



The 2nd International Symposium on Sustainable Agriculture (ISSA2026) and
The 3rd National Conference on Technology and Agricultural Innovation (NCTAI2026)

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Efficiency of *Trichoderma asperellum* in Controlling Round Spot Disease of Rubber Trees

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Abstract

Hevea brasiliensis is one of the most important economic crops in Thailand, particularly in the southern region, which serves as a major rubber-producing area. However, rubber production is frequently affected by Circular Leaf Spot Disease or New Leaf Fall Disease caused by *Colletotrichum* sp. This disease results in leaf yellowing and premature defoliation, negatively affecting plant growth and yield. Currently, most farmers rely on chemical fungicides for disease management however, the continuous use of chemicals may cause adverse effects on the environment and farmers' health. Therefore, the use of the antagonistic fungus *Trichoderma asperellum* has emerged as an alternative biological control method. The objective of this study was to evaluate the efficacy of *Trichoderma asperellum* in controlling Circular Leaf Spot Disease in rubber trees caused by *Colletotrichum* sp. The causal pathogen was isolated and identified from diseased rubber leaves exhibiting typical symptoms. The inhibitory effect of *Trichoderma asperellum* against *Colletotrichum* sp. was assessed under laboratory conditions using the dual culture technique with two treatments and five replications (1) pathogen control (*Colletotrichum* sp.) and (2) *Trichoderma asperellum* co-cultured with *Colletotrichum* sp. In addition, a detached leaf assay was conducted using three treatments with six replications: (1) sterile distilled water (control), (2) *Colletotrichum* sp., and (3) *Trichoderma asperellum* combined with *Colletotrichum* sp. The results showed that *Trichoderma asperellum* inhibited the mycelial growth of *Colletotrichum* sp. by 80.29% and overgrew the pathogen by 65.20% within five days after inoculation. Furthermore, disease severity on rubber leaves was reduced from 83.33% to 33.33%. These findings indicate that *Trichoderma asperellum* has strong potential as a biological control agent against Circular Leaf Spot Disease in rubber trees. Its application may help reduce the use of chemical fungicides, lower production costs, and promote safe and sustainable rubber production.

Keywords : *Hevea brasiliensis*, Circular Leaf Spot Disease, *Colletotrichum* sp., *Trichoderma asperellum*,





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Mapping Flood Damage on Thepha Farms

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Abstract

With climate change comes more severe weather patterns, bringing an additional challenge to farmers around the globe. In wet climates, this may mean more intense flooding during wet seasons, but more drought in dry seasons. Parts of Thailand have a wet tropical climate, and heavy rains can lead to flood damage to property and land. The goal of this research is to draw conclusions on the implications of different types of farming practices, such as monoculture or regenerative, with the rise of natural disasters. This research used the data collected by the Thaksin University undergraduate Bioacoustics laboratory, which traveled to almost 50 farms in the Phattalung province and collected a large range of data to account for the number of farms, types of practices they use, the locations, and whether or not they have been damaged by flooding in the past few months. The ArcGIS maps from this data will compare the relationships between farm type and each farm's specific attributes to their flood or erosion damage severity levels, and aid in a discussion about climate resilience, regenerative agriculture, and the implications of climate catastrophes in agriculture.

Keywords : sustainable agriculture, climate resilience, flooding, erosion, ArcGIS mapping





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Radio Frequency Tempering Combined with Conventional Thawing : A Novel Approach to Improving Microstructure and Water-Holding Capacity of Frozen Porcine *Longissimus dorsi* Muscle

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Abstract

Radio frequency tempering (RFT) has been proposed as an alternative method for improving the efficiency and quality of frozen meat thawing. In this study, RF tempering at 27.12 MHz was combined with either air convection thawing (RFTA; RF tempering followed by air convection at 20°C) or water immersion thawing (RFTW; RF tempering followed by water immersion at 20°C). These treatments were compared with conventional air convection (AC, 20°C), water immersion (WI, 20°C), refrigeration thawing (RT, 4°C), and fresh meat (FM). The RFTW and RFTA reduced thawing time to 145 and 195 min, respectively, whereas WI, AC, and RT required about 180, 330, and 815 min. AC caused the greatest moisture loss, while RT retained water better than WI ($P < 0.05$). In contrast, RFTW and RFTA showed the smallest changes in water-holding capacity, microstructure, shear force, protein solubility, TBARS, TVB-N, and color ($P < 0.05$). These results suggest that RF tempering combined with conventional thawing can shorten thawing time and better preserve pork quality, indicating strong potential for meat processing.

