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Rechristening the Zabo integrated farming system to the Ruza integrated farming system practised at Kikruma village of Nagaland, India

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Kikruma village in the Phek district of Nagaland state is known for its integrated traditional farming system termed Zabo (which means impounding rainwater) for paddy cultivation in terrace fields by the Chakhesang tribe. A visit was conducted by a team of researchers from ICFRE-Rain Forest Research Institute, Jorhat, Assam to Kikruma village in September 2021, when during an interaction with a progressive farmer Mr. Zanehu Tunyi, it was informed that the term Zabo farming has been popularly used by the researchers and exists in the literature, however, the term Ruza is more appropriate for this integrated traditional farming system. A research article "Zabo: A time-tested integrated farming system practised by Chakhesang Tribe of Nagaland" published in the year 2018, reported that the term Zabo is also known as Dzüdü or Ruza system in certain areas of the Phek district. During the visit, the team of researchers from the ICFRE-Rain Forest Research Institute observed that Zabo and Ruza terms are used for two different types of ponds constructed for different purposes. The progressive farmers of Kikruma village explained the farming processes practised in their region. He suggested popularizing the Zabo farming as the Ruza farming system owing to the reasons that the actual water harvesting ponds used for paddy cultivation are known as Ruza in their local area and dialect instead of Zabo. The term Zabo is mainly used for small ponds or pits dug for rearing fish and fish fingerlings during the dry season.

Keywords: Integrated farming, Kikruma village, Ruza farming, Zabo

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Kikruma village located at 1500 m a.s.l. in Phek district of Nagaland state is well known for its unique integrated traditional farming system. The cultivation of paddy crop in terrace fields is known as the Zabo farming system which means impounding runoff water into ponds. This is an indigenous method of rainwater harvesting from forest hilltops to the constructed ponds near the paddy fields. The integrated traditional practice is popularly known as Zabo farming across the scientific domain[1-4]. The farming system is dependent on rainwater harvesting from the forest hilltops during the monsoon season for paddy cum fish cultivation (Fig. 1a). The agrobiodiversity of Zabo farming system has been well documented and reported[3]. Based on the literatures and field survey, the team of researchers from ICFRE-Rain Forest Research Institute, Jorhat, Assam recorded and analyzed the variation between the terms Zabo and Ruza farming systems and proposed to rename it as Ruza farming system instead of the Zabo farming system.

Methodology

A field visit by the team of researchers from ICFRE-Rain Forest Research Institute, Jorhat, Assam was conducted to Kikruma village in September 2021. The purpose of the field visit was to collect soil samples, crop yield data and related information under the research project "Genetic diversity of plant growth promotory diazotrophs and fluorescent pseudomonads associated with traditionally distinct mountain agroecosystems of Nagaland". The team visited the farm and interacted with the farmers. During the field visit and data collection, progressive farmer Mr. Zanehu Tunyi guided the research team and took them around the farm. The team conducted a detailed interview with Mr. Zanehu Tunyi and gathered the desired information and soil and crop

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samples. While interviewing, Mr. Tunyi explained various aspects of the integrated farming system practised in Kikruma village and shared several other information related to this integrated farming system which has still not been reported in the scientific literature until today. Recently Singh *et al*.[3] have reported that the term Zabo is also known as Dzüdü or Ruza system in certain areas of Phek. However, Mr. Zanehu Tunyi explained that the Ruza ponds are constructed in the middle of the paddy fields for runoff rainwater harvesting and storage and have variable dimensions (Fig. 1a). While the Zabo pits are dug in the paddy fields for rearing fish (Fig. 1b). The photographic evidences were also recorded by the team to demonstrate the reasonable differences between the terms used in their local dialect (Fig. 1a & b). Mr. Tunyi, who has developed this integrated farming system explained the differences between Zabo and Ruza and suggested to rename and popularize it as Ruza farming system. The differences between Ruza and Zabo and other related aspects of this farming system are presented in the results and discussion section.

Results and Discussion

Ruza

The large-sized ponds with variable dimensions (40 × 40 or 30 × 40 ft and 4-5 ft depth) are constructed for runoff water harvesting from the forested hilltop during monsoon season for paddy cum fish cultivation (Fig 1a). The runoff water from hilltops is harvested through channels/ Nalas and stored in the Ruza ponds for wet terrace paddy cultivation (Fig. 1c).

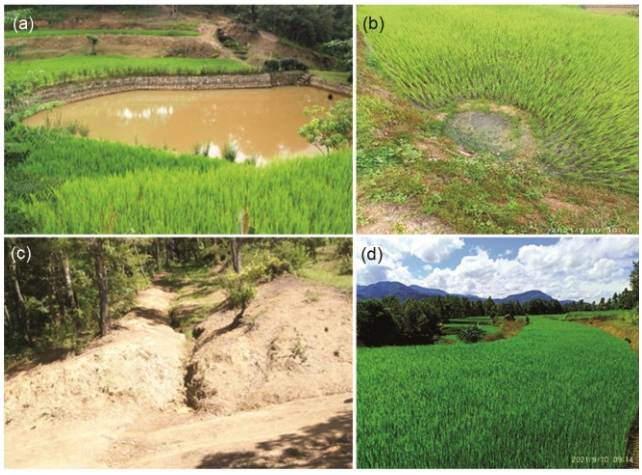

Fig. 1 — (a)- Ruza pond for runoff rainwater harvesting and storage, (b)- Zabo pit for fish cultivation during dry season, (c)- Rainwater harvesting channel from forest hilltop to Ruza pond, (d)- Integrated farm land

Zabo

Small pits are dug in the paddy fields for rearing fish and conservation of fish fingerlings during the dry season (Fig 1b). After crop harvest in October, the paddy fields dry up and the fishes move into pits called Zabo[5]. During the winter season, the farmers harvest fish from Zabo ponds which are still filled with water.

