

GURUKASHIUNIVERSITY



**Doctor of Philosophy
In
Vegetable Science**

Session:2025-26

Faculty of Agriculture

Program Structure									
Cours e Code	Course Title	Type of Cours e	L	T	P	To tal Cr edi ts	Int.	Ext.	Total Marks
PPH 101	Research Methodology	Core	4	0	0	4	30	70	100
PPH 102	Research and Publication Ethics	Core	2	0	0	2	30	70	100
PPH 104	Computer Applications in Research	Skill Base d	0	0	4	2	30	70	100
PPH 115	Recent Trends in Vegetable Production, Advances in Breeding of Vegetable Crops, Abiotic Stress Management in Vegetable Crops and Seed Certification, Processing and Storage of Vegetable Crops	core	4	0	0	4	30	70	100
Total Credits						12	120	280	400

CourseTitle:ResearchMethodology

CourseCode:PPH101

L	T	P	Credits
4	0	0	4

**Total
Hours:60**

LearningOutcomes

On the completion of the course the students will be able to

1. Formulate research problems by conducting comprehensive literature reviews utilizing web sources
2. Apply appropriate research design choices based on research questions and objectives.
3. Explore the integration of qualitative and quantitative data and the concept of triangulation and complementarity of data sources.
4. Utilize statistical software packages commonly used in research for importing, managing, cleaning, and analyzing data.
5. Apply different statistical techniques to summarize and analyze data effectively.

Course Content

Unit-I

15 Hours

Introduction to Research

Meaning, Objectives, Characteristics, Significance and Types of Research. Understanding a Research Problem, Literature Review, Methods and Reporting, Selecting the Research Problem, Steps in Formulation of a Research Problem.

Unit-II

15Hours

Research Process and Hypothesis

Constructing Hypotheses; Conceptualizing a Research Design-Meaning and Types of Research Design.

Parametric and Non-Parametric Test, Errors and Level of Significance. Completely randomized design, Random block design, Latin square design, and Statistical analysis. Components of time

series, Analysis of time series, Measurement of trend, Measurement of seasonal variations.

Unit-III
Hours

15

Sampling Design and Data Analysis

Sampling Techniques-Probability and Non-Probability, Qualities of a good Sample, Sample Size and its Determination.

Introduction to Qualitative, Quantitative and Mixed Methods, Quantitative Methods- Univariate, Bivariate and Multivariate, Qualitative Methods-Grounded Theory and Triangulations, Mixed Methods- Convergent Parallel, Explanatory Sequential, Exploratory Sequential and Transformative.

Implementation of statistical techniques using statistical packages viz. SPSS R including evaluation of statistical parameters and data interpretation, Regression Analysis, Covariance, analysis of variance.

Unit-IV
Hours

15

Report Writing

Types of Reports- technical and Popular Reports, Significance of Report Writing, Different Steps in Writing Report, Art of Writing Research Proposals, Research Papers, Projects Reports and Thesis; Basics of Citation and Bibliography/Reference Preparation Styles; Report Presentation: Oral and Poster Presentations of Research Reports.

Suggested Reading

- Gupta, S. (2010). Research Methodology and Statistical Techniques. Deep & Deep Publications (P) Limited, New Delhi.
- Kothari, C.R., Garg, G. (2019). Research Methodology: Methods and Techniques. 4th Edition, New Age International (p) Limited. New Delhi.
- Sahay, Vinaya and Pradumna Singh (2009). Encyclopedia of Research Methodology in Life Sciences. Anmol Publications. New

Delhi.

- Kauda J. (2012). Research Methodology: A Project Guide for University Students. Samfunds literature Publications.
- Dharmapalan B. (2012). Scientific Research Methodology. Narosa Publishing

Course Title: Research and Publication Ethics

Course Code: PPH102

L	T	P	Credits
2	0	0	2

Total Hours

30

Learning Outcomes

On the completion of the course the students will be able to

1. To have awareness about the publication ethics and publication misconducts.
2. To understand indexing and citation databases, open access publications, research metrics (citations, h-index, impact factor etc.).
3. Develop hands-on skills to identify research misconduct and predatory publications.

