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POTENTIALITY OF SCIENTIFIC OYSTER MUSHROOM PRODUCTION IN DHUBRI DISTRICT OF ASSAM UNDER THE AMAR GAON AMAR GAURAV PROGRAMME (AGAG)

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ABSTRACT

Oyster mushroom (*Pleurotus spp.*) cultivation holds significant potential in Dhubri district of Assam and has gained popularity among the farmers. In recent times, it has emerged as a promising agri-based enterprise due to its low production cost, short growth cycle and high nutritional value. Dhubri district of Assam, with its favourable agro-climatic conditions with moderate temperatures (20-30°C) and high humidity and availability of agricultural waste like rice straw, sawdust and other agro-residues reduces production costs, making it an attractive venture for small-scale and even landless farmers. Economically, oyster mushroom cultivation offers high returns with low investment, generating additional income for rural households, particularly women folk. Furthermore, its rich protein and micronutrient content can address malnutrition in the region, emphasizing its economic, nutritional, and environmental benefits. This study was conducted under Amar Gaon Amar Gaurav (AGAG) programme, initiated by the Government of Assam, and implemented by Assam Agricultural University at SCSCA, AAU, Dhubri, aims to promote rural development through sustainable agricultural practices. This study explores the feasibility of oyster mushroom cultivation in Dhubri under AGAG, focusing on economic benefits, employment generation, and nutritional security. The findings suggest that oyster mushroom farming can be undertaken as a viable livelihood option for rural farmers, farm women and rural youths with the average production of 4.97 kg per unit from 1kg spawn in one growing cycle and cost benefit ratio of 1: 2.09 contributing to income enhancement and women empowerment. It can be concluded that with proper policy interventions and community participation, oyster mushroom cultivation can enhance rural livelihoods, food security and sustainable agriculture in Dhubri district of Assam.

Key words: Oyster mushroom, Dhubri, Assam, agro-climatic suitability, rural livelihood, Amar Gaon Amar Gaurav

Introduction

The Amar Gaon Amar Gaurav (AGAG) (My Village, My Pride) programme is a flagship initiative launched by the Government of Assam in 2017 to promote sustainable rural development, self-employment and livelihood option. Under this programme potentialities of oyster mushroom production were undertaken at Sarat Chandra Sinha College of Agriculture under Assam Agricultural

University, Rangamati, Dhubri, Assam during 2023-24. The programme undertaken by SCSCA, AAU, Dhubri aims to improve livelihood opportunities by integrating oyster mushroom farming among the farming communities which can enhance rural livelihoods, improve food security and support eco-friendly farming practices. It is known as “Dhingri” in India and has fan or oyster shaped cap. (Ahlawat *et al.*, 2008). They grow easily on decaying

