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Impact of Government Schemes and Subsidies on the Adoption of Protected Mushroom Cultivation and Farmers' Awareness in Ayodhya District, Uttar Pradesh, India

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A B S T R A C T

Protected cultivation of mushroom has emerged as a high-value, climate-resilient agri-enterprise well suited to the small and marginal landholding structure of eastern Uttar Pradesh. Despite a comprehensive ecosystem of central and state support — MIDH, NHM, RKVY, PM-FME, AIF and ODOP — adoption of protected mushroom cultivation in Ayodhya district remains uneven. The present study, restricted to the first two research objectives, assesses (i) the impact of government schemes and subsidies on adoption and (ii) farmers' awareness and utilization of these subsidy programmes. Primary data were collected during 2025–26 from 75 mushroom growers selected across eight blocks of Ayodhya district through a multistage stratified random sampling design and a pre-tested interview schedule. Data were analysed using percentage analysis, mean, standard deviation, the chi-square test, the t-test and a Technology Adoption Index (TAI). Results show that 62.7% of farmers were aware of at least one scheme but only 38.7% had availed subsidy benefits, leaving an awareness–utilization gap of 24 percentage points. The overall TAI was 58.4% (moderate); beneficiaries recorded a significantly higher mean TAI (71.2%) than non-beneficiaries (49.8%) ($t = 5.84$, $p<0.001$), and 48.3% of beneficiaries were full adopters against only 8.7% of non-beneficiaries. Education level ($\chi^2 = 14.82$, $p<0.05$) and landholding size ($\chi^2 = 12.34$, $p<0.05$) were significantly associated with adoption. KVKs (44.7%) and the District Horticulture Office (38.3%) were the principal information channels, while digital channels remained underused (14.9%). The study concludes that subsidies exert a strong positive effect on adoption but that awareness generation alone is insufficient; procedural simplification and sustained extension support are essential to convert awareness into utilization.

Introduction

Mushroom cultivation represents a distinctive agricultural enterprise that requires minimal land, utilizes agricultural waste substrates, operates year-round and generates high returns relative to investment. With proteins (20–35% on dry-weight basis), essential amino acids, dietary fibre and minerals, edible mushrooms — chiefly Button (Agaricus bisporus), Oyster (Pleurotus spp.) and Milky (Calocybe indica) — are gaining demand in urban and semi-urban markets.

For marginal farmers, rural youth and women entrepreneurs, the enterprise offers an accessible entry into agri-business without large landholdings or heavy capital outlay.

Protected cultivation — growing mushrooms under controlled or semi-controlled conditions of temperature, humidity, light and CO_2 using polyhouses, insulated rooms, shade-net houses or climate-controlled chambers — enhances yield consistency, reduces contamination and improves product quality. However, the capital cost of protected structures (approximately ₹3–5 lakh for a standard polyhouse and ₹8–12 lakh for fully climate-controlled rooms) is prohibitive for resource-constrained farmers without institutional support.

To bridge this barrier, the Government of India and the Government of Uttar Pradesh operate several support programmes — the Mission for Integrated Development of Horticulture (MIDH), the National Horticulture Mission (NHM), the Rashtriya Krishi Vikas Yojana (RKVY), the Pradhan Mantri Formalisation of Micro Food Processing Enterprises (PM-FME), the Agriculture Infrastructure Fund (AIF) and the One District One Product (ODOP) scheme — offering capital subsidies, credit linkage, training and market support. Despite this, adoption of protected mushroom cultivation in Ayodhya district remains uneven, and limited empirical evidence exists on whether these interventions genuinely facilitate adoption and whether farmers are aware of and able to utilize them.

Against this background, the present paper examines the first two objectives of a larger investigation: (1) to assess the impact of government schemes and subsidies on the adoption of protected mushroom cultivation in Ayodhya district; and (2) to study farmers' awareness and utilization of subsidy programmes for protected mushroom cultivation.

Singh and Verma (2025) reported that capital subsidies of 40–50% reduced the break-even period for polyhouse investments from 5.2 to 2.8 years, though about 23% of subsidized structures remained underutilized owing to inadequate technical knowledge — underscoring that finance must be paired with training.

Jayaraman (2024) found that states combining subsidies, training and market linkages achieved adoption rates 2.3 times higher than states offering subsidies alone. Iqbal (2023), using logistic regression on 120 farmers, identified subsidy receipt as the strongest predictor of adoption (OR = 3.47, $p<0.01$), ahead of training participation and KVK membership.

NABARD (2022) observed that projects combining credit with skill development achieved 67% adoption success against 34% for credit-only interventions, and documented an average awareness–utilization gap of about 37% across mushroom development programmes.

Gupta and Singh (2020) cautioned that subsidy benefits often favour semi-medium and medium farmers, with marginal farmers capturing only 18% of disbursals despite forming the majority — information asymmetry, weak banking relationships and documentation requirements being the main barriers. Kumar and Verma (2020) similarly found high initial investment (71%), lack of technical knowledge (58%) and inadequate outreach (43%) to be the leading constraints.