Keywords : Microstructure, Water-Holding Capacity, Pork, Radio-frequency tempering, Thawing





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Application of Photosynthetic Bacteria and *Bacillus* spp. for Wastewater Treatment in Hybrid Catfish(*Clarias macrocephalus* X *Clarias gariepinus*) Culture under a Recirculating Aquaculture System (RAS)

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Abstract

This study aimed to compare the effectiveness of *Bacillus* spp. and photosynthetic bacteria for wastewater treatment of hybrid catfish culture in recirculating aquaculture system (RAS). A completely randomized design (CRD) consisting of five treatments with three replicates each was employed: no microbial supplementation (control, T1), *Bacillus* spp. (PM.1) (T2), mixed photosynthetic bacteria (T3), photosynthetic bacterium strain P6 (T4), and a commercial photosynthetic bacterial product (PSBIO) (T5). Hybrid catfish (6.74 ± 0.03 g initial weight) were stocked at 25 fish per experimental unit. Fish were fed twice daily for 6 weeks. The results showed that final body weight, specific growth rate, FCR, and survival rate did not differ significantly among treatments ($P > 0.05$). The overall mean final body weight was 39.90 ± 0.90 g per fish, the specific growth rate was $4.23 \pm 0.05\%$ day⁻¹, and the FCR was 1.12 ± 0.03 . Water quality analysis indicated that pH gradually decreased from 9 to 7 during the culture period. No significant differences were observed among treatments in ammonia, nitrite, or nitrate concentrations ($P > 0.05$), although microbial treatments showed a tendency to reduce ammonia and nitrite levels at certain sampling periods. In contrast, phosphate concentration increased over time, from 0.11 ± 0.01 to 26.00 ± 0.47 mg L⁻¹. In conclusion, supplementation with *Bacillus* spp. (PM.1) and photosynthetic bacteria under the conditions of this study did not significantly improve fish growth performance or water quality compared with the control ($P > 0.05$). Nevertheless, both microbial treatments were compatible with hybrid catfish culture without adversely affecting fish growth and demonstrated the potential to reduce ammonia and nitrite concentrations during the culture period.

Keywords : *Bacillus* spp. PM.1, photosynthetic bacteria, water quality, recirculating aquaculture system





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Phatthalung THI impacts on cattle growth and nutrient digestion

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Abstract

This study investigated the effects of environmental conditions on physiological responses and growth performance of cattle under tropical region in Phatthalung Province, Thailand. A total of eight cattle, comprising Red Brahman and Holstein breeds, were used in the experiment. Animals were fed Paragrass as roughage on an ad libitum basis. Data were collected during the summer period from May to July, including feed intake, ambient temperature, relative humidity, and daily respiration rate (RR). Body weight was recorded weekly during weeks 1, 2, and 3, while fecal samples were collected in week 2 to determine total tract digestibility.

The results showed that the average ambient temperature and relative humidity during the study were 31.4°C and 38.7%, respectively, corresponding to a temperature-humidity index (THI) of 73.7, indicating a level of heat stress in cattle. As THI increased, feed intake tended to decrease, while the average respiration rate rose to 55 breaths per minute. Mean body weight increased from 144 ± 93 kg to 148 ± 94 kg in 2 weeks, representing a 2.78% gain. However, average daily gain (ADG) remained low, whereas feed conversion ratio (FCR) and feed cost per gain (FCG) showed an increasing trend. With a concentrate feed cost of approximately 6 THB/kilogram, the overall FCG was about 18 THB/kilogram of weight gain. Additionally, total tract digestibility coefficients for crude protein and neutral detergent fiber (NDF) were 62.20% and 51.25%, respectively. These findings indicate that hot and humid environment in Phatthalung Province significantly affect physiological responses and reduce production efficiency in cattle.

