BASICS-I

2011-12

General Agriculture

for

ICAR'S JRF EXAM

Roop Singh Maitry, Panch Ram Mirjha & Pankaj Sinha

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For ICAR'S JRF Exams

(Based on Authorized and Current information)

Compiled by :

Roop Singh Maitry
(Ph.D. Scholar, WST, I.A.R.I.)

Panch Ram Mirjha
(Ph.D. Scholar, Agronomy, I.A.R.I.)
&
Pankaj Kumar Sinha
(P.G. Scholar, Agri. Extension, I.A.R.I.)

PREFACE

The competition in agricultural examination is increasing day by day as population is increasing. Therefore, now-a-days it is not easy job to get admission in any agricultural university for master degree especially through the ICAR's JRS exam. Along with big syllabus (looks short but its big) of JRF exam, higher completion makes it very tough. So, in this regards i am presenting this book to serve my junior plus friend for ICAR's JRF exam. The questions asked in ICAR' JRF entrance examination are genuine and very specially sieved by different types of intelligent and brilliant scientists. So, the competitors need to read lot of. Keeping all in view, I am tried to solve the problems of ALL FIGHTERS, by giving series of books on **"General Agriculture for ICAR's JRF Entrance Exam"**. It includes two part viz. BASIC-I, BASIC-II + Advance**. BASIC-I** covers only the syllabus of general agriculture for ICAR's JRF Entrance Exam given in prospectus of ICAR's JRF Entrance Exam-2011-12. It also includes the 8 years memory based question papers asked in ICAR's JRF Entrance Exam and the analysis on questions asking pattern. **Part-2 (BASIC-II + Advance)** covers additional part of general agriculture which can be asked but not given in syllabus. It also includes the advance information and facts that can be asked in ICAR's JRF Entrance Exam.

My own view on this book is to provide the readers the already cooked material for ICAR's JRF Entrance Exam so that they will get some relax by preparing notes. I found there is no such type of book specially made for ICAR's JRF Entrance Exam. Therefore, I have tried to compile this book.

Dear friends, I am just trying to help all of you, and to give some relax. I did my all efforts to make this book so convince with easy and feasible words. In this first edition, there may be some mistake in grammar, spelling and words formation. Please, you co-operate me to correct the material by sending me e-mail. After all, the objective of this book is to help each other. So readers are being apologized for their inconvenience.

Here, I would like to express my heartfelt thanks to the great person who taught me to do something for others. With the following his rules, I came to get all what I have today. I also thanks all who helped me to compile this book, especially to Mr. Panch Ram Mirjha, Mr. Pankaj Sinha, My college juniors and now class batch in IARI for his hard work to compile this. I am highly thankful to Mr. Sunil who always gave me good company and friendship. Finally, I wish to thank all the friends, who encouraged me to compile this book along with my all well wishers.

I dedicate this book to my father Late K. P. Maitry and whole family.

Author

RJ...

Dated: 11th Ferb., 2011

Roop Singh Maitry
IARI, New Delhi

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QUESTION PAPERS AND WRITING ANSWERS IN THE EXAMINATION

The examination shall have one question paper for each of the 20 major subject-groups, consisting of 150 multiple-choice, objective type questions, each with four options and also 10 cross-matching type questions, each having five sub-questions/pairings for every subject-group paper. In each subject-group, 150 multiple choice, objective type questions would be serially numbered from 1-150 whereas 10 cross-matching type questions would be serially numbered from 151-160. **Marking scheme**: Each correctly answered multiple-choice, objective type question will earn four marks whereas each correctly answered cross-matching type question will earn 5 marks (1 mark for each correct pairing) with a maximum of 650 marks for each major subject-group paper. For each incorrectly answered multiple-choice, objective type question, one mark would be deducted from the total score whereas for each incorrectly answered cross-matching type sub-question/pairing, 0.2 marks would be deducted from the total score. Question with no response indicated will not be awarded any mark and there will be no negative marking for that question. The candidates are advised not to attempt such questions in the OMR answer sheet, for which they are not sure of the correct answer. More than one answer indicated against a question will be deemed as incorrect answer and will invite negative marking.

Candidate will be required to choose the correct answer and mark in the OMR answer sheet by shading/ darkening the corresponding circle/bubble against the serial number of the question with HB pencil or with black ball-point pen at his/her choice.

General Agriculture Syllabi for ICAR'S All India Entrance Examination for Admission to Master Degree Programmes and ICAR-JRF (PGS) -2011-12

Code 01: MAJOR SUBJECT GROUP "A" - PLANT BIOTECHNOLOGY

Basic Sciences & General Agriculture: Importance of agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeon-pea, sugarcane, groundnut, tomato, and mango. Major soils of India; role of NPK and their deficiency symptoms. General structure and function of cell organelles; mitosis and meiosis; Mendelian genetics. Elementary knowledge of growth, development, photosynthesis, respiration and transpiration; Elements of economic botany. General structure and function of carbohydrates, proteins, nucleic acids, enzymes and vitamins. Major pests and diseases of rice, wheat, cotton, chickpea, sugarcane and their management. Organic farming; biofertilizers; biopesticides. Recombinant DNA technology; transgenic crops. Important rural development programmes in India; organizational set up of agricultural research, education and extension in India. Elements of statistics.

Code 02: MAJOR SUBJECT GROUP "B" - PLANT SCIENCES

Importance of Agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeon-pea, sugarcane, groundnut, tomato, potato and mango. Major soils of India, role of NPK and their deficiency symptoms. Structure and function of cell organelles; mitosis and meiosis; Mendelian genetics; elementary knowledge of photosynthesis; respiration, and transpiration; structure and functions of carbohydrates, proteins, nucleic acids, enzymes and vitamins. Major pests and diseases of rice, wheat, cotton, chickpea, sugarcane and their management.

Code 03: MAJOR SUBJECT GROUP "C" - PHYSICAL SCIENCE

Importance of Agriculture in national perspective; basic principles of crop production, diversification, diversification of Agriculture, principle of nutrient and water management, package of practices for rice, wheat sorghum, maize, chickpea, pigeon pea, potato, sugarcane, groundnut, major vegetable crops. Role of essential plant nutrients, their deficiency symptoms and management options. Structure and function of plant cells, cell division, Basic concept of plant physiology relating to crop production- Biochemical compounds viz, carbohydrates, proteins, enzymes, fats, liquid vitamins and their function, developmental programmes relating to rural upliftment and livelihood security; organisational set up of agricultural education research and extension and future strategies for upgradation.

Code 04: MAJOR SUBJECT GROUP "D" - ENTOMOLOGY AND NEMATOLOGY

Importance of Agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeon-pea, sugarcane, groundnut, tomato, cole crops, mango, grapes, banana, oilseeds other than groundnut, soybean and mustard. Major soils of India, role of NPK and their deficiency symptoms. Mendelian genetics; elementary knowledge of photosynthesis; respiration, and transpiration;
Major cropping systems (rice-wheat cropping, crop rotations, mixed cropping); soil degradation-soil salinity and acidity and management; some aspects of post-harvest technology; varietal improvement; importance of heterosis in crop production; crop protection principles in field and storage. Major insect pests and diseases of agricultural crops like rice, cotton, pulses, oilseed crops like groundnut, soybean and mustard, vegetables like tomato, cole crops; fruit crops like mango and banana and their management principles. Transgenic crops. Important rural development programmes in India; organizational set up of agricultural research, education and extension in India; Elements of statistics.

Code 05: MAJOR SUBJECT GROUP "E" – AGRONOMY

Importance of Agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeon-pea, sugarcane, groundnut, rapeseed and mustard, potato. Major soils of India, role of NPK and their deficiency symptoms. Structure and function of cell organelles; mitosis and meiosis; Mendelian genetics: elementary knowledge of photosynthesis; respiration, photorespiration and transpiration; structure and functions of carbohydrates, proteins, nucleic acids, enzymes and vitamins. Major pests and diseases of rice, wheat, cotton, chickpea, sugarcane and their management. Important rural development programmes in India; organisational set up of agricultural research, education and extension in India; Elements of statistics.

Code 06: MAJOR SUBJECT GROUP "F" - SOCIAL SCIENCES

Importance of Agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeon-pea, sugarcane, groundnut, tomato and mango. Major soils of India, role of NPK and their deficiency symptoms. Structure and function of cell organelles, mitosis and meiosis; Mendelian genetics; elementary knowledge of photosynthesis; respiration, and transpiration; structure and functions of carbohydrates, proteins, nucleic acids, enzymes and vitamins. Major pests and diseases of rice, wheat, cotton, chickpea, sugarcane and their management. Important rural development programmes in India; organisational set up of agricultural research, education and extension in India; Elements of statistics. Measures of central tendency and dispersion, regression and correlation; concept of probability, sampling techniques and tests of significance.

Code 07: MAJOR SUBJECT GROUP "G" - STATISTICAL SCIENCES

Agriculture: Importance of Agriculture/Forestry/Livestock in national economy. Basic principles of crop
production. Major diseases and pests of crops. Elementary principles of economics and agri-extension. Important rural development programmes in India. Organizational set up of Agricultural research, education and extension in India.

Code 08: MAJOR SUBJECT GROUP "H" – HORTICULTURE

Importance of Agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeon-pea, sugarcane, groundnut, tomato and mango. Major soils of India, role of NPK and their deficiency symptoms. Structure and function of cell organelles; mitosis and meiosis; Mendelian genetics; elementary knowledge of photosynthesis; respiration, and transpiration; structure and functions of carbohydrates, proteins, nucleic acids, enzymes and vitamins. Major pests and diseases of rice, wheat, cotton, chickpea, sugarcane and their management. Important rural development programmes in India; organizational set up of agricultural research, education and extension in India; Elements of statistics.

Code 09: MAJOR SUBJECT GROUP "J" - FORESTRY/AGROFORESTRY & SILVICULTURE

Importance of Agriculture/Forestry/Livestock in national economy. Basic principles of crop production. Important rural development programmes in India Elementary principles of economics and agri-extension. Organizational set up of Agricultural Research, education and extension in India. Major diseases and pests of crops. Elements of statistics.

Code 11: MAJOR SUBJECT GROUP "L" - WATER SCIENCE AND TECHNOLOGY

Importance of Agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeon-pea, sugarcane, groundnut, tomato and mango. Major soils of India, role of NPK and their deficiency symptoms. Structure and function of cell organelles; mitosis and meiosis; Mendelian genetics; elementary knowledge of photosynthesis; respiration, and transpiration; structure and functions of carbohydrates, proteins, nucleic acids, enzymes and vitamins. Pests and diseases of major crops and their management, important rural

development programmes in India; organizational set up of agricultural research, education and extension in India.

Code 12: MAJOR SUBJECT GROUP "M" - HOME SCIENCE

Importance of agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeon-pea, sugarcane, groundnut, tomato, and mango. Major soils of India; role of NPK and their deficiency symptoms. General structure and function of cell organelles; mitosis and meiosis; Mendelian genetics. Elementary knowledge of growth, development, photosynthesis, respiration and transpiration; Elements of economic botany. General structure and function of carbohydrates, proteins, nucleic acids, enzymes and vitamins. Major pests and diseases of rice, wheat, cotton, chickpea, sugarcane and their management. Organic farming; biofertilizers; biopesticides. Recombinant DNA technology; transgenic crops. Natural Resources: forest, water, mineral, food, energy and land resources. Ecosystems. Biodiversity & its conservation. Environmental pollution. Environmental ethics. Important rural development programmes in India; organizational set up of agricultural research, education and extension in India. Elements of Statistics.

