Model Answer Paper

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE

SEMESTER END EXAMINATION

B.Sc. (Hons.) (Agri)

Semester: VI (New)		**Academic year: 2020-21**
Course No.: GPB- 366		**Course Title:- Crop Improvement-II (Rabi Crops)**
Credits : 2 (1+1)		
Day & Date:-14/6/2021		**Time:---** **Total Marks:-40**
Note:-	**1. Solve ANY FOUR questions from SECTION 'A'**	
	2. Solve any SIX questions from SECTION 'B'	
	3. All questions from SECTION 'C' are compulsory	
	4. Send the PDF of answer sheet to the e mailof respective course teacher	

SECTION A

(Write the answer in 4-5 sentences only. Each question carries 4 marks)

Q1. What are the major rabi Cereal crops and enlist the breeding objectives of Wheat crop.

Major rabi cereal crops are

1. Wheat – *Triticum aestivum*
2. Common oat - *Avena sativa*
3. Barley- *Hordeum vulgare*

Breeding objectives in Wheat crop

1. High yield
   High yield depends on
   a) The number of heads / unit area
   b) The number of grains / head.
   c) The average weight of grain
2. Breeding non- lodging varieties:
3. Breeding for disease resistance
4. Breeding for insect resistance
5. Breeding for quality.

Q2. What is Plant Genetic Resources? Enlist the kinds of germplasm.

The sum total of genes in a crop species is referred to as genetic resources.

Or Gene pool refers to a whole library of different alleles of a species. **Or** Germplasm may be defined as the sum total of hereditary material i.e., all the alleles of various genes present in a crop species and its wild relatives.

Kinds of Germplasm

1. Land races
2. Obsolete Cultivars
3. Modern cultivars
4. Advanced breeding lines
5. Wild forms of cultivated species
6. Wild Relatives
7. Mutants

Q3. Enlist the major breeding objectives and breeding methods used in chickpea.

Breeding Objectives: **2**

1. Increased seed yield
2. Increased biomass, tall, erect and compact cultivars
3. Resistance to diseases like *A, blight, Fusarium wilt* , Root rot, Botrytis grey mold.
4. Resistance to insect pests – Pod borer

5. Tolerance to stress environments
a) Cold b) Heat c) Drought d) Saline and Alkaline.

Breeding procedures: **2**

1. Pedigree method: for resistance breeding (disease, insect, nematode, orobanche spp)
2. Modified bulk method : for stress situations (drought, cold, heat, iron deficiency)
3. Back cross method: for interspecific hybridization. Limited backcross (one or two) for desi x kabuli introgression and also for resistance breeding. Resistance to fusarion wild can be easily transferred from desi to kabuli type.
4. Somaclonal variation: through plant tissue culture appears to be a potential tool for generation and exploitation of useful variability.
5. Mutation Breeding.

Q4. Write short note on

a) Enlist the major breeding objectives for fodder crop improvement. **2**

Major breeding objectives

(i) High dry matter yield
(ii) Better quality components– crude protein content, in-vitro dry-matter digestibility, low percentage of neutral detergent fibre and toxicity,
(iii) High response to inputs,
(iv) Tolerance to adverse soils- acidic/saline soils, tolerance to extreme weather conditions – high rainfall/ low moisture regime,
(v) Resistance to diseases and insect-pests,
(vi) Greater aggressiveness/ fast growth and competing ability or complementation with the companion crop,

b) Enlist the feature of wheat ideotype **2**

Ideotype of wheat is having following main features:
1. A short strong stem. It imparts lodging resistance and reduces the losses due to lodging.
2. Erect leaves. Such leaves provide better arrangement for proper light distribution resulting in high photosynthesis or CO2 fixation.
3. Few small leaves. Leaves are the important sites of photosynthesis, respiration and transpiration. Few and small leaves reduce water loss due to transpiration.
4. Larger ear. It will produce more grains per ear.
5. An erect ear. It will get light from all sides resulting in proper grain development.
6. Presence of awns. Awns contribute towards photosynthesis.
7. A single culm.

