**The University of Jordan Department: Plant Protection**

**Faculty: Agriculture 2015-2016/ 1st Semester**

**Program: M.Sc. in Plant Protection**

**Parasitic Flowering Plants (0606771)**

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| Credit hours | 3  | Level | MSc.  | Pre-requisite | Weed Science |
| Coordinator/ Lecturer | J. R. Qasem | Office number | 266 | Office phone | 22515 |
| Course website |  | E-mail | jrqasem@ju.edu.jo | Place | Faculty of Agriculture |

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| Office hours |
| Day/Time | Sunday | Monday | Tuesday | Wednesday | Thursday |
|  | 10-12 | 10-12 | 9-11 | 10-12 | 11-1 |

**Course Description**

The course covers parasitic flowering plants and their distribution worldwide, their impact on their hosts, especially on the strategic crops, means of management, with emphasis on parasitic plants in Jordan. The course includes conducting some laboratories, field study cases, literature surveys and presentation of research papers.

**Learning Objectives**

The main objectives of the course are :

The underlying philosophy of this course is that parasitic flowering plants are diverse, and some are of economic importance in the world as well as in Jordan. The major objective of this course is to provide students with a strong knowledge about parasitic weeds (PW) in the following aspects:

1- General categorization and identification of parasitic flowering plants ( PFP)

2 Most important parasitic weeds in the world

3- Potential impact of parasitic weeds on agriculture world wide

4- Parasitic weeds in Jordan, species, distribution, host range, and their impact

 Management of parasitic weeds

**Intended Learning Outcomes (ILOs):**

Successful completion of the course should lead to the following outcomes:

* Knowing the importance of parasitic weeds in agriculture and their environmental impacts.
* Identify & categorize parasitic weeds according to different classification methods, which enable students to know better these species and the losses they cause to agriculture.
* Gain knowledge on mechanisms of parasitism of different parasitic genera
* Knowing the role of different ecological factors on growth and productivity of these parasites and weeds and their response to agricultural practices and changes occur in their environment.
* Able to manage parasitic weeds problems in different crops.

**A. Knowledge and Understanding:** Student is expected to

* **U**se knowledge in identifying types of parasitic weeds species in a specific area
* Employ skills acquired in managing parasitic weeds
* Prepare and deliver well-structured reports about parasitic weeds and their possible management approaches in certain areas
* Be aware of the hazards of parasitic weeds in various areas
* initialize and participate in establishing proper effective management of parasitic weeds
* Work effectively with farmers( subsistent, small or large) in minimizing the negative impact of parasitic weeds

**B. Intellectual Analytical and Cognitive Skills:** Student is expected to

* Know parasitic weeds and their distribution, problems and managements in the world.
* Know regional spread parasitic species and losses caused to agriculture and environment
* Know mechanism of parasitism and physiological effects of parasites on host species
* Gain knowledge on parasitic weeds worldwide and their managements.
* Keep up to date information on recent developments on parasitic weed magnitude, problem, managements.

**C. Subject- Specific Skills:** Student is expected to:

* Identify parasitic weeds
* Discuss information about the potential impact of parasitic weeds
* Discuss/explain the essential concepts and major principles relevant to parasitic weeds biology and physiology of parasitism
* Point out parasitic weeds distribution in Jordan, and their management.

**D. Transferable Key Skills:** Students is expected to:

* Be able to employ the knowledge in developing strategic management of parasitic weeds
* Work effectively with farming communities whether subsistent, small or large farmers
* Work effectively with private sector
* Perform effectively at scientific forums

