

REVIEW ARTICLE**Constraints in Vegetable Production
in India : A Review****Kohima Noopur¹, Jitendra Kumar Chauhan², S.S. Walia³, M.R. Verma⁴,
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ABSTRACT

Vegetables are considered as protective food due to presence of nutrients, nutraceuticals and antioxidant. India is second largest producer of vegetable in world after China. Vegetable production is the major driver of sustainable agriculture. Although, India has produced more than its requirement but at household level, still there is nutritional deficiency. There is wide gap exist between the farm yield and potential yield. There are a number of constraints which discourage the vegetable growers. The adoption the improved varieties and technologies might increase the production and productivity but there are constraints being faced by the farmers. Lack of knowledge about improved varieties and techniques of vegetable production have been ranked first. The stray cattle, monkey and wild animals are also discouraging vegetable grower's especially male youth. Most of the farms are fragmented and posing problem in vegetable production at household level. The distant market, non-availability of storage facility, low price of produce during cropping season and high transportation cost discouraging farmers for adoption of new technologies and consequently reduce the yield and income. The irrigation facilities are also affecting the vegetable cultivation. The farmers are of the opinion that chemical cost is very high; besides few of the market chemicals are spurious. Generally the vegetables are sensitive to climate change. A little change in temperature and soil moisture might alter physiological and biochemical process in plant and reduces the yield. Varieties and non monetary inputs affect the production and productivity of vegetables. Empowerment of farmers including farm women will create awareness and market information to increase yield and income of vegetable growers even at household level.

Key words : *Vegetables; Production constraints; Household; Technology adoption.*

India is a diverse country where agriculture is the prime mover of its economic growth as 66 per cent India population contributes 20-25 per cent of its GDP (Choudhary *et al.*, 2022). India witnessed green revolution with the production of cereals which provided food security. However, the nutrition security remained a question necessitating a change in nutrient supplemental crop production. The focus has now shifted from food grain to horticultural crops. For the last decade horticulture production including vegetable cultivation has been the major divers towards sustainable agriculture. This is because of agricultural extension has given impetus to vegetable production and to diversify the agricultural base as

well as increasing farmer's income thereby improving standard of living. Out of 341.63 million tons of horticulture produce, vegetable production is 200.45 million tons (APEDA, 2023). Hence, vegetable play a major role in improving food, income and nutritional security at household (Panwar *et al.*, 2019) as well as at national level. The nutrients which are present in vegetables are chemical components present in food that help human stay nourished (Chakroborty *et al.*, 2022). The production of vegetable increased and reached 200.45 million tons during 2022. But there was a sharp decline in its production during 2017 which came down to 100 million tons (Fig.1) due to decline in production of tomato, onion and potato.



Fig. 1. Vegetable production in India (2010-22)

India is still largely a rural economy with 66 per cent of its population living in rural areas (*World Bank, 2019*) is also an important consumer as an Indian household spend about 45 per cent of its expenditure on food. India is now the second largest vegetables producer only next to China contributing 12.3 per cent to the world vegetable production. India rank 1st in okra, chili, pepper, onion and bean production while for tomato, potato, peas, cabbage and cauliflower its rank is 2nd (*FAOSTAT, 2022*). Vegetables are being grown in open field as well as under protected cultivation (*Singh et al., 2017*) with major shift from traditional methods of production to new science-based methods viz., new improved varieties, cultural practices, manure and fertilizers as well as pesticides (*Noopur et al., 2021*). The enhanced production can be achieved if these practices are well communicated to farmers through effective and efficient extension methods which can create awareness and influence their decision to adopt the recommended improved technology(s) (*Akpan et al., 2012*). The effectiveness of technology adoption depends upon selecting the right method, at right time to the right people and associate with the higher earning and lower poverty (*Kassie et al., 2011*). In India large population is vegetarian thereby for food and nutrition security vegetables have great importance.

In India, most of the population is vegetarian and hence vegetable play a significant role in food and nutritional security (*Amit et al., 2023*). Cultivation of vegetable proving nutritional and income security and considered to replace subsistence farming in the rainfed hills, arid, dry land and coastal agro-ecosystem (*Noopur et al., 2021*). Farmers have adopted the vegetables production due to changing food habits and

