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**Department of Field Crops**

**College of Agricultural Engineering Sciences**

**University of Salahaddin**

**Subject: Industrial Crops 1**

**Course Book – (Year 2)**

**Lecturer's name: Assist. Prof. Rabar Fatah Salih, PhD**

**Kazhal KamalMuhammad, MSc.**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | **First Semester** | |
| **2. Lecturer in charge** | **Rabar Fatah Salih, PhD. & Kazhal Kamal Muhammad. MSc.** | |
| **3. Department/ College** | **Field Crops / Agricultural Engineering Sciences** | |
| **4. Contact** | **e-mail:rabar.salih@su.edu.krd**  **Tel: (optional) +964 782 4670202**  [**kazhal.muhammad@su.edu.krd**](mailto:kazhal.muhammad@su.edu.krd)  **+964 0750 4934459** | |
| **5. Time (in hours) per week** | **Theory: 2 in Study hall 2 & some lectures will done on online**  **Practical: 3in Lab 3** | |
| **6. Office hours** | **10 Theory, 8 Practical** | |
| **7. Course code** |  | |
| **8. Teacher's academic profile** | [C.V - Rabar Fatah Salih - Google Sites](https://www.google.iq/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwiNp6i5rJXSAhXhFZoKHZmVB2YQFggYMAA&url=https%3A%2F%2Fsites.google.com%2Fa%2Fsu.edu.krd%2Frabar-fatah-salih%2Freflections&usg=AFQjCNE3HOKThraPamS8vQBroIvuivbqEw) I am a lecturer at Salahaddin University-Erbil, College of Agriculture, Department of Field Crops. I hold a PhD as an assistant professor of Post-Harvest Engineering, Field Crops/ Fiber Crops.  I graduated as the fourth best student in department of plant production, and the tenth best student in the whole of the College. After graduation, I directly employed as a demonstrator at the same Department and College. In 2010, I obtained a MSc at the Department of Field Crops, College of Agriculture, Salahaddin University - Erbil.  I also completed a PhD study in 2016 in Post-Harvest Engineering at the Department of Biological and Agricultural Engineering, Faculty of Engineering, Universiti Putra Malaysia.  I attended to three international conferences as presenter in 2014 and 2015, Malaysia, one of them in Erbil 2017. However, I attended to other three international conferences just as guest all of them in Erbil, 2016-2017. Also, I published many academic papers in international journals. However, I published a scientific book on kenaf plant, 2015.  Two article researches were submitted, it was done in 2017 and 2018. Moreover, I have a new project about “Row Spacing and Seeding Rate Affect on Growth and Yield Parameters of Flax (*Linum usitatissimum* L.)”.  I attended to the 1st International Agri Sciences Conference 2019 Salahaddin University-Erbil, College of Agricultural Engineering Sciences. Also, I am as a member and supervision of the Second Agriculture Exhibition which was done with the conference (7-6 November 2019).  Kazhal Kamal Muhammad   * Date of Birth: 22March 1986 * Place of Birth:Erbil * Nationality: Iraqi * Marital status: Marriage * Sex: Female   Education:   * B.Sc:Plant Production / College of Agriculture( 2007-2008)/ University of Salahaddin / Kurdistan Region/ Iraq. * M.Sc: Field Crops/ FiberCrops/ College of Agriculture (2014)/University ofSalahaddin/ Kurdistan Region/ Iraq. * Phd student   Work History:   1. College of Agriculture, Field Crops department/ University of Salahaddin /Iraq   July 2014 until date ( Lecturer) | |
| **9. Keywords** | **Fiber crops, growing, fiber extraction, using** | |
| **10. Course overview:**  This course is more interested and necessary for students, since during this course students are taking the new lectures which are about the industrial crops especially fiber crops. Fiber crop is one of the most important crops should be every students have information on it. On the other hand, this course generally explains types of fiber crops, and then focus on the fiber crops can grow in Kurdistan. However, teach them how to improve fibers, extraction, and how to use it in different areas or industries. | | |
