Income Generation Opportunities Through Secondary Agriculture Towards Sustainability in Angul District of Odisha: A Case Study

ABSTRACT

AIMS: The aim of the study was for attempting various Income Generation interventions to address poverty, unemployment and lack of economic opportunities which could increase participants' ability towards secured livelihoods. Secondary agriculture is essentially a way of business development that aids in providing farming households in rural areas with income and employment.
Place and duration of the study: The study was conducted in Krishi Vigyan Kendra Angul, Odisha between 2016-17 to 2021-22.
Methodology: PRA survey of the village followed by group discussions and other approaches were conducted to identify the constraints and accordingly the process planning was performed for strengthening their livelihood. By the technological interventions from Krishi Vigyan Kendra, Angul the famers took trainings for grasping ideas & scientific knowledge about the enterprises. Periodically some critical inputs under various programme were also provided from the KVK.
Results: As a result, year after year the farmers practicing bee-keeping could able to earn in an average of Rs. 5,14,100/- from 180 bee boxes by selling pure honey & bee-colonies. Besides this, another group of farmers with improved colour poultry breeds under backyard condition with an average yield of 1.62 kg could earn an average net return of Rs. 14,742/-.
Conclusion: Given that the world's population is quickly growing, it is imperative for global agriculture to turn to secondary agriculture (honey bee and poultry farming) in order to provide opportunities not only for improving livelihood but also for nutritional security.

Keywords: Enterprises, Income Generation, Productivity, Secondary agriculture

1. INTRODUCTION

"Angul district has come into existence as a separate district consequent upon the re-organisation of districts in Odisha on 1st April 1993. As per the agro-climatic condition, it comes under Mid Central Table Land zone in 840.16' to 850.23' East Longitude and 200.31' to 210.41' North Latitude with 300 meters. above MSL. The river Brahmani flows in the middle and Mahanadi demarcates the western border of the district" (District Census Handbook 2011). "Industries like NALCO, NTPC, Jindal & TATA steel and Talcher Coal Field have brought the fame of the district to national level. The climate of the zone is fairly humid with dry and hot summer followed by wet and humid monsoon and mild winter having average normal rainfall of 1401.9 mm per annum. The soil of the district is mostly Red Lateritic, Sandy & Alluvial in nature" (District Vision Document 2020).

"Due to population explosion and social conflicts majority of the joint families have been disintegrated into nuclear families, as a result of which the size of land holding is fragmented into smaller sizes. Therefore, the proportions of small and marginal farmers in the district are 16.8 & 77.3 % respectively" (Ahirrao 2013). "Emphasis is always given to select small and marginal farmers having small land holdings as that enables them to practice improved agricultural technologies in their own field and can demonstrate different practices to the fellow farmers. As field-based agriculture is always affected by natural calamities, price fluctuation and inefficient marketing system, adoption of secondary agriculture plays a vital role in improving the livelihood of a marginal or small farm family" (Orissa Forestry Vision, 2020).

"Bee-keeping is an enterprise which requires a high investment with very high returns. This enterprise not only gives return from selling honey, wax and colonies but also helps in increasing crop yield by improving pollination" (Orissa Forestry Vision, 2020). "Bee-

keeping and pesticides don't really go hand in hand because chemicals cause the insects to die. So, the farmers are asked to refrain from using pesticides while rearing the bees. Hence KVK, Angul intensified honey bee rearing in the backyard of marginal and landless farmers in the district by giving training and providing some critical inputs to the practising farmers" (Sahoo 2011). "Similarly, Angul is having a good number of cattle like cows, buffaloes, goats and sheep as domestic animals (District vision document, 2020). Bullocks are mostly used for the traditional method of cultivation in the district where as cows are mostly kept for milk. Besides these, poultry farming now-a-days is becoming a popular enterprise in which chicks like Aseel, Kadaknath, Vanaraja, RIR etc. are now being distributed in SCSP scheme by KVK, Angul" (Udharwar 2018). "The world is at a critical juncture, and there is an urgent need for transformative food systems that ensure the empowerment of poor and vulnerable population groups, often smallholders with limited access to resources or those living in remote locations, as well as the empowerment of women, children, and youth "(FAO 2018). The backyard poultry production system, as practiced by 80% of the world's rural population (Wong et al. 2017), can be a transformative change in low- and middle-income countries.

