

**Syllabus**  
**B. Sc. (Ag) Hons. Part-III, Semester-I**  
**Agriculture University, Jodhpur**

**Courses & Credits**

<b>Course No.</b>	<b>Course Title</b>	<b>Credits</b>
BT-4311	Principles of Plant Biotechnology	3(2+1)
AGRON-4311	Practical crop production I (kharif crops)	1(0+1)
ENTO-4311	Crop and stored grain pests and their management	4(3+1)
PBG-4311	Breeding of Field / Horticultural crops	3(2+1)
AECON-4311	Agricultural marketing, Trade and Prices	2(1+1)
AENGG-4311	Protected cultivation and Post harvest Technology	2(1+1)
PPATH-4311	Diseases of Field Crops and their management	3(2+1)
AGRON-4312	Rainfed Farming	2(1+1)
HORT-4311	Production technology of spices, Aromatics and Medicinal crops	2(1+1)
	<b>Total</b>	<b>22(13+9)</b>



# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-I**

### **Agriculture University, Jodhpur**

**BT-4311**

**Principles of Plant Biotechnology**

**3(2+1)**

**Theory:**

Concepts of Plant Biotechnology: History of Plant Tissue Culture and Plant Genetic Engineering: Scope and importance in crop Improvement : Totipotency and Morphogenesis, Nutritional requirements of in vitro cultures; Techniques of in vitro cultures, Micropropagation, anther culture, pollen culture, ovule culture, embryo culture, Test tube fertilization, Endosperm culture, factors effecting above in vitro cultures, Applications and achievements, somaclonal variation, Types, Reasons, somatic embryogenesis and synthetic seed production technology, Protoplast isolation, culture, manipulation and fusion, Products of somatic hybrids and cybrids, Applications in crop improvements, Genetic Engineering, Restriction enzymes, Vectors for gene transfer-, gene cloning, Direct and Indirect method of gene transfer-Transgenic plants and their applications. Introductory knowledge about blotting techniques, molecular markers, QTL, Marker assisted selection and application in crop improvement.

**Practical:**

Requirements of Plant tissue culture laboratory: Techniques in Plant tissue culture- Media Components and preparation; sterilization techniques and inoculation of various explants, callus induction and plant regeneration; Demonstration of Micropropagation, Anther culture, embryo culture, Hardening/ Acclimatization of regenerated plants, somatic embryogenesis and synthetic seed production, Demonstration of isolation and culture of protoplast, demonstration of isolation of DNA, gene transfer technique and gel electrophoresis techniques.

**Suggested Readings:**

1. Brown, T.A.2001 gene cloning and DNA Analysis-An Introduction, Blackwell Science, London
2. Gupta, P.K.2006. Biotechnology and Genomics, Rastogi Publication, Meerut
3. Prohit, S.S.1997, Biotechnology, Agrobotanical Publication Bikaner
4. Rajdan, M.K.1996, An introduction to, plant tissue culture, Oxford and IBH Publishing Company, New Delhi
5. Ramawat, K.G. 2000, Plant Biotechnology, Kalyani Publishers, Ludhiana
6. Mascarenhas, A.F. 1991. Handbook of Plant Tissue Culture, Publications and Information Division, ICAR, New Delhi.

