CONSTRAINTS PERCEIVED BY THE FARMERS IN THE ADOPTION OF SUSTAINABLE CULTIVATION PRACTICES OF NAGA KING CHILLI

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Naga king chilli (Capsicum chinense Jacq) with GI tag (PIB, 2021) is best known worldwide for its intrinsic value and holds a distinct place in global trade due to its unique characteristics of high pungency, flavour and bioactive components. Thus, acknowledged as one of the most valued spice crops of Nagaland. Nagaland produces about 4000 MT of Naga king chilli annually. 70 percent of the production is marketed by traders in Kolkata and Guwahati (YES Bank Ltd. and IDH, 2018). The indigenous practice of Naga king chilli which is largely organic by default and agro-climatic conditions favouring sustainable cultivation, the prospects of sustainable Naga king chilli cultivation in Nagaland are massive. However, the ramifications of climate change, lack of access to improved technologies and postharvest losses have posed a significant threat to the sustainable Naga king chilli production in Nagaland, making the farmers’ livelihood vulnerable. Hence, the study was conducted to assess the constraints perceived by the farmers in adopting sustainable cultivation practices of Naga king chilli and suggest strategies to overcome them.

The study was carried out during the year 2020-2023 applying an ex post-facto research design. The Henry Garrett Ranking Technique was employed for the study. Where the respondents were asked to rank the given problem according to the magnitude of the problem. The orders of merit given by the respondents were converted into ranks by using the following formula: Percent position= 100*(R_{ij} -0.5)/N_{j}

Where, R_{ij} = rank given for i^{th} constraints by j^{th} individual;

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The percentage position of each rank thus obtained was converted into scores by referring to the table given by Garrett (1969). Then, for each factor, the scores of individual respondents were added together and divided by the total number of the respondents for whom the scores were added. These mean scores for all the factors were arranged in the order of their ranks and inferences were drawn.

Constraints perceived by the respondents in the adoption of sustainable cultivation practices of Naga king chilli in the region were studied under nine different aspects of the constraints. One of the major constraints recorded was biotic and abiotic constraints.

Where, the most severe constraints were epidemics of pests and diseases with a mean score of 70.34 followed by fluctuation of temperature (65.20), drought during crop period (60.76), occurrence of showers during harvest (60.76) and weed infestations (60.64). In the case of technical constraints, lack of knowledge about insect pest and disease management (66.85) was a major constraint among the respondents, followed by lack of mechanization of the farm (60.91), lack of knowledge about seeds/seedling treatment (57.28) and lack of knowledge about value addition of Naga king chilli (56.64). The highest extension constraint recorded was the lack of technical guidance from extension staff (63.30) followed by extension agents not being available for consultation (63.26), untimely visits of extension agents (58.87) and insufficient extension activities like training, demonstrations, kisan mela etc. by extension agencies (53.91). The top post-harvest constraints in the adoption of sustainable cultivation practices of Naga king chilli were the lack of proper storage facilities (61.46) followed by the lack of processing facilities at the local level (60.89) and increasing processing costs (59.08). The major input supply constraints were the high requirement of manure and fertilizer (62.26) followed by non-availability of fertilizers and bio-pesticides in time (60.61), lack of irrigation facilities (53.10) and non-availability of seeds and planting materials in time (52.64). The top marketing constraints perceived by the respondents were poor access to market information (66.15) followed by lack of proper market (64.73), distressed sales (59.62), high charges on transporting (52.40), exploitation by middlemen (48.94) and fluctuation in market price (47.61). In the case of land/soil-related constraints, steep and undulated land (62.18) was a serious limitation followed by soil erosion (61.39), poor land preparation (52.45) and soil fertility (46.43). Economic constraints experienced by the farmers were associated with the high cost of inputs (60.56) followed by the high cost of planting material (56.22), lack of credit facilities (52.00) and labour-intensive crop (50.66). Major social constraints were no institutional support for commercial Naga king chilli cultivation (60.86) followed by farmers having poor resource base (53.32), younger generation not interested in farming (52.96), poor educational status (52.36) and lack of motivation for Naga king chilli cultivation (51.68). The above findings were in line with the findings of Rais et al. (2021), Kumar et al. (2023) and Sahoo et al. (2023).