So, in the present study KVK, Angul has put an effort to intensify Bee-keeping and introduce improved poultry breeds for rural scheduled caste poultry farmers. "A baseline survey was made from 10 nos. of practising Bee-keepers during 2016-17 and it was found that, they had the constraints like lack of land resources, capital, technical knowhow, process of rearing of bees etc. Similarly, before introducing the improved poultry breeds, a baseline survey was conducted and information was collected from 30 backyard poultry farmers of two villages of Angul district though personal interview, questionnaires and group discussion" (Udharwar 2018). "The information was collected on the performance of existing desi birds, dual purpose birds and problems faced by them in their management aspects. It was observed that, high mortality in day old chicks" (Ganesan 2005;District Census Handbook 2011), less availability of chicks and its feed in nearby locality, poor weight gain, less egg production by desi birds and lack of broodiness in the dual purpose chicken and lack of technical knowledge were the major constraints for providing a continuous source of income for rural poultry farmers (Orissa Forestry Vision, 2020).

Hence, Krishi Vigyan Kendra, Angul designed the present study to know the economic impact of rearing honey bees and improved poultry breeds in Angul district of Odisha. With this background, the study was conducted with the following objectives:

1. To study the economic status of Honey bee farmers after scientific interventions.
2. To study the economic status of farmers after rearing of improved poultry breeds.

2. METHODOLOGY

At the beginning of the study, training programmes on different aspect of Bee-keeping and Poultry Farming were planned to educate the farmers. Then the centre distributed different bee-keeping equipment like veil, gloves, nucleus boxes, smokers, queen gate etc. to practicing farmers and 21-day old chicks to only those farmers who had made poultry shed by them. There are different types of bees you can work with, Indian or foreign and different types of bees produce different quantity and quality of honey, in different regions (District Vision Document 2020). Which bees are best for your area you will learn with experience? Farmers received their training in bee keeping from KVK in different sequential periods (Maulick 2013: Sahoo 2011)). "If you are planning to start a bee keeping business, you must train yourself. After the training you must consult the bee keepers in your locality that will provide you guidance and advise which will be as useful as your training. The books from which you learn are important but practical knowledge is even more important" (Udharwar 2018).

"They continued that there are two important things with bee keeping - one is the honey you get and the other is the bee sting that you have to guard yourself against. The

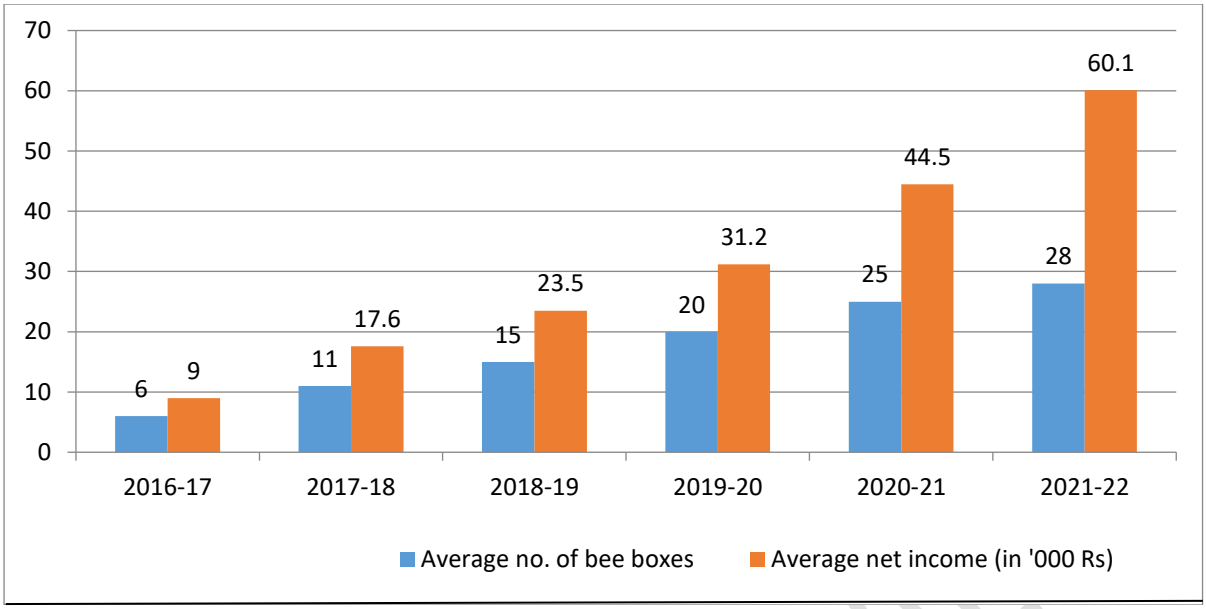
bees don't attack and sting unless they sense danger. You will learn with experience, how to treat bees, how to handle them and to collect honey without being stung by the bees" (Varma and Power 2005; Verma and Singh 2007). "Among the farmers, one farmer *i.e.* Mr. Bijaya Bir of Banatala village started his business gaining all the knowledge, ideas and practices from KVK and continued his study till date by extending the bee boxes and selling honey" (Pradhan 2020). According to Mr. Bir, another aspect of bee keeping is where you place your boxes. The type of honey you get depends on the plants that are around the boxes and from which the bees can collect nectar for the honey. "Different flowers grow in different seasons in Odisha; hence you get different type of honey in different seasons. You can harvest honey 2-3 times in a year from your boxes. Then he describes the process of collecting honey. You must always use mask and gloves. You must keep a smoke sprayer handy in case the bees get angry. You should use custom made stands to place boxes on, so that insects don't eat up the honey. You must be extremely careful while opening and closing the boxes, making sure that the bees don't get offended. You should have good outer coverings for the box. In rainy or other seasons when the nectar is not available for the bees, you can give the bees artificial food" (Ahirrao 2013).