| **11. Course objective:**  This course has general and specific objectives.  ***General objective:*** To introduce fiber crops, growing in Kurdistan, and then to improve their fibers.  ***Specific objectives are:***   1. Identify and describe the fiber crops. 2. To provide students with background information necessary to think critically about fiber crops and its importance. 3. To care of fiber crops as a main crop and then to make a plan for using it in the future to development economic of Kurdistan. | | |
| **12. Student's obligation**   1. Participation is more important, every student should be pay attention during a class. It will be encouraging them to collect information about the subjects. Next, it causes to earn all scores very well. 2. Students should be found the topics which relationship to fiber craps, then make presentation. It will be not only to collect the score but also to teach them how to be a lecturer and researcher in future. 3. There will be a short, timed, quiz once a week, on Wednesday. These quizzes will be open book and open note. Quizzes will emphasize interpreting information, formulating hypotheses, and synthesizing concepts from lecture. I will drop the three lowest quiz scores. Quizzes will cover all course material covered to-date. 4. During this course to exams will be done. The first exam will be after 4 lectures, the second exam after 8 lectures or in the end of the course. | | |
| **13. Forms of teaching**  In the first, I preparing lecture as a hard copy and I give to my students’whole together. I also during the class used data show and I preparing power points of the lecture then I explain for them. Some time, if subjects need to more explanation, I using white board for them. Actually, for every class I have a short video (Document) about the topics. It is more important and interested for understandingthem. | | |
| **14. Assessment scheme**  I have a plan about assessment and examination for the students as following:   * I preparing two types of exam about (Theory part) and also all students must be attending of examination two times. * Students must be attending of examination two times (Practical part). * I have quiz for students every weeks. It is helping them during exam, and also it causes to active them during a class. * I have questions during a class, since I believe that it attracts students and then helps them to easy understanding. * Class participation 5% * Presentation 5% * Weekly quizzes 10% * First Exam 40% * Second Exam 40%   That information also can be fitted to the practical part with its subjects. | | |
| **15. Student learning outcome:**  In the result believe that, students learning more new things about fiber crops, and also they will try to use this information to find a job during their lives. | | |
| **16. Course Reading List and References‌:**  Salit, M. S. (2014). Tropical Natural Fibres and Their Properties. In Tropical Natural Fiber Composites (pp. 15-38). Springer Singapore.  Zhang, T. (2003). Improvement of kenaf yarn for apparel applications (Doctoral dissertation, Faculty of the Louisiana State University and Agricultural andMechanical College in partial fulfillment of the requirements for the degree of Master of Science in The School of Human Ecology by Ting Zhang BS,Beijing University of Chemical Technology).  Rabar, F. S. (2016). Influence of Potassium, Boron and Zinc on Growth, Yield and Fiber Quality of Two Kenaf (*Hibiscus cannabinus* L.) Varieties. (Doctoral dissertation, Faculty of Engineering, Biological and Agricultural Engineering, Universiti Putra Malaysia, Serdang, Selangor, Malaysia.  Rabar, F.S. (2015) Improve Protein Content in the Cell Wall of the Kenaf Fibers (*Hibiscus cannabinus* L.). LAMBERT Academic Publishing.  Webber, C. L. (1993). Crude protein and yield components of six kenaf cultivars asaffected by crop maturity. Industrial Crops and Products, 2(1), 27-31.  Rowell, R. M., Han, J. S., & Rowell, J. S. (2000). Characterization and factorseffecting fiber properties. Natural Polymers and Agrofibers BasesComposites. Embrapa Instrumentacao Agropecuaria, P. O. Box 741, Sao Carlos, 13560-970 SP, Brazil, 2000., 115-134.  