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Assessment of constraints and suggestions for adoption of kodo-kutki production technology among tribal farmers in Dindori district, Madhya Pradesh

Bhuneshwari Devi, MK Dubey and DK Jaiswal

Abstract
The study was conducted in Dindori district of Madhya Pradesh to identify the major constraints faced by tribal farmers in the adoption of minor millet (Kodo-kutki) production technology and the suggestions offered by Kodo-kutki growers for its adoption. For this purpose, a sample of 120 farmers was considered as respondents for the study and the collected data were analyzed using suitable statistical methods. The analysis results showed that the major constraints faced by Kodo-kutki growers included a lack of proper training in the adoption of Kodo-kutki production technology, insufficient knowledge of seed treatment and recommended chemical doses, inadequate storage facilities, unavailability of high-yielding variety (HYV) seeds, limited technical knowledge, the non-availability of fertilizer at the appropriate time, a lack of technical information at the Gram Panchayat level and the unavailability of organic manure. The major suggestions offered by Kodo-kutki growers for the adoption of Kodo-kutki production technology were as follows: proper storage facilities should be made available at the block level, subsidies for plant protection should be increased, HYV seeds should be made available at the time of sowing, mass production and supply of organic manure should be ensured, improved seeds should be provided on time and in sufficient quantities, Gram Sevaks should provide frequent and timely technical guidance and knowledge and skill-oriented training should be imparted at the village level.

Keywords: Constraints, suggestions, minor millets, kodo-kutki, production technology, tribal farmers

Introduction
Millet, one of the oldest known foods to humans, may well be the first cereal grain cultivated for domestic purposes. Minor millets, a group of small, coarse grains within the millet family (Poaceae subfamily Panicoideae), possess the remarkable ability to thrive in extreme ecological conditions. According to the Food and Agriculture Organization (FAO), global millet production reached 89.17 million tonnes in 2019-20, covering an area of 74 million hectares. India stands out as a global leader in millet production, contributing 17.9 million tonnes in 2020-21. Millets are cultivated across 21 Indian states, encompassing approximately 12.5 million hectares and accounting for over 15% of the world's total millet production. Small millets, such as Kodo-kutki, are renowned for their exceptional nutritional value, often surpassing rice and wheat in various essential nutrients. Kodo (*Paspalum scrobiculatum*) is a nutritious grain with 8.3 grams of protein, while kutki (*Panicum sumatrense*) is cholesterol-rich and beneficial for overall health. Both grains are vital to rainfed tribal and hilly agriculture, where crop substitution remains a challenging endeavor.

In Dindori district, Kodo-kutki cultivation is primarily undertaken by the Baiga and Gond communities, particularly in hilly terrain under the Tejaswini program. Women self-help groups have embraced organic farming of Kodo and kutki, further promoting their cultivation. These millets are rich in protein, carbohydrates, fiber and essential minerals, making them valuable components of a balanced diet. Despite their nutritional benefits, the contribution of millets to India's total food grain production has decreased from 22.17% in 1950-51 to 6.94% in 2011-12. However, states like Madhya Pradesh, Chhattisgarh and Uttarakhand continue to lead in small millet cultivation. In Dindori district alone, Kodo-kutki occupies 34.71 hectares, yielding 32.11 tonnes with a productivity rate of 925 kg per hectare.

To address the need for nutritional security and sustainable rainfed farming in India, there is a pressing requirement for new high-yielding millet varieties, along with promotional strategies and policies. The second green revolution should prioritize nutrition, an aspect overlooked in the production-centric first green revolution. This shift is essential to combat hidden hunger, particularly micronutrient deficiency, prevalent in states like Bihar and Orissa.

Millets, resilient and adaptable, can play a pivotal role in achieving these goals, offering a time-tested solution for food security in changing climates. In summary, millets, as small-seeded, hardy grasses, hold the potential to transform agriculture in India and address critical nutritional challenges. Their rich history as a staple food in regions like Northern Africa and China underscores their importance in human diets for millennia.

