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**Department of Field Crops**

**College of Agriculture Engineering Science**

**Salahaddin University -Erbil**

**Subject: Industrial Crops- Oil and Sugar Crops**

**Course Book – 3nd year students**

**Lecturer's name: Asst. Prof. Bahar Jalal**

**B.Sc. in Field Crops, Univ. of Salahaddin**

**M.Sc. in Field Crops Production.**

**Academic Year : 2022 - 2023**

**Course Book**

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| **1. Course name** | **Fall semester** |
| **2. Lecturer in charge** | **Assist. Professor. Bahar Jalal Mahmood**  |
| **3. Department/ College** | **Field crops/ Agriculture** |
| **4. Contact** | **e-mail: bahar. mahmmod @su.edu.krd.****Tel: (optional):07504672974****e-mail: Tel: bahar.mahmmod@su.edu.krd**  |
| **5. Time (in hours) per week**  |  **Theory: 2 hours per week****Practical: 3 hours per week**  |
| **6. Office hours** | **15 hours per week** |
| **7. Course code** |  |
| **8. Teacher's academic profile**  | 1. **The main points in my academic profile can be summarize as follow:**
2. **Teaching B.Sc. MSc students.**
3. **Doing scientific researches.**
4. **Supervising MSc students in (Industrial crops / oil crops /Medical crops).**
5. **Contributing in examine committee for Diploma and MSc**
6. **Evaluation of some researches for scientific journals in Kurdistan and Iraq.**
7. **Supervising students of research project and seminars of 4th year’s students, Field crop department.**
8. **Participating in discussion in MSC thesis.**
9. **Reviewing researches from other university.**
10. **Doing statistical analysis for numerous post graduate**
	1. **Students.**
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| **9. Keywords**  | **Industrial crops definition, History and classification, oil crops,****Definition, Classification, Sugar crops Definition, Classification** |
| **Subject: - Oil and Sugar crops (practical part).****Kazhal Kamal Muhammad, (MSc)****e-mail:** **kazhal.muhammad@su.edu.krd****+964 0750 4934459****Field crops/ Agriculture Engineering Science**

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|  **Teacher's academic profile**  | **Kazhal Kamal Muhammad*** **Date of Birth: 22March 1986**
* **Place of Birth: Erbil**
* **Nationality: Iraqi**
* **Marital status: Marriage**
* **Sex: Female**

**Education:** * **BSc: Plant Production / College of Agriculture ( 2007-2008)/ University of Salahaddin / Kurdistan Region/ Iraq.**
* **M.Sc.: Field Crops/ Fiber Crops/ College of Agriculture (2014) / Salahaddin University-Erbil of / Kurdistan Region/ Iraq.**
* **PhD student**

