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Recovery of Indigenous Technical Knowledges for Sustainable Agricultural Farming Innovations in Murshidabad District of West Bengal

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ABSTRACT

It was observed that since time immemorial a number of Indigenous Technical Knowledge (ITK) have been adopted by the farmers. It was also observed that the ITK have been scientific explanation rather than superstition. India is a country populated by a number of indigenous communities, most of which have their own set of unique traditional knowledge and technology base. The indigenous technological knowledge can be promoted through scientific approach as a mean of higher and sustainable agricultural production, which will be eco-friendly, too. These traditional knowledge and technologies have played a significant role in the overall socio-economic development of the communities. A study on some of the native knowledge and technologies, with special reference to the concept of ITK, prevalent among a number of home-grown communities was carried out and the significance of the same in innovation has been evaluated. The study was conducted within the framework of Agriculture and allied sectoral system of innovation. A wide range of diverse sectors including agriculture, animal husbandry and fishing were considered for the purpose of the study as all these sectors are crucial in Indian context. During the course of the study, it has been observed that ITK is in vogue throughout rural India, is little documented and there is danger of extinction of this knowledge. It is of paramount importance to document these practices and to assess their validity. There is a lack of proper alliance between the practice of indigenous and modern knowledge. An appropriate association between the traditional and modern knowledge and technology systems has immense potential to benefit the society.

Key words: *Indigenous Technical Knowledge (ITK), sustainable agriculture, Sectoral System*

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INTRODUCTION

ITK refers for indigenous technical knowledge and is also known as, indigenous knowledge, traditional knowledge and ancient knowledge etc. The indigenous technical knowledge is the localized knowledge, transmitted from generation to generations and time tested by local community to solve the particular problems taking cognizance of local factors. Indigenous knowledge develops within a particular community and maintains a non-formal means of dissemination. It is based on resource conservation to the betterment of next generations. This resource conservation attitude of indigenous technical knowledge fosters the sustainability and sustainable agriculture is the urgent need to conserve the agricultural resources for next generations. Innovation is the first attempt to carry out an invention in practice[1]. Within the broad framework of indigenous knowledge, the contribution of Indigenous Technical Knowledge is remarkable. The sustainable agriculture is the holistic approach of ecofriendly agricultural technologies. The eco-friendly agricultural technologies cannot be ignored the indigenous technical knowledge (ITK). The ITK in agriculture are organic in nature. They do not harm any agricultural resources and environment. It was built up on farmer's own knowledge generated over centuries, unlike modern technologies, which are exogenous. But unfortunately, the mad race for modernization of agriculture, the time tested indigenous technologies are fast getting scarce and improvised. To achieve the goal of sustainable agriculture, its urgent to restore ITK in agriculture[2]. West Bengal is agriculture leading state of India have high crop producing area and rich biodiversity of crops and livestock including fishery. The farmers of this state have been practicing various traditional knowledge of agriculture over centuries. The present study was aimed to survey the scientific traditional knowledge of agricultural and allied sectors to the recovery of ITK for sustainable agriculture under West Bengal.

MATERIAL AND METHODS

The study was conducted within the framework of Agriculture and allied sectoral system of innovation in Murshidabad district of West Bengal during 3 consecutive years (2014-2016). A random sampling was applied to draw the samples for the study. Total 13 villages of 4 Blocks were selected to draw the sampling. The ITKs were documented through interaction and discussion with farmers of the study area.

RESULTS AND DISCUSSION

There were 11 ITKs observed for sustainable agriculture under Murshidabad district of West Bengal belonging to three sectors i.e. agriculture, animal husbandry and fishery and each have observed 3, 6 and 2 ITKs respectively.

Following sectors are considered for the purpose of the study

A. Agriculture
    1) Indigenous Grain Storage Structures
    2) Snail exoskeleton as rodent repellent
    3) Colouration of bicycle tire
B. Animal Husbandry
    1) Incubation and Hatching apertures
    2) Coconut oil and naphthalene mixture
    3) Kerosene and mustard oil emulsion
    4) Poultry shed on height
    5) Pot charcoal chicken brooder
    6) Traditional goat and sheep farming
C. Fishery
    1) Breeding trap of freshwater livebearer
    2) Milk and egg emulsion in nursery pond