Ashori, A., Harun, J., Raverty, W. D., & Yusoff, M. N. M. (2006). Chemical andmorphological characteristics of Malaysian cultivated kenaf (*Hibiscuscannabinus*) fiber. Polymer-Plastics Technology and Engineering, 45(1),131-134.  Azizi Mossello, A., Ainun, Z. M. A., & Rushdan, I. (2009). Chemical, morphological, and technological properties of Malaysian cultivated kenaf (Hibiscus cannabinus L.) fibers. Kenaf Biocomposites, Derivatives & Economics, Bandar Baru Seri Petaling, Kuala Lumpur: Pustaka Prinsip Sdn. Bhd.  Khalil, H. A., Yusra, A. I., Bhat, A. H., & Jawaid, M. (2010). Cell wall ultrastructure, anatomy, lignin distribution, and chemical composition of Malaysian cultivated kenaf fiber. Industrial Crops and Products, 31(1), 113-121.  Khalina, A., Nazri, A.M., and Hasniza, M.Z. (2008). Simulation studies of fiberreinforced plastic composite on injection molding processing for automotive application. Proceedings Colloquium of Kenaf Research output 1-2December 2008, Seremban, Negeri of the Sembilan Malaysia Universiti Putra Malaysia.  Hossain, M. D., Musa, M. H., Talib, J., & Jol, H. (2010). Effects of nitrogen,phosphorus and potassium levels on kenaf (*Hibiscus cannabinus* L.) growthand photosynthesis under nutrient solution. Journal of Agricultural Science,2(2), p49.  Kano, T. (1997). Development and prospect of kenaf board. Reference No. 47 of the  kenaf society of Kochi and economic reports of Ehime, 25, 44.  Cosentino, S.L., & Copani, V. (2003). Agroindustria, 2, 2/2: 137-145. In: Effects of Nitrogen, Phosphorus and Potassium Levels on Kenaf (*Hibiscus cannabinus*L.) Growth and Photosynthesis under Nutrient Solution  Bert, N. (2002). Kenaf fibres. In Presentation of the 5th Annual Conference of the American Kenaf Society, Memphis TN Nov (pp. 7-9).  Fakhradeen, A.Q.S., & Rabar, F. S. (2011). Response of growth, and yield for sixgenotypes of cotton (*Gossypium hirsutum* L.) to potassium fertilization. Journal of Kirkuk University for Agricultural Sciences, 2(1), 84-93.  Fakhradeen, A.Q.S., & Rabar, F. S. (2010). Response of fibers properties of somecotton (*Gossypium hirsutum* L.) genotypes to potash fertilization. Journal ofTikrit University for Agricultural Sciences, 11(3), 110-119.  Hasfalina, C. M., Maryam, R. Z., Luqman, C. A., & Rashid, M. (2010). The potentialuse of kenaf as a bioadsorbent for the removal of copper and nickel from single and binary aqueous solution. Journal of Natural Fibers, 7(4), 267-275.  Hosomi, K. (2000). Utilization dried kenaf leaves to the meal. In Proceeding of the2000 International Kenaf Symposium, Hiroshima, Japan, Oct (pp. 13-14).  Cheng, Z. (2001). Kenaf research, products and applications in Japan. Plant Fibers Prod, 23(3), 16-24.  LeMahieu, P. J., Oplinger, E. S., & Putnam, D. H. (2003). Kenaf. Alternative Fieldcrops Manual. http://www. corn. agronomy. wisc. edu/FISC/Alternatives/Kenaf. htm. | | |
| **17. The Topics:** | | **Lecturer's name** |
| **First Lecture**  **Fiber Crops**  **Fiber Division**   1. Fiber division according to use: 2. Textile Fibers 3. Cordage Fibers 4. Brush and Mat Fibers 5. Bagging Fibers 6. Staffing and Upholstery Fibers 7. Paper-making Fibers 8. Morphological division: 9. Natural Fibers 10. Man-made Fibers 11. Fiber Blends   **Second Lecture**  **Natural Fibers**  **History of Natural Fiber Applications within the Motor Industry**  **Benefits and Importance to use Natural Fibers Compared to Others**  **Third Lecture**  **Cotton**  **History of Cotton**  **Cotton Species and Types**  **Fourth Lecture**  **Growth of Cotton**  **Cotton Products**  **Production statistics and practices**  **Fiber Processing**  **Fiber quality**  **Fifth Lecture**  **Bast Fibers**  **Bast Fiber Overview**  **Bast fiber types**  **Seventh Lecture**  **Bast Fiber Basic Structureand Properties**  **Molecular structure**  **Morphological structure**  **Mechanical properties**  **Eighteenth Lecture**  **Physical and chemical properties**  **Bast Fiber Production**  **Plant harvesting**  **First Examination (Theory)**  **Bast Fibers**  **Flax (*Linum usitatissimum