

DAFTAR PUSTAKA

- Abd-Alla, M. H. S. M. Al-Amri and E.-E. and A. W. Elsadek. 2023. Enhancing rhizobium legume symbiosis and reducing nitrogen fertilizer use are potential options for mitigating climate change. *Agric. MDPI* 13(11).
- Abobatta, W. F. and and A. M. El-Azazy. 2020. Role of organic and biofertilizers in citrus orchards. *Aswan Univ. J. Environ. Stud.* 1(1):13–27.
- Abubakar, M. S. and M. L. Attanda. 2022. Factors that cause seed dormancy.
- Afzal, A. and S. A. Asad. 2019. Microbial applications for sustainable agriculture. *Page Innovations in Sustainable Agriculture.*
- Aguado, G. D. E. M. Uliarte and M. I. Funes-Pinter. 2023. Effect of different concentrations of bioslurry on the germination and production of tomato seedlings (*solanum lycopersicum* L.). *Rev. Fac. Nac. Agron. Medellín* 76(1):10149–10156.
- Aiken, G. E. J. C. Henning and E. Rayburn. 2020. Management strategies for pastures, beef cattle, and marketing of stocker-feeder calves in the upper south: the i-64 corridor. *Page Management Strategies for Sustainable Cattle Production in Southern Pastures.*
- Alam, F. M. Bhuiyan S. S. Alam T. R. Waghmode P. J. Kim and Y.-B. Lee. 2015. Effect of *rhizobium* sp. barirgm901 inoculation on nodulation, nitrogen fixation and yield of soybean (*glycine max*) genotypes in gray terrace soil. *Biosci. Biotechnol. Biochem.* 79(10):1660–1668.
- Aloo, B. N. V. Tripathi B. A. Makumba and E. R. Mbega. 2022. Plant growth-promoting rhizobacterial biofertilizers for crop production: the past, present, and future. *Front. Plant Sci.* 13.
- Archontoulis, S. V. and F. E. Miguez. 2015. Nonlinear regression models and applications in agricultural research. *Agron. J.* 107(2).
- Arora, N. K. and R. Singh. 2014. Comparative study of different carriers inoculated with nodule forming and free living plant growth promoting bacteria suitable for sustainable agriculture. *J. Plant Pathol. Microbiol.* 05(02).
- Arun Kumar, M. N. Telagam N. Mohankumar K. M. Ismail and T. Rajasekar. 2020. Design and implementation of real-time amphibious unmanned aerial vehicle system for sowing seed balls in the agriculture field. *Int. J. Emerg. Technol.* 11(2).
- Aserse, A. A. L. A. Räsänen F. Assefa A. Hailemariam and K. Lindström. 2012. Phylogeny and genetic diversity of native rhizobia nodulating common bean (*phaseolus vulgaris* L.) in ethiopia. *Syst. Appl. Microbiol.* 35(2).

- Aspalli, N. U. K. Nidoni K. J. Mc H. Iatha and S. Aspalli. 2020. Comparison of efficacy of different afforestation techniques with seed wombs. *Int. J. Curr. Microbiol. Appl. Sci.* 9(2):3065–3072.
- Astari, R. . Rosmayati and E. . Bayu. 2014. PENGARUH pematangan dormansi secara fisik dan kimia terhadap kemampuan berkecambah benih mucuna (*mucuna bracteata* d.c). *J. Online Agroekoteknologi* 27(2).
- Atkinson, V. L. 2003. Mine and industrial site revegetation in the semi-arid zone, north-eastern eyre peninsula, south australia. University of South Australia.
- Avelino, A. C. D. D. A. d. Faria L. D. d. Oliveira Y. N. Cervo A. S. C. Filho M. A. Farinha O. H. S. Rondon J. G. d. Abreu W. M. Peixoto M. Rossi and J. Rodrigues. 2019. Fungi associated with major agricultural and forage crops in integrated systems of brazilian tropical regions. *J. Exp. Agric. Int.*:1–13.
- Azile, D. T. S. Tembakazi M. Babalwa P. C. Retief and M. M. Mongezi. 2022. Evaluation of the residual effect of bioslurry effluent on biological yield and nutritional content of swiss chard (*beta vulgaris* l.). *African J. Agric. Res.* 18(8):594–600.
- Badiane, A. A. Faye C. F. Yamoah and R. P. Dick. 2001. Use of compost and mineral fertilizers for millet production by farmers in the semiarid region of senegal. *Biol. Agric. Hortic.* 19(3).
- Bageel, A. M. D. H. Honda J. T. Carrillo and D. Borthakur. 2020. Giant leucaena (*leucaena leucocephala* subsp. *glabrata*): a versatile tree-legume for sustainable agroforestry.
- Bailly, C. 2019. The signalling role of ros in the regulation of seed germination and dormancy. *Biochem. J.* 476(20):3019–3032.
- Baird, L. M. R. A. Virginia and B. D. Webster. 1985. Development of root nodules in a woody legume, *prosopis glandulosa* torr. *Bot. Gaz.* 146(1):39–43.
- Balehegn, M. A. Duncan A. Tolera A. A. Ayantunde S. Issa M. Karimou N. Zampaligré A. Kiema I. B. Gnanda P. Varijakshapanicker E. Kebreab J. C. B. Dubeux K. J. Boote M. Minta F. Feyissa and A. T. Adesogan. 2020. Improving adoption of technologies and interventions for increasing supply of quality livestock feed in low- and middle-income countries. *Glob. Food Sec.* 26:100372.
- Bar-Shmuel, N. A. Behar and M. Segoli. 2019. What do we know about biological nitrogen fixation in insects? evidence and implications for the insect and the ecosystem. *Insect Sci.* 27(3):392–403.
- Bashan, Y. 1998. Inoculants of plant growth-promoting bacteria for use in agriculture. *Biotechnol. Adv.* 16(4):729–770.
- Battisti, L. J. C. Lara and J. A. Leigh. 1992. Specific oligosaccharide form of the rhizobium *melliloti* exopolysaccharide promotes nodule invasion in alfalfa.

Proc. Natl. Acad. Sci. 89(12):5625–5629.

Bedoić, R. L. Čuček B. Čosić D. Krajnc G. Smoljanić Z. Kravanja D. Ljubas T. Pukšec and N. Duić. 2019. Green biomass to biogas – a study on anaerobic digestion of residue grass. *J. Clean. Prod.* 213.

Bellanger, M. 2024. NFixdb (nitrogen fixation database)—a comprehensive integrated database for robust ‘Omics analysis of diazotrophs. *Nar Genomics Bioinforma.* 6(2).

Benezech, C. F. Berrabah M. F. Jardinaud A. Le Scornet M. Milhes G. Jiang J. George P. Ratet F. Vailleau and B. Gourion. 2020. Medicago-sinorhizobium-ralstonia co-infection reveals legume nodules as pathogen confined infection sites developing weak defenses. *Curr. Biol.* 30(2).

Bhardwaj, D. M. W. Ansari R. K. Sahoo and N. Tuteja. 2014. Biofertilizers function as key player in sustainable agriculture by improving soil fertility, plant tolerance and crop productivity.

Bichoff, R. S. A. N. de Albuquerque D. de C. Mariano R. S. Okumura R. S. Oliveira C. F. de O. Neto I. de J. M. Viégas A. J. S. Pedroso J. D. N. Alves D. C. Sodré and G. F. Valente. 2018. Overcoming seed dormancy and evaluation of viability in *leucaena leucocephala*. *Aust. J. Crop Sci.* 12(1).

Bonten, L. T. C. K. B. Zwart R. P. J. J. Rietra R. Postma and M. J. G. de Hass. 2014. Bio-slurry as fertilizer is bio-slurry from household digester a better fertilizer than manure? a literature review. *Alterra* (November).

Bopape, F. L. C. W. Beukes K. Katlego A. I. Hassen E. T. Steenkamp and E. T. Gwata. 2023. Symbiotic performance and characterization of pigeonpea (*cajanus cajan* l. millsp.) rhizobia occurring in south african soils. *Agric.* 13(1).

