UNIVERSITY OF SARGODHA

DEPARTMENT OF PLANT BREEDING AND GENETICS

COURSE OUTLINE Fall 2021

Course Tittle: BREEDING CEREALS CROPS

Course Code: PLBG-6207

Credit Hours: 3(2-1)

Instructor: Dr. USMAN SALEEM

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DESCRIPTION& OBJECTIVES

Cereals are considered as the grains of life and the foundation of human civilization. Cereals grains are the amalgamation of endosperm, germ, and bran. It focuses on importance, status, evolution and breeding techniques in cereals. It describes the procedure of variety development. Today cereals have passed a series of genetic manipulation, re-arrangement of genetic architecture, polyploidization to compete all biotic and abiotic stresses, like diseases, water stress, winter hardiness, salinity, frost, mineral toxicity etc. It will enable students to understand applications of genetic principles in cereal breeding, various reproductive systems in cereals, variety development and release procedures. This course is designed to enhance the research skills among the students to compete the changing world, focusing on cereal crops and its byproducts. Students will practically handle segregating populations and data recording. At the end of the course students will be able to understand the genetics and breeding behavior of cereal crops and its estimation.

To enable students to understand:

* Application of genetic principles in cereal breeding
* Various reproductive systems in cereals
* Variety development and release procedures

READINGS

1. Sleper, D.A and J.M. Poehlman.2006. Breeding Field Crops. 4th ed. Iowa State University Press, Ames, USA.
2. Singh, B.D. 2003. Plant breeding: Principles and Methods. Kalyani Publisher, New Dehli India
3. Morris, P.C. and J.H. Bryce. (ed.). 2000. Cereal Biotechnology. Woodhead, New York, USA.
4. Nanda, J.S. 2000. Rice Breeding and Genetics: Research Priorities and Challenges. Pak Book Corporation, Lahore, Pakistan.
5. Gupta, S.K. Practical Plant Breeding, Second Enlarged edition, Agrobios India
6. Acquaah, G. 2007. Principles of Plant Genetics and Breeding, Blackwell Publishing, USA

CONTENTS

1. Importance of cereals; wheat, rice, barley, oats and triticale.
2. Status of cereals; global and local perspective.
3. Evolution, origin, and phenology of cereal crops.
4. Breeding techniques and objectives in cereals. Yield and quality parameters in cereals.
5. Breeding for biotic and abiotic stresses.
6. Procedure for variety development. Preliminary and multi-location yield trials (NUYT, Micro Yield Trials).
7. Exploitation of male sterility systems for hybrid development in cereals.

COURSE SCHEDULE

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| Sr # | Topics and Readings | Week |
| 1. | Importance of Cereals, Status of Creals | Week-one |
| 2. | Evolution, Origin and history, Adaptation of wheat | Week-Two |
| 3. | Floral Biology, Selfing and Crossing in wheat, Breeding Objectives of wheat | Week-Three |
| 4. | Breeding Methods in cereals | Week-four |
| 5. | Economic importance, origin and history, adaptation of rice | Week-five |
| 6. | Floral Biology, Selfing and Crossing in wheat, Breeding Objectives of rice | Week- six |
| 7. | Economic importance, origin and history, adaptation of Maize, Hybrid seed production | Week-Seven |
| 8. | Floral Biology, Selfing and Crossing in wheat, Breeding Objectives of maize | Week- eight |
| 9. | Review of course  **Mid examination** |  |
| 10. | Economic importance, origin and history, adaptation of Sorghum | Week-ten |
| 11. | Floral Biology, Selfing and Crossing in wheat, Breeding Objectives of Sorghum | Week-eleven |
| 12. | Economic importance, origin and history, adaptation of Barley, Floral Biology, Selfing and Crossing in wheat, Breeding Objectives of Barley | Week-twelve |
| 13. | Economic importance, origin and history, adaptation of Oat, Floral Biology, Selfing and Crossing in wheat, Breeding Objectives of Oat | Week-Thirteen |
| 14. | Breeding for biotic and abiotic stresses | Week-Fourteen |
| 15. | Procedure for variety development. Preliminary and multi-location yield trials | Week-Fifteen |
| 16. | Exploitation of male sterility systems for hybrid development in cereals | Week-Sixteen |
| 17. | Presentations  Review of course | Week-eventeen |
| 18. | **Final Examination** |  |

RESEARCH PROJECT

ASSESSMENT CRITERIA

Sessional: 8 (Class Attendance:2, Presentation: 4, Assignments: 2)

Mid Term Test: 12

Final Term Test: 20

RULES AND REGULATIONS

1: 80 % class attendance is required to get 2 Marks.

2: Assignments submitted after deadlines get no reward.