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Sustainable Agriculture In Vocational High Schools In Southeast Sulawesi: Practice Learning And Local Wisdom

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ABSTRACT

The research aims to (1) analyze local wisdom in Southeast Sulawesi to support sustainable agriculture and (2) analyze supporting factors for the integration of sustainable agriculture in local wisdom-based learning in Vocational High Schools (SMK). This research used a qualitative approach. The study participants were selected purposively with consideration. The informants were school principals and productive teachers. The research was conducted in Muna Barat, Konawe, Konawe Selatan, and Kolaka districts. Data was collected through interviews, observations, and documentation review. Data analysis using Descriptive analysis. The community in Southeast Sulawesi has some local wisdom that supports sustainable agriculture, tradition mearano, honowu/katambhari, kasalasa, and kolambu. Such is the case with the tradition of livestock-crop-fishery integration. Local wisdom is maintained and improved through increasing knowledge and skills through SMK. Regulatory support, expertise competencies relevant to local excellence, curriculum, and learning are essential for integrating sustainable agriculture based on local wisdom in Southeast Sulawesi.

Keywords: Vocational High School, Local Wisdom, Curriculum, Farming System.

INTRODUCTION

Sustainable agricultural development critiques conventional development that has exploited the environment and negatively impacted society. The concept of sustainable agriculture is very diverse. Georgieva et al., (2021) stated sustainable agriculture is a productive

agricultural business, with quantity and quality balanced with environmental conservation and environmental resources to remain productive and maintained for future generations. Sustainable agriculture reduces inputs (water, pesticides, and fertilizers) and increases crop productivity (Khoshnodifar, 2020).

Sustainable agriculture can balance economic, environmental, and social aspects, creating resilient agricultural systems in the long term (Rose et al., 2019). According to Gebska et al., (2020), two significant advantages of sustainable agricultural practices are water protection against pollution and reducing greenhouse gas emissions. Organic fertilizers benefit the soil, plants, and farmers (Mayanglambam et al., 2020). Sustainable agricultural practices are diverse LEISA farm systems (Low External Input Sustainable Agriculture) (Firth et al., 2020). Conservation Agriculture (CA, use of mulch, crop rotation, intercropping and practices, zero tillage, use of organic fertilizers, agroforestry, water harvesting, erosion control, cultivation of hydroponic crops, agroecology, integrated farming systems, and rotational grazing, use of biopesticides (Wezel et al., (2014); Kurgat et al., (2020); Slimi et al., (2021); Mishra et al., (2020), and use microbial biofertilizers (Fasusi et al., 2021).

One of the implementations of LEISA is by integrating agriculture, livestock, and fisheries. This practice has become local wisdom for farmers. It's just that this practice is still a side activity that does not have high economic and social value. Lack of knowledge and skills hinders the integration of agriculture fisheries and livestock (Purnomo, 2021).

Socializing sustainable agriculture by implementing plant-livestock-fish integration, as a wisdom of the people of Southeast Sulawesi, is important in learning in SMK. The existence of SMK is expected to overcome barriers to knowledge and skills in integrated agricultural practices. We are equipping students with integrated agricultural skills, implementing sustainable agriculture, and maintaining local wisdom based on local excellence.

In particular, the study of education for sustainable agricultural development is getting attention. Education influences the adoption of sustainable agriculture (Thanh & Yapwattanaphun, 2015). Sumane et al., (2017) suggest that knowledge of sustainable agriculture is important in transitioning to more sustainable agriculture. Young farmers with a high education level are potential targets for organic farming adoption. (Sapbamrer & Thammachai, 2021). The education level of farmers should be improved, and highly educated people should be encouraged to engage in the development of organic farming (Zhou & Ding, 2022).

Education to support sustainable agricultural development is essential. It's just that implementation in the field of education is still weak. There are gaps in its implementation in the formal education system at the school level (Sinakou et al., 2018). The results show that

academics in education for sustainable development have not understood the concept holistically (Sofiana et al., 2022). Teachers have never received training on sustainable agriculture (Fitriani R, 2023).

One side of agriculture is a local advantage of Southeast Sulawesi Province based on mapping conducted by the Ministry of Education and Culture of the Republic of Indonesia. The spectrum (major) of SMK expertise must align with local excellence. The potential of agriculture in Southeast Sulawesi is an opportunity for SMK to integrate local wisdom by implementing learning that integrates plants-livestock-fish.

