Q 1. What do you mean by plant breeding, give its scope and importance of plant breeding and give its objective ?

Ans ⇒ **Defination of plant breeding ⇒**

" plant breeding may be defined as the art, science and technology of improving genetic make up of crop plant in relation to their economic use for mankind "

Scope of plant breeding ⇒

① There is ample scope for genetic improvement of pulses and oilseed crops
② In India, considerable area is under rainfed cultivation, Hence, there is need to develop crop cultivars resistant to drought condition.
③ In view of global warming, there is need to develop crop cultivars suitable for climate change.
④ The labour has become very expensive. Hence there is need in many crop to develop varieties suitable for machine harvesting.
⑤ The problem of metal toxicity is increasing in many area particularly adjacent to industries. Hence, there is need to develop crop cultivars tolerant to metal toxicity.

objective of plant breeding ⇒

In plant breeding, there are two type of objective viz. general objective and crop specific

objective. A brief account of some general objec plant breeding is presented below :-

(i) Higher yield :- The main objective of a plant breeder is to improve the yield of economic produce which differs from crop to crop. Improvement yield can be achieved either by evolving high yielding varieties or hybrids.

(ii) Improvement in Quality :- The price of produce is determined by its quality. Ago quality differs from crop to crop. It refers t cooking quality to rice, baking quality in whea malting quality in barley, fibre length, streng and fineness in cotton, nutritive & keeping quality in fruits and vegetable. protein conten in pulses, oil content in oil-seed and sugar content in sugarcane and sugar beet etc.

(iii) Resistance to Biotic Stress :- Biotic Stress refers t Stress causes by biotic factor such as insects, diseases and parasite weeds. In crop plant considerable yield losses are caused by insect and diseases. Genetic resistance is the cheapest and the best method of minimizing such losses Resistant varieties are developed through the use of resistant donor parent available in the gene pool.

(iv) Resistance to Abiotic Stress :- crop plant also suff from abiotic factors such as drought, soil salinity, heat, wind, cold, and frost

Breeders to develop resistance varieties for such environmental conditions.

(v) Wider Adaptability ⇒ Adaptability is an important objective in plant breeding because it helps in stabilizing the crop production over regions and season. Adaptability refers to suitability of a variety for general cultivation over a wide range of enviromental conditions.

(vi) Early Maturity ⇒ Early maturity is a desirable character which has several advantages. It require less crop management period, less insecticidal sprays, permits double cropping system and reduces over production cost. This earliness is an important objective in plant breeding programmes.

(vii) Insensitivity to Temperature and Light ⇒ Development of varieties insensitive to light and temperature helps in crossing the cultivation boundaries of crop plant. In maize, rice and potato now varieties are available which can be grown during summer as well as winter season. Evolution of photo and thermoinsensitive varieties permit their cultivation in new areas outside the boundaries of cultivation of a crop specie.

(viii) Synchronous Maturity ⇒ It refers to maturity of a crop species at one time. This character is highly desirable in crops like greengram, cowpea, and cotton where several picking are required for crop harvest.

(ix) Desirable Agronomic characters ⇒ It includes plant height, branching, tillering capacity growth habit etc. Usefulness of these traits also differ from crop to crop.

(x) Development of Toxin free varieties ⇒ It is essent to develop varieties free from toxic compound in some crops to make them safe f human consumption.

(xi) crop specific objective ⇒ In some crop such as greengram, blackgram and pea Seeds germinate in the standing crop before harvesting if rain are received. A period of dorm has to be introduced in these crop to check los due to germination.

Que 2) What do you mean by male sterility? Enlist different types of male sterility describe all type of male sterility.

Ans ⇒

Definition of male sterility ⇒

Male sterility can be defined as a condition in which pollen is either absent or nonfunctional in flowering plants.

Different types of male sterility ⇒

There are three type of male sterility ⇒

(a) genetic male sterility.
(b) cytoplasmic male sterility.
(c) cytoplasmic genetic male sterility.

(a) Genetic male sterility ⇒ The pollen sterility whic is caused by nuclear gene is termed as gen or genetic male sterility. This type of sterility has been reported in several crop plant like barley, whe maize, cotton, sorghum, lucerne, tomato, sugarbeet

main feature of genetic male sterility are given below ⇒

(i) Main sterility genes are usually recessive and rarely dominant.

