

DAFTAR PUSTAKA

- Abdulai, A.-R., Tetteh Quarshie, P., Duncan, E., & Fraser, E. (2023). Is agricultural digitization a reality among smallholder farmers in Africa? Unpacking farmers' lived realities of engagement with digital tools and services in rural Northern Ghana. *Agriculture & Food Security*, 12(1), 11. <https://doi.org/10.1186/s40066-023-00416-6>
- Agustiani, N., Sujinah, S., Hikmah, Z. M., Hadiawati, L., Samijan, S., Kamal, Y., Wahab, M. I., Lliorca, L., & Hayashi, K. (2021). Initial Validation Of “Werise” Technology For Planting Time Determination at Rainfed Lowland Using Inpari 41 Variety. *Agric: Journal Of Agricultural Science*, 33(2 SE-Articles), 165–174. <https://doi.org/10.24246/agric.2021.v33.i2.p165-174>
- Akulwar, P. (2020). A Recommended System for Crop Disease Detection and Yield Prediction Using Machine Learning Approach. In *Recommender System with Machine Learning and Artificial Intelligence* (hal. 141–163). <https://doi.org/https://doi.org/10.1002/9781119711582.ch8>
- Arangurí, M., Mera, H., Noblecilla, W., & Lucini, C. (2025). Digital Literacy and Technology Adoption in Agriculture: A Systematic Review of Factors and Strategies. In *AgriEngineering* (Vol. 7, Nomor 9). <https://doi.org/10.3390/agriengineering7090296>
- Argarisma, F. (2023). Program Aplikasi Pgpr Di Lahan Sawah Pada Kelompok Tani “Maju Makmur” Desa Kalisat, Kecamatan Kalisat, Kabupaten Jember. Politeknik Negeri Jember
- Asante, B. O., Ma, W., Prah, S., & Temoso, O. (2024). Promoting the adoption of climate-smart agricultural technologies among maize farmers in Ghana: using digital advisory services. *Mitigation and Adaptation Strategies for Global Change*, 29(3), 19. <https://doi.org/10.1007/s11027-024-10116-6>
- Badan Perakitan dan Modernisasi Pertanian. (2024). *Dukung Program Strategis, Kementerian Pertanian Luncurkan SIAP TANAM Versi 1.0*. <https://doi.org/https://brmp.pertanian.go.id/berita/dukung-program-strategis-kementerian-pertanian-luncurkan-siap-tanam-versi-10>
- Badan Pusat Statistik. (2023). *Hasil Pencacahan Lengkap Sensus Pertanian 2023 - Tahap I*. <https://www.bps.go.id/id/pressrelease/2023/12/04/2050/hasil-pencacahan-lengkap-sensus-pertanian-2023>
- Balasundram, S. K., Shamshiri, R. R., Sridhara, S., & Rizan, N. (2023). The role of digital agriculture in mitigating climate change and ensuring food security: an overview. *Sustainability*, 15(6), 5325.
- Budiman, L., & Suhendi, D. (2024). Resiliensi penguatan ketahanan pangan daerah di Indonesia. *Jurnal Perlindungan Masyarakat: Bestuur Praesidium*, 1(2), 63–

71.