Bowen, M. K. F. Chudleigh S. Buck and K. Hopkins. 2018. Productivity and profitability of forage options for beef production in the subtropics of northern australia. *Anim. Prod. Sci.* 58(2):332.

C.N, E. A. C.C A. V.A and U. K.T. 2021. Sustainable energy in nigeria: an integrated women-friendly energy supply approach. *Int. J. Sustain. Energy Environ. Res.* 10(2):47–57.

Ceccon, E. E. J. González and C. Martorell. 2015. Is direct seeding a biologically viable strategy for restoring forest ecosystems? evidences from a meta-analysis. *L. Degrad. Dev.* 27(3):511–520.

Change, I. 2006. 2006 ipcc guidelines for national greenhouse gas inventories. *Inst. Glob. Environ. Strateg.* Hayama, Kanagawa, Japan.

Chauhan, A. and T. Jindal. 2020. Microbiological methods for environment, food and pharmaceutical analysis. Page *Microbiological Methods for Environment, Food and Pharmaceutical Analysis*.

- Chen, H. M. Batley J. Redmond and B. G. Rolfe. 1985. Alteration of the effective nodulation properties of a fast-growing broad host range rhizobium due to changes in exopolysaccharide synthesis. *J. Plant Physiol.* 120(4):331–349.
- Chojnacka, K. and K. Moustakas. 2024. Anaerobic digestate management for carbon neutrality and fertilizer use: a review of current practices and future opportunities. *Biomass and Bioenergy* 180.
- Cissé, A. A. Arshad X. Wang F. Yattara and Y. Hu. 2019. Contrasting impacts of long-term application of biofertilizers and organic manure on grain yield of winter wheat in north china plain. *Agronomy* 9(6):312.
- Clúa, J. C. Roda M. E. Zanetti and F. A. Blanco. 2018. Compatibility between legumes and rhizobia for the establishment of a successful nitrogen-fixing symbiosis.
- Cubillos-Hinojosa, J. G. P. E. M. Mindiola J. L. H. Mulford and A. de J. P. Castilla. 2019. Biological fixation of nitrogen by native isolates of rhizobium sp. symbionts of *leucaena leucocephala* (lam.) de wit. *Acta Agronómica* 68(2):75–83.
- Dabessa, A. Z. Abebe and S. Bekele. 2018. Limitations and strategies to enhance biological nitrogen fixation in sub-humid tropics of western ethiopia. *J. Agric. Biotechnol. Sustain. Dev.* 10(7):122–131.
- Dahlanuddin T. Panjaitan S. A. Waldron M. J. Halliday A. Ash S. T. Morris and H. M. Shelton. 2019. Adoption of *leucaena*-based feeding systems in sumbawa, eastern indonesia and its impact on cattle productivity and farm profitability. *Trop. Grasslands - Forrajes Trop.* 7(4):428–436.
- Deaker, R. E. Hartley and G. Gemell. 2012. Conditions affecting shelf-life of inoculated legume seed. *Agriculture* 2(1):38–51.
- Deng, L. Y. Liu and W. Wang. 2020. Biogas technology. *Page Biogas Technology.*
- Dhanda, S. and B. S. Chauhan. 2022. Seed germination ecology of *leucaena leucocephala* as influenced by various environmental parameters. *Weed Sci.* 70(3).
- Dicenzo, G. C. M. Zamani A. Checcucci M. Fondi J. S. Griffitts T. M. Finan and A. Mengoni. 2019. Multidisciplinary approaches for studying rhizobium–legume symbioses.
- Dumani, A. T. T. Silwana B. Mpambani R. Celliers and M. M. Mbangcolo. 2021. Effect of bioslurry effluent on growth, biological yield and nutritional content of swiss chard (*beta vulgaris* l.). *J. Agric. Ext. Rural Dev.* 13(3):173–181.
- Ehrenfels, B. 2023. Hydrodynamic regimes modulate nitrogen fixation and the mode of diazotrophy in lake tanganyika. *Nat. Commun.* 14(1).
- El-Far, S. 2022. Biogas production from date palm leaves. *J. Soil Sci. Agric. Eng.*

13(12):387–391.

Van Epps, A. and L. Blaney. 2016. Antibiotic residues in animal waste: occurrence and degradation in conventional agricultural waste management practices.

Etesami, H. 2022. Root nodules of legumes: a suitable ecological niche for isolating non-rhizobial bacteria with biotechnological potential in agriculture.

Fages, J. 1992. An industrial view of azospirillum inoculants: formulation and application technology. *Symbiosis*.

Fara, D. A. L. Al-Hmoud I. Rashid B. Z. Chowdhry and A. A. Badwan. 2020. Understanding the performance of a novel direct compression excipient comprising roller compacted chitin. *Mar. Drugs* 18(2):115.

Feria, M. J. A. Alfaro F. López A. Pérez J. C. F. García and A. Rivera. 2012. Integral valorization of *leucaena diversifolia* by hydrothermal and pulp processing. *Bioresour. Technol.* 103(1):381–388.

Fernando, N. T. Humphries S. K. Florentine and B. S. Chauhan. 2016. Factors affecting seed germination of feather fingergrass (*chloris virgata*) . *Weed Sci.* 64(4).

Foschi, M. L. M. Juan B. Pascual and N. Pascual-Seva. 2020. Water uptake and germination of caper (*capparis spinosa* L.) seeds. *Agronomy* 10(6).

Frahat, M. G. S. A. El-Settawy and R. R. Shehata. 2018. Influence of rhizobia inoculation and rock-phosphate on biomass and nitrogen content of *leucaena leucocephala* (lam.) de wit seedlings. *Alexandria Sci. Exch. J.*

Freeman, J. F. and M. E. Uchanski. 2022. Adapting to the land: a history of agriculture in colorado. Page Adapting to the Land: A History of Agriculture in Colorado.

Freyer, B. P. Ellssel F. Nyakanda and S. Saussure. 2024. Exploring the off-farm production, marketing and use of organic and biofertilisers in africa: a scoping study. Rep. to Eur. Comm. DeSIRA-LIFT Eur. Union.

Fuglie, K. O. M. Peters and S. Burkart. 2021. The extent and economic significance of cultivated forage crops in developing countries. *Front. Sustain. Food Syst.* 5.

Fukuoka, M. 2009. The one-straw revolution: an introduction to natural farming. New York Review of Books.

Funes-Pinter, M. I. G. E. Pisi M. Aroca L. Martínez M. C. Z. Fernández and E. M. Uliarte. 2020. Plant bioestimulants: compost tea and bioslurry characterization.

Garcia, G. W. T. U. Ferguson F. A. Neckles and K. A. E. Archibald. 1996. The nutritive value and forage productivity of *leucaena leucocephala*. *Anim. Feed*

Sci. Technol. 60(1–2):29–41.

Gee, G. W. and D. Or. 2018. Particle-size analysis. Page Methods of Soil Analysis, Part 4: Physical Methods.

Ghosh, S. A. Sarkar T. Bagdi and A. K. Hazra. 2021. Organic farming and digested biogas slurry for sustainable agriculture in india: a review. J. Soc. Work Soc. Dev. 12:81–96.

Gohil, N. B. N. K. Gajre and V. H. Kadiwala. 2020. Biogas slurry: as a fertilizer. Agric. Environ. 1(3).

Gomes, D. F. E. Ormeño-Orrillo and M. Hungria. 2015. Biodiversity, symbiotic efficiency, and genomics of rhizobium tropici and related species. Biol. nitrogen Fixat.:747–756.

Gopalakrishnan, S. V. Srinivas and S. Samineni. 2017. Nitrogen fixation, plant growth and yield enhancements by diazotrophic growth-promoting bacteria in two cultivars of chickpea (*cicer arietinum* L.). Biocatal. Agric. Biotechnol. 11.

Gornish, E. S. H. A. Arnold and J. S. Fehmi. 2019. Review of seed pelletizing strategies for arid land restoration. Restor. Ecol. 27(6):1206–1211.

Groot, L. de and A. Bogdanski. 2013. Bioslurry= brown gold? a review of scientific literature on the co-product of biogas production. Food and Agriculture Organization of the United Nations (FAO).

