Original Research Article

Impact of Training in Composite Fish Cultivation Program on participants' abilities in West Kameng District, Arunachal Pradesh, India

Abstract

The study was conducted during 2012-2022 to determine the effectiveness of Composite fish Culture (CFC) training programme on trainee's knowledge in the West Kameng district by the KVK. Most of participants in these training programs were farmers and labourers including rural youths. It was found that majority of respondents joined the training course to adopt the fish farming as an occupation. The results revealed that just after completion of training, most of participants were having Medium to high level of knowledge except <9% of trainees having low level of knowledge regarding composite fish culture technology in mid hill and foothill areas of the district. The findings indicated that farmers trainings programme were conducted by Krishi Vigyan Kendra, West Kameng was effective in enhancing the knowledge gain by the participants to enhance their fish culture skill at village level in far flung areas of Arunachal Pradesh. By using this knowledge they can find self-employment which will be helpful to reduce the fish production gap as well as to support the rural economy of the state.

Keywords: Knowledge, training, trainees, Composite fish culture, Knowledge gain etc.

1. Introduction

Freshwater aquaculture has great potential to increase the farmers' income and providing economic and nutritional security among rural farming community living in far flung areas and it is fastest growing food production sector, become the predominant source of protein supplement for a massive growing population in India. As per latest edition of SOFIA 2024, the State of World Fisheries and Aquaculture, an estimated 61.8 million people were employed in the primary sector of fisheries and aquaculture in 2022, down from 62.8 million in 2020 while the global fisheries and aquaculture production in 2022 surged to 223.2 million tones, with an increase rate of 4.4 percent from the year 2020. Recent studies also indicated that investments in new production systems, management practices and skill development result in considerable increase in production and income (Kumar and Engle, 2016; Kumar *et al.*, 2018). With the aim of increasing fish production the Government of India has also launched and implemented the various schemes for the fish farmers in the country but hard to accomplish without well-trained and skilled workforce. Skill development is becoming equally important, like other factors of production as fish farming is becoming more skill-intensive, technology-driven and inert-linked with allied economic activities. Lack of skill or knowledge among farmers may result in low productivity. In this connection "Training" is the easiest method to transfer or gain knowledge as individual of any age irrespective of gender and educational status can participate in training programmes. Training helps the farmers in raising awareness about new farming technologies and bridges the gaps between production and productivity (Swetha et el., 2020; Uttej et al., 2023). Studies on the effectiveness of training for farmers showed that most of the training programmes in developing countries failed due to excessive concentration on a particular technology transfer rather than a broader spectrum of farmer empowerment including knowledge dissemination. However,Past studies also proved that skill development training for farmers yielded positive results and these gaps could be overcome by carefully revising and designing the skill development training, which can facilitate to achieve desired productivity and income. It has already been proven that capacity building of fish farmers through training is more worthwhile than providing financial support.Tripp *et al.* (2005) also confirmed that training contributed significantly to enhance farmers' skill and knowledge.In order to update rural farmers with knowledge, skills and new scientific techniques of farming, the Farm Science Centre known as "Krishi Vigyan Kendras (KVKs)" plays an important role by designing different types of area specific and need based training courses (Singh & Tanwar 2018). Training is an important aspect of the entrepreneurship development and it is considered as part

of strategy for growth and development of an organization. Basicallytraining is intended to help individuals to learn and to bring a desired standard of efficiency, condition and behavior. Thus, it is sustained, coordinated and focused effort to enhance individual's competence for enduring success (Pandey *et.al* 2017).

The various need based farmers friendly training programmes are being imparted on regular basis by the scientist of said Farm Science Centre in the country including North Eastern States of the country. Among NER the Arunachal Pradesh is a largest hill state and shares its international boundaries with Bhutan in the west, China in the north and Myanmar in the east with a wide range of climates and altitudes (Misra *et.al.,* 2024). Fish farming is playing a vital role from economic, nutritional and employment point of view in the state, in spite of increase in the production, the current level of fish production is not sufficient to fulfill the requirement, very much far-away to meet out the present consumption demand. Therefore, to fulfill the above said production gap and to ensure the positive attitudinal changes among fish farmers a series of farmers training programme have been imparted by the KVK West Kameng in the whole district started from Bhalukpong Assam border to Senge Village near to Sella pass covering most of villages in all the circles of the district to increase the fish production and boost the farmers economy for nation building. With reference to these training programmes conducted by the KVK the present study was conducted to evaluate the impact of composite fish culture training programmes on trainee's knowledge gain and their economy in the West Kameng District of Arunachal Pradesh since 2012 to 2022.