Learning practices that integrate plant-livestock-fish as the implementation of sustainable agriculture. Based on the above background, the purpose of the study is to find out: (1 analyze local wisdom in Southeast Sulawesi to support sustainable agriculture, and (2) analyze supporting factors for the integration of sustainable agriculture in local wisdom-based learning in Vocational High Schools (SMK)

RESEARCH METHODOLOGY

The design of this study was qualitative. Participants consisted of a principal and 4 productive teachers selected by purposive sampling with the consideration of participants understanding the context of the research. Research locations in SMKN 1 Baula, SMKN 9 Konawe Selatan, SMKN 1 Kusambi, and SMKN SPP Wawotobi. Data collection using in-depth interviews, observation, and document review methods. Data were analyzed using descriptive analysis. Researchers triangulate data through the triangulation of sources and techniques.

RESULT AND DISCUSSION

Local Wisdom of Community in Southeast Sulawesi

Research sites in Muna Barat, Kolaka, Konawe, and South Konawe districts have advantages of local agriculture, animal husbandry, and fisheries. The Muna ethnic community has some local wisdom in farming. The kolambu tradition uses the yard to grow several types of plants and raise livestock. This tradition, in addition to efforts to use the yard, also serves the availability of family food (Widayat et al., 2020).

Tradition Kasalasa for the Muna ethnic community is an agricultural implementation focusing on ecological aspects (Baka et al., 2019). The Muna community's habit of integrating livestock and crops has positively impacted. Research conducted by Mpalasi (2020) Farming with integration: (1) cattle-cashew, (2) poultry-cashew, (3) cashew-horse cashew, (4) cashew-goat livestock increase community income.

Honowu/Katambhari is a tradition of the Binongko community of Southeast Sulawesi in agriculture. Honowu/katambhari is the tradition of using garbage or manure derived from plants or animals given to the

roots of food plants (Hidrawati et al., 2019). This local wisdom is one of the sustainable agriculture that reduces the use of organic fertilizers.

The local wisdom of Tolaki ethnicity spread in Konawe, Kolaka, and South Konawe Districts is Mearano. Mearano is the local wisdom that combines fish-plant. This tradition is done by making holes in the rice field to collect rainwater. In addition, the hole is used to irrigate rice fields and raises freshwater fish. This tradition contains spirit mepokoaso and medulu, namely the tradition of working together and gathering (Moita, 2017). This concept has been developed in an innovation known as Mina padi.

In addition, the communities that inhabit the Konawe, Kolaka, and South Konawe regions have habitually raised livestock crops, although it is still traditional. One of the local wisdom of the Tolaki ethnicity is grazing cattle and buffaloes on oil palm plantation land, as shown in Figure 1.

Figure 1. Integration of Cattle-Palm Plants (Rianse, 2021)

Supporting factors for the integration of sustainable agriculture in learning based on local wisdom in Vocational High Schools (SMK)

SMK is a national education subsystem to produce graduates with certain field skills. As an academic unit focusing on skills, it impacts learning and emphasizes practice. Based on interviews, observations, and document reviews, the factors that support the integration of sustainable agriculture in local wisdom-based learning in SMK are as follows:

Regulatory support

National Education System Law number 20, the year 2003, chapter 50 mentions that the district/city government manages basic education, intermediate, and education units based on local excellence. Local excellence (potential) can build local wisdom. In line with the National Education Law, The Ministry of Education and Culture of the Republic of Indonesia has mapped an area's local excellence (potential). Southeast

Sulawesi's agriculture, mining, and services sectors are leading. The mapping became the basis for the opening of majors in SMK.

The President of the Republic of Indonesia issued Presidential Instruction Number 19 of 2016 About the Revitalization of Vocational High Schools in the Framework of Improving the Quality and Competitiveness of Indonesian Human Resources. The Presidential Instruction gives authority to local governments to develop SMK following local excellence. The existence of vocational schools based on local excellence is very important and integrated into learning to support local wisdom.

Regulation of the Minister of Education and Culture of the Republic of Indonesia number 34 of 2018 concerning National Standards for Vocational Education. Competence of graduates having technical abilities in certain areas of expertise, which is further described in the learning content in the Content Standards. The scope of the material includes the History of Agricultural Development, the Concept of Integrated Agriculture, the Concept of Agrotechnology, and Present and Future Agrotechnology. These two standards will be further elaborated in the learning content.

Curriculum support that has a sustainable agriculture paradigm.

