GENERAL HORTICULTURE

► Classification of fruit crops

A. Tropical fruits: Mango, banana, citrus, papaya, sapota, guava, grapes, pineapple, jack
B. Subtropical fruits: Mangosteen, avocado, litchi, rambutan, loquat, durian, persimmon, passion fruit
C. Temperate fruits: Apple, pear, quince, peach, plum, pear, almond, apricot, cherry, walnut and pecanut
D. Arid and semi-arid fruits: Ber, aonla, annonaceous fruits, pomegranate, datepalm, fig, bael, phalsa, jamun

► Common Names of Fruit crops:-

Sr. No.	Fruit crops	Common Name
1	**Aonla**	Indian Gooseberry
2	**Walnut**	King of nuts
3	**Pecan nut**	Queen of nuts
4	**Pistachio nut**	Smiling Nut
5	**Mandarin**	Fancy fruit
6	**Mango**	Bathroom fruit, King of fruits
7	**Banana**	Adam's fig, Tree of Paradise, Kalpataru, Apple of paradise
8	**Avocado**	Butter fruit
9	**Papaya**	Melon tree
10	**Kiwi fruit**	Chinese Gooseberry , China miracle

Climacteric fruits	Non-climacteric fruits
Mango, banana, sapota, guava, papaya, apple, pear, peach, plum, nectarine, annona, fig, apricot, avocado, blueberry, feijoa guava, passion fruit, cherimoya, kiwi, cran berry, rasp berry durian, jack, ber	**Citrus fruits, grapes, pineapple, pomegranate, rambutan, litchi, ber, jamun, cashew, cherry, strawberry, aonla, phalsa, loquat, olive**

Fruit Crops & Spacing (IBPS-AFO-EXAM-2016)*

Fruit crops	Spacing(m^2)	Fruit crops	Spacing(m^2)
Pomegranate	5×5	Jamun	12×12
Guava	7×7	Sweet Orange/Apricot	6×6
Litchi	8×8	Mango/Sapota	10×10
***Banana**	**1.8×1.8**	Peach/Fig	5×5
Aonla/Bael/Ber	8×8	Plum	7×7

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MAJOR FRUIT CROPS

1) Mango:-

- **National fruit of India**
- **About 39% of world mango produced in India.**
- **Spongy tissue is a major problem in Alphonso variety of Mango**
- **Ambika:- Amrapali x Janardan Pasand**
- **Export variety of Mango – Alphonso and Kesar**
- **Rumani variety of mango have apple shape fruit.**
- **Exotic varieties of mango:- Tommy Atkins, Zilette, Haden, Sensatation, Julie**

2) Litchi (*Litchi chinensis*) :-

- **Dried litchi :- Litchi nut**
- **Origin – China**
- **Most cultivated varieties:- Saharanpur,Dehradun.Calcutta, Bombai, Bedana, Rose scented Muzaffarpur, Shahi, Deshi**
- **Highest area and production – Bihar**
- **Propagation:- Air-layering**
- **Fruit cracking is a major problem in litchi due to high temperature, low humidity, low soil moisture**

Temperate fruit:-

1) Apple (*Malus x domestica*)

- **Origin – South- Western Asia**
- **Family- Rosaceae**

Banana is staple food of South Africa.

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☞ **Spacing and planting density for different scion-stock combinations (IBPS-AFO-EXAM-2016)***

Sr.No	Fruit crops	Scion/variety	Rootstock	Tree size	Spacing(m)	Density (tree/ha)
1	Apple	Standard	Seedling	Vigorous	7.5 X 7.5	178
2	***Apple**	**Standard**	**MM 111 &Merton 793**	**Semi-vigorous**	**6.0 X 6.0**	**278**
3	Apple	Standard	MM106, M 7	Semi-dwarf	4.5 X 4.5	494
4	Apple	Standard	M9 &M6	Dwarf	1.5 X 1.5	4444
5	Apple	Spur type	Seedling	Semi-vigorous	5.0 X 5.0	400
6	Apple	Spur type	MM 111 &Merton 793	Semi-dwarf	3.5 X 3.5	816
7	Apple	Spur type	MM 106,M7	Dwarf	3.0 X 3.0	1111

2) Pear/Naspati:- (*Pyrus communis*)

☞ **Most cultivated varieties – Le Conte, Kieffer, Gola , Patharnakh, Bartlett, Punjab nakh, Baggugosha**