Materials and methods

As per available database of trainees, a total 127 farmers were trained on the scientific package and practices of Composite fish culture technology during 2017 to 2022 and they were considered as the population for the study. Primary data were collected during December 2021 to June 2022 from the selected trainees. Not needed here.

2.1. Description of study area

Describe the study area clearly under this title

The study was conducted in 3 circles of district West Kameng*i.e*Dirang, Thembang and Bhalukpong having 127 nos. of fish farmers by the KVK West Kameng since 2012-2022 to access the knowledge acquired by trainees on composite fish culture technology. The various

type trainees comprised of farmers, labourers and unemployed rural youth.The socio-demographic profile of trainees varies from semi-urban to rural, illiterate to post graduates, landless to land holders and different categories with age group between 25-55 years.

2.2. Research design and data collection

A knowledge test comprising of ten objective type questionnaires was framed to determine the impact of training programmes before and after the training. Quantitative technique was used to assign marks for each answer of the respondents. Individual participant knowledge score was calculated by assigning one credit for correct answer and no credit for incorrect answer.

2.4. Data analysis

The gain in knowledge was assessed by calculating the difference between the knowledge acquired on scientific package and practices of Composite fish culture technology by the trainees before and after the farmers trainings programme. The data for knowledge gain was tabulated and analyzed by using the following standard formulas -

Compute Knowledge Gain **(CKG) =** *Post training test – Pre training test* **(Becker 1998)**

Knowledge Index **=** *No. of correct responses by the participants X 100 / total no of items*(**Swetha *et. al.*, 2020)**

The knowledge scores are further assessed by classifying the trainees into three categories as low (0 to 35%), medium (36 to 60%) and high (more than 60%) level of knowledge.

Results and Discussion

3.1. Demographic characteristics of sample respondents

The participant's socio demography of trainees was assessed through various characteristics like age group, educational status, gender wise participation, land holding and their occupation etc.

Trainee's age group-

On the basis of age group the participants were categorized in 3 categories as the farmers having age group 25-35 year in category I, 36-45 year in category II and 46-55 year in category III respectively. The details are depicted in **Fig 1 a.**