**Work History:**1. **College of Agriculture, Field Crops department/ University of Salahaddin /Iraq**

**July 2014 until date ( Lecturer)** |

**10. Course overview:** **Oil and Sugar is a branch of industrial crops which deals with studding the oil and sugar crops and study their origins, distribution, classification, oil description, the differences between oil and fat, some information on some oil crops then study on some sugar crops.****The fundamental concepts in this subject are : Classify the industrial crops based on their used** , **Industrial Crop Definitions** ,**History of Industrial Crops, Type of Industrial Crops , Industrial Oil Crops , The Importance of Oil Crops , Classification of Oil Crops such as according to growth season ,** **according to oil strength in the natural weather, according to common fatty acids in oil ,** **Types and sources of oils and fats, The chemical composition of oils and fats (Lipids) , Fatty Acids (FA) ,definition ,classification , Differences between saturated and unsaturated fats, Essential Fatty Acids , hydrogenation and its Mechanisms, advantage and dis advantage , hydrogenation ,oil oxidation, Rancidity and its type , factors affecting on Rancidity ….. Some oil crops such as Rapeseed, Sunflower, Sesame …. etc .and its important, classification, origin, botanical description, abiotic factors affecting sugar crops, some agriculture practices, harvesting methods.****Sugar crops and its important, classification, origin, botanical description, abiotic factors affecting sugar crops, some agriculture practices, harvesting methods.** |
| **11. Goals of the course or Goals of studying plant production:**1**- High light on industrial, its classification.****2- High light on oil crops, its classification, origin, history.****3- Study important oil crops then study the following topics:*** **Study the economic important.**
* **Study the origin of crops.**
* **Study the abiotic factors affecting oil crops.**
* **Study the main agricultural practices on growth, yield and quality of oil crops.**
* **Study the soil and crop management.**
* **Study the sowing date, seeding rates, replanting, thinning, cultivation.**
* **Harvesting and storage of field crops, horticulture plants and rotation.**
1. **Study important sugar crops then study the following topics:**
	* **Study the economic important.**
	* **Study the crop origin.**
	* **Study the abiotic factors affecting oil crops.**
	* **Study the main agricultural practices on growth, yield and quality of sugar crops.**
	* **Study the soil and crop management.**
	* **Study the sowing date, seeding rates, replanting, thinning, cultivation.**
	* **Harvesting and storage of field crops, horticulture plants and rotation**.
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| **12. Student's obligation****The student must have an important role:**1. **The students must contribute in the scientific discussions in the class or teaching hall.**
2. **The students must know the importance of quizzes, homework, reports and exams.**
3. **It is necessary to contribute the student in presentation a scientific subject**
4. **Each student attends a report within the lecture program at the end of the lecture. ‌**
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| **13. Forms of teaching**1. **General review of previous lecture to refresh some information regarding the lecture.**
2. **Power point presentations: for the lectures and using explanation diagrams beside photos of both oil and sugar crops.**
3. **Running conservations to reach the solutions of some presented problems concerning industrial crops**
4. **Performing activities between lecture and students**
5. **Field trips to the olive oil factory.**
6. **Using Soxhlet apparatus for oil extraction and determining oil %,**
7. **Making a trip to the sunflower oil extraction factory.**
8. **Using some videos about the extracting sugar from sugar beet or sugar cane.**
9. **Visiting some oil crops field.**
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| **14. Assessment scheme****Breakdown of overall assessment and examination:****1-Monthly exam 10 marks.****2-Quizzes 3 marks.****3-Present and contributing in scientific discussions2 marks.****4-Seminar 2 marks. Total marks are 15** **Practical part: two exams 20, quiz and report with presentation from 15, total is 35 mark****؟**‌ |
| **15.** Student learning outcome:**Explaining the most important industrial crops, then oil and sugar crops and training on determining how preparing samples for oil extraction, then explain the important amino acids used for oil extraction , explain the important steps for oil extraction using Soxhlet apparatus and how to use it and calculate oil%.****Methods of sowing, then proper time in sowing, sowing rate, weeding, cultivation, disease control, methods of cropping, harvesting and storing products all of these methods will be benefit for our students to improve oil and sugar with the industrial crops.**  |
| **16. Course Reading List and References‌:**1. **Chapman S. R and Lark P.C (1982) Crop Production Principles and Practices. Montana State University**
2. **Darby, Heather; Philip H and Hannah, H (2013) oilseed production in the northeast, A Guide for Growers of Sunflower and Canola. Vermon university.**
3. **Hans L. F. Stuart C. and L. P Thijs (2008) Plant Physiological Ecology. Second Edition. New York.**
4. **Havlin, j, L; Tisdale, S, L; Nelson, W,L and Beaton, J, D(2016)Soil fertility and fertilizer .Person Education**
5. **Kapur , P. and Sudha ,R,G .(2004) Experimental plant ecology. New Delhi . India.**
6. **Khalaf, A . S (2010). Principles of field crops. College of agriculture. University of Dohuk,**
7. **Khalaf, A . S (2016). Seed and seed technology. College of Agriculture, University of Dohuk,**
8. **Martin J.H. R.P.Waldren and D.L. Stamp (2006) Principals of Field Crop Production .Columbus, Ohio**
9. **Martin J.H. R.P.Waldren and D.L. Stamp (2009). Principals of Field Crop Production (Fourth edition). Pearson Prentice Hall and Martin Waldron Stamp. Langston University.**
10. **Prasad D (2005) Crop Protection Management Strategies. Daya Publishing House.Delhi-110 035.**
11. **Richards, J. R., Zhang, H., Schroder, J. L. Hattey, J. A. and Raum, R. (2011). M. Journal of micronutrient availability as affected by the long-term application of phosphorus and organic amendments . Soil Science Society of American Journal. 75(3):927-939.**
12. **Robbelen,G :R,K,Downey and A,Ashri(1989) Oil crops of the worled .New York ,Book. .**
13. **Roy R. N, A .Finck, G.J.Blair and H.L.S.Tandon (2007) Plant Nutrition for Food Security. Discovery Publishing House. New Delhi -110002.**
14. **Schulze. E.D and Erwin. B. M (2002) Plant Ecology. Germany.**
15. **Sharma P. D. (2009), Ecology & environment. second reprinting, 10th edition. Rastogi publications, New Delhi.**
16. **Sinclair T.R and F. P. Gardner (1998) Principle of Ecology in plant production. USA.**
17. **Singh V., P. C. Pande & D. K. Jain (2008) A text books of botany angiosperms. 3rd edition. Rastogi publications, New Delhi.**
18. **Singh, B.P (2010). Industrial crops and uses. USA**
19. **Simpson M. G. (2006), Plant systematic, Elsevier academic press, Oxford, UK.**
20. **Stehouwer. R (2000) How Soils Supply Plant Nutrition. College of Agriculture Science.**
21. **Vyas, A.K (2005) An Introduction to Agriculture. (Third edition) .Indian Council of Agriculture Research, New Delhi.**
22. [**http://www.GeoChemBio.com**](http://www.GeoChemBio.com)**.**
23. **http:∕∕** [**www.knowledgeblank.irri.org.url**](http://www.knowledgeblank.irri.org.url)
24. **Journals:**
* **Journal of Plant and soils.**
* **Journal of Agricultural sciences**