wood or straw (Wikipedia, 2018). In Dhubri district it is popularly known as “Lafu”. Oyster mushrooms are the easiest to cultivate and have the shortest growing period when the necessary conditions are met and the costs required for cultivation are financially lower than other mushroom species (Akçay *et al.*, 2023). In Assam its cultivation is gaining popularity as a sustainable agri-business due to its minimal land requirement and high profitability. Oyster mushrooms, in particular, are well-suited for tropical regions like Assam due to their adaptability to high humidity and moderate temperature. Oyster mushroom provides numerous health benefits as it contains high-quality protein, vitamins (B-complex, D), minerals (iron, potassium, zinc), and antioxidants, contains beta-glucans and polysaccharides that enhance immune function, helps regulate cholesterol levels and improves insulin sensitivity, benefiting diabetic patients. Adding *Pleurotus* mushrooms to diet can provide a flavourful and nutrient-dense option to support overall health and well-being (Aditya and Bhatia, 2023). Studies suggest bioactive compounds in oyster mushroom that may inhibit tumor growth and high fiber content promotes healthy digestion and gut microbiota. Owing to their simple and cost-effective cultivation techniques, high biological efficiency and nutritional and medicinal benefits, oyster mushrooms are widely popular and cultivated throughout the world (Mane *et al.*, 2007). Oyster mushroom farming requires minimal startup costs (substrate, spawn, and basic infrastructure) but yields high profits due to quick harvest cycles (4-6 weeks). Kapoor and Behl (1983) and Chauhan and Sood (1992) also reported that mushroom growing has been appreciated as a technically feasible and profitable venture and widely accepted by the researchers as a good venture to uplift income, employment generation and rural development. It can be cultivated in multiple cycles annually, ensuring a steady year-round for farmers. Mushroom cultivation uses agro-residues like paddy straw, sawdust, and sugarcane bagasse, reducing input costs and promoting waste recycling. It provides livelihood opportunities, especially for women and rural youth, through farming, processing, and marketing. However, despite its nutritional and economic potential, oyster mushroom farming in Dhubri district faces challenges such as lack of technical knowledge, lack of training and monitoring, limited access to quality spawn, and inconsistent market linkages. The AGAG programme can play a pivotal role in addressing these barriers by providing training, inputs, and market support to farmers. By promoting oyster mushroom cultivation under AGAG, Dhubri district can witness enhanced rural livelihoods, women empowerment, and sustainable agricultural

growth. This study was undertaken with the objective of exploring the scope of oyster mushroom farming in Dhubri district under AGAG, analyzing its production potential, economic viability, and potential impact on rural development.

Materials and Methods

A Front-Line Demonstration (FLD) programme was conducted at SCSCA, AAU, Dhubri Assam under AGAG programme during 2023-24. For the study four villages namely Nidani, Khutapara, Botordol and Barunitra were selected based on the baseline survey. Potential farmers and SHGs for oyster mushroom cultivation were selected based on their response in the base line survey conducted through stratified random sampling of selected villages in Dhubri district. From each of the four villages, 100-150 households (including marginal farmers, women SHGs, and landless labourers) were selected and demographic details (family size, education, occupation), landholding size and current crop patterns, awareness and interest in mushroom cultivation, willingness to invest time/money in training programme were collected. Group



Fig 1: Photographic evidence of the FLD programme on oyster mushroom.

Table 1: Yield of oyster mushroom of beneficiaries of different villages.

Villages	NOB	1H	2H	3H	4H	AY
Nidani	1	6.65	5.67	4.27	2.45	4.76
	2	6.01	5.27	3.92	2.27	4.36
	3	7.03	5.88	4.21	2.88	5.00
	4	6.93	5.74	4.91	3.82	5.35
	5	7.07	5.78	4.79	2.88	5.13
	6	6.90	5.22	3.93	2.56	4.65
	7	6.91	5.29	3.82	2.27	4.57
	8	6.28	4.94	3.79	2.91	4.48
	9	7.80	6.68	5.47	3.79	5.93
	10	6.92	5.47	4.49	3.42	5.08
						4.93
Khutapara	1	6.79	5.61	4.72	3.51	5.16
	2	6.15	5.19	3.79	2.74	4.47
	3	6.71	5.18	4.17	2.55	4.65
	4	7.32	5.89	4.80	2.95	5.24
	5	6.74	5.04	4.17	2.78	4.68
	6	7.10	6.09	4.62	2.88	5.17
	7	7.18	5.99	4.24	2.92	5.08
	8	6.73	4.99	3.70	2.77	4.54
	9	6.97	5.68	4.36	2.98	5.00
	10	6.97	5.61	4.33	2.84	5.12
						4.91
Botordol	1	7.77	6.96	5.22	3.80	5.94
	2	6.93	5.89	5.05	3.58	5.36
	3	5.93	4.75	4.11	2.81	4.40
	4	6.85	5.29	4.00	2.79	4.73
	5	7.01	6.76	5.08	2.87	5.43
	6	7.86	6.79	4.75	3.51	5.73
	7	7.69	6.12	4.42	2.88	5.28
	8	6.96	5.28	3.60	2.81	4.66
	9	6.83	5.59	4.11	3.30	4.96
	10	6.29	5.50	4.84	3.49	5.03
						5.15
Barunitara	1	6.72	5.74	4.55	2.87	4.97
	2	6.16	5.18	3.92	2.45	4.43
	3	7.77	6.58	4.48	2.73	5.39
	4	7.00	5.74	4.90	2.87	5.13
	5	7.42	6.65	4.83	3.29	5.55
	6	6.93	5.32	4.06	2.45	4.69
	7	6.65	5.39	3.92	2.31	4.57
	8	6.02	5.04	3.50	2.45	4.25
	9	7.00	5.53	3.57	2.80	4.73
	10	8.40	6.79	5.32	3.50	6.00
						4.97
NOB: Number of beneficiaries; 1H: 1 st harvesting (Kg/unit); 2H: 2 nd harvesting(Kg/unit); 3H: 3 rd harvesting(Kg/unit); 4H: 4 th harvesting(Kg/unit); AY: Average yield (Kg/unit)						