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**AGRON- 4311**

**Practical Crop Production -1(Kharif crops)**

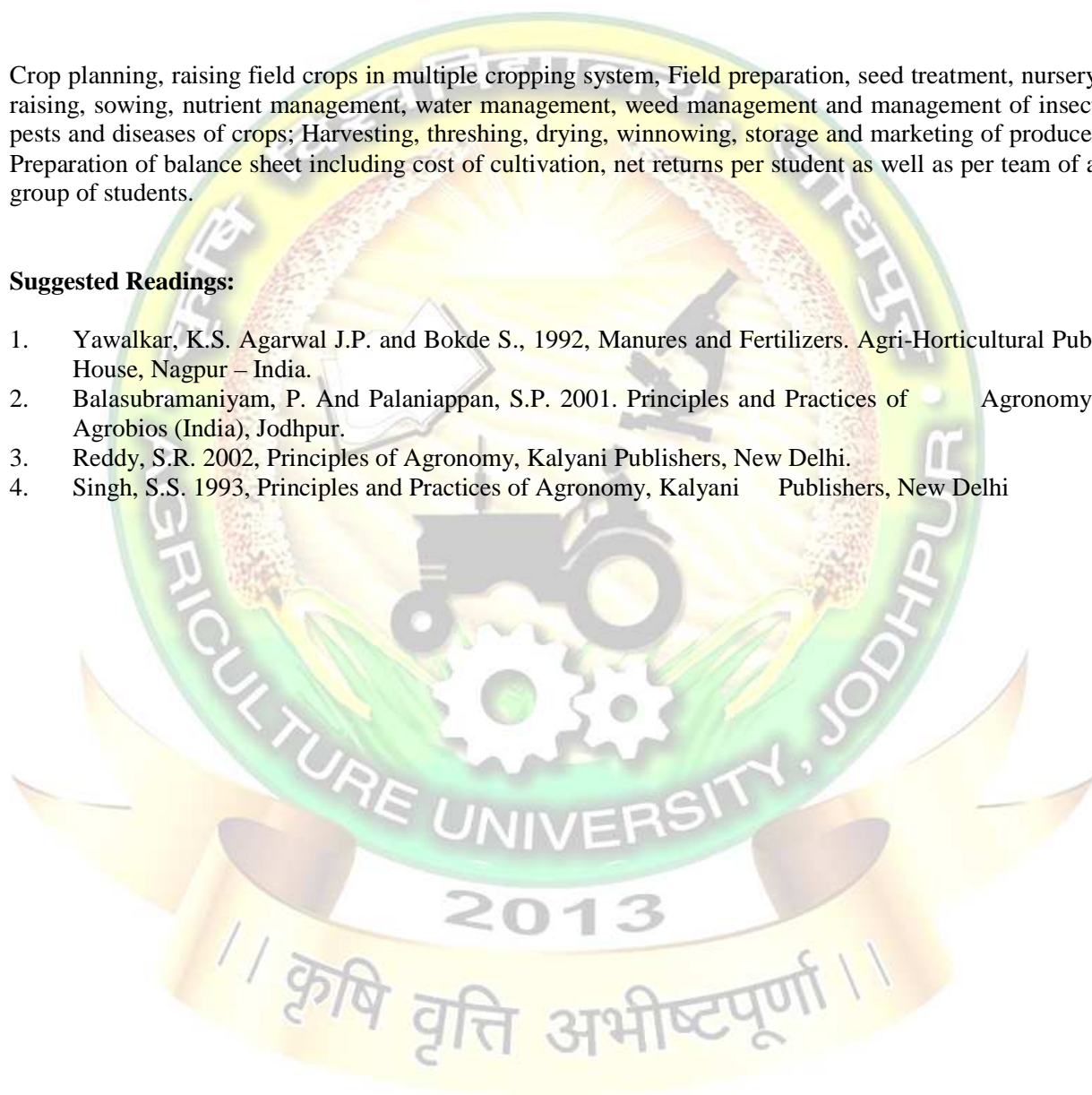
**1(0+1)**

**Practical:**

Crop planning, raising field crops in multiple cropping system, Field preparation, seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect pests and diseases of crops; Harvesting, threshing, drying, winnowing, storage and marketing of produce. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of a group of students.

**Suggested Readings:**

1. Yawalkar, K.S. Agarwal J.P. and Bokde S., 1992, Manures and Fertilizers. Agri-Horticultural Pub. House, Nagpur – India.
2. Balasubramaniam, P. And Palaniappan, S.P. 2001. Principles and Practices of Agronomy, Agrobios (India), Jodhpur.
3. Reddy, S.R. 2002, Principles of Agronomy, Kalyani Publishers, New Delhi.
4. Singh, S.S. 1993, Principles and Practices of Agronomy, Kalyani Publishers, New Delhi





# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-I**

### **Agriculture University, Jodhpur**

**ENTO- 4311**

**Crop and Stored Grain Pests and Their Management**

**4 (3+1)**

**Theory:**

Polyphagous pests: Red hairy caterpillar, White grub, Termite, Locust, Grasshopper.

Crop pests: Distribution, biology, nature and symptoms of damage, and management of insect pests of rice, pearl millet, sorghum, maize, wheat, sugarcane, cotton, pulses (Gram and *Kharif* pulses), groundnut, castor, sesame, sunflower, mustard, soybean, brinjal, okra, tomato, cruciferous and cucurbitaceous vegetables, potato, chillies, onion, garlic, mango, citrus, pomegranate, guava, ber, apple, coconut and ornamental plants.