Grote, J. D. Krysciak K. Petersen S. Güllert C. Schmeisser K. U. Förstner H. B. Krishnan H. Schwalbe N. Kubatova and W. R. Streit. 2016. The absence of the n-acyl-homoserine-lactone autoinducer synthase genes *traI* and *ngrI* increases the copy number of the symbiotic plasmid in *sinorhizobium fredii* ngr234. Front. Microbiol. 7.

Gruber, N. and J. N. Galloway. 2008. An earth-system perspective of the global nitrogen cycle. Nature 451(7176):293–296.

Guilayn, F. J. Jimenez J. L. Martel M. Rouez M. Crest and D. Patureau. 2019. First fertilizing-value typology of digestates: a decision-making tool for regulation. Waste Manag. 86.

Guo, K. J. Yang N. Yu L. Luo and E. Wang. 2023. Biological nitrogen fixation in cereal crops: progress, strategies, and perspectives.

Guo, Z. and F. Qin. 2022. An empirical analysis of the role of forage product trade on grassland quality and livestock production in china. Land 11(11):1938.

Habibi, S. 2024. Insights into genetic and physiological characteristics of clover rhizobia in afghanistan soils. Appl. Microbiol. 4(1):112–123.

Hafsa, S. H. A. A. Z. Salem A. A. Hassan A. E. Kholif M. M. Elghandour A. Barbabosa and S. López. 2016. Digestion, growth performance and caecal

fermentation in growing rabbits fed diets containing foliage of browse trees. *World Rabbit Sci.* 24(4):283.

Hanson, J. and R. H. Ellis. 2020. Progress and challenges in ex situ conservation of forage germplasm: grasses, herbaceous legumes and fodder trees. *Plants* 9(4):446.

Harmini, H. W. Puastuti E. Sutedi and D. Yulistiani. 2023. Scarification's effect on the growth of *leucaena leucocephala* cv taramba:113–117.

Harris, M. A. 2016. Quenching of phosphorus-fixation in a disturbed caribbean bauxite mine overburden using root exudates: implications for acidic tropical soils.

Hassan, F. E. M. A. S. Alyafei S. Kurup A. Jaleel N. Al Busaidi and Z. F. R. Ahmed. 2023. Effective priming techniques to enhance ghaf (*prosopis cineraria* L. druce) seed germination for mass planting. *Horticulturae* 9(5).

Hindersah, R. N. N. Kamaluddin S. Samanta S. Banerjee and S. Sarkar. 2020. Role and perspective of azotobacter in crops production. *Sains Tanah - J. Soil Sci. Agroclimatol.* 17(2):170.

Hirsch, A. M. M. R. Lum and J. A. Downie. 2001. What makes the rhizobia-legume symbiosis so special?

Hopmans, J. W. and K. L. Bristow. 2001. Soil and environmental analysis, physical methods. *Geoderma* 103(3–4).

Hou, L. R. Wang G. Yin M. Liu and Y. Zheng. 2018. Nitrogen fixation in the intertidal sediments of the yangtze estuary: occurrence and environmental implications. *J. Geophys. Res. Biogeosciences* 123(3):936–944.

Hu, W. N. Jiang J. Yang Y. Meng Y. Wang B. Chen W. Zhao D. M. Oosterhuis and Z. Zhou. 2016. Potassium (k) supply affects k accumulation and photosynthetic physiology in two cotton (*gossypium hirsutum* L.) cultivars with different k sensitivities. *F. Crop. Res.* 196.

Huang, Q. 2024. Enhancing soil health and biodiversity through nitrogen fixation symbiosis in leguminous plants. *Mol. Microbiol. Res.* 14.

Huarte, H. R. and R. L. Benech-Arnold. 2010. Hormonal nature of seed responses to fluctuating temperatures in *cynara cardunculus* (L.). *Seed Sci. Res.* 20(1):39–45.

Hungria, M. and G. Kaschuk. 2014. Regulation of n₂ fixation and no₃⁻/nh₄⁺ assimilation in nodulated and n-fertilized *phaseolus vulgaris* L. exposed to high temperature stress. *Environ. Exp. Bot.* 98:32–39.

Husin, M. N. 2012. Pengaruh pupuk organik cair nasa terhadap nitrogen bintil akar dan produksi *macroptilium atropurpureum*. *J. Agripet* 12(2).

- Hwang, S. J. D. Ray P. B. Cregan C. A. King M. K. Davies and L. C. Purcell. 2014. Genetics and mapping of quantitative traits for nodule number, weight, and size in soybean (*glycine max* L.[merr.]). *Euphytica* 195(3).
- Ibáñez, F. L. Wall and A. Fabra. 2017. Starting points in plant-bacteria nitrogen-fixing symbioses: intercellular invasion of the roots.
- Ibrahim, T. O. A. O. Ogunsiji O. A. Oni B. F. Awotedu O. T. Bolanle-Ojo and B. A. Ajani. 2021. Understanding seed dormancy and germination. *J. Exp. Agric. Int.*:1–9.
- Ishikawa, S. S. Hoshiba T. Hinata T. Hishinuma and S. Morita. 2006. Evaluation of a biogas plant from life cycle assessment (lca). Pages 230–233 International Congress Series. Elsevier.
- Islam, M. R. S. M. E. Rahman M. M. Rahman D. H. Oh and C. S. Ra. 2010. The effects of biogas slurry on the production and quality of maize fodder. *Turkish J. Agric. For.* 34(1).
- Jeevanandham, S. M. Sekar D. Dhachinamoorthi M. Muthukumar N. Sriram and J. Joysaruby. 2010. Sustain-release of various drugs from leucaena leucocephala polysaccharide. *J. Young Pharm.* 2(1):15–20.
- Jesus, E. da C. R. de A. Leite R. do A. Bastos O. O. da S. Aragão and A. P. Araújo. 2018. Co-inoculation of bradyrhizobium stimulates the symbiosis efficiency of rhizobium with common bean. *Plant Soil* 425(1–2).
- Jetti, A. J. Jetti and R. Perla. 2017. Treatments to break seed dormancy in *givotia rottleriformis* griff. *Adv. Crop Sci. Technol.* 05(02).
- Jiménez-Guerrero, I. S. Acosta-Jurado P. del Cerro P. Navarro-Gómez F. J. López-Baena F. J. Ollero and J. Vinardell. 2017. Transcriptomic studies of the effect of nod gene-inducing molecules in rhizobia: different weapons, one purpose. *Genes (Basel)*. 9(1):1.
- Jones, R. 1979. The value of leucaena leucocephala as a feed for ruminants in the tropics. *World Anim. Rev.* 31(0).
- Jorgewad, R. A. Pillai A. Mohite A. Sawant And S. Bakare. 2023. Optimisation of media for production of cost- effective rhizobium [biofertilizer]. *Interantional J. Sci. Res. Eng. Manag.* 07(03).
- Joseph, S. A. L. Cowie L. Van Zwieten N. Bolan A. Budai W. Buss M. L. Cayuela E. R. Graber J. A. Ippolito and Y. Kuzyakov. 2021. How biochar works, and when it doesn't: a review of mechanisms controlling soil and plant responses to biochar. *Gcb Bioenergy* 13(11):1731–1764.
- Juhanda, J. Y. Nurmiaty and E. Ermawati. 2013. PENGARUH skarifikasi pada pola imbibisi dan perkecambahan benih saga manis (*abrus precatorius* L.). *J. Agrotek Trop.* 1(1).