Materials and Methods

The study was conducted in the Dindori District of Madhya Pradesh, specifically within the east-central region. This region consists of seven blocks: Dindori, Shamnapur, Mehandwani, Amarpur, Karanjiya, Bajag. Among these, the block with the highest tribal population, Bajag, was purposively selected from the district. Within the selected Bajag block, a total of five villages were randomly sampled for the study. These villages include Khapripani, Shitalpani, Shivri, Sunpuri and Khamhera. A purposive selection process was used to choose 120 Kodo Kutki growers who were actively involved in Kodo Kutki Production Technology. To identify constraints in the adoption of minor millet production technology, a list was compiled based on literature reviews and discussions with extension functionaries, scientists, and progressive farmers. Data were collected from the respondents through well-structured and pre-tested interview schedules, using a personal interview method. Constraints were assessed using a two-point continuum, where 'yes' received a score of 2, and 'no' received a score of 1. Suggestions for improving the adoption of recommended minor millet production technology were also obtained from the respondents. The collected data were subsequently tabulated and analyzed using appropriate descriptive statistical analysis tools. The constraints were ranked based on percentage analysis and the findings are discussed in detail in this paper.

Results and Discussion

The present study summarizes its results and discussions based on the responses of respondents, aiming to identify the challenges faced by Kodo Kutki millet growers during the adoption of Kodo Kutki production technology and to gather suggestions for improving its adoption.

Table 1 presents the data on constraints perceived by Kodo Kutki growers in adopting recommended Kodo Kutki production technology. The data indicates that the majority of Kodo Kutki growers encountered certain constraints. Notably, the most prominent constraint was the lack of adequate training in adopting Kodo Kutki production technology (95.83%), followed by insufficient knowledge regarding seed treatment and the recommended use of chemicals (69.16%), absence of proper storage facilities (66.67%), unavailability of high-yielding variety (HYV) seeds (58.33%), limited technical knowledge (55.83%), the non-availability of fertilizers at the appropriate time (53.33%), the absence of technical information at the Gram Panchayat level (50.83%), and the unavailability of organic manure (49.16%). Similar findings were reported by Shriwas *et al*. in 2019 [6].

Table 1: Constraints faced by tribal kodo kutki growers in adoption of kodo kutki production technology

S. No.	Constraints	Frequency	Percentage	Rank
1.	Lack of storage facility	80	66.67	III
2.	Lack of technical knowledge	67	55.83	V
3.	Unavailability of HYV seeds	70	58.33	IV
4.	Non- availability of fertilizer at appropriate time	64	53.33	VI
5.	Unavailability of organic manure	59	49.16	VIII
6.	Lack of knowledge seed treatment and the recommended dose of chemicals	83	69.16	II
7.	Non- availability of technical information Gram Panchayat	61	50.83	VII
8.	Lack of proper training for adoption of kodo kutki production technology.	115	95.83	I

Respondents were asked to provide suggestions regarding the adoption of Kodo Kutki production technology. Among the numerous suggestions they offered, Table 2 presents the most significant ones.

The majority of respondents recommended the following: the establishment of storage facilities at the block level (79.17%), the implementation of knowledge and skill-oriented training at the village level (77.50%), the availability of high-yielding variety (HYV) seeds at the time of sowing (55.83%), ensuring timely access to fertilizers (53.33%), frequent and timely technical guidance from Gram Sevaks (51.66%), an increase in subsidies for plant protection chemicals and fertilizers (50.00%), the promotion of mass production and supply of organic manure (45.83%), and the provision of improved seeds in a timely and sufficient quantity (35.83%). Pradhan *et al*. (2022) [3] reported similar findings.

Table 2: Distribution of tribal farmers according to suggestions to overcome constraints minor millet cultivation

S. No.	Suggestions	Frequency	Percentage	Rank
1.	Storage facility should be made available at block level	95	79.17	I
2.	Subsidy should be increased on plant protection chemicals and fertilizers	60	50.00	VI
3.	HYV seed at the Time of sowing should be made available	67	55.83	III
4.	Provision for availability of fertilizer right time	64	53.33	IV
5.	Mass production and supply of organic manure should be made	55	45.83	VII
6.	Improved seed be provided in time and sufficient quantity	43	35.83	VIII
7.	Gram Sevak should provide technical guidance frequently and timely	62	51.66	V
8.	Knowledge and skill oriented training should be imported at village level	93	77.50	II

Conclusion

The study concludes that the primary challenges faced by Kodo Kutki growers in adopting Kodo Kutki production technology include a lack of proper training in its adoption (95.83%), insufficient knowledge regarding seed treatment and the recommended use of chemicals (69.16%), the absence

of adequate storage facilities (66.67%), and the unavailability of high-yielding variety (HYV) seeds (58.33%). Respondents provided valuable suggestions to address these challenges, including the establishment of storage facilities at the block level (79.17%), the implementation of knowledge and skill-oriented training at the village level (77.50%), and ensuring the availability of HYV seeds at the time of sowing (55.83%).

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