(ii) In majority of cases, sterility is caused by single gene. However, in few cases two or more gene control male sterility.

(iii) This system consists of two types of lines viz., A line and B line. A line refer to genetic male sterile line (mm) which is used as female parent in hybrid seed production. B line is heterozygous fertile (Mm) line which is similar to A line except for sterility B line is used to maintain (sterile line (A). Thus A and B line are isogenic lines with a difference of fertility locus.

(iv) The genetic male sterile line is maintained by crossing recessive male sterile plant (mm) with heterozygous male fertile plant (Mm), such cross will yield 50% sterile plant and 50% fertile plants.

Merits ⇒ (1) GMS can be used for the production of hybrid seed in both seed propagated crops & vegetatively propogated species.

(2) Genetic male sterility generally does not have undesirable agronomic characters.

(3) It require less area and labour, because the breeder has to maintain only A and B line.

Demerits ⇒ There are three main disadvantage of genetic male sterility. (1) It is less stable.

(2) GMS can sometime become fertile particularly low temperature.

(2) 50% plants are fertile which have to be removed every year in hybrid seed product^{n}. This increase cast of hybrid seed.

(3) Identification of male sterile and fertile plant is po only after anibesis.

(b) Cytoplasmic Male Sterillity ⇒ The pollen sterility which is controlled by cytoplasmic gene or plasmagene is known as cytoplasmic male sterility. It has been reported in onion, sugarbeet, sorghum. The main features of cytoplasmic mal sterility are given below -

(1) plant carrying particular type of cytoplasm are male sterile but will produce seed if pollinators are present.

(2) This system consist of A line and B line. A is male sterile and B is male fertile.

(3) The cytoplasmic male sterile line is maintained by crossing of A line with B line.

(4) cytoplasmic male sterility cannot be utilized for hybrid seed production without the use of restorer li because F_1 seed produce only male sterile F_1 plant

(5) CMS is not influenced by environmental factor suc as low or high temperature.

Merit ⇒ The CMS is that it is stable one & is not effected by environmental factor.

Demerit ⇒ The CMS can not be used for the productio of hybrid in those crop where seed or grain the economic product.

(c) cytoplasmic Genetic male sterility ⇒ When pollen sterility is contro by both cytoplasmic and nuclear genes, it is know as cytoplasmic genetic male sterility. This type of male sterility was first discovered by Joaes and Davis in 1994 in onion.

The main features of cytoplasmic, genetic male sterility are given below -

(i) The male sterility is controlled by the interaction of cytoplasm and nuclear genes.

(ii) This system includes A, B, and R lines. A is male sterile line, B is similar to A, in all feature but is male fertile and R restores the fertility in the F_1 hybrid and hence is called restorer line since B line is used to maintain the fertility, It is also referred to as maintainer line.

(iii) cytoplasmic male sterile line can be maintained by crossing the male sterile cytoplasmic line with male fertile cytoplasmic line.

(iv) There is type of male sterility can be used for the production of hybrid in both vegetatively propagated as well as seed propogated crop because in F_1 hybrid fertility by the restore line.

Merits :- (1) cytoplasmic genetic male sterility is widely used for hybrid seed production in both seed propogated species and vegetatively propogated species.

(2) CGMS is highly is highly stable and reliable.

(3) It is not affected by environmental factor

Demerits :-

(1) It require more area and labour

(2) The main disadvantage of this system is that the breeder has to maintain three types of line viz. A, B and R.

Qu 8) What do you mean by self incompability give the classification different type of self incompability explain any one in detail.

Ans→

Defination of self incompability ⇒

Self incompatibility is an important mechanism which prevent autogamy and promote allo Incompatibility refers to the inability of a plant with functional pollen to set seed when self pollina

Types of self Incompatibility ⇒

(1) gametophytic self incompati
(2) Saprophytic self incompatibi

(1) Gametophytic System / self incompatibity ⇒

The self incompatibility which is controlle by the genetic constitution of gametes, it is known a gametophytic self incompatibility.

The main feature of this system are presented below ⇒

(1) Self incompatibility In-majority of species is governed by a single gene S_1 which has large numbe of multiple alleles. However, in rye self incompatibili reaction is governed by two loci.

(2) In this system alleles have individual action i the style without interaction.