ICAR'S JRF ENTRANCE EXAMS- 2003-04
General Agriculture (Memory based)

1. Which one of the following is not a legume crop?
   (A)Wheat (B) Peas
   (C) Beans (D) Groundnut
2. Total cultivated area in India is close to
   (A) 500 Mha (B) 400 Mha
   (C) 180 Mha (D) 60 Mha
3. Nitrogen deficiency in plants leads to
   (A) Chlolorosis (B) Excessive growth
   (C) Profuse flowering (D) Dark green colour
4. The two major races of rice are.
   (A) Europian and tropical (B) Indica and Japonica
   (C) Asiatic and American (D) Temperate and tropical
5. N:P:K requirement in legume is generally
   (A) 3:1:1 (B) 3:1:0
   (C) 1:2:2 (D) 4:2:1
6. Which of the following state has the largest geographical area
   (A) U.P. (B) Bihar
   (C) M.P. (D) Rajasthan
7. The highest production in terms of million tones per year in India is that of
   (A) Pulses (B) Groundnut
   (C) Potatoes (D) Sugarcane
8. Respiration in plant is essentially a process related to the following
   (A) Evaporation (B) Transpiration
   (C) Oxidation (D) None of these
9. Linkage between gene affects
   (A) Vernalization (B) Fertilization
   (C) Anaphase (D) Independent assortment
10. NPK are required in plant nutrition as
   (A) Trace element (B) Microelement
   (C) Micro nutrient (D) None essential
11. DNA contains following number of nitrogenous base
   (A)One (B) Two
   (C) Four (D) Ten
12. Animal and plant cell can be differentiated by
   (A) Conductivity (B) Size
   (C) Presence or absence of cell wall (D) Shape
13. In temperate countries, sugar is generally obtained from which of the following crops
   (A)Maple (B) sugar beet

(C) Wheat (D) Sugarcane

14. The idea of particulate nature of inheritance was given by
(A) Darwin (B) Mendel
(C) Jones (D) Bateson

15. Cultivated rice Oryza sativa has the following number of cromosomes
(A) 2n =32 (B) 2n =20
(C) 2n =24 (D) 2n =18

16. In the presence of sunlight CO_2 and H_2O (with the help of chlorophyll) and converted in to carbohydrate, this is known as
(A) Photosynthesis (B) Respiration
(C) Metabolism (D) Solar radiation

17. Soil productivity takes in to account the following
(A) Soil structure (B) Soil moisture
(C) Soil fertility (D) Soil fertility and productivity

18. If chromosome compliment of two diploid species is combined in one, the result species would be
(A) Amphidiploid (B) Haploid
(C) Monogenic (D) Polygenic

19. Alternate form of gene at the same locus are referred to as
(A) Allele (B) Plastid
(C) Dominant (D) Chromosome

20. Sequence of growing crops in a piece of land is known as
(A) Crop insurance (B) crop rotation
(C) Crop production (D) Crop management

21. India has to provide for its population
(A) 2 billion (B) 1 billion
(C) 600 million (D) 1 million

22. In diploid species generally a following number of the chromosomes are involved in the pollen mitosis
(A) 4n (B) 2n
(C) 1n (D) 3n

23. Sulphur fungicides can be freely used on all vegetable except the following
(A) Beans and peas (B) Okra
(C) Root vegetable (D) Cucurbits

24. Karnal bunt is a serious disease of
(A) Apple (B) Tomato
(C) Wheat (D) Mung

25. Zinc is required for the synthesis of
(A) Tryptophane (B) Sugar
(C) Fats (D) Proteins

26. Contour system of orchard planting is generally followed in
(A) Saline soils (B) U.P.
(C) Hills (D) Punjab

27. NARS refers to
(A) National Agricultural Research Streams
(B) National Agricultural ayurvedic System
(C) National Agricultural Review System
(D) National Agricultural Research System

28. Cryo-preservation is done in liquid nitrogen at a temperature of
(A) -196°C (B) 200°C
(C) 0 °C (D) 4°C

29. Crossing over during meiois results in
(A) Breaking linkage (B) Promoting linkage
(C)Help mutation (D) None of these

30. The simplest measure of variability in data set is
(A) Range (B) Mean
(C) Mode (D) Median

ICAR'S JRF ENTRANCE EXAMS- 2004-05
General Agriculture (Memory based)

1. *Triticum aestivum* is a
(A) **Hexaploid** (B) Diploid
(C) Tetraploid (D) Euploid

2. Gregor John Mendal worked on the crop
(A) Sweet Pea (B) Field pea
(C) Beans (D) **Garden pea**

3. t-test is applicable when the numbers of treatments are
(A) **2** (B) 6
(C) 8 (D) 12

4. The first Director General of ICAR
(A) **Dr. B. P. Paul** (B) Dr. R. S. Paroda
(C) Dr. M.S. Swaminathan (D) Dr. B. Vishwanath

5. Red and purple colour of maize (*Zea Mays*) is due to deficiency of
(A) Ca (B) N
(C) F (D) **P**

6. Geographical area of India is
(A) **328 Mha** (B) 148 Mha
(C) 428 Mha (D) 392 Mha

7. Most common method of irrigation in India is
(A) Border irrigation (B) **Check basin irrigation**
(C) Sprinkler irrigation (D) Drip irrigation

8. Global warming is attributed to increase in concentration of green house gases like
(A) CO_2 (B) CFCs
(C) CH_4 (D) **All of these**

9. The cropping intensity of India during 2004-05 is about
   (A) 125% (B) **135%**
   (C) 145% (D) 155%
10. The net gain of ATP during glycolysis is
   (A) 1 (B) 4
   (C) **2** (D) 8
11. The error degree of freedom for a RBD design with 10 treatments and 4 replications is
   (A) 20 (B) **27**
   (C) 40 (D) 36
12. Absorption of solute ions is regulated by
   (A) Nucleus wall (B) Cell organelles
   (C) Vacuoles (D) Plant cell membrane
13. One gram of glucose produces how much fat or oil
   (A) 0.25 g (B) 0.35 g
   (C) **0.45 g** (D) 0.32 g
14. Total number of State Agriculture University in India in the year 2004 was
   (A) 25 (B) 44
   (C) **34** (D) 30
15. Growth of plant towards light is called?
   (A) Phototropism (B) Photorespiration
   (C) Photocromatism (D) **Photoperiodism**
16. The CO_2 content of soil air is
   (A) 3% (B) **0.3** %
   (C) 0.03% (D) 0.003%
17. The C: N ratio of humus is
   (A) 20: 1 (B) 100: 1
   (C) **10: 1** (D) 400:1
18. Densest part of atmosphere strata is
   (A) **Troposphere** (B) Thermosphere
   (C) Stratosphere (D) Mesosphere
19. The plants which open their stomata during night for taking CO_4 are known as
   (A) C_3 (B) **CAM**
   (C) C_4 (D) All of above
20. Plants absorb phosphorus in the form of
   (A) **H_2PO_4** (B) PO_4
   (C) SSP (D) P
21. Principle of Experimental design is given by
   (A) **R A Fisher** (B) Wilcox
   (C) Cox and Cochran (D) WG Cochran
22. An acid derived from green leaves of chickpea prescribed for intestinal disorders is
   (A) Citric acid (B) Sulphuric acid
   (C) **Oxalic acid** (D) Prussic acid

23. Which one of the plant is the C_4 plant?
(A) **Maize** (B) Potato
(C) Pea (D) Papaya

24. Atmosphere extends above mean sea level to a height of about
(A) 160 km (B) **1600 km**
(C) 1600 meter (D) 1600 miles

25. Criteria for the essentiality of nutrients for plants was given by
(A) **Arnon** (B) Wilcox
(C) Liebig (D) None

26. The Oleoresin compounds occurs in
(A) Cotton (B) Maize
(C) **Chilli** (D) Ginger

27. The law of tolerance was introduced by
(A) Milvert (B) Shelford
(C) Hilaire (D) **Ear- net Haeckel**

28. End product of glycolysis is
(A) ATP (B) **Pyruvate**
(C) PEP (D) Glucose

29. Plants capable of growing in rocks crevices are called
(A) Calciphytes (B) Chosmophytes
(C) **Lithophytes** (D) Helophytes

30. Plant cells are connected with the help of
(A) **Plsmodesmata** (B) Cellwall
(C) Plasma membrane (D) Plasmoderma

ICAR'S JRF ENTRANCE EXAMS- 2005-06
General Agriculture (Memory based)

1. Saffron (kesar) belong to the family
(A) Apiaceae (B) Iridaceae
(C) Orchidaceae (D) Lauraceae

2. The 5- carbon compounds produced during dark reaction of photosynthesis is
(A) Ribose phosphate (B) Xylulose phosphate
(C) **Ribulose bis phosphate** (D) Seda heptulose phosphate

3. Most suitable design for experiment involving varying number of tillage and nitrogen levels is
(A) Latin square (B) RBD
(C) Strip plot (D) **Split plot**

4. In a RBD experiment having 9 treatments and 4 replications, the error degree of freedom will be
A) **24** (B) 32
(C) 27 D) 36

5. The plants with male and female flowers on different plants are called
(A) Dicot (B) Dichogamy
(C) Dicliny (D) **Dioecious**

6. The contribution of Agricultural sector to the gross domestic product (GDP) in India in the year 2004-05 has been nearly
(A) **25 %** (B) 45 %
(C) 35 % (D) 55 %

7. Which one of the following process results in release of energy ?
(A) Metabolism (B) **Catabolism**
(C) Anabolism (D) Physiology

8. Which one of the following element is a constituent of protoplasm?
(A) Sulphur (B) **Calcium**
(C) Iron (D) Potassium

9. Which one of the following element is mobile in plants but immobile in soil ?
(A) Sulphur (B) Zinc
(C) Boron (D) **Phosphorus**

10. Which of the following is non-climacteric fruit?
(A) Litchi (B) Mango
(C) Banana (D) **Apple**

11. Which of the following process is not takes place in evolution of plants?
(A) Crossing over (B) Mutation
(C) **Linkage** (D) Coupling

12. Solar constant is equal to (in cal/cm^2/min)
(A) **1.94** (B) 194
(C) 19.4 (D) 0.194

13. Khaira disease in rice is due to the deficiency of
(A) Boron (B) Mn
(C) S (D) **Zn**

14. Which one of the following is a C3 plant?
(A) **Wheat** (B) Maize
(C) Pearlmillet (D) Sorghum

15. Criteria for the essentiality of nutrients for plants was given by
(A) Arnon (B) Wilcox
(C) Liebig (D) None

16. Which one of the following is sulphur-containing amino acid?
(A) Tryptophan (B) **Cystine**
(C) Proline (D) Lysine

17. Horse latitude lies in between north and south latitudinal belt of equator
(A) 0 to 50 (B) **30 to 35**
(C) 20 to 250 (D) 10 to 15

18. The splitting up of water molecules in plant cells in the presence of sunlight is called
(A) Photophosphorylation (B) Photosynthesis
(C) **Photolysis** (D) Phosphorylation

19. What does the stomata open?
(I) When the guard cells are in flaccid condition
(ll) When there is an accumulation of K ions in the guard cells
(III) When water enters into the guard cells
(IV) When the water potential of guard cells is lower than that of adjacent cells
(A) **II, III and IV** I and IV (B) I and III
(C) (D) None

20. The number of Agro-climatic zones of India is
(A) 17 (B) 7
(C) 15 (D)**10**

21. Norin - dwarf gene was introduced in which cereal?
(A) **Wheat** (B) Oat
(C) Rice (D) Maize

22. The centre of origin of *Triticum aestivum* is
(A) Chilean centre (B) South Mexican centre
(C) **Mediterranean centre** (D) Near eastern region

23. Which state of India leads in area under wheat crop?
(A) Punjab (B) MP
(C) **UP** (D) Rajasthan

24. The process of use of microorganism to remove salts from soil is referred as
(A) Chelation (B) **Bioremediation**
(C) Oxidation (D)Phyto - remediation

25. Economic part of Isabgol is
(A) Leaf (B) **Seed and husk**
(C) Seed (D) Husk

26. Which part of the plant cell is known as power house?
(A) Golgi bodies (B) Ribosomes
(C) **Mitochondria** (D) Lysosomes

27. Which one of the following clay mineral has the highest CEC?
(A) **Vermiculite** (B) Montmorillonite
(C) Kaolinite (D) Illite

28. The light generated reducing power is
(A) ATP (B) **$NADPH_2$**
(C) $FADH_2$ (D) $NADH_2$

29. Under seventh approximation soil classification, the number of soil orders is
(A) 15 (B) 14
(C) 8 (D) **11**

30. The grand period of rainfall in India is
(A) Post monsoon (B) North-east monsoon
(C) Cold weather period (D) **South - west monsoon**

