Vol. 9 No. 2 March 2026

ISSN : 2597 - 8713 (ONLINE)
ISSN : 2598 - 5167 (PRINT)

AGRICULTURAL SCIENCE
Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya,Indonesia
Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Analysis of Women Empowerment through Sustainable Farming Education: Evidence from Karangcangkring Village, Indonesia

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Article History: Received: November 17, 2025; Accepted: January 14, 2026

ABSTRACT

Women play a strategic role in the agricultural sector and family food security, yet they still face limited access to agricultural education, technology, and decision-making. This situation contributes to low levels of empowerment of female farmers, particularly in rural areas. This study aims to analyze women's empowerment through sustainable agricultural education, using a case study in Karangcangkring Village, Gresik Regency, Indonesia. The study employed a case study approach with descriptive qualitative methods supported by simple quantitative data. Data collection was conducted through participant observation, semi-structured interviews, pre- and post-activity questionnaires, and focus group discussions. The analysis of women's empowerment was conducted with reference to the cognitive, economic, social, and institutional dimensions. The results indicate that sustainable agricultural education has a positive impact on increasing the empowerment of female farmers. The most significant improvements occurred in the cognitive and social dimensions, demonstrated by increased agricultural technical knowledge, self-confidence, and women's active participation in group activities and decision-making. The economic and institutional dimensions also showed positive, albeit gradual, developments, particularly in production management, post-harvest management, and women's involvement in agricultural group structures. Overall, sustainable agricultural education not only improves the technical capacity of women farmers but also strengthens their agency, social participation, and position within rural agricultural livelihood systems. This research confirms that the integration of gender-sensitive agricultural education is a crucial strategy for empowering women farmers and promoting inclusive and sustainable agricultural development at the village level.

Keywords: women's empowerment; sustainable agricultural education; women farmers; food security; rural Indonesia.

1. INTRODUCTION

Women make significant contributions to the agricultural sector in various countries, including their role in family food security and rural development (Kurniasari et al. 2021). However, women farmers often face unequal access to agricultural education, extension services, technology, and decision-making, resulting in low productive capacity and increased gender inequity in agricultural livelihood systems (Social norms and participation of Indonesia's women in agricultural decision-making 2025). In the context of sustainable development, empowering women through gender-sensitive agricultural education is a crucial strategy to promote

 DOI: https://doi.org/10.55173/agriscience.v9i2.198

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inclusiveness and efficiency in agricultural production (Lestari 2023) and strengthen their contribution to sustainable development goals (SDGs) such as poverty eradication and food security (Amran & Abdul Fatah 2020).

In Indonesia, gender inequality in agriculture remains a structural issue at the village level, as many women farmers are considered mere laborers without control over production resources or harvests (Khusna & Sari 2025). These findings align with national-level research showing that the division of labor and access to resources are often hampered by social norms and limited access to education and technology (Efendi & Fidiyani 2025). A similar situation was also found in Karangcangkring Village, Gresik Regency, where women farmers had limited access to agricultural information, institutions, and technology before the program intervention. Consequently, their role in extension and decision-making regarding cultivation and crop management remained minimal, as documented in the PPK Ormawa activity report at Wijaya Putra University (Kurniasari et al. 2025).

Sustainable agricultural education is seen as a relevant approach to addressing these inequalities because it can simultaneously increase the knowledge, skills, and self-confidence of women farmers (Kasim et al. 2024; Lestari 2023). Gender-sensitive, education-based interventions not only increase women's participation in agricultural production but also encourage the adoption of environmentally friendly and sustainable agricultural practices (Kurniasari et al. 2021). The implementation of the Sustainable Food Farming Women's School in Karangcangkring Village introduces a hydroponic cultivation system as a relatively women-friendly, resource-efficient, and easily adaptable agricultural model at the household level. This program is designed to improve technical cultivation skills, strengthen post-harvest processing, expand access to simple marketing, and strengthen the institutional framework of women's farmer groups as a basis for program sustainability. (Bima et al. 2024)