- Chambers, R. (1994). Participatory rural appraisal (PRA): Analysis of experience. *World development*, 22(9), 1253–1268.
- Coggins, S., McCampbell, M., Sharma, A., Sharma, R., Haefele, S. M., Karki, E., Hetherington, J., Smith, J., & Brown, B. (2022). How have smallholder farmers used digital extension tools? Developer and user voices from Sub-Saharan Africa, South Asia and Southeast Asia. *Global Food Security*, 32, 100577. <https://doi.org/10.1016/j.gfs.2021.100577>
- Debaeke, P., Pellerin, S., & Scopel, E. (2017). Climate-smart cropping systems for temperate and tropical agriculture: mitigation, adaptation and trade-offs. *Cahiers Agricultures*, 26, 34002. <https://doi.org/10.1051/CAGRI/2017028>
- Defitriani, D., Madarisa, F., Silfia, S., & Tanjung, H. B. (2025). Local Champions Berkarakter Kewirausahaan Sosial dan Strategi Penyuluhan untuk Pengembangan Pusat Pelatihan Pertanian dan Pedesaan Swadaya. *Syntax Literate; Jurnal Ilmiah Indonesia*. <https://doi.org/10.36418/syntax-literate.v10i2.57760>
- DeNeve, K. M., & Heppner, M. J. (1997). Role play simulations: The assessment of an active learning technique and comparisons with traditional lectures. *Innovative higher education*, 21(3), 231–246.
- Dibbern, T., Romani, L. A. S., & Massruhá, S. M. F. S. (2024). Main drivers and barriers to the adoption of Digital Agriculture technologies. *Smart Agricultural Technology*, 8, 100459. <https://doi.org/10.1016/j.atech.2024.100459>
- Digital Innovations in Extension Education: A Review of Emerging Technologies and their Impact on Agricultural Knowledge Dissemination. (2025). *Journal of Experimental Agriculture International*, 47(5 SE-Review Article), 408–423. <https://doi.org/10.9734/jeai/2025/v47i53430>
- Djaini, A., & Indrianti, M. A. (2024). Peningkatan Kapasitas Petani dalam Menghadapi Perubahan Iklim melalui Inovasi Kebijakan Pertanian Berbasis Teknologi di Kabupaten Gorontalo: Literature Review. *Jurnal Technopreneur (JTech)*, 12(2), 54–57.
- Dwipayasa, I. M., Suardi, I. D. P. O., & Putra, I. G. S. A. (2025). Strategi Komunikasi Penyuluh Pertanian Lapangan dalam Diseminasi Peningkatan Produktivitas Padi di Subak Anggabaya, Kota Denpasar. *Ranah Research: Journal of Multidisciplinary Research and Development*, 7(4), 2565–2574.
- Falah, Z., Fitriyanti, E., Alifah, N., & Fadillah, E. N. (2025). Narratives of Change: How Farmers Perceive the Impact of Digital Tools on Traditional Practices. *Digital Agriculture and Innovation Journal*, 1(1), 22–27.
- FAO. (2023). *Strengthening digital agricultural extension and advisory services in smallholder farming*. <https://doi.org/10.4060/cc6267en>

- Gumbi, N., Gumbi, L., & Twinomurinzi, H. (2023). Towards Sustainable Digital Agriculture for Smallholder Farmers: A Systematic Literature Review. In *Sustainability* (Vol. 15, Nomor 16). <https://doi.org/10.3390/su151612530>
- Hari Yati Nur, Yoshua Putrawan Simanjuntak, Kayla Devina Azzahra, Jonathan Sitohang, Zefania Intan Kusuma, Melia Ari Santi, Elsa Ramadhan, Agief Julio Pratama, M. Iqbal Nurulhaq, Tri Budiarto, Widya Hasian Situmeang, Ratih Kemala Dewi, Restu Puji Mumpuni, & Edi Wiraguna. (2025). Perspektif Masyarakat dalam Penerapan Digitalisasi Pertanian. *Manfaat: Jurnal Pengabdian Pada Masyarakat Indonesia*, 2(2 SE-Articles), 56–67. <https://doi.org/10.62951/manfaat.v2i2.352>
- Hariadi, U., & Perdana, P. (2025). Transformasi Digital dan Pengembangan SDM Pertanian: Strategi Menghadapi Era Revolusi Industri 4.0. *Jurnal Pertanian Agros*, 27(2), 257–266.
- Hariyanto, Susanti, P. A., Hadjaat, M., Wasil, M., & Susilawati, A. D. (2023). Meningkatkan Literasi Teknologi di Masyarakat Pedesaan Melalui Pelatihan Digital. *Jurnal Abdimas Peradaban*, 4(2 SE-Articles), 12–21. <https://doi.org/10.54783/w3e72c91>
- Hasanaliyeva, G., Si Ammour, M., Yaseen, T., Rossi, V., & Caffi, T. (2022). Innovations in disease detection and forecasting: a digital roadmap for sustainable management of fruit and foliar disease. *Agronomy*, 12(7), 1707.
- Hermawan, A., Wakhidati, Y. N., & Sari, L. K. (2025). Faktor yang Mempengaruhi Peran Pusat Pelatihan Pertanian dan Pedesaan Swadaya (P4S) dalam Meningkatkan Pengetahuan dan Keterampilan Petani di Kabupaten Banyumas. *Proceedings Series on Physical & Formal Sciences*, 8, 70–74. <https://doi.org/https://doi.org/10.30595/pspfs.v8i.1475>
- Hidayati, F., Syahni, R., Suliansyah, I., & Tanjung, H. (2025). Adoption Of Agricultural Technology Innovation In Indonesia: Challenges And Alternative Solutions. *AGRITEPA: Jurnal Ilmu dan Teknologi Pertanian*, 12(1 SE-Article Research). <https://doi.org/10.37676/agritepa.v12i1.8646>
- Hidayati, I. N., & Suryanto, S. (2015). Pengaruh perubahan iklim terhadap produksi pertanian dan strategi adaptasi pada lahan rawan kekeringan. *Jurnal Ekonomi & Studi Pembangunan*, 42–52.
- Incoom, A. B. M., Adjei, K. A., Odai, S. N., Siabi, E. K., Donkor, P., & Frimpong, K. (2025). Adaptation strategies by smallholder farmers to climate change and variability: The case of the savannah zone of Ghana. *Sustainable Futures*, 9, 100543. <https://doi.org/https://doi.org/10.1016/j.sftr.2025.100543>
- Irmayanti, Badrul Ainy Dalimunthe, Tetty Rahmiati Harahap, Yusmaidar Sepriani, Erni Wahyuni, & Izmawal Pebriani Nasution. (2025). Optimization Of Sustainable Agriculture Through Integration Of Mathematics, Agrotechnology and Economic Literacy For Empowering The Labuhanbatu Community. *JURNAL BIMA*, 3(3 SE-), 509–516.