On awareness, Singh and Kumar (2024) identified education level, training-camp participation and proximity to KVK as significant predictors of scheme awareness, with secondary-educated farmers 2.8 times more likely to be aware of MIDH.

ICAR (2021) reported a substantial gap whereby 65% of farmers had heard of a scheme but only 28% had availed benefits, citing bureaucratic procedures, collateral requirements and delayed releases.

Anand and Yadav (2021) showed that KVK-trained farmers were 3.2 times more likely to apply for schemes, and Yadav and Mishra (2023) found FPO membership raised both awareness (by 48%) and utilization (by 36%). Upadhyay (2021) noted strong inter-district variation in scheme effectiveness, with districts having active KVK and FPO networks recording 40–60% higher adoption.

Materials and Methods

Study Area and Period

The study was conducted in Ayodhya district of Uttar Pradesh during the agricultural year 2025–26. Ayodhya was selected purposively given its significant concentration of registered mushroom growers (approximately 180) and the availability of scheme-implementation records through the District Horticulture Office. Eight blocks — Pura Bazar, Maya Bazar, Masodha, Milkipur, Tarun, Rudauli, Bikapur and Harington Ganj — with prominent mushroom activity were covered.

Sampling Design

A multistage stratified random sampling design was adopted. Ayodhya district was chosen purposively (Stage 1); eight blocks (Stage 2) and prominent mushroom-growing villages (Stage 3) were selected; 75 mushroom farmers were then drawn through random sampling proportional to farm-size categories (Stage 4); and 20 market functionaries were selected from block trade lists for secondary information (Stage 5).

Data collection

Primary data were collected through a pre-tested structured interview schedule administered in personal interviews, covering socio-economic profile, scheme awareness, subsidy application and utilization experience, and adoption of protected cultivation practices. A pilot survey of 10 farmers (excluded from the final sample) was used to refine the schedule. Secondary data were obtained from the District Horticulture Office (Ayodhya), NABARD and NHB reports, ICAR-DMR bulletins and government policy documents.

Analytical tools

Percentage analysis described the distribution of respondents across categories, while mean and standard deviation were computed for quantitative variables. The chi-square test ($\chi^2 = \Sigma[(O_i - E_i)^2 / E_i]$) examined associations between categorical variables at the 5% level of significance. A Technology Adoption Index (TAI) was computed as the percentage of recommended practices adopted out of 12 ICAR-DMR-recommended practices, and an independent-samples t-test compared mean TAI between beneficiaries and non-beneficiaries.

Results and Discussion

Socio-Economic Profile of Respondents

The majority of growers (46.7%) belonged to the 31–45 years age group, followed by 26.7% in the 46–60 years group; the presence of 14.7% youth (20–30 years) reflects the enterprise's appeal as an agri-entrepreneurship option. Educationally, 37.3% had completed secondary schooling and 13.3% were graduates or above.

Marginal (32.0%) and small (26.7%) farmers dominated the sample, mirroring the agrarian structure of the district, and 70.6% had fewer than five years of mushroom-cultivation experience, indicating the recent emergence of the enterprise.

Awareness and Utilization of Government Schemes

Awareness and utilization of the six major schemes are presented in Table 1. Overall, 62.7% of respondents were aware of at least one scheme, but only 38.7% had actually applied for and availed subsidy benefits, leaving an awareness–utilization gap of 24 percentage points. MIDH recorded the highest awareness (50.7%) and application (28.0%), followed by NHM, while AIF and ODOP remained least known.

This gap closely matches the 37% average awareness–utilization gap reported by NABARD (2022) and the pattern documented by ICAR (2021), confirming that hearing about a scheme does not translate readily into accessing it. The shortfall is attributable largely to complex documentation, the need to arrange the unsubsidized share of investment, and delays in subsidy release.

The principal sources of scheme information are shown in Table 2. The Krishi Vigyan Kendra (KVK) was the leading channel (44.7%), followed by the District Horticulture Office (38.3%) and fellow farmers (29.8%). Digital channels (mobile phone/internet) reached only 14.9% of respondents, indicating a substantial untapped opportunity for digital extension as rural smartphone penetration rises.

Table.1 Awareness and utilization of government schemes (n = 75)

Government Scheme	Farmers Aware	Awareness %	Applied for Subsidy	Application %
MIDH (NHB component)	38	50.7	21	28.0
NHM (State component)	32	42.7	16	21.3
RKVY	22	29.3	10	13.3
PM-FME	18	24.0	7	9.3
AIF (NABARD)	12	16.0	5	6.7
ODOP (UP Govt.)	15	20.0	6	8.0
Any scheme (total)	47	62.7	29	38.7

Table.2 Sources of scheme information

Information Source	No. of Respondents	Percentage %
KVK	21	44.7
District Horticulture Office	18	38.3
Fellow Farmers / Neighbours	14	29.8
Television / Radio	9	19.1
Mobile Phones / Internet	7	14.9
NGO / SHG / FPO	6	12.8
Bank Officials	4	8.5
Others	2	4.3