Research findings, there are two categories of vocational schools in this study. First, the SMK Center of Excellence/SMK-CoE, namely SMKN 1 Baula, uses the 2013 Curriculum for grade XI and XII students and the Merdeka Curriculum for grade X students in learning. Non-SMK-CoE vocational schools (SMK 1 Kusambi, SMKN 9 Konawe Selatan, and SMKN SPP Wawotobi) use the 2013 curriculum for all levels.

Based on the literature review and interviews with SMK PK teachers. Curriculum Merdeka explicitly material “Sustainable Agriculture” taught in phase E or grade X. Strengthening the Pancasila Student Profile and Work Culture through the Pancasila Student Strengthening Project aims to create graduates who are by the Pancasila student profile and contribute to sustainable development, which a global issue today.

Although the 2013 curriculum is explicitly not yet accommodating the concept of “Sustainable Agriculture, " learning materials that lead to sustainable agriculture, especially the ecological dimension, have been taught. Based on the literature review in student reference books, Environmental Conservation, and Fertilization material in the subjects of Cultivation Basics, the Basic Competence (CB) to be achieved is for students to preserve living environments and fertilization. Both themes are students practice composting that utilizes plant waste and animal waste.

The 2013 Curriculum and the Independent Curriculum, references for education units, must be developed by local excellence and wisdom.

Learning themes will be very meaningful if they are contextually linked to the local wisdom of the community. So, differences in the local wisdom of the community will impact the curriculum developed in each academic unit.

Currently, SMK is still given the choice of implementing the curriculum, whether to use the independent curriculum or continue to use the 2013 curriculum. The curriculum as an educational reference is crucial in supporting sustainable agriculture in vocational schools. Research conducted by (Khoshnodifar et al., 2020) concluded that curriculum is an important element that has a greater influence than other elements in supporting work behavior. The curriculum is the main document that guides the implementation of teaching (Seikkula-Leino et al., 2021).

Compatibility of SMK with local excellence

SMKN 1 Kusambi is in Kusambi District, West Muna Regency, formerly Sekolah Menengah Teknologi Pertanian (SMTP) Raha, Established in 1994. SMKN 1 Kusambi has 4 expertise competencies, namely: (1) Automotive Light Vehicle Engineering, (2) Freshwater Fisheries Agribusiness, (3) Agribusiness, Food Crops and Horticulture (ATPH) dan (4) Poultry agribusiness. Kusambi sub-district has agricultural and livestock potential. Farming and cattle or poultry farming have become local wisdom for the Kusambi community.

SMKN 1 Baula was established in 2001 based on Regent Decree Number 733, dated January 10, 2001. Located in Baula District bordering Pomalaa District, which has a nickel processing center in Southeast Sulawesi carried out by PT Antam. In addition to mining, Kolaka district is known for its agricultural potential, especially plantation crops.

SMKN 1 Baula has different soil characteristics caused by metal content, so modifications are needed in agricultural development and innovation in cultivation. SMKN 1 Baula has competence in Livestock Agribusiness and Plant Agribusiness expertise. As one of the SMK Centers of Excellence, the Socialization of sustainable agriculture programs using organic fertilizers and natural pesticides has been carried out.

SMKN SPP Wawotobi was established in 1983. It is one of the vocational schools in Southeast Sulawesi that still maintains its identity as the School of Agricultural Development. So that SMKN SPP Wawotobi does not open a spectrum of expertise outside agriculture. SMKN SPP Wawotobi has a land area of 50 hectares and has the competence of expertise in Food Crops and Horticulture (ATPH), Agribusiness Plantation Crops, Poultry Agribusiness, dan Veterinary Nursing. Expertise competence is in line with the local excellence of Konawe Regency.

SMKN 9 Konawe Selatan is located on the Mowila-Sabulakoa road, Mulya Sari, Mowila District, South Konawe Regency. SMKN 9 Konawe Selatan was established in 2011. Expertise competencies include

Agribusiness, Food Crops and Horticulture (ATPH), and Computer and Network Engineering (TKD). Mowila sub-district is known as a producer of horticultural crops, rice paddy fields, and cattle breeding.

Learning practices implement sustainable agriculture based on local wisdom.

Research findings show that SMK SPP Wawotobi, SMKN 1 Baula has the competence of ATPH and Poultry expertise. SMKN 1 Kusambi has competence in Food Agribusiness, Poultry Agribusiness, and Freshwater Fisheries Agribusiness. SMKN 9 Konawe Selatan has ATPH expertise. The existence of this expertise competency provides learning opportunities that integrate livestock-crop-fisheries.