Stored grain pests: Coleopteran and Lepidopteran pests, their identification, biology and damage. Preventive and curative methods for control of stored grain pests.

**Practical:**

Identification, damage symptoms and management of insect pests of rice, pearl millet, sorghum, maize, wheat, sugarcane, cotton, pulses, castor, mustard, brinjal, tomato, okra, cruciferous and cucurbitaceous vegetables, onion, garlic, chillies, mango, guava, citrus, pomegranate, ber, coconut. Identification, biology, damage symptoms and management of stored grain and polyphagous insect pests.

**Suggested Readings:**

- 1 Atwal, A.S. and Dhaliwal, G.S. 2002. Agricultural Pests of South Asia and Their Management, Kalyani Publishers, New Delhi.
- 2 David B.V. 2003. Elements of Economic Entomology, Popular Book Depot, Chennai
- 3 Pradhan, S. 1968. Insect Pests of Crops, National Book Trust, New Delhi
- 4 Nayar, M.R.G.K. 1986. Insects and Mites of Crops in India, ICAR, New Delhi.
- 5 Srivastava, K.P. 2004. A Text Book of Entomology, Vol.II, Kalyani Publishers, New Delhi.
- 6 Khare, B.P. 1994. Stored Grain Pests and Their Management, Kalyani Publishers, New Delhi

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# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-I**

### **Agriculture University, Jodhpur**

**PBG 4311**

**Principles of Plant Biotechnology**

**3 (2+1)**

**Theory:**

Concepts of Plant Biotechnology : History of Plant Tissue Culture and Plant Genetic Engineering : Scope and importance in Crop Improvement : Totipotency and Morphogenesis, Nutritional requirements of in-vitro cultures; Techniques of In-vitro cultures, Micropropagation, Anther culture, Pollen culture, Ovule culture, Embryo culture, Test tube fertilization, Endosperm culture, Factors affecting above in-vitro culture; Applications and Achievements; Somaclonal variation, Types, Reasons, Somatic embryogenesis and synthetic seed production technology; Protoplast isolation, Culture, Manipulation and Fusion; Products of somatic hybrids and cybrids, Applications in crop improvement; Genetic engineering; Restriction enzymes, Vectors for gene transfer, Gene cloning, Direct and indirect method of gene transfer – Transgenic plants and their applications. Introductory knowledge about blotting techniques, molecular markers, QTL, Marker assisted selection and application in crop improvement.

**Practical:**

Requirements for plant Tissue Culture Laboratory : Techniques in plant Tissue Culture – Media components and preparation; Sterilization techniques and inoculation of various explants, callus induction and plant regeneration; Demonstration of Micropropagation, Anther culture, embryoculture, Hardening/Acclimatization of regenerated plants, somatic embryogenesis and synthetic seed production; Demonstration of isolation and culture of protoplast; Demonstration of isolation of DNA, gene transfer technique and gel electrophoresis techniques.

**Suggested Readings:**

1. Brown, T.A. 2001 Gene Cloning and DNA analysis – An Introduction. Blackwell Science. London.
2. Gupta, P.K. 2006 Biotechnology and Genomics. Rastogi Publication, Merrut.
3. Purohit, S.S. 1997. Biotechnology. Agro Botanical Publication. Bikaner.
4. Rajdan, M.K. 1996 An Introduction to Plant Tissue Culture. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
5. Ramawat, K.G. 2000. Plant Biotechnology. S. Chand and Company, New Delhi.
6. Singh, B.D. 2001. Biotechnology. Kalyani Publishers. Ludhiana.
7. Mascarenhas, A.F. 1991. Handbook of plant tissue culture. Publications and information division, ICAR, New Delhi.

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AGECON- 4311

Agricultural Marketing, Trade and Prices

2 (1+1)