- Kamau Rewe, M. W. 2022. Utilization of cow dung bioslurry from anaerobic digestion as fertilizer in improving soil fertility and maize productivity in kiambu county, kenya. Pwani University.
- Karavidas, I. G. Ntatsi V. Vougeleka A. Karkanis T. Ntanasi C. J. Saitanis E. Agathokleous A. Ropokis L. Sabatino F. Tran P. P. M. Iannetta and D. Savvas. 2022. Agronomic practices to increase the yield and quality of common bean (*Phaseolus vulgaris* L.): a systematic review. *Agronomy*.
- Karki, A. B. 2005. Biogas: as renewable source of energy in nepal; theory and development. BSP-Nepal.
- Kato-Noguchi, H. and D. Kurniadie. 2022. Allelopathy and allelochemicals of *Leucaena leucocephala* as an invasive plant species.
- Kaur, J. and Vishnu. 2022. Bacterial inoculants for rhizosphere engineering: applications, current aspects, and challenges. Page Rhizosphere Engineering.
- Kchikich, A. R. Ben Mrid I. Kabach M. Nhiri and R. El Omari. 2021. Arbuscular mycorrhizal fungi enhance sorghum plant growth under nitrogen-deficient conditions through activation of nitrogen and carbon metabolism enzymes. *Int. J. Agric. Biol.* 26(2):201–208.
- Keller, K. R. and J. A. Lau. 2018. When mutualisms matter: rhizobia effects on plant communities depend on host plant population and soil nitrogen availability. *J. Ecol.* 106(3).
- Khoshnevisan, B. N. Duan P. Tsapekos M. K. Awasthi Z. Liu A. Mohammadi I. Angelidaki D. C. W. Tsang Z. Zhang J. Pan L. Ma M. Aghbashlo M. Tabatabaei and H. Liu. 2021. A critical review on livestock manure biorefinery technologies: sustainability, challenges, and future perspectives. *Renew. Sustain. Energy Rev.* 135.
- Khuntia, D. N. Panda M. Mandal P. Swain S. G. Sahu and S. Pattanayak. 2022. Symbiotic effectiveness of acid tolerant nodulating rhizobia on growth, yield and nutrient uptake of pigeon pea (*Cajanus cajan* L.) in acidic alfisols. *Int. J. Bio-Resource Stress Manag.*
- Kimura, E. and M. A. Islam. 2012. Seed scarification methods and their use in forage legumes. *Res. J. Seed Sci.* 5(2).
- Kiruba N, J. M. and A. Saeid. 2022. An insight into microbial inoculants for bioconversion of waste biomass into sustainable “bio-organic” fertilizers: a bibliometric analysis and systematic literature review.
- Kucera, B. M. A. Cohn and G. Leubner-Metzger. 2005. Plant hormone interactions during seed dormancy release and germination. *Seed Sci. Res.* 15(4):281–307.
- Kumar, A. L. M. Verma S. Sharma and N. Singh. 2022. Overview on agricultural

potentials of biogas slurry (bgs): applications, challenges, and solutions. *Biomass Convers. Biorefinery* 13(15):13729–13769.

Kumar, A. L. M. Verma S. Sharma and N. Singh. 2023. Overview on agricultural potentials of biogas slurry (bgs): applications, challenges, and solutions.

Kumar, M. and R. K. Singh. 2023. Influence of biofertilizers and phosphorus on growth and yield of lentil (*lens culinaris medik*). *Int. J. Plant & Soil Sci.*

Kumar, S. L. C. Malav M. K. Malav and S. A. Khan. 2015. Biogas slurry: source of nutrients for eco-friendly agriculture. *Int. J. Extensive Res.* 2(2):42–46.

Kumar, V. K. 2022. Optimization of inoculum to substrate ratio for enhanced methane yield from leather fleshings in a batch study. *J. Indian Chem. Soc.* 99(3).

Kuswanto, F. and A. S. Li'aini. 2022. Mechanical scarification influence on *gleditsia assamica* bor water uptake and germination. *Biosaintifika J. Biol. Biol. Educ.* 14(2).

Kyaruzi, J. J. Kyewalyanga and M. H. Muruke. 2004. Cyanobacteria composition and impact of seasonality on their nitrogen fixation rate in a mangrove ecosystem adjacent to zanzibar town. *West. Indian Ocean J. Mar. Sci.* 2(1).

Latif, M. A. C. M. Mehta and D. J. Batstone. 2017. Influence of low ph on continuous anaerobic digestion of waste activated sludge. *Water Res.* 113.

Lawal, I. M. 2021. Nitrogen fixing bacteria and their application for heavy metal removal: a mini review. *J. Biochem. Microbiol. Biotechnol.* 9(2):43–47.

Liao, C. Q. Tian and F. Liu. 2021. Nitrogen availability regulates deep soil priming effect by changing microbial metabolic efficiency in a subtropical forest. *J. For. Res.* 32(2).

Liu, A. C. A. Contador K. Fan and H. Lam. 2018. Interaction and regulation of carbon, nitrogen, and phosphorus metabolisms in root nodules of legumes. *Front. Plant Sci.* 9.

Long, S. R. 1996. *Rhizobium* symbiosis: nod factors in perspective. *Plant Cell* 8(10):1885.

Ma, J. Z. Song Y. Zhou and H. Han. 2022. Iron–molybdenum quantum dots for enhancing the nitrogenase activity of nodules. *Acs Appl. Nano Mater.* 5(11):16694–16705.

Madsen, M. D. L. N. Svejcar J. Radke and A. Hulet. 2018. Inducing rapid seed germination of native cool season grasses with solid matrix priming and seed extrusion technology. *PLoS One* 13(10):e0204380.

Mahboob, W. G. Yang and M. Irfan. 2023. Crop nitrogen (n) utilization mechanism and strategies to improve n use efficiency.

- Mahmud, K. S. Makaju R. Ibrahim and A. Missaoui. 2020. Current progress in nitrogen fixing plants and microbiome research.
- Maitra, S. M. Brestic P. Bhadra T. Shankar S. Praharaj J. B. Palai M. M. R. Shah V. Berek P. Ondrisik M. Skalický and A. Hossain. 2022. Bioinoculants— natural biological resources for sustainable plant production.
- Malhotra, H. Vandana S. Sharma and R. Pandey. 2018. Phosphorus nutrition: plant growth in response to deficiency and excess. Page Plant Nutrients and Abiotic Stress Tolerance.
- Manfredini, A. E. Malusà C. Costa F. Pallottino S. Mocali F. Pinzari and L. Canfora. 2021. Current methods, common practices, and perspectives in tracking and monitoring bioinoculants in soil. *Front. Microbiol.*
- Manpaki, S. J. P. D. M. Karti and I. Prihatoro. 2017. Respon pertumbuhan eksplan tanaman lamtoro (*leucaena leucocephala* cv. tarramba) terhadap cekaman kemasaman media dengan level pemberian aluminium melalui kultur jaringan. *J. Sain Peternak. Indones.* 12(1):71–82.
- Mantovani, D. M. Veste K. Boldt-Burisch S. Fritsch L. A. Koning and D. Freese. 2015. Carbon allocation, nodulation, and biological nitrogen fixation of black locust (*robinia pseudoacacia* l.) under soil water limitation. *Ann. For. Res.* 58(2):1.
- Mao, C. Y. Feng X. Wang and G. Ren. 2015. Review on research achievements of biogas from anaerobic digestion.
- Mariappan, I. R. Prabhakaran V. Vivekanand M. S. Poomani K. Muthan S. Dhandayuthapani S. Sivasamy R. Regurajan and V. Subramanian. 2024. Exploring cutting-edge approaches in anaerobic digestion and anaerobic digestate management. *ChemBioEng Rev.* 11(3):573–594.
- Marschner, P. and Z. Rengel. 2023. Nutrient availability in soils. Page Marschner's Mineral Nutrition of Plants.
- Martín-Pedrosa, M. A. Varela E. Guillamón B. Cabellos C. Burbano J. Gómez-Fernández E. d. Mercado E. Gómez-Izquierdo C. Cuadrado and M. Múzquiz. 2016. Biochemical characterization of legume seeds as ingredients in animal feed. *Spanish J. Agric. Res.* 14(1):e0901.
- Martínez-Reyes, C. M. S. Rodríguez-Zaragoza N. Cabirol A. Alarcón and M. R. Mendoza-López. 2021. Effect of predation by colpoda sp. in nitrogen fixation rate of two free-living bacteria. *Microb. Ecol.* 83(4):1026–1035.
- Mártir, M. C. M. C. B. Tlusty P. van Berkum and P. Graham. 2007. The genetic diversity of rhizobia associated with *dalea purpurea* vent. in fragmented grasslands of west-central minnesota. *Can. J. Microbiol.* 53(3):351–363.
- Medha, I. S. Chandra and J. Bhattacharya. 2023. Elucidating the potential of biochar-bentonite composite and kaolinite-based seed balls for the

remediation of coal mining impacted heavy metals contaminated soil. *Sustain.* 15(17).

