



# Indigenous Knowledge Collection in NICRA-AICRPAM Domain Districts for Weather Events

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

Indigenous Technical Knowledge (ITK) is the experience of local people gained from past generation and forefathers. Knowledge base is gained through tradition and culture. Prevailing knowledge is used in making farming operational management for gain in crop production. Crop and irrigation cycles are also being followed through traditional knowledge base and advanced techniques are available now. However, importance of the treasure of knowledge gained from forefathers and inherited to local people in present situation can't be ignored. Indigenous technical knowledge (ITK) is the assemblage of awareness and understanding of various facts which people have developed over a large span of time and continue to expand it. Social participation gives an idea of the respondent's participation in social activities. The NICRA-AICRPAM project has been carried out since 2011 in Chhattisgarh state. Main objective of the project is developing climate resilient technologies in agriculture. This ITK collection can be one effective mean to achieve this objective.

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The study was conducted to identify indigenous knowledge prevailing among the village side in NICRA domain districts Mahasamund and Kanker (Chhattisgarh state). The study was to examine traditional knowhow of farmers in Kanker and Mahasamund districts of Chhattisgarh during 2021 and their scope of application in farming activities. The objective of survey was to collect and document traditional knowledge base from the local farmers so as to work towards climate resilience in agriculture. As rainfall is the main factor in rainfed agriculture, stress was on collection of knowledge regarding rainfall prediction. The study was conducted under CRIDA, Hyderabad sponsored NICRA-AICRPAM project entitled "National Innovations on Climate Resilient Agriculture". Project has been implemented in Department of Agrometeorology, Indira Gandhi Krishi Vishwavidyalaya, Raipur, (C.G.) since 2011. Here in this paper the astronomical, environmental and biological indicators perceived by local masses in forecasting rainfall have been collected, identified and examined. This knowledge will help its utilization in agricultural operations and practices. Interviews were conducted by Field Information Facilitators by contacting masses and peasants. Various indigenous technical knowledge of the project domain area were collected and analyzed. Experience of seasonal rainfall forecasting can be strengthened by using this knowledge base. ITK techniques of rainfall prediction may serve as supplemental knowledge base to advanced scientific technologies.

**Keywords:** *Indigenous Technical Knowledge (ITK); rainfall forecasting; abiotic factors; biotic factors; climate patterns.*

## 1. INTRODUCTION

Under changing agricultural scenario and availability of improved weather information, it is desirable to utilize weather parameters as agricultural resource for input saving, pest disease management and yield improvement. Weather events can have profound and often have quite visible effects on economic activity. Farmers can take part in decision process within which information is to be used as appropriate means to investigate the potential for use of improved climate information [1]. Results indicated that modest improvements in forecast accuracy would have potentially significant value [2,3,4]. A detailed analysis of every cropping system is required for identification of the value of those weather/climate events which have a large impact on productivity. Availability of improved climate information would ameliorate (lessen) the negative aspects and exploit positive features of weather variability.

Indigenous Technical Knowledge (ITK) is the knowledge that people in given community have developed over ages. Indigenous knowledge is found to be socially desirable, economically affordable, sustainable and involves minimum risk for rural farmers and producers. South West Monsoon rainfall is the main source of water supply for rainfed agriculture. This rainfall is the main source of water for agricultural activities in the region. Indian monsoon is a gamble with a food basket and impacting country's production to a significant extent. In rainfed agriculture,

production and productivity of crops is affected by rainfall amount and distribution [5]. It has been emphasized that there is need of stepping up efforts to provide reliable data on weather to the farmers as climate is the most important parameter that determines the quality and quantity of agricultural production. ITKs can provide vast and supplemental knowledge over advanced forecasting knowledge available nowadays.

Weather forecast plays a vital role in agricultural production. The advance information of weather helps to minimize crop losses to a considerable extent. Thus, development and improvement of the art of weather prediction has been essential since time immemorial. Presently, we have many improved technologies for weather forecasting as well as their dissemination to stake holders. Previously, when there was no such technology available, farmers used to predict weather phenomena based on their natural, cultural and social phenomena [6].

Water available in abundance in nature is perhaps the cheapest and of course the essential input for production of food and energy. Even in areas where rainfall is ample, it is unevenly distributed affecting the crop yields due to excessive water at one time and due to water stress at the other. Therefore, natural occurrence of rainfall both in time frame and space has to be managed to correspond to agricultural needs. Local experience can help a lot in this way and therefore there was a need of collection of ITKs.

Among the several factors contributing to low productivity, lack of irrigation facilities is also important factor. This is also true for Chhattisgarh state as the onset of monsoon at the initial stage, break monsoon conditions among the crop growth stages and cessation of rainfall at the terminal stage determine the productivity of rice and other *kharif* crops. Increasing evidences over the past few decades indicate that significant changes in climate are taking place worldwide as a result of enhanced human activities. ITKs information also give information about seasonal rainfall and help plan cropping strategies. The collection of this knowledge may largely help plan cropping strategies. Therefore this study was conducted to identify indigenous technical knowledge and to examine traditional knowledge of farmers in Kanker and Mahasamund districts of Chhattisgarh.

