



International Journal of Biology Sciences

ISSN Print: 2664-9926
 ISSN Online: 2664-9934
 NAAS Rating (2026): 4.82
 IJBS 2026; 8(3): 22-25
www.biologyjournal.net
 Received: 18-12-2025
 Accepted: 29-01-2026

Yasa Sirilakshmi
 Ph.D. Research Scholar, Dairy
 Extension Division, ICAR-
 NDRI, Karnal, Haryana,
 India

GDS Kumar
 Principal Scientist, ICAR-
 IIOR, Rajendranagar,
 Hyderabad, Telangana, India

Jagan Mohan Reddy
 Director, EEI, Rajendranagar,
 Hyderabad, Telangana, India

Assessing the influence of socio-demographic profile characteristics of farmers on the oilseed yield gaps

Yasa Sirilakshmi, GDS Kumar and Jagan Mohan Reddy

DOI: <https://www.doi.org/10.33545/26649926.2026.v8.i3a.590>

Abstract

Yield gaps in agriculture remain a critical challenge to enhancing farm productivity, even in the context of significant advancements in crop management technologies. While agronomic and environmental factors have been widely studied, the role of farmer-specific characteristics in influencing the gap between potential and realized yields has received comparatively less attention. This study investigates the association between selected farmer profile characteristics and yield gaps among 120 oilseed growers in Mahabubnagar district of Telangana. Fourteen variables encompassing demographic, socio-economic, communication, and psychological dimensions including age, education, size of landholding, annual income, farming experience, trainings undergone, irrigation potential, social participation, input acquisition pattern, information-seeking behaviour, achievement motivation, risk-taking ability, knowledge, and market intelligence were analyzed. Data were collected using a structured, pre-tested interview schedule, and Pearson's product-moment correlation coefficients were computed to determine the direction and strength of relationships. The findings reveal that several characteristics, such as education, farming experience, trainings undergone, social participation, input acquisition pattern, information-seeking behaviour, risk-taking ability, and knowledge, have significant associations with yield gaps, highlighting the importance of human and informational factors in achieving higher productivity. Other characteristics, including age, size of landholding, annual income, achievement motivation, and market intelligence, showed non-significant relationships, suggesting that their influence is less direct. These results underscore the need for extension strategies that not only provide technological inputs but also strengthen farmers' knowledge, decision-making capacity, and access to information. Enhancing these human factors can substantially contribute to minimizing yield gaps and improving oilseed productivity.

Keywords: Yield gap, farmer profile characteristics, oilseed productivity

Introduction

Agricultural productivity is a foundational pillar of rural livelihoods, food security, and economic growth in developing countries. Although technological innovations such as improved seed varieties, fertilizer recommendations, and optimized agronomic practices have proliferated over recent decades, the gap between the attainable yield under ideal management and the actual yield realized by farmers remains significant. This discrepancy, commonly known as the *yield gap*, arises not only from biophysical and environmental constraints but also from human and institutional factors (Hatfield & Beres, 2019) [4]. Understanding these under-explored dimensions is essential for effectively closing productivity gaps. In many smallholder farming systems, farmers may have access to modern technologies, yet they differ widely in their adoption and implementation. These differences often stem from their socio-demographic and behavioural characteristics, including education levels, farming experience, risk orientation, and access to information. Empirical research has shown that such factors significantly influence crop performance and yield outcomes. For instance, a study among smallholder maize farmers in India found that socio-economic variables and farm management practices jointly explained a large share of yield variance (Dutta *et al.*, 2020) [3]. Oilseed crops are particularly sensitive to management practices because they often require precise timing and quality inputs. Farmers' knowledge, experience, training exposure, and willingness to seek information can therefore be critical determinants of yield performance. Despite the importance of these farmer-level variables, much of the yield-gap literature focuses on agronomic or environmental constraints, while

Corresponding Author:
Yasa Sirilakshmi
 Ph.D. Research Scholar, Dairy
 Extension Division, ICAR-
 NDRI, Karnal, Haryana,
 India

the human dimension receives comparatively little attention. In sub-Saharan Africa, for instance, low access to extension, knowledge gaps, and limited investment capacity were identified as key drivers of yield gaps. Effective extension services and capacity-building interventions must consider these human attributes in order to be truly responsive and impactful. Tailoring interventions to farmers' education levels, leveraging social learning networks, and providing training that aligns with behavioural characteristics may unlock productivity potential. Such an approach aligns with recent research advocating for more farmer-centric strategies in closing yield gaps (Ongoma *et al.*, 2025) [5]. The present study aims to quantify how a set of fourteen farmer profile characteristics relate to yield gaps among oilseed producers. By examining the direction and strength of these associations, the study seeks to identify which attributes can be leveraged to reduce yield disparities. Ultimately, findings from this research are expected to inform extension planning and capacity-building strategies that are grounded in the realities of farmer diversity.