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| **Content** | **Reference** | **Week** | **ILO/s** |
| Introduction to course contents, botanical affiliations of PFP and agronomic importance | 4, 5, 6, 7 | 1 | A, B, C, D. |
| Evolutionary aspects | 1,4, 5 | 1 | A, B, C, D. |
|  Parasitisim concept, taxonomy, species of agricultural importance | 1, 4, 6, 7 | 2 | A, B, C, D. |
| Scope of agronomic problems , distribution of parasitic weeds (PW) worldwide, Host range a- Orobanche, Cistanche | 3, 4, 9 |  | A, B, C, D. |
| b- Striga  | 4 | 2 | A, B, C, D. |
| c- Cuscuta  | 4, 6 | 3 | A, B, C, D. |
| d- Viscum, Osyris, Cynomorium | 4 | 3 | A, B, C, D. |
| Seeds: life span, post ripening, conditioning | 3, 4, 7 | 4 | A, B, C, D. |
| Germination and dormancy, preconditioning, stimulants and species host relationship, phenology, variations | 3, 4, 6, 7 | 4 | A, B, C, D. |
| 1st Hr Exam |  | 5 | A, B, C, D. |
| Parasitic habit , morphological and anatomical reductionism | 1, 4 | 5 | A, B, C, D. |
| Chemotropism, haustorial initiation, attachment | 4 | 6 | A, B, C, D. |
| Papilla formation, penetration, link to host conductive tissues | 4, 8 | 6 | A, B, C, D. |
| Comparative histology of germination, establishment of Viscum, Orobanche, Cuscuta | 3, 4, 5, 7 | 7 | A, B, C, D. |
| Regulation of early development, effect on the host | 4 | 7 | A, B, C, D. |
| Mineral nutrition of host & parasite | 4, 7 | 8 | A, B, C, D. |
| Trends in metabolic reductionism | 4 | 8 | A, B, C, D. |
| Water relations, osmo-regulation, drought tolerance & host resistance | 4, 5 | 9 | A, B, C, D. |
| Leaf conductance in host & parasite | 4, 8 | 9 | A, B, C, D. |
| Biochemical aspects of parasitism, hormonal levels | 8 | 10 | A, B, C, D. |
| Biotic interactions, mimicry, reversion of species in Loranthaceae | 1, 2, 4 | 10 | A, B, C, D. |
| 2 Hr exam |  | 11 | A, B, C, D. |
| PW management Host resistance patterns, breeding for resistance | 9 | 11 | A, B, C, D. |
| Management resources, stimulants, seed bank reduction | 4, 9 | 12 | A, B, C, D. |
| Fumigants, soil solarization, organic matter fermentation | 4, 6, 9 | 12 | A, B, C, D. |
| Fertility, nodulation for the control of Orobanche and Striga | 4, 9 | 13 | A, B, C, D. |
| Flooding, Rotation, planting date differential response to climatic and edaphic factors  | 4, 6, 9 | 13 | A, B, C, D. |
| Catch crops, trap crops, spacing and shading, non-host and parasite development | 1, 3, 4, 6, 9 | 14 | A, B, C, D. |
| Control methods-tillage, grazing, hoeing, cutting | 4, 6, 9 | 14 | A, B, C, D. |
| Biological control. Bioherbicides | 8 | 15 | A, B, C, D. |
| Chemical control, foliar and soil applied, seed dressings | 4, 9 | 16 | A, B, C, D. |
| Growth hormones and antitranspirants | 4, 8, 9 | 16 | A, B, C, D. |

**Learning Methodology**

1)Lectures: 32 lectures /1.5 hr each

2) Case Study: 4-5

3) Assignments, Reports, Projects: field reports on case studies

**Projects and Assignments**

Each student will be assigned to perform, present and discuss a case study on one of the key topics in the course

**Evaluation**

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| **Evaluation** | **Point %** | **Date** |
| **Mid. Term Exam**  | 40 | 8-10th week |
| **Reports, Assignments, Presentation** | 20 | Arranged with lecturer  |
| **Final Exam**  | 40 | University schedule |

**Main Reference/s:**

1. Parker, C. and C. R. Riches. (1993). Parasitic weeds of the world, biology and control. Cab International. 332 pages. ISBN 0851988733

**References:**

1. Musselman, L.J. (1987). Parasitic weeds in agriculture, Volume 1, Striga. CRC Press. 317 pages. ISBN 0849362725
2. Barlow, B.A. (1983). Biogeography of Loranthaceae and Viscaceae. In the Biology of Mistletoes, ed. , M. Calder. and P. Bernhardt. Academic Press, Sydney, pp. 19-46.
3. Joel, M.D., Gressel, J., and Musselman, L.J. (eds.). (2013). Parasitic Orobanchaceae. Parasitic mechanisms and control strategies. Springer, London.
4. Parker, C. and C. R. Riches. (1993). Parasitic weeds of the world, biology and control. Cab International. 332 pages. ISBN 0851988733
5. Press, M. and Graves, J. (eds.). (1996). Parasitic Plants. Chapman & Hall, New York.
6. Qasem, J.R. (2003). Weeds and their Control. University of Jordan, Amman, Jordan
7. Qasem, J.R. (2006). Recent advances in parasitic weed research, an overview. In: *Weed Management Handbook*, 2006 pages 627-728 (H.P. Singh *et al*., eds.). ISBN -13: 978-1-56022-957-5, ISBN 1-56022-957-8. The Haworth Press Inc., USA.
8. Qasem, J.R. (2006). Parasitic weeds and allelopathy, from the hypothesis to the proof. In: *Allelopathy*, *A Physiological Process with Ecological Implications*, 2006 page 565- 637 (Manuel J. Reigosa and Nuria Pedrol, and Luis Gonzalez eds.) ISBN-IO 1-4020-4279-5 (HB), ISBN-13 978-1-4020-4279-9 (HB), ISBN-IO 1-4020-4280-9 (e-book), ISBN-13 978-1-4020-4280-5 (e-book): Springer, The Netherlands.
9. Suerborne, Joachim.(1991). Parasitic flowering plants, ecology and management. Verlag Josef Margraf, . ISBN 3-8236-1217-4. 127 pages
10. Various proceedings of symposia, workshops and conferences on parasitic weeds
11. Websites to be announced during the course
12. Specialized journals, articles and research papers

**Intended Grading Scale (Optional)**

0-69 **C**

70-73 **C+**

74-76 **B**-

77-80 **B**

81-84 **B+**

85-89 **A**-

90-100 **A**

**Notes:**

* Concerns or complaints should be expressed in the first instance to the module lecturer; if no resolution is forthcoming, then the issue should be brought to the attention of the module coordinator (for multiple sections) who will take the concerns to the module representative meeting. Thereafter, problems are dealt with by the Department Chair and if still unresolved the Dean and then ultimately the Vice President. For final complaints, there will be a committee to review grading the final exam.
* For more details on University regulations please visit:

 <http://www.ju.edu.jo/rules/index.htm>