Keywords : Cattle, Digestibility, Growth, stress, Temperature-Humidity Index





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**Health of Thale Noi Swamp Buffaloes and Humans under the One Health
Framework: A Case Study in Phatthalung Province, Thailand**

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Abstract

This study aimed to analyze the relationship between buffalo health and the health of swamp buffalo keepers under the One Health framework in the Thale Noi wetland, Phatthalung Province, Thailand. A cross-sectional survey was conducted among 25 swamp buffalo keepers using a structured questionnaire covering socio-demographic characteristics, buffalo production systems, and knowledge, attitudes, and practices (KAP) related to zoonotic disease prevention and One Health. Data were analyzed using descriptive statistics.

The results showed that most respondents were male (68.0%), had completed primary education (68.0%), and were engaged primarily in agriculture (96.0%). The average age was 57 ± 12 years, with an average of 32 ± 14 years of buffalo-raising experience and 31 ± 41 buffaloes per household. Most buffaloes were raised in wetland grazing systems (92.0%), reflecting the close dependence of local livelihoods on the Thale Noi wetland ecosystem. The respondents demonstrated a moderate-to-high level of knowledge regarding zoonotic diseases and buffalo health, with an overall knowledge score of 76.4%. However, only 40.0% correctly understood the One Health concept. Attitude toward disease prevention and integrated health management was at the highest level (Mean = 4.53 ± 0.66), while preventive practices were at a high level (Mean = 4.07 ± 1.16). Practices such as consulting veterinarians and maintaining hygiene were widely adopted, although consistent use of personal protective equipment remained relatively low.

These findings indicate that buffalo keepers possess positive attitudes and appropriate preventive practices but require greater awareness of the One Health concept. Strengthening integrated education, disease surveillance, and collaborative management among the livestock, public health, and environmental sectors will contribute to improving the health of buffaloes, humans, and the wetland ecosystem in a sustainable manner.

Keywords : One Health; Swamp buffalo; Zoonotic diseases; Knowledge, Attitude and Practice (KAP); Thale Noi Wetland





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Costs, Revenues, and Economic Trajectories of Forest Farming: Comparing New England, USA and Hat Yai, Southern Thailand

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Abstract

This research brief examines the short-run (establishment years) and long-run (up to thirty years) economics of agroforestry and forest-farming systems through two comparative case contexts: Temperate forest farms in New England, USA, focused on mushroom, maple, and timber production, and Tropical smallholder farms in Thailand, integrating rubber trees with annual and perennial intercrops. The analysis aims to quantify and compare the cost structures, revenue timing, and financial viability of these systems under different time horizons and discount rates. In addition to private economic returns, the brief considers non-market ecosystem benefits (carbon sequestration, soil conservation, biodiversity habitat) that influence long-term value and resilience.

Keywords : sustainable agriculture, Non-Timber Forest Products (NTFPs), climate resilience, Economics





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Effects of Oil Palm Ash Application on Potassium Fertilizer Reduction, Yield, and Fruit Quality of Coconut