<https://jurnal.jndi.my.id/index.php/bima/article/view/333>

- Iswanto, E. H., Nuryanto, B., & Baliadi, Y. (2016). Antisipasi ledakan wereng cokelat (*Nilaparvata lugens*) dengan penerapan teknik pengendalian hama terpadu biointensif. *J. Iptek Tanaman Pangan*, 11(1), 9–18.
- Julyani, S., & Khairullah, K. (2025). Pemanfaatan Pengolahan Citra Untuk Deteksi dan Identifikasi Hama pada Tanaman Secara Otomatis. *Ranah Research: Journal of Multidisciplinary Research and Development*, 7(5), 3518–3525.
- Klerkx, L., Jakku, E., & Labarthe, P. (2019). A review of social science on digital agriculture, smart farming and agriculture 4.0: New contributions and a future research agenda. *NJAS: Wageningen Journal of Life Sciences*, 90–91(1), 1–16. <https://doi.org/10.1016/j.njas.2019.100315>
- Lamichhane, J., Barzman, M., Booi, K., Boonekamp, P., Desneux, N., Huber, L., Kudsk, P., Langrell, S., Ratnadass, A., Ricci, P., Sarah, J., & Messéan, A. (2015). Robust cropping systems to tackle pests under climate change. A review. *Agronomy for Sustainable Development*, 35, 443–459. <https://doi.org/10.1007/s13593-014-0275-9>
- Läpple, D. (2023). Information about climate change mitigation: What do farmers think? *EuroChoices*, 22(1), 74–80.
- Lu, B., & Hanim, R. N. (2024). Enhancing Learning Experiences through Interactive Visual Communication Design in Online Education. *Eurasian Journal of Educational Research (EJER)*, 109.
- Malhi, G. S., Kaur, M., & Kaushik, P. (2021). Impact of climate change on agriculture and its mitigation strategies: A review. *Sustainability*, 13(3), 1318.
- Maula, I. M. (2025). Evaluation of the Effectiveness of Digital Training Program for Farmers in Increasing the Adoption of Modern Agricultural. *Journal of Agricultural Economy and Technology Development*, 2(1), 12–21. <https://doi.org/https://doi.org/10.59261/jaetd.v2i1.11>
- Mkuhlani, S., Kephe, P. N., Rusere, F., & Ayisi, K. (2024). Modelling approaches for climate variability and change mitigation and adaptation in resource constrained farming systems. In *Frontiers in Sustainable Food Systems* (Vol. 8, hal. 1510162). Frontiers Media SA.
- Mollel, M., Quiroz, L. F., Varley, C., Firestine, A., McLoughlin, M.-E., Kafunah, J., Kharkar, S., O'Farrell, J., Ndlovu, N., Johnston, A., McKeown, P. C., Brychkova, G., Murray, U., Leiva, S., & Spillane, C. (2025). Digital technologies to accelerate the impact of climate smart agriculture by next-generation farmers in Africa. *Frontiers in Sustainable Food Systems*, 9, 1462328. <https://doi.org/https://doi.org/10.3389/fsufs.2025.1462328>
- Mooy, H., & Watuwaya, B. K. (2023). Peran Penginderaan Jauh dan Sistem Informasi Geografis dalam Penerapan Pertanian Cerdas di Era Industri 4.0. *Prosiding Seminar Nasional Tahun 2023*, 5(1).