3) Plum:- (*Prunus domestica*)

☞ **Prunes (dried plum) prepared from plum with high sugar**

☞ **Most cultivated varieties:- Santa Rosa, Mariposa, Burbank, Alubukhara**

3) Peach:

☞ **Nectarine – fuzzless peach**

☞ **Most cultivated varieties:- July Elberta**



Pollination in Fruit crops:-

Insect – Citrus, Guava, Litchi, Ber, Mango, Apple, Peach, Plum

Wind- Coconut, Jackfruit, Papaya, Sapota, Pomegranate, Date palm

Birds- Banana, Pineapple,

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Pruning in Fruit crops (Pruning time):- (IBPS-AFO-EXAM-2016)*

1) Sweet orange:-Late winter or early spring

2) *Grape:- North india (Dec- January), In T.N.(Dec-Jan/May-June)

Summer pruning /back pruning- March to april(Back/foundation)

October pruning (fruit pruning/forward) –October

AP/MH/KN

3) Peach :- regular pruning (mid winter/Dec to January)

4) Ber:- April- May

5) Leaf pruning in date palm :- June

6) Fig:- December

7) Phalsa:- December- January

High temperature loving tree:- Rambutan

High micro nutrient loving tree:- Citrus

High water loving :- Banana

- **Study of cultivation of citrus:- citriculture**
- **Cultivation of grape is known as:- viticulture**
- **Study of wine from grapes:- viriculture**
- **Science of wine making:- Enology**
- **Study of tea is known as :- Tsiology**

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SOIL SCIENCE

MINERAL NUTRITION:

* Essential element – (criteria proposed by Arnon and stout)
(1) In the absence of that element, plants is not able to complete its life cycle
(2) The element should not be substituted by other element
(3) element should form a part of any molecule or constituent of the plant.
* Beneficial element –They do not form the constituent of plant can grow without it but if present it is advantageous to the plant
* Macronutrients: CH, O, N, S, Ca, Mg, K, P
* Micronutrients : Cl, Fe, B, Mn, Zn, Cu, Mo
* Mobile elements: N,P,K, Mg, Mn, Mo, Cl, Zn and Na
* Immobile elements: Bo, Fe, Ca, Cu, S
* Beneficial elements: Co, Sl, Selenium, Na, Nl
* Cobalt: Legumes
* Silicon: Rice, Maize
* Nickel: Legumes
* Criteria of the essentiality of mineral elements propose by Arnon and stout
* Atleast 60 elements are present in plants out of which only 16 are essential

Carbon: (46% dry weight basis)
Source: Co_2 from the air
Function: Most of the compounds in the living cells are C-containing.

Oxygen: (50%)
Source: O2, Co2, H2o
Function: The most abundant elements by weight in plants Required for all compounds in plants.

Hydrogen: (6%)
Source: H2o
Function: Most abundant elements by number of atoms Present in all the compounds in the living cell Component of H2o

Nitrogen: 1.5%
Source: NO3, NH4 in the soil solution, Legumes through N2 fixation.
Function: All the crops prefer No3-(Nitrate) except Rice which prefers NH4 + (ammonium)
Components of nucleic acid. Chlorophyll molecule, Proteins
Deficiency: Pale yellow leaves & reduced growth red leaves in cereals
Red colour develops in Apple due to the anthocyanin production
Root lengthening in wheat
Excess Nitrogen leads to vegetative growth, delay in flowering

Phosphorus: (0.2-0.8%)

Source : H3PO4 & Hpo4 from the soil solution

Function: Component of nucleic acid, Phospholipids (Membranes), ATP
Deficiency: variable colour development in leaves (Dark green) reduced tillering & leaf fall. Anthocyanin produced give pink colour.

