

Lecture 13

Chapter No.6 PULSES

Importance of pulses in indian agriculture:

- Pulse crops called grain legumes are the most important food crops after cereals.
- They have been valued as food, fodder and feed and have remained as main stay of Indian agriculture.
- The term pulse is derived from the latin word “Puls” meaning “pottage” (thick soup)
- Pulse crops play an important role in agricultural economy of India .
- They fix atmospheric nitrogen and their deep penetrating root system enable the plants to utilize limited available moisture more efficiently.
- Indian Institute of Pulse Research (IIPR) was established in 1993 at Kanpur
- In 1992-93, Technology Mission on Pulses was started by 2 sub terms.
- NPDP : National Pulse Development Programme.
- SFPP : Special Food grain Production Programme.
- Per capita requirement of Pulses :
- Per capita requirement of Pulses: Acc. To ICMR – 150gm /day and Acc. To FAO – 140gm /day
- At present, the per capita availability of pulses in India is only 47gm/day

Importance of Pulses:

- They are rich source of proteins
- The average protein available in pulses is 20-30%. Pulses are rich in ‘Ca’ & Phosphorous. They are also good sources of Vitamins.
- Pulses provide a superior quality of fodder & feed to the cattle, as they are good forage crops with proteins and minerals content.
- They are considered as good green manure crops because of rich canopy development.
- They improve the soil fertility by biological nitrogen fixation
- The nitrogen needs of pulses is low & minimizes the N requirement of succeeding crop by around ¼ of its total requirement.
- Pulses help in the Soil and Water conservation.
- They improve the physical condition of the soil like soil aeration, water holding capacity by improving microbial population, breaking of hard pans and moisture retention.
- Pulses are important in crop mixtures / rotation. They act as catch crops.
- Some crops act as smothering crops which control weeds & protects soil from erosion E.g.:- Cowpea and Horse gram. Pulses can also be used better intercrops.

PULSES -REASONS FOR LOW YIELDS OF PULSES IN INDIA

In spite of the importance of pulses in our daily diet, the production of pulses has not yet increased proportionately as that was increased in the cereal production. Looking the situation being a national level problem, it is important to analyse different constraints leading to low productivity of pulses. The following have been realized the major constraints in pulse production.

I. AGRONOMIC CONSTRAINTS:

- i) Improper sowing time: The pulse crops gets last preference and priority in the sowing schedule. Late planting not only results in poor growth but also leads to high attack of sucking pests. If sowing of pigeon pea is delayed beyond 20th July, there a is significant reduction in yield. In case of mungbean delay in sowin g beyond August reduced the yield to the extent of about 600 kg/ha. A late sown crop is more prone to serious damage by pod borer.
- ii) Low seed rate: Farmers hardly use any recommended seed rate. Very poor plant population has been

reported in case of arhar, moong and urd in the farmers fields. Farmers have been using a seed rate of 10-15 kg/ha as against the requirement of 20-25 kg/ha in case of moong and urd.

iii) Defective method of sowing: Pulses are hardly sown in rows. This creates lot of problems in adopting agronomic practices such as weeding, hoeing, spraying, harvesting etc

iv) Inadequate interculture: Farmers hardly follow interculture in these crops. Line sowing helps for interculture operations through bullock drawn implements and hand hoes etc. Pulse crops suffer due to the infestation of weeds because of their initial slow growth.

v) Insufficient irrigation: Though pulse crops are drought tolerant, one or two protective or life saving irrigations are required, particularly in rabi pulses. For Kharif pulses also, protective irrigations are essential during the period of dry spell. Farmers give priority for irrigation to cereals and millets. Irrigations, if provided, wherever possible, enhances production, particularly at the pod development stage of pulse crops.

vi) Sowing under utera cultivation: Large area under pulses is sown as utera without cultivation and inputs. The yields of such crops is very poor.

vii) Poor management conditions: The concept that pulses can grow and produce better yields on marginal lands without any inputs and management is not correct. Being protein rich crops, pulses require more energy input per unit of production as compared to cereals. But on the contrary, they are grown under conditions of energy starvation resulting in poor yields.

viii) Non-availability of efficient *Rhizobium* culture: In general, *Rhizobium* culture is the cheapest input with high cost: benefit ratio: Symbiotic nitrogen fixation takes place very effectively if the natural relationship is established between the legume cultivar and its specific strain of *Rhizobium*. However, use of *Rhizobium* culture is not getting popular among the farmers because unlike fertilizers, the specific cultures of desired quality are not readily available in the market. Many times spurious cultures are supplied to the farmers which are not effective and the farmers lose faith in using *Rhizobium* culture.

ix) Weed infestation: Because of their inherent slow growth rate at the initial stage, pulse crops suffer due to infestation of weeds. Depending upon the duration of the crop, the critical period for weed competition in the pulses varies from 20-45 DAS. If weeds are not controlled during this period, marked crop losses ranging from 30-50% in chick pea, 50-70% in green gram and black gram and as high as 90% in pigeon pea have been recorded.

x) Losses due to diseases and insects pests: Pulses in general are susceptible to a large number of diseases and insect pests, which cause heavy losses. The major diseases are wilt, blight and grey-mould in chickpea. Powdery mildew and leaf spot diseases in green gram, black gram and cowpea etc. For yield stability and wider adaptability of genotypes, it is essential that varieties with multiple resistance to these major diseases are identified, adopted and popularized. Such multiple resistant varieties are wanting among the pulse crops.