Next part is the extension of income of poultry birds by SC farmers of Angul district who could gain ideas of poultry bird rearing from KVK. The KVK distributed the chicks with rearing all kinds of vaccinated procedures. The day-old chicks of improved breeds like Aseel, RIR, Kadaknath, Vanaraja were procured from CPDO, Bhubaneswar. The chicks were reared for 21 days in poultry brooding unit of KVK, Angul. During those 21 days rearing period vaccinations to all the birds were done. Ranikhet disease vaccine (F strain/ La Sota strain) was done on 7th day and booster dose on 21th day of age. Infectious bursal disease or Gumboro disease vaccine was done on 14th day. Multivitamin suspensions were given to all chicks during firsts 10 days. During the initial 5 days chicks were fed with suji followed by commercial starter poultry feed up to 21 days. Body weight gains on weekly basis were recorded. Before distribution of chicks training programmes on different aspects of poultry farming such as housing, brooding, feeding, disease control and preventive measures, poultry products and by products, and marketing management were organized and also farmers were distributed extension literature on poultry birds and its management. During the total trial period the required health care measures were being provided at the doorstep of farmers by KVK scientists. The data on body weight gain, egg production, mortality % and the cost of cultivation and returns aspects of backyard poultry farming were collected from the farmers.

3. RESULTS AND DISCUSSION

3.1 Bee-Keeping

Fig 1: Bee-keeping economics from 2016-17 to 2021-22



One of the success stories is Mr. Bijaya Bir of Bantala village of Angul district who was feeling frustrated & depressed owing to his unemployment until Krishi Vigyan Kendra, Angul as a mandatory routine work, once visited his village and interacted with Mr. Bir during 2016.The centre surveyed his status and knew that, he started bee keeping in 2006 with 6 boxes with an initial investment of Rs.12,000/- only (Table 1). As his profit increased, he started spending & increasing the number of bee units and boxes. During that time, he had raised the number of boxes from 6 to 17. In the previous year 2022, he could earn Rs.5,14,100/-by extending is bee units and boxes to 240 selling 1.1 quintal of honey from his backwards.

3.1.1 Support of KVK and other agencies/departments

Mr. Bir got the opportunity for honey bee training with his own interest from OUAT in the year 2002. After intervention of KVK he got motivated and started rearing of honey bee in a scientific way in the year 2006 with 6 boxes of honey bee and slowly he develops interest on honey bee and multiplies the colonies to 17 boxes (Table 1). His keen desire to be productive and economically active impressed KVK scientists and consequently he was trained in scientific bee keeping at KVK and OUAT, Bhubaneswar in several phases.

Table 1. Economic study of beekeeping by Mr Bijaya Bir

Items	Year (2002)	Net Income (Rs.)	Year (2004)	Net Income (Rs.)	Year (2014)	Net Income (Rs.)	Year (2017)	Net Income (Rs.)	Year (2022)	Net Income (Rs.)
Honey (No. of Box)	6kg (2)	1200	24kg (6)	4800	68kg (17)	20400	120kg (32)	36000	1.1q (240)	3,85,000
Bee box with colony	-	-	-	-	10	7000	15	10500	180	1,26,000
Queen gate	-	-	-	-	8	80	12	120	150	1500
Honey Extract	-	-	-	-	1	200	3	600	8	1600

or										
	Total	**1200**		**4800**		**27680**		**47220**		**5,14,100**

Today he is earning Rs.5,14,100/- per year from sale of honey, bee equipment, bee box and colonies of *Apis cerana indica*

3.1.2 Scope and scale of operation of the enterprise

Mr. Bijay Ku. Bir have 180 honey bee boxes with colonies of *Apis cerana indica*. He started honey bee rearing with 6 boxes and able to multiply the colonies and by selling them he is getting more benefit.

