

Selection of suitable Agro climatic condition and seed/planting material for quality seed production

Agro climatic /Ecological factors

Edaphic factors

Soil for seed production should have optimum moisture, good texture and structure. Different vegetables have different soil requirements and in general, loams are the best. Clay soils in high rainfall area become sick and cause lack of aeration which affects seed quality. Soil pH should be around 7, as neutral. The problematic soil like saline soil and acidic soil are to be avoided for seed production. pH affects seed production in sensitive plants like legumes and vegetables.

Fertile soils are highly preferable for seed production. Soil should have adequate macro and micro nutrients and microbial load for producing vigorous and viable seeds. For example Boron deficiency causes black rot in cole crops particularly cabbage and cauliflower and hollow heart in garden pea. Molybdenum causes physiological disorder like whiptail in crucifers. Excess nitrogen results more of vegetative growth that leads to more proneness to diseases and insects resulting reduction in seed quality and yield. N, P and K in balanced dose increases seed yield and improves seed quality and induce resistance.

The seed production should be avoided under soil moisture stress or poor drainage conditions. Ill drained soils causes chlorosis and wilt diseases. The soils should be free from soil borne pathogen and nematodes especially for seed production in horticultural crops.

For producing good quality, soil should free from pathogens. For example bacterial wilt inoculum available in most soils infests solanaceous vegetables tomato, brinjal and chilli. Fusarium wilt in many vegetables spreads from seed to soil. Wilt gets established through planting material (seeds) and thus spreads further from the soil. Soil should also be free from weed seeds.

Climatic factors

1. Temperature

Temperature plays a major role in seed production. Seed germination, seed crop growth and maturity of vegetable seeds are influenced by temperature. Too high temperature during seed crop maturity brings forced maturity and poor seed quality. Optimum temperature is required from sowing to the day of harvest. For *e.g.* cole crops seed production requires low temperature (4-10⁰C) at initial stage and high temperature (15-20⁰C) at reproductive stage i.e. during seed

development and maturation. Higher temperatures and strong winds cause desiccation of pollen grains and drying of stigma results in poor seed set and seed quality. High temperature adversely affects seed production due to drying of anthers in lab-lab; flower shedding in tomato and chillies and production of higher percentage of hard seed in leguminous vegetables. Over wintering (chilling) / vernalization is needed for cabbage, cauliflower, beets, carrots, turnips etc, to have shift from vegetative to reproductive phase which helps in quality seed production.

In some vegetables, high temperature inhibits development of ovules and fruits and causes shedding of flower buds and young pods / fruits. Higher temperature results in shriveling of seeds lower yield and poor seed quality. Temperature between 24 - 38⁰C is most favourable for activities of pollinators particularly bees. Pollinators are an important component in vegetable seed production and without these quality seed productions is not possible particularly in cross and often cross-pollinated vegetables. These pollinators stop working at low (below 20⁰ C) or high temperature (beyond 38⁰ C), heavy rains, strong winds which hampers quality seed production

2. Humidity

Higher relative humidity more than 90 per cent cause heavy flower drop and during maturation will lead to production of blonded seeds (eg peas,) Relative humidity reduced lesser than 40 per cent leads to production of hard seeds. Flowering, pollination and seed setting in temperate vegetable needs low humidity and dry weather and moderate to low humidity in sub-temperate and tropical vegetable varieties. High humidity and low temperature also encourage production of diseased seeds. Slightly warm dry climate is suitable for production of disease-free seed.

3. Rainfall

Excessive rain, apart from affecting pollination, leads to a higher incidence of diseases resulting in mould attack and seed discoloration. Activity of pollinators (bees) is practically nil during rains and when flowers are wet. It may also results in delayed maturity and at the time of maturation leads to pre-germination or sprouting of seeds in standing crops (eg. peas, beans). Strong wind and heavy rainfall at or near harvest may cause heavy seed losses through shattering and also complicate the harvesting operations (e.g. amaranthus). Rain at physiological maturity affects the initial quality and storability

4. Cold

Temperatures below 10°C may not be suitable for tropical crops. It will affect anthesis, pollen germination, pollen fertility delayed growth and maturity, incomplete exertion, reduced filling, choking of panicle and incidence of pest and disease.

