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AGRICULTURE FIELD OFFICER (AFO)

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PREFACE

Dear Learner,

We Congratulate you on your decision to Join IBT and start training with us.

This book of Agriculture Field Officer (AFO) focuses on the preparation of Agriculture Field Officer as an important module for all examinations. Some of the special features of this book are :-

This book will takes you to the journey of learning Agriculture as per competitive examination.

This book also contains the questions asked in different examination.

This Book is an outcome of the ongoing research & development activities of the experienced & dedicated members of R & D team.

We have taken every possible action to remove the errors either of principles or of printing. All suggestions to make the book more useful is cordially invited and will thankfully acknowledged. Please send us your suggestions at rnd@ibtindia.com.

With Best Wishes,

R & D Team - **IBT**
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Agronomy and Plant Nutrients

IMPORTANT TERMS RELATED TO AGRICULTURE

Augment Crops – Such crops are grown to supplement the yield of the main crops e.g. Japanese mustard with berseem.

Avenue Crops – Such crops are grown along farm roads and fences e.g. Pigeon pea, Glycicidia sisal etc.

Border/Guard Crops – Such crops protect another crops from trespassing of animals or restrict the speed of wind and are mainly grown as border e.g. safflower (thorny oilseed crop) is planted around the field of gram.

Cash Crops – A crop, such as tobacco, grown for direct sale rather than for livestock feed or a crop grown by a farmer primarily for sale to others rather than for his or her own use e.g. sugarcane, cotton, jute, tobacco etc.

Catch/Contingent Crops – Such crops are cultivated to catch the forthcoming season when main crop is failed e.g. Linseed, tona, urd, moong, cowpea etc.

Fouling Crops – Such crops whose culture practices allow the infestation of weeds intensively e.g. direct seeded upland rice.

Ley Crops – Any crop or combination of crops is grown for grazing or harvesting for immediate or future feeding to livestock e.g. Berseem + Mustard.

Nurse Crops – A crop of trees (nurse trees), shrubs or other plants introduced to foster or nourishment of another crops by i.e. shading it, protecting it from frost, insolation or wind. The widest use of nurse crops is in the establishment of leguminaceous plants such as alfalfa, clover e.g. Sunhemp in sugarcane, Jowar in cowpea, Rai in pea.

Restorative Crops – Restorative crops are crops that help in maintaining the fertility of the soil, for e.g. pulses and legumes.

Silage Crops – Such crops like corn, legumes, and grasses that have been harvested at early maturity, finely chopped, packed tightly to exclude air, and stored in tower silos, pits, or trenches for proper fermentation which is used as animal feed during lean period or off season e.g. Maize, cowpea, Jowar etc.

Stimulate Crops : Stimulate crops stimulate the human body e.g. tobacco, opium etc.

Trap Crops – Trap crops are grown to protect the main cash crop from a certain pest or several pests. These crops are planted in completely surrounding the main cash crop and prevent pest attack from all sides of the field through attracting the pest e.g. cotton red bug trapped by Ladyfinger around cotton.

CLIMATIC REQUIREMENTS OF FIELD CROPS

1. Rice :

- (a) Rice needs *hot and humid climate*.
- (b) Minimum temperature for germination, flowering and grain formation is 10, 23 and 20-21°C, respectively.
- (c) Optimum temperature for growth, flowering and grain formation is 21-36, 25-29 and 20-25, respectively.
- (d) Maximum temperature for which rice crop tolerate is 40°C.
- (e) Requirement of rainfall throughout growth period is 100-150 cm.
- (f) Rice is a *short day plant*.

2. Wheat:

- (a) Wheat needs *cold and dry climate*.
- (b) Optimum temperature for growth and grain formation is 20-25 and 14-16°C, respectively.
- (c) Water required for proper growth is 60-90 cm.
- (d) Wheat is a long day plant.

3. Maize :

- (a) Maize grows from sea level to 3000 metre altitude.
- (b) Minimum temperature for germination is 6-7°C.
- (c) Most suitable temperature for germination and growth is 21-23 and 30-32°C, respectively.
- (d) Maize crop requires 50-80 cm rainfall for proper growth.
- (e) Maize is a *day neutral plant*.

4. Sorghum :

- (a) Sorghum is a *short day plant*.
- (b) Minimum temperature for germination is 7-8°C.
- (c) Suitable temperature for optimum crop growth is 27-32°C.
- (d) Requirement of rainfall throughout growth period is 40-60 cm.
- (e) It can *tolerate drought conditions as well as water logging condition*.

5. Pearl Millet/Bajra :

- (a) Bajra is a *warm weather crop*.
- (b) Best suited temperature for crop growth is between 27-30°C.
- (c) Requirement of rainfall throughout growth period is 25-35 cm.
- (d) It can *tolerate hot temperature*.
- (e) Bajra is a *short day plant*.

6. Barley:

- (a) Barley needs *cold weather* during early crop growth period and warm and dry weather at maturity.
- (b) Water requirement for good crop growth is 35-50 cm.
- (c) Barley is a *long day plant*.

7. Gram :

- (a) Gram is a winter season crop.
- (b) It is a *long day plant*.
- (c) Minimum temperature for germination is 6-8°C.
- (d) Suitable temperature for optimum crop growth is 20-25°C.
- (e) Requirement of water throughout growth period is 35-45 cm.
- (f) Severe cold and frost at the time of flowering causes detrimental effect to gram seed development.