ICAR'S JRF ENTRANCE EXAMS- 2006-07

General Agriculture (Memory based)

1. Agroclimatic zones in India are
   (A) 18 (B) **15**
   (C) 20 (D) 17
2. Law of Minimum was given by
   (A) **Liebig** (B) Blackman
   (C) Shelford (D) Oement
3. Sulphur containing amino acid
   (A) Lysine (B) **Methionine**
   (C) Glutamine (D) Glycine
4. Contribution of agriculture in GDP is
   (A) 23% (B) 30%
   (C) 40% (D) 60%
5. The specific heat of water is
   (A) 0.5 Cal/g (B) 2 Cal/g
   (C) 1 **Cal/g** (D) 4 Cal/g
6. Disease caused by Zn deficiency is
   (A) **Khaira** (B) Mosaic
   (C) Die-back (D) Whip tail
7. Mat nursury is related to
   (A) Papaya (B) Tobacco
   (C) Rice (D) Wheat
8. ANOVA' was given by
   (A) AL. Bowley (B) Horace Secrist
   (C) R A Fisher (D) Karl Pearson
9. Karnal bunt is caused by
   (A) Albugo candida (B) **Nevosia indica**
   (C) Phytophthora infestans (D) None of these
10. Bonneville, Early Badger, Arkel are the improved varieties of
    (A) Frenchbean (B) **Pea**
    (C) Sunflower (D) Soybean
11. Most of the wheat varieties are
    (A) Quantitative long day plants (**B) Short day plants**
    (C) Day neutral (D) None of these
12. The simplest measure of variability in a data set is
    (A) Mean (B) **Range**
    (C) Median (D) Mode
13. The crop having the highest pesticide use is
    (A) **Cotton** (B) Oilseeds
    (C) Rice (D) Wheat
14. Double cross hybrid maize production technique was introduced by
    (A) G.H. Shull (B) Mendel

(C) **D.F.Jones** (D) E.M.East

15. 'Vertisol' is related to
    (A) Laterite soil (B) Red soil
    (C) Alluvial soil (D) **Black soil**
16. The square of standard deviation is
    (A) Coefficient of variance (B) Standard deviation
    (C) **Variance** (D) Mean deviation
17. The principle of making use of greater homogeneity in groups of experimental units reduce the experimental error is
    (A) **Local control** (B) Experiment
    (C) Replication (D) Experiment Error
18. Sugarcane inflorescence is
    (A) Racemose (B) **Spikejet**
    (C) Compound (D) Capitulum
19. Country having the maximum area of hybrid rice is
    (A) **China** (B) India
    (C) Indonesia (D) U.S.A.
20. Transgenic crop having maximum cultivated area in the world is
    (A) Maize (B) Rice
    (C) **Soybean** (D) Cotton
21. Rice grain is deficient in
    (A) **Lysine** (B) Alanine
    (C) Glycine (D) Isoleucine
22. An ideal type of rice with small, thick and erect leaf was proposed by
    (A) **Yoshida** (B) Tsunoda
    (C) Murata (D) Tanaka
23. Net cultivated area in India is
    (A) **143 Mha** (B) 150 Mha
    (C) 180 Mha (D) 328 Mha
24. Soil air contains CO_2 (%)
    (A) 0.03 (B) 2.50
    (C) **0.25** (D) 3.0
25. When the fertility gradient of the field is in two directions, the most appropriate experimental design is
    (A) CRD (B) RBD
    (C) Split (D) **LSD**
26. Biurate content in urea is
    (A) 1.5% (B) 4%
    (C) **2%** (D) 5%
27. Maximum productivity of sugarcane in India is
    (A) Punjab (B) Uttar Pradesh
    (C) Haryana (D) **Tamil Nadu**
28. Greenhouse gas having largest contribution to global warming

(A) **Carbon dioxide (60%)** (B) Nitrous oxide (5%)
(C) Methane (15%) (D) CFC

29. Non-edible plant suitable for biodiesel
(A) **Jatropa** (B) Castor
(C) Coconut (D) Rapeseed

30. Total geographical area of India is
(A) **328.9 Mha** (B) **328.9 ha**
(C) 328.9 sq.km (D) 328.9 Mile

ICAR'S JRF ENTRANCE EXAMS- 2007-08
General Agriculture (Memory based)

1. PAR (Photo-synthetically active radiation) is measured in
(A) Photon (B) Watts
(C) **Einstein** (D) Quantum

2. The study of relationship between properties and plant production is as
(A) Agronomy (B) Pedology
(C) **Edaphology** (D) Soil chemistry

3. Triticale is a cross between:
(A) **Wheat x Rye** (B) Wheat x Barley
(C) Barley x Oat (D) t x Oat

4. Maximum number of treatment accommodates in RBD without loss of efficiency is
(A) **20** (B) 60
(C) 40 (D) 10

5. Photo-respiration rate is highest in which group of plants?
(A) **C_3 plants** (B) CAM plants
(C) C_4 plants (D) None of these

6. The first maize hybrid in India was
(A) **Ganga-l** (B) Kisan
(C) Vijay (D) Vikram

7. Aflatoxin contamination generally found in
(A) Arher (B) **Groundnut**
(C) Chickpea (D) Soybean

8. Which crop is also known as white gold?
(A) Maize (B) Opium
(C) Soybean (D) **Cotton**

9. Required seed rate for raising tomato nursery is
(A) 1000 gm (B) 400 Kg
(C) **400 gm** (D) 2.0 Kg

10. In Indo-gangatic plains, rice-wheat cropping system covers about
(A) 5 m ha (B) **10** m ha
(C) 15 m ha (D) 20 m ha

11. Test between two population variance is done by
(A) **F - test** (B) Z test
(C) t – test (D) Arithmetic mean
12. Which test is used for comparing two means from independent samples?
(A) F - test (B) t – test
(C) Chi - square – test (D) Z - test
13. CO_2 accepter in C4 plants is
(A) PGA (B) RuBP
(C) **OAA** (D) All
14. The chemical responsible for lathyrism in mammals is
(A) BOAA (B) HeN
(C) 2,4- DB (D) NAA
15. Which element is involved in bio- synthesis of IAA ?
(A) Nitrogen (B) Boron
(C) **Zinc** (D) Copper
16. The area under Bt - cotton in India is about
(A) 6.4 mha (B) 5.4 mha
(C) 4.4 mha (D) 3.4 mha
17. The dwarfing gene in rice is:
(A) Opaque – 2 (B) Tift - 23 A
(C) Dee - Gee - Woo – Gen (D) Norin -10
18. The net gain of ATP in glycolysis is
(A) 12 ATPs (B) 24 ATPs
(C) 1 ATP (D) **2 ATPs**
19. The precursor of ethylene is
(A) Histidine (B) Glycine
(C) Tryptophane (D) **Methionine**
20. Which state contributes maximum pulse production?
(A) U. P. **(B) M.P.**
(C) Punjab (D) Maharastra
21. Which of the following crops has the largest area under transgenic globally?
(A) Cotton (B) Soybean
(C) Tobacco (D) Maize
22. Sugar-beet is an indicator plant for
(A) Sodium (B) Molybdenum
(C) Zinc (D) Phosphorus
23. Which of the following gases contributes maximum to global warming?
(A) CFC (B) CO2
(C) Methane (D) NO_2
24. In India, area under rice is about
(A) 25 Mha (B) 28 Mha
(C) 45 Mha (D) 57 Mha
25. Sunflower is also known as an individual plant for the deficiency of

(A) Nitrogen (B) Zinc
(C) Boron (D) Potash

26. Soil air contains CO_2 (%)
(A) 0.03 (B) 2.50
(C) **0.25** (D) 3.0
27. When the fertility gradient of the field is in two directions, the most appropriate experimental design is
(A) CRD (B) RBD
(C) Split (D) **LSD**
28. Plants capable of growing in rocks crevices are called
(A) Calciphytes (B) Chosmophytes
(C) **Lithophytes** (D) Helophytes
29. The C: N ratio of humus is
(A) 20: 1 (B) 100: 1
(C) **10: 1** (D) 400:1
30. Densest part of atmosphere strata is
(A) **Troposphere** (B) Thermosphere
(C) Stratosphere (D) Mesosphere

ICAR'S JRF ENTRANCE EXAMS- 2008-09
General Agriculture (Memory based)

1. Dangerous gas for depletion of ozone layer is:
(A) Ethane (B) Methane
(C) **CFC** (D) Carbon-dioxide
2. Which of the following is not a biopesticide?
(A) Bioneem (B) **Carbaryl**
(C) Biolap (D) Dipel
3. Major cropping system of trans-gangatic plains is
(A) Soybean – wheat (B) Rice – rice
(C) **Rice –wheat** (D) Maize – wheat
4. Photosynthetic inhibition by 02 is called:
(A) Reaction (B) **Warburg's effect**
(C) Back inhibition (D) Competitive effect
5. Crop logging is done in
(A) **Sugarcane** (B) Maize
(C) Tobacco (D) Cotton
6. Blue revolution is related with:
(A) Crops (B) Energy source
(C) **Fish** (D) Oilseeds
7. Inflorescence in rice is known as

(A) Ear (B) Raceme
(C) Spike (D) **Panicle**

8. Alluvial soils are found in :
(A) Deserts (B) Forests
(C) **River delta** (D) Mountains

9. Weight of one cotton bale is
(A) **170 Kg** (B) 160 Kg
(C) 180 Kg (D) 190 Kg

10. Hybrid cotton in India was evolved for the first time in
(A) 1975 (B) 1980
(C) **1970** (D) 1985

11. Net cultivated area in India during 2004- 05 was
(A) 138 million hectare (B) **141 million hectare**
(C) 135 million hectare (D) 144 million hectare

12. The relative proportion of sand, silt and clay is called
(A) **Soil texture** (B) Soil aggregation
(C) Soil structure (D) Soil taxonomy

13. Which of the following crops is thermo-insensitive?
(A) **Sunflower** (B) Wheat
(C) Rice (D) Jowar

14. The IARI was established in : 24.
(A) 1907 (B) 1909
(C) 1904 (D) **1905**

15. In which of the following crops GM varieties are available for cultivation in India
(A) Mustard (B) **Cotton**
(C) Soybean (D) All of the above

16. Photo-periodically rice is a
(A) Day neutral plant (B) Long day plant
(C) **Short day plant** (D) None of these

17. The present level of carbon-dioxide in atmosphere is :
(A) 190 ppm (B) **295 - 300 ppm**
(C) 420 - 460 ppm (D) 490 ppm

18. Maize belongs to the category :
(A) Bisexual (B) **Monoecious**
(C) Dioecious (D) None of these

19. Pheromone trap attracts:
(A) Female moths (B) Female bugs
(C) **Male moths** (D) Caterpillars

20. Origin place of soybean is
(A) Brazil (B) Mexico
(C) **China** (D) Peru

21. India rank first in the production of the following crops in the world:
(A) Rice (B) Wheat

(C) Soybean (D) **Pigeon-pea**

22. In plants, enzyme responsible for the synthesis of the malic acid is :
(A) **Rubisco** (B) PEP carboxylase
(C) Kinase (D) Urease

23. Which soil has highest efficiency?
(A) Loamy soil (B) Sandy soil
(C) **Clay soil** (D) None of these

24. Which of the following insecticides may be recommended for the control of termites?
(A) **Chlorpyriphos** (B) Nimbicidine
(C) Dimethonate (D) Methyl- 0 - demetone

25. Correct order of rice producing countries is
(A) **China> India> Indonesia> Thailand** (B) India> China> Indonesia> Thailand
(C) Indonesia> Thailand> China> India (D) None on these

26. The depth of seeding in wheat is depends on
(A) Length of mesocotyl (B) Length of radical
(C) **Length of coleoptiles** (D) None of these

27. IGFRI is located at:
(A) **Jallandhar** (B) Jodhpur
(C) Jhansi (D) Jorhat

28. The photosynthetically active (PAR) falls in the range of
(A) **400 - 700 nm** (B) 100- 400 nm
(C) 700- 1000 nm (D) None of the above

29. Missing data are calculated by using
(A) Field plot technique (B) **Missing plot technique**
(C) ANOVA (D) None of these