**Theory:**

Agricultural Marketing: Concepts and Definition, Scope and subject matter, Market and Marketing: Meaning, Definitions, Components of a market, Classification. Market structure, Conduct, performance. Marketing structure, Market functionaries or agencies, Producer's surplus: Meaning, Types of producers surplus, marketable surplus. Marketed surplus, importance, Factors affecting Marketable surplus. Marketing channels: Meaning, Definition, Channels for different products. Market integration, Meaning, Definition, Types of Market Integration. Marketing efficiency: Meaning, Definition, Marketing costs, Margins and price spread, Factors affecting the cost of marketing, Reasons for higher marketing costs of farm commodities, Ways of reducing marketing costs. Theories of International Trade: Domestic Trade, Free trade, International Trade, GATT, WTO, Implications of AOA. Market access, Domestic support, Export subsidies, EXIM-Policy & Ministerial conferences. Cooperative Marketing. State Trading. Ware Housing Corporation; Central and State, Objectives, Functions, Advantages. Food Corporation of India: Objectives and Functions. Quality Control, Agricultural Products, AGMARK. Price Characteristics of agricultural product process, Meaning, Need for Agricultural Price Policy. Risk in Marketing: Meaning and importance, Types of Risk in Marketing. Speculations and Hedging, Futures trading, Contract farming.

**Practical:**

Identification of marketing channels; Study of Rythu Bazars, Regulated markets; Study of unregulated markets; Study of livestock markets; Price spread analysis; Visit to market institutions, NAFED; Study of SWC, CWC and STC; Analysis of information of daily prices; Marketed and marketable surplus of different commodities.

**Suggested Readings:**

1. S.S. Acharya and N.L. Agarwal (1987) Agricultural Marketing in India, Oxford & IBH, New Delhi
2. J.R. Moore, S.S. Johl and A.M. Khusro (1973) Indian Food Grain Marketing, Printice Hall, New Delhi
3. A.S. Kahlon & D.S. Tyagi (1983) Agricultural Price Policy in India, Allied Publishers, New Delhi
4. V.K. Bhall and S. Shiva Ramu (1996) International Business-Environment and Management, Anmol Publications (P) Limited, New Delhi



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**AENGG -4311**

**Protected Cultivation and Post Harvest Technology**

**2(1+1)**

**Theory:**

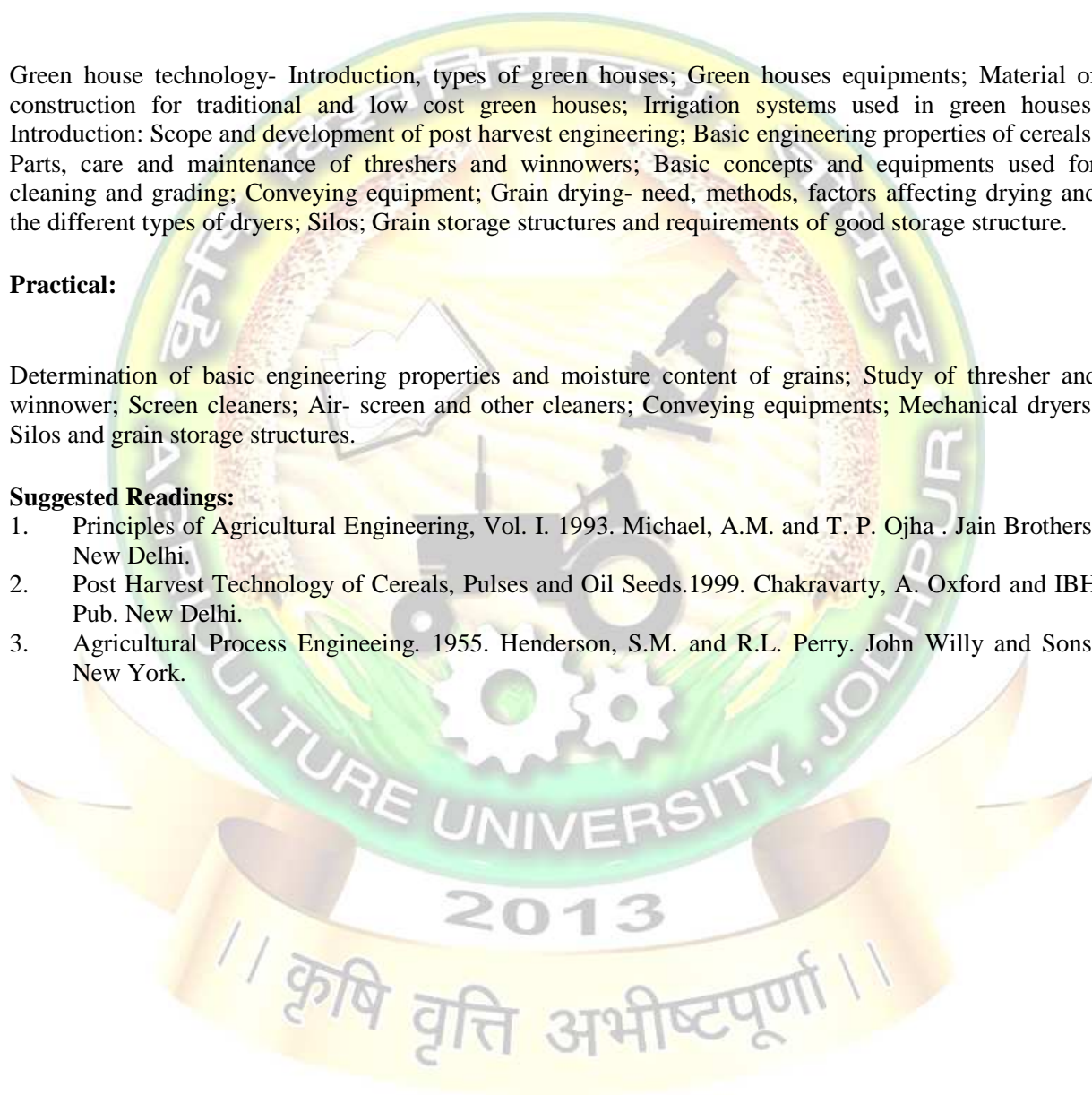
Green house technology- Introduction, types of green houses; Green houses equipments; Material of construction for traditional and low cost green houses; Irrigation systems used in green houses; Introduction: Scope and development of post harvest engineering; Basic engineering properties of cereals; Parts, care and maintenance of threshers and winnowers; Basic concepts and equipments used for cleaning and grading; Conveying equipment; Grain drying- need, methods, factors affecting drying and the different types of dryers; Silos; Grain storage structures and requirements of good storage structure.