- Meegoda, J. N. B. Li K. Patel and L. B. Wang. 2018. A review of the processes, parameters, and optimization of anaerobic digestion.
- Mehata, D. K. I. Kattel P. Sapkota N. P. Ghimire and R. K. Mehta. 2023. Biofertilizers: a sustainable strategy for organic farming that would increase crop production and soil health. *Plant Physiol. Soil Chem.* 3(2):49–53.
- Mehlich, A. E. Bellis and J. K. Gitau. 1964. Fertilizing and liming in relation to soil chemical properties. Scott Lab. Dep. Agric. Nairobi.
- Mendoza-Arroyo, G. E. M. J. Chan-Bacab R. N. Águila-Ramírez B. O. Ortega-Morales R. E. C. Solís A. O. Chab-Ruiz K. I. Cob-Rivera B. B. Dzib-Castillo R. E. Tun-Che and J. C. Camacho-Chab. 2020. Inorganic phosphate solubilization by a novel isolated bacterial strain enterobacter sp. itcb-09 and its application potential as biofertilizer. *Agriculture* 10(9):383.
- Menge, D. N. L. A. A. Wolf and J. L. Funk. 2015. Diversity of nitrogen fixation strategies in mediterranean legumes.
- Miyamoto, Y. G. Huang and T. Hirowatari. 2007. Systematic position of *pyloetis mimosae*(stainton) (lepidoptera: tineidae), with redescription of the adults and immature stages. *Entomol. Sci.* 10(4):363–371.
- Mohamed, K. E. A. Salih W. B. Zomrawi B. M. Dousa and M. M. Hamza. 2016. Effect of dietary graded levels of leucaena leucocephala leaves as a source of protein on small ruminant performance and blood parameters. *Int. J. Livest. Res.* 6(1):27.
- Mohammad, A. B. and A. Chatterjee. 2021. Cultivation of berseem (*trifolium alexandrinum*) and oats (*avena sativa*) fodder crops by using biofertilizers and biopesticide: an experience from farmers' field in nadia district of west bengal. *Int. J. Bio-Resource Stress Manag.* 12(3):211–215.
- Möller, K. 2015. Effects of anaerobic digestion on soil carbon and nitrogen turnover, n emissions, and soil biological activity. a review.
- Möller, K. and T. Müller. 2012. Effects of anaerobic digestion on digestate nutrient availability and crop growth: a review. *Eng. Life Sci.* 12(3):242–257.
- Montoya-Martínez, A. C. G. Rincón-Enríquez P. Lobit L. López-Pérez and E. E. Quiñones-Aguilar. 2019. NATIVE arbuscular mycorrhizal fungi from the rhizosphere of agave cupreata and their effect on agave tequilana growth. *Rev. Fitotec. Mex.*
- Muhammad, R. 2015. Effects of cold water, mechanical and acid scarifications on germination and seedling growth of pre-chilled seeds of leucaena leucocephala. *Int. J. Sci. Res.*

- Mukherjee, A. and S. K. Bordolui. 2022. Eminent roles of micro-nutrients in quality seed production. *Int. J. Plant Soil Sci.*
- Mwakidoshi, E. R. H. I. Gitari E. M. Muindi A. Wamukota M. F. Seleiman and S. Maitra. 2023. Smallholder farmers' knowledge on the use of bioslurry as a soil fertility amendment input for potato production in kenya. *L. Degrad. Dev.* 34(8):2214–2227.
- Mwenda, G. M. G. W. O'Hara S. E. De Meyer J. Howieson and J. Terpolilli. 2018. Genetic diversity and symbiotic effectiveness of phaseolus vulgaris-nodulating rhizobia in kenya. *Syst. Appl. Microbiol.*
- Mwende Muindi, E. 2019. Understanding soil phosphorus. *Int. J. Plant Soil Sci.*
- Mwendia, S. W. R. Odhiambo A. Juma D. Mwangi and A. M. O. Notenbaert. 2021. Performance of urochloa and megathyrsus forage grasses in smallholder farms in western kenya. *Front. Sustain. Food Syst.* 5.
- Naciri, R. W. Rajib M. Chtouki Y. Zeroual and A. Oukarroum. 2022. Potassium and phosphorus content ratio in hydroponic culture affects tomato plant growth and nutrient uptake. *Physiol. Mol. Biol. Plants* 28(4).
- Naseer, I. M. Ahmad S. M. Nadeem I. Ahmad Najm-ul-Seher and Z. A. Zahir. 2019. Rhizobial inoculants for sustainable agriculture: prospects and applications.
- Nawrot-Chorabik, K. M. Osmenda K. Słowiński D. Latowski S. Tabor and S. Woodward. 2021. Stratification, scarification and application of phytohormones promote dormancy breaking and germination of pelleted scots pine (*pinus sylvestris* L.) seeds. *Forests* 12(5):621.
- Ngongo, Y. S. Ratnawaty and P. R. Matitaputty. 2022. Cattle production system in semi-arid area of timor island. *Iop Conf. Ser. Earth Environ. Sci.* 1041(1):12029.
- Nurhayati, A. L. D. Permana R. Aulia and N. Nurhidayat. 2023. Enhancement growth of plantlet gracilaria sp. with additional fermented fertilizer. *Iop Conf. Ser. Earth Environ. Sci.* 1273(1):12036.
- Nwankwo, C. I. 2019. Seedball technology development for subsistence-oriented pearl millet production systems in sahelian west africa.
- Nwankwo, C. I. and L. Herrmann. 2024. Seedball technology overcomes effect of small seed-size and low soil fertility on early pearl millet seedling performance. *African Crop Sci. J.* 32(2):157–170.
- Nwankwo, C. I. J. Mühlena K. Biegert D. Butzer G. Neumann O. Sy and L. Herrmann. 2018. Physical and chemical optimisation of the seedball technology addressing pearl millet under sahelian conditions. *J. Agric. Rural Dev. Trop. Subtrop.* 119(2):67–79.
- Nwankwo, C. I. H. M. Oumarou M. Nouri A. M. Aminou and L. Herrmann. 2022.

Seedball technology enhances pearl millet yield in a sahelian subsistence production system. *Crop Pasture Sci.* 73(4).

Obiasi, C. C. 2015. Hot water enhanced germination of *leucaena leucocephala* seeds in light and dark conditions. *Curr. Res. Agric. Sci.* 2(2).

Ohyama, T. 2010. Nitrogen as a major essential element of plants. *Nitrogen Assim. Plants* 37:1–17.

Ojo, O. A. and O. E. Fagade. 2002. Persistence of rhizobium inoculants originating from *leucaena leucocephala* fallowed plots in southwest nigeria. *African J. Biotechnol.* 1(1):23–27.

Ormeño-Orrillo, E. P. Menna L. G. P. Almeida F. J. Ollero M. F. Nicolás E. Pains Rodrigues A. Shigueyoshi Nakatani J. S. Silva Batista L. M. Oliveira Chueire and R. C. Souza. 2012. Genomic basis of broad host range and environmental adaptability of rhizobium tropici ciat 899 and rhizobium sp. prf 81 which are used in inoculants for common bean (*phaseolus vulgaris* L.). *BMC Genomics* 13:1–26.

Ormeño-Orrillo, E. D. F. Gomes P. del Cerro A. T. R. de Vasconcelos C. Canchaya L. G. P. de Almeida F. M. Mercante F. J. Ollero M. Megías and M. Hungria. 2016. Genome of rhizobium *leucaenae* strains cfn 299t and cpao 29.8: searching for genes related to a successful symbiotic performance under stressful conditions. *BMC Genomics*.

Özdoğan, D. K. 2023. Genetic characterization of rhizobium bacteria isolated from bean (*phaseolus vulgaris* L.) nodules and its effect on growth. *Soil Stud.* 12(2):62–69.

Pajčin, I. V. Vlajkov J. Dodić A. Jokić and J. Grahovac. 2021. Biotechnological production of plant inoculants based on nitrogen-fixing bacteria. *J. Process. Energy Agric.* 25(2):56–63.