30. Soil mulch is useful in:
(A) **Minimize evaporation losses** (B) Improving aeration
(C) Improving drainage (D) Removing weeds

ICAR'S JRF ENTRANCE EXAMS- 2009-10
General Agriculture (Memory based)

1. The average concentration of carbon dioxide in the atmosphere is :
(A) 0.03 ppm (B) 30 ppm
(C) 0.3 ppm (D) **300 ppm**

2. Agrostology is the study of:
(A) Root (B) **Grasses**
(C) Flower (D) Fruit

3. Atmospheric layer nearest to earth Surface is
(A) **Biosphere** (C) Exosphere

(B) Thermosphere (D) Troposphere

4. Plant that grow on extremely dry soil are classified under :
   (A) Thalophytes (B) Hydrophytes
   (C) **Xerophytes** (D) Hydroponics

5. Ground water table is measured by :
   (A) Tensiometer (B) **Piezometer**
   (C) Pressure plate (D) Neutron probe

6. Mycorrhiza is associated with what part of plants?
   (A) **Roots** (B) Leaf
   (C) Stem (D) Fruits

7. The most Suited N fertilizer for tea is:
   (A) Urea (B) Calcium nitrate
   (C) Ammonium chloride (D) Ammonium sulphate

8. Which food is designated as "Boneless meat"?
   (A) Banana (B) Potato
   (C) **Soybean** (D) Tapioca

9. Which of the following control the root initiation, cell elongation and apical dominance?
   (A) **Auxins** (B) ABA
   (C) Gibberellins (D) Ethylene

10. Study of soil from the stand point of higher plant is known as :
   (A) Pedology (B) Physiology
   (C) **Edaphology** (D) Geo physics

11. Pruning is most essential for:
   (A) Cauliflower (B) Rubber
   (C) **Tea** (D) Chinchona

12. The progeny of breeder seed is:
   (A) **Formation seed** (B) Nucleus seed
   (C) True seed (D) Certified seed

11. The basis of farm budgeting is:
   (A) production function analysis (B) Linear programming
   (C) **Cost - benefit analysis** (D) Farm planning

13. The largest tea production state in India is:
   (A) Tamil Nadu (B) **Assam**
   (C) Meghalaya (D) Kerala

14. The plant nutrient which help in translocation of sugars and starch is :
   (A) Mg (B) Mo
   (C) **K** (D) Na

15. Saffron is largely produced in:
   (A) **J & K** (B) Kerala
   (C) Himachal Pradesh (D) Uttarakhand

16. A crop that can supply oil for petrochemicals is:
   (A) Neem (B) Rubber

(C) Macadamia (D) **Jatropha**

17. IA market guided by rules and regulation is called :
    (A) Perfect market (B) **Regulated market**
    (C) Seasonal market (D) Terminal market
18. Most widely cultivated mustard type in India is:
    (A) Yellow / brown sarson (B) Black mustard
    (C) Toria (D) **Indian mustard**
19. C4 plant normaly produce more biological yield than C3 plant because of:
    (A) More photorespiration (B) **Less photorespiration**
    (C) Less photophosphorylation (D) More photophosphorylation
20. Absolute zero is:
    (A) - 273 °C (B) 273 ° C
    (C) **273 °K** (D) 273 °F
21. In India maximum area under wheat is occupied by the Species?
    (A) ***Triticum aestivum*** (B) *Triticum dicoccum*
    (C) *Triticum durum* (D) *Triticum vulgare*
22. Which among the following colures absorbs more radiation?
    (A) Blue (B) **Black**
    (C) Red (D) White
23. Impect of green house effect is:
    (A) **Global warming** (B) Ice melting
    (C) Sea formation (D) Sea level rise
24. Which of the following elements is most mobile in soil ?
    (A) Ca (B) K
    (C) Mg (D) **N**
25. The most deficient micro - nutrient in Indian soil is :
    (A) Cu (B) Mn
    (C) **Zn** (D) B
26. Magnesium is a constituent of :
    (A) Nucleic Acid (B) Enzyme system
    (C) Cell wall (D) **Chlorophyll**
27. The C : N ratio of arable soil commonly ranges from :
    (A) 6 : 1 to 7: 1 (B) 18: 1 to 19: 1
    (C) **8 : 1 to 15:1** (D) 3 : 1 to 4: 1
28. Dwarfing gene in wheat is :
    (A) Nif – gene (B) **Norin**
    (C) Dee - gee - woo – gen (D) Proteina
29. Which of the following element immobile in soil but mobile in plants?
    (A) S (B) B
    (C) Zn (D) **P**
30. Which soil has highest efficiency?
    (A) Loamy soil (B) Sandy soil
    (C) **Clay soil** (D) None of these

01. Importance of Agriculture in national economy

Indian Agriculture: Present Economic View

- A record production of 233.88 Million tons of food grains is found in year **- 2008-09**
- Contribution of Indian agriculture to Growth rate in GDP in 2008-09 (at constant rate of 2004-05) **–1.6%**
- Contribution Indian agriculture to GDP in 2008-09 (at constant rate of 2004-05) **–15.7%**
- Share of agriculture to total imports in 2008-09 **– 2.74%**
- Share of agriculture to total exports in 2008-09 **–10.23%**
- Contribution of Indian agriculture to total Employment in 2008-09 **- 52%**
- Highest MSP increase in 2008-09 over last year for crop **- Ragi-58%**
- Lowest MSP increase in 2008-09 over last year for crop **-Wheat-8%**
- India supports total geographical area of world **-2%**
- India supports population of world **- 18%**
- India supports livestock of world **- 15%**
- India supports forest of world **- 1.5 %**
- Total Geographical Area (TGA) of India **- 329 Mha**
- Potential for Biological Production of India **- 265 Mha**
- Per Capita land availability in India (1991-92) **- 0.37 ha**
- Per Capita Agri. land availability in India (1991-92) **- 0.16 ha**
- Net cultivated area available in India (2004-05) **- 143 Mha**
- Irrigated area available in India (2004-05) **-56.3 Mha**
- National Commission on Farmers established in year **-2004**
- Chairman of National Commission on Farmers (NCF) **- M.S. Swaminathan**
- National Horticulture Mission (NHM) started in year **- 2005**
- National Bamboo Mission (NBM) started in year **- 2006-07**
- National Rain fed Area Authority (NRAA) started since **-03/11/2006**
- National Food Security Mission (NFSM) started since **- Rabi, 2007**
- Rain fed Area Development Programme (RADP) started since **- 20 March, 2008**
- Average fertilizer consumption in India during 2008-09 **- 128.8 Kg/ha**
- Highest average fertilizer consumption in India during 2008-09 **-Punjab (212Kg/ha)**
- Lowest average fertilizer consumption in India during 2008-09 **– Arunachal Pradesh (5 kg/ha)**
- Nutrient consumption ration (NPK) during 2007-08 **- 5.5:2.1:1**
- National Project on Management of Soil Health & Fertilizer (NPMSF) established in year **- 2008-09**
- Integrated Scheme of Oilseeds, Pulses, Oil palm & Maize (ISOPOM) started since **- 1st April, 2004**
- Kisan Call Centre(KCC) started since **- 21st Jan 2004**
- Toll free No. of Kisan Call Centre **- 1551**

- DMRI- Directorate of Marketing Research and Inspection established at **- Nagpur , Maharashtra**
- First livestock census conducted in India during **- 1919**
- Rank of India in Silk production **- 2nd** (1st-China)
- Silk production in India during 2008-09 **- 18,320 MT**
- Indian agriculture provides about ..... % of the livelihood **- 65%**
- Agricultural growth Rate in production **- 5.8%**
- About .....% people are living in rural areas and are still dependent on Agriculture **- 75%**
- About .....% of India's geographical area is used for agricultural activity **- 43%**
- Father of Hybrid rice in India **- Dr. E.A. Siddiqe**
- Milk production in India during 2008-09 **- 108 Mt.**
- Milk production is highest over World in **- India**
- India rank in Milk production **- 1st rank**
- Milk Availability (g./person/day) in India during 2008-09 **- 258**
- Food grain production (Mt.) in India during 2008-09 **-233 Mt**
- Fruit production in India during 2007-08 **- 63 Mt**
- India rank in Fruit production **- 2nd rank**
- Vegetable production in India during 2007-08 **- 125 Mt**
- India rank in Vegetable production **- 2nd rank**
- Agriculture accounts …….% of National work force **- 52**

Nanotechnology in Agriculture:

- The term "Nanotechnology" is coined by **- Nario Taniguichi** (1974), at Univ. of Tokyo, Japan
- Nanotechnology is Understanding and control of matter at dimension of **1-100 nm**
- Example of Nano based Smart Delivery System **- Halloysite**
- Nano Particles(NPs) of ZnO, SiO_2 and TiO_2 used for Bacteria & Green Algae are - **Nano Pesticide**
- Nano Particles used for reclamation of heavy Particles
  -**Amphiphylic Polyurethane**, **Zeravalent Iron** (nZVI), and Nano sized **Zeolite**.

Crop Biotechnology in Agriculture:

- First transgenic plant in the world is **-Flavr Savr™ tomato**
- First transgenic plant Flavr Savr™ tomato is for **- delayted ripining**
- First transgenic plant Flavr Savr™ tomato was released for commercial cultivation in 1994 by **- Calgene (Compony)**
- Final Approval Committee for release of transgenic crops in India **- GEAC (Genetic Engineering Approval Committee)**
- Area under transgenic plant in World during 2008 **- 125 Mha**
- Area under transgenic plant in World during 2009 **- 139 Mha**
- Rank of India for transgenic plant **-4th** (1st-USA, 2nd-Mexico, 3rd- Argentina)

- Crops having highest transgenic plant cultivation area - **Soybean>** Corn>Cotton
- Area under Bt-cotton in India **- 7.5 Mha** (2008), **8.4 Mha** (2009)(86% of cotton area)
- First genetic engineering company is **- Genentech,** 1976
- First transgenic crop **- Tobacco**

Irrigation in India-2010:

- National water awards (2007) are given to **-Hiware Bazar Gram Panchayat, Ahmadnagar, Maharashtra**
- Area under micro irrigation system in India (2008-09) **- 3.88 Mha**
- Area under Drip in India (2008-09) **- 1.42 Mha**
- Highest area under Drip in India (2008-09) **- Maharashtra**
- Area under Sprinkler in India (2008-09) **- 2.45 Mha**
- Highest area under Sprinkler in India (2008-09) **-Haryana**
- Year announced as the "Water year" **-2007**
- Artificial Recharge of Ground Water Advisory Council (ARGWC)- constituted in year **- 2006**
- National Institute of Hydrology is situated at **- Roorkee, Uttarakhand**
- World Congress on conservation Agriculture held at **- New Delhi** (2009)

Informatics in Agriculture:

- E-*chaupal* estabilished by **- Indian Tobacco Comp. (ITC)** for M.P.
- Soya-Chaupal is for weather, farming practice and Market price of Soybean in **- M.P.**
- ARIS- Agricultural Research Information System, est. by **- ICAR, 1995**
- VERCON (Vitrual Extension, Research and Communication Network) developed by **-FAO,2001**
- "Indian Agriculture on-line" was established by - **Ministry of Agriculture** in 1997
- AGMARKNET-**Agricultural Marketing Information Network**
- NADAMS-**National Agricultural Drought Advisory and Management Systems**
- APHNET-Animal Production and Health Informatics Network
- ARISNET-**Agricultural Research and Information System**
- ACINET: Agricultural Credit Informatics Network
- ICT- **Information and Communication Technology**

ITK in Agriculture:

- Bael fruit can be used to contol **–rice blast**
- Cow urine used for **– wheat termite control , sorghum smut control**

India's position in world Agriculture Rank

- Total Area : **Seventh**
- Irrigated Area : **First**
- Population : **Second**

- Economically Active population : **Second**
- Total Cereals : **Third**
- Wheat : **Second**
- Rice : **Second**
- Coarse grains : **Fourth**
- Total Pulses : **First**
- Oil Seeds : **Second**
- Fruits and Vegetables : **Second** (first-China)
- Implements (Tractors) :**Third**
- Milk : **First**
- Live Stock (cattle, Buffaloes) : **First**
- Rice : **Second** (1st China)
- Maize : **5th** (USA >China >Brazil)
- Wheat : **Second** (China > India >USA)
- Groundnut : **Second** (China > India)
- Sugarcane : **Second** (Brazil > India)
- Total Cereals : **3rd** (China > USA > India)
- Coarse Cereals : **4th** (USA > China > Brazil)
- Total Pulses : **1st**
- Mustard & Rapeseed : **3rd** (China > Canada > India)
- Fruits & Veg : **Second** (China > India)
- Cotton : **3rd** (China > USA > India)
- Tobacco : **3rd** (China > Brazil > India)
- Tea, Jute & Allied Fibers : **1st**
- Coffee : **6th**
- Cattle Population : **1st** (16.5%)
- Buffalo Population : **1st** (56.7%)
- Milk Production : **1st** (15%)
- Egg Production : **4th** (China>USA>Japan>India)
- Total Geographical Area : **7th** position (2.4% of world)
- Total Arable Land : **2nd** (1st USA) 162 Mha
- Total Irrigated Area : **1st** position (21% of world)
- Human Population : **2nd** (1st China) 17% of world

Indians who secured 'World Food Prizes':

- 1987 -Dr. M. S. Swaminathan For - **India's green revolution**
- 1989 - Dr. Verghese Kurien - **Milk cooperatives**
- 1996 - Dr. Gurudev S Kush - Improved yield potential of rice
- 1998 - Mr. B. R. Barwale - **Founder of MAHYCO**
- 2000 - Dr. Surinder K Vassal - **Quality Protein Maize (QPM)**
- 2005 - Dr. Modaduga V Gupta - **For Aquaculture**

Current World Food Prizes awardees:

- 2008-09 - Dr. Gebisa Ejecta
  For- **First Sorghum hybrid resistant to Drought and Striga weed**
- 2009-10 -Dr.