(3) pollen grain are unable to germinate or funct on a pistil having similar allele as that of pollen The pollen tube growth is usually inhibited in the style or ovary.

(4) This system give rise to three type of pollination viz, (1) fully incompatible ($S_1S_2 \times S_1S_2$) in which both all

are common in the pollen and ovule. (ii) half the pollen is compatible ($S_1S_2 \times S_1S_3$) in which one allele is different and (iii) fully fertile ($S_1S_2 \times S_3S_4$) when both alleles differ in pollen and ovule.)

(5) Gametophytic system permit recovery of male parent only in the partially fertile crosses which are obtained when one allele deffer in the cross viz. $S_1S_2 \times S_1S_3$. This cross would give rise to S_1S_3 and S_2S_3 progeny.)

(6) plant species belonging to gametophytic self incompatibility system have binucleate pollen.

(7) All gametophytic system operate with well stigma surface and there is no direct interaction between one pollen grain and one surface cell because germination take place in a common fluid medium.

(8) The biochemical substance which is associated with the incompatibility response of the pollen develop very late i.e during pollen formation in gametophytic system.

(9) With few expectation, gametophytic system is polyallelic, homomorphic and often involve a stylar reaction for species with binucleate pollen grain.

Qu 4) Enlist different method used in self and cross pollinated crop

Ans → Method of breeding used in self pollinated crop :

(i) Introduction
(ii) pure line selection
(iii) mass selection
(iv) pedigree method
(v) Backcross method
(vi) bulk method
(vii) Single seed descent method.

Method of breeding used in cross pollinated crop :

(1) Mass selection
(2) progeny selection.

Qu 5) Define the Heterosis, give the various Hypothesis of Heterosis and explain the different method of Heterosis estimation

Ans →

Defination : "Heterosis refers to the superiority of fi hybrid in one or more characte over its parents".

various Hypothesis of Heterosis :

(1) Dominance Hypothesis
(2) overdominante Hypothesis
(3) epistasis

(1) Dominance Hypothesis :

This theory was proposed by Davenport (1908), Bruce (1910) and Keeble and Pelmin (1910). This is the most widely accepted explanation of heterosis. According to this Hypothesis Heterosis is the result of the superiority of dominant allele when arressive allele are deleterious. Here the deleterious recessive gene of one parent are hidden by the dominant gene of another parent and the hybrid exhibits heterosis. Both the parents differ for dominant gene suppose genetic constitution of one parent is AABBccdd and that of another as aabbCCDD. A hybrid between these two parent will have four dominant gene each. Thus heterosis is directly proportional to the number of dominant gene contributed by each parent.

AABBccdd x aabbCCDD ⟶ AaBbCcDd
Parent 1 with 2 dominant gene | Parent 2 with 2 dominant gene | Hybrid with 4 dominant gene

(2) overdominance Hypothesis :

This theory was independently proposed by Shull and East in 1908 and supported by East (1936) and Hull (1945). This theory called by various name such as Stimulation of heterozygous, cumulative action of divergent alleles, Single gene heterosis, Superdominance and overdominance. Though this theory was proposed by Shull and East in 1908.

According to this hypothesis, heterosis is the result of superiority heterozygote over its both homozygous parent. Thus heterozygosis is

directly proportional to the heterozygosis. The superiority of heterozygote over both homoz may arise either due to (i) production of super hybrid substance in heterozygote which is comp different from either of the homozygous produ (ii) greater buffering capacity in the heterozygo resulting from cumulative action of divergent al or stimulation of divergent allele.

(3) Epistasis ⇒

Epistasis refers to interaction between allele of two or more different loci. It is also known as non-allelic interaction. The non-allelic interaction is of three type viz. additive x additive, dominance x dominance and additive dominance. Epistasis, particularly that involve dominance effect (dominace x dominace) may contribute to heterosis.

Estimation of Heterosis ⇒

Heterosis is estimated in three different wa (i) over mid parent (ii) over better parent and (iii) over commercial hybrid. Thus on th basis of estimation heterosis is of three type as given below ⇒

(i) Average heterosis is estimated with the help of following formula -

Average heterosis = $[(F_1 - MP)/MP] \times 100$

where F_1 is the mean value of f_1 and MP is the mean value of two parent involved in the cross.

