

Course No. H/HORT- 121

**Course Title: Growth and Development of
Horticultural Crops**

Credits: (1+1) 2

Semester: II

Theory:

Growth and development-definitions, components, photosynthetic productivity, Canopy photosynthesis and productivity, leaf area index (LAI) - optimum LAI in horticultural crops, canopy development; different stages of growth, growth curves, Crop development and dynamics (Case studies of annual/perennial horticultural crops), growth analysis in horticultural crops. Plant bio-regulators- auxin, gibberellin, cytokinin, ethylene inhibitors and retardants, basic functions, biosynthesis, role in crop growth and development, propagation, flowering, fruit setting, fruit thinning, fruit development, fruit drop, and fruit ripening. Flowering-factors affecting flowering, physiology of flowering, photoperiodism-long day, short day and day neutral plants, vernalisation and its application in horticulture, pruning and training physiological basis of training and pruning-source and sink relationship, translocation of assimilates. Physiology of seed development and maturation, seed dormancy and bud dormancy, causes and breaking methods in horticultural crops. Physiology of fruit growth and development, fruit setting, factors affecting fruit set and development, physiology of ripening of fruits-climatic and non-climacteric fruits. Physiology of fruits under post-harvest storage.

Practical

Estimation of photosynthetic potential of horticultural crops, leaf area index, growth analysis parameters including harvest index, bioassay of plant hormones, identification of synthetic plant hormones and growth retardants, preparations of hormonal solution and induction of rooting in cuttings, ripening of fruits and control of flower and fruit drop. Important physiological disorders and their remedial measures in fruits and vegetables, seed dormancy, seed germination and breaking seed dormancy with chemicals and growth regulators.

Teaching Schedule:

Lecture No	Topics	Weightage (%)
1	Plant growth and development – definition, components of growth and phases of growth in Horticultural Crops	5
2	Different stages of growth and growth curve.	5

3	Growth analysis of Horticultural Crops, crop development and dynamics (case studies of annual/perennial Horticultural Crops)	5
4	Leaf area index (LAI), optimum LAI in Horticultural Crops and canopy development	5
5	Photosynthetic productivity – Photosynthetic efficiency of C ₃ and C ₄ plants.	5
6	Translocation of assimilates – theories of translocation of organic solute, source and sink relationship.	10
7-8	Plant bioregulators – Auxins, gibberellins, cytokinin, ethylene , inhibitors and retardants, basic functions & biosynthesis.	10
9	Role of bioregulators in growth and development.	5
10	Role of bioregulators in propagation and flowering, fruit setting. Fruit thinning, fruit development, fruit drop and fruit ripening.	10
11	Photoperiodism – long day, short day and day neutral plant and vernalization	5
	and its application in Horticultural Crops	
12	Physiology of flowering, factors affecting flowering.	5
13	Training and pruning, physiological basis of training and pruning.	5
14	Physiology of fruit growth and development, fruit setting, factors affecting fruit setting and development.	10
15	Physiology of ripening fruit, climacteric and non-climacteric fruit, Physiology of fruits under post-harvest storage.	5
16	Physiology of fruit growth and development, fruit setting, factors affecting fruit setting and development.	10
Total		100

Practical schedule:

Practical	Name/Title
1	Estimation of photosynthesis potential of hort. Crops by IRGA
2	Estimation of leaf area & leaf area index in hort. Crops
3	Studies on growth analysis- measurement of growth by using Arc indicator and auxanometer.
4	Measurement of growth by different growth analysis equations.
5	Determination of harvest index in different hort. Crops
6	Studies on preparation of hormonal solutions.

7	Identification and use of synthetic plant hormone and growth retardant, bioassay of plant hormone.
8	Studies on PGR in induction of rooting in cutting in hort. Crops.
9	Study of role of PGR in fruit ripening.
10	Study of role of PGR in control of flower drops.
11	Studies of important physiological disorder and their remedial measures in fruit & vegetables – I Macro elements
12	Studies of important physiological disorder and their remedial measures in fruit & vegetables –II- Microelements
13	Study of seed dormancy – causes and methods of breaking dormancy with chemicals & growth regulators,.
14	Study of seed viability testing
15	Study of germination – types of seed germination – factors affecting seed germination
16	Study of germination-methods of seed germination testing.

Text books:

Salisbury. 2007. *Plant Physiology*. CBS. New Delhi.

Taiz, L. 2010. *Plant Physiology*. SINAUR. USA.

Zeiger. 2003. *Plant Physiology*. PANIMA. New Delhi. UK.

Delvin, R.M . 1986. *Plant Physiology*. CBS. Delhi.

Richard, N. Arteca. 2004. *Plant Growth Substances*. CBS. New Delhi.

Jacobs, W. P. 1979. *Plant Hormones And Plant Development*. Cambridge Univ. London.

Basra, A. S. 2004. *Plant Growth Regulators in Agriculture & Horticulture*. HAWARTH press. New York.

Noggle G.R and Fritz T.G. *Introductory Plant Physiology*

Reference books:

Edward E. Durna. 2014. *Principles Of Horticultural Physiology*. CABI,

Lincoln Taiz and Edwards Zeiger (5th Edition). *Plant physiology*

Pandey and Sinha. *Plant Physiology*

Carl fedtke. *Biochemistry and Physiology of Herbicide Action*

Aswani pareek, S.K. Sopory, Hans Bohnert Govindjee. *Abiotic stress adaptation in plants:*

Physiological, Molecular and Genomic foundation

Horst Marschner, *Mineral Nutrition of Higher plants*