A. Agriculture

Indigenous Grain Storage Structures: Kuthi (Fig.1) is a covered grain storage structure. It is an essential home-grown storage structure for storing various food grains, especially paddy grains (*Oryza sativa*) and wheat grains (*Triticum aestivum).* It is indigenously made-up with a poultice made up of tank silt, rice straw, rice bran and bamboo. It protects the grains from pests, diseases, rats, rodents and even from fire. Grains stored in the structure will have a keeping quality for about 1-2 yrs without much corrosion in quality. It should be mentioned here that no other modern structure will exhibit same performance. In general, total storage capacity of the Kuthi is about 100-200 kg but varies with the size. After filling the grains, Kuthi is covered with its lid. Kuthi is almost a stationary structure and is not frequently moved[3].

Fig. 1

1) **Snail exoskeleton as rodent repellent:** It is an innovative method under ITK to minimize crop loss through rodent in crop fields such as rice, potato, wheat, groundnut including different types of vegetable etc. in field. This innovation is a traditional practice among all caste of West Bengal i.e. from hilly area to sundarbans. Farmers are used empty exoskeleton of snail. A bunch (10-15 pcs) of empty exoskeleton is tying up with a channelized rope in hanging situation, which connected with nearby farmers home. Farmers are using this type exoskeleton bunch in 10 katha 7-8 pcs. It works when winds are blow, creates a sound from that empty snail exoskeleton. After creation of sound field rodents are feel some one is entered into the field, it create a fear factor in rate resulting rodents are run out from the field.

2) **Colouration of bicycle tire:** The colouration of bicycle tire with white is a traditional method practiced over West Bengal. To control field rodent farmers are used this type of innovation- all well known that rodent has fear factor on snake. Snake skin colour remarked as black and white. When white demarcation is done on black tire the tire almost looks like a snake, and it keeps on bamboo at middle of the field. Rodents are run out from the field.

B. Animal Husbandry

1) **Incubation and Hatching Operations:** Though the electric hatchery practices followed in commercial chicken production, broody hens were found to be widely used for hatching duck and improved variety of poultry (RIR & Vanaraja) eggs. Therefore, artificial incubation was not at all practiced in

hatching operation in villages of West Bengal. Mud pots (Fig.2) were used for hatching purpose with saw dust or paddy straws, rice bran as bedding material. The eggs were placed in the pots over the bedding material and the broody hen was made to sit on eggs. About 10-12 duck or poultry eggs were set per broody hen for 28 or 21 days. The same broody hens could be utilized for two hatches continuously.

Fig. 2

2) Coconut oil and naphthalene mixture: The coconut oil and napthalene mixture (Fig.3) is a traditional medicine practiced Murshidabad district of West Bengal. It is very effective practice for indigestion treatment to refute costly inputs on synthetic drugs and its side effects. Coconut oil (40 ml) and crushed naphthalene powder (2 balls) mixture (fig.4) is practiced by painting over the whole body of small ruminants devoid of natural orifices of the animal. After 10-15 minutes maximum ecto-parasites (fly, mite, lice and tick) will die and rest of the parasites will fly off. During this application care should be taken to avoid painting in eyes, nose and mouth of animal. It is applied once in a day, repeat on 8^{th} day[4].

Fig. 3

3) Kerosene and mustard oil emulsion: The kerosene and mustard oil emulsion is a mainly traditional medicine practiced among tribal people of Murshidabad district of West Bengal. It is very effective practice for indigestion treatment of desi poultry birds. Kerosene (20 ml) and mustard oil (80 ml) emulsion (fig.4) is painted on the infected area. Within 2-3 minutes latter all the ecto-parasites (mite, lice and bedbug) will die. During this application care should be taken to avoid painting in eyes of poultry. It is applied once in a day.

Fig. 4

4) Poultry shed on height: Construction of poultry shed on height from earth is a traditional method practiced in backyard farming over Murshidabad district of West Bengal. Majority of the poultry owners were rearing the birds in backyard/free-range system but they made necessary arrangement for night shelter of the birds to protect them from predators i.e. jackal, cat, dog and rat. Predator risk is strongly reduced by construction of poultry shed on height (approx 4-6 ft from ground). Sheds (fig.5) are made up of bamboo and iron sheet.