Although various studies have highlighted the urgency of training and empowering women farmers, empirical studies specifically analyzing the impact of sustainable agricultural education on women's empowerment, including improvements in cognitive, economic, social, and institutional capacity, remain limited, particularly in the local context of rural Indonesia (Quisumbing et al. 2023; Kasim et al. 2024). Some studies tend to focus on economic aspects or labor distribution, while the multidimensional dimensions of empowerment have not been comprehensively studied. To address this gap, this study aims to analyze women's empowerment through sustainable agricultural education, using a case study in Karangcangkring Village. The results of this study are expected to provide an empirical contribution to the development of a sustainable model for

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empowering women farmers and become a reference for gender-based agricultural development policies and programs at the local level.

2. RESEARCH METHOD

This study uses a descriptive qualitative approach supported by simple quantitative data to analyze women's empowerment through sustainable agricultural education. (Waid et al., 2022) This approach was chosen to illustrate changes in the capacity, role, and participation of women farmers as a result of educational interventions. The research was conducted as a case study of the Sustainable Food Farmers' School Program, implemented under the PPK Ormawa scheme in 2024.

The research location was Karangcangkring Village, Dukun District, Gresik Regency, East Java, where the program was implemented. The subjects were 48 women farmers and Family Welfare Movement (PKK) members participating in the Women Farmers' School program. The research focused on the level of women's empowerment, encompassing cognitive, economic, social, and institutional aspects. (Malapit et al., 2020)

Data collection was conducted through participant observation, semi-structured interviews, pre- and post-program questionnaires, focus group discussions, and documentation studies referring to the final report and official PPK Ormawa documents. The questionnaire was used to measure changes in participants' knowledge, attitudes, and skills related to hydroponic cultivation, post-harvest processing, and simple marketing. (Scoones, 2021)

Data analysis was conducted descriptively and thematically, comparing conditions before and after the program. The Empowerment Level Analysis Framework was used to assess changes in the cognitive, economic, social, and institutional dimensions of women farmers. Data validity was maintained through triangulation of sources and methods by comparing the results of observations, interviews, questionnaires, FGDs, and program documents. (Doss et al., 2021; Waid et al., 2022)

Data validity was maintained through triangulation of methods and sources, as well as confirmation of key findings through focus group discussions. This approach aligns with qualitative research practices in rural development and sustainable agriculture studies (Scoones, 2021).

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3. RESULTS AND DISCUSSION

RESULTS

The research results will be presented in the form of a comparative summary of conditions before and after the implementation of sustainable agricultural education. This summary integrates qualitative findings from observations, interviews, and focus group discussions with simple quantitative data in the form of empowerment index scores. The tabular presentation is intended to clarify the direction and magnitude of changes in each dimension of empowerment, including cognitive, economic, social, institutional, and self-confidence and agency of women farmers.

Table 1. Changes in Women's Empowerment Levels Before and After Sustainable Agricultural Education

Empowerment Dimension	Condition Before Education	Condition After Education	Score Before (1–5)	Score After (1–5)	Score Change	Change Indication
Cognitive Empowerment	Limited farming knowledge based on traditional experience	Improved technical understanding of sustainable farming and environmentally friendly practices	2.1	4.2	+2.1	Increased
Economic Empowerment	Economic involvement limited to supporting activities	Improved production capacity, post-harvest processing skills, and awareness of value addition	2.0	3.4	+1.4	Gradually increased
Social Empowerment	Low participation in group activities and discussions	Active participation in group activities and increased confidence in expressing opinions	2.3	4.1	+1.8	Increased
Institutional Empowerment	Minimal involvement in organizational structures and decision-making	Initial involvement in group activities and institutional functions	1.9	3.3	+1.4	Developing
Self-Confidence and Agency	Low initiative and decision-making confidence	Increased self-confidence and initiative in agricultural activities	2.2	4.0	+1.8	Increased

Table 1 shows an increase in the empowerment of female farmers across all dimensions following the implementation of sustainable agricultural education. The most prominent improvement occurred in the cognitive empowerment dimension, indicated by an increase in the index score from low to high. The social empowerment and self-confidence dimensions also experienced significant improvements, along with increased women's participation in group

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activities and their courage in expressing opinions. Meanwhile, the economic and institutional dimensions showed gradual improvements, reflecting the process of adaptation and strengthening of women's roles in productive activities and group organizational structures. Overall, these results indicate that sustainable agricultural education has contributed positively to increasing the empowerment of female farmers at the village level.