5. Wind

Wind is necessary for pollination in wind pollinated crops. Improves seed setting in highly cross-pollinated crops like onion and crucifers. At times winds act as a source of contamination and protection of seed crops has to be done using barriers. . Heavy winds may carry pollen too far or prevent deposition on stigma thus reducing seed set. Dry winds also desiccate pollen resulting in loss of viability and development of hard seeds in legumes. Heavy winds results in lodging and shattering of seeds / pods.

6. Insect activity

Insects are beneficial as well as harmful in seed production. In alfalfa alkali bees are reared to increase tripping which is a mechanism where in the alignment of a bee on the keel petal pushes forward the stigma, which brushes the pollen. In dwarf sunflower, and onion rearing 6 honeybees hives / ha increases the seed production by 30 per cent. Similarly the insects acts a source of contamination and in insect pollinated crops one kilometer distance is required as isolation. Insects damage seeds right from the pod stage till harvest and account for 20-30% of the seed production losses e.g. in cucurbit red pumpkin beetle and beetle in pulses are pollen eater.

Selection of suitable production environment based on adoptability

Crop specific temperate, sub tropical and tropical environment should be selected based on their genetic adoptability as it results in better survival capacity of a variety under given environmental condition. For example temperate crops will not set seed in tropical conditions and the virus free production of seed potato is possible only in plains though the multiplication rate is higher at hilly areas. In general the area selected should have the following characteristics

- ❖ Free from volunteer plants, weed plants and other crop plants.
- ❖ In the proceeding season the same crop should have not been grown.
- ❖ Avoid areas where isolation is a problem.
- ❖ Having a well distributed rainfall in the cropping period.
- ❖ Avoid areas of very high and low rainfall.
- ❖ Prevalence of cool and dry weather is preferable.
- ❖ Avoid high temperature and relative humidity areas where germination is poor.
- ❖ Avoid heavy windy areas.
- ❖ Avoid coastal belts and marshy places and heavy windy areas.
- ❖ Avoid areas of endemic diseases and pests.

- ❖ Select compact areas for hybrid seed production.
- ❖ Available of skilled labourers especially in hybrid seed production of crops.
- ❖ Near the processing operations with transporting facilities and marketing facilities.

Selection of land

- ❖ Select well levelled field for uniform maturity.
- ❖ Select nearest to irrigation sources.
- ❖ Select fertile fields.
- ❖ Avoid weedy fields particularly the presence of abnoxious weeds.
- ❖ Avoid problem fields like alkaline, saline and sodic soils.
- ❖ Avoid sick fields.

Selection of season

- ❖ Proper season for specific kind of crop.
- ❖ Off season is better to avoid isolation problem.
- ❖ Selection of crop and varieties
- ❖ The variety should be adapted to the agro climatic conditions of the region.
- ❖ The variety should really be a high yielder.
- ❖ The variety should be a popular one.
- ❖ Select varieties having wide adaptability.
- ❖ Select photo and thermal insensitive varieties, drought resistant, pest and disease resistant one.
- ❖ Should possess other desirable attributes namely, earliness of the crop, seed quality etc.

Selection of Seeds

The seed used for raising a seed crop should be of known purity, appropriate class (farmers can produce certified seed). Breeder Seed can be produced only by the university and Foundation Seed by State Seed Farm / and invariably obtained from an authorized official agency while purchases of seed the following should be carefully examined.

For

B.S - N.S

F.S - B.S are the basic material for seed

C.S - F.S production

Commercial - C.S Other details on the tag - agency, purity, germination.

Validity period. Verify that all the bags of the same variety.