Table.3 Overall adoption status by beneficiary category

Adoption Status	Beneficiaries (n=29)	Non-Beneficiaries (n=46)	Total (n=75)
Full adopters (>8 practices)	14 (48.3%)	4 (8.7%)	18 (24.0%)
Partial adopters (5–8 practices)	11 (37.9%)	16 (34.8%)	27 (36.0%)
Minimal adopters (<5 practices)	4 (13.8%)	26 (56.5%)	30 (40.0%)

Table.4 Types of protected structures adopted (% within group)

Structure Type	Beneficiaries %	Non-Beneficiaries %
Polyhouse (Fan & Pad system)	41.4	6.5
Insulated Brick Growing Room	55.2	34.8
HDPE Shade Net House	31.0	28.3
AC-Controlled Chamber	13.8	2.2
Traditional Thatched Shed	24.1	52.2

Table.5 Association between education level and adoption status

Education Level	Adopters	Non-Adopters	Total
Illiterate	2	5	7
Primary	4	10	14
Middle	7	9	16
Secondary	18	10	28
Graduate and above	8	2	10
Total	39	36	75

Note: χ^2 calculated = 14.82; χ^2 critical (df = 4, p = 0.05) = 9.488; association significant.

These findings align with Anand and Yadav (2021) and Yadav and Mishra (2023), who emphasised the central role of KVKs and FPOs in raising both awareness and actual utilization, and with Pradhan (2021), who advocated integrating mushroom advisories into digital platforms such as mKisan and Kisan Suvidha.

Impact of Schemes on Adoption of Protected Cultivation

The impact of scheme participation on adoption is presented in Table 3. The overall Technology Adoption Index (TAI) for the sample was 58.4%, classified as moderate adoption against ICAR-DMR benchmarks. Beneficiary farmers recorded a significantly higher mean TAI (71.2%) than non-beneficiaries (49.8%), and the difference was statistically significant ($t = 5.84$, $p<0.001$). Strikingly, 48.3% of beneficiaries were full adopters (more than eight recommended practices) compared with only 8.7% of non-beneficiaries, while 56.5% of non-beneficiaries remained minimal adopters.

The differential is also visible in infrastructure choice (Table 4). Beneficiaries transitioned markedly towards technologically superior structures — insulated brick growing rooms (55.2%), polyhouses with fan-and-pad systems (41.4%) and AC-controlled chambers (13.8%) — whereas a majority of non-beneficiaries (52.2%) continued to rely on traditional thatched sheds with minimal environmental control. This indicates that capital subsidies have enabled a genuine technological upgrade rather than merely subsidising existing practice.

These results are consistent with Iqbal (2023), who found subsidy receipt to be the strongest predictor of adoption, and with NABARD (2022), which reported higher adoption success where finance was combined with skill support. The provision of capital subsidies thus validates the policy rationale for continued public investment in protected horticulture, though the moderate overall index signals that implementation quality continues to cap the realised impact.

Association between socio-economic variables and adoption

A chi-square test confirmed a significant association between education level and adoption status (Table 5). The calculated value ($\chi^2 = 14.82$) exceeded the critical value (9.488 at $df = 4$, $p = 0.05$), rejecting the null hypothesis of independence. Adoption rose steadily with education — from 2 of 7 illiterate respondents to 8 of 10 graduates — indicating that educational attainment strongly conditions a farmer's ability to access and use schemes.

Landholding size was likewise significantly associated with adoption ($\chi^2 = 12.34$, $p<0.05$). Together these findings corroborate Singh and Kumar (2024) and ICAR (2021), and echo the equity concern of Gupta and Singh (2020) that information asymmetry and socio-economic stratification skew access in favour of relatively advantaged farmer categories — a critical consideration for inclusive scheme design in a district dominated by marginal and small holdings.

The study establishes that government schemes and subsidies exert a significant positive impact on the adoption of protected mushroom cultivation in Ayodhya district. Beneficiaries recorded a substantially higher Technology Adoption Index (71.2%) than non-beneficiaries (49.8%), with nearly half achieving full adoption and transitioning to technologically superior structures such as polyhouses and insulated rooms. At the same time, the awareness–utilization gap of 24 percentage points — 62.7% aware but only 38.7% availing benefits — reveals that awareness generation alone is insufficient. The significant association of education and landholding with adoption further indicates that access remains skewed toward advantaged farmer categories.

To translate awareness into utilization and broaden adoption among marginal farmers, the findings point to three priorities: simplifying and digitising subsidy application procedures with time-bound release; strengthening KVK and District Horticulture Office outreach while activating underused digital and FPO channels; and pairing capital subsidies with hands-on technical support so that subsidised structures are used to their full potential. A shift from input-centric subsidy delivery toward outcome-oriented, extension-backed and digitally-enabled support would be pivotal in realising the full potential of protected mushroom cultivation as a climate-resilient and economically viable agri-enterprise in the region.

Author Contributions

Anushka Singh: Investigation, formal analysis, writing—original draft. Victoria A. Masih: Validation, methodology, writing—reviewing.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical Approval Not applicable.

Consent to Participate Not applicable.

Consent to Publish Not applicable.

Conflict of Interest The authors declare no competing interests.

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