Q5. Enlist the various steps involved in hybrid seed production technology in sunflower crop using male sterility system.

In Sunflower hybrid seed is produced by using cytoplasmic genetic male sterile system. The source of cytoplasm used is Helianthus peteolaris.

Hybrid seed Production (AxR):

1. **Land requirement**
2. **Isolation requirement**: 600 meters for maintenance of A line and 400 meters for hybrid seed production or AxR.
3. **Planting ratio**: The proportion of female (A-line) and male line (B or R-line) should be 3:1
4. **Following the recommended cultural Practices**
5. **Roughing**: Rouging should be done in both male and female parental line to remove the volunteer plants and offtypes from both male and female parental line.
6. **Number of Field Inspections** : A minimum of four field inspections should be conducted.
7. **Supplementary Pollination :**

a. Hand pollination

b. Bee Hives: Bee hives may be kept at 200 feet distance at 3-4 places in the field to increase bee activity.

8. Harvesting and threshing : Harvest the male parent first and remove them from the field to avoid mechanical mixtures. Then harvest the female rows.

9. Seed Yield: Depending on the inbred line and the management practices adopted seed yield may be in the range of 4-5 q/ha.

SECTION B

(Write the answer in one sentence only. Each question carries 2 marks)

Q.6 Do as directed (Two mark each)

a. Write botanical names of i) Linseed – ***Linum usitatissum*** L

ii) Guava - ***Psidium guajava***

b. Write down centre of origin of i) Potato:- **Andean mountains of Peru and Bolivia**

ii) Mango :- **Tropical Himalayas**

c. Name of the species from which GMS/CMS source is transferred

i) Sunflower:- ***Helianthus petiolaris***

ii) Wheat - ***Triticum timophevi***

d. Write the species involved in nobalization of cane : ***S.officinarum, S. barberi & S. spontaneum***

e. Which fatty acid present in Mustard seed oil in high proportion: **Euricic acid**

f. **Define Adaptation :** It is the capacity of genotypes to adjust themselves in a specific or particular environmental condition, so as to reach a certain level of phenotypic expression.

g. Define Crop Ideotype: According to Donald, a crop ideotype is a plant model, which is expected to yield a greater quantity or quality of grain, oil or other useful product when developed as a cultivar.

SECTION C

(Choose the correct option. Each question carries 1 mark)

Q.7 Choose the correct option

1) Which fatty acid is present in higher proportion in linseed

a) Oleic acid **b) Linolenic acid**

c) Behenic acid d) Palmetic acid

2) Ideal Female : male ratio in sunflower hybrid seed production is

a) 1 : 1 b) 2 : 1

c) 3: 1 d) 4: 1

3) The term ideotype was coined by Donald in 1968 working with which crop.

a) Chickpea b) **Wheat**

c) Sunflower d) Potato

4) Removal of off types/volunteer plants from seed production plots is known as

a) Inspection **b) Rouging**

c) Isolation d) None of the above

5) Which is the factor of micro environment of a plant

a) Solar radiations
b) Disease and pest incidence
c) Soil factors
d) **All of the above**

6) As per the Eberher and Russel model a genotype is considered as stable when

a) Regression co-efficient of unity (b=1)
b) S2di = 0
c) High mean performance
d) All of the above

7) Unilateral/Bilateral sexual polyploidization is the breeding method used in which crop

a) Potato
b) Chickpea
c) Wheat
d) Linseed

8) Pustovit method of crop breeding is used in which crop.

a) Sugarcane
b) Wheat
c) Potato
d) Sunflower

9) Barseem, a fodder crop belongs to which family

a) Fabaceae
b) Malvaceae
c) Poaceae
d) Compositeae

10) Inflorescence of sugarcane crop is known as

a) Panicle
b) **Arrow**
c) Spike
d) None of the above

11) Chromosome number of safflower is

a) 2n = 12
b) 2n = 24
c) 2n = 36
d) 2n = 48

12) *Triticum aestivum* L. speies of wheat is

a) Diploid
b) Trtraploid
c) **Hexaploid**
d) None of the above

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