Some important years:

- International year of rice **- 2004**
- International year of micro credit **- 2005**
- International year of desert and desertification **- 2006**
- International year of water (theme-more crop per drop) **- 2007**
- International year of potato **- 2008**
- International year of fibre **- 2009**
- International year of Biodiversity **- 2010**

Per Capita Availability (2009-10)

- Cereals (gm/ per capita/day) **- 409.9**
- Pulse (gm/ per capita/day) **- 29**
- Milk (gm / per capita/day) **- 245**
- Minimum requirement of milk (gm/ per capita/day) **- 240**

Crop Production Scenarios in Indian Agriculture (2008-09):

- Total food grains production in India during 2008-09 **-233.88 Mt**
- Total food grains production in India during 2007-08 **- 230.78 Mt**
- India is ..... largest economy in terms of GDP during 2008-09 **-10th**
- India's rank in world plant biodiversity **-10th**
- India's rank in Asia plant biodiversity **- 4th**
- India's rank in Purchasing Power Parity (PPP) **- 4th**

Leading state in production and area of crops during 2008-09:

- Rice production and area **- WB> UP**
- Rice Productivity **- Punjab**
- Wheat production and area **- UP> Punjab**
- Wheat productivity **- Haryana**
- Pulse s production **- MP**
- Pulse productivity **- Haryana**
- Oilseed production **- MP>AP**
- Oilseed productivity **- TN**
- Groundnut production **- Gujarat**
- Groundnut productivity **- TN**
- Mustard production **- Rajasthan**

- Cotton production - **Maharashtra**
- Jute production - **West Bengal**
- Coffee production - **Karnataka**
- Tea production - **Assam**
- Rubber production - **Kerala> Tripura**
- Potato production - **UP**
- Onion production - **Maharashtra**
- Sugarcane production - **Uttar Pradesh**
- Sugarcane productivity - **Tamil Nadu**
- Maize production - **Karnataka**
- Soybean production - **MP**
- Soybean productivity - **AP**

Production of major crops:

CROPS	2006-07	2007-08	2008-09
Rice	93.43	96.69	**99.15**
Wheat	75.80	78.57	**80.58**
Coarse cereals	30.66	40.76	**39.48**
Cereals	199.89	216.02	**219.21**
Total pulses	14.20	14.76	**14.66**
Total food grains	214.09	230.78	**233.88**
Total oilseeds	24.29	29.75	**28.15**
Sugarcane	355.52	258.84	**231.56**
Cotton	226.3 lakh bales	246.84 lakh bales	**231.56 Lakh bales**

Crop Production 2009-10 (Based on Advance Estimate)

- Kharif food grains production - **98.83 Mt**
- Kharif rice production - **71.65 Mt**
- Total kharif production of coarse cereals - **22.76 Mt**
- Total production of Kharif pulses - **4.42 Mt**
- Total kharif production of the nine Oilseeds - **15.233 Mt**
- Sugarcane production - **249.48 Mt**
- Cotton production - **23.66 Million bales** (of 170 kg each)
- Production of jute and mesta - **10.243 Million bales** (of 180 kg each)

Highest/Lowest production year-

Crop	Year (highest)	Year (lowest)
• Food grain	2008-09	2002-03
• Wheat	2008-09	2002-03
• Rice	2008-09	2002-03

• Pulse	2003-04	2002-03
• Nine Oilseed	2007-08	2002-03
• Sugarcane	2006-07	2003-04
• Cotton	2007-08	2002-03

Allied sector Production figure in 2008-09:

- Milk Production **- 108.5 million tonnes**
- Eggs Production **- 55.6 Billion**
- Wool Production **- 42.7 Million kg**
- Meat Production **-3.8 Million tones**
- Fish production **- 7.6 million tones**
- Silk production **-18, 324 Kg**

MSP-2009-10 (Rs.per Quintal)

- Paddy- Rs.1000/-
- Jowar- Rs.860/-
- Arhar- Rs.2300/-
- Cotton - Rs.2500/-
- Wheat- Rs.1100/-
- Gram- Rs.1760/-
- Sugarcane -Rs. 129.8/-
- Barley- Rs.750/-

Leading state in production & area of crops: 2008-09

Crops	Prod. (Mt)	Leading Prod. state	Area (Mha)	Productivity (Kg/Ha)
• Rice	99.15	WB>AP>UP	45.35	2186
• Wheat	80.58	UP>PNJ>HR	27.88	2891
• Maize	19.29	AP>KN>RJ	28.19	2355
• Jowar	7.31	MH>KN>MP	7.68	-
• Bajra	8.83	RJ>UP>GJ	8.74	-
• C. Cereal	39.48	RJ>MH	27.62	-
• Cereal	219.21	-	22.37	-
• T. Pulses	14.86	MH>MP>AP	7.97	655
• Chickpea	7.0	MP>MH>AP	7.97	-
• Lentil	0.81	UP>MP	1.31	-
• Pig.pea	2.3	MH>KN	3.4	-
• T. Food Grain	233.8	UP>PNJ>AP	123.22	-
• T.oilseed	28.16	MP>MH>GJ	27.46	-
• Soybean	9.9	MP>MH	9.52	-
• G. nut	7.34	GJ>AP	6.22	-

• Mustard	7.37	RJ>UP	6.19	-
• Sunflower	1.25	KN>AP	1.83	-
• Sugarcane	273.93	UP>MH	4.4	-
• Potato	28.43	UP>WB	-	-
• Cotton*	23.6	GJ>MH	9.41	419
• Jute*	10.41	WB>BHR	0.91	-
• Coffee	-	KN	-	-
• Tea	-	Assam	-	-
• Rubber	-	Kerala	-	-
• Onion	-	MH	-	-

***Million Bales**

Important facts:

- FCI Buffer stock during 2009 **- 16.2 Mt**
- MSP is determined by **- CACP (Commission on Agriculture cost and Prices)**
- 'Swaljaldhara' drinking water project is run since year **- 2002**
- 'Hariyali' watershed development program established in year **- 2003**
- NAREGA changes to MAREGA (Mahatma Gandhi Rural Employment Guaranty Act) in year **- 2005**
- The Protection of Plant Varieties and Farmers' Rights (PPV&FR) Authority, established in year **- 2005,** Nov. at **New Delhi** (Chairaman- S. Nagrajan)
- India's rank in fertilizer consumption **- 3rd**
- Per hectare NPK consumption **-128 kg**
- Coefficient of Variation of South west Monsoon in 2009 **- 10%**
- Total No. of Soil Testing Laboratories (STLs)in India in 2008-09 **-750**
- Total irrigation potential in India by March 2007 **- 102.77 Mha**
- Accelerated Irrigation Benefit Programme (AIBP) started since **-1996-97**
- Full form of NAFED
  -National Agricultural Cooperative Marketing Federation of India Limited
- Full form of CCI **- Cotton Corporation of India**
- The Macro Management of Agriculture Scheme (MMA) was formulated in **-2000-01**
- National Food Security Mission (NFSM) has been launched from the **rabi 2007-08** to enhancing the production of **rice, wheat and pulses** by 10, 8 and 2 million tonnes respectively by the end of the Eleventh Plan
- Kisan Credit Card Scheme (KCC) was introduced in **- August 1998**
- Rashtriya Krishi Vikas Yojana (RKVY) - launched in **- August 2007**
- National Bamboo Mission (NBM)- commenced in **- 2006-07**
- Chairman of Planning Commissions **- M. S. Ahuliwalia**
- Chairman of National Commission for Farmers **- Dr. M.S. Swaminathan**
- India's Rank is first in production of
  - **Milk, Coconut, Tea, Banana, Mango, Cashew nut (export, import and processing) and Pulses**

- India's Rank is 2nd in production of - **Rice , Wheat, Cotton, Fruit and vegetable**
- India's Rank is 3rd in- **Tobacco, rubber, Egg and fertilizer**
- Maximum Consumption of Imported Pesticide is
  - Carbaryl followed by Cholorpyriphos
- Maximum Consumption of Indigenous Pesticide
  - BHC followed by Monocrotophos & Endosulfan
- Maximum export of agro chemicals (in terms of rupees)
  - Cypermethrin followed by Endosulfan, Phosphide & Lindane
- The top Agrobusiness company: **Novartis** (Hindustan Ciba-Geigy & Sandoz)
- Total production of pesticides in India during 2007-08 **-95,000 tones**
- Number of pesticides registered in India by 31/12/1999 **- 155**
- Number of technical grade pesticides manufactured in India -
- Plant Protection adviser to GOL **- Dr. R. L. Rajak**
- Insecticides Act formulated in year
  - 1968 (with recommendation of **Thakur committee**)
- Insecticides rules formulated in year **- 1971**
- Brown revolution is for promotion of **- Agro Industries development**
- Pink revolution is for promotion of **- Onion production**
- Yellow revolution is for promotion of **- Oilseeds production**
- The word green revolution was coined by **- William Gaudd**
- Father of Green revolution **- Dr. Norman E. Borlaoug**
- Father of Green revolution in India **- Dr. M.S. Swaminathan**
- Father of hybrid rice production **- Yuvan long ping**
- First laureate of the "world food' prize **- Dr. Swaminathan**
- World Food prize to Dr M S Swaminathan for his contribution is in year– **1986**
- Dr. H. M. Beachell and Dr. Gurdev singh khush are **-Rice breeders**
- National Centre for Integrated Pest Management (NCIPM) situated at
  – IARI, New Delhi
- Central Plant Protection Training Institute (CPPPTI) situated at **– Hyderabad**
- The largest per hectare pesticide consuming country is **– Taiwan**
- Total number of pesticides banned in India **- 29**
- Recently banned pesticides in India is **- Phosphamidon**
- Highest consumption of pesticide is in crop **– cotton** (54%) 2nd- paddy (22%)
- The country has the maximum arable land per person - **Australia** (approx 200 acres).
- The Indian Food grains storage management and Research Institute is located at
  - Hapur, UP.
- The world first agricultural census was conducted in year **- 1930**
- The headquarters of Directorate of marketing and Inspection (DMI) established in 1935 is located at **– Faridabad, Haryana**
- The Agricultural produce (Grading and Marking) Act was passed in **– 1937**
- Agriculture Price Commission (presently, CACP) declared prices every year