(ii) Heterobeltiosis is worked out as follows ⇒

Heterobeltiosis = $[(F_1 - BP)/BP] \times 100$

where Bp is the mean value of the better parent of the particular cross.

(iii) Useful Heterosis is estimated as follow ⇒

Useful heterosis = $[(F_1 - CC)/CC] \times 100$

where CC is the mean value over replication of the local commercial cultivar.

(iii) ⇒ give the difference Between.

(i) Mass selection and pureline selection

Mass selection		Pureline selection	
1.	Used both in self and cross pollinated crop	1.	practiced in self pollinated crop only
2.	Large number of plants are selected	2.	comparatively less number of plant are selected.
3.	The produce of the selected plant is mixed and sown as such in next year	3.	produce of individual plant is kept separate and progeny row are raised next year.
4.	No control of pollination	4.	pollination is controlled
5.	variety develop is heterozygous and not uniform	5.	variety is homozygous homogenous and uniform.

6.	Due to heterozygosity the variety deteriorate quickly.	6. Due to homozygosity the variety lasts long.
7.	The method has to be repeated once in 2-3 years to purify the variety	7. No need to repeat
8.	wider adaptability due to heterozygosity	8. Narrow adaptability due to homozygosity
9.	No knowledge of science is required It is more on art.	9. knowledge of science and genetic is required.
10.	Selection within a variety is effective	10. Selection within a pureline variety is not effective
11.	The variety is relatively difficult to identify.	11. It is relatively easy to identify in seed certification programm.

(11) Difference between pedigree method and Bulk method.

	pedigree method		Bulk method.
1)	Most widely used Breeding method	1)	used only to a limited extent
2)	Individual plants are Selected in f_2 and subsequent generation and individual plant progenies are grown	2)	f_2 and subsequent generation are grown in bulk.
3)	Artificial selection :- artificial disease epidemics etc. are an integral part of the method.	3)	Mainly natural selection. In certain cases artificial selection may be essential.
4)	Natural selection does not play any role	4)	Natural selection determine the composition of pop n at the end of the bulking period.
5)	pedigree record have to be maintained which is often time consuming and laborious	5)	No pedigree record are maintained.
6)	generally its taken 12-13 years to release new variety	6)	Taken more than 15 years
7)	Require close attention of breeder from f_2 onward	7)	It is quite simple & does not require much attention

8)	planting the segregating generation are space planted to permits effective individual plant selection.	8)	The bulk population are generally planted at commercial plantings → rates
9)	population size is small in comparison to bulk.	9)	The population size is large.

(iii) Difference between Synthetic and composite varie

	Synthetic variety		composite variety.
1.	No. of inbredlines are less (6-8)	1.	No. of lines are more (even upto 20)
2.	GCA of parental line is tested	2.	GCA of parental line is not tested.
3.	performance can be predicted	3.	performance can not be predicted
4.	It is Broad based	4.	More broad based.
5.	Synthetic can be reconstituted at a later date	5.	cannot be reconstituted.
6.	Seed replacement after 4-5 year	6.	cannot be reconstituted.

4) What do you mean by Recurrent selection give its type and explain any one in details.

Defination ⇒

"Recurrent selection may be defined as reselection generation after generation with interbreeding of selects to provide for genetic recombination".

It is an important method of population improvement which is used to improve the frequency of desirable alleles for a character in a breeding population.