Panigrahi, S. and B. K. Dubey. 2019. A critical review on operating parameters and strategies to improve the biogas yield from anaerobic digestion of organic fraction of municipal solid waste.

Parkash, V. and S. Singh. 2020. Potential of biochar application to mitigate salinity stress in eggplant. *HortScience* 55(12):1946–1955.

Parrotta, J. A. 2000. *Leucaena leucocephala* (lam.) de wit. leguminosae (mimosoideae). *Silvics Nativ. Exot. trees Puerto Rico Caribb. islands*:306–316.

Peng, S. A. Chen H. Fang J. Wu and G. Liu. 2013. Effects of vegetation restoration types on soil quality in yuanmou dry-hot valley, china. *Soil Sci. Plant Nutr.* 59(3):347–360.

Peoples, M. B. D. F. Herridge and J. K. Ladha. 1995. Biological nitrogen fixation: an efficient source of nitrogen for sustainable agricultural production?

- Pereyra, G. H. Hartmann B. Michalzik W. Ziegler and S. Trumbore. 2015. Influence of rhizobia inoculation on biomass gain and tissue nitrogen content of leucaena leucocephala seedlings under drought. *Forests* 6(10).
- Permana, I. G. Despal A. Rosmalia and M. D. Rahayu. 2022. Inclusion of different level leucaena in dairy ration to balance rumen degradable and undegradable protein ratio. *lop Conf. Ser. Earth Environ. Sci.* 1020(1):12013.
- Pesha, J. V G. Renukadevi G. Srinath R. Sheshanth and S. Premkumar. 2023. Eco-centric landscaping: the science and strategy of 5-meter seed ball deployment. Page 2023 International Conference on System, Computation, Automation and Networking, ICSCAN 2023.
- Philp, J. W. Vance R. W. Bell T. Chhay D. A. Boyd V. Phimpachanhvongsod and M. D. Denton. 2019. Forage options to sustainably intensify smallholder farming systems on tropical sandy soils. a review. *Agron. Sustain. Dev.* 39(3).
- Pinter, I. F. M. V. Salomón J. N. Martín E. M. Uliarte and A. Hidalgo. 2022. Effect of bioslurries on tomato solanum lycopersicum l and lettuce lactuca sativa development. *Rev. La Fac. Ciencias Agrar. Uncuyo* 54(2):48–60.
- Pirttilä, A. M. H. M. P. Tabas N. Baruah and J. J. Koskimäki. 2021. Biofertilizers and biocontrol agents for agriculture: how to identify and develop new potent microbial strains and traits. *Microorganisms* 9(4):817.
- Plaxton, W. C. and H. Lambers. 2015. Phosphorus metabolism in plants. Page Phosphorus Metabolism in Plants.
- Priyadharshini, C. M. Gnanachitra D. Balachandar and D. Jayanthi. 2022. Assessment of shelf-life and efficacy of the seed-coating delivery system of biofertilizers in maize. *Int. J. Plant Soil Sci.*:548–558.
- Prosin, M. D. M. Borodulin E. Safonova and Y. Golovacheva. 2021. Research of extractors for the extraction of target components from plant materials of various internal structures. *E3s Web Conf.* 273:1031.
- Qureshi, M. A. H. Shahzad M. Saeed S. Ullah M. A. Ali F. Mujeeb and M. A. Anjum. 2019. Relative potential of rhizobium species to enhance the growth and yield attributes of cotton (*Gossypium hirsutum* L.). *Eurasian J. Soil Sci.* 8(2):159–166.
- Rachal, D. M. J. I. Mead R. Dello-Russo and M. T. Cuba. 2022. Deep-water delivery model of *Ruppia* seeds to a nearshore/terrestrial setting and its chronological implications for late pleistocene footprints, Tularosa basin, New Mexico. *Geoarchaeology* 37(6):923–933.
- Rachma, Y. A. R. Indrati and S. Supriyadi. 2022. Karakteristik perkecambahan biji lamtoro [*Leucaena leucocephala* (Lam.) de Wit] pada perlakuan skarifikasi serta perubahan nilai gizi setelah perkecambahan. *Bul. Anat. dan Fisiol.* 7(1).
- Razaq, M. P. Zhang H. L. Shen and Salahuddin. 2017. Influence of nitrogen and

phosphorous on the growth and root morphology of acer mono. PLoS One 12(2).

Remans, R. A. Croonenborghs R. T. Gutiérrez J. Michiels and J. Vanderleyden. 2007. Effects of plant growth-promoting rhizobacteria on nodulation of phaseolus vulgaris l. are dependent on plant p nutrition. Eur. J. Plant Pathol. 119(3):341–351.

Rengasamy, P. 2016. Soil chemistry factors confounding crop salinity tolerance-a review. Agronomy 6(4).

Rewe, M. K. E. M. Muindi J. B. Ndiso K. Kinusu S. Mailu P. N. M. Njeru and R. Thomas. 2021. Effect of bioslurry from fixed dome and tubular (flexi) biodigesters on selected soil chemical properties, maize (zea mays) growth, yield and quality. Int. J. Plant Soil Sci.:158–171.

Ribeiro, R. A. M. A. Roge A. López-López E. Ormeño-Orrillo F. G. Barcellos J. Martínez F. L. Thompson E. Martínez-Romero and M. Hungria. 2012. Reclassification of rhizobium tropici type a strains as rhizobium leucaenae sp. nov. Int. J. Syst. Evol. Microbiol. 62(5).

Rincón-Rosales, R. L. Lloret E. Ponce and E. Martínez-Romero. 2009. Rhizobia with different symbiotic efficiencies nodulate acaciella angustissima in mexico, including sinorhizobium chiapanecum sp. nov. which has common symbiotic genes with sinorhizobium mexicanum. Fems Microbiol. Ecol. 67(1):103–117.

Riva, C. V. Orzi M. Carozzi M. Acutis G. Boccasile S. Lonati F. Tambone G. D'Imporzano and F. Adani. 2016. Short-term experiments in using digestate products as substitutes for mineral (n) fertilizer: agronomic performance, odours, and ammonia emission impacts. Sci. Total Environ. 547.

Rodrigues, J. F. M. and S. P. De Oliveira. 2016. Can tortoises facilitate the germination of plants with dry fruits? a simulation of the effects of chelonoidis carbonarius (testudines: testudinidae) on the germination of leucaena leucocephala (fabaceae). Rodriguesia 67(3).

Rodrigues, J. S. M. S. Garrido J. A. B. da Silva W. L. Simões R. A. Silva and M. do N. Amorim. 2019. Growth and nutritional status of maize plants in response to different doses and application frequencies of biofertilizer. Científica 47(1):123.

Rogel, M. A. E. Ormeno-Orrillo and E. M. Romero. 2011. Symbiovars in rhizobia reflect bacterial adaptation to legumes. Syst. Appl. Microbiol. 34(2):96–104.

Rosenblueth, M. E. Ormeño-Orrillo A. López-López M. A. Rogel B. J. Reyes-Hernández J. Martínez-Romero P. M. Reddy and E. Martínez-Romero. 2018. Nitrogen fixation in cereals. Front. Microbiol. 9.

Rudel, T. K. B. K. Paul D. White I. M. Rao R. v. d. Hoek A. Castro M. Boval A. M. Lerner L. Schneider and M. Peters. 2015. LivestockPlus: forages, sustainable

intensification, and food security in the tropics. *Ambio* 44(7):685–693.