Course Content

• RPE 01: PHILOSOPHY AND ETHICS

3 Hours

1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgements and reactions

• RPE 02: SCIENTIFIC CONDUCT

5 Hours

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data

• RPE03: PUBLICATION ETHICS

7 Hours

1. Publication ethics: definition, introduction and importance
2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
5. Violation of publication ethics, authorship and contributorship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

PRACTICE

• RPE 04: OPEN ACCESS PUBLISHING

4

Hours

1. Open access publications and initiatives
 2. SHERPA/ROMEO online resource to check publisher copyright & self- archiving policies
 3. Software tool to identify predatory publications developed by SPPU
- Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

• RPE 05: PUBLICATION MISCONDUCT

4

Hours

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.)

Use of plagiarism software like Turnitin, Urkund and other open source software tools

RPE 06: DATABASES AND RESEARCH METRICS

7

Hours

A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g-index, i10 index, altmetrics

Suggested Readings

- Bird, A. (2006). Philosophy of Science. Routledge.
- MacIntyre, A. (1967) A Short History of Ethics. London.
- P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:978-9387480865
- National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition. National Academies Press.
- Rensik, D. B. (2011). What is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10. Retrieved from <https://www.niehs.nih.gov/resources/bioethics/whatis/index.cfm>
- Beall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179. <https://doi.org/10.1038/489179a>

Course Title: Computer Applications in Research

Course Code: PPH104

L	T	P	Credits
0	0	4	2

**Total
Hours 30**

Learning Outcomes

On the completion of the course the students will be able to

1. The students will become familiar with the usage of software for managing the reference.
2. To make literature reviews easily.
3. To make reference management by using open software.

Course Content

Unit I

06

Hours

MS Word Essentials-Create a document with styled headings and subheadings, Add headers, footers, and page numbers, Adjust page layout settings (margins, orientation, page size).

Table Creation and Management-Insert, format, and style tables, Adjust cell size, merge/split cells, and sort/filter data.

Working with Graphics-Insert and format images, shapes, SmartArt, and text boxes, Apply text wrapping around objects.

Unit II

08

Hours

Basics of PowerPoint- Slide layouts, themes, and templates, Adding multimedia: Images, audio, and videos.

Advanced Techniques- Animations and transitions for visual effects, Slide master for consistent formatting, Interactive elements: Hyperlinks and action buttons.

Design Best Practices- Typography, color schemes, and visual hierarchy, Tips for engaging presentations.

Unit III

08

Hours

Introduction to Mendeley- Installing and setting up Mendeley Desktop and Web, Importing references from various sources.

Organizing References- Creating folders and tagging references, Annotating and highlighting PDFs.

Citations and Bibliography- Integrating Mendeley with MS Word, using citation styles (APA, MLA, Chicago), Generating a bibliography automatically.

Unit IV

08

Hours

AI Tools for Productivity- Text-Based AI Tools (e.g., ChatGPT) Writing assistance, summarization, and brainstorming, Grammar and style checking, Image and Design Tools, Speech and Audio Tools

Suggested Readings

- Office 2007 in Simple Steps, Kogent Solutions, (Wiley Publishers).
- MS-Office 2007 Training Guide, S. Jain (BPB Publications).
- Computer Fundamentals by P.K. Sinha (BPB Publications).
- <https://www.mendeley.com/reference-management/reference-manager>
- <https://chat.openai.com>
- <https://edu.google.com/workspace-for-education/classroom/>

Course Title:Recent Trends in Vegetable Production, Advances in Breeding of Vegetable Crops, Abiotic Stress Management in Vegetable Crops and Seed Certification, Processing and Storage of Vegetable Crops

Course Code: PPH115

L	T	P	Credits
4	0	0	4

Total Hours 60

Learning Outcomes

On the completion of the course the students will be able to

1. Acquire the knowledge about recent trends in production technology of vegetable crops.
2. Breeding objectives, trends and Recent Advances in vegetable breeding.
3. Attain the knowledge about effect of different abiotic stresses on vegetables and methods to mitigate abiotic stress in vegetables
4. Acquire the knowledge on seed certification, the knowledge on seed processing and storage.