Types of Recurrent Selection ⇒

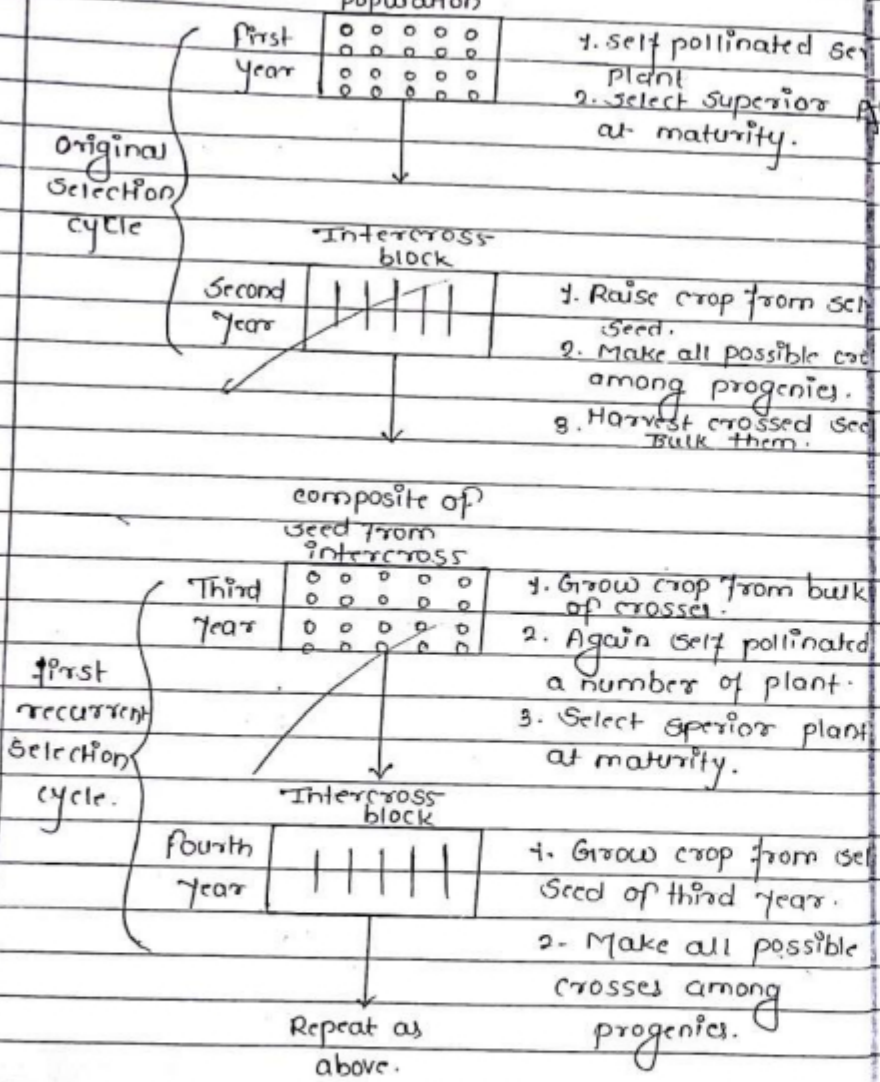
There are four types of Recurrent Selection ⇒ (a) simple recurrent selection.
(b) Recurrent selection for general combining ability.
(c) recurrent selection for specific combining ability
(d) Reciprocal recurrent selection.

(a) simple Recurrent selection ⇒

"A type of recurrent selection that does not include tester is referred to as simple recurrent selection." This method is an extension of mass selection.

Main feature of simple recurrent selection are given below ⇒

(i) The tester is not used in this scheme.
(ii) It does not measure the combining ability.
(iii) The selection is based on phenotype or simple te
(iv) This method is useful only for those characte
have high heritability.



• procedure of simple recurrent selection.

of Same genes of the Same family is known as this

What do you mean hybridization, Define wide Hybridization. give the Role of wide Hybridization in crop improvement.

Hybridization ⇒

" The mating or crossing of two plant or line of dissimilar genotype is known as hybridization."

on the basis of taxonomic relationship of the two parent hybridization is classified into two broad group (i) Intervarietal hybridization. (ii) Distant hybridization.

Defination of wide hybridization ⇒

" crossing between different species of the same genus or different genera of the same family is known as wide Hybridization"

Role of wide hybridization in crop improvement ⇒

wide or distant hybridization has played significant role in improving crop plant for (i) yield (ii) disease resistance (iii) Insect resistance quality (iv) adaptation (vi) mode of reproduction and (vii) dwarf stature earliness etc.

(i) Improvement in yield ⇒

Improvement in yield has also been achieved through the use of wide hybridization in some crop. Some examples are given below.

(a) In tobacco, yield were increase by the use of wild species Nicotia debneyi.

(b) yield of sugarcane and octaploid strawberries have been increas by the use of their

(ii) Disease resistance ⇒

wide hybridization has been instrume
in transferring disease resistance from wild
species into cultivated ones. Some examples are
given below -

① cotton = Resistance to rust and black arm
② Tobacco = Resistance to mosaic virus, w
fire, black fire, blue mould, black
③ sugarcane = Resistance to serch disease.
④ potato = Resistance to late blight, leaf r
and virus x.
⑤ wheat = Resistance to to rust and eye spo
⑥ Okra = Resistance to yellow mosaic virus
⑦ Tomato = Resistance to bacterial canker
bacterial wilt, fusarium wilt,
leaf mould.