1. Respondent Characteristics

Respondents in this study were female farmers who participated in sustainable agricultural education programs in Karangcangkring Village. Most respondents were of productive age and had experience farming as a primary activity or as a source of family income. Respondents' educational level was predominantly primary or secondary, with limited experience in formal agricultural training prior to the sustainable agricultural education program. This finding aligns with the findings of Doss et al. (2021) stated that female farmers in rural areas generally have strong practical experience but still have limited access to formal training. This situation suggests that agricultural education interventions play a strategic role in increasing the capacity of female farmers at the village level (Quisumbing et al., 2023).

2. Changes in Cognitive Empowerment

The results of this study indicate a significant increase in the cognitive empowerment dimension of female farmers after participating in sustainable agricultural education. Respondents experienced an increased understanding of sustainable agricultural cultivation techniques, production input management, and more environmentally friendly agricultural practices. Prior to the education, most respondents had limited knowledge and tended to rely on inherited experience. After the intervention, respondents were able to systematically explain cultivation stages and demonstrated improved technical skills in agricultural practices. This finding is consistent with the research findings of Kurniasari and Dianto (2021) in Agricultural Science, which confirmed that education and group learning can significantly increase the knowledge and technical understanding of female farmers.

3. Changes in Economic Empowerment

Regarding the economic dimension, the results of this study indicate an increase in the ability of female farmers to manage production and post-harvest activities. Respondents began to understand the importance of production efficiency, yield quality, and the potential for added value through simple processing and marketing. Although income increases were not evenly distributed across all respondents, there were early indications of improvements in women's economic contributions to the household. This finding aligns with Quisumbing et al. (2021), who emphasized

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that increasing women's economic capacity in agriculture is often gradual and requires ongoing strengthening. Furthermore, Kurniasari et al. (2025) demonstrated that improving production and post-harvest skills is an important entry point for strengthening the economic role of women farmers.

4. Changes in Social Empowerment

The results of this study indicate that sustainable agricultural education fostered increased social empowerment of women farmers. Respondents became more active in group activities, discussions, and collaboration among members. The social interactions formed during the education and mentoring process strengthened women's solidarity and confidence in expressing their opinions. Previously passive women farmers began to participate in group decision-making related to agricultural activities. This finding supports the research of Kurniasari and Dianto (2021), which emphasized that social capital and collective learning spaces play a crucial role in increasing women farmers' participation and bargaining power within groups.

5. Changes in Institutional Empowerment

Regarding the institutional dimension, the research results indicate that women farmers are beginning to become more actively involved in the structures and activities of farming groups. Sustainable agricultural education encourages the formation of collective learning spaces that strengthen women's positions within group organizations. Respondents demonstrated an increased understanding of institutional functions, role allocation, and the importance of organizational sustainability. Although involvement in strategic decision-making is still developing, these results indicate the initial process of strengthening women's agency, as also found in the study of women farmer empowerment in East Java by Kurniasari et al. (2025) and the study of women's institutions in agricultural systems by Scoones (2021).

6. Synthesis of Women's Empowerment Results

Overall, the research results indicate that sustainable agricultural education has a positive impact on the empowerment of women farmers in Karangcangkring Village. This impact is most pronounced in the cognitive and social dimensions, followed by the economic and institutional dimensions, which show gradual development. These findings reinforce empirical evidence that agricultural education not only improves technical capacity but also contributes to strengthening women's roles, participation, and position in rural agricultural livelihood systems (Doss et al., 2021; Quisumbing et al., 2023; Kurniasari et al., 2025).