Potassium:
Only present in plants as K+ not bound to any components
Function: Stomatal closing & opening
Disease resistance

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Osmotic adjustment, needed for cell elongation
Deficiency: rosette, die back in plants
Chlorosis:
Stunted growth & Thin shoots
Tip burns & leaf scorch in older leaves
*** Magnesium**
Constitutent of chlorophyll
Activates many enzymes
Deficiency: Older leaves affected Cholorosis. Sand drown disease in tobacco
*** Sulphur:** 0.1%
Source: Soluble sulphates
Functions: Aminoacids (Cystein and Methonene)
Coenzyme A
Volatile Oils
Deficiency: Downward cupping of leaves e.g. tobacco, Torr, Tea,
Tea yellow disease
Chlorosis
*** Calcium:**
Functions: Calcium pectate is present in the middle lamella of the cell wall
ATPase activator
Counteract metal toxicity
Deficiency:Young leaves are mostly affected
Hooked tips & distort leaves
*** Iron**
Component of cytochromes, Catalase, peroxidase
Deficiency: Intervienal Chlorosis (iron Chlorosis)
Leaf bleaching (S. Cane)

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Deficiency symptoms

* N: general starvation
* Fe: Intervienal chlorosis e.g. S. Cane
* Mn: Grey speck Disease of oats, pahla blight of sugarcane, marsh spot of pea
* Copper: Die back disease of citrus or exanthema, Reclamation, white tip disease
* Zinc: Mottled leaf of citrus, drenching of citrus
* Little leaf/ Rosette as in Apple, Pine, Peach walnut, citrus etc, white tip of maize
Khaira disease of rice
* Molybdenum: Whip tail of cauliflower and brassicae, scald of legumes
* Boron: Heart rot of sugar beet and marigold
Canker of table beet
Browning & Hallow stem of cauliflower
Cracked stem of alfa-alfa
Hard fruits of Citrus
Top sickness of Tobacco
Water core of turnip
* Phosphorus: Sickle leaf disease
* Calcium: blossom End Rot (BER) in tomato and Tip hooking in cauliflower

1. Mn. Gray speck in oat, Marsh spot in pea, pahala blight in sugarcane
2. Cu. Reclamation disease in cereals
3. Zn. Kharif in rice, white (bud) in maize, Frenching on citrus
4. Mo. Whiptail is cauliflower N fixation
5. Mg. Is a constituent of chlorophyll
6. B. Browning of cauliflower
7. Symbiotic nitrogen fixing bacteria: Rhizobium
8. Gene responsible for N fixation – Nif genes
9. Micro element needed for N fixation

Free living N fixing bacteria *Azotobactor*, clostridium
Micro organism associated with casuavina frankia
Conversion of ammonia to nitrite – Nitrosomonas,
Conversion of nitrite of Nitrate- Nitrobacter

ENTOMOLOGY

Insecticides rules : 1971
Brown revolution - Promotion of Agro Industries Dvt.
Pink revolution - Promotion of onion production
Yellow revolution - Promision of oilseeds production
The word green revolution was coined by "William Gadd"
Father of Green revolution 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 – 1996
Rice breeders: Dr. H. M. Beachell Dr. Gurdev singh khush

Pests of Sugarcane
1) Shoot borer: *Chilo infuscatellus* (crambidae) or early shoot borer
Number of feeding punctures near the base of shoot. Rotten portion of straw colored dead heart emits offensive odour. It can be pulled out eastly.
Control: Earthing up during early stage.
- Trash mulching
- Trichogramma Chilonis

Soil application of Gammas HCH emulsion @ 1 kg a.i./ha over the cane sets in famous at the time of planting
- Granulosis Virus can also be used
2) Top borer: Scirphophaga excerptalis (Pryalidae)
Midrib tunnelling. Shot – holes on axial bud growth leaves, dead heart and can be pulled out easily and given bunchy top appearance, Acrial root formation.
Control:
- Avoiding of frequent irrigation
- Carbofuran @ 1 kg a.i./ha synchronizing with brood emergence

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- Trichogramma japonicum
- Pre-pupal parasitoid Isotima Javensis
- Resistant var: COJ67, CO 1007

3) Internode borer: *Chilo sacchaviphagus indicus (crambidac)*
Attack starts from 4th months onwards. Internodes constricted and shortened with many bore holes: fresh bore holes with wet frass, stunted growth. Major pests in peninsular India. Hardening of internodes.
Control: Detrashing at 5.7 & 9th months
-T- chilonis @ 3.5 cc/ha/fortnight from 4th month until a month before harvest.
4) Gurdaspur borer: (Crambidae) *Acigone steniellea*
Two phases: Gegarious phase – feed on first internode from to & may larvae enter into the core through single hole.
Solitary phase – dispersed to other came by silhen treads.
5) White grub: *Holotrichia consanguinea: H. Serrata. (Meloionthidae Anomula begglensis* (Rutelinae)
Drying of crops : Yellowing & nibbling of leaves: roots eaten away.
Control: *Netarhizium onisopliae*
-Pudding & crop rotation