(iii) Insect resistance ⇒

less progress has been made on i
resistance. Resistance to jassid and boll weevil
cotton, leaf chewing insect, peanut and aphid
in strawberry has been transferred from the
wild species to cultivars.

(iv) Improvement in quality ⇒

In some crops, wild species have
been used to improve the quality cultivated on
for example protein content in rice, oats and
rye.

Q. give the defination of mutation. give the different type of mutagenc. explain the procedure of mutation breeding.

ns→ Defination of mutation ⇒

"Mutation refers to sudden heritable change in the phenotype of an individual."

Type of mutagene ⇒

Mutagene are of two type ⓐ physical mutagene
ⓑ chemical mutagene.

ⓐ physical mutagene ⇒

physical mutagene include various type of radiation viz. x-rays, gamma rays, alpha particle, beta particles, fast and thermal (slow) neutrons and ultra violet rays.

ⓑ chemical mutagene ⇒

There is a long list of chemical which are used as mutagens. Detailed treatment of such chemical is beyond the scope of this discussion. The chemical mutagene can be divided into four group viz. ① alkylating agents ② base analogue ③ acridine dyne & ④ other mulagene

procedure of mutation breeding ⇒

④ 1 year ⇒

① seed treatement with selected mutagene using recommended dose and duration of treatment.

(ii) Raising M_1 generation wing wider spacing.
(iii) Recording observation on morphological var and fertility.
(iv) Selfing of du M_1 plant to avoid contamina
(v) Harvesting of each M_1 plant separately.

(2) 2nd year ⇒
(i) Raising M_2 generation from self seed obt from M_1 wing wider spacing.
(ii) Identification and selection of disease resistance mutant.
(iii) Harvesting seed of such mutant separat

(3) 3rd year ⇒
(i) Raising M_3 generation separately for each M_2 selected plant.
(ii) Evaluation of homozygosity for disease resistance.
(iii) Bulking of homozygous disease resistant M_3 progeny.

(4) 4th year ⇒
planting of M_4 disease resistant progeny in replicated trial wing check for comparison.

(5) 5-9 year ⇒
(i) Multi-location evaluation in co-ordinated trials for disease resistance.
(ii) The disease resistant line is releard as a variety.

---

10) Define polyploidy, what is Euploidy, give the type of aneuploidy and its application in crop improvement.

Defination of polyploidy -
"An organism or individual having more than two basic or monoploid sets o chromosome is called polyploid and such condition is known as polyploidy"

Euploidy ⇒
"The change in chromosomb number which involve entire set is called euploidy"
Euploidy includes (1) Monoploids (2) diploids and (3) polyploidy.

Types of Aneuploidy ⇒
(1) Hypoploidy - (a) Monosomic.
(b) Nullisomic
(2) Hyperploidy - (a) Trisomic
(b) Tetrasomic

(1) Hypoploidy - loss of one or two chromosome from diploid set.
(a) Monosomic - loss of one chromosome from one pair (2n-1) or from two different pair (2n-1-1)
(b) Nullisomic - Loss of one chromosome pair (2n-2)
(2) Hyperploidy - Addition of one chromosome to one pai or two different pair.
(a) Trisomic - Addition of one chromosome to one pai (2n+1) or two different pair (2n+1+1)

Application in crop improvement ⇒

Aneuploids are useful in crop improvement in various way. Some of the uses of aneuploidy in plant breeding are briefly presented below,

(i) Locating gene ⇒ Aneuploids are useful tools for locating gene on specific chromosome. Monosomic and nullisomic are used for the purpose. Monosomic analysis has been used in wheat, cotton, tobacco, oat and other crop for locating gene on specific chromosome. In case of nullisomic, loss of a pair of chromosome will affect expression of some characters.

(ii) Interspecific gene transfer ⇒ Monosomics are also used in transfering chromosome with desirable gene from one species to another.

(iii) Aneuploids are used for developing alien addition and alien substitution line in various crops.

Que ii) What is the synthetic variety and composite variety give the difference Between Synthetic and ~~hybrid~~ composite variety.