- Muhtadi, M., & Lisdiyanta, T. (2023). Evaluasi Pelatihan Teknologi Informasi dan Komunikasi Bagi Petani di Sumatera Utara, Sumatera Barat dan Sumatera Selatan. *Jurnal SOLMA*, 12(2 SE-Articles), 640–652. <https://doi.org/10.22236/solma.v12i2.11152>
- Munawar, Z., Putri, N. I., Komalasari, R., Fudsyi, M. I., & Haryaman, A. (2023). Penerapan TIK Pada Penyuluhan Pertanian Di Desa Dengan Metode Pertanian Berkelanjutan. *Darma Abdi Karya*, 2(2), 156–165.
- MURAD, M., Sarjan, M., Anwar, H., & Sumarsono, J. (2025). Sudut Pandang Filsafat Ilmu Terhadap Perilaku Petani dalam Mengadopsi Teknologi Pasca Panen Kopi untuk Mendukung Pertanian Berkelanjutan: Philosophy of Science Perspective on Farmer Behavior in Adopting Coffee Post-Harvest Technology to Support Sustainable. *Journal of Multidisciplinary Science and Natural Resource Management*, 1(1), 16–26.
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078. <https://doi.org/https://doi.org/10.1016/j.compedu.2012.04.016>
- Ngigi, M. W., & Muange, E. N. (2022). Access to climate information services and climate-smart agriculture in Kenya: a gender-based analysis. *Climatic Change*, 174(3–4), 21. <https://doi.org/10.1007/s10584-022-03445-5>
- Nurmalasari, N., Irmayani, I., Evar, F. O., Amirayanti, A., & Ahmad, N. Y. (2025). Pemberdayaan Petani Rumput Laut di Desa Tirowali Kecamatan Ponrang Kabupaten Luwu Sulawesi Selatan. *Abdimas Toddopuli: Jurnal Pengabdian Pada Masyarakat*, 7(1), 200–211. <https://doi.org/https://doi.org/10.30605/atjpm.v7i1.6929>
- Paling, S., Makmur, A., Albar, M., Susetyo, A. M., Putra, Y. W. S., Rajiman, W., Djamilah, S., Suhendi, H. Y., & Irvani, A. I. (2024). *Media pembelajaran digital*. Tohar Media.
- Sistem Peringatan Dini dan Penanganan Dampak Perubahan Iklim pada Sektor Pertanian, (2018). [https://peraturan.bpk.go.id/Download/153657/Permentan Nomor 39 Tahun 2018.pdf](https://peraturan.bpk.go.id/Download/153657/Permentan%20Nomor%2039%20Tahun%202018.pdf)
- Saputra, R., & Rahman, D. (2024). Manajemen pelatihan dalam penguatan kelompok tani pada pelaku agribisnis inklusif: Tinjauan literatur. *Jurnal Intelek dan Cendekiawan Nusantara*, 1(6), 10317–10326.
- Silviah, R. (2024). Peran Pendidikan dan Pelatihan dalam meningkatkan Keahlian Petani di Sektor Pertanian dan Perkebunan. *Jurnal Greenation Pertanian dan Perkebunan*, 2(3), 44–49.
- Sugihono, C., Hariadi, S. S., & Wastutiningsih, S. P. (2024). Integrasi Pemanfaatan Teknologi Informasi dan Komunikasi untuk Meningkatkan Layanan Penyuluhan Pertanian. *Jurnal Penyuluhan*, 20(02), 178–190.
- Tamru, S., Hansen, J., Zebiak, S., Tesfaye, A., Minten, B., Demissie, T., Radeny,

- M., Tesfaye, K., & Solomon, D. (2025). Climate information services enhance farmers' resilience to climate change: Impacts on agricultural productivity. *Climate Risk Management*, 49, 100724. <https://doi.org/https://doi.org/10.1016/j.crm.2025.100724>
- Thottadi, B. P., & Singh, S. P. (2024). Climate-smart agriculture (CSA) adaptation, adaptation determinants and extension services synergies: a systematic review. *Mitigation and Adaptation Strategies for Global Change*, 29(3), 22.
- Umi, A. R. L., & Sudrajat, R. H. (2024). Peran Komunikasi Penyuluh Pertanian Dalam Mengenalkan Teknologi Digital Petani Apps Pada Pelaku Kegiatan Pertanian. *Jurnal Riset Mahasiswa Dakwah dan Komunikasi*, 6(2), 194–206.
- Ummah, R. R. M., & Widayanti, S. (2025). Peningkatan Pengetahuan Petani dalam Budidaya Kakao Melalui Kegiatan Sekolah Lapang di Desa Bulili, Kabupaten Sigi. *Agrokreatif: Jurnal Ilmiah Pengabdian kepada Masyarakat*, 11(2), 218–229.
- Wahyuni, L. (2020). *Pendidikan Orang Dewasa (Andragogi)*. Universitas Brawijaya Press.
- Zheng, H., Ma, W., & He, Q. (2024). Climate-smart agricultural practices for enhanced farm productivity, income, resilience, and greenhouse gas mitigation: a comprehensive review. *Mitigation and Adaptation Strategies for Global Change*, 29(4), 28.