B. *Popillae* milky disease
6) Termites: *Odentotermes spp: Microtermes obesi*
Older leaves dry up first & cane falls down if disturbed.
Filled with moist soil inside the papery rind.
7) Sugarcane scale: *Melanaspis glomerate:* (diaspridiadae)
Grayish block appearance of stem. Reduced yield, juice quality of Jaggery production
Control: Detrashing & Trash burning.
8) Leaf hopper: *Pyrilla perpusilla* (Lophopidae)
Yellowish white spots on leaves; sooty mould on later stages.
Control: Externel parasitoid: *Epiricarlia melanoleuca* (Ephpyropidae)
Green muscardine fungus: *Aceria sacchari (*Eriophyidae)
Forming a circular Ereneum gall in the inner side of the leaf sheath
Wheat
1) The rabi crops which are seriously damaged by white grub beetle are wheat and potato.
2) Wheat shootfly: *Atherigona naquii*
3) Ghujia weevil: *Taenymecus indicus* is a pest of wheat, barley gram and mustard. The adult weevils cut to germinating seedlings grub feed on soil humus.
4) Wheat aphid: *Macrosiphum miscanthi*
5) Wheat gall nematode or ear cockle nematode *Anguina triticl* Bacterium associated: *Corynebacterium tritici*
Seed galls/ Thundu disease/ yellow ear rot (Bacterium+Nematode)
Mgt. Hot water treatment of seeds at 500C for 2 hrs.
6) Wheat stem borer *Sesamia inferens* (Noctuidae).
Rice
1) Yellow stem borer: *Scirpophaga incertulas* (Pyraustidae)
Deed heat in young seedlings
White earhead in panicle stage. No grain formation.
Monophagous pest
Control:
1) Parasitiods: *Tetrastichus Schoenobii;* egg parasitiod *Trichogramma Japonicum*

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* Destruction of stubbles
* Host plant resistance: TKM 6 resistant variety contains *Penta deconal* & silica.
* Pheromone Oviposition deterants in rice for stem borer

2) Gall fly or gall midge: *Orseoeoa oryzae* (Cecidomyiidae)

silver shoot or onion leaf which is a modified leaf sheathcaused by maggot.
Bio control agent: Playigaster oryzae

3) Leaf folder: *cnapholocrocis medinalis* (Pyraustidae)
Longitadial folding of leaves & drying of leaves by larva.
Control: Avoid use of excess nitrogen
Parasitoids: *Trichogramma Japomcum*

4) Green leaf hopper: *Nephotettix virescens* (Cicadellidae)
yellowing of leaves
Vector of rice Tungro, Yellow dwarf, Transitory yellowing

5) Brown planthopper: Nilaparvata lugens (Delphacidae)
Hopper burn drying burning symptom in young plants. Circular patches of drying. Vector of grassy stunt. Ragged stunt and wilted stunt.
Avoid use of excess nitrogen
Resistant varieties: Py3, CO42, Mudgo (low aspargine content)
Resurgence causing pesticides: Acephate, Fenthion, Phosphamidon, synthetic Pyrethriods, Methyl demeton.
Predators: *Cyrtorhimus lividipennis Lycosa sp. Microvetia* sp.

6) Ear head bug: *Leptocorisa acuta:* L. *oratorius* (Gundhi bug) (Alydidae): chaffy grains with black spot. Feeds on tender stem. Peduncle and milky grains leads to chaffy earhead.
Control: Fenthion 100 EC 200 ml
Malathion 5% dust @ 10 kg/ha.
Clean cultivation- removal of weeds & grasses.

7) Rice root nematode: *Hirschmaiviella oryzae* (Mentck disease)

8) White up rematode or spring dwarf nematode: *Aphelexhcopdes besseyi* hot water treatment of seeds at 520C for to min.

9) Rice stem nematode: *ditylenchus angustus*
Larva disease in rice.

10) Rice case worm: *Nymphula depunctalis*
Larva with in tubular cases. Floating on water.

Cotton: consuming 54% of total inscticide in India though the area under cotton is only 5%

1) Cotton jassid or leafhopper: *Amrasca devastans (A.biguttula biguttula cicadellidae)*
Hopper burn yellowing, curling, bronzing & drying.