increasing awareness towards balance diet and concept of nutritional security (*Agropedia, 2009*) as vegetables are the source of nutrients viz., vitamins, minerals and fibre (*Noopur et al., 2023*), which are not present in staple food (*FAO, 2009*). There are more than 7000 species known to be used for food and are either partly used, however about 30 crops are known to provide 95 per cent of the world food energy (*Noopur, 2015*). During the last decade there has been significant increase in productivity of vegetables than fruits resulted in marked increase in per capita vegetable availability (Table 1). The country is now in a position to provide more then recommended quantity vegetable to its population. But despite increase in production of food grains, vegetables, and other commodities, we are about 35.7 per cent underweight, 38.4 per cent stunted and 58.4 per cent anemic, while women (age 15-49) were also under weight and anemic (53.00%) necessitating the need to have all the time more vegetables available at household level (*Noopur et al., 2019*) through round year vegetable kitchen gardening. *Gogoi et al. (2018)* stated that 33.33 per cent of surveyed respondents were deficits in vegetable availability in the state of Assam.

Table 1. India’s vegetable production and availability

Population in India during 2020-21	1408 million
Production of vegetables in 2020-21	200.54 million tones
Per capita availability of vegetables	390 g vegetable/day/person
Recommended level of vegetables	306 g vegetable/day/person

(Collected and compiled from different sources)

Constraint in vegetable production: Improved vegetable production technologies are not fully

adopted by the farmers. When they grow vegetable, some problems are being faced resulting into partial or non adoption of improved technologies. Higher vegetable production can be achieved by adoption of all recommended technologies by farmers (*Suman, 2011*) necessitating to channelize efforts to increase the farm yield which is possible by identifying the problem and constraints being faced by the vegetable growers. It has been observed that farmers select varieties which do not have high yielding capacity leading to loss to the farmers. The genetic makeup is responsible for higher growth, better physiological and biochemical attributes may help in improving yield (*Noopur et al., 2023*), which can be exploited in addressing low yield of vegetables.

Social constraints: This problem is location specific and mostly concerned with individuals inhabiting in a specific social setup. *Arya et al. (1984)* revealed that lack of awareness, co-ordination among farmers grouping and adverse socio-political systems in the villages were the most common constraints in adoption of new technology. The problem of stray cattle, monkey, wild boar, sambar, nilgai (Blue Bull) and other wild animals are widespread and discouraging vegetable production. In the state of Himachal Pradesh about 71 per cent panchayats are suffering from monkey menace (*Thakur et al., 2022*). The role of male youth in small vegetable farming was very poor, whereas in commercial farming, the role of women in decision taking is increasing (*Nath et al., 2020*). While addressing the social constraints, socio-economic security need to be addressed which means the measures that enhance social capabilities, ensure economic security and enable vulnerable section of the population to survive (*Gautam and Jha, 2022*).

Resource constraints: Farm is the basic managerial and decision-making unit by which agricultural activities are carried out necessitating the need of resource management (*Raj and Shivaramu, 2023*). Land consolidation is still not done to whole India due to which small land holding are scattered (*Sahu et al., 2013*) causing problems in management of crops. High cost of seed and input chemicals being faced by farmers in vegetable production (*Ram et al., 2009*). Vegetables require high water which is some time is not available even at right time affecting cultivation of vegetable especially during summer season. *Naik et al. (2019)* reported that lack of irrigation facilities (94.79 %) and cost of pesticides (90.62%) were the most

important resource constraints of vegetable growers in Andhra Pradesh. Other resource constraints were lack of cold storage facilities (88.54%), unavailability of improved seed of vegetables (86.45%), scattered and small land holdings (85.41%). Whatsoever chemicals or pesticides are purchased by the farmers are costly and spurious (67.00%) which were not very effective in controlling insect pest and diseases resulting yield reduction and high production cost (60.00%) of vegetable production (*Kumar et al., 2019*) making farmers reluctant in vegetable production. Farmers are also facing problem of cost and availability of field labour. The labour alone accounting for an average of 36 per cent of the cost of vegetable production and inflated other cost also (*Anonymous, 2023*)

Climate change constraints: Climate change is the long-term alteration of weather parameters and could be refer to a particular location, region, or the planet as a whole. It cause weather pattern unpredictable which can make it difficult to grow and maintain vegetable. The rural areas are more vulnerable to climate change as the people are dependent on natural resources. The geographical area of India comprised of mountains, valleys, coastal region, deltas, and climatic conditions little change in temperature will disturb the whole ecology and pattern of vegetable growing in these regions (*Bhardwaj, 2012*). Vegetables are sensitive to climate change. Any changes in temperature and soil moisture are the causes of low yield due to alteration of physiological and biochemical processes. Crop failure, reduction in yield and quality and increasing pest and disease are the common problem which renders vegetable cultivation unprofitable (*Koundinya et al., 2014*). The pollination in vegetables is also threatening due to altered behavior of pollinating agents (*Schweiger et al., 2010*) as these agents reduce their pollination services (*Corbet et al., 1993*). The white fly is also more vigorous in spreading virus disease in okra under high temperature (*Noopur et al., 2022*).