– Minimum support price

- The Govt. determines the support prices of crop products on the recommendation of **- Commission for Agricultural Costs and Prices.**
- The demand for agricultural products in general is **- Inelastic**
- The apex body for institution finance for agriculture in India is **-National Bank For Agriculture and Rural Development (NABARD)**
- The earlier name of WTO was **- GATT**
- AGMARK is established in **- 1937**
- AGMARK is an indicator of **–Purity**
- The Govt. of India set up planning commission in **- March, 1950**
- The price below which the producers are not ready to sell is known as **– Reserve price**
- The highest per capita income of farmers is in **– Punjab**
- The scheme of Regional Rural banks (RRBs) was launched in India on **– 2nd October, 1975**
- The Reserve Bank of India Act for its establishment was passed in the year **– 1934**
- The Kisan Credit Card Scheme (KCCS) was introduced in **- 1998-99**
- The new national Agricultural Insurance Scheme (NAIS) was introduced in the country from **- Rabi, 1999-2000**
- The minimum wages act was enacted by the govt. of India on **- 1948**
- NABARD was established on 12th July, 1982 on the recommendation of **- Shivaraman Committee**
- Cooperative movement in India was started in **– 1904**
- The headquarters of Asian Development Bank (ADB) is at **- Manila**
- The National Agriculture Policy (NAP) was announced on **– 28th July, 2000**
- The Commission for Agricultural Costs and Prices (CACP) recommends the minimum Support Prices for..... important crops **- 24**
- The period of 11th five year plan in India is **- 2007-2012**
- The chairman of National Development Council (NDC) is **- Prime minister**
- Value added tax (VAT) is a **- Indirect tax**

Recent insecticide data (updated up to nov, 2009)

- Number of insecticide included in insecticide schedule **- 787**
- Pesticides Banned for manufacture, import and use **- 27**
- Pesticide / Pesticide formulations banned for use but their manufacture is allowed for export **- 2**
- Pesticide formulations banned for import, manufacture and use **- 4**

- Pesticide Withdrawn **- 7**
- No. of pesticides refused registration **- 18**
  - Pesticides restricted for use in India **– 13**
  - Insecticides approved by the registration committee for protecting buildings from termites
    - **Chlorpyriphos** 50% EC, **Ethion** 50% EC, **Imidacloprid** 30.50% SC, **Lindane** 20% EC.
  - Insecticides approved by the registration committee to control termites in agricultural crops under the insecticides act, 1968
    - Chlorpyriphos 20 EC, **Endosulfan** 35 EC, **Imidacloprid** 17.8 % SL
  - No. of Insecticides approved by the registration committee to control household pests in houses under the insecticides act, 1968 **- 39**

Recent Horticulture Data (2009-10)

- Percentages share of horticulture crops in production
  – Vegetable (60%) < **fruits** (31%) < **Plantation** crops (5%)
- Percentages share of horticulture crops in Area
  – Vegetable (40%) < **fruits** (30%) < **Plantation** (15%)
- Fruits crops leading in Area **- Mango>citrus>Banana**
- Fruits crops leading in Production **- Banana> Mango>citrus**
- Fruits crops leading in Productivity **- Papaya> Banana>Grape**
- State leading in fruits crops area **- MH>AP>UP**
- State leading in fruits crops production **- AP>MH>TN**
- Vegetable crops leading in area **- Potato>Onion>Tomato**
- Vegetable crops leading in production **- Potato>Onion>Tomato**
- Vegetable crops leading in Productivity **- Tapioca> Cabbage >Potato**
- State leading in vegetable crops Area - WB>UP>Bihar
- State leading in vegetable crops Production - WB>UP> Bihar
- India's rank in the fruits production – 2nd (1st - Brazil)
- India's rank in the vegetables production - 2nd (1st -China)
- India is the largest producer of
  - 1. **Mango**, 2. **Banana**, 3. **Sapota**, 4. **Acid Lime**, 5. **Cauliflower**
- India is the 2nd largest producer of - 1. **Onion**, 2. **Potato**
- Per capita fruit recommended in India **- 120 gm/day/person**
- Per capita fruit availability in India **- 70-80 gm/day/person**
- Per capita vegetables recommended in India **- 275 gm/day/person**
- Per capita vegetables availability in India **- 120 gm/day/person**

2. Basic principles of crop production

1. Climate and its influence on crops:

- A condition of atmosphere at a given place at a given time is called - **Weather**
- A weather condition over a given region during a longest period is called- **Climate**
- Structure of atmosphere is in sequences of (from lower to upper)
  - Troposphere- Stratosphere- Mesosphere – Ionosphere
- All weather phenomenons like rain, fog occur in -**Troposphere**
- Energy falling in one minute is a surface area of one square cm at the outer boundary of atmosphere and is called -**Solar constant**
- Solar constant is equivalent to **- 1.94 cal/cm^2/min**
- PAR stands for **- Photosyntheticaly Active Radiation**
- Influence of crop growth by the relative length of day and night especially for floral initiation is called **- Photoperiodic effect**
- Long day plant is the plants require …….day for floral initiation
  - Long day (>14 hrs.)
- Wheat, Barley and Oat are the example of **- Long day plant**
- Short day plant is the plants require …….day for floral initiation - shorter day (less than 10 hrs)
- Rice, Sorghum and Maize are the example of **- Short day plant**
- Cotton, Sunflower and Buck wheat are the example of **- Neutral plants**
- Average rainfall in India **- 120 cm**
- Rain bearing clouds is **– cumulonimbus, cumulus**
- A particular day is called as rainy day if the rainfall received is
  - More than 2.5 mm
- Instruments used to measure Radiation - **Pyranometer**
- Instruments used to measure Pressure - **Barograph**
- Instruments used to measure PAR - **Quantum sensor**
- Instruments used to measure Temperature - **Thermograph**
- Instruments used to measure Dew - **Darosometer**
- Instruments used to measure water table - **Peizometer**
- Instruments used to measure rain - **Raingauge**
- Instruments used to measure Soil moisture - **Tensiometer**
- Instruments used to measure Leaching and ET - **Lysimeter**
- Instruments used to measure Direct solar radiation - **Pyrheliometer**
- Instruments used to measure Humidity **- Psychrometer** (or) **hygrometer**
- A chemical used for cold cloud seeding - **Silver iodide**
- A chemical used for warm cloud seeding - **Sodium chloride**
- Indian Meteorological Organization situated at **-New Delhi (earlier Pune)**
- Lines of equal temperature is called - **Isotherm**
- Lines of equal pressure is called - **Isobar**
- Line of equal rainfall is called - **Isohyets**
- Lines of equal wind speed is called - **Isotach**

- Kharif season crops is cultivated since **- June to September**
- Rabi season crops is cultivated since **– October to March**

2. Growth and development

- Example of C_3 plant **– Rice, Wheat , Cotton, Soybean**
- Example of C_4 Plants **- sugarcane, maize, sorghum pearl millet**
- Example of CAM Plants **- Pine apple, sisal** and **agave**
- Plant growth regulator used as Cotton defoliant **- Abscisic acid**
- Plant growth regulator used as Sugarcane ripener **- Glyphosate**
- Plant growth regulator used for Seed less grape **- Gabbroic acid**
- Plant growth regulator used for fruits thinner and flower initiator **- NAA**
- Plant growth regulator used for Sucker control in tobacco - **MH**
- Plant growth regulator used for ripening of fruits - **Ethylene**

3. Soil & Fertilizer

- Inherent capacity of soil to supply adequate nutrients for plant growth is called **- Soil fertility**
- Capacity of soil to produce in terms of yields is called - **Soil Productivity**
- Soil fertility+ management includes in **- Soil productivity**
- Relative proportion of soil particles is called **- Soil texture**
- The arrangement of soil particles is called **- Soil structure**
- Size of Sand Particle **- 0.2 to 0.02**
- Size of Silt Particle **- 0.02 to 0.002**
- Size of Clay Particle **- < 0.002**
- Size of gravel **- > 2mm**
- Which structure is better for crop cultivation - **Crumby**
- Pore space is occupied by **- water and rain**
- Total pore space is more in - **clay soil** (50-60%)
- Total pore space is low in - **sand soil** (30-40%)
- Weight of soil per unit volume is called - Bull density
- The Bull density of common soil is - 1.5g/cm^3
- Particle density is also known as - true density
- Weight of solid portion of soil per unit volume is called – Particle density
- The Particle density of common soil is - 2.6 g/cm^3
- % pore space can be calculate by formula - (PD – BD) x 100/PD
- CO_2 concentration in soil air is - over 0.3%
- CO_2 concentration in soil air is ……..time higher than atmosphere **- 10**
- Well decomposed organic matter is called as - **Humus**
- Humus is also known as - **Lingo protein**
- Carbon: Nitrogen (C:N) ratio for organic matter – 12:1
- C:N ratio for Legume – 23:1
- C:N ratio for cereals –90:1

- C:N ratio for FYM -100:1
- The soil moisture held by the soil against gravitation at energy status of -0.1 to 0.33 bar is called - **Field Capacity**
- The soil moisture held at energy status of - 0.33 bar to –15 bar (= 1569 g) is called - Available soil moisture
- Urea is a - Organic fertilizer
- CAN (calcium ammonium nitrate) is a - Neutral fertilizer
- Recommended ratio of NPK for cereal crops is - 4:2:1
- Present NPK consumption ratio in India - 9:3:1
- **Deficiency disorders**
- Gray speck in oat is due deficiency of - Mn
- Marsh spot in pea is due deficiency of - Mn
- Pahala blight in sugarcane is due deficiency of - Mn
- Reclamation disease in cereals is due deficiency of - Cu
- Kharif in rice is due deficiency of - Zn
- White bud in maize is due deficiency of - Zn
- Trenching on citrus is due deficiency of - Zn
- Whiptail is cauliflower is due deficiency of - Mo
- Mg is a constituent of - Chlorophyll
- Browning of cauliflower is due deficiency of - Bo
- Symbiotic nitrogen fixing bacteria is - Rhizobium
- Gene responsible for N fixation – Nif genes
- Micro element needed for N fixation - Molybdenum
- Micro element which is constituents of NR - Mo
- Free living N fixing bacteria is **- *Azotobactor*, clostridium (Actinomycetes)**
- Conversion of ammonia to nitrite is occurs in the present of – Nitrosomonas
- Conversion of nitrite of Nitrate is occurs in the present of - Nitrobacter

4. TILLAGE

- A physical condition of soil at which tillage operation can perform better to obtained good seed bed is called - Tilth
- Implements used for primary tillage are - country plough , Mouldboard, Plough, Bose plough
- Implements used for secondary tillage – blade harrow, disc harrows tractor drawn cultivator
- Breeding sub soil is done by – chisel plough
- For Pudding use machine are – Wet land puddler, tractor drawn cage wheel
- Sowing is done by – Mechanical seed drill
- Weeding is done by – Japanese rotary weeder

5. IRRIGATION

- Project covering …….of command area is called Major irrigation project **- More than 10,000 ha**
- Project covering …….of command area is called Medium irrigation project **– 2000 to 10,000 ha**
- Project covering …….of command area is called Minor irrigation project **– Less than 2000 ha**
- 1 ha cm of water = **– 1000 litre**
- 1 cu feet of water = **– 28.32 liters**
- Number of hectare irrigated by constant flow of one current of water is called **- Duty of water**
- Total depth of water irrigated by one ha is called - **Delta**
- Gaseous loss of water from the surface leaf is called - **Transpiration**
- Ratio between yield and Evapotranspiration or WUE is called **- Water use efficiency**
- Water use efficiency can be obtain from the formula **- WUE= Y/ ET**
- Field water use efficiency can be obtain from the formula **- FWUE= Y/WR**
- **Type of irrigation**
- Flooding is done for the for **- rice**
- Check basins is done for the for **- wheat, finger millet**
- Basin method is done for the for **– Fruit crops**
- Furrow irrigation is done for the for **- Cotton, sugarcane, tobacco, vegetables**
- Soil moisture is measured by - **Tensiometer**
- Drip irrigation was discovered in - **Israel**
- The country has 100 % cultivate area under irrigation - **Egypt**
- Method of irrigation can provide protection against frost - **Sprinkler**
- The method of irrigation suitable for row crops is - **Furrow method**
- The method of irrigation suitable for undulated areas - **Sprinkler**
- The most common method among the surface methods of irrigation is **- Check basin**
- The country having the highest area under drip irrigation- **USA**
- State having the highest area under drip irrigation - **Maharashtra**
- State having the highest area under sprinkler irrigation - **Haryana**
- Water requirement of Rice **– 1250 mm**
- Water requirement of wheat **- 300-400 mm**
- Water requirement of Groundnut **- 550-600**
- Water requirement of Sugar cane **- 2250-2500 mm**
- **Important river project:**