Based on interviews with ATPH productive teachers, in learning practice at SMKN PP Wawotobi, vegetable cultivation uses two treatments: vegetable plants only use organic fertilizers, and vegetable cultivation combines organic and inorganic fertilizers. Learning practices by integrating livestock and crops, as shown in Figure 2.

Figure 2. Livestock-crop integration

Based on Figure 1, SMKN SPP Wawotobi has competence in Poultry and ATPH expertise. Chicken manure will be processed into fertilizer to cultivate vegetable plants. The learning theme is "Fertilization," a reference for students, the need for manure as basic fertilizer, as much as 1 kg/10m^2.

Integrating livestock and plants at SMK 1 Baula in the learning process experienced several obstacles, including limited processing facilities. Teachers more often buy compost from farmers because it is more practical and reduces the image of agriculture that is synonymous with the sun, and dirty dirt, which can lead to bullying from students of other competencies.

SMKN 1 Kusambi has expertise in Agribusiness, Food Crops, Horticulture, Poultry, and Freshwater Fisheries. Plant-livestock integration has been carried out, but livestock-crop-fisheries integration has not been optimally carried out. Increasing teacher competence related to integrated agricultural systems and the availability of facilities and facilities is needed to optimize the integration of integrated agriculture in learning.

Farming while raising livestock, such as cows and poultry, has become local wisdom that needs to be preserved. It's just that farmers' habits have not been balanced with adequate knowledge, skills, and technology. Increased knowledge and skills need to be developed modernly through vocational education.

From education, humans get knowledge and information about conservation in modern (Abas et al., 2022). Environmental education is an effort to preserve the natural environment and also as an effort to maintain local wisdom (Effendi, 2019). Vocational education supports sustainable agriculture that accommodates local wisdom, including learning that integrates livestock crops and fisheries.

The integrated agricultural system is farm management that combines plants, animals, and fish in unity (Ittaqillah et al., 2020). This practice has a positive impact, reducing negative environmental impacts (Sarkar et al., 2021). Integrated farming systems can reduce the impact of climate change (Paramesh et al., 2022). Livestock-crop farming can reduce CO2 emissions, reducing soil nutrient loss (Xu & Sun, 2023). The tradition of "Sen" and the use of manure for crops is the local wisdom of farmers in West Timorese (Ngongo et al., 2022).

The conceptual knowledge of teachers and practical knowledge of sustainable agriculture greatly influences the successful integration of education for sustainable agriculture. The importance of teacher competence for sustainability needs to be integrated into teacher education and training (Bertschy et al., 2013). Teacher competence is the key to educational development for sustainable development in higher education (Weng et al., 2020).

Structured training for teachers is needed to internalize sustainable agriculture in vocational schools. Sustainable agriculture practices are not simple or complex and require a multidisciplinary approach. Teacher training and education need to pay special attention to educational skills for sustainability (Uitto & Saloranta, 2017). The debate over how training programs can support teachers in addressing sustainable development challenges (Manasia et al., 2020)

CONCLUSION

Mearano, Honowu/kaplusri, kasalasa, kolambu, and aquaculture traditions integrate livestock-plant-fish as local wisdom that supports

sustainable agriculture. Local wisdom must be preserved and socialized through formal education. SMK, as an educational subsystem to produce skilled alums in agriculture, has a role in preserving local wisdom. The necessary supporting factors consist of (1) government regulations, (2) the suitability of vocational schools with regional excellence, (3) curriculum support that has a sustainable agriculture paradigm, and (4) integration in learning. The presence of the Merdeka Curriculum provides a reminder of integrating sustainable agriculture into learning. Thematic learning by exploring local wisdom and excellence is very important to be developed by the education unit, as stated in the Operational Curriculum of the Education Unit.

REFERENCES

Abas, A., Aziz, A., & Awang, A. (2022). A Systematic Review on the Local Wisdom of Indigenous People in Nature Conservation. Sustainability, 14(3415).

Baka, W. K., Sarimustaqiyma, I., Syarni, P., Rianse, U., & Yusran. (2019). Karakteristik Petani Ubi Jalar Ungu Dan Perkembangan Penerapan Prosesi Kasalasa Sebagai Kearifan Lokal di Kabupaten Muna. Buletin Penelitian Sosial Ekonomi Pertanian Fakultas Pertanian Universitas Haluoleo, 21(1), 17–23.

