



Exploiting the Potential of Vegetative Propagation to Economize Protected Cultivation of Vegetables

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In recent years, the protected cultivation has emerged as one of the technologies to overcome climatic diversity and has potential to increase productivity and quality of vegetables. Simultaneously, protected cultivation is also being promoted extensively by various Government Schemes in India and plenty of success has been achieved in this regard. High cost of seeds (Rs. 5-8/ seed or even more) and non-availability of seeds of farmers' choice are some of the limiting factors for economic cultivation of vegetable crops under protected cultivation. De-shooting/ de-suckering of laterals or suckers is a common cultural practice in crops like cucumber, tomato etc. Thus, vegetative propagation presents lots of potential not only fulfilling the demand of farmers but also ensures true to type planting material at low cost.

Introduction

India has a wide range of diverse climatic-conditions, but vegetable cultivation practices have generally been restricted to regional and seasonal needs. Although the production of vegetables has increased to a level of 156.5 million tonnes from an area of 9.1 million ha, but still the technologies used and practices followed are predominantly traditional, resulting in low productivity and inconsistent quality and quantity of produce supplied to various markets in the country.

In several parts of the country, climatic variations do not allow year round cultivation of vegetables under open conditions. Similarly, biotic stresses mainly during monsoon and post monsoon period do not allow successful outdoor cultivation of vegetables. It is also difficult to grow vegetables under extreme weather conditions during winter in upper reaches of the Himalayas.

It has now been realised that to achieve higher production levels, productivity has to be increased through the adoption of hybrid varieties and improved production technology like greenhouse technology. In many countries like European countries, USA, China, Japan, Israel, South Korea, Turkey etc., where climate prevents or reduces the choices for year round production, vegetables are being cultivated under protected environments. Greenhouses being the most efficient means to overcome climatic diversity make the use of advances in technology to control the environment for maximizing crop productivity and increasing the quality of vegetable produce. Protected cultivation has the potential of fulfilling the requirements of small grower as it can increase the yield manifold and at the same time improve the quality of the produce significantly as per the demand of the market.

Rationale

Growing vegetables under protected structures through seed is very much expensive due to high prices of the hybrid seeds (Rs. 5-8/seed or even more) which a poor farmer can't afford for each crop. In order to utilize maximum vertical space under protected structures, it is always recommended to train the plants according to different training systems as advocated/suited to different climatic conditions. This is generally achieved through timely and continuous pruning of side shoots or laterals (cucumber) and suckers (tomato) throughout the growing season. Main purpose of training and pruning is to allow maximum interception of light for proper growth and development of plants. So, these laterals/ suckers can be utilized as planting material in those areas where relay cropping is possible or farmers have numbers of commercial units. Propagation through these cutting can also be useful for staggered planting to make the availability of commercial products throughout the year. Sometimes, unavailability of seeds of hybrids at peak time poses lot of problems and farmers are left with no choice. Vegetative propagation through cutting not only provides true to type plants but also ensures the timely availability of the same for cultivation.

Planting Material

The side shoot/ laterals or suckers are used as planting material. Time of using these laterals as propagation material depends largely on the purpose of taking advantage of staggered planting or relay cropping. The lateral shoots of 7-8 cm are taken from plants, but utmost care is required to avoid the cutting from virus affected plants and it is always recommended to sterilize the tools/ knife being used for making such operations.



De-suckering and preparation of suckers for transplanting in coco-peat

Rooting Media

It has been observed that soil less medium consisting of coco-peat, vermiculite and perlite in 3:1:1 ratio on volume basis is best for raising of these cuttings. But, owing to the high cost of vermiculite and perlite, it is rather advisable at farmer level to go for coco-peat as rooting media. It has also been critically noticed that healthy planting materials can be raised in coco peat alone, which is as good as raised in three constituents of rooting media. Coco peat from Sri Lanka and India contain several macro- and micro-plant nutrients, including substantial quantities of potassium, sodium and chloride. So, before using coco-peat as rooting media, it is always very important to wash coco-peat with ordinary water to remove excess of elements which are soluble in water such as potassium, sodium and chloride. Washing of coco-peat helps to reduce the electrical conductivity to a tolerance limit. Thereafter, buffering of coco peat is done with calcium nitrate @ 100g per 10 litres of water for 5 kg of coco-peat. During

this process, calcium [2+] is introduced in order to remove monovalent positive ions such as potassium [1+] from the coconut complex. In this way, we remove not only elements which are soluble in water but also elements which are bound to the coconut complex. Ideally, the treated water should be administered into coco-peat over a 24 hours period via a slow sprinkler system if possible at farmer level, otherwise coco-peat can be rested in calcium nitrate solution for 24 hours. Once the resting period is over, coco-peat is rinsed with water twice, now coco-peat is ready to use as rooting medium. The lateral shoots/ suckers are then transplanted in the media preferably in the evening hours. The plug trays having 50 plugs are good for cucumber and tomato.



Planting of suckers in coco-peat

Irrigation and Fertigation

The plants are kept moist following irrigation at appropriate interval. Plugs should be watered thoroughly in the morning and spot watered in mid afternoon if necessary. It is advisable not to water the plants in the evening otherwise moist conditions overnight may induce the development of fungal disease. Fertigation is done after 7-8 days of transplanting, when cutting starts to establish. As the three nutrients nitrogen, phosphorus and potassium are most important in terms of amounts needed for healthy shoot and root growth and commonly added via 19:19:19 @ 50g per 100 litres of water. These plants are given fertilizers on alternate day basis and are ready for transplanting in 30-35 days in the final field.



Root initiation in transplants

Fully grown transplants

Conclusion

The economic and quality realization has become possible for farmers through protected cultivation of vegetable crops. The selection of varieties/ hybrids for such conditions is very important, unfortunately farmers have limited choice of varieties exclusively for protected cultivation. Once a farmer gets good economic returns from a variety, the farmers expect to get seeds of that variety again and again which has realized his dreams. But sometimes, seed of a particular variety may not be available at desired time or if he gets the seed that may not be 100 per cent pure. Under such situation, the vegetative propagation of varieties offers a lot of opportunity in solving such problem. This technology is highly important for those areas which have the advantage of taking relay cropping or where staggered planting under commercial units provides high returns to the farmers.