



**Department of Field Crops**

**College of Agricultural Engineering Sciences**

**Salahaddin University**

**Subject: Technology of Pulse Production**

**Course Book – (Year 3)**

**Lecturer's name: Dr. Krmanj Yousif Naby**

**Academic Year: 2023-2024**

# Course Book

<b>1. Course name</b>	<b>Pulses</b>
<b>2. Lecturer in charge</b>	
<b>3. Department/ College</b>	<b>Field Crops/ Agricultural Engineering Sciences</b>
<b>4. Contact</b>	<b>e-mail: Krmanj.naby@su.edu.krd Tel: (07504701347)</b>
<b>5. Time (in hours) per week</b>	<b>Theory: 2 Practical: 3</b>
<b>6. Office hours</b>	<b>Availability of the lecturer to the student during the week</b>
<b>7. Course code</b>	
<b>8. Teacher's academic profile</b>	<b>BSc Plant Production, Salahaddin University, 2005-2006. MSc Field Crop Production, Salahaddin University- Erbil, 2012</b>
<b>9. Keywords</b>	Economic importance and uses of pulses, problems related to pulses as food, Nitrogen fixation in pulses, Intercropping, Faba bean, Chickpea, Lentil, Mungbean.
<b>10. Course overview:</b>	
<p>The objective of the course of legume crops (Pulses) is definition of its origin and evolution of legume crops as seed food as well as its economic importance as an essential source of human food along with grain crops (Cereals) in addition to their use in animal feed, as well as a source cheap nitrogen through improved the soil properties by nitrogen fixation by bacteria root nodes that coexist with the roots of these crops.</p> <p>Then identify the most important legume crops in terms of their economic importance, their geographical distribution and appropriate environment for the cultivation of each crop, as well as soil appropriate, sowing date and operations to prepare land for cultivation and farming methods favorite in every crop, in addition to seed rate or plant density appropriate and service operations crop such as weed control, fertilization and control of insects and diseases and the need of these various crops or irrigation amounts possibility of planting under rainfall and irrigation conditions and how incorporated in the crop rotations with other crops and finally determine the maturity of each crop and harvesting method appropriate.</p>	
<b>11. Course objective:</b>	
<p>The course will cover texts on review of some economic and uses of pulses as food for human and livestock, most important problems related to pulses as food, some information about nitrogen fixation and intercropping with cereals, distribution and production of some pulse crops such as faba bean, chickpea, lentil and mungbean.</p>	
<b>12. Student's obligation</b>	
<p>The student must be commitment in the presence of practical and theoretical lectures and weekly preparation in order to be ready to perform quizzes and quarterly exams, in addition to providing weekly reports for practical lectures.</p>	
<b>13. Forms of teaching</b>	
<p>Different forms of teaching will conducted to gain the objectives of the course, such as:</p> <ol style="list-style-type: none"> <li>1. Power point presentations.</li> <li>2. Practical lecturers.</li> </ol>	
<b>14. Assessment scheme</b>	
<p>Students are required to conduct two writing tests in each theoretical and practical lectures, each</p>	

exam will be on 100 mark then it will transferred to 40 mark, 25 on writing test, while 15 mark for practical lectures. The final examination will be on 60 marks.

**15. Student learning outcome:**

The students must be known some information about legume crops which are members of the Leguminosae (fabaceae) family. They have "fruits" which consist of a pod that opens on two sides down its length to reveal the seed. Legume crops are also capable of fixing atmospheric nitrogen, an essential plant nutrient, in the soil. It does this with the help of root nodules, which usually contain a beneficial fungus (various Rhizobia species). Some examples of legumes are faba bean, chickpea, lentil, mung bean, peanuts, beans and peas. The students must be known Botany and Production Practices of these pulses.

**16. Course Reading List and References:**

- Singh, F. and B. Diwakar. 1995. Chickpea Botany and Production Practices. Skill Development Series no. 16. International Crops Research Institute for the Semi-Arid Tropics Patancheru 502 324, Andhra Pradesh, India Training and Fellowships Program, ICRISAT.
- Al-younis et al., 1980. Cereal and Legume Crops. Mosul Univ. Press, IRAQ.
- Some Internet Sites.