Bertschy, F., Kiinzli, C., & Lehmann, M. (2013). Teachers' Competencies for the Implementation of Educational Offers in the Field of Education for Sustainable Development. Sustainability, 5, 5067–5080. 10.3390/su5125067

Effendi, T. D. (2019). Local Wisdom-based Environmental Education through Kikigaki Method : Japan Experience and Lesson for Indonesia Local Wisdom-based Environmental Education through Kikigaki Method : Japan Experience and Lesson for Indonesia. IOP Conference Series: Earth and Environmental Science. https://doi.org/10.1088/1755-1315/239/1/012038

Fasusi, O. A., Cruz, C., & Babalola, O. O. (2021). Agricultural Sustainability : Microbial Biofertilizers in Rhizosphere Management. Agriculture, 11(163). /10.3390/agriculture11020163

Firth, A. G., Baker, B. H., Brooks, J. P., Smith, R., Iglay, R. B., & Brian Davis, J. (2020). Low external input sustainable agriculture: Winter flooding in rice fields increases bird use, fecal matter, and soil health, reducing fertilizer requirements. Agriculture, Ecosystems and Environment, 300(August 2019), 106962. 10.1016/j.agee.2020.106962

Gebska, M., Grontkowska, A., Swiderek, W., & Golebiewska, B. (2020). Farmer awareness and implementation of sustainable agriculture practices in different types of farms in Poland. Sustainability (Switzerland), 12(19), 1–17. https://doi.org/10.3390/su12198022

Georgieva, T., Grau, Y., Berova, M., Georgieva, R., & Yordanov, Y. (2021). Innovations in the professional education of teachers and trainers in sustainable agriculture development. Bulgarian Journal of Agricultural Science, 27.

Hidrawati, Rianse, U., Iswandi, R. M., Arafah, N., & Hamzah, A. (2019).

Pengetahuan lokal masyarakat pulau binongko dalam sistim ketahanan pangan. Buletin Penelitian Sosial Ekonomi Pertanian Fakultas Pertanian Universitas Haluoleo, 21(1), 36–44.

Ittaqillah, E., Sadono, D., & Wahyuni, E. S. (2020). Hubungan Partisipasi Petani dengan Keberlanjutan Sistem Pertanian Terpadu Mina Padi. Jurnal Sains Komunikasi Dan Pengembangan Masyarakat [JSKPM], 4(1), 55–72. 10.29244/jskpm.4.1.55-72

Khoshnodifar, Z. (2020). Comparative comparison of lecture and team member teaching design methods in Iran's agricultural higher education system. Journal of Agricultural Science and Technology, 22(4), 891–904.

Kurgat, B. K., Lamanna, C., Kimaro, A., Namoi, N., Manda, L., & Rosenstock, T. S. (2020). Adoption of Climate-Smart Agriculture Technologies in Tanzania. Frontier in Sustainable Food Systems, 4(5), 1–9. https://doi.org/10.3389/fsufs.2020.00055

Manasia, L., Ianos, M. G., & Chicioreanu, T. D. (2020). Pre-service teacher preparedness for fostering education for sustainable development: An empirical analysis of central dimensions of teaching readiness. Sustainability, 12(1), 4–6. 10.3390/SU12010166

Mayanglambam, Bijeeta, B., & Dev, N. M. (2020). Role of Biofertilizers in Sustainable Agriculture-prospect and Constraints. Biotica Research Today, 2(5), 12–26.

Mishra, J., Dutta, V., & Arora, N. K. (2020). Biopesticides in India : technology and sustainability linkages. 3 Biotech, 1–12. 10.1007/s13205-020-02192-7

Moita, S. (2017). Kearifan Lokal Masyarakat etnis Tolaki dalam pengelolaan Sumber daya Pesisir. Jurnal Sosiologi Pendidikan Humanis, 2(3).

Mpalasi, L. P. (2020). Entrepreneurship dalam usaha tani terpadu. CV. Kanaka Media.

Ngongo, Y., Basuki, T., Hosang, E. Y., Nulik, J., Hau, D. K., Sitorus, A., Mau, Y. S. (2022). Local Wisdom of West Timorese Farmers in Land Management. Sustainability Review, 14(6023), 1–21.