Table 2: Cost economic analysis of oyster mushroom demonstration.

Parameters	Villages			
	Nidani	Khutapara	Botordol	Barunitara
Average Yield/Village (kg/unit)	4.93	4.91	5.15	4.97
Gross cost (Rs./unit)	3230.00	3230.00	3230.00	3230.00
Gross income (Rs./unit)	9860.00	9820.00	10300.00	9940.00
Net income (Rs./unit)	6630.00	6590.00	7070.00	6710.00
B:C ratio	1:2.05	1:2.04	1:2.19	1:2.08

Discussions (GDs) involving the village headman on community perceptions of mushroom farming, and challenges in adoption (*e.g.*, lack of technical knowledge, market access) were discussed. In addition, the resource availability with the farmers like quantity of paddy straw/ sawdust per village, access to water and storage facilities, existing infrastructure (*e.g.*, shaded sheds for cultivation), market analysis like local demand for oyster mushrooms (households, restaurants and markets), price trends (seasonal variations), competing suppliers from neighbouring districts were considered while selecting the farmers, farm women, rural youth for the said oyster mushroom cultivation under AGAG programme implemented by SCS College of Agriculture, AAU, Rangmati, Dhuri at Nidani, khutapara, Botordol and Barunitara villages of Dhubri district. From each village, 10 numbers of beneficiaries were selected and 1 kg of spawn was distributed to each 40 beneficiaries of all the four adopted villages. The other inputs needed for the FLD, like straw, firewood, polybag, dettol, rope, cotton was also supplied to the beneficiaries. From each 1kg of spawn distributed to each 10 nos. of beneficiaries of one village, 7 beds were prepared per kg of spawn and in this study, we have considered these seven beds as one production unit. To assess the economic viability, net profit and the cost benefit ratio has been calculated based on the performance and yield obtained from the demonstrations conducted among the adopted beneficiaries of the four villages. Before conducting the demonstrations, the beneficiaries were imparted hands-on training on preparation of substrate, hot water treatment, drying of substrate, spawning, pinning, *etc.* in order to make the demonstration successful.

Process of cultivation

For mushroom cultivation the basic requirements are rice straw and spawn along with favourable temperature

Table 3: SWOT Analysis: Oyster mushroom cultivation in Dhubri district of Assam.