- Rusdy, M. 2016. Improvement of seed germination and early seedling growth of *leucaena leucocephala* by cold water, mechanical and acid scarification pretreatment. *Int. J. of. Res. Sci.* 01(01).
- Ryan, J. S. Garabet A. Rashid and M. El Gharous. 1999. Assessment of soil and plant analysis laboratories in the west asia- north africa region. *Commun. Soil Sci. Plant Anal.* 30(5–6).
- Sadafzadeh, E. A. Javanmard M. Amani Machiani and A. Sofo. 2023. Application of bio-fertilizers improves forage quantity and quality of sorghum (*sorghum bicolor* L.) intercropped with soybean (*glycine max* L.). *Plants* 12(16).
- Salama, H. S. A. A. I. Nawar and H. E. Khalil. 2022. Intercropping pattern and n fertilizer schedule affect the performance of additively intercropped maize and forage cowpea in the mediterranean region. *Agronomy* 12(1).
- Salisbury, F. B. and C. W. Ross. 1995. *Fisiologi tumbuhan*.
- Salomon, E. P. Tidåker and S. Bergström Nilsson. 2022. Flows and budgets of nutrients and potentially toxic elements on four swedish organic farms using digestate from agricultural residues. *Org. Agric.* 12(2).
- Samantaray, A. S. Chattaraj D. Mitra A. Ganguly R. Kumar A. Gaur P. K. Das Mohapatra S. de los Santos-Villalobos A. Rani and H. Thatoi. 2024. Advances in microbial based bio-inoculum for amelioration of soil health and sustainable crop production. *Curr. Res. Microb. Sci.*:100251.
- Sánchez-Santana, T. O. López-Vigoa J. M. Iglesias-Gómez L. Lamela-López and M. Soca-Perez. 2018. The potential of silvopastoral systems for cattle production in cuba. *Elementa* 6.
- Sangadji, I. 2020. Nutritional quality and fiber fraction of complete feed silage based on sago by-products, *imperata cylindrica* and *leucaena leucocephala*. *Bul. Peternak.* 44(4).
- Santana, Á. L. J. A. Zanini and G. A. Macedo. 2020. Dispersion-assisted extraction of guarana processing wastes on the obtaining of polyphenols and alkaloids. *J. Food Process Eng.* 43(4).
- Sardans, J. and J. Peñuelas. 2021. Potassium control of plant functions: ecological and agricultural implications. *Plants* 10(2).
- Sarmiento, R. T. and R. P. Varela. 2015. Assessing the biomass potential of major industrial tree plantation species for green energy production. *Open J. For.*
- Schmidt, L. 2000. Pedomon penanganan benih tanaman hutan tropis dan sub tropis. *Danida For. Seed Cent.*
- Schuman, Z. 2024. Integrated proteomics and metabolomics reveal altered

- metabolic regulation of *xanthobacter autotrophicus* under electrochemical water-splitting conditions. *ACS Appl. Mater. Interfaces* 16(31):40973–40979.
- Scott-Wendt, J. L. R. Hossner and R. G. Chase. 1988. Variability in pearl millet (*pennisetum americanum*) fields in semiarid west africa. *Arid L. Res. Manag.* 2(1):49–58.
- Šesták, Z. 2003. Foyer, c.h., noctor, g. (ed.): photosynthetic nitrogen assimilation and associated carbon and respiratory metabolism. *Photosynthetica* 41(3).
- Sethi, D. S. Subudhi V. D. Rajput K. Kusumavathi T. R. Sahoo S. K. Dash S. Mangaraj D. K. Nayak S. Pattanayak T. Minkina A. Glinushkin and V. Kalinitchenko. 2021. Exploring the role of mycorrhizal and rhizobium inoculation with organic and inorganic fertilizers on the nutrient uptake and growth of acacia mangium saplings in acidic soil. *Forests* 12(12):1657.
- Shahbaz, M. M. J. Akhtar W. Ahmed and A. Wakeel. 2014. Integrated effect of different n-fertilizer rates and bioslurry application on growth and n-use efficiency of okra (*hibiscus esculentus* L.). *Turkish J. Agric. For.* 38:311–319.
- Shaheb, R. M. I. Nazrul and A. M. Khan. 2017. Agro economic performance of bioslurry on boro rice cultivation in some sites of moulvibazar district. *Bangladesh J. Agric. Res.* 42(2):363–371.
- Sharma, B. 2021. Enriched biogas and biofertilizer production from eichhornia weed biomass in cow dung biochar-amended anaerobic digestion system. *Environ. Technol. Innov.* 21.
- Si, Q. Y. Ma and D. Zang. 2016. The causes of dormancy and the changes of endogenous hormone content in *cephalotaxus sinensis* & seeds. *Agric. Sci.* 07(12):834–849.
- da Silva, N. M. H. Taniwaki V. C. A. Junqueira N. F. de Arruda Silveira M. M. Okazaki and R. A. R. Gomes. 2017. Microbiological examination methods of food and water. Page Microbiological Examination Methods of Food and Water.
- Simms, E. L. and D. L. Taylor. 2002. Partner choice in nitrogen-fixation mutualisms of legumes and rhizobia. *Integr. Comp. Biol.* 42(2):369–380.
- Sithole, N. Z. Tsvuura K. Kirkman and A. Magadlela. 2021. Nitrogen source preference and growth carbon costs of *leucaena leucocephala* (lam.) de wit saplings in south african grassland soils. *Plants*.
- Somrang, P. A. Wannagon W. Sornlar P. Choeycharoen S. Prasanphan and W. Shongkittikul. 2016. Lampang raw material characterization to assess the suitability for ceramics industry. *Key Eng. Mater.* 690:187–193.
- Soromessa, Y. D. and T. 2016. Socio economic and environmental benefits of biogas slurry. *J. Environmental Earth Sci.* 6(11).

- Soumaré, A. A. Diédhiou M. Thuita M. Hafidi Y. Ouhdouch S. Gopalakrishnan and L. Kouisni. 2020. Exploiting biological nitrogen fixation: a route towards a sustainable agriculture. *Plants* 9(8):1011.
- Stanton, D. E. S. A. Batterman J. C. v. Fischer and L. O. Hedin. 2019. Rapid nitrogen fixation by canopy microbiome in tropical forest determined by both phosphorus and molybdenum. *Ecology* 100(9).
- Syamsuddin. 2023. Physicochemical test of leucaena leucocephala pellets using various types of adhesives. *lop Conf. Ser. Earth Environ. Sci.* 1253(1):12123.
- Szubka, M. E. Talik K. Sadecka D. A. Pawlak P. Zajdel and A. Guzik. 2017. Characterization of raw materials and self-organized bi_2o_3 -ag eutectic by x-ray diffraction, scanning electron microscopy, and x-ray photoelectron spectroscopy. *Cryst. Res. Technol.* 52(8).
- Talwar, D. K. Singh and J. Singh. 2017. Effect of biofertilizers on soil microbial count, nutrient availability and uptake under november sown onion. *J. Appl. Nat. Sci.* 9(1):55–59.
- Tamilarasan, C. R. Jerlin and K. Raja. 2021a. Seed ball technique for enhancing the establishment of subabul (*leucaena leucocephala*) under varied habitats. *J. Trop. For. Sci.* 33(3):349–355.
- Tamilarasan, C. R. Jerlin and K. Raja. 2021b. Standardization of seed ball media for fodder sorghum to increase green cover and fodder availability in degraded lands. *J. Appl. Nat. Sci.* 13(SI).
- Tamura, K. G. Stecher and S. Kumar. 2021. MEGA11: molecular evolutionary genetics analysis version 11. *Mol. Biol. Evol.* 38(7):3022–3027.
- Telles, T. S. M. A. Nogueira and M. Hungria. 2023. Economic value of biological nitrogen fixation in soybean crops in brazil. *Environ. Technol. Innov.* 31.
- Testa, L. M. M. Morese C. Miller L. Traverso T. Pirelli P. Fracassi T. Kato C. McGinnis M. Colangeli and D. Chiaramonti. 2023. Bioenergy and nutrition: positive linkages for the achievement of the sustainable development goals. *Wiley Interdiscip. Rev. Energy Environ.* 12(6).
- Thomas, L. and I. Singh. 2019. Microbial biofertilizers: types and applications.
- Timofeeva, A. M. M. R. Galyamova and S. E. Sedykh. 2023. Plant growth-promoting soil bacteria: nitrogen fixation, phosphate solubilization, siderophore production, and other biological activities.
- Tiro, B. M. W. S. Tirajoh U. Usman P. A. Beding and F. Palobo. 2021. Pertumbuhan tanaman lamtoro (*leucaena leucocephala* cv. tarramba) mendukung penyediaan pakan di kawasan pengembangan sapi potong. *J. Pertan. Agros* 23(1):74–83.
- Tränkner, M. E. Tavakol and B. Jákli. 2018. Functioning of potassium and

magnesium in photosynthesis, photosynthate translocation and photoprotection. *Physiol. Plant.* 163(3).

