

REVIEW ARTICLE Short Communication

OFF SEASON CULTIVATION OF CUCURBITS UNDER PLASTIC LOW TUNNELS: A APPROACH/ LOW COST TECHNIQUE TOWARDS DOUBLING FARMER INCOME

¹RAKESH KUMAR, ²V RAJASREE, ³LALICHETTI SAGAR, ⁴U.TRIPURA, ⁵Amit Ahuja, ⁶KARTHICK R

¹PhD scholar, ²Assistant Pofessor, ³PG scholar, ⁴PhD scholar, ⁵PhD scholar, ⁶PhD scholar

¹Division of Vegetable Science & Floriculture,

Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu-180009, India

Abstract: India is endowed with a wide variety of agro-climate conditions & enjoys an enviable position in the horticulture map of the world. In spite of having more diversity, it is a facing a lot of constraints like photo stress, moisture stress, temperature stress weed growth, soil nutrient deficiencies, excessive wind velocity and atmospheric carbon dioxide protected cultivation is a unique, specialized cropping technique where these constraints related to biotic and abiotic factors can be controlled to an extent. Protected cultivation of vegetable crops offers distinct advantage of quality, production per unit area and favorable market price to the growers. It increases farmers income in off season as compared to the normal season since it results in early nursery and early crop hence off season cultivation of cucurbits is one of the most profitable technology under Northern plains of India.

Keywords: Off Season, Low Tunnel, Cucurbits, Cropping System

INTRODUCTION

Vegetables and fruits are known as protective foods which play important role in overcoming micronutrient deficiencies and providing opportunities of higher farm income through efficient utilization of space vertically and through control of micro climatic conditions surrounding the crop under protected structures. Vegetables are generally sensitive to environmental extremes which causes the low yields. There are different ways and means to increase the yield but the perfection and promotion of protected cultivation of vegetables will be the most promising one. In natural season local vegetables flood the markets substantially bringing down the prices. In the absence of storage infrastructure and vegetable processing industry in the country, off season vegetables farming is the only viable option which can add value to the farmer produce. Cucurbits can be cultivated in off season under plastic low tunnels where temperature is controlled for specific growth of plants. Protected structures i.e, low tunnel can play important role to minimize the impact of temperature fluctuation over precipitation, fluctuating sunshine hour and infestation of disease and pest (Singh and Satpathy, 2005)

PLASTIC LOW TUNNELS

Portable plastic low tunnels technology is used for off season cucurbits nursery production which temporarily protect the crop from low temperature injury to speed up the plant growth in the early stages. low tunnels are frequently used in Mediterranean region to cover strawberry, watermelon, tomato, cucumber, squash, asparagus. These plastic low tunnels are the best way for off season vegetables nursery production by modifying the micro-climate around the plants. These plastic low tunnels are cheaper and cost of the 3.5 m × 1.25 m × 1.0 m size with polythene sheet of 120 GSM is approximately Rs. 3000/ tunnel. The bed size prepared under tunnels are 3×3×0.15 cm in which the sowing is done according to traditional method of nursery raising off season production of high value low volume vegetable crops (parthenocarpic cucumber, muskmelon), is highly demanded in the market. Plastic house cater to winter production of

vegetables. The vast majority of the houses are covered with plastic polyvinyl chloride or polythene sheet usually called poly tunnel. Plastic tunnels has been popularized in recent years because it prevents frost damage during flowering and fruiting stage. In fact this technique could be increasingly necessary to mitigate adverse effects of climate change on fruit growing (Carlen and Kruger, 2009). Production under high or low tunnels can improve fruit precocity, allowing growing to get the premium prices usually occurring early in the harvest season (Demchak, 2009) protecting crops under plastic (polyethylene), either with high tunnels or green houses, generates changes in the environmental condition of light, temperature and relative humidity that may have effect on the plant (Li *et al.*, 2012). Studies have shown that air temperature inside the tunnel is 3 to 20°C higher and soil temperature is 2-5°C higher than soil temperature recorded in open fields (Ogden and Van iersel, 2009). Temperature and relative humidity play an important role in leaf stomatal conductance (gs) and therefore in the transpiration rate and photosynthesis of the plant (Righi *et al.*, 2012) Polyethylene film that are commonly used to cover green house or tunnel can reduce transmission of photosynthetically active radiation (PAR) between 20% and 30% compared to radiation under unprotected conditions (Cowan *et al.*, 2014) it has been found that a decrease in PAR availability may have negative effects on crop production under plastic because it decreases photosynthetic rate, which in turn affects yield and quantity (Sandri *et al.*, 2003). Low tunnel can warm the soil and protect the plants from hails, cold wind and injury and advance the crop than normal season because temperature goes below 8°C for 30- 40 days during winter season in plains of North India