## 2. METHODOLOGY

The study was conducted in Kanker and Mahasamund districts of Chhattisgarh state. Kapsi and Albeda villages from Kanker block and Shirgidi and Jhalkhamaria villages from Mahasamund block were selected purposely in the year 2021-22. Factors addressed among the personal interviews were weather parameters viz., temperature and rainfall. Their utility for farming community and perceptions prevailing among local masses were documented. Target number of farmers were about 40. Feedback about ITK and its indicator prevailing among village masses was collected. Villages selected were NICRA-AICRPAM (National Innovations on Climate Resilient Agriculture) domain villages. Firsthand information is collected from the respondents through well-structured questionnaire. The data were collected through personal interview technique with the help of an interview schedule.

## 3. RESULTS AND DISCUSSION

Effective extension techniques play a significant role in simulating the transfer of technology and in accelerating the pace of economic development of state. However extension mechanism is based on advanced scientific knowledge, perception and deep knowledge of the local farmers. To meet these requirements,

farmers need to have current deviations like new technology of agriculture, new crops, seeds, insecticides, nutrient and water management and marketing of agricultural produces. Further this kind of ready hand information on contingencies and weather aberrations and on-field-technology can help the developing dominated region. Through feedback received from the local farmers, it has been observed that farmers can have significantly gain in saving their precious weather sensitive inputs like fertilizers, pesticides and irrigation water and also in epidemic-disease management. Further utility of the collecting ITKs have been found in helping farmers regarding adjustment in routine production and post-harvest operations for achieving maximum productivity and economy of different cropping systems.

### 3.1 ITK Technologies Identified

Indigenous Technical knowledge for weather events has been compiled for two districts as per survey (Table 1). Here the astronomical, environmental and biological indicators factors practiced by local masses in forecasting rainfall has been collected, identified and examined. Interviews were conducted by Field Information Facilitators by contacting masses and peasants. It has been found that indicators of weather forecasting are mainly biological creatures viz., frogs, ants, termites, ants etc. These creatures give idea about future conditions of rainfall or dry spell. However, astronomical bodies like moon are also giving indication for rainfall forecast. Maximum number of farmers are aware of this astronomical perception.

### 3.2 Indigenous Knowledge Related to Weather and Climate Forecasting

Farmers use a combination of information or individual information. These informations are of plants, animals, insects, meteorological and astrological indicators to predict local weather [7]. This technique commonly practices indigenous knowledge of weather and seasonal climate forecasting in many regions of the world [8,9]. In this paper, we generalized indigenous knowledge based indicators into biological, non biological and meteorological indicators. The ITK technologies compiled under NICRA-AICRPAM project are shown in Table 1 [10].

**Table 1. ITK technologies compiled under NICRA-AICRPAM project**

S.No.	NICRA District	Farmer Name/ village	ITK	Remarks and Indicator
01	Kanker	Farmer group 1 (2*)	Ants carry eggs from one place to another (safer places)	Forecasting of rains
		Farmer Group 2 (3*)	Digging of earth by bear at many places and cumulation at one place	Forecasting of rain
		Farmer group 3(6)	Winged termites appearing	No rain in immediate future
		Farmer Group 4 (6 )	Caves in trees are there and frogs living there make sound some times	There is forecasting of rainfall
		Farmer Group 5 (2 nos.)	Red ants appear in swarms	Forecasting of rainfall
		Farmer Group 6 (10 nos.)	There is round circle around moon	Forecasting of rain
		Farmer Group 7 (1 no.)	Winged termites and round circle around moon	Forecasting of rain possible accordingly
		Farmer Group 8 (1 no.)	Red ants in high population are appearing	Forecasting of rains
02	Mahasamund	Farmer Group 9 (1 no.)	Ants entering in holes / caves is indication	Rain forecasting
		Farmer Group 10 (1 no.)	Termites flying at low altitudes	Immediate rain forecasting

#### 4. CONCLUSION

Low and fluctuating rainfall during crop growing season is a constraint for improving crop production in rainfed regions. In rainfed agriculture, the importance of rainfall over-rides all other climatic factors which determine the yields. With almost negligible irrigation facilities in rainfed regions, rain water shortages often lead to moisture stress causing substantial reduction in crop yields. Collection of ITKs has been done based on some astronomical, environmental and biotic factors in NICRA domain villages. As per perception of local masses, these ITks are valuable tools for rainfall forecasting. Moreover its importance rises significantly in rainfed agriculture. Validation of the ITKs is also required and can be future course of study. Presently this information of ITKs can be used in agricultural planning with advanced information of weather forecasting available nowadays. To achieve this objective, integration of data from modern techniques of weather forecasting with biological and astronomical evidences from traditional

knowledge can be done. All available abiotic and biotic indigenous rainfall forecasting techniques collected as ITKs may serve as a supplemental information to advanced scientific technologies.

#### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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