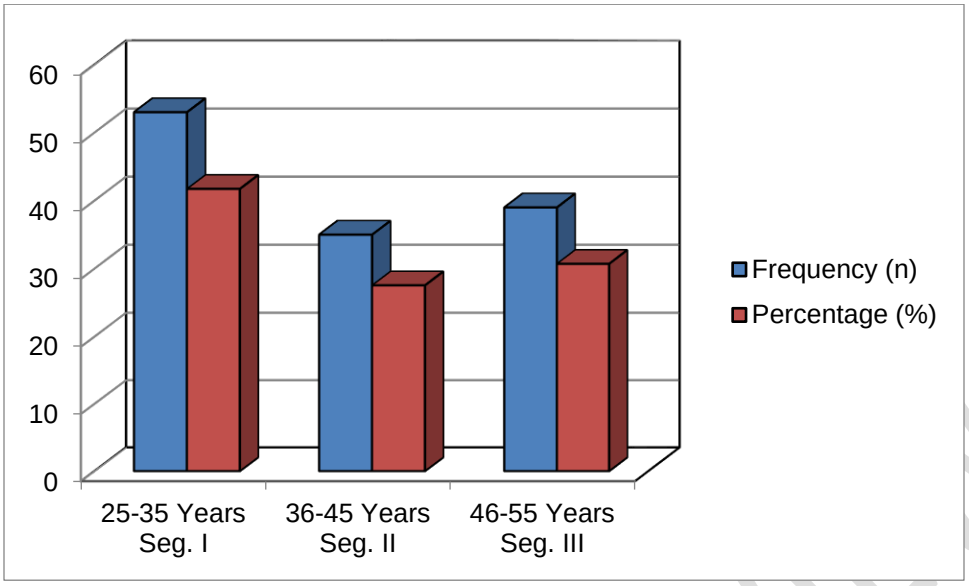

Fig 1 a): Participants distribution based on age group

As indicated in the figure above the maximum numbers of participants were from category age group of 25-35 years having 41.73%, followed by age group of 46-55 years that have 30.71% and least age group 36-45 years of participants were 27.55%. The number of trainees was found highest from Category I might be because of their age factor as they were maximum from young age group and want to earn sufficient money from various sources to upgrade their life standard where as the number of trainees was higher in category III in compare to category II because of their health concern and higher interest to eat fresh fish from their own sources rather than buying the one or two week old fishes available in the market injected with formaldehyde to protect from rotting. The study was in line with the findings of Singh *et.al.* 2013.

Gender based trainee's participation-

All the trainees were from tribal community with involvement of both male and female gender. The females were share higher percentage which was 59.84%, followed by males that were 40.16%. Gender wise farmer's distribution has been illustrated in **Fig 1 b.**

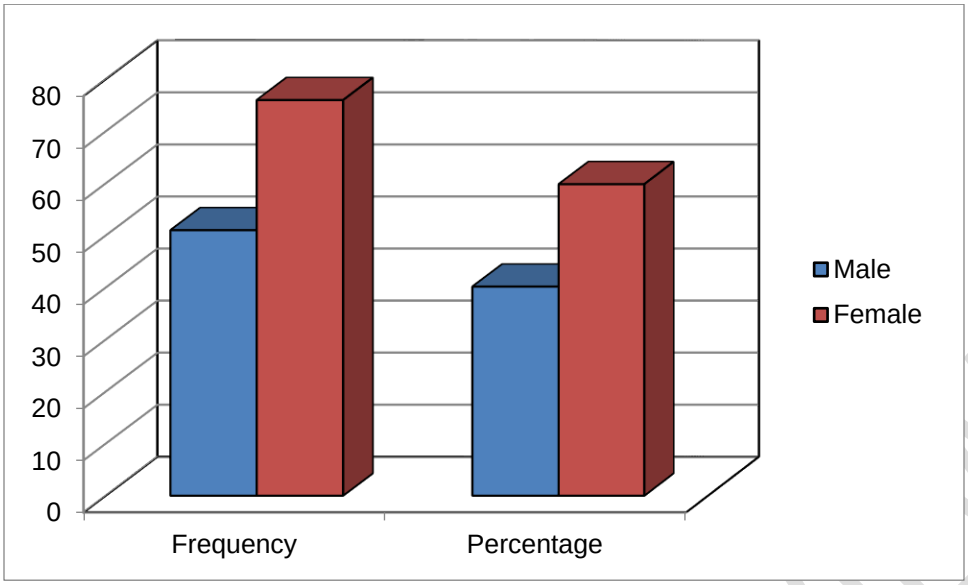

Fig 1 b): Gender wise participation by the trainees

The higher no. of female participants might be due more female population along with the freedom to participate equally for all work in the North eastern States including Arunachal Pradesh. The same trend of female farmer's participation has been recorded in the study of Women Participation in hilly areas of Uttarakhand by Qureshi *et.al.*,2021.

Trainee's education standard

The education status of respondents was categorized in 5 groups *i.e* G1, G2, G3, G4 and G5 for Illiterate, Primary to middle level, Secondary to Senior secondary, Senior secondary to graduate and Post Graduate respectively. It was observed highest for G3 with a frequency of 47 and share percentage of 37.00 followed by G4 with a frequency of 32 and share percentage of 25.19, G2 with a frequency of 28 and percentage 22.05, G1 with a frequency of 13 and percentage 10.24 and G5 having frequency of 07 and percentage 5.51respectively. The detail of trainees based on their education has been depicted in **Fig 1c.**