DOUBLING FARMER INCOME

The fruits remain available in the market from April to November which causing glut in the market leads to price crash in the main season (Kumar *et al.*, 2015) But, the price of the produces have high premium value their off season forcing techniques like green house, poly house, net house and low tunnel (Enoch and Enoch, 1999) but installation of these structures are costlier which is unaffordable by the small and marginal farmers. Out of these techniques, low tunnel is found me of the best for non woody species, such as ornamental and vegetables. This technology for cucurbits nursery production has been extended to the farming community successfully. Farmers are gradually adopting different protected structures to combat the climatic vagaries and emerging biotic and non-biotic challenges in vegetables production.

ORIENTAITON AND TEMPERTATURE CONTROL MECHANISM INSIDE THE STUCTURE

Generally, the tunnels are made in north to south direction to receive maximum sun light. Transparent plastic of 30-50 micron is commonly used for making low tunnels, which reflects infra-red radiation to keep the temperature of low tunnels higher than outside. These tunnel increases the inside temperature and entrapment of carbon dioxide, resulted more photosynthesis activity of crops lead to early produce. They create a favorable micro climate around the crop by providing , frost and pest protection and reducing moisture loss (Butler and Ross, 1999) Hence, warm season cucurbits like bottle gourd, bitter gourd, muskmelon , pumpkin, watermelon etc. can be produced during winter season (4-15 °C) especially in northern plains using low tunnels which is easy to handle and can be transported from one place to another with ease.

CONCLUSION

Protected cultivation of vegetables provides the best way to increase the productivity and quality of vegetables, especially cucurbits. The yield of some cucurbits like cucumber can be increased manifold compared to their open field cultivation. Plastic low tunnels are highly suitable and profitable for off-season cultivation of cucurbits like summer squash, bottle gourd, bitter gourd, muskmelon, watermelon, round melon and long melon in peri-urban areas of northern plains of India. To cater the vegetable needs of the local population and army in the inaccessible areas like Ladakh low tunnel cultivation could be an answer. It may be a useful for marginal farmers by increasing farmers income in off season as compared to the normal season since it results in early nursery and early crop hence off season cultivation of cucurbits is one of the most profitable technology under Northern plains of India.

REFERENCES

1. Butler, B.R. and Ross, D.S. 1999. Extending the production season for vegetables and small fruits. College of Agriculture and Natural Resources, University of Maryland.pp1-5
2. Carlen, C., and Kruger. E. 2009. Berry production in changing climate condition and cultivation systems: further reserch requirements. *Acta Horticulturae* 838:225-228.
3. Cowan, J.S., C.A. Miles, P.K. Andrews, and D.A. Inglis. 2014. Biodegradable mulch performed comparably to polyethylene in high tunnel tomato (*Solanum lycopersicum* L) production. *Journal of Science Food and Agriculture* 94:1854-1864
4. Demchak, K. (2009) Small fruit production in high tunnels *Hort Technology* 19(1): 44-49.
5. Enoch, H.Z. and Enoch Y. 1999. The history and geography of green house, p. 1-15. In: G. Stanhilland H. Z. Enoch (eds). *Greenhouse ecosystems. Elsevier, Amsterdam, The Netherlands.*
6. Kumar Sanjay, Batra, Pratap Kumar Narender 2015. Early season cultivation of bottle gourd: Effect of date of sowing and growing condition on different Growth parameters. *IJTA*,33(2):1139-1143
7. Li, X., W. Chen, and Y. Li. 2012 Study on photosynthetic characteristics of blueberry in greenhouse. *Acta Horticulturae* 926:315-320.
8. Ogden, A.B., and M.W. Van Iersel. 2009. Southern high bush blueberry production in high tunnels: temperatures, development, yield, and fruit quality during the establishment years. *HortScience* 44: 1850-1856.
9. Righi, E.Z., G.A. Buriol, L.R. Angelocci, A.B. Heldwein, and I.F. Tazzo. 2012. Relationships of photosynthetic photon flux density, air temperature and humidity with tomato leaf diffusive conductance temperature. *Brazilian Archives of Biologyand Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-7: 4829-4835* 4835 *Technology* 55:359 370
10. Sandri, M.A., J.L. Andriolo, M. Witter, and, and T. Dal Rose. 2003. Effect of shading on tomato plant grows under greenhouse. *Horticultuura Brasileria* 21:642-645
11. Singh, R. K. and Satpathy, K. K. 2005. Scope and adoption of plastic culture technology in north east hill region. In: *Agricultural mechanisation in North East India*, ICAR, Research Complex for NEH region, Barapani. Pp. 114-21.