Ans →

Synthetic variety ⇒ "A variety which is develop by intermating in all possible combinations, a number of Inbred lines with good general combining ability and mixing the seed of crosses in equal quantity."

composite variety ⇒ "A composite variety is produced by mixing the seed of several phenotypically outstanding line in all combination among the mixed line.

The Synthetic variety for commercial cultivation was first suggested in maize. Both synthetic and composite ve cultivers are polymorphic stable.

- Difference between synthetic variety and composite variety.

Synthetic variety	composite variety
1) No. of inbred line are less	1) No. of line are more (even upto 20)
2) GCA of parental line is tested	2) GCA of parental line is not tested.
3) performance can be predicted	3) performance can not be predicted.
4) It is Broad Based	4) More broad based.
5) Synthetic can be reconstituted at a later date	5) cannot be reconstituted.
6. Seed replacement after 4-5 year	6. cannot be reconstituted

Que 10) What are different method used in self pollinate cro explain Back cross method and pedigree method.

Ans → Different method used in self pollinate crop ⇒

(i) plant introduction
(ii) pure line selection
(iii) mass selection
(iv) pedigree method
(v) backcross method
(vi) bulk method
(vii) single seed descent method.

• Back cross method ⇒ Backcross refers to crossin of F_1 with either of its paren

A system of breeding in which repeated backcros are made to transfer a specific character to a u adapted variety for which the variety is deficient referred to as backcross breeding. The main feat of backcross method of breeding are briefly pres below ⇒

(i) Application - The backcross method is generally u to improve specific character of a well adap variety for which it is deficient such as resistant a specific disease.

(ii) parental material - Backcross method involve two t of parent viz. recipient parent and donor parent. The parent which receive a desirable cha cter is known as recipient parent. The parent wh donate the desirable character is known as donor parent.

(iii) Genetic constitution - Backcross method retain th genotype or original variety except for t character which is improved by backcrossing.

(iv) Number of backcross - Generally 5 to 6 backcro are sufficient

(v) Basic requirement ⇒ The basic requirement to st start a backcross programm are (i) recurren parent (ii) donor parent and (iii) high herita ility of the character under transfer.

Merits ⇒ (i) Backcross method retains all desirable characters of a popular adopted variety and replace undesirable allele at a particular locus.

(ii) This is a useful method for transfer of oligogenic charcter like disease resistance. It is also us in the incorporation of gene for quality.

(iii) This is used for developed of isogenic line and multiline variety, a mixture of several isogenic lin

(iv) The male sterility and fertility restorer gene an transferred to various agronomic base by thi method.

(v) This is the only breeding method which is used for interspecific gene transfer.

(vi) The variety developed by this method does not require multilocational testing because it is identica to parent variety except for the character.

Demerits ⇒ (i) This method is used to rectify the defe of an adapted variety. The new variety differ from the old one only in respect of defect which has been rectified.

(ii) It involve lot of crossing work. The backcross have to be made for 6-8 generation. In pedigree and bulk method hybridization is done onl

(iii) sometime undesirable character is tigh linked with desirable one which is also transfer to the new variety

Achievements ⇒ Backcross method has been widely u for the development of disease resistant varieties in both self and cross pollinated specie

• pedigree Breeding method →

Pedigree refers to record of ance of an individual selected plant. pedigree breeding is a method of genetic improvement of self poll species in which superior genotype are selected from segregating generation and proper recor of the ancestry of selected from segregating generation and proper record of the plant are maintained in each generation.

Main features of this breeding method are given below -

(i) Application - This method is widely used for the improvement of self pollinated species. It is generally used when both the parents that are used in the hybridization have good agronon charector.

(ii) Maintenance of pedigree record → In this meth proper record of the ancestry of each sel plant or plant progeny is maintained for all generation of selection.

(iii) Selection - In this method only human selection artificial selection is used. Natural selecti is allowed to operate only in the modified form of pedigree breeding known as mass pedigree me

(iv) Time taken - Development of new crop cultiver. by this method generally takes 14-15 year

(v) Genetic constitution - The variety developed by this method is homozygous and homogeneous, because it is a progeny of single homozygote.

Merits →

(i) pedigree method provides information about the mode of inheritance of various qualitative charectors which is not possible by other breeding methods.

(ii) There are chances of recovering transgressive Segregant by pedigree method.

(iii) This method takes 14-15 years to release a new variety.