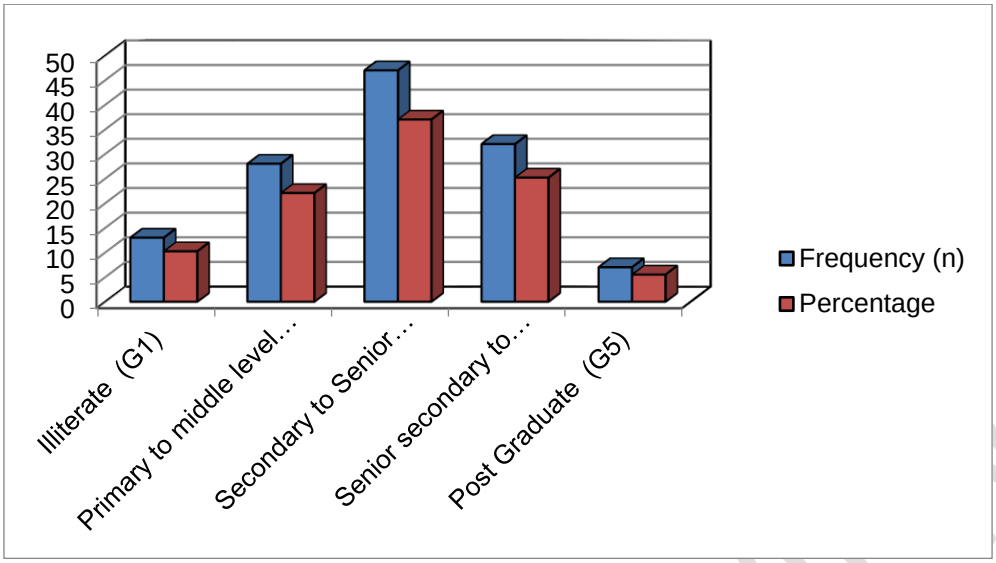

Fig 1c): Distribution of trainees based on their education

The highest share of trainees up to Secondary to Senior secondary education might be because of good availability of schools from Primary to higher secondary level in far flung areas too followed by Senior secondary to graduate because of the availability of colleges almost in all the district head quarter of whole state of Arunachal Pradesh but after that the share of trainees in higher education becomes slow due to rare availability of higher educational institutes and their economic backgrounds. The lower no. of illiterate population is because of good awareness about the education in the district as it is powerful weapon for quality societal change. The study was in line with the findings Singh *et.al*, 2013.

Participants land holding

The land holding was observed highest > 2ha with a lowest frequency value n= 33 and 25.98 share percentage for the group (FG3) followed by moderate land holding of 1-2 ha for the group (FG2) with highest frequency value n=55 and percent share of 43.31 and lowest land holding 0.5-1.0 ha for (FG1) with a frequency value n=39 and 30.71 percent share among whole participants group. The data clearly showed that no. of farmers was highest for the group FG2 having moderate land holding betwee1-2 ha followed by FG1 with lowest 0.5-1.0 ha of land holding and FG3 with the >2ha which was recorded highest in term of land holding. The land holding details of trainees has been illustrated in **Fig 1d.**