**17. The Topics:**

**Lecturer's name**

We ek no.	Subject	Lecturer's name
		Dr. Krmanj Yousif Naby
1st	Definition of the subject and its importance.	
2nd	Most important legume crops- Scientific names- The economic importance of legume crops.	
3rd	Importance of legume seeds in nutrition- Problems related to food.	
4th	Nitrogen fixation in legume crops- Groups of rhizobium specialized in nitrogen fixation.	
5th	Factors affecting the nitrogen fixation. Intercropping system and their types.	
6th	Faba bean- origin and geographical distribution- Environment appropriate- Soil appropriate- Sowing date- Agriculture operations.	
7th	Seeding rate- Service operations of the crop- weed control- fertilization- Irrigation-Crop rotation- Maturity and harvesting.	
8th	Chickpea- origin and geographical distribution- Environment appropriate- Soil appropriate- Sowing date- Agriculture operations.	
9th	Seeding rate- Service operations of the crop- weed control- fertilization- Irrigation-Crop rotation- Maturity and harvesting.	
10th	Lentil- origin and geographical distribution- Environment appropriate- Soil appropriate- Sowing date- Agriculture operations.	
11th	Seeding rate- Service operations of the crop- weed control- fertilization- Irrigation-Crop rotation- Maturity and harvesting.	
12th	Mungbean- origin and geographical distribution- Environment appropriate- Soil appropriate- Sowing date- Agriculture operations.	
13th	Seeding rate- Service operations of the crop- weed control- fertilization- Irrigation-Crop rotation- Maturity and harvesting.	
14th	Lathyrus	
15th	Some legume vegetative crops such as cowpea and pea.	

**18. Practical Topics (If there is any)**

Practical part consists of describing the botanical of legume crops.

## 19. Examinations:

**Q1:** What are the characteristics of suitable crops for intercropping cultivation with pulses?

Answer:

1. Plants must be short.
2. Plants must be growing to be a high density.
3. Plants must be homogeneous in sowing date, flowering and maturity.
4. Plants must be resistant to diseases and insects.
5. Plants must have a high response to fertilization.
6. Plants must have a high productivity.

**Q2:** Explain the types of cultivated chickpeas which are based on seed size and color.

Answer:

- a. **Macroserma** (kabuli type). The seeds of this type are large (100-seed mass >25 g), round, and cream-colored. The plant is medium to tall in height, with large leaflets and white flowers, and contains no anthocyanin.
- b. **Microserma** (desi type). The seeds of this type are small and angular in shape. The seed color varies from cream, black, brown, yellow to green. There are 2-3 ovules pod<sup>-1</sup> but on an average 1-2 seeds pod<sup>-1</sup> are produced. The plants are short with small leaflets and purplish flowers, and contain anthocyanin.

**Q3:** Explain the main factors that affect the yield components and cause lower yield of faba bean in Iraq.

Answer:

1. Low temperatures during the flowering period, leading to sterility and lack of seeds in the pods.
2. freezing and Aphid infection during the vegetative period of growth to reduce the number of flower and the number of pods / plant
3. The heavy irrigation or drought during the flowering period led to the fall of flowers and thus the lack of yield.
4. Irregular irrigation affects negatively on the completion of seed maturation and their weight.
5. Infections of insects and diseases reduce the amount of seeds and their quality.

**Q4:** Divide legume crops into groups' as specialty rhizobium type.

Answer:

Group of legume crops	Rhizobium type	Host type
Broad bean and Vetch	<i>R. leguminosarum</i>	Broad bean, Lentil, Vetch, Peas
Alfalfa	<i>R. meliloti</i>	Alfalfa, Clover
Soybean	<i>R. japonicum</i>	Soybean, chickpea, Pea nut
Clover	<i>R. trifolii</i>	Different types of clover
Kidney bean	<i>R. phaseoli</i>	Kidney bean
Lupines	<i>R. lupini</i>	Different types of Lupines
Cow pea	<i>R. spp.</i>	Cow pea, Mung bean,

**Q5:** Enumerate the factors affecting the nitrogen fixation. And write in brief about drought or water stress.

Answer:

1. **Genetic factors:**
2. **Environmental factors:**
3. **Temperature.**
4. **Availability of light and oxygen to plant**
5. **Inoculation**
6. **Drought or water stress.** The decrease in fresh weight of the bacterial nodes by 20% leads to stop the process of nitrogen fixation. If the plant over the stage of wilting, the bacterial nodes doesn't retrieved its activity even if watering the plant again, Due to the areas of separation in the channels connecting the cells of a single node.  
The reason for the decline in nitrogen fixation in plants exposed to a water stress is low carbohydrate processed for the bacterial nodes due to the decline of photosynthesis, decreased of respiration and the occurrence of some anatomical changes.

**Q6:** Enumerate most important problems related to pulses as food.

Answer:

1. The phenomenon of sensitivity from broad bean.

2. Flatulence factors.
3. Undesirable flavor in pulses food products, due to carotene oxidase (Lipoxygenase) enzyme.

**20. Extra notes:**

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**21. Peer review**