River	Name of the project	States benefited
1. Damodar	Damodar Valley project	West Bengal
2. Sutlet	Bhakra Nangal (Indira Gandhi)	Punjab, HP, Rajasthan

3. Kosi	Kosi Dam	Bihar
4. Mahanadi	Hirakund (largest dam in the world)	Orissa
5. Krishna	Nagaarjuna sagar	Andra, Karnataka
6. Tungabhadra	Tunga bhadra project	KN, AP
7. Chambal	Gandhi sagar, Kota Borrage (Ranna pratap sagar)	MP. Rajasthan

Critical stages of Irrigation:

Name of Crops		Critical growth stages
• Sorghum	:	Primordial initiation, flag leaf, flowering and grain development
• Maize	:	Tasseling, Silking and grain development
• Rice	:	Tillering, panicle initiation, milk stage
• Wheat	:	Crown root initiation, tillering, boot leaf stage, dough stage
• Pearl millet	:	Tillering, Flowering
• Gram	:	Branching, Pod development
• Soybean	:	Flowering, Grain development
• Groundnut	:	Branching, peg penetration, pod development
• Sunflower	:	Seedling, Bud initiation, flowering
• Cotton	:	Square formation, ball formation, ball development
• Sugarcane	:	Seedling, tillering, ground growth

6. DRY FARMING

- The practice of crop production entirely with rainwater received during the crop season in low rainfall (<800mm) areas is called **- dry or dryland farming**
- Extremely dry climate with an annual average precipitation usually less than 250 mm is called **- Arid climate**
- Process of subjecting seeds before sowing to alternate cycle of wetting and drying to induce tolerance to drought is called **- Seed hardening**
- Chemicals which is increased in plants during drought **- Proline**
- Collecting and storage of water on the surface of soil for subsequent use **- Water harvesting**
- Any material applied to transpiring plant surfaces for reducing water loss **- Anti-transparent**
- Example of Stomatal closing type Anti-transparent **- Phenyl Mercuric Acetate**
- Example of Film forming type Anti-transparent **– Mobileaf**
- Example of Reflectant type Anti-transparent **- Kaoline spray**
- Example of Growth retardant **– Cycocel** (CCC)

7. HERBICIDES

- A herbicide that kills only targeted plants on weeds while crops are not affected is called **- Selective herbicide**
- Example of Selective herbicide are **- Atrazine, 2,4-D, Butachlor**
- A herbicide that kill all vegetation that they come in contact is called **- Non Selective herbicide**
- Example of Non Selective herbicide are **- Paraquat, Diquat**
- A herbicide that move within the plant to effect as herbicide is called **- Systemic herbicide**
- Example of Systemic herbicide are **- Atrazine 2,4-D, propanil**
- A herbicide that kills plants when they come in contact with plants is called **- Contact herbicide**
- Example of Contact herbicide are **- Diquat, Paraquat**
- Pre-emergence application herbicide **- Paraquat, Diquat, 2,4-D**
- Pre Planting incorporation herbicide **- Fluchloralin**
- Example of Soil sterilenths are **- Diuron, Atrazine, Methyl bromide**
- Effective herbicides on mono cotyledons weeds are - **Delapon**, **Fluchloalin**
- Herbicides which have low residual toxicity **- Diquat paraquat**
- Herbicides which have high residual toxicity **- Diuron, Atrazine**
- Weeds which derives foods directly from the host plant is called **- Parasitic weeds**
- Example of Total stem parasite - **Cuscuta** (associated with Lucerne crop)
- Example of Partial stem parasite -**Loranthus** (associated with tree crops- mango)
- Example of Total root parasite - Orabanche associated with Tobacco
- Example of Partial root parasite - Striga associated with sorghum
- Weeds growing in water bodies is called **- Aquatic weeds**
- Water hyacinth, hydrilla, Salvania, cattail weeds Example of **- Aquatic weeds**
- One plant having detrimental effect on other plants by releasing root chemical through roots **- Allelopathy**

8. CROPPING SYSTEM

- Growing of only one crop on a piece of land year after year is called
  - Mono Cropping
- Growing two or more crops on the same piece of land in one calendar year is called **- Multiple cropping**
- Growing 2 or more crops simultaneously with definite row arrangement is called **-Inter cropping**
- Growing at low or more crops in sequate on the same piece of land in a farming year **- Sequential cropping**
- Ratio between grass sown area and Net sown area is called- **Cropping Intensity**
- Cropping Intensity can be obtained from the formula
  = (Gross Sown Area/ Net sown areas) X 100
- Growing of crops in between Kharif and rabbi season is called **- Zaid cropping**

- The slash and burn type of cultivation in the hill treats of North Eastern Region is called **- Jhum/ shifting cultivation**
- Quick growing crop incidentally planted and harvested in between two major crops, mainly to utilize residual fertilizer is called **- Catch crop**
- Example of Catch crop is **- Toria**
- Crops which are grown primarily to cover the soil and to reduce the loss of moisture and erosion is called **- Cover crop**
- System of growing together crops of different heights at the same time on the same piece of land is called **- Multy storey cropping**
- Example of Multy storey cropping is **- Coconut + Pepper + cocoa + Pineapple**

9. WEED MANAGEMENT

- An unwanted plants, a plant out of place is called **- Weed**
- The term weed was firstly used by **- Jethro Tull**
- Weed is plant **- out of place**
- Example of Relative weed is **– rice in wheat field**
- Example of Absolute weed is **- *Cyperus rotundus***
- Example of Mimicry weed is **- Phalaris in wheat field** and **wild rice in the field**
- Example of Noxious weeds is **- Parthenium**
- National Research Centre for weed science located at **- Jabalpur (1988)**
- 2,4-D used for **- Broad leaved weeds**
- A weed that complete their life eyclein one year is called **- Annuals weeds**
- Example of Annuals weeds is **- Phaloris monr, Echinocloa colonum, Amaranthus**
- A weed that complete their life cycle in five years is called **- Binneal weeds**
- Example of Binneal weeds is **- Alternanithra echinata; Eichorrutim intybus**
- A weed that complete their life cycle in More than 2 years is called **- Perennial weeds**
- Example of Perennial weeds are **- cynodam dactylon, cyperus rotundus**

10. AGROFORESTRY

- Agro forestry is a form of **- multiple cropping**
- The systemic research in agro-forestry is taken by **- ICRAF**
- International Centre for Research in Agro-Forestry (ICRAF) situated at **- Nairobi, Kenya**
- National Research Centre for Agro-forestry situated at **– Jhansi (1988)**
- The most important agro-forestry practice is known from the - **"kangeyan tract of Tamil nadu"** (*Acacia leucophloea* + *Cenchrus setigerus*)
- Agri-silviculture is **- trees + crops**
- Alley cropping is **- perennial hedges + crops**
- Agri-horticulture is **- fruit trees + crops**
- Agri – Silvi – horticulture is **- trees + fruit trees + crops**
- Agri-silviculture is **- trees + crops + pasture or animals**
- Silvi- olericulture is **- trees + vegetables**

- Horti – pasture is **- fruit trees + pasture/animals**
- Silvi – pasture is **- trees + pasture/animals**
- Horti-apiculture is **- fruit trees + honeybees**
- Aqua forestry is **- trees + fishes**
- ''Taungya" originated from - **Myanmar**
- ''Taungya" it meant for - **hill cultivation**
- *Alnus nepalensis* is - **non-leguminous nitrogen fixing tree**
- Process of inhibition of growth of one plant by chemical compounds from the neighbouring plants is called - Allelopathby
- Agro-forestry tree species having allelopathic effect on crop:

Tree species	**Effect on:**
• Alnus nepalensis	- Glycine max
• Casuarina equisetifolia	- Cowpea, sorghum, sunflower
• Eucalyptus tereticornis	- Cowpea, Sorghum, sunflower, potato
• Gliricidia sepium	- Maize, rice, tropical grasses
• Leucaena leucocephala	- Maize, cowpea, sorghum, sunflower

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3. Cultivation of Major Crops

(Rice, Wheat, Pigeon pea, Sugarcane, Tomato, Cauliflower, Mango and Rose)

1. RICE

- Botanical name of rice **- *Oryza sativa***
- Highest production and productivity of rice in India **- West Bengal**
- Protein content in rice **- 7%**
- Gene responsible for dwarf varieties of rice **- dee-gee-woo-gene**
- Long stem which had lodging tendency found in rice type - **Indica**
- Short stem which has no Lodging Tendency found in rice type **- Japonica**
- Wild type of rice **- Javanica**
- Three types of rice culture – Upland, Low and Deep water rice
- Rice culture in which Seeds are sown directly of the main field, is called **-Upland**
- ……..% of area is under upland **- 60%**
- Seed rate for Upland culture **- 100 kg**
- Nursery area in Wet or transplanting system is ……..area of main field **- 1/10th (OR)** 1000 m^2 per ha
- Dapog method of Nursery is developed from **- Philippines**
- Area enough for planting one hectare under Dapog method of nursery **-30-40 m^2**
- Under Dapog method of Nursery, Seedling become ready for transplanting within **- 11-14 days**
- Optimum Seed rate for the short duration variety of rice **- 40-50 kg/ha**
- Optimum spacing for the short duration variety of rice **– 20x10**
- Optimum spacing for the medium duration variety of rice **- 20x15**
- Fertilizer rate for rice cultivation **– 100:50:50 kg NPK/ha**
- Zn application rate in rice cultivation **– 25 kg/ha**
- Aman season of rice, sown in month of…….and harvested in …….. **- May -June and October -December**
- AUS season of rice, sown in month of…….and harvested in …….. **- March- April and August/ September**
- Boro season of rice, sown in month of…….and harvested in …….. **- December-January and April/ May**
- Most familiar Weeds of rice are **– *Echinocloa colonum, E. crusgalli***
- *Sanwa (Echinocloa colonum)* of rice can be controlled by using the herbicides **- Butachlor/Machete**
- Herbicide, Butachlor, can be applied as **-Pre emergence**
- First developed dwarf variety in rice **- Taichung Native (TNI)**
- Drought tolerant variety of rice **- Bala, Bhavani**
- Blast resistant variety of rice **- Jaya, Rasi, CO-14**
- BLB resistant variety of rice **- TKM-6**
- Salt resistant variety of rice **- Jaya, Ratna**

- Super rice variety is **- Lunisree**
- Super rice variety is developed by **- CPRI**
- Super rice concept given by **- G. S. Khush**
- Deep water rice variety **- Pankaj, Jaganath**
- National average Yield of rice for India **-1750 kg/ha**

2. WHEAT

- Botanical name of wheat ***- Triticum aestivum***
- Highest production of wheat in India - UP
- Highest productivity of wheat in India **- Punjab**
- Protein content in wheat is **- 11%**
- Protein of wheat is called **- Gluten**
- Bread wheat is scientifically called ***- Triticum aestivum***
- Macroni wheat is scientifically called ***- Triticum* durum**
- Emmer wheat is scientifically called ***- Triticum* dicoccum**
- Percentage of area under the Bread wheat in India **- 87%**
- Percentage of area under the Macroni wheat in India **- 12%**
- Percentage of area under the Emmer wheat in India **- 1%**
- Normal sown varieties of wheat are **- Kalyansona, Sonora 64; Lermaroja**
- Mutant varieties of wheat are **- Sabarmathi sonora**
- Late Sown variety of wheat are **– Sonalika**
- Sowing of wheat under normal sown **-I fortnight of Nov.**
- Sowing of wheat under Late sown **- II**
- Normal seed rate of wheat cultivation **- 100 Kg**
- Normal Spacing for wheat cultivation **- 22.5 cm between rows, No spacing between plants**
- Normal depth of sowing dwarf varieties of wheat **- 5 cm**
- Depth of wheat sowing depends on **- coleoptiles length**
- Most critical stage for irrigation on wheat **- Crown Initiation Stage (20-25 DAS)**
- Most known weed of wheat is **- wild oat *(Phalaris minor)***
- *Phalaris minor* can be controlled by using herbicides - Isoproturon/ **2, 4 -D**
- Normal Fertilizer rate for wheat cultivation **- 120:60:40 kg NPK/ha**
- National average Yield of wheat for India **- 2900 kg/ ha**
- Gene responsible for dwarfness in wheat **- Rht 1 and Rht 2**
- First dwarf variety of wheat is **- Norin- 10**