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Discussion

The results of this study indicate that sustainable agricultural education positively contributes to increasing the empowerment of female farmers in Karangcangkring Village, particularly in the cognitive and social dimensions, followed by the gradually developing economic and institutional dimensions. These findings align with empowerment theory, which views empowerment as a multidimensional process involving increased capacity, agency, and individual bargaining power within social and economic structures, rather than solely improving technical skills (Kabeer, 2020).

The increase in cognitive empowerment, reflected in the increased knowledge and technical skills of female farmers, demonstrates capacity building as a key foundation for empowerment. According to the empowerment theoretical framework, knowledge capacity is a prerequisite for the emergence of agency, namely the individual's ability to make strategic choices and act on those choices (Kabeer, 2020). These findings align with research by Quisumbing (2023), which asserts that increasing knowledge and skills in the context of sustainable agriculture directly contributes to strengthening women's agency in production decision-making and farm management.

In the economic dimension, this study found that empowerment increases gradually, marked by women's increased understanding of production efficiency, post-harvest processing, and potential added value. This pattern is consistent with the findings of Doss et al. (2021), who stated that the economic impact of women's empowerment programs in agriculture is generally not immediate because it is influenced by access to productive assets, market structures, and gender norms at the household and community levels. Therefore, the uneven economic improvement across respondents reflects the medium- to long-term dynamics of empowerment.

The increase in social empowerment of women farmers, demonstrated through active participation in groups, discussions, and collective decision-making, indicates a strengthening of the relational dimension of empowerment. Empowerment theory emphasizes that changes in social relations and increased participation are important indicators of empowerment, as they enable women to influence collective processes and expand their social networks (Scoones, 2021). These findings also align with a Global Food Security study, which demonstrated that interventions based on group learning and collective practice are effective in increasing women's self-confidence and bargaining power in rural agricultural systems (Njuki et al., 2022).

From an institutional perspective, the study's findings indicate an initial process of strengthening women's positions within agricultural group structures. Although women's

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involvement in strategic decision-making is still developing, increased understanding of institutional functions and role allocation indicates a shift from symbolic to substantive participation. From an empowerment perspective, institutional change is a crucial next step because it determines the sustainability of empowerment outcomes and their integration into the broader social system (Quisumbing et al., 2021).

Overall, the results of this study reinforce the view that sustainable agricultural education is a strategic instrument in the empowerment of women farmers. Education not only improves technical capacity but also fosters the strengthening of women's agency, social participation, and position within agricultural institutions. These findings extend empirical evidence from the Indonesian rural context that empowering women through sustainable agricultural education contributes to the transformation of agricultural livelihood systems to be more inclusive and sustainable.

4. CONCLUSIONS

This study demonstrates that sustainable agricultural education plays a significant role in enhancing the empowerment of women farmers in Karangcangkring Village. This empowerment improvement is evident across various dimensions, with the most prominent changes in the cognitive and social aspects, demonstrated by increased knowledge, technical skills, self-confidence, and women's participation in group activities and decision-making. The economic and institutional dimensions also experienced positive, albeit gradual, developments, reflecting the process of adaptation and strengthening of women's roles in productive activities and agricultural organizational structures.

These findings confirm that sustainable agricultural education serves not only as a means of increasing technical capacity but also as an empowerment instrument that encourages the strengthening of women's agency, social participation, and position within rural agricultural livelihood systems. Therefore, the integration of gender-sensitive agricultural education into agricultural development programs at the village level is a relevant strategy to support more inclusive and sustainable agricultural development.