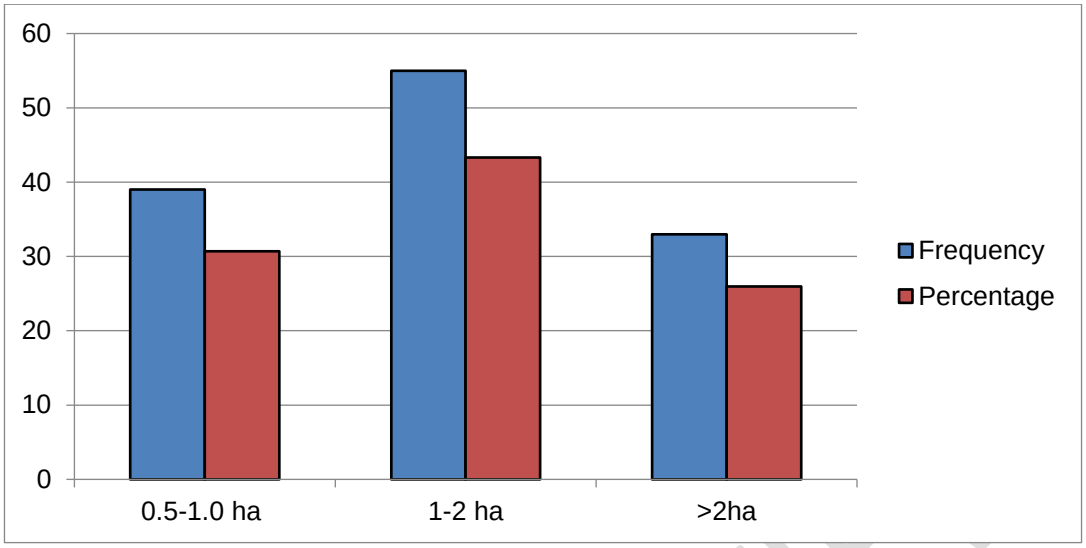

Fig 1d) ***Participants distribution based on land holding***

The maximum no of farmers having moderate size of land holding may be due to hilly terrain of the district and sparse population with respect to size of geographical area while highest size of land holding with smallest no. off trainees which is very common at higher peaks of the district might be because of very less population at higher altitudes but blessed with higher land availability because of their tough locations whereas the trainees from foothill areas were found with lowest size of land holding which was between 0.5-1.0 ha only might be due to less farming land and highly condensed population in that geographical location. The study was in line with the findings Birthalm, 2010.

Participant's occupation

The recorded data indicates that the maximum participants were unemployed rural youth having frequency value n=43 with the share percentage 33.86 followed by the farmers with frequency value n=25 and percent share of 19.69 while the lowest frequency value *i.e* n=22 and 17.32 percent share of participants were recorded from laborer community among whole intended beneficiaries. The distribution of trainees based on their occupation has been depicted in **Fig 1e.**

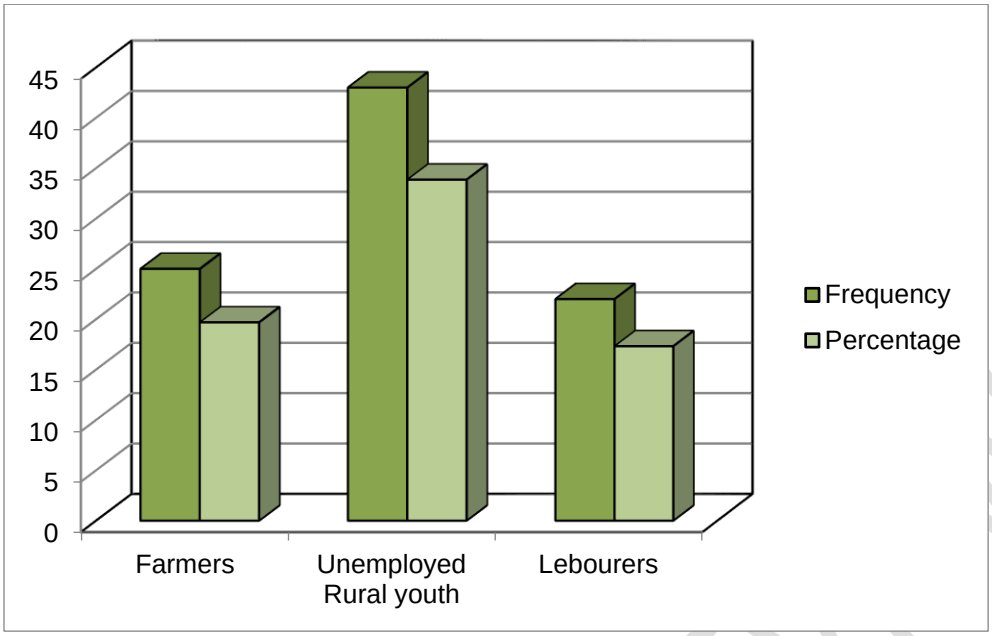

Fig 1e) ***Participants occupation***

The highest number as well as unemployment recorded in the group of trainees from Rural Youth category could be due to their lower education standard *i.e.* highest number of trainees have only secondary to senior secondary level of education followed by their home sickness tendency as they don't want to go outside for job purpose. The same type of findings was also reported by Gangwar (2018) for the study on employment vulnerability of rural youth in the hills of Uttarakhand.