Trinick, M. J. 1965. *Medicago sativa* nodulation with *leucaena leucocephala* root-nodule bacteria.

Triyani, U. and H. Hafsan. 2022. Mengungkap rahasia interaksi antara mikroba dan tanaman.

Tufail, M. S. G. Krebs A. Southwell J. Piltz and P. C. Wynn. 2017. Forage development through farmer participatory research for the sustainability of smallholder dairy farmers. *J. Dairy Vet. Anim. Res.* 5(4).

Valente, T. N. P. E. D. S. Lima B. B. Deminicis A. S. Cezário W. B. R. dos Santos L. A. Souza and V. G. B. de Lima. 2017. Different treatments for breaking dormancy of *leucaena* seeds (*leucaena leucocephala*). *J. Agric. Sci.* 9(3).

Vejan, P. R. Abdullah T. Khadiran S. Ismail and A. N. Boyce. 2016. Role of plant growth promoting rhizobacteria in agricultural sustainability—a review. *Molecules* 21(5):573.

Wang, L. L. Zhang Z. Liu D. Zhao X. Liu B. Zhang J. Xie P. Zhang P. Li S. Chen R. Dixon and J. Li. 2013. Correction: a minimal nitrogen fixation gene cluster from *paenibacillus* sp. wly78 enables expression of active nitrogenase in *escherichia coli*. *Plos Genet.* 9(10).

Wang, S. J. Liu Y. Liu and C. Tian. 2024. Application of rhizobium inoculation in regulating heavy metals in legumes: a meta-analysis. *Sci. Total Environ.*:173923.

Warnars, L. and H. Oppenoorth. 2014. *Bioslurry: a supreme fertilizer*. Ed Kelly Atkinson. Netherlands Deltahage.

Watt, L. J. 2024. Forage brassicas can enhance the feed base and mitigate feed gaps across diverse environments. *Crop Pasture Sci.* 75(4).

Willems, A. and M. D. Collins. 1993. Phylogenetic analysis of rhizobia and agrobacteria based on 16s rna gene sequences. *Int. J. Syst. Bacteriol.* 43(2).

Willis, R. B. M. E. Montgomery and P. R. Allen. 1996. Improved method for manual, colorimetric determination of total kjeldahl nitrogen using salicylate. *J. Agric. Food Chem.* 44(7).

Wulandari, D. K. Baskoro Y. Mahmuudah F. Kusmiyati A. R. Pratiwi and A. Budiharjo. 2024. Bioprospecting of rhizobia as plant growth promoting rhizobacteria potential from root nodules of groundnut (*arachis hypogaea* l.). *Trends Sci.* 21(7):7651.

Xu, C. Y. Tian Y. Sun and L. Dong. 2013. Effects of biogas slurry irrigation on growth, photosynthesis, and nutrient status of *perilla frutescens* seedlings. *Commun. Soil Sci. Plant Anal.* 44(22).

- Xu, S. Y. Zhou Y. Qiao S. Yue X. Zhang Y. Zhang M. Liu Y. Zhang and Z. Zhang. 2023. Seagrass restoration using seed ball burial in northern china. *Restor. Ecol.* 31(1).
- Xu, W. 2021. The effect of biogas slurry application on biomass production and forage quality of *Lolium multiflorum*. *Sustain.* 13(7).
- Yadav, K. K. S. Krishnan N. Gupta S. Prasad M. A. Amin M. M. S. Cabral-Pinto G. Sharma R. Marzouki B. Jeon S. Kumar N. Singh A. Kumar S. Rezanian and S. Islam. 2021. Review on evaluation of renewable bioenergy potential for sustainable development: bright future in energy practice in india. *Acs Sustain. Chem. Eng.* 9(48):16007–16030.
- Yadav, N. and P. Srivastava. 2019. In vitro studies on gelatin/hydroxyapatite composite modified with osteoblast for bone bioengineering. *Heliyon* 5(5):e01633.
- Yan, H. 2022. Development of microalgae-bacteria symbiosis system for enhanced treatment of biogas slurry. *Bioresour. Technol.* 354.
- Yendrek, C. R. Y. Lee V. Morris Y. Liang C. I. Pislariu G. M. Burkart M. H. Meckfessel M. Salehin H. Kessler H. G. Wessler M. M. Lloyd H. Lutton A. Teillet D. J. Sherrier E.-P. Journet J. M. Harris and R. Dickstein. 2010. A putative transporter is essential for integrating nutrient and hormone signaling with lateral root growth and nodule development in *medicago truncatula*. *Plant J.* 62(1):100–112.
- Yousif, M. A. I. Y. R. Wang and C. Dali. 2020. Seed dormancy overcoming and seed coat structure change in *leucaena leucocephala* and *acacia nilotica*. *Forest Sci. Technol.* 16(1).
- Yu, R. P. H. Yang Y. Xing W. P. Zhang H. Lambers and L. Li. 2022. Belowground processes and sustainability in agroecosystems with intercropping.
- Yu, W.-X. Q.-Y. Liang Z. Du and D.-S. Mu. 2023. Characterization of *plebeibacterium marinum* gen. nov., sp. nov. and *plebeibacterium sediminum* sp. nov., revealing the potential nitrogen fixation capacity of the order *marinilabiales*. *Front. Mar. Sci.* 10.
- Yue, Y. W. N. Guo Q. M. Lin G. T. Li and X. R. Zhao. 2016. Improving salt leaching in a simulated saline soil column by three biochars derived from rice straw (*oryza sativa* L.), sunflower straw (*helianthus annuus*), and cow manure. *J. Soil Water Conserv.* 71(6):467–475.
- Yuniar, R. N. Sukarno R. Tanio S. Anwar T. S. Nugraha and W. N. Fadillah. 2023. Native arbuscular mycorrhiza colonization in seedling root of dogfruit (*archidendron pauciflorum*) planted as seed-ball in field. Page IOP Conference Series: Earth and Environmental Science.
- Zahoor, R. H. Dong M. Abid W. Zhao Y. Wang and Z. Zhou. 2017. Potassium fertilizer improves drought stress alleviation potential in cotton by enhancing

photosynthesis and carbohydrate metabolism. *Environ. Exp. Bot.* 137.

- Zeng, Y. H. Bai W. Yu S. Xia Q. Shen Y. Huang F. Lv G. C. Bazan and S. Wang. 2023. Increased nitrogenase activity in solar-driven biohybrids containing non-photosynthetic bacteria and conducting polymers. *Angew. Chemie* 135(30).
- Zhang, K. X. Han Y. Fu Y. Zhou Z. Khan J. Bi L. Hu and L. Luo. 2023. Biochar coating as a cost-effective delivery approach to promoting seed quality, rice germination, and seedling establishment. *Plants* 12(22):3896.
- Zhang, S. Q. Cao M. Zhang L. Cai and Y. Qing. 2013. Effects of particle size on electromagnetic and microwave absorption properties of-epoxy composite. *Int. J. Appl. Ceram. Technol.* 11(4):762–772.
- Zhao, G. X. Zhu G. Zheng G. Meng Z. Dong J. H. Baek C. O. Jeon Y. Yao Y. H. Xuan J. Zhang and B. Jia. 2024. Development of biofertilizers for sustainable agriculture over four decades (1980–2022). *Geogr. Sustain.* 5(1).
- Zhong, L. 2023. Physiological mechanisms of *Breitschneidera sinensis* hemsl. seed dormancy release and germination. *Forests* 14(12):2430.
- Zhou, J. B. Deng Y. Zhang A. B. Cobb and Z. Zhang. 2017. Molybdate in rhizobial seed-coat formulations improves the production and nodulation of alfalfa. *PLoS One*.
- Zubaidah, S. I. Mansur S. W. Budi and A. Yusmur. 2022. Seedball coating material formulation to enhance germination and growth of fruit and forest seeds. Page IOP Conference Series: Earth and Environmental Science.