graphical representation of ARHAR crop in terms of area and production in the different districts of Punjab during 2018-19



Graph 3: Graphical representation of Moong crop in terms of area and production in the different districts of Punjab during 2018-19.

Problems Faced By Legume Crop Production in Punjab
Production related constraints

- Farmers have less knowledge or poor socio-economic therefore farmers do not practice the seed treatment, adaption of proper crop management/cropping sequence, and Rhizobium inoculation to meet any contingent situation.
- High wilt disease in chickpea, Lathyrus, pigeon pea, and yellow mosaic virus in Urd bean and moong bean chances increases with delay in sowing date. Untimely rainfall, frost, relative humidity, and cloudy weather to the rabi pulses, are the major production-related constraints, especially at the flowering stage.
- Yield decreases because of late sowing and results in a

smaller leaf area, short stature, short-grain filling period, and fewer nodes. This can be corrected by the popularization of varieties with better sink and longer phases of reproduction.

- Fruit and flower drop leads to poor sink realization that goes up to 35-35% due to reduced light intensity, hormonal imbalance, water, and soil factor, high temperature, gas exchange in the canopy, at grain filling time low activity of RUBP Carboxylase enzyme, moisture and stress caused by high temperature, high pest infestation, high abscission, repeated sowing due to poor germination, monsoon behaviour, soil salinity, alkalinity, and low nitrogen availability, etc, are some constraints in pulses production

- Cultivation of pulses on the low-quality lands results in poor and low yield quality of grains in the NFSM districts of Ferozpur. 10% of farmers reported this problem in low-quality lands.
- Legume crops lack in competing for soil nutrients with other crops in intercropping and traditional mixed systems. Legume crop productivity is reduced when legume crop is a minority among other mixed crops.
- The legume grown in the post rainy season is poor.

Input related constraints

- Non-availability of recommended high-yielding varieties seeds on the specific location-based. Because generally production and distribution are done for very old varieties that are poor performers.
- Lack of Post Harvest Technology support and domestic milling support.
- 1-2 critical irrigation is best for pulses to respond favourably, but the non-opening of canals, less priority to the pulses/legumes, and lack of power supply or low voltage addressing micro- irrigation problems.

Market- related constraints

- Unorganized and distressed sales, connectivity to

mandies, difficult access to warehousing, price security, exploitation of farmers in mandies, heavy storage loss that is up to 20-30%, open market prices above MSP is ruling, are some of the major market-related constraints.

- The difference between whole and milled product price in the chain of producer– buyer-consumer, small scale processing has lack of support, non-linking of pulses to procurement policy and value addition, at domestic level lack of scientific storage facilities and packaging are other market-related constraints.

Technology-related constraints

Lack of knowledge on nutrient use efficiency, integrated pest management, poor knowledge about spray solutions, and multiplicity of extension systems are the major constraints related to technology transfer.

Lack of credit and cash

Cash is the element that helps the farmer to shift to high input high output agriculture from low input low output production. But the farmers have a low risk-bearing ability and low asset base therefore they have low access to credit. Credit facilities from informal and formal sources are limited for pulse crops due to unstable returns.

Table showing damage to different crop under climate variability

Climate variability	Damage %	Crop
1. Cold in midseason heat in <i>Rabi</i> season	10-40%	Pigeonpea, gram
2. Micronutrient deficiency unbalanced use soil test; issues in quality		All Crops
3. Pod borer complex	40-60% 10-90%	Pigeon pea Chickpea
4. Region specific technologys Pigeonpea on bunds transplanting/intercro pping etc		All crops

Suggestion to grow legume in Punjab and steps taken by government to increase legume production

- Pulses cultivation has fallen in the agriculture map of Punjab state. However, the new high-yielding varieties of short-duration pigeon pea developed by ICRISAT can help to increase the area of legume crop in Punjab. Conservation of groundwater and soil degradation process can be reversed by the cultivation of water-efficient varieties of pigeon peas.
- Legumes can be introduced in the rice-wheat cropping system; it can introduce diversification from the typical conventional farming system of rice-wheat. Legumes will enhance soil fertility.
- The introduction of minimum support prices in legumes can encourage farmers to grow more legumes in their rice-wheat cropping cycles.
- According to a chief agriculture officer, Jalandhar if farmers get minimum support price for moong then farmers can earn 35,000 to Rs. 42,000 per acre from the 5-6 quintals moong per acre. The input cost including labor, seed, and other expenditure would be Rs. 8000-9000 per acre. It will maximize the farmer's profit even those who have small landholdings (one hectare) which can earn around 55000 in two month period after excluding the input cost.
- Farmers want the government to make a separate local procurement system, so that whatever produce is there can be consumed in Punjab only.
- Seed priming should be adopted, Rhizobium strain treatment to seeds, use gypsum in saline soils, lime pelleting for acidic soils, sowing should be done in moist

soil(in chickpea) for good crop establishment.