Course Content

Unit-1

15 Hours

Recent Trends in Vegetable Production

Present status and prospects of vegetable cultivation; nutritional and medicinal values; climate and soil as critical factors in vegetable production; choice of varieties; nursery management; modern concepts in water and weed management; physiological basis of growth, yield and quality as influenced by chemicals and growth regulators; role of organic manures, inorganic fertilizers, micronutrients and biofertilizers; response of genotypes

to low and high nutrient management, nutritional deficiencies, disorders and correction methods. Different cropping systems; mulching; containerized culture for year round vegetable production; crop modeling, organic gardening; vegetable production for pigments, export and processing of: Tomato, brinjal, chilli, sweet pepper, potato. Cucurbits, cabbage, cauliflower, knol-khol, Bhendi, onion, peas and beans, amaranthus, drumstick, Carrot, beet root and radish, Sweet potato, tapioca, elephant foot yam and taro.

Unit-2

20 Hours

Advances in Breeding of Vegetable Crop

Evolution, distribution, cytogenetics, genetic resources, genetic divergence, types of pollination and fertilization mechanisms, sterility and incompatibility, anthesis and pollination, hybridization, inter-varietal, interspecific and inter-generic hybridization, heterosis breeding, inheritance pattern of traits, qualitative and quantitative. Plant type concept and selection indices, genetics of spontaneous and induced mutations, problems and achievements of mutation breeding, ploidy breeding and its achievements, in vitro breeding; breeding techniques for improving quality and processing characters; breeding for stresses, mechanism and genetics of resistance, breeding for salt, drought; low and high temperature; toxicity and water logging resistance, breeding for pest, disease, nematode and multiple resistance of; Tomato, brinjal, chilli, sweet pepper, potato. Cucurbits, Cabbage, cauliflower, knol-khol, Bhendi, onion, peas, beans, amaranthus, drumstick, Carrot, beet, radish, Sweetpotato, tapioca, elephant foot yam and taro.

Unit-3

15 Hours

Abiotic Stress Management in Vegetable Crops

Environmental stress and its types, soil parameters including pH, classification of vegetable crops based on susceptibility and tolerance to various types of stress; root stock, use of wild species, use of antitranspirants. Mechanism and measurements of tolerance to drought,

water logging, soil salinity, frost and heat stress in vegetable crops.

Soil-plant-water relations under different stress conditions in vegetable crops production and their management practices. Techniques of vegetable growing under water deficit, brackish water, water logging, soil salinity and soil sodicity condition.

Techniques of vegetable growing under high and low temperature conditions, soil salinity, brackish water, use of chemicals in alleviation of different stresses.

Unit-4

10 Hours

Seed Certification, Processing and Storage of Vegetable Seeds

Seed certification, history, concepts and objectives, seed certification agency, phases of seed certification, Indian Minimum seed Certification standards, Planning and management of seed certification programmes. Principles and procedures of field inspection, seed sampling, testing and granting certification, OECD certification Schemes. Principles of seed processing, Methods of seed drying and cleaning, seed processing plant- Layout and design, seed treatment, seed quality enhancement, packaging and marketing. Principles of Seed Storage, orthodox/ recalcitrant seeds, types of storage (open, bulk, controlled, germplasm, cryopreservation), factors affecting seed longevity in storage (Pre and postharvest factors). Seed aging and deterioration, maintenance of seed viability and vigor during storage, storage methods, storage structures, transportation and marketing of seeds.

Suggested Readings

- Bose TK & Som NG. 1986. Vegetable Crops of India. Naya Prokash. Bose TK, Kabir J, Maity TK, Parthasarathy VA & Som MG. 2003.
- Vegetable Crops. Vols. I-III. Naya Udyog.
- Brewster JL. 1994. Onions and other Vegetable Alliums. CABI. FFTC. Improved Vegetable Production in Asia. Book Series No. 36.
- Ghosh SP, Ramanujam T, Jos JS, Moorthy SN & Nair RG. 1988. Tuber Crops. Oxford & IBH. Gopalakrishnan TR. 2007. Vegetable Crops. New

India Publishing Agency.