The repercussions of climate change have posed a significant threat to the traditional cultivation practices of Naga king chilli as farmers are fully dependent on natural resources for their livelihood. Naga king chilli is generally cultivated in jhum hills under rainfed conditions using traditional cultivation practices. These traditional practices become inefficient during extreme shifts in temperature, erratic rainfall and high incidence of insect
pests and diseases. Therefore, water management strategies, technical assistance in core areas of Naga king chilli cultivation, location-specific production and management strategies might be effective in minimizing the problems faced by the farmers in sustainable Naga king chilli cultivation practices. Introduction of soil conservation-oriented farming systems like, Sloping Agricultural Land Technology (SALT) and Soil and Water Conservation (SWC) approaches with longer fallow periods (up to 15 years) to naturally build up soil fertility and integrated farming systems with fast-growing and nitrogen-fixing trees and shrubs on contours boundaries and hilltop may help in reducing soil erosion, enrich the soil, provide fodder, fuel-wood and biomass (FOCUS, 2018). These approaches may solve the problem of biotic and abiotic constraints, and land/soil-related constraints faced by the respondents.

Constraints related to extension and market could be curtailed through modern technology upskilling on the use of online platforms for an efficient exchange of farm information and research knowledge while accessing market information and staying connected with buyers around the world. The farmers may also be motivated to form Farmers Producers Organization (FPO) among Naga king chilli farmers to increase sales and profits, eliminate exploitation by middlemen and acquire better price realization. Besides the sale of fresh and dried chillies, there is a huge scope for value addition of Naga king chilli. However, unfortunately, irrespective of much biological and commercial strength of the crop, the post-harvest handling and processing is still in the infancy stage. Therefore, training on post-harvest management activities like grading, processing, packaging and storage of Naga king chilli is essential. This will protect the farmers from post-harvest losses ultimately add value to their produce and improve economic stability among the farmers.

With no insurance or security against financial losses during crop failures, the farmers usually settle for sporadic intercrop of Naga king chilli in the jhum fields. These constraints may be averted through a comprehensive approach and community involvement by educating and engaging farmers, youths and village leaders on the available institutional credits and crop insurance schemes. These initiatives may come as an essential tool in developing confidence among the farmers to take up sustainable cultivation of Naga king chilli on a commercial scale whilst increasing the production and economic status of the farmers.

In conclusion, epideemics of pests and diseases (70.34), lack of knowledge about insect pest and disease management (66.85), lack of technical guidance from extension staff (63.30), lack of proper storage facilities (61.46), high requirement of manure and fertilizer (62.26), poor access to market information (66.15), high cost of inputs (60.56), no institutional support for commercial Naga king chilli cultivation (60.86), steep and undulated land (62.18) were the most serious constraints perceived by the farmers in adopting sustainable Naga king chilli cultivation practices in the study area. Addressing the varied challenges of Naga king chilli farmers requires a holistic and collaborative approach. The threats of global climate change causing outbreaks of pests and diseases could be minimized to some extent by adopting Integrated Pest Management (IPM) strategies along with the use of biopesticides. Equipping farmers on livestock waste management and composting with available organic matter from the field may resolve the problem of manures and fertilizers. Moreover, educating farmers to take advantage of Information and
Communication Technology (ICT) to access vital production and market-related information. In addition, the provision of cold storage facilities at the village level might encourage the farmers to adopt sustainable Naga king chilli cultivation practices for increased production and productivity. Thus, a collaborative effort of policymakers, research organizations and other stakeholders could be instrumental in formulating and implementing adaptation strategies that are production and conservation-oriented.

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