- Integrated disease and pest management strategies should be done like seed treatment, application of different fungicides to avoid major biotic stresses during the cultivation of pulses mostly to those which are grown after rice crop.
- The phosphorous requirement of crops is high therefore the optimum application of SSP and DAP should be done at the sowing time and it should be available at a subsidized rate. The use of micronutrients like B, Zn, Fe, Mo helps in the productivity of legumes.
- An increase in cropping intensity by inter/mixed/multiple cropping etc should be done. Timely and adequate use of critical inputs should be adopted with assured quality.

Conclusion

NFSM system in the Punjab state showed a positive impact on pulse cultivation in the Ferozpur district. This happened due to area increased and therefore resulted in higher production in the sample farms of the district. Summer moong cultivation in the state is adopted by farmers because of the availability of vacant land after wheat harvesting after a month of April and before rice sowing in that fallow land. Cultivation of summer moong provides additional income to the farmers and also helps to make the soil more fertile for the succeeding crops. It can be an additional income-generating enterprise for the farmers.

The area is increased for gram and Kharif moong in the sample farms of Ferozpur under the NFSM scheme started by the government. But the total return from the pulses is still less than the wheat and paddy that are the major competing crops. NFSM has shown a positive impact in area and

production but the lack of government agency procurement in Punjab acts as a hurdle in increasing the area of pulses in the state. Since these crops are risky in terms of profitability because of low yield hence, farmers should be provided with insurance cover for the legume crops in the state if the crop gets damaged because of natural calamities and unseasonal rainfalls. It will encourage the farmers to grow more legumes and will help the farmers to become financially stable. As there is a proper marketing mechanism for wheat and paddy same is needed for the legumes to make legume crop cultivation as the alternative source of income to the farmers. Diversification of Punjab agriculture by the legumes cultivation with help to overcome the overexploitation of natural resources.

The rice-wheat cultivation has contributed to achieving food self-sufficiency and enhancing food production. But according to the present study rice-wheat cropping system is becoming stagnant from the last decade. The cost of cultivation of these crops has increased as input prices are increasing such as pesticides and fertilizers. Therefore, there is a need to increase the area under other crops like pulses and oilseeds to sustain the agriculture in Punjab. But the production, area, and productivity of pulses have declined over the years in Punjab state. That led to a decline in per capita pulses availability in the state. Pulses are considered as the 106 options for agriculture diversification in Punjab as these are an integral part of the diet and a rich source of protein. To increase the production and area under legumes we need to adopt region-specific or area-specific approaches such as 1- including legumes crops in multiple cropping systems. 2- Legumes should be grown as intercrops. 3- Intercropping should be done with the crops where rainfall occurs and people practice single cropping. 4- Developing cultivars suitable for problematic soils that should increase the legume performance. 5- Developing disease and pest-resistant varieties. 6- Development of nitrogen-fixing varieties. 7- Development of better storage facilities and improving infrastructure.

References

1. Singh JM, Grover DK. Impact of national food security mission-pulses on legumes production performance in Punjab, India. *Legume Research: An International Journal*, 2015, 38(5).
2. Rao MR. Legumes production in traditional and improved cropping systems in India. In *Symposium on Grain Legumes Production*, 1982, 113-134.
3. Kaur S, Gupta S. Original Paper Economics of Pulse Cultivation in Punjab. *World*, 2018, 5(4).
4. Singh AK, Singh SS, Prakash VED, Kumar S, Dwivedi SK. Pulses production in India: Present status, sent status, bottleneck and way forward. *Journal of Agri Search*. 2015;2(2):75-83.
5. Ghatha IS, Singh J. Causes of stagnation in production of pulses and oil seeds in Punjab. *Economic Affairs (Calcutta)*. 1983;28(3):774.
6. https://pdf.usaid.gov/pdf_docs/Pnack223.pdf
7. https://www.pau.edu/content/ccil/pf/pp_rabi.pdf
8. <https://indianexpress.com/article/explained/why-punjab-wants-to-push-pulses-cultivation/>