- Kallo G & Singh K. (Ed.). 2001. Emerging Scenario in Vegetable Research and Development. Research Periodicals & Book Publ. House.
- Kurup GT, Palanisami MS, Potty VP, Padmaja G, Kabeerathuma S & Pallai SV. 1996. Tropical Tuber Crops, Problems, Prospects and Future Strategies. Oxford & IBH.
- Sin MT & Onwueme IC. 1978. The Tropical Tuber Crops. John Wiley & Sons.
- Singh NP, Bhardwaj AK, Kumar A & Singh KM. 2004. Modern Technology on Vegetable Production. International Book Distr. Co.
- Singh PK, Dasgupta SK & Tripathi SK. 2006. Hybrid Vegetable Development. International Book Distr. Co
- Acta Horticulture. Conference on Recent Advance in Vegetable Crops. Vol. 127.
- Chadha KL, Ravindran PN & Sahijram L. 2000. Biotechnology in Horticultural and Plantation Crops. Malhotra Publ. House.
- Chadha KL. 2001. Hand Book of Horticulture. ICAR.
- Dhillon BS, Tyagi RK, Saxena S & Randhawa GJ. 2005. Plant Genetic Resources: Horticultural Crops. Narosa Publ. House.
- Janick JJ. 1986. Horticultural Science. 4th Ed. WH Freeman & Co
- Kaloo G & Singh K. 2001. Emerging Scenario in Vegetable Research and Development. Research Periodicals and Book Publ. House.
- Kaloo G. 1994. Vegetable Breeding. Vols. I-III. Vedams eBooks.
- Peter KV & Pradeep Kumar T. 2008. Genetics and Breeding of Vegetables. (Revised Ed.). ICAR.
- Ram HH. 2001. Vegetable Breeding. Kalyani.
- Dwivedi P & Dwivedi RS. 2005. Physiology of Abiotic stress in Plants. Agrobios.
- Lerner HR (Ed.). 1999. Plant Responses to Environmental Stresses. Marcel Decker.
- Maloo SR. 2003. Abiotic Stresses and Crop Productivity. Agrotech Publ. Academy.
- Agarwaal PK and Anuradha V. 2018. Fundamentals of seed science and

technology. Brilliant publications, New Delhi.

- Basra AS. 2000. Hybrid seed production in vegetables. CRC press, Florida, USA.
- Bench ALR and Sanchez RA. 2004. Handbook of seed physiology. Food products press, NY/ London.
- Chakraborty SK, Prakash S, Sharma SP and Dadlani M. 2002. Testing of distinctiveness, uniformity and stability for plant variety protection. IARI, New Delhi
- Copland LO and McDonald MB. 2004. Seed science and technology, Kluwer academic press.
- Fageria MS, Arya PS and Choudhry AK. 2000. Vegetable crops: breeding and seed production Vol 1. Kalyani publishers, New Delhi.
- George RAT. 1999. Vegetable seed production (2nd Edition). CAB International.
- Hazra P and Som MG. 2016. Vegetable seed production and hybrid technology (Second revised edition), Kalyani publishers, Ludhiana, 459p
- Kalloo G, Jain SK, Vari AK and Srivastava U. 2006. Seed: A global perspective. Associated publishing company, New Delhi.
- Singhal NC. 2003. Hybrid seed production. Kalyani publishers, New Delhi.

Suggested Reading Journals list for reading

- American Journal of Horticultural Sciences
- American Potato Growers
- Annals of Agricultural Research
- Annual Review of Plant Physiology
- California Agriculture

1. Haryana Journal of Horticultural Sciences
2. HAU Journal of Research
3. Horticulture Research
4. Hort Science
5. IIVR Bulletins
6. Indian Horticulture
7. Indian Journal of Agricultural Sciences
8. Indian Journal of Horticulture
9. Indian Journal of Plant Physiology
10. Journal of American Society for Horticultural Sciences
11. Journal of Arecanut and Spice Crops
12. Journal of Food Science and Technology
13. Journal of Plant Physiology
14. Journal of Biology and Technology
15. Postharvest Biology and Technology
16. Scientia Horticulturae
17. Seed Research
18. Seed Science
19. South Indian Horticulture
20. Vegetable Grower
21. Vegetable Science