L.,* Linaceae) Fibers**  **Hemp (*Cannabis sativa L.,* Cannabaceae) Fibers**  **Jute (*Corchorus capsularis,* Tiliaceae) Fibers**  **Kenaf (*Hibiscus cannabinus* L., Malvaceae) Fibers** Uses of Kenaf **Ramie (*Boehmeria nivea* L. and *Boehmeria viridis*, Urticaceae) Fibers**  **Leaf Fibers**  **Sisal (*Agave sisalana*, Liliaceae) Fibers**  **Pineapple (*Anannus comosus*, Bromeliaceae) Leaf Fibers (PALF)**  **Second Examination (Theory)**  **Abaca (*Musa textilis* Nee, Musaceae) Fibers**  **Banana Fibers (*Musa ulugurensis* Warb, Musaceae )**  **Oil Palm (*Elaeis guineensis*, Palmacea) Fibers**  **Fruit Fibers**  **Coconut Husk or Coir (*Cocos nucifera*, Palmae) Fibers** | | Rabar Fatah Salih  (2 hrs)  (2 hrs)  (2 hrs)  (2 hrs)  (2 hrs)  (2 hrs)  (2 hrs)  2 hrs)  (2 hrs)  (2 hrs) |
| **18. Practical Topics (If there is any)** | |  |
| **1st week:** Botanical characteristics of cotton plant**.**  **2nd week:** Growth and distribution of cultivated cotton.  **3rdweek:** Seed dormancy, Germination of cotton plant.  **4th week:** Reproduction and dispersal, Fruit development, Seed morphology**.**  **5thweek:** Uses of cotton and its by-products.  **6thweek:** Boll shedding, Boll development, Anatomy composition, chemical composition of cotton plant.  **7thweek:** Natural properties of cotton plant such as Grade, Length.  **8thweek:** Strength, Fineness, Maturity.  **9thweek:** Description of Flax plant, Flax fiber, Threshing flax.  **10thweek**: Retting processes of flax fiber.  **11th week**: Sisal, Plant description**.**  **12thweek**: Fiber extraction in sisal plant**.**  **13thweek**: Hemp, varieties, uses.  **14thweek**: White jute.  **15thweek**: Tossa jute.  **16thweek**: Ramie, Fiber extraction. | | Miss Kazhal Kamal Muhammad  (3 hrs) |
| **19. Examinations:**  **Q1:** Define five of the following terms: **(25) Marks**   1. Moisture regain 2- Fiber Crops 3- Fiber strength 2. Length uniformity index 5- Cotton 6- High Volume Instrument (HVI)   \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  **Q2:**   1. What is the Bast Fiber? Write the name of the major bast fiber plants. **(15) Marks** 2. Draw the schematic of a sisal plant, and then write its scientific name. **(10) Marks**   \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  **Q3:**   1. What are the benefits of using natural fibers compared to other kind of the fibers? **(10) Marks** 2. Explain briefly the stages in the development of the cotton fiber within the boll. **(15) Marks**   \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  **Q4:**   1. How to division the fiber according to use? **(10) Marks** 2. Fill in the blanks:**(15) Marks** 3. The scientific name of cotton is \_\_\_\_\_\_\_\_. Also, linaceae is a family name of \_\_\_\_\_\_\_ and \_\_\_\_\_\_. 4. *Hibiscus cannabinus* is a scientific name of the \_\_\_\_\_\_\_\_. 5. \_\_\_\_\_\_\_ is a value for fiber fineness and maturity measured by airflow across a bundle of fibers. 6. The major chemical component in the cell of the plant fibers is \_\_\_\_\_\_\_. 7. Bast fibers are obtained from fibrous plant \_\_\_\_\_\_\_\_. 8. The major physical properties of bast fibers discussed here refer to \_\_\_\_\_\_\_, fineness, linear \_\_\_\_\_\_,   volume density and \_\_\_\_\_\_\_\_.  **«»«»«»«»«»«»«»«»«»«»«»«»«»«»«»«»«»«»**  ***Dr. Rabar Fatah Salih***  ***Fiber Crops/ Post Harvest Engineering***  ***Lecturer in Department of Field Crops***  **Note:** Can say this kind of questions could be right as a practical part, only the subjects must be relationship to the practical part. | | |
| **20. Extra notes:** | | |
| **21. Peer reviewپێداچوونه‌وه‌ی هاوه‌ڵ**  This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.  *(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).*  ئه‌م کۆرسبووکه‌ ده‌بێت له‌لایه‌ن هاوه‌ڵێکی ئه‌کادیمیه‌وه‌ سه‌یر بکرێت و ناوه‌ڕۆکی بابه‌ته‌کانی کۆرسه‌که‌ په‌سه‌ند بکات و جه‌ند ووشه‌یه‌ک بنووسێت له‌سه‌ر شیاوی ناوه‌ڕۆکی کۆرسه‌که و واژووی له‌سه‌ر بکات.  هاوه‌ڵ ئه‌و که‌سه‌یه‌ که‌ زانیاری هه‌بێت له‌سه‌ر کۆرسه‌که‌ و ده‌بیت پله‌ی زانستی له‌ مامۆستا که‌متر نه‌بێت.‌‌ | | |