**المصادر العربية:**1. **طيفور، حسين عونى و رزكار حمدى رشيد (1990) المحاصيل الزيتية . وزارة التعليم العالى و البحث العلمى / جامعة الموصل .**
2. **رزق ، توكل يونس و حكمت عبد على (1982). المحاصيل الزيتية و السكرية. وزارة التعليم العالى و البحث العلمى . الموصل .**
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| **17. The Topics:** | **Lecturer's name** |
| ***1-Introduction;* In this week students will learn the introduction to Industrial crops** **History and Classification** 1.Introduction to oil crops.**2-Oil crops, its importance, classification, *chemical composition of oils and fats (Lipids)***2- Classification and composition of food oil ,Classification according to iodine number, Oil Production & Process**3-Fatty acids, its classification, essential fatty acids, hydrogenation**, **its advantage and dis advantage and oxidation** 3-Rape seed, description, growth stages and agriculture practices ***4-Sesame: History, Economic Importance, distribution,* *Environmental conditions, Sesame Shattering,sesame seed, oil, and cake .*** 4.Sesame crop : The introduction, taxonomy, morphological character, agronomic practices and importance of sesame crop. **5- Sunflower: *History of Sunflower Culture,* Economic importance, Nutation or Heliotropism of Sunflower, sunflower branching, seed oil Climatic and environmental requirements. Crop rotation.**Sun flower: Botanical classification, growth stages, agriculture practic**e** **6 – Safflower: Economic importance, Origin, Suitable Environmental conditions for growth Climate, Position in crop rotation, Maturity and harvest .**6.Safflower , Botanical description, Planting , uses .**7-Peanut: *Economic Importance, History of Peanut Culture, peanut types, Plant Peg, Gynophore, adaptation*****Safflower: Economic importance, origin**, ***History,******Adaptation, crop rotation. chemical composition.***7- Peanut, Botanical description, Nutritional qualities**,** types of peanuts, land preparation and planting , seed quality, harvesting .**8- Soybean:** ***History, Economic Importance, Environmental conditions, Seed Inoculation,*** ***Soybean Meals, Oils, and Protein.*** 8.Soybean : Introduction ,Soybean growth stages, Planting ,Harvesting .***9- Sugar crops:*  Sugar beet: Economic importance, Most advantages of sugar beet, Habitation and geographic distribution , Adaption, adaptation ,harvesting.** 9. Sugar crops: Introduction, importance and use of crop, agronomic practices and growth stages10- **Sugar cane: Economic importance, product of sugar cane, Ratoon and harvest.** 10-Sugar cane: Morphological character, importance and use of crop, agronomic practices and growth stages. 11- oil crop extraction factory  | **Lecturer's name****Asst . prof. Bahar Jalal Mahmood****First meeting 10/1/ 2023****1st practical meeting Lecturer's name****Kazhal kamal 9/1/2023****2nd Lecture theory****2nd lecture practical**  **3rd theory Lecture** **3rd practical lecture****4th** **theory Lecture** **4th practical lecture****5th** **theory Lecture** **5th practical lecture****6th** **theory Lecture** **6**t**h practical lecture****7th theory lecture****7th practice lecture****8th theory lecture****8th practice lecture****9th theory lecture****9th practice lecture****10th theory lecture****10th practice lecture****11th lecture** |
| **19. Examinations:**1- Define the following phrases:* Rancidity