Fig 2 : Mr. Bir at KVK Campus

Fig 3 : Bijaya's Bee Unit

Fig 4 : Innovative honey extractor

3.1.3 Specific Achievement

Economic joviality has been achieved by adopting this innovative skill of self-employment by others in nearby areas. He has inspired & trained many persons and is a master trainer for Jan Sikshya Sansthan for Dhenkanal & Angul district and as on date is a satisfied grooming entrepreneur. Slowly due to his own interest he is now able to prepare the wooden bee boxes and other bee equipment like bee veil, queen gate, dummy board etc. Besides this he has his own innovation in making the honey extractor, which makes the extraction easier with minimum loss of honey in less time. At a time 7kg of honey can be extracted with this extractor.

3.2 Poultry farming

Generally rural families follow low protein diets and so protein malnutrition is prevalent, particularly among pregnant women, nursing mothers and growing children (Wong et al. 2017). Rearing improved chicken varieties in rural backyards will increase availability of eggs and meat thereby aiding in alleviation of protein malnutrition, besides providing subsidiary income (Udharwar, 2018). It is efficient in transforming feed protein and energy into human food and it uses a very low capital investment and space for small-scale poultry production which allows poultry production to be practiced even by landless families or other rural poor (Debnath et al. 2011). In Odisha desi/native chicken of about 5-25 numbers are reared by rural households under the traditional scavenging system which provides food and financial security, and has socio cultural and socio-religious significance. But in back yard poultry farming, growth is limited due to high seasonal mortality, low productivity and sub optimal management (Rawat et al. 2016). To combat this different development and extension agencies have been effectively working on promoting backyard poultry as a promising enterprise for rural areas.

Fig 5 : Input distribution

Fig 6 : Scientist (Animal Sc.) imparted training to farmers

The present study was conducted to find out the gain in body weight, egg production, and average age at first laying in the Improved variety Chicken under backyard conditions along with the impact on their socio-economics status of scheduled caste farmers. It was observed that these birds were better resistance to disease with a mortality of 3-7% and meat quality was widely accepted by the native people (Table 2). It was found that the body weight gain pattern was significantly higher than that of desi (country) type birds. The farmer also got higher net return *i.e.* Rs. 14,742/- than the desi breed (Rs. 4745/-).

Singh et al. (2018a) reported that the Vanaraja chick's survivability up to 4 weeks was 96% in the summer season and 83% in the winter season in sub-temperate climatic conditions. Backyard farming fulfils a wide range of functions, e.g., the provision of meat and eggs, food for special festivals, chicken for traditional ceremonies, pest control, and petty cash, utilizing minimum inputs, minimum human attention, and causing less environmental pollution (Singh et al. 2018b).

Table.2. Showing different parameters and economic analysis of Improved variety Chicken and desi bird under backyard system.

Breed	Yield component			Mortality (%)	Yield (Avg. body wt/bird)	Cost of cultivation (Rs./unit of 20 birds)	Gross return (Rs/ unit of 20 birds)	Net return (Rs./ unit of 20 birds)	BC ratio
	Avg body wt/25 wks	Avg. egg production/ year	Age of first laying (weeks)						
Desi Chicken	Cock:1.1kg, Hen: 0.9 kg Avg:1 kg	45	26	20	1.0 kg	5,200	9,945	4,745	1.91
Improved variety Chicken	Cock:1.7kg, Hen:1.55 kg Avg:1.62kg	145	25	3	1.62 kg	8,800	23,542	14,742	2.67

3. CONCLUSION

Given that the world's population is quickly growing, it is imperative for global agriculture to turn to secondary agriculture (honey bee and poultry farming) in order to provide opportunities not only for improving livelihood but also for nutritional security.

In rural areas, beekeeping plays a significant role in the agricultural and horticultural industries. People seek it much because of its excellent nutritional worth. Comprehending the behavior and nature of bees is essential for the efficient management of beekeeping. Additionally, the beehives need to be properly maintained according to the various seasons. In addition to its excellent nutritional value, honey is often employed in the manufacturing of pharmaceuticals. In addition to producing honey, honeybees also create bee wax, which is utilized in the manufacturing of cosmetics and other industries. Care and manipulation of honeybees to enable them to produce and store more honey than they need so that the excess can be collected. Across the world the bees support millions of livelihoods while also enriching the ecosystem.

