Course Code : PLB 202
Course Title : Introductory Plant Breeding
Credit Hours : 3 (2 + 1) Full Marks: 75 Theory: 50 Practical: 25

OBJECTIVES

Upon the completion of this course, the students will be able to know the basic concept of plant breeding and its relationships with other disciplines, and principles of genetics to crop improvement.

I. SYLLABUS

Introduction to plant breeding; Plant introduction, domestication and germplasm conservation; Modes of pollination and reproduction; Pollination control: male sterility and self incompatibility; Qualitative and quantitative characters; Biometrical techniques in plant breeding; Selection in self pollinated crops; Genetic composition and selection in cross pollinated crops; Hybridization techniques; Heterosis and inbreeding; Breeding methods in self and cross pollinated and asexually propagated crops; Mutation breeding; Polyploidy breeding; Ideotype breeding and breeding for pest resistance; Release of new varieties; Crop improvement; Participatory plant breeding and intellectual property rights.

II. Course Breakdown

A. Lecture

S. N.	Topics	No. of Lectures
1.	Introduction to plant breeding (definition, history, goals, nature, objectives, activities, achievements and relationship to other disciplines)	1
2.	Plant introduction, domestication and germplasm conservation.	2
	2.1 Plant introduction, domestication and acclimatization	
	2.2 Concept of Gene pool and Centers of origin	
3.	Modes of pollination and reproduction	1
4.	Pollination control: male sterility and self incompatibility	1
5.	Qualitative and quantitative characters	1
6.	Biometrical techniques in plant breeding	1
7.	Selection in self pollinated crops	1
	7.1 Pureline theory, progeny test, origin of variation	
	7.2 Genetic gain/advance, heritability	
8.	Genetic composition and selection in cross pollinated crops	2
	8.1 Hardy Weinberg law and equilibrium, factors affecting equilibrium, mating Systems	
	8.2 Selection response and gain from selection in cross pollinated crops	
9.	Hybridization techniques (definition, objectives, types, procedures and consequences)	1

10.	Heterosis and inbreeding	2
	10.1 Definition, types, effects, theories governing of heterosis	
	10.2 Definition and effects of inbreeding and inbreeding depression	
11.	Breeding methods in self and cross pollinated and asexually propagated crops	6
	11.1 Breeding methods in Self Pollinated crops	
	11.1.1 Mass selection, pureline selection and pedigree selection	
	11.1.2 Back cross selection, bulk selection and single seed descent selection	
	11.2 Breeding methods in cross Pollinated crops	
	11.2.1 Mass selection, progeny selection, half sib and full sib selection	
	11.2.2 Simple recurrent selection and selfed progeny selection	
	11.3 Breeding methods in asexually propagated crops: clonal selection	
12.	Mutation breeding	2
	12.1 Definition and types of mutagenes	
	12.2 Mutation breeding and procedure and its applications	
13.	Polyploidy breeding	2
	13.1 Definition of related terms; production and applications of haploids, aneuploids, autotriploids, autotetraploids	
	13.2 Production and applications of alloploids; evolution of wheat, Brassica, Triticale, tobacco and Raphanobrassica)	
14.	Ideotype breeding and breeding for pest resistance	2
	14.1 Ideotype breeding	
	14.2 Breeding for disease and insect resistance	
15.	Release of new varieties (evaluation, identification and release)	1
16.	Crop improvement of some important crops in Nepal	3
	16.1 Rice and wheat	
	16.2 Maize and legumes	
	16.3 Potato and tomato	
17.	Participatory plant breeding and Intellectual property rights	1
	Total	**30**

B. Practical

S. N.	Topics	No. of practical
1.	Study and draw floral parts of self pollinated field crops	1
2.	Study and draw floral parts of cross pollinated field crops	1
3.	Estimation of heterosis and inbreeding depression	1
4.	Estimation of heritability and genetic gain from selection	1
5.	Plant breeding data recording	1
6.	Scoring data and determining resistance/susceptibility to pests	1
7.	Determining physical and genetic purity in the laboratory	1
8.	Hybridization techniques of self pollinated crops	1
9.	Hybridization techniques of cross pollinated crops	1
10.	Hybrid seed production using CMS and self incompatible lines	1
11.	Describing the traits for release of a new variety	1
12.	Visit and study of the research activities at National wheat research program	1
13.	Visit and study of the research activities at National maize research program	1
14.	Visit and study of the research activities at National grain legumes research program	1
15.	Visit and recording of the plant breeding activities of a given farmer	1
	Total	**15**

REFERENCES

Chopra, V.L., 2000. Plant Breeding: Theory and Practices (2nd Ed.). Baba Barkha Nath Printing Press. New Delhi. India.

Gupta, S.K., 2003. Plant Breeding: Theory and Techniques. Agrobios. India.

Poehlman, J.M. and D.A. Sleper, 1995. Breeding Field crops (4th ed.). Panima Publishing Corporation. New Delhi. India.

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