Fig. 5

5) Pot charcoal chicken brooder: Use of pot charcoal chicken brooder is mostly common in backyard poultry farmers. To maintain the proper house temperature is essential in order to keep birds healthy as well as to maximize weight gain and minimize feed conversion, and it is more important during the first few weeks of a bird's life. It made of mud (fig.6) and purchased from local pottery people (Fig. 1) by poultry farmer. The inner cylinder of the pot had 28 cm length and 25 cm diameter. It had been built in a way to have 35 to 45 holes on the sides to allow oxygen entrance and heat exit. Another similar empty pot was overlapped mouth-to-mouth on each of the pots for the purpose of retaining heat and flames of fire, before it had been put at the centre of brooder. In the pot charcoal chicken brooder, wood charcoal is used as source of heat to warm the pots. The heat that radiates from the pot makes the environment in the brooder warm.

Fig. 6

6) Traditional goat and sheep farming: Traditional goat and sheep farming is a traditional method practiced over West Bengal. The droppings of goat and sheep contain higher nutrients than farmyard manure and compost. On an average, the manure contains 3 per cent N, 1 per cent P2O5 and 2 per cent K2O. The sweeping of sheep or goat sheds are placed in pit (Fig.7) for decomposition and it is applied later to the field prior to cultivation. The nutrients present in the urine are wasted in this method. It is very flourishing practice for soil nutrient management to deny toxic hazards of fertilizers. This practice improves the soil structure (aggregation) so that the soil holds more nutrients and water, and therefore becomes more fertile.

Fig. 7

C. Fishery

1) **Breeding trap of freshwater livebearer:** Livebearer fishes gives birth the young ones. After birth they take food and swim freely like mature. Guppy (*Poecilia reticulata*), molly (*P. sphenops*), platy (*Xiphophorus maculatus*), swordtail (*X. helleri*) are the popular livebearer among the aquarium fish keeper in the world. Mainly progressive fish breeder used plastic packet for breeding. They keep the plastic packet in a 5 nos. rows in the cement tank (size 6x3x1.5 ft) with the help of two threads. On the bottom side 4-5 very small pore create for escaping the newly born young once. Each row contains 10 nos. of plastic packet. After that they put only gravid female livebearer fish in each packet with some aquatic weeds like *Hydrilla, Ceratophyllum or Cabomba* etc. to reduce predation/ cannibalism.
2) **Milk and egg emulsion in nursery pond:** Soap emulsion (Fig.8) is produced by thoroughly mixing 5-6 pieces of poultry egg into 2-3 litres of lukewarm water. Emulsion sprays into nursery pond (0.33 acre area) 72 hours before releasing of spawn. Then 1kg milk power dissolves in 5 litres of lukewarm water and then adds it into 75 litres of fresh water and mixed thoroughly. Then milk spray into the pond water 2 hours prior to spawn release into the nursery pond. Stacking rate of spawn 8 bati per 0.33 acre (1 bati= 250g spawn). After using this technique survival rate of spawns enhanced to 85-95% than normal practices (70-75%). Milk act as a balanced food for spawns at the initial stage and rest of milk used by phytoplankton in the nursery pond. It leads to maintain primary productivity of the nursery pond. This media can also help for laying mosquito eggs which is a good protein source for spawns. Growth rate will increased and to reach spawn to fry stage required 15-20 days in normal cases but through this techniques required 10-12 days. Health condition of this fish seed will better.

Fig. 8

CONCLUSION

In case of traditional societies, the local indigenous individual is the major actor. In many cases, the indigenous communities are not well aware of the value of their indigenous knowledge which has been passing from generation after generation. Actors such as scientific institutions and NGOs could play crucial role in this regards for capacity building among the indigenous community and popularization of traditional methods and techniques. In today's context, there is an

urgent need to evaluate and popularize indigenous innovation. Government schemes and Research and Development activities should reach the indigenous users and scientific rationale behind these indigenous technologies should be studied for patenting the same.Indigenous knowledge may contribute in several ways such as by helping identification of cost-effective and sustainable mechanisms for poverty alleviation, which are locally manageable and meaningful. Farmers of West Bengal are rich in traditional knowledge transferred and adopted from generations together. Such knowledge and practices of farmers is worth validating and exchanging with the other parts of the world to make innovative agriculture sustainable farming which is gaining importance locally as well as globally. knowledge from different parts of the world, its proper documentation, validation and sharing and exchange of knowledge on global basis to provide good quality food on sustainable basis with reduced adverse impact on the environment.

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