3. REDGRAM/ARHAR/PIGEONPEA

- Botanical name of Pigeonpea ***- Cajanus cajan***
- Normal season of sowing Pigeonpea in India - June/July
- Normal seed rate for Pigeonpea cultivation is -12-15 kg/ha
- Normal spacing for extra early variety of Pigeonpea cultivation is **- 50 x30 cm**
- Normal spacing for early variety of Pigeonpea cultivation is **- 75 x30 cm**

- Normal spacing for Long day variety of Pigeonpea cultivation is **- 90 x30 cm**
- Important pegionpea varieties **- Pusa Ageti, prabhat**
- Wilt resistant varieties of pegionpea **- Mukhta**

4. SUGARCANE

- The sugarcane flowering is called **- Arrowing**
- The sugarcane flower is called **- Arrow**
- Wild type sugarcane is *- Sacharum Spontoneum*
- Noble sugarcane is *- Sacharum officinarium*
- Noble can used for chewing purpose is *- Sacharum officinarium*
- Sugarcane which takes 18 months for harvesting and usually planted in June-July (Kharif) is called **- Adsali sugarcane**
- Sugarcane which takes 12 months for harvesting and usually planted in Dec-January in south India is called **- Eksali sugarcane**
- Eksali sugarcane is usually planted in south India during **- Dec- January**
- Eksali sugarcane is usually planted in North India during **- Feb-April**
- Eksali sugarcane is usually planted in North India during Feb-April due to **- Late harvest of Rice**
- Instrument used to the maturity of sugarcane is **- Brix Meter**
- Ideal reading Brix meter for optimal maturity of sugarcane is **-18-22**
- State for largest area and highest production of sugarcane is **- U.P**
- State for highest productivity of sugarcane is **- Tamil Nadu**
- Normal Seed rate for sugarcane production **-25-30000 sets of 3 budded, 45-50000 sets of 2 budded and 1, 25000 sets for single budded**
- Normal Spacing for sugarcane production **- 90 cm between the rows**
- Normal Fertilizer rate for sugarcane production **-270:150:120 kg NPK/ha**
- Sugarcane ripener used is **- Glyphosate (5 kg / ha)**
- Important weeds of sugarcane are ***-Sorghum halapense, Cynodan dactylon***
- Red rot resistant variety of sugarcane are **– CO-1148, CO-19, B-17**
- Smut resistant variety of sugarcane are **– CO-527, CO-449**
- 'Variety famous as a 'Wonder cane' is **- COC-671 (highest sugar %)**
- National average yield of sugarcane in North India **- 60-100 t/ha**
- National average yield of sugarcane in South India **- 120-140** t/ha

5. BENGAL GRAM (CHICKPEA)

- Botanical name of Bengal gram *- Cicer arietinum*
- The crop known as king of pulse is **- Chickpea**
- Area under Bengal gram production **- 7.87 Mha**
- Production of Bengal gram **- 4.5 Mt**
- Bengal gram occupies …… % of area under pulses **- 33%**

- Leaf of Bengal gram contains **- Malic acid**
- Normal Sowing Season of Bengal gram **-II fortnight of October**
- Normal Spacing for cultivation of Bengal gram **- 30x10**
- Normal seed rate for cultivation of Bengal gram **- 100kg**
- Normal fertilizer rate for cultivation of Bengal gram–**20:60:10 NPK Kg /ha**
- Normal depth of sowing for cultivation of Bengal gram **- 7-10 cm**
- Plucking of apical buds on 30 DAS to encourage lateral branching in Bengal gram is called **- Nipping**
- Bengal gram harvested after **- 150 days**
- National average yield of Bengal gram from irrigated area **– 1500 kg/ha**
- National average yield of Bengal gram from rainfed area **- 400-500 kg/ha**

6. Ground nut

- Botanical name of groundnut **- Arachis hypogeal**
- Origin of groundnut **- Brazil**
- Largest producer of groundnut **- Gujarat**
- Oil content of groundnut **- 40-50%**
- Protein content of groundnut **- 26%**
- Best soil for groundnut cultivation **- Sandy loam**
- Normal sowing season for groundnut cultivation **–June-July**
- Normal Seed rate for cultivation of spreading type groundnut **– 120 kg**
- Normal Seed rate for cultivation of bunch type groundnut **- 110kg**
- Normal Spacing for cultivation of spreading type groundnut **- 45x10 cm**
- Normal Spacing for cultivation of bunch type groundnut **- 30x10 cm**
- Normal Fertilizer rate for cultivation of groundnut **– 20-40:40-90:20-40 kg NPK/ha**
- Gypsum rate for cultivation of groundnut **- 400 kg/ha**
- Which ground nut shows dormancy **- Spreading type**
- Chemical used to break dormancy in Spreading type groundnut is **- GA_3**
- Which ground nut tends to germinate in the field itself before harvest **-Bunch type**
- Chemical used to arrest germination of Bunch type ground nut, in the field itself before harvest is **- Malic hydrazide**
- Chemical used for floral initiation in groundnut **- NAA @ 40 ppm on 40 DAS**
- The fungi which affect kernel during shortage in ground nut - ***Aspergillus flavus***
- Bitter taste of groundnut kernel is due to **- Afalotoxin**

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CROP PRODUCTION UPDATES

RICE

- Chromosome no. of rice (*Oryza sativa*) **– 2n = 24**
- Origin of rice **– South- East Asia** or **Indo-Burma**
- Rice occupies …….area over the world **- 150 Mha**

- The largest producer country of rice - **China**
- India's rank in rice production - **second**
- The country which is the largest growing country in the world (44.6 m ha)- **India**
- No. of species identified under Genus Oryza -21
- cultivated species of Genus Oryza are **- *O. sativa* (Asia) and *O. glaberrema* (Africa)**
- Varietal group of O. sativa
  - Indica (tropical), **Japonica** (temperate), **Javanica** (Intermediate)
- Country having the richest rice germplasm collection in the world **- India**
- The process of tillering start in Rice…… Days After Planting **-10**
- Rice grain is a …….type of fruit **- Caryopsis**
- Rice inflorescence is called **- Panicle**
- Optimum temperature for rice seed growing is **- 20-35˚C**
- Rice is a **- Short day plant**
- Three system of rice cultivation
  1. Dry cultivation – Rainfed
  2. Semi dry cultivation – After 45-60 days treated as wet crop
  3. Wet cultivation – 3-5 cm standing water
- 45 % of rice grown is under **- Irrigated condition**
- There are 3 type of nursery
  1. Wet nursery: 25-30 days (age of seedlings)
  2. Dry nursery: 20-25 days
  3. Dapog nursery:
- Dapog nursery gives seedling ready for transplantation within **- 14 days**
- Area required in Dapog method of nursery **- 30 m^2 for 1 ha**
- Seed rate in Dapog method of nursery **- 1 kg/m^2**
- Dapog method of nursery is introduced from **- IRRI, Philippines**
- …… % yield loss caused by weeds in rice **- 10** %
- Traditional basmati cultivating area in the country
  - Punjab, Haryana, and western U.P
- World first high yielding and also semi-dwarf Basmati variety - **Pusa Basmati**
- Rice hybrid technology based on **- 3 line breeding** (A line, B line & R line)
- Paddy harvested at …… % moisture and stored at ……% **- 20** % and **14** %
- Khaira disease in rice cause by deficiency of **- 'Zn'**
- Disease which is major problem in rainfed upland, rainfed lowland and hill area
  - Blast disease
- Neck blast damage is severe in ……..varieties **- Basmati**
- Chlorophyll meter method and leaf colour chart used for …….... determination
  - leaf 'N' status (crude method)
- Rice protein is called **- Oryzein**

Wheat (*Triticum aestivum*)

- Chromosome no. of wheat **– 2n = 42**

- Origin of wheat is – **Asia minor/ South West Asia/ Central Asia**
- Wheat revolution in india occurs in year 1967, due to variety **-'HD 2329'**
- India is ……in terms of area and production of wheat (after China) **- second**
- Before green revolution all varieties in India were **- tall** type
- In wheat most critical stage is **- CRI**
- *Phalaris minor* is major weed in **- Wheat** fields
- Zinc and sulphur deficiency in wheat field reported in **-Punjab**
- Mn deficiency in wheat field reported in **- Punjab**
- Causal organism of Leaf/Brown rust of wheat is ***- Puccinia recondita***
- Causal organism of Stripe / Yellow rust of wheat is ***- P. striiformis***
- Causal organism of Stem / Black rust of wheat is ***- P. graminis tritici***
- Wheat grains stored well in …..% moisture content **- less than 10 %**
- Wheat protein is called **- Glutenin**

Barley (*Hordeum vulgare*)

- Lugri is a fermented drink developed from **- Hull less barley grains**
- 'Pearl barley' is suited for **- Kidney disorders**
- Seed rate of barley is **– 75-80 kg/ha**
- Critical stage in barley is **-Active Tillering Stage**(30-35 DAS)
- Molya disease Resistance variety of Barley is **- RD-2052**
- Malting quality is high in this variety **- Rekha**

Maize (*Zea mays*)

- Quality protein maize (QPM) varieties released by using **-Opaque-2 genes**
- Quality protein maize (QPM) varieties are **– Shaktiman 1 & 2, HQPM 1, Sakti 1**
- Hybrid varieties of maize are **– Ganga 1, Deccan 107, 109**
- Composites varieties of maize are **– Parbhat, pratap, Pusa comp.2, Pusa comp1**
- Normal seed rate of maize is **-20 kg/ha**
- Maize grain contains ……. %protein & ……..% oil **- 8-10 %and 4-5%**
- Sweet maize variety is **– African tall**
- Sweet corn variety is **– Composite madhuri and priya**
- Pop corn variety is **– Amber, V L Amber, Pearl popcorn**
- Baby corn is **– VL 42, Prakash**
- Maize protein is called **- Zein**
- Two most critical stages of maize is **– Tasseling & Milking stage**

MILLETS

- Millets belongs to …….group of plants **- C_4**
- Higher productivity among the millet **- Finger millet**

Sorghum (*Sorghum bicolor)*

- 2n = 20
- Seed rate = 18 kg / ha
- Hybrids : CSH 1 to 6, CSH 9,10, 11, 13, 16, 17,18
- Major pest: Shoot fly, stem borer, midge, ear head bug
- HCN (Dhurrin, synthesized in roots) present in early stage (40-50 days)

Pearl millet (*Pennisetum glaucum)*

- 2n = 14
- Seed rate = 5 kg/ ha
- 80 % phosphorus in grain stored in the form of 'phytate'
- Productivity high in UP>Gujarat> Haryana

Others

- Finger millet (*Eleusine coracana*), 2n = 36
- Kodo millet (*Paspalum scrobiculatum*), 2n = 40
- Fox tail millet (*Setaria italia*), 2n = 18
- Proso millet (*Panicum millaceum*), 2n = 36
- Little millet (*Panicum sumatranse*), 2n = 36
- The inflorescence of sugarcane is called Arrow

PULSES

- It is important dietary protein
- Bengal gram (*Cicer arietinum*), 2n = 16
- Pigeon pea *(Cajunus cajan),* 2n = 22, highly sensitive to frost
- Green gram *(Vigna radiata*), 2n = 22. Very sensitive to water logging
- Black gram *(Vigna mungo*), 2n = 22
- French bean (*Phaseolus vulgaris*), 2n = 22
- Cow pea (*Vigna unguiculata*), 2n = 22
- Lentil *(Lens culinaris)*
- Field pea (*Pisum sativum)*
- Lathyrus *(Lathyrus sativus)*

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