II) GENETICAL CONSTRAINTS:

The major constraints of pulse production in the country is the lack of suitable genotypes with higher yield potential on farmer's fields. Some other genetical constraints are,

- Lower productivity
- Non synchronous flowering/fruitletting
- Non-responsiveness to good management
- Complete or partial absence of genetic resistance to major diseases and pests (eg: *Helicoverpa armigera* under continuous rainfall, causes wilt and sterility mosaic in red gram etc.)
- Indeterminate growth habit of most of the pulses
- Instability in performance
- Lack of good and quality and certified seed [SRR (seed replacement ratio in pulses is 2.5% against the recommended SRR i.e. 10%]
- Non-availability of drought and waterlogging resistant varieties.

III. PHYSIOLOGICAL CONSTRAINTS:

Besides the agronomy and genetical constraints, physiological constraints are also plays a major role in the low production and productivity of pulses. Some of the physiological constraints are:

- Low harvest index
- Low sink potential [source=leaf, drymatter; sink=seed]
- A lot of dry matter goes for production of stalk, with the result the harvest
- Index is very low. For example, in pigeonpea out of about 15,000kg total dry
- Matter produced, the grain share was only 10 percent. On the other hand, in
- Case of most of dwarf wheats, the grain share is even more than 33% of the
- Total dry matter.
- Flower drop is another physiological problem in pulse crops. This results in poor pod setting and consequently low yield.
- Non-responsiveness to fertilizers.
- Photo and thermosensitive phenomenon.
- Lack of short duration varieties i.e. long duration gives low per day production.

STRATEGIES FOR IMPROVING THE PRODUCTIVITY OF PULSES:

The problem of short supply of pulses was brought to notice of I.C.A.R and an integrated All India Co-ordinated Programme was started in 1972-73 in collaboration with U.S. Department of agriculture for the pulse improvement work in the country. The main emphasis for increasing pulse production is to be laid on following points:

1. Bringing an additional area under short duration high yielding varieties to fit in multiple cropping programmes to be grown as catch crop.
2. Developing new cropping systems like companion cropping, mixed cropping (or) intercropping for growing pulses between widely spaced crops such as sugarcane, maize, potato, cotton, arhar, groundnut, bajra and jowar etc. both under irrigated and rainfed conditions.
3. Evolution, multiplication and use of improved seeds of various pulses.
4. Adoption of efficient plant protection measures.
5. Basal placement of phosphatic fertilizers and treating the seeds with Rhizobium culture.
6. Growing pulses on relatively fertile lands rather than growing them on marginal and submarginal lands.
7. Adoption of improved package of practices like line sowing, control of weeds, harvesting at right time or at physiological maturity to avoid splitting of pods and thereby minimising shattering losses.
8. Granting subsidy on Government loans to the growers and providing improved seeds, fertilizers and plant protection materials on concessional price to the farmers.
9. Evolution of better plant-types of pulses for boosting pulse production.

The varieties thus developed are characterised under:

- a) Non-spreading and erect types.
- b) Thermo and photoinsensitive.
- c) Early maturing
- d) Responsive to applied inputs with high yield potentials.
- e) Fairly resistant to water logging, insect pests and diseases.
- f) Resistant to drought and frost.
- g) High nutritional qualities.

Rice fallow production Technology and Constraints:

Sowing of sprouted seeds short duration pulses particularly Green gram and Black gram just 3-4 days

before harvest of paddy is known as relay cropping. Popularly termed as Rice fallow pulses.

The seed rate recommended in the system is higher than that of direct sowing of Black gram and Green gram. The rice fallow pulses are grown with the available residual soil moisture and residual fertility. Before sowing of pulse seed alleys are made in the paddy field for removal excess water as well for easy sowing and proper distribution of seeds in the field.

Lecture 14

REDGRAM (*Cajanus Cajan*)

Common names- Arhar, tur, redgram, congo pea, gungo pea, no eye pea
Pigeonpea is the second most important pulse crop of India after chickpea.

AREA, PRODUCTION & PRODUCTIVITY:

- * India ranks first with about 90% of the world area and 85% of production aving 3.61 mha of area, 2.7 mtonnes of production and 747 kg/ha of productivity.
- * Pigeonpea ranks sixth in area and production in comparison to other pulses.

Crop duration-

Long duration varieties (180-270 days), Medium duration varieties(), Early varieties(120-150 days), Extra early varieties(less than 120 days).

* For kharif , never choose early and extra early varieties as the rains coincide with flowering and pod formation.

* Generally medium duration varieties are recommended for kharif.

* Late maturing varieties during kharif may suffer from terminal stress.

* In A.P., LRG-30 (PALNADU) is t he promising variety both in kharif and Rabi, ICPL 85063 (Lakshmi) both for kharif and Rabi.

VARIETIES FOR KHARIF: Duration 170-180 days

ICPL 332 (Abhaya)

ICPL 8719 (Asha)

Maruti(LRG-41)

Early maturing varieties for Rabi CPL-87

ICRISAT varieties – ICPL 870, ICPH-8 (Hybrid variety)

ORIGIN: Africa

DISTRIBUTION: The important Pigeonpea growing states are Maharastra, U.P., M.P, A.P & Karnataka. In India, Maharastra, U.P & M.P together occupy 62% of the area & contribute 73% of total production.

SOIL: It can be grown on a wide range from Sandy loams to clay loams. The crop performs well on fertile well drained loamy soils. Saline, Alkaline and waterlogged are not suitable.

CLIMATE:

- It is a quantitative short day flowering response plant i.e. the onset of flowering is hastened as day length shortens.
- It is grown throughout the tropical, sub-tropical & warmer regions of the world between 30°N & 35°S latitude.
- It tolerates heat and drought. It prefers moist and warm climate during vegetative period and cool and dry period during reproductive stage.#
- It is susceptible to frost.
- The cloudy weather and excessive rainfall during flowering damage the crop to a great extent.

SEASON:

Kharif: June – July