Trainees Knowledge assessment with respect to different operational parameters-

The Table No.1 reveals about the knowledge of trainees before and after training programme on Composite fish culture package and practice imparted by the Subject Matter Specialist from KVK West Kameng. The gain in knowledge was calculated by subtracting the post-training and pre-training percentage while Knowledge index had been calculated by the assessment of trainees responses for CFC operational parameters.

a) Trainees knowledge on CFC operational parameters before training -

The pretest data in relation to different operational parameters of composite fish culture before training revealed that the participants had maximum knowledge on selection of fish species *i.e* 25.10% followed by 15.65% for Stocking size and density of fish species, 10% on fish marketing, 8.5% on site selection and pond construction, 5% for the Preparation of pond before stocking as well as on Artificial feeding also while it was 4% on Fish health management and

only 2% for water quality management. The detail of Trainees knowledge on CFC operational parameters before training has been illustrated in **Fig 2a.**

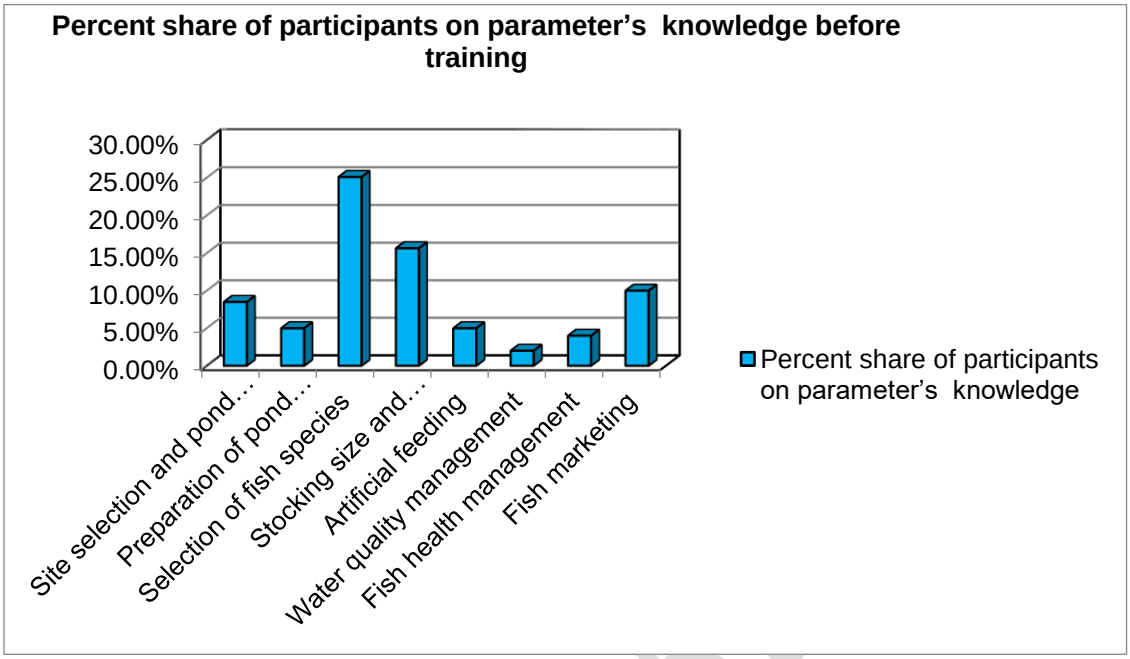

Fig 2a): Trainees knowledge on CFC operational parameters before training

The difference in knowledge level as well as poor knowledge of trainees for the CFC operational parameters before training might be because of lack of knowledge on complete package and practices of Composite fish culture along with unawareness about the importance of CFC technology to enhance the aquaculture production. The study was in line with the findings of Singh *et. al.*,(2008) in that studied on Adoption level of Composite fish culture techniques in District Badaun Uttar Pradesh.

Trainee's knowledge on CFC operational parameters after training –

The recorded post-evaluationdata clearly indicates that there was significant increase in the knowledge about different operational parameters of CFC technology after training of participants. It was highest 67.25% for the parameter of Site selection and pond construction, followed by 58.13% in Preparation of pond before stocking, 57.85% on Selection of fish species, 53.86% for fish health management, 52.00% on Fish marketing, 45.00% for Stocking size and density of fish species, 40.35 on artificial feeding and 35.72 on water quality management respectively. The detail about Trainees knowledge on CFC operational parameters after training has been depicted in **Fig 2b.**

The significant changes in the knowledge level of trainees about different CFC operational parameters along with the parameter wise knowledge variation among the trainees were observed during the study which may be because of their parameter wise personnel concern

and thinking besides the proper training on whole package and practices of Composite fish culture technology. The same trend in the findings for different operational parameters was also reported by Swetha *et. al.*,(2020).