2) Whitefly: *Bemisia tabaci* (Aleyrodidae)
Shedding of leaves, stunting of plants, bud boll opening and poor quality lint., contamination of lint with honey dew and sooty mould appearance.
Vector of cotton leaf curl virus disease in Punjab.
Whitefly outbreak on cotton in AP during 1985-86.
Outbreak was due to indiscriminate use of insecticides particularly synthetic pyrethroids against Heliothis.

3) Spotted bollworm: *Earias vitella*
Spiny bollworm: *Earias insulana* (Noctuidae)
Symptom: Boring of terminal shoots of young, plants “Flaring of squares” and boring of young bolls frass at the entrance hole.

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Moths are green in colour.
4) Pink bollworm: *Pectinophora gossypiella* (Gelichidae)
Symptom: Rosetting of flowers
Eating of seeds
Double seed formation, Locular burrowing
Diapause during winter
5) American bollworm: *Helicoverpa armigera* (Noctuidae)
large, circular bore holes with faecal pellets. Larvae feed by thrusting their heads alone inside.
6) Red cotton bug: *Dysdercus cingulatus* (Pyrrhocoridae)
Roting of bolls: water soaked spots
Lay eggs in soil
Bacterim associated: *Nematospora gossypii* – staining of hint.
Control measures: All pests
i) Crop rotation with cereal: Bhendi should not be grown in rotation
ii) Yellow sticky trap for monitoring whitefly
iii) Whitefly tolerant var. LPS 141 and Supriya
iv) Pheromone trap for PBW (Gossyplure)
Pheromone trap for Helicopiveria (Helilure)
Biological control:
Trichogramma chilonis against bollworms
Spodoptera NPV 250-500 LE/ha (1 LE=6x109 POB= 3 larvae)

Helicoverpa NPV
B.t. Formulation against early instars of bollworms
Synthetic pyrethriods should be used only during peak flowering and boll formation stages.
Stem weevil: *Pempherulus affinis*
Stem gall near the base of the plant
MCU 3 – resistant variety
Control – soil application of granular insecticide/Neem cake
Chick pea (Bengal gram)
1) *Helicoverpa armigera* – Gram pod borer or gram caterpillar consume foliage and developing pods.
2) *Greasy cutworm, Agrotis ypsilon* (Noctuidae)

Cut the stems at ground level
Regular pest:
Occur most frequently on cultivated crops
Eg.: cotton bollworms, Brinjal fruit borer
Occasional pest:
Occurring less frequently
Eg.: case worm on rice
Seasonal pests:
Occurs in a particular season of year
Eg.: red hairy caterpillar on groundnut
Persistent pest:
Occurs throughout the year on crops
Eg.: chilli thrips. Rose thrips
Sporadic pests:

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Occurs in a few isolated localities
Eg.: Gall midge on rice in Madurai area
Endemic pests:
Occurs in same Agril. Area year after year
Eg.: nematode on potato in Nilgris

Migratory pests:
Moves from one area to others and causes damage
Eg.: Locust
Epidemic pests:
Occur in particular area/season in severe form
Pandemic pests:
Occur in a large geographical area/entire country or continent
Eg.: locust outbreak
NCIPM – National Centre for Integrated Pest Management – IARI, New Delhi
CPPPTI – Central Plant Protection Training Institute – Hyderabad
* The largest per hectare pesticide consuming country – Taiwan
* Total number of pesticides banned in India = 29
* Recently banned - Phosphamidon
* Highest consumption – cotton 54% followed by paddy 22%

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AGRONOMY

TILLAGE

Tilth physical condition of soil resulting from Tillage
Implements used for primary tillage: country plough , Mouldboard, Plough, Bose plough
Implements used for secondary tillage –(blade harrow, disc harrows tractor drawan ultivator)
Breeding sub soil – chisel plough
Pudding – Wet land puddler, tractor drawn cage wheel
Sowing – Mechanical seed drill
Weeding – Japanese rotary weeder
Net sown = 143 mha (1998) and 142.22 mha 1999
Rainfed = 92 mha (1998)
Irrigated = 50 mha, 25 mha (37.6%)

HERBICIDES

Selective herbicide – Kills only targeted plants on weeds while crops are ont affected
Eg. Siomazine, atrazine, 2,4-D butachlor, alachlor, fluchloralin Pendimethalum MCPA, Glyphosate, Propanil
Non Selective herbicide – Kill all vegetation that they come in confact.
Eg. Paraquat, Diquat.
Systemic herbicide: Systemic herbicide move within the plant

Eg: Atrayine, simayibne, propanil, 2.4-D MCPA, Glypthocte Butachlor, Fluchloralin. etc.