Rancidity is the natural process of ***decomposition*** of fats or oils by either *hydrolysis or oxidation, or both*. Rancidity is the *development of unpleasant smells in fats and oils*, which are often accompanied by changes in their *texture and appearance.* * Nutation:

It is a phenomenon of sunflower that tilts the head to the west in the afternoon. After sunset, the stem gradually straightens until it becomes erect at about midnight. After that, the stem gradually bends in the opposite direction up to as much as 90 degrees, so that the head faces east by sunrise. Soon afterward, the stem starts to straighten until the head is erect again at noon.1. *Discuss the following:*
* *Types of lipids:*

*There are three kinds of lipids:** 1. *Simple lipids: They are esters of fatty acids with various alcohols. For example, oils, fats, and waxes.*
	2. *Complex lipids: These are esters of fatty acids with alcohol + containing additional groups. For example, phospholipids, glycolipids, and lipoproteins.*
	3. *Derived lipids: Are the substance derived from simple or complex lipids by hydrolysis. For example, steroids, cholesterol, and vitamin A and D.*

3-Enumerate the following:1. ***fatty acids classification in oil with examples:***
* Oil crops containing (Oleic acid and Linoleic acid), for example, sunflower, sesame, peanut, and cottonseed.
* Oil crops containing (Linolenic acid), for instance, flax.
* Oil crops containing (Erucic acid), for example, rapeseed, cramp.
* Oil crops containing (Hydroxyl acid), for instance, castor bean.
* Perennial plants which oil contains (Lauric acid), for example, oil palm tree and coconut tree.

*4-*Compare between saturated *and unsaturated fats:* 1. ***From The following, correct the incorrect phrases:***
2. **Peanut is preferred planting after wheat crop not winter-legume crops in rotation methods.**

**Right : Peanut is preferred planting after winter-legume crops not wheat crop in rotation methods.**1. **Tick mark or match the correct term or phrase:**

**1- Seed yield potential per plant in soy bean is closely related to :****a. Soil salinity b- high temperature c. day length requirement d. Amount of water applied.**2- More suitable soil for sugar beet is:* 1. Clayey soil b. Sandy soil c. All soils are possible d. Silty clay soil

7- ***Comment on the following phrases (give reasons*****Sesame must harvest by hand?** **Because of shattering characteristic, sesame has been grown primarily on small plots that are harvested by hand.** 1. **How is bird control in sunflower?**

 * + Select varietal plant types with head types that turn down after flowering.
	+ Plant early hybrids at early planting dates, and harvest early.
	+ Avoid planting sunflower within a quarter mile of marshes or sloughs that consistently harbor large quantities of birds and contain water in later summer.
	+ Leave at least a 100-yard buffer strip of a crop not as attractive to birds, such as small grains, adjacent to shelter belts, groves or other wooded areas.

8/**fill the following blanks with suitable phrases.** 1. The scientific name of soybean is …………1………………. .
2. Oil content of groundnut is …………1………….. , while the protein content is ……2………… .
3. Factors responsible for low production of sesame are: ……1……, …2…………, …3………., …4……., ……5……. .
4. Sunflowers growth stages are: ……1………… , …2………………, …………3…………… , ………4……………,

**1/** *Glycine max.***2/** 44-55% and 22-32% .3/Shattering losses.- Lack of improved high yielding varieties.- Cultivation on marginal lands.- Low level of fertilizer use.- Poor crop management5/1- Planting the seed1. Germination
2. The seedling, leaf and plant development.
3. Growing a bud.
4. Flowering.
5. Pollination
6. Seed development.
7. Harvesting.
 |
| **20. Extra notes:**The information is sufficient but the course is too short that we may be cannot complete the syllabus.  |
| **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ** .‌‌  |