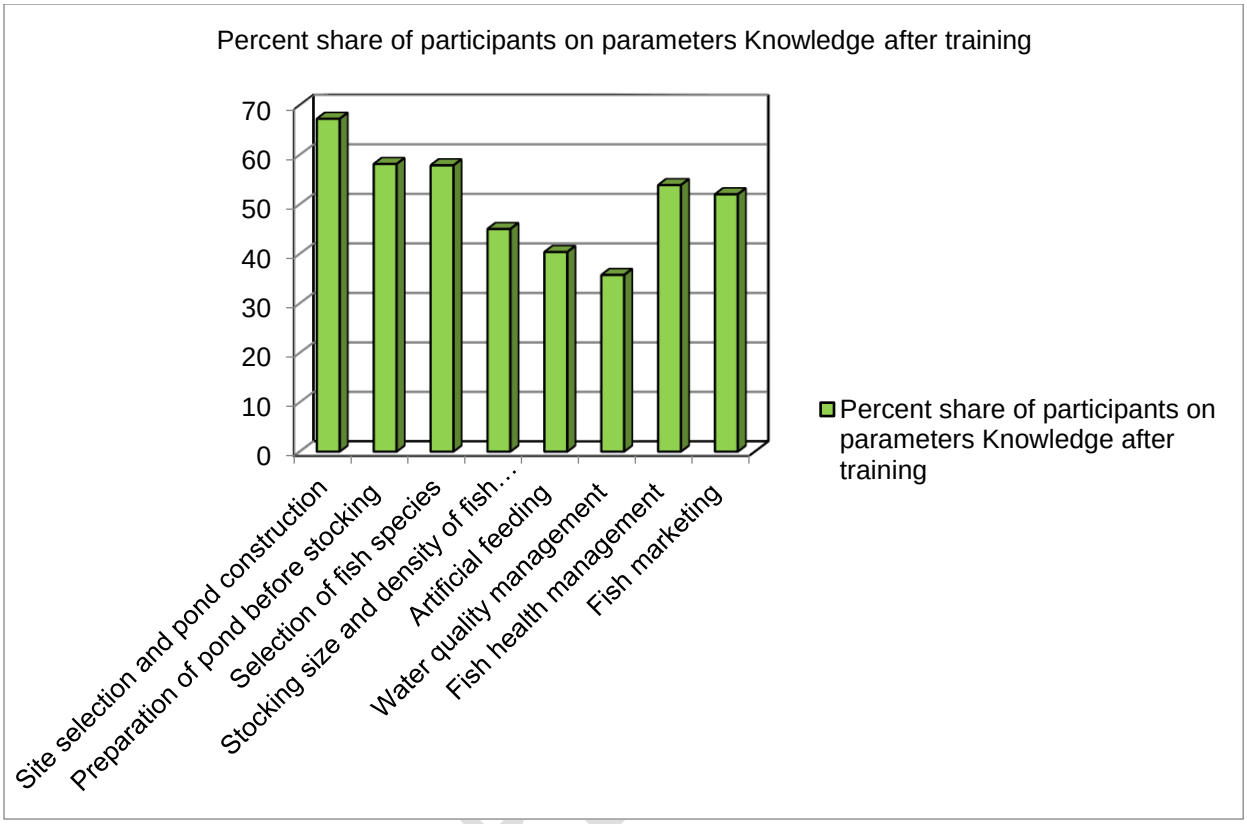

Fig 2b): Trainees knowledge on CFC operational parameters after training

C) Assessment of participants Compute Knowledge gain -

It is the positive change in the knowledge of participants after training and assessed by the test between Post evaluation test after conduction of training programmes and pre evaluation test before training. The data regarding the Compute Knowledge gain has been given in Table No.1. The recorded findings clearly indicates that it was highest 58.7 for Site selection and pond construction followed by 53.13for the culture parameter regarding pond Preparation before stocking, 49.86 in Fish health management, 35.35 for artificial feeding, 33.72 on water quality management, 32.75 for Selection of fish species and 29.35 for Stocking size and density of fish species. There were observed the significant changes in compute knowledge gain by the trainees after training which clearly shows that training programme conducted by the KVK on fishery had a good effect in enhancing the fish culture skill among the intended beneficiaries selected for the purpose so far. The same lines of results have been reported by the Laxmi *et al*., (2015) on the evaluation of training programmes organized on fish production technology.

