

# 21ELCT315 COMMERCIAL PLANT BREEDING

Hours Per Week :

L	T	P	C
1	-	4	3

Total Hours :

L	T	P
15	-	60

## COURSE DESCRIPTION AND OBJECTIVES:

Main objective of is to familiarize the student about the commercial plant breeding techniques which are used to produce new high yielding varieties/hybrids

## COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Students will understand the aims and objectives of commercial plant breeding
2	Students will understand principles and techniques of hybrid seed production and registration. Students will learn Intellectual Property Rights (IPR)

## SKILLS:

- ✓ *Develop standard procedure to produce certified seed of cereals, millets, pulses and oilseeds crops*
- ✓ *Practice emasculation and pollination techniques*
- ✓ *Handle equipment used in biotechnology laboratory*



Source:

<http://www.kulcsarseed.hu/varieties-maintenance/>

**ACTIVITIES:**

- o *Visit to hybrid and varietal seed production plots*
- o *Demonstration of emasculation and hybridization techniques*
- o *Detailed study about quality characters of donor parent*

**UNIT - 1**

Types of crops and modes of plant reproduction - Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production

**UNIT - 2**

Genetic purity test of commercial hybrids - Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton and pigeon pea; Quality seed production of vegetable crops under open and protected environment

**UNIT - 3**

Alternative strategies for the development of the line and cultivars - haploid inducer, tissue culture techniques and biotechnological tools

**UNIT - 4**

IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act - Variety testing, release and notification systems in India - Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops

**UNIT - 5**

Breeder's equation - Market segmentation, development of product concepts and product profiles – Optimizing breeding pipelines, deploying novel genomic and phenomic tools; Rapid generation advancement (speed breeding) – multi environment testing and data driven decision making for product advancement and recycling for increasing the rate of genetic gain

**LABORATORY EXPERIMENTS****LIST OF EXPERIMENTS**

- 1&2. Floral biology in self pollinated species and cross pollinated species
3. Selfing techniques
4. Crossing techniques
- 5-7. Techniques of seed production in self and cross pollinated crops using A/B/R and two line system
8. Learning techniques in hybrid seed production using male-sterility in field crops
9. Understanding the difficulties in hybrid seed production
10. Tools and techniques for optimizing hybrid seed production
11. Concept of rouging in seed production plot
12. Concept of line and its multiplication in hybrid seed production
13. Line purification in hybrid seed production
14. Role of pollinators in hybrid seed production
- 15-24. Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeonpea, cotton and vegetable crops
- 25&26. Sampling and analytical procedures for purity testing and detection of spurious seed
27. Seed drying

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28. Seed storage structure in quality seed management
  29. Screening techniques during seed processing *viz.*, grading and packaging
  30. Visit to public and private seed production and processing plants

**REFERENCES:**

1. Agarwal, R.L. 2015. *Seed Technology*. Oxford and IBH Publication Co., New Delhi
2. Khare, Dharendra and Bhala, M.S. 2014. *Seed Technology second revised edition*. Scientific Publishers. Jodhpur
3. Phundan Singh, 2014. *Essentials of Plant Breeding*. Kalyani Publishers, New Delhi
4. Singh, B.D. 2015. *Plant Breeding: Principles and Methods*. Kalyani Publishers, New Delhi