Methodology

The study was conducted in Mahabubnagar district of Telangana. From the district, two mandals, Addakal and Mohammadabad, were purposively selected based on their highest area under oilseed cultivation. A random sampling procedure was adopted. From each mandal, six villages

were randomly selected, and from each village, ten farmers were randomly chosen, resulting in a total sample of 120 respondents. The research followed a cross-sectional, ex-post facto design to assess the relationship between farmer profile characteristics and yield gaps without manipulating the independent variables. Primary data were collected using a structured and pre-tested interview schedule, capturing fourteen independent variables, including age, education, size of landholding, annual income, farming experience, trainings undergone, irrigation potential, social participation, input acquisition pattern, information-seeking behaviour, achievement motivation, risk-taking ability, knowledge, and market intelligence. The dependent variable, yield gap, was calculated as the difference between the recommended potential yield and the actual yield achieved by the farmers. Data collection involved face-to-face interviews, supported by verification of yield data through observation and consultation with local agricultural records. The interview schedule was pre-tested to ensure clarity, reliability, and validity of responses. Collected data were coded, tabulated, and analyzed using SPSS software. Pearson's product-moment correlation coefficient was applied to determine the strength and direction of relationships between each farmer characteristic and yield gap, with significance tested at 0.05 and 0.01 probability levels.

Results and Discussion

Table 1: Distribution of respondents based on the relationship between selected profile characteristics and yield gap ($N = 120$)

S. No	Variable	Characteristics	Correlation Coefficient (r)
1	X1	Age	-0.23**
2	X2	Education	-0.281*
3	X3	Size of landholding	0.054 NS
4	X4	Annual income	0.127 NS
5	X5	Farming experience	0.356*
6	X6	Trainings undergone	0.220**
7	X7	Irrigation potential	0.020 NS
8	X8	Social participation	-0.161*
9	X9	Input acquisition pattern	0.437*
10	X10	Information seeking behaviour	0.352**
11	X11	Achievement motivation	0.035 NS
12	X12	Risk taking ability	-0.104*
13	X13	Knowledge	0.452**
14	X14	Market intelligence	0.077 NS

Significance levels:

- *Significant at 0.05 level
- **Significant at 0.01 level
- NS – Non-significant

The correlation analysis presented in Table 1 reveals a range of relationships between farmers' profile characteristics and the observed yield gap in oilseed cultivation. Yield gap, being a multifaceted outcome, reflects not only agronomic conditions but also the behavioural, informational, and managerial attributes of farmers. The results reveal patterns that highlight which characteristics constrain performance and which contribute to narrowing yield disparities. Age demonstrated a negative and significant association with yield gap ($r = -0.23$), suggesting that older farmers tend to experience wider gaps between potential and actual yields. This negative direction implies that as age increases, the ability or willingness to incorporate modern practices may decline. Older farmers often rely heavily on traditional techniques and exhibit greater resistance to change, which limits their adoption of improved technologies and scientific

recommendations. Similar findings were earlier highlighted by Saradhara *et al.* (2020) and Dodiya (2014) [2], who reported that younger farmers typically demonstrate greater curiosity, openness, and responsiveness to innovation, enabling them to achieve better yield performance. Education also exhibited a negative and significant correlation with yield gap ($r = -0.281$). This relationship underscores the role of literacy and formal learning in enhancing farmers' understanding of agronomic principles, pest dynamics, nutrient management, and technological options. Educated farmers are better equipped to interpret extension advisories, evaluate new information critically, and implement recommendations accurately. As a result, they tend to optimise input use and reduce managerial inefficiencies. These results remain consistent with those documented by Saradhara *et al.* (2020) and Dodiya (2014)

[2], who noted that higher educational attainment directly supports improved adoption behaviour and more efficient farming operations. The size of landholding showed a positive but non-significant relationship with yield gap ($r = 0.054$). This indicates that whether a farmer owns a small, medium, or large farm, the magnitude of yield gap may not differ substantially. Oilseed production practices in the study region appear relatively uniform across holdings, resulting in comparable levels of efficiency or inefficiency. Similar conclusions were reported by Sardhara *et al.* (2020) [7], affirming that land size alone does not necessarily translate into better performance unless complemented by improved practices and inputs. Annual income similarly showed a positive but non-significant correlation ($r = 0.127$). Although economically better-off farmers are generally expected to invest in high-quality seeds, fertilizers, and other essential inputs, income alone does not guarantee scientific management. Parikh (2013) [6] noted that income facilitates adoption indirectly, but knowledge, training, and attitudes play a stronger role in reducing yield gaps. Farming experience had a positive and significant influence on reducing yield gaps ($r = 0.356$), indicating that more experienced farmers are better able to achieve higher yields closer to the potential. With greater experience, farmers develop enhanced understanding of soil behaviour, varietal performance, weather patterns, and pest management, which enables more informed and effective decision-making in crop production. Sharma (2021) [8] also highlighted the positive contribution of accumulated experience toward enhanced productivity and stability in crop outcomes.