Vegetables are highly sensitive to flooding especially for shallow root vegetables, the roots strive for oxygen as soil air was replaced by inundating water (*Parsad and Chakravorty, 2015*) and accumulation of endogenous ethylene that cause damage to the plant. Drought is defined as a long period of abnormally low rainfall and vegetable are succulent consist of 90 per cent water (*AVRDC, 1990*). Hence the drought adversely affect the vegetable yield and quality due to reduction in seed germination, chlorophyll content,

electrolyte leakage, leaf relative water content and vegetative growth (Kirank *et al.*, 2001). Nuruddin *et al.* (2003) stated that immediately after transplant, flowering and fruit development, tomato need more water. Cucumber, melons, squashes, pumpkin, beans, peppers and tomato are most sensitive to drought at flowering and fruiting.

Technological constraints: A wide gap in yield potential and yield obtained is responsible for low yield. Most of the farmers are not aware of improved varieties with vegetable production technology probably lack of proper and adequate data. Chikkeri *et al.* (2023) stated that the potential of tomato is not completely exploited due to lack of adequate data on the varieties suited to the specific agro-climatic conditions. The adoption of the improved varieties and technology can lead to enhanced production and productivity (Sahu *et al.*, 2009). This is dependent on transfer of technology either through awareness campaign or through training (Sharma *et al.*, 2014). The lack of knowledge of IPM was listed the first technological constraint (Naik, *et al.*, 2019), while the second and third constraints were lack of knowledge of improved varieties, seed rate and sowing time (85.42%). In a study, Sahu *et al.* (2013) stated that the lack of knowledge about improved varieties (Noopur *et al.*, 2022) seed rate and sowing time (88.33%) is major technological constraint. Integrated nutrient/pest management was next to it (85.0%) and lack of soil testing facilities in the state of Uttarakhand. India is marching towards intensive cultivation for which mechanical power has become essential for timely completion of a variety of farm operations (Singh *et al.*, 2023) but due to small and marginal land holding costly machinery is not available to the vegetable growers. These constraints can be addressed through agricultural extension services to strengthen farmer-farmer extension to increase vegetable production and productivity (Thangjam *et al.*, 2020). Under this programme, extension specialist should treat each farm person (farmers, youth, farm women and school dropout) as a potential entrepreneur (Sandhu and Chauhan, 2020)

Marketing constraints: Non availability of proper marketing facilities followed by storage facilities especially for women was important constraints impeding the vegetable farming (Samantaray *et al.*, 2009). The non remunerative price was ranked 1st by Sahu *et al.* (2013) followed by transportation facilities, high market charges and distantly located market. The

marketing related constraints by cauliflower growers expressed as major constraints was low price (73.00%), lack of cooperative marketing system (70.00%) and no ready market in the village (60.00%) and dominance of traders in the village (Satapathy and Das, 1996). The higher price fluctuations (73.00%) were the main problem of cauliflower grower followed by unorganized marketing system (67.00%), lack of loading and unloading labour (60.00%) were (Kumar *et al.*, 2019) leading to escalation of marketing cost and reduction in net price received by the growers. If the produce is directly sold to the consumers, the net price received by the grower is relatively higher (Baba *et al.*, 2010). Naik *et al.* (2019) indicated non remunerative price as one of the market constraints (95.83%) followed by market facilities (87.50%) and distantly located market discourage them to grow vegetables (78.12%). Most of the vegetable growers are small and marginal farmers and cannot afford high cost of transportation charges (75.00%). Likewise, in Mewat region of Haryana, the major marketing constraints were distance market, non availability of storage facilities and high transportation cost, besides low price of onion (Goyal and Goyal, 2022).

CONCLUSION

Vegetables play a pivotal role in food and nutritional security even at household level. A part of vegetable produce is also being consumed by vegetable growers. Lack of knowledge, problem of stray animals, monkey and wild animals are discouraging vegetable growers. Socio-economic factors, spurious market inputs, and non remunerative vegetable price besides marketing facilities are the common factors discourage the farmers. Labour cost during vegetable production, loading and unloading of produce escalating marketing cost leading to reduction of net return of the farmers. If these vegetable growers are directly linked with consumer, the profit of the farmer would be little higher and vegetable growers can be encouraged to grow healthy crop to take care of consumer and environment.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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