8. Field Pea :

- (a) Field pea requires cool growing season.
- (b) Minimum temperature for germination is 4-6°C.
- (c) Optimum temperature for its growth is 13-18°C.
- (d) Water requirement for proper growth is 40-60 cm.
- (e) Field pea is a *short day plant*.
- (f) Frost can damage the plant during flowering period.
- (g) High humidity is harmful to pea crop due to incidence of disease.

9. Pigeon pea :

- (a) Pigeon pea grows well under warm tropical and subtropical climate.
- (b) During vegetative growth, crop prefers a fairly moist and warm climate.
- (c) During flowering and ripening stage, it requires bright sunny weather for proper fruit setting.
- (d) It is highly susceptible to frost at the time of flowering.

10. Green Gram :

- (a) Green gram requires *hot climate*.
- (b) It requires an average annual rainfall of 60-80 cm.
- (c) Best suited temperature for crop growth is between 25-32°C.
- (d) It can *tolerate drought* to a great extent.
- (e) It is *day neutral plant*.
- (f) It is considered to be *the hardiest pulse among all pulse crops*.

11. Black Gram :

- (a) Black gram requires a *hot and humid growing season*.
- (b) Black gram can be grown successfully from sea level up to an elevation of 2000 metre altitude.
- (c) Water requirement for proper growth is 40-60 cm.
- (d) Heavy rains during flowering stage are harmful to yield of pea crop.

12. Soybean :

- (a) Soybean grows well in *warm and moist climate*.
- (b) Optimum temperature for growth of most of the varieties is 26-32°C.
- (c) Water requirement for proper growth is 60-75 cm.
- (d) Soybean is a *short day plant*.

13. Groundnut :

- (a) Groundnut is wide spectrum adaptable crop which grown in all 3 seasons.
- (b) It requires tropical climate.
- (c) It requires an average annual rainfall of 50-100 cm.
- (d) Best suited temperature for crop growth is between 25-35°C.
- (e) Flowering and seed setting affected by cloudy weather.
- (f) It is a *day neutral plant*.
- (g) It resists drought and tolerate flooding for one week once it establish.

14. Rapeseed and Mustard :

- (a) Cool temperature, clear dry weather with bright sunshine accompanied with adequate soil moisture increases the oil percentage of crop.
- (b) Water requirement for proper growth is 35-45 cm.
- (c) The crop can not tolerate drought as well as water logging condition.

15. Sunflower :

- (a) Sunflower is also a wide spectrum adaptable crop, grown in all 3 seasons.
- (b) It requires subtropical climate.
- (c) The requirement of annual rainfall varies from 30-150 cm.
- (d) Best suited temperature for crop growth is between 20-25°C.
- (e) During vegetative phase, crop requires cold temperature.
- (f) Higher temperature (> 38°C) during reproductive stage reduce the oil content.
- (g) It is a *day neutral plant*.

16. Cotton :

- (a) Cotton is a *warm season crop*.
- (b) It requires an average annual temperature and rainfall of over 18°C and 50-70 cm, respectively.
- (c) A daily mean temperature of 16°C for seed germination, 21-27°C for proper vegetative growth and 27-32°C for fruiting phase.
- (d) Abundant sunshine during boll maturation and harvesting is essential to obtain a good quality crop produce.
- (e) Heavy showers of rain or heavy irrigation during fruiting period causes shedding of flowers and young bolls.

17. Sugarcane :

- (a) Sugarcane is a *tropical plant*.
- (b) It requires an average annual rainfall of 250-300 cm.
- (c) Optimum temperature for crop growth is between 32-35°C.
- (d) Besides temperature and rainfall, light (day length) plays a very important role in proper growth and development *i.e.* tillering of cane.
- (e) Short day length decreases number of tillers plant⁻¹.
- (f) Under long day length conditions, plant produces more dry matter.

18. Potato

- (a) Potato is a temperate and *cool climate crop*.
- (b) Optimum temperature for germination and vegetative growth is 25 and 17°C, respectively.
- (c) For tuberization, it requires 17-20°C temperature.
- (d) Tuberization stopped, when temperature exceeds 30°C.
- (e) Cloudy weather, rainy days and high humidity is unfavourable for potato crop.

OIL PERCENTAGE OF OILSEED CROPS

Crop	Oil(per cent)
Coconut	55-60 per cent
Sesamum	46-52 per cent
Groundnut, Sunflower	44-50 (45 per cent)
Niger	35-45 per cent
Castor	35-40 per cent
Rapseed & mustard	33-34 per cent
Safflower	24-36 per cent
Soybean	18-20 per cent

MUTANT VARIETIES OF CROPS

Crop	Mutant Varieties
Rice	Jagannath, Prabhavati
Chickpea	BGM-48, BGM-413
Pea	Hans
Arhar	Trombay, Vishakha-1
Wheat	Sarbati Sanora
Cotton	MCU-7, MCU-10
Tobacco	Jayshri, Bhavya
Moong	Dhulli, Pant Mung 2, MUM 2
Urd	CO1, Sarla
Mango	Rosica
Tumeric	BSR-1

TOXIC SUBSTANCES FOUND IN DIFFERENT FODDER AND FOOD CROPS

Crops/Plants	Toxic Substance
Sorghum	HCN/Dhurin/Prussic acid
Alfalfa/ Lucerne, Berseem	Saponines
Pearlmillet, Napier grass	Oxalic acid
Sweet clover (<i>Melilotus</i> sp.)	Coumarins
<i>Leucaena leucocephala</i> (Subabul)	Mimosine
Lathyrus/Khesari	Lathogen/Neurotoxin(BOAA)