In addition to giving the most disadvantaged communities in developing nations income and jobs, backyard chicken farming ensures food and nutritional security. For them, the first and last resource to be exploited in an emergency is backyard chickens. Low productivity in backyard poultry production systems is a well-known problem that can be solved by applying scientific management techniques, enhancing genetics, or enhancing health care. For SC farmers who may raise multiple chicks in their farms for economic development, this farming guarantees a secure means of subsistence. So, secondary agriculture owing to beekeeping and poultry farming can enhance nutritional and livelihood security to the farmers by practicing all these assets in their backyards for profit maximization.

REFERENCES

1. Ahirrao, J. 2013. 'Entrepreneurship and Rural Women in India', New Century publication, New Delhi
2. Debnath, MK, Majumdar D, and Das, PK. Status of backyard and small-scale poultry production to sustainable livelihood- a case study. Journal of Crop and Weed, 2011;7(2): 113-115.
3. District Census Handbook 2011 - Angul" (PDF). Census of India. Registrar General and Census Commissioner of India.
4. District vision document, 2020. District Planning office, Angul.
5. FAO. 2018. *World Livestock: Transforming the Livestock Sector Through the Sustainable Development Goals*. Rome: FAO.
6. Kumar, P. Corporate Social Responsibility Assessment of Global and Indian Trends and Prospects, Paradigm: Journal of Institute of Management Technology, 2003;7(1), 15-23.
7. Orissa Forestry Vision 2020. Forest Department, Govt of Orissa.
8. Pradhan H. Study of Economical, environmental and health status among the female bidi workers in village area of Angul district of Odisha. World Journal of Pharmaceutical Research, 2020; (3): 935-947.
9. Prabhakar R. Mishra S. 2013. A study of corporate social responsibility in Indian Organization: Introspection", ISBN: 978-1-922069-25-2.
10. Pradhan LR, Thripahty S. Corporate and women empowerment in Odisha", Odisha Review, December-2013.
11. Rawat, SK, Gupta, R. Narain, S. Study on the performance of backyard poultry production reared by rural woman in Mahoba, Indian Res J Ext Edu., 2016;15(4):24-28.
12. Sahoo C. Corporate Social Responsibility: Issues and Controversies, European Journal of Business and management, 2011; 3(2): 1-5.

13. Varma SB, Power Y. 2005. 'Rural empowerment through SHGs, NGOs and PRIs national slum dwellers federation in India', Deep and Deep Publication, New Delhi.
14. Verma RBS, Singh RK. 2007. 'Facets of Empowerment, policies, programmes & perspectives', New Royal book Publication, Luckhnow.
15. Ganesan, G. Rural Transformation through Self-Help Groups, (SHG), Kiscm World, January, 2005, Pp. 13-14.
16. Maulick, Bama Ganguli Nee. 'Empowering Rural Women-A step Towards Inclusive Growth,' Kurukshetra, September, 2013;61(10):.9-12.
17. Singh M, Islam R, Avasthe RK. Factors affecting fertility, hatchability and chick survivability of vanaraja birds under intensive rearing in sub-temperate condition. Indian J Anim Sci. 2018a;88, 331–334.
18. Singh M, Mollier RT, Rajesha G, Ngullie AM, Rajkhowa DJ, Rajkumar U, et al. Backyard poultry with vanaraja and srinidhi: proven technology for doubling the tribal farmers' income in Nagaland. *Ind Farm* 2018b; 68, 80–82.
19. Udharwar, SV. A case study on Vanaraja: a dual-purpose variety developed exclusively for free range poultry farming in rural and tribal areas. A compendium of PGDAEM-Manage Project review, 2018;1:39-40
20. Wong JT, de Bruyn J, Bagnol B, Grieve HLi M, PR. Alders RG. Small-scale poultry and food security in resource-poor settings: A review. *Global Food Security* 2017;15: 43-52. doi: 10.1016/j.gfs.2017.04.003
21. Yadava CG, Moulasab, Srinivasulu G. B., Achari R, Chandan K., Santhosh K. M., Raghavendra. Livelihood Restoration Options for Mining Affected Areas in the Kalyana Karnataka Region, India. J. Exp. Agric. Int. [Internet]. 2024 Mar. 4 [cited 2024 May 17];46(4):89-94. Available from: https://journaljeai.com/index.php/JEAI/article/view/2343
22. Oluwasola BT, Solomon KA. Sustainability of Agriculture Value Chain by Rural Women for Income Generation in Oluyole Local Government of Oyo State, Nigeria. AJAEES [Internet]. 2019 Sep. 17 [cited 2024 May 17];36(1):1-10. Available from: https://journalajaees.com/index.php/AJAEES/article/view/775
23. Crosson PR. Sustainable agriculture. InGlobal development and the environment 2016 Mar 17 (pp. 45-52). Routledge.