b) Participants Knowledge Index-

The knowledge Index (KI) is an indicator for measuring the ability to adopt and diffuse the knowledge by the trainees. The data related to KI have been depicted in the table no. 1 reveals that it was highest 81.25 with respect to Site selection and pond construction followed by 72.25 for pond preparation before stocking the fingerlings, 71.25 for selection of fish species, 66.25 in reference to fish health management, 65.00 for the parameter on fish marketing, 56.25 with respect to stocking size and density of fish species whereas it was found 50.00 with reference to artificial feeding and lowest 43.75 for water quality management. There were observed a parameter as well as participant wise variation in the knowledge index which may be due to their personal concern on specific CFC parameter along with the education standard and age group of the respondents. Beside these above facts, the significant change have been observed in knowledge Index of trainees after training which was higher enough in comparison to sassed KI of participants before training which might be due to higher interest of the trainees in the training programme and availing opportunity to discuss their doubts related to CFC technology with subject matter specialists may be another reason for their improved knowledge level. The above findings are in accordance with the findings of Swetha *et. al.*, (2020) on the study of Training impacts on knowledge level of Fish farmers with respect to Composite Fish Culture technology.

Table No: 1 Knowledge of trainees before and after training programme

S. No.	Parameters	Pre-evaluation (%)	Post-evaluation (%)	Compute Knowledge Gain	Knowledge Index
1.	Site selection and pond construction	8.50	67.25	58.75	81.25
2.	Preparation of pond before stocking	05.00	58.13	53.13	72.5
3.	Selection of fish species	25.10	57.85	32.75	71.25
4.	Stocking size and density of fish species	15.65	45.00	29.35	56.25
5.	Artificial feeding	5.00	40.35	35.35	50.00
6.	Water quality management	02.00	35.72	33.72	43.75
7.	Fish health management	04.00	53.86	49.86	66.25
8.	Fish marketing	10.00	52.00	42.00	65.00

(Participants Knowledge before training and acquired Knowledge gain after participation in training programme) **(n=127)**

Extent of adoption by the trainees after training

The data presented in Table 2 shows the adoption status of CFC technology by the participants after the training program. Majority of the trainees 58.27% had shown the medium (adoption of CFC Operational parameters between 36-70%) level of adoption with the frequency value of n=74 followed by high level of adoption (adoption of CFC Operational parameter >70)

by the 33.07% of participants having frequency value of n=42 and it was minimum with respect to low level of adoption (adoption of CFC Operational parameter between 0-35%) by the 8.67% of trainees with lowest frequency value n=11.

Table No: 2 The adoption status of CFC technology by the participants after the training program

Adoption level (%)	Frequency (n)	Percentage
Low (0-35)	11	8.67
Medium (36-70)	74	58.27
High level (> 70)	42	33.07

(Extent of adoption by the trainee's)

The maximum no. of participants was found to involve in medium level of adoption because of higher no. of rural youth participants in the training programmes who were involve in govt. contract work also rather than fish culture practice fully, for them it was as a side business to obtain fresh fishes for their family and friends consumption at household level and not for commercial purpose. The trainees following the high level of adoption was also good but less than the medium level adoption follower which might be due to the reason as they were fully interested in the programme as well as have good education standard ranging from senior secondary to postgraduate where as no. of trainees following the lower level of adoption was lowest and the reason behind lower adoption level might be due to the poor interest on CFC technology supported with lack of their own faming land for said purpose. These findings are almost synonyms to the findings of Belakeri *et al*., (2017).

4. Conclusion

The above findings clearly indicate that farmers trainings programme conducted by Krishi Vigyan Kendra, West Kameng were helpful in disseminating the composite fish culture technology at village level in far flung areas of Arunachal Pradesh. Most of participants in these training programs were farmers and labourers including rural youths. By using this knowledge they can find self-employment which will be helpful to reduce the gap in production and productivity to support the rural economy in the state of Arunachal Pradesh.

Although the effort had been made by the SMS fisheries from KVK West Kameng to support the farming community since 2012-2022 but still there is the need of hour to update them about other area specific latest technologies related to fish farming in the region.

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