Strengths	Weaknesses	Opportunities	Threats for mushroom farming
1. Favorable Climate: High humidity (80-90%) and moderate temperatures (20-30°C) ideal for oyster mushroom growth.	1. Lack of Technical Knowledge: Farmers lack technical skill on mushroom production, spawn production, handling, and pest management.	1. Growing Demand for Healthy Food: Rising urban demand in five-star hotels, restaurants, etc in smart cities/metropolis like Guwahati, Siliguri etc. for fresh and dried mushrooms.	1. Climate Variability: Extreme rainfall or droughts may disrupt humidity control. High temperature also affects its production
2. Abundant Agro-Waste: Easy availability of paddy straw, sawdust, sugarcane bagasse and other crop waste as low-cost substrate for mushroom production.	2. Perishability & Post-Harvest Losses: Short shelf life (2-3 days fresh) without cold storage or drying facilities.	2. Value-Added Products: Potential for production of mushroom value-added products like mushroom powder, pickles, biscuits, cakes and snacks.	2. Competition from other Districts: Bongaigaon, Kokrajhar, Chirang, Goalpara, etc. already supply fresh and dry mushrooms to Guwahati.
3. Short Growth Cycle: Provides more nos. of harvest (4-6 weeks) which allows for multiple cultivation cycles per year with higher return.	3. Limited Market Linkages: Few organized markets; dependence on local traders	3. Export Potential: Proximity to Bangladesh, Bhutan, West Bengal, Meghalaya, Siliguri markets.	3. Price Fluctuations: Seasonal oversupply can crash prices (e.g., post-harvest glut in winter).
4. Nutritional & Economic Benefits: Higher protein and low-calorie food source; sells at Rs. 150-200/kg (fresh) and Rs. 800-1000/kg (dried) providing nutritional and economic benefit.	4. Low Adoption Rate: Cultural preference for traditional crops; hesitation to try new farming methods.	4. Provides nutraceuticals: Mushroom is a low cost naturally available food rich in proteins and low in calories. Provides vitamins and minerals and good for curing many ailments	4. Pest & Disease Outbreaks: Contamination risks (e.g., green mold) due to poor hygiene practices.
5. Government Support Technological support on training in mushroom cultivation skill, and spawn production from KVKs, SAU, Zonal RARS	5. Lack of awareness that mushroom can be cultivated and consumed. Fear of being poisoned through mushroom consumption	5. AGAG Convergence: Linkage with MGNREGA for infrastructure (mushroom sheds) and PMFME for processing units.	5. Limited supply of healthy mushroom seeds due to lack of proper mushroom spawn producer.

and humidity conditions. A temperature range of 20-28°C, relative humidity of 80%-90% and ample ventilation is required during spawn run and for reproductive growth 12-18°C temperature is optimum (Sharma, 2015). Temperature must be maintained at $23 \pm 2^\circ \text{C}$ initially for a week and then it can be reduced to $16 \pm 2^\circ \text{C}$ for subsequent weeks as reported by Sharma (2015).

Substrate preparation

Rice straw is the best substrate for oyster mushroom cultivation. At first rice straw was cut into small pieces of 1 inch size and soaked in cold water for overnight.

Hot water treatment

In order to sterilize the substrate, the hot water treatment was done. Wet straw was boiled at around 80-90°C for at least 1 hour.

Drying of rice straw

In a clean cemented floor, the boiled straw was sun dried. It is the crucial point of mushroom production as it may inhibit mycelial run because of excess moisture in the straw and also to prevent contamination of other fungal spores.

Spawning

Polythene bags of size 60cm×40 cm was used for oyster mushroom spawning. To give a cylindrical shape to the bed the bottom of the bag was tied with a thread. Spawn at the rate of 150 gm per bed was used. In a 5kg bag, 4 layers of spawn and 5 layers of straw were accommodated. After spawning the bag was tied with the help of a thread and incubated in a dark room for spawn run. Before incubation 20-25 numbers of holes were made around the polythene bag with the help of a

puncher. The spawn run was completed in 15-20 days.

Pinning

After completion of spawn run, the appearance of pinhead was observed in 6-8 days. A mist of water was sprayed every day over the beds just after pinhead formation. Gradually there was growth of white cottony mycelium which was also observed by Mohan (2009) in his experiment. The harvesting was done before the cap was fully opened.