Paramesh, V., Kumar, P., Shamim, M., Ravisankar, N., Arunachalam, V., Nath, A. J., Kashyap, P. (2022). Integrated Farming Systems as an Adaptation Strategy to Climate Change : Case Studies from Diverse Agro-Climatic Zones of India. Sustainability, 14(11629), 1–22.

Rose, D. C., Sutherland, W. J., Barnes, A. P., Borthwick, F., Ffoulkes, C., Hall, C., … Dicks, L. V. (2019). Integrated farm management for sustainable agriculture: Lessons for knowledge exchange and policy. Land Use Policy, 81(December 2018), 834–842. 10.1016/j.landusepol.2018.11.001

Sapbamrer, R., & Thammachai, A. (2021). A Systematic Review of Factors Influencing Farmers ' Adoption of Organic Farming. Sustainability, 13(3842), 1–28. 10.3390/su13073842

Sarkar, A., Azim, J. A., Asif, A. Al, Qian, L., & Peau, A. K. (2021). Structural equation modeling for sustainable agriculture indicators: Prospective of a developing country's agriculture. Land Use Policy, 109(March). 10.1016/j.landusepol.2021.105638

Seikkula-Leino, J., Jónsdóttir, S. R., Håkansson-Lindqvist, M., Westerberg, M., & Eriksson-Bergström, S. (2021). Responding to Global Challenges through Education: Entrepreneurial, Sustainable, and Pro-Environmental

Education in Nordic Teacher Education Curricula. Sustainability, Vol. 13. https://doi.org/10.3390/su132212808

Sinakou, E., Pauw, J. B., & Goossens, M. (2018). Academics in the field of Education for Sustainable Development: Their conceptions of sustainable development. Journal of Cleaner. Retrieved from S0959652618306115

Slimi, C., Prost, M., Cerf, M., & Prost, L. (2021). Exchanges among farmers' collectives in support of sustainable agriculture: From review to reconceptualization. Journal of Rural Studies, 83(July 2020), 268–278. 10.1016/j.jrurstud.2021.01.019

Sofiana, A. R., Kulsum, D., & Safitri, M. N. (2022). Integrasi pendidikan untuk pembangunan berkelanjutan pada mata pelajaran dasar-dasar agriteknologi pengolahan hasil pertanian. Edufoortech, 7(1).

Sumane, S., Kunda, I., Knickel, K., Strauss, A., Tisenkopfs, T., Rios, I., … Ashkenazy, A. (2017). Local and farmers' knowledge matters! How integrating informal and formal knowledge enhances sustainable and resilient agriculture. Journal of Rural Studies, 1–10. 10.1016/j.jrurstud.2017.01.020

Thanh, N. Van, & Yapwattanaphun, C. (2015). Banana Farmers ' Adoption of Sustainable Agriculture Practices in the Vietnam Uplands : the Case of Quang Tri Province. Agriculture and Agricultural Science Procedia, 5, 67–74. 10.1016/j.aaspro.2015.08.010

Uitto, A., & Saloranta, S. (2017). Subject teachers as educators for sustainability: A survey study. Education Sciences, 7(1). 10.3390/educsci7010008

Weng, S.-S., Liu, Y., Dai, J., & Chuang, Y.-C. (2020). A Novel Improvement Strategy of Competency for Education for Sustainable Development (ESD) of University Teachers Based on Data Mining. Sustainability, Vol. 12. 10.3390/su12072679

Wezel, A., Casagrande, M., Celette, F., Vian, J. F., Ferrer, A., & Peigné, J. (2014). Agroecological practices for sustainable agriculture. A review. Agronomy for Sustainable Development, 34(1), 1–20. 10.1007/s13593-013-0180-7

Widayat, W., Abdullah, W. G., Romantiaulia, W. I., & Mihrad, E. S. (2020). Local wisdom of Muna Community in utilizing of the yard as family food security Local wisdom of Muna Community in utilizing of the yard as family food security. IOP Conference Series: Earth and Environmental Science, 782. 10.1088/1755-1315/782/3/032018

Xu, X., & Sun, M. (2023). Coupling crop and livestock production can reduce agricultural GHG emissions from smallholder farms. Science, 26(6), 106798. 10.1016/j.isci.2023.106798

Zhou, X., & Ding, D. (2022). Factors Influencing Farmers’ Willingness and Behaviors in Organic Agriculture Development: An Empirical Analysis Based on Survey Data of Farmers in Anhui Province. Sustainability, Vol. 14. 10.3390/su142214945