Contact herbicide – Kills plants when they come in contact with plants
Eg. Diquat, Paraquat.
Pre-emergence application – application of herbicide before the emergence of weeds.
(c4) Paraquat, Diguat, 2.4-D, Propanil, Isoproturon, Glyphosate .
Pre Planting incorporation – application of herbicide before sowing of crops eg. Fluchloralin.
Soil sterilenths – (eg.) Diuron, Atrazine, Methyl bromide
Effective herbicides on Monocotylidous weeds –
eg. delapon, fluchloalin.
Herbicides which have low residual toxicity- Diquat paraquat
Herbicides which have high residual toxicity – Diuron Atrazine.

Parasitic weeds

Total stem parasite	-	Cuscuta associated with lucorn crop
Partial stem parasite	-	Loranthus associated with tree crops
Total root parasite	-	Orabanche associated with Tobacco
Partial root parasite	-	Striga associated with sorghum
Aquative weeds	-	Weeds growing in water bodies eg. Water hyacinth, hydrilla, Salvania, cattail weeds.

CROPPING SYSTEM

Mono Cropping – Growing of only one crop on a piece of land year after year
Multive cropping – Growing two or more crops on the same piece of land in one calender year.
Inter cropping – Growing 2 or more crops simultaneously with definite row arrangement. Sequential cropping- Growing at low or more crops in sequate on the same piece of land in a farming year.
Zaid cropping – Growing of crops in between Kharif and rabbi season
Jham/ shifting cultivation – The slash and burn type of cultivation in the hill treats of North Eastern Region.
Catch crop – Quick growing crop incidentally planted and harvested in between two major crops, mainly to utilize residual fertilizer
Cover crop – Crops which are grown primarily to cover the soil and to reduce the loss of moisture and eroion
Multy storey cropping- system of growing together crops of different heights at the same time on the same piece of land (eg.) coconut + Pepper + cocoa + Pineapple

Classification of weeds

1. Based on duration:
(a) Annuals – Complete their life eyclein one year eg. Phaloris monr, Echinocloa colonum, Amaranthus (Pig weed family)
(b) Binneal weeds – complete their life cycle in five years (eg.)
Alternanithra echinata; Eichorrutim intybus

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(c) Perennial weeds – More than 2 years
(eg.) cynodon dactylon, cyperus rotundus

ICAR AWARDS

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1) ICAR Norman Borlaug Award

To recognize the outstanding achievements of a scientist

2) ICAR Challenge Award 2015

To find a solution for any immediate or long-standing problem, or limitation in agriculture, which is coming in the way of agricultural development and/ or enhancing productivity in any major agricultural, horticultural or animal/fish product, ICAR has instituted a Challenge Award

3) Sardar Patel Outstanding ICAR Institution Award

In order to recognize outstanding performance by the ICAR institutes, DUs of ICAR, CAU and State Agricultural Universities,

4) Chaudhary Devi Lal Outstanding All India Coordinated Research Project Award

In order to recognize outstanding performance of the AICRP and its cooperating centers and to provide incentive for outstanding performance in terms of linkages and research output and its impact given to the selected AICRP. All the All India Coordinated Research Projects, which have been in operation for at least 10 years can apply for the award.

5) Jawaharlal Nehru Award for P.G. Outstanding Doctoral Thesis Research in Agricultural and Allied Sciences

In order to promote high quality doctoral thesis research in priority/frontier areas of agriculture and allied sciences

6) Panjabrao Deshmukh Outstanding Woman Scientist Award

All women scientists engaged in research in agricultural and allied subjects /extension in a recognized institutions are eligible for this award.

7) Vasantrao Naik Award for Outstanding Research Application in Dry Land Farming Systems (IBPS-AFO-EXAM-2016)

In order to promote outstanding research and application in priority aspects of dry land farming systems & water conservation,

8) Jagjivan Ram Abhinav Kisan Puruskar /Jagjivan Ram Innovative Farmer Award (National/Zonal)

In order to recognize the outstanding contributions of innovative farmers for initiatives in development adoption, modification and dissemination of improved technology and practices for increased income with sustainability

9) N.G. Ranga Farmer Award for Diversified Agriculture

In order to recognize outstanding contribution of innovative farmers for diversified agriculture,

10) Chaudhary Charan Singh Award for Excellence in Journalism in Agricultural Research and Development

The contribution made by the journalists would be judged on the basis of the articles/success stories published in Hindi/English/ Regional languages News papers / Magazines /Journals / electronic media in India during the preceding three years.