Based on the above observations during the field visit to the Kikruma village and interaction with the progressive farmers, we may reasonably draw comparisons between the Zabo and Ruza and find that the terms are not interchangeable and may suitably be used while referring to the type of farming systems. The progressive farmer Mr. Zanehu Tunyi opined that the Ruza farming system is a more appropriate term instead of the Zabo as the paddy cum fish cultivation is dependent on 'Ruza' rainwater harvesting ponds. Besides, the farmer also explained about different types of paddy fields categorized based on the availability of water resources. The two distinct types of paddy fields popularly known as:

Dziitsuii paddy fields

These paddy fields receive water from base flow fed by groundwater discharge and remain filled with water around the year. These fields are used for paddy cultivation during the Kharif season and for fish and snail cultivation throughout the year.

Füso paddy fields

These paddy fields dry up after the crop harvest and are usually irrigated using runoff water stored in the Ruza ponds during the monsoon season.

This description of the paddy fields has not been documented in context with the Zabo farming system in literature to date. This is unique information and was explored during the visit to Kikruma village and interaction with the local farmers.

The Chakhesang farming community cultivates six indigenous paddy varieties on a rotation basis. Initially, only the high yielding paddy varieties are cultivated for human consumption, and later as the soil nutrients and fertility decline, low yielding paddy varieties are used for cultivation which may be used for animal or poultry feed.

This farming system makes the best use of the optimum resources from the forests, agriculture, horticulture, fishery, animal husbandry, and soil &

Table 1 — Indigenous paddy (*Oryza sativa* L) verities cultivated in Ruza (Zabo) farming system

Variety name	Properties
Tani group	
Tani kumure	Red grain
Tani kumuga	White grain
Ribolu	White grain, dwarf plant
Richolu	White grain, tall plant
Thivuri	White grain, tall plant
Tani-Niro	White grain, tall plant
Kumunyo group (gum rice, used for wine making also)	
Nyode	White grain, sticky
Nyogo	White grain, tall plant
Rhenyoküzü	White grain, tall plant
Demelu	White grain, tall plant
Nyohu	White grain, tall plant
Rhenyo	White grain, tall plant
Some important plant species grown surrounding the paddy fields	
Forestry species	
Vernacular name	**Scientific name**
Himalayan alder (Rupo)	*Alnus nepalensis* D. Don
Cotton tree	*Bombax ceiba* L.
Parkia (Yongchak)	*Parkia timoriana* (DC.) Merr. (*Parkia roxburghii* G. Don)
Neem	*Azadirachta indica* A. Juss.
Khasi pine	*Pinus kesiya* Royle ex Gordon
Melia	*Melia azedarach* L.
Oak	*Quercus serrata* Murray
Bamboo species	*Bambusa* sp.
Fruit species	
Banana	*Musa* sp.
Mango	*Mangifera indica* L.
Papaya	*Carica papaya* L.
Pomegranate	*Punica granatum* L.
Plum	*Prunus domestica* L.
Peach	*Prunus persica* (L.) Stokes
Lemon	*Citrus limon* (L.) Burm. f.
Ficus	*Ficus semicordata* Buch. -Ham. ex Sm.
Indian gooseberries	*Phyllanthus emblica* L.
Guava	*Psidium guajava* L.

water conservation measures[3]. The components of the agrobiodiversity of the Zabo farming system are well documented still few components as observed during the study have been noted and tabulated (Fig. 1d & Table 1). Rich agrobiodiversity serves as the source of multiple nutrition for the farmers and the conservation of plant diversity in the village (Supplementary Fig. S1). The farming system is unique and developed by the local people of the village using their wisdom, knowledge, and skills for efficient soil and water conservation and optimum utilization of natural resources in the region for sustainable livelihood. Similarly, the Alder-based jhum cum agroforestry system in Khonoma village[6], alder large cardamom agroforestry in Sikkim[7], and pineapples-based traditional agroforestry system in Northeast India are the examples of a few prominent sustainable traditional farming systems in the Eastern Himalayan region of India.

Mr. Zanehu Tunyi, from the Kikruma village had been instrumental in developing this integrated farming system. A few pictures of the integrated farming system are presented in Supplementary Fig. S1. The study of the integrated farming system and the observations made during the visit to Kikruma village as a part of project work funded by the Indian Council of Forestry Research and Education, Dehradun makes the team members suitably suggest the renaming of the Zabo farming system to the Ruza, as from the details mentioned in this paper it is evident that the Zabo is a sub-component of the large farming system such as Ruza.

Conclusions

The study observed that the terms, Zabo and Ruza are used for different purposes. The term Ruza is used for runoff rain water harvesting and storage for paddy cum fish farming. However, the term Zabo is used for small pits dug in the paddy fields for fish fingerling rearing. Therefore, it is concluded that the term Ruza farming system is more appropriate term than Zabo and both the terms are not synonymous.

Supplementary Data

Supplementary data associated with this article is available in the electronic form at https://nopr.niscpr.res.in/jinfo/ijtk/IJTK_23(11)(2024)1023-1026_SupplData.pdf

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Conflict of Interests

There are no conflicts of interest declared by the authors.

Author Contributions

KG: Grant received, Conceptualization, data acquisition and manuscript writing, PKV- Plant identification and data preparation, GM- manuscript editing, DR- manuscript review and editing, SSK- Assistance in data acquisition.

Prior Informed Consent

Prior informed consent was obtained from all stakeholders who voluntarily agreed to study and publish.

Data Availability

The author confirms that all data generated or analyzed during this study are included in this article.

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