**Practical:**

Determination of basic engineering properties and moisture content of grains; Study of thresher and winnower; Screen cleaners; Air- screen and other cleaners; Conveying equipments; Mechanical dryers; Silos and grain storage structures.

**Suggested Readings:**

1. Principles of Agricultural Engineering, Vol. I. 1993. Michael, A.M. and T. P. Ojha . Jain Brothers, New Delhi.
2. Post Harvest Technology of Cereals, Pulses and Oil Seeds.1999. Chakravarty, A. Oxford and IBH Pub. New Delhi.
3. Agricultural Process Engineering. 1955. Henderson, S.M. and R.L. Perry. John Willy and Sons, New York.



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**P.PATH-4311**

**Disease of Field Crops and Their Management**

**3(2+1)**

**Theory:**

Economic importance , symptoms , etiology, disease cycle and management of diseases of **Wheat** (rusts, loose smut and Karnal bunt); **Barley** (covered smut and stripe disease); **Bengal gram** (Ascochyta blight and wilt); **Mustard** (white rust, Alternaria blight and white rot); **Rice** (blast, bacterial blight and khaira); **Maize** ( brown stripe downy mildew , sugarcane downy mildew and Fusarium stalk rot); **Sorghum** (grain smut , loose smut and anthracnose); **Bajra** (ergot, smut and downy mildew); **Sugarcane** (red rot, whip smut and grassy shoot disease); **Groundnut** (tikka and collar rot); **Cotton** (root rot ,bacterial blight and leaf curl); **Sesamum** (bacterial leaf blight and phyllody); **Pigeonpea** (wilt and sterility mosaic);**Clusterbean** (Alternaria blight); **Castor** (Fusarium wilt and bacterial blight); **Soybean** (bacterial pustule and charcoal rot); **Moth** and **Mungbean** (yellow mosaic virus).

**Practical:**

Study of symptoms, etiology, host-parasite relationship and control measures of diseases of wheat, barley, bengal gram, rice, maize, sorghum, bajra, sugarcane, groundnut, cotton, clusterbean, moth and mungbean. Visits of diseased field during the semester. Student should submit at least 25 pressed well mounted disease specimens.