11) Fakhruddin Ali Ahmed Award for Outstanding Research in Tribal Farming Systems

the biological resources and livelihoods or in original work directly applicable to tribal farming system

12)Bharat Ratna Dr C. Subramaniam Award for Outstanding Teachers

In order to provide recognition to outstanding teachers and to promote quality teaching in the field of Agriculture, four outstanding teacher awards are given annually

13) Best Krishi Vigyan Kendra Awards(National & Zonal)

These awards recognize for outstanding performance by Krishi Vigyan Kendra at national level & zonal level and provide incentives for outstanding KVK performance, promote a sense of institutional pride in KVK for developing models of extension education and technology application

14) Dr Rajendra Prasad Puruskar for technical books in Hindi in Agricultural and Allied Sciences

These awards recognize to authors of original Hindi Technical books in agriculture and allied sciences & incentivize Indian writers to write original standard works in agricultural and allied sciences in Hindi

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15) Lal Bahadur Shastri Outstanding Young Scientist Award

In order to recognize the talented young scientists who have shown extraordinary originality and dedication in their research programmes, four individual awards are to be given annually

16) Rafi Ahmed Kidwai Award for Outstanding Research in Agricultural Sciences

In order to recognize outstanding research in agricultural and allied sciences & provide incentives for excellence in agricultural research, this award is to be given to agricultural scientists for outstanding contribution in specified areas

17) Swami Sahajanand Saraswati Outstanding Extension Scientist Award

The award is exclusively meant for individual extension scientist/teacher for excellence in agricultural extension methodology and education work.

18) NASI-ICAR Award For Innovation and Research on Farm Implements

In order to reduce drudgery of farm women by development of farm implements and to encourage researchers and innovators to develop farm implements for farm women, ICAR and NASI have instituted the **NASI-ICAR Award For Innovation and Research on Farm Implements - 2015.**

19) ICAR Award for Outstanding Interdisciplinary Team Research in Agricultural and Allied Sciences

To recognize encourage and promote the understanding that practical and useful research would normally have to be interdisciplinary approach. It is exclusively meant for interdisciplinary team of scientists jointly planning and implementing integrated programme/project.

20) Haldhar Award

In order to recognize outstanding contribution of organic farmers ICAR has instituted an awardtitled **Haldhar Organic Farmer Award 2015.**

21) Administrative Awards

Cash Award Scheme for Administrative/TechnicaI/Supporting category employees of ICAR Research Institutes/NRCs/Bureaus/ZCUs has been instituted by the ICAR in order to recognize the excellence in performance.

The Indian Council of Agricultural Research (ICAR) is an autonomous organisation under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare , Government of India. Formerly known as Imperial Council of Agricultural Research, it was **established on 16 July 1929** as a registered society under the Societies Registration Act, 1860 in pursuance of the report of the Royal Commission on Agriculture. The ICAR has its headquarters at New Delhi.

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The Council is the apex body for co-ordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the entire country. With 101 ICAR institutes and **71 agricultural universities** spread across the country this is one of the largest national agricultural systems in the world.

The ICAR has played a pioneering role in ushering Green Revolution and subsequent developments in agriculture in India through its research and technology development that has **enabled the country to increase the production of foodgrains by 5 times**, **horticultural crops by 9.5 times**, **fish by 12.5 times** , **milk 7.8 times** and **eggs 39 times** since 1951 to 2014, thus making a visible impact on the national food and nutritional security. It has played a major role in promoting excellence in higher education in agriculture. It is engaged in cutting edge areas of science and technology development and its scientists are internationally acknowledged in their fields.

Total KVKs - 645

ANIMAL HUSBANDRY

- Surathi buffalo breed is a native of Gujrat
- Toda is a breed of buffalo
- Dual purpose breed of cow is Tharparkar
- Dual purpose breed of goat is Jamnapari
- Dual purpose breed of sheep is Mandya
- Ongole is a breed of cow
- Average PH of normal milk is 6.6
- Tallest breed of sheep in India – Nellore

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