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Agron-312 Geoinformatics, Nano-technology and Precision Farming 2(1+1)

Theory

Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture. Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS; Remote sensing concepts and application in agriculture; Image processing and interpretation; Global positioning system (GPS), components and its functions; Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture; Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Practical

Introduction to GIS software, spatial data creation and editing. Introduction to image processing software. Visual and digital interpretation of remote sensing images. Generation of spectral profiles of different objects. Supervised and unsupervised classification and acreage estimation. Multispectral remote sensing for soil mapping. Creation of thematic layers of soil fertility based on GIS. Creation of productivity and management zones. Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming.

Lecture schedule-Theory

| S.N. | Topic | No. of lectures |
|------|---|-----------------|
| 1. | Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; | 2 |
| 2. | Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture | 1 |
| 3. | Crop discrimination and Yield monitoring, soil mapping; | 1 |

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| 4. | fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS; | 2 |
| 5. | Remote sensing concepts and application in agriculture; | 1 |
| 6. | Image processing and interpretation; | 1 |
| 7. | Global positioning system (GPS), components and its functions; | 1 |
| 8. | Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; | 1 |
| 9. | STCR approach for precision agriculture; | 1 |
| 10. | Nanotechnology, definition, concepts and techniques, | 1 |
| 11. | brief introduction about nanoscale effects, | 1 |
| 12. | nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, | 1 |
| 13. | Use of nanotechnology in seed and water for scaling-up farm productivity | 1 |
| 14. | Use of nanotechnology in fertilizer and plant protection for scaling-up farm productivity | 1 |

Lecture schedule: Practical

| S.N. | Topic | No. of lectures |
|------|--|-----------------|
| 1. | Introduction to GIS software, spatial data creation and editing. | 2 |
| 2. | Introduction to image processing software. Visual and digital interpretation of remote sensing images. | 2 |
| 3. | Generation of spectral profiles of different objects. | 2 |
| 4. | Supervised and unsupervised classification and acreage estimation. | 2 |
| 5. | Multispectral remote sensing for soil mapping. | 1 |
| 6. | Creation of thematic layers of soil fertility based on GIS. | 1 |
| 7. | Creation of productivity and management zones | 1 |
| 8. | Fertilizers recommendations based of VRT and STCR techniques. | 1 |
| 9. | Crop stress (biotic/abiotic) monitoring using geospatial technology. | 1 |
| 10. | Use of GPS for agricultural survey. | 1 |
| 11. | Formulation, characterization and applications of nanoparticles in agriculture. | 1 |
| 12. | Projects formulation and execution related to precision farming | 1 |

References:

1. Krishna, K.K. 2013. Precision Farming: Soil Fertility and Productivity Aspects. Apple Academic Press
2. Srivastava, G.S. 2014. An Introduction to Geoinformatics. McGrew Hill Education (India) Pvt. Ltd. , New Delhi
3. Gupta, R.K. and Subhash Chander. 2008. Principles of Geoinformatics. Jain Brothers, New Delhi.
4. Choudhary, S. 2011. Applied Nanotechnology in Agriculture. Arise Publishers & Distributors
5. Sekhon, B.S. 2014. Nanotechnology in agri-food production: an overview. Nanotechnology, Science and Applications 7:31-532.

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