Results and Discussion

Mushrooms are generally grown in winter season from the month of September-October to March-April, although some species can be grown in the summer season too. (Baruah *et al.*, 2021). The harvesting is done when the cap has the diameter of 8-10 cm. It is possible to get 500-800 g to a kilogram fresh mushroom per kilogram of the dry substrate *i.e* rice straw. (Katel, *et al.*, 2022). In the FLD programme after two to three weeks under proper management condition, mushroom was harvested from each of the bed and weighed periodically. The crop was harvested in four flushes by all the beneficiaries of four villages. The highest yield was recorded in the 1st harvesting followed by second, third and fourth harvest, respectively. Subsequent harvestings were done at 10-15 days interval (Table 1). The average yield of four villages namely Nidani, Khutapara, Botordol and Barunitara were 4.93Kg/unit, 4.91Kg/unit, 5.15 Kg/unit and 4.97 Kg/unit, respectively. However, it was noticed that the average yield of oyster mushroom in subsequent harvest was lower compared to the first harvest. This reduction in yield from 1st harvesting to rest of the harvesting might be due to rise in temperature and low relative humidity conditions. This finding aligns with the studies of Chitra *et al.*, (2018) that revealed low yield due to the high temperature (37°C to 40°C) in the month of April and low relative humidity. The overall yield improvement was recorded in first and second seeding in the month of January and February as mentioned due to optimum temperature and relative humidity for the development of mycelium, which helped in improving the yield of the crop as reported by Chitra *et al.*, (2018).

The study of economic analysis of oyster mushroom production revealed that the cost of production of mushroom was Rs. 3230.00/unit for all the four villages as the required inputs were provided equally to each beneficiary of each village under the FLD. Results revealed that gross income of Rs 9860.00, Rs. 9820.00, Rs. 10,300.00 and Rs. 9940.00 per unit were achieved by the beneficiaries of four villages, *viz.*, Nidani, Khutapara, Botordol and Barunitara, respectively (Table

2). The economic viability of the mushroom production was also reported by Singh *et al.*, (2018) with mushroom yield from 80 to 120 kg/100 kg of wheat straw and total income from 100 kg wheat straw was Rs. 6400120.00 with a net profit of Rs. 4650-12000 in a six-month period. Beneficiaries in the adopted villages under the demonstration achieved net income of Rs. 6630.00, Rs.6590.00, Rs.7070.00 and Rs. 6710.00 per unit, respectively in Nidani, Khutapara, Botordol, and Barunitara villages, respectively with B:C ratio of 1:2.05, 1:2.04, 1:2.19 and 1:2.08, respectively from oyster mushroom cultivation (Table 2).

Conclusion

The study revealed that oyster mushroom cultivation offers a sustainable economic opportunity for farmers, farm women and rural youth while contributing to better nutrition and health security, making it an ideal crop for rural development under initiatives like AGAG in Dhubri district of Assam. The farmers were also interested for quality spawn production in order to get good quality mushroom seed. At least one mushroom spawn production unit can be set up in each village that will follow continuous production of mushroom leading to good quality mushroom spawn as well as fresh and dry mushroom supply to nearby villages and district head quarter for employment generation. Oyster mushroom cultivation not only enhances the income of the farmers through year-round cultivation but also recycles the agro-wastes generated during crop production and helps in the cleaning up of the environment. The residues generated after mushroom cultivation can be utilized in preparation of compost. From the SWOT analysis, it can be concluded that there is an ample opportunity and strong potential for oyster mushroom cultivation in Dhubri district of Assam. Addressing the weaknesses (training, proper storage) can make it a sustainable livelihood option. Mitigating threats (climate risks, market instability, *etc.*) through proactive policy interventions, the AGAG programme for scientific oyster mushroom cultivation not only boosts incomes but can also enhance nutritional security and women's empowerment in Dhubri district of Assam.

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