Trainings undergone had a positive and significant effect on reducing yield gaps ($r = 0.220$), highlighting the importance of structured learning and capacity-building initiatives. Farmers who participate in such trainings gain updated technical knowledge, practical skills, and the confidence to implement scientific cultivation practices effectively, thereby achieving yields closer to the potential. Consequently, their yield performance improves. Irrigation potential displayed a positive but non-significant association ($r = 0.020$), revealing that access to irrigation does not necessarily ensure better yields. This may be attributed to adequate irrigation availability among most respondents or to the possibility that other constraints limit yield optimization. Social participation demonstrated a negative and significant relationship ($r = -0.161$), suggesting that active involvement in farmer groups, cooperatives, or community networks increases exposure to innovations. Sardhara (2020) [7] also emphasized the importance of peer-learning and collective interaction for effective technology adoption. Input acquisition pattern had a positive and significant influence on minimizing yield gaps ($r = 0.437$), indicating that farmers who obtain quality inputs promptly are better equipped to implement scientific crop management practices, thereby achieving higher and more consistent yields. Sharma (2021) [8] similarly recognized timely input procurement as a major determinant of productivity. Information-seeking behaviour exhibited a positive and significant effect on reducing yield gaps ($r = 0.352$), suggesting that farmers who actively seek knowledge are more capable of adopting improved practices, addressing cultivation challenges, and refining their techniques, which collectively lead to higher productivity and smaller yield gaps. Achievement

motivation, however, showed a positive yet non-significant association ($r = 0.035$), implying that internal drive alone is insufficient without complementary knowledge and skills. Risk-taking ability demonstrated a negative and significant correlation ($r = -0.104$), supporting Sardhara *et al.* (2020) [7], who noted that farmers willing to experiment are more likely to achieve higher yields. Knowledge exhibited one of the strongest positive and significant relationships with yield gap ($r = 0.452$). As emphasized by Dodiya (2014) [2] and Parikh (2013) [6], knowledgeable farmers can efficiently adopt innovations, manage resources, and enhance productivity. Market intelligence showed a positive but non-significant relationship ($r = 0.077$), implying that awareness of market trends does not directly impact productivity.

Conclusion

The study clearly establishes that farmer-related characteristics play a decisive role in determining the extent of yield gaps in oilseed cultivation. Significant variables such as education, farming experience, training exposure, social participation, input acquisition behaviour, information-seeking patterns, risk-taking ability, and knowledge strongly influenced farmers' ability to achieve potential yields. These findings highlight that yield gaps are not solely a consequence of technical or environmental constraints; rather, they are deeply shaped by human and behavioural factors that determine farmers' adoption and execution of scientific practices. Therefore, strategies to reduce yield gaps must prioritize farmer empowerment along with technological dissemination. Strengthening farmers' knowledge base, improving their access to reliable information, ensuring availability of quality inputs, and enhancing their motivation and managerial skills are essential steps toward bridging existing productivity gaps. By addressing these critical behavioural determinants, extension systems can significantly elevate oilseed productivity, enhance farm incomes, and promote more sustainable and competitive farming systems.

Future Recommendations

To reduce yield gaps and enhance oilseed productivity, it is essential to focus on strengthening farmers' knowledge and skills through targeted training programs and capacity-building initiatives, especially for those with lower formal education. Improving access to timely and quality inputs, promoting active social participation through farmer groups and cooperatives, and facilitating information-seeking behaviour via ICT tools and extension services can empower farmers to adopt improved practices. Encouraging scientific risk-taking, linking farmers to market information and value chains, and providing policy support for extension outreach and participatory learning platforms can collectively help bridge existing yield gaps and enhance overall farm efficiency and sustainability.

References

1. Akhtar S, Abbas A, Faisal M, Raza MH, Samie A, Yu M, *et al.* Roles of personal, household, physical, and institutional factors on farmers' efficiency of hybrid maize production: Implications for food security. *Agriculture*. 2023;13(9):1840.
2. Dodiya B. Technological gap in adoption of castor seed production technology by the castor growers. Anand (IN): Anand Agricultural University; 2014.

3. Dutta S, Chakraborty S, Goswami R, Banerjee H, Majumdar K, Li B, Jat ML. Maize yield in smallholder agriculture system—An approach integrating socio-economic and crop management factors. *PLoS One*. 2020;15(2):e0229100.
4. Hatfield JL, Beres BL. Yield gaps in wheat: Path to enhancing productivity. *Front Plant Sci*. 2019;10:1603.
5. Ongoma V, Brouziyne Y, Bouras EH, Chehbouni A. Closing yield gap for sustainable food security in sub-Saharan Africa—Progress, challenges, and opportunities. *Front Agron*. 2025;7:1572061.
6. Parikh AH. Technological gap in adoption of improved cultivation practices by soybean growers. Anand (IN): Anand Agricultural University; 2013.
7. Sardhara AD, Jadav NB, Kapuriya TD. Relationship of technological gap in adoption of plant protection practices with socio-economic characteristics of cotton growers. *Gujarat J Ext Educ*. 2020.
8. Sharma P, Dupare B, Patel RM. Crop management and socio-economic determinants of soybean yield variability in Central India: A regression tree approach. *J Oilseeds Res*. 2021;68.