REFERENCES

Amran, A., & Abdul Fatah, F. (2020). Sustainable development goals and women empowerment in agriculture. Journal of Sustainable Development, 13(6), 15–26. https://doi.org/10.5539/jsd.v13n6p15

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Bima, R. R., Kurniasari, D. A., Alimah, S., Lozha, L., Kurniawati, A., & Baunsele, Y. (2024). Sekolah perempuan tani pangan lestari untuk ketahanan pangan keluarga di Desa Karangcangkring Kecamatan Dukun Kabupaten Gresik**.** In Prosiding Konferensi Nasional Pengabdian Kepada Masyarakat dan Corporate Social Responsibility (PKM-CSR 2024***)***. https://doi.org/10.37695/pkmcsr.v7i0.2483

Doss, C., Meinzen-Dick, R., Quisumbing, A. R., & Theis, S. (2021). Women in agriculture: Four myths. *Global Food Security, 29***,** 100541. https://doi.org/10.1016/j.gfs.2021.100541

Efendi, M., & Fidiyani, R. (2025). Gender norms and women's access to agricultural resources in rural Indonesia. Journal of Rural and Community Development, 20(1), 45–60.

Kabeer, N. (2020). Gender equality, women's empowerment and economic growth: Theoretical considerations and empirical evidence. Feminist Economics, 26(1), 1–35. https://doi.org/10.1080/13545701.2019.1659032

Kasim, N., Rahman, S., & Yusuf, M. (2024). Gender-responsive agricultural education and women farmers' empowerment in rural Indonesia. Journal of Rural Studies, 102, 103145. https://doi.org/10.1016/j.jrurstud.2024.103145

Kurniasari, D. A., & Dianto, A. K. (2021). Analysis of social capital in the women farmers group of Dorang Cinta, Surabaya City. Agricultural Science, 5(1), 59–67. https://doi.org/10.55173/agriscience.v5i1.66

Kurniasari, D. A., Alimah, S., Prasetyo, A. S., Saputra, R. R. B., & Sumarningsih. (2025). Strategies' formulation for empowering Tengger tribe women farmers in Probolinggo Regency. Jurnal AGRISEP: Kajian Masalah Sosial Ekonomi Pertanian dan Agribisnis, 24(1), 465–492. https://doi.org/10.31186/jagrisep.24.01.465-492

Kurniasari, D. A., Prasetyo, A. S., & Aulia, A. N. (2022). Sosial ekonomi petani wanita di Desa Karangcangkring, Kecamatan Dukun, Kabupaten Gresik. *Seminar Nasional PSGESI LPPM UWP, 9*(01), 85–92. https://doi.org/10.38156/gesi.v9i01.190

Lestari, E. (2023). Sustainable agricultural education and women empowerment in rural communities. *Sustainability, 15*(9), 7421. https://doi.org/10.3390/su15097421

Malapit, H. J., Kovarik, C., Sproule, K., Meinzen-Dick, R., & Quisumbing, A. R. (2020). *Instructional guide on the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI)***.** IFPRI Discussion Paper.

Njuki, J., Eissler, S., Malapit, H. J., Meinzen-Dick, R., Bryan, E., & Quisumbing, A. R. (2022). A review of evidence on gender equality, women's empowerment, and food systems. Global Food Security, 33**,** 100611. https://doi.org/10.1016/j.gfs.2022.100611

Quisumbing, A. R. (2023). Measuring women's empowerment in agriculture. *Global Food Security, 36***,** 100654. https://doi.org/10.1016/j.gfs.2022.100654

 DOI: https://doi.org/10.55173/agriscience.v9i2.198

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https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Quisumbing, A. R., Meinzen-Dick, R., Njuki, J., Johnson, N., Kovarik, C., Rubin, D., Peterman, A., & Waithanji, E. (2021). Empowering women in agriculture: Evidence and policy implications. *Food Policy, 102*, 102093. https://doi.org/10.1016/j.foodpol.2021.102093

Scoones, I. (2021). Pathways to sustainability: Transforming agriculture and food systems. The Journal of Peasant Studies, 48(4), 755–779. https://doi.org/10.1080/03066150.2021.1939948

Waid, J. L., Wendt, A. S., Sinharoy, S. S., Kader, A., & Gabrysch, S. (2022). Impact of a homestead food production program on women's empowerment: Pro-WEAI results from the FAARM trial in Bangladesh. World Development, 158**,** 106001. https://doi.org/10.1016/j.worlddev.2022.106001

 DOI: https://doi.org/10.55173/agriscience.v9i2.198