(iv) The breeding value of selected plant is ascertained by progeny test. Thus pedigree Selection is based on genotype value rather than phenotypic value.

Demerits →

(1) The selected material becomes so large that handling of the same becomes very difficult.

(2) Record have to be maintained for all the selected plant and progenies which take lot of valuable time of a breeder.

(3) Since large no. of progeny are rejected in this method there are chances of elimination of some valuable material.

Que 15) Give Short Notes on,

① clonal Selection -

progeny of single plant obtained by asexual reproduction is known as clone. A procedure of selecting superior clone from the mixed population of asexually propagating crop is referred to as clonal selection. The crop which arepropagated asexually or by vegetative means are known as asexually propogated or vegetatively propogated or clonal crop. The main feature of clonal selection are presented as follows -

(i) Relevance - clonal selection is relevant to vegetatively propogated or asexually propg

(ii) Base material - The mixed population of vegeta very propogated or crop is used as base material

(iii) variation - In a clonal variety, the variation is entirely due to environmental factors.

(iv) Genetic constitution - A variety developed by clon Selection is heterozygous but homogeneous.

(v) Adaptation - A clonal variety is more adaptable to environmental variation due to high level heterozygosity than pure line.

(vi) Disease resistance - clonal varieties are highly vulnerable to new race of a disease due to narrow genetic base.

(vii) Reconstitution - Exact reconstitution of a clonal variety is not possible.

(viii) produce - The produce of a clonal variety is highly uniform due to homogenow nat

(xi) Maintenance - The clonal variety is maintained by asexual propagation.

② Apomixis ⇒

Apomixis refers to the development of Seed without sexual fusion. In apomixis embr develops without fertilization. Thus apomixis is an asexual means of reproduction. Apomixis is found in many crop species. Reproduction in some species occur only by apomixis. This apomixis is termed as obligate apomixis But in some species sexual reproduction also occur in addition to apomixis. Such apomixis is known as facultative apomixis.

There are four type of apomixis viz. (i) parthenogenesis (ii) apogamy, (iii) apospory and (iv) adventive embryony.

③ Type of Introduction ⇒

plant introduction are generally classi on the basis of adoptation and utilization. Base on adaption, plant introduction are of two type (i) primary introduction and (ii) Secondary introdu ction. Based on utilization again introduction are of two type viz. (i) direct introduction and (ii) Indirect introduction. These are defined a follows -

(i) primary introduction ⇒ Introduction that can be us for commercial cultivation as a variety without any change in the original genotype called primar introduction.

(ii) Secondary Introduction ⇒ Introduction that can b used as a variety after selection from the original variety or used for transfer of some desirable gene to the cultivated variety is known

4) Effect of inbreeding →

The different effect of inbreeding are -

① Appearence of lethal and sublethal Alleles → Inbreeding result in appearence of lethal, sublethal and subvital character. Eg. chlorophyll deficies, rootless seedling.

② Reduction in vigour - general reduction in vigour size of various plant part.

③ Reduction in Reproduction ability - Reproductive ability of population decrease rapidly. Many line reproduce purely that they can not be maintained.

④ Separation of population into distinct line - population rapidly separate into distinct line. ie due to increase in homozygosity.

⑤ Increase in homozygosity - Each line become homozygous. Therefore variation within a line decrease rapidly.

⑥ Reduction in yield - IB leads to loss in yield. The inbred that survive and maintained have much less yield than the open pollinated variety from which they have been developed.

5) Asexual Reproduction →

Asexual reproduction refers to multiplication of plant without the fusion of male and female gametes.

The asexual reproduction is of two type viz, ⓐ vegetative reproduction ⓑ Apomixis.

① vegetative reproduction - Multiplication by vegetative Plant part.

ⓐ Natural - Multiplication by Rhizome, tuber, corm, bulb, runner, suckers and stolon.

ⓑ Artificial - multiplication by stem and root cutting, grafting, budding.

② Apomixis - Development of embryo without sexual fusion.

ⓐ parthenogenesis - Development of embryo from egg cell without fertilization.

ⓑ Apogamy - Development of embryo either from synergids or antipodal cells.

ⓒ Apospory - origin of embryo from diploid egg cell of another embryosac developed from diploid tissue

ⓓ Adventive - origin of embryosac directly from diploid cell

ⓔ Embryony diploid cell → belonging to either nucellus or integument.