RAMA UNIVERSITY

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FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

Introduction

The progress in plant improvement would have been of little significance, without methods whereby improved forms could have been maintained in cultivation. Most cultivated plants either would have lost or reverted to less desirable forms unless they are propagated under controlled conditions that perceive the unique characteristic which make them useful. Plant propagation means multiplication of plants with the aim to achieve increase in number and preserve the essential characteristics of the mother plant. It is essentially of two types:

A. Sexual Propagation
B. Asexual Propagation

Sexual Propagation

- Sexual reproduction refers to multiplication of plants by seeds. Seeds are formed after successful pollination and fertilization by the union of male and female gametes.
- Meiosis division takes place in the course of fusion and the chromosome numbers are reduced to half, which after fertilization becomes normal.
- The plants raised through seed are called seedling plants.
- Propagation of plants by seeds offers many advantages however several have disadvantages too.
- Sexual propagation involves careful management of germination conditions and facilities and knowledge of the requirements of individual kind of seeds.

Success of seed propagation depends upon fulfilling the following conditions:

- Using seed of proper genetic characteristics to produce the cultivar or species, of provenance desired. This can be accomplished by obtaining seed from a reliable source or dealer.
- Using good quality seeds which germinate rapidly and vigorously to withstand possible adverse environmental conditions in the seed bed and provide a high percentage of usable seedlings.
- Manipulating the seed dormancy by applying pre-germination treatments or proper timing of planting.
- Providing proper environment for seed germination i.e., supplying sufficient water, proper temperature, adequate oxygen and either light or darkness (depending upon kind of seed) to the seeds and resulting seedlings until they are well established.

Advantages:

- Propagation by seeds is simple and easy.
- Seed propagation is only mean of diversity particularly in the selection of chance seedlings.

- Seedling plants are long lived, productive and have greater tolerance to adverse soil and climatic conditions and diseases.
- Seed propagation makes feasible to propagate plants like papaya and coconut in which asexual means of propagation is not common.
- Hybrids can only be developed by sexual means.
- Sexual propagation offers opportunities of polyembryony (citrus, mango or jamun) and apomixis (*Malus sikkimensis, Malus hupehensis, Malus sargentii*), which produces true- to - type plants.
- Seed is the source for production of rootstocks for asexual propagation.
- Seeds, if stored properly can be kept for longer duration /period for future use.

Disadvantages:

- Seedling plants are not true to type to the mother plants due to heterozygous nature of fruit plants.
- Seedling plants have long juvenile phase (6-10 years) and hence flowering and fruiting commences very late.
- Sexually raised plants are generally tall and spreading type and thus are cumbersome for carrying out various management practices like pruning, spraying, harvesting etc.
- Seeds of many fruits are to be sown immediately after extraction from the fruits as they lose their viability very soon e.g. cashew nut, *jamun*, jackfruit, citrus, mango and papaya.
- The beneficial influences of rootstocks on scion variety cannot be exploited in sexual propagation.
- Seedling plants usually produce fruits of inferior quality.

Asexual Propagation

- It is independent of sexual propagation process as there is no involvement of sex organs.
- It takes place due to mitotic division. Mitotic division continues in shoot tip, root tip and cambium
- When some portion of plant is wounded, mitotic division takes place.
- Under mitotic division, chromosomes divide longitudinally to form two daughter cells. This forms the basis of asexual propagation.
- The plants raised through asexual process are identical to mother plants. Cutting, division, layering, budding and grafting are main techniques of asexual propagation.

Advantages

Asexually propagated plants are true to type to their mother plants.

- Asexually propagated plants have short juvenile phase and bear flowers and fruits in the early age (3-4 years) than seedling plants.
- The vegetatively propagated plants are smaller in stature and hence management operations like spraying, pruning and harvesting etc. become easy.

- Plants in which seed setting does not take place (e.g. pineapple and banana), asexual propagation serves as a substitute for sexual propagation.
- Using asexual methods, desirable characters of a mother plant can be perpetuated/ multiplied easily.
- The benefits of rootstocks and scion are usually exploited through asexual propagation.
- Repairing of damaged portion of plant is possible through asexual propagation as in case of bridge grafting.
- It is possible to convert a non-productive local variety into productive improved variety by using asexual methods.
- It is possible to grow several varieties on one plant or change variety of existing plant by top working.

Disadvantages

Asexual propagated plants have shorter life-span.

- Asexual propagation restricts diversity.
- Sometimes asexual propagation disseminates diseases e.g. *Tristeza* virus in citrus.
- Technical expertise/skill is required.