**Suggested Readings:**

- 1 Cook A A 1981 . Diseases of tropical and sub-tropical field fiber and oil plants. Mac Millan Publishing Co. New York.
- 2 Gupta V K and Paul Y S (eds) 2002. Diseases of field crops. Indus Publishing Co. ND.
- 3 Mehrotra R S and Aggarwal A.2007.Plant Pathology (2<sup>nd</sup>.ed.) Tata McGraw-Hill Publishing Co Ltd. ND.
- 4 Mishra A ,Bohra A and Mishra A 2005. Plant Pathology. Agrobios. Jodhpur (India).
- 5 Rangaswamy ,G and Mahadevan,A .2001. Diseases of crop plants in India. Prentice hall of India Pvt Ltd ND.
- 6 Singh R S .2007 Plant Diseases.(8<sup>th</sup>.ed) Oxford and IBH Publishing Co.Pvt .Ltd .ND



# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-I**

### **Agriculture University, Jodhpur**

**AGRON- 4312**

**Rainfed Farming**

**2(1+1)**

#### **Theory:**

History of rainfed agriculture and its importance in India with particular reference to Rajasthan, extent of problem and constraints related to climate, soil, technological and socio-economic conditions; Delineating criteria for rainfed and drylands; Efficient utilization of water through soil and crop management practices- reducing water losses through mulching (use of mulching), Use of antitranspirants- their kind and mode of action and effect on crop yield; Increasing water storage by reducing run off and increasing infiltration through mechanical and cultural measures; Water harvesting techniques; Watershed management- its concept, objectives and principles; Integrated watershed management for drylands; Efficient management of rainfed crops- land preparation, seeding and crop density, selection of crops and varieties for dryland, alternate cropping and land use strategies, soil fertility management and fertilizer use techniques, weed control and intercultural operations, mid season corrections for mitigating the aberrant weather.

#### **Practical:**

Delineating criteria for rainfed and drylands; Onset and withdrawal of the monsoon, amount, intensity and distribution in Rajasthan and India ; Critical analysis of rainfall and estimation of moisture index and aridity index, crops and cropping systems for drylands; Acquiring skill in tillage methods for *in situ* moisture conservation, effects of soil mulching and its effect on soil moisture. Spray of antitranspirants on dryland crops and their effects on crops; Seed soaking and seed treatment with chemicals for sowing under moisture stress conditions, methods of fertilizer application in dry land areas; Effect of plant density, thinning, leaf removal on crop growth under moisture stress condition; Study of the salient features of a model water shed; Alternate land use strategies-- Agro-forestry, grass legume forage and alley cropping systems; Visit to dry land experiments ; to expose students to the latest agro-techniques and watershed management practices; Study of runoff plots and soil /nutrient losses.

#### **Suggested Readings:**

1. Singh, R.P. 1995, Sustainable Development of Dryland Agriculture in India. Scientific Publishers, Jodhpur.
2. Singh, S.S., 1993, Crop Management Under Irrigated and Rainfed Conditions, Kalyani Publishers, New Delhi.
3. De, G.C. 1989, Fundamentals of Agronomy Oxford and IBH Publishing Co., New Delhi.
4. Reddy, T.Y. and Reddi, G.H.S. 1992, Principles of Agronomy, Kalyani Publishers, New Delhi.
5. Dhruva Narayan, V.V.; Singh, R.P., Bhardwaj, S.P. Sharma, M. Sikka A.K., Vithal, K.P.R. and Das; S.K. 1947. Watershed Management for Drought Mitigation, ICAR Publication.
6. Murthy, J.V.S. 1994, Watershed Management Wiley, Eastern Limited, New Age International Limited, New Delhi.

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**HORT- 4311 Production Technology of Spices, Aromatic and Medicinal Crops 2 (1+1)**

**Theory:**

Importance and scope of Spices, Aromatic and Medicinal crops. Cultivation technology of Spices, Aromatic and Medicinal crops– ginger, turmeric, pepper, cardamom, coriander, cumin, fenugreek, fennel; Aromatic crops – lemon grass, citronella, palmarose, vetiver; Medicinal plants –opium, ocimum, aloe, guggal ,senna, plantago, stevia,curry leaf, drumstick

**Practical:**

Identification of spices, aromatic and medicinal plants, Propagation techniques of spices, aromatic and medicinal crops. Propagation and planting methods of turmeric; Harvesting procedures in aromatic plants; Processing and curing of spices (ginger, turmeric and black pepper); Cost of cultivation of spices. Visit to aromatic & medicinal plant nurseries and seed spices field.

**Suggested Readings:**

1. Sharma, R. (2004). Agro. Techniques of Medicinal Plants. Daya Publishing House, Delhi
2. Pruthi, J.S.(1993). Major Spices of India. Crop Management & Post harvest Technology. ICAR, New Delhi
3. Dashora, L.K. Production Technology of Plantation Crops, Spices, Aromatic & Medicinal Plants.