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Abstract

Oil palm ash, a potassium-rich by-product generated from the combustion of oil palm biomass for energy production in industrial factories, is produced in large and continuously increasing quantities. This material has potential as an alternative potassium source for coconut cultivation. However, its high alkalinity and salinity may limit its agricultural application. Therefore, this study aimed to evaluate the use of oil palm ash for reducing potassium fertilizer requirements in coconut production. The experiment was arranged in a randomized complete block design (RCBD) with five treatments: T1, 100% potassium fertilizer based on soil analysis (1,000 g K₂O tree⁻¹ year⁻¹); and T2–T5, oil palm ash at 50 kg tree⁻¹ year⁻¹ combined with 75%, 50%, 25%, and 0% of the recommended potassium fertilizer rate, respectively. In treatments T1–T4, nitrogen and phosphorus fertilizers were applied according to soil analysis recommendations at rates of 1,200 g N tree⁻¹ year⁻¹ and 500 g P₂O₅ tree⁻¹ year⁻¹, respectively. The results showed that the combined application of oil palm ash and chemical fertilizer significantly increased soil potassium availability and soil pH, thereby enhancing potassium uptake and accumulation in coconut leaves. Consequently, cumulative yield increased significantly. The application of 50 kg oil palm ash tree⁻¹ year⁻¹ combined with 50% of the recommended potassium fertilizer rate (500 g K₂O tree⁻¹ year⁻¹) provided the most balanced nutrient supply and produced the highest cumulative yield (2,383 fruits rai⁻¹ year⁻¹), compared with the full recommended chemical fertilizer treatment (1,920 fruits rai⁻¹ year⁻¹), and was significantly higher than the other treatments ($P \leq 0.05$).

Keywords : oil palm ash, potassium fertilizer, yield, coconut





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Development of a Cost-Effective Tissue Culture Medium Sterilization Technique for the Micropropagation of *Musa* sp. “ Kluai Hom Thong ” (AAA Group)

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Abstract

Kluai Hom Thong banana (*Musa* sp. “ Kluai Hom Thong ”), belonging to the AAA genome group, is a economically important crop that is highly popular among consumers and international market. Tissue culture propagation is widely used for banana production because it enables rapid multiplication of large numbers of uniform, disease-free plantlets. However, the technique requires specialized equipment, materials, and laboratory facilities, resulting in high production costs and limiting its adoption among farmers and small-scale producers. This study aimed to compare the effectiveness of three sterilization methods for culture media and their effects on the growth of ‘ Kluai Hom Thong ’ banana plantlets. The sterilization treatments consisted of (1) autoclave sterilization, (2) steam sterilization, (3) chemical sterilization using sodium hypochlorite solution (Haiteer) at a concentration of 0.4 ml/L . Explants were cultured on Murashige and Skoog (MS) medium supplemented with 30 g/L sucrose, 7 g/L agar, and 0.1 mg/L naphthaleneacetic acid (NAA) or 4 mg/L benzyladenine (BA). Each treatment was replicated three times, and plant growth was evaluated after four weeks of culture. The results showed that MS medium supplemented with 0.1 mg/L NAA and sterilized with 0.4 ml/L sodium hypochlorite solution produced the highest leaf and root development, with an average of 1.573 ± 0.065 leaves and 1.827 ± 0.752 roots per plantlet, respectively. No significant differences in shoot proliferation were observed among treatments at the 95% confidence level. These findings suggest that sodium hypochlorite can serve as an effective alternative sterilization method for tissue culture media, reducing equipment and energy costs while maintaining satisfactory plant growth. This approach has potential for promoting cost-effective production of high-quality planting material at farmer level.

Keywords : *Musa* sp. “ kluai Hom Thong”, Tissue culture, Autoclave sterilization, Steam sterilization, Sterilization using Sodium Hypochlorite (Bleach)





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Effect of Oil Palm Ash Application Rates on the Growth of Oil Palm Seedlings

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Abstract

This study aimed to investigate the effects of incorporating oil palm ash into growing media on the chemical properties of the media, seedling growth, nutrient uptake, and the economic feasibility of oil palm seedling production. The experiment was arranged in a randomized complete block design (RCBD) with 5 growing media treatments: (1) soil coir dust (1:1), (2) soil palm ash (1:1), (3) soil palm ash (2:1), (4) soil coir dust palm ash (1:1:1), and (5) soil coir dust palm ash (2:1:1). The results showed that the incorporation of oil palm ash increased the pH, available phosphorus, and exchangeable potassium of the growing media. Different growing media compositions did not significantly affect seedling growth in terms of stem diameter, plant height, or leaf number. However, the soil palm ash (1:1) treatment significantly increased root dry weight and potassium uptake, indicating that oil palm ash serves as an effective source of plant-available

This study aimed to investigate the effects of incorporating oil palm ash into growing media on the chemical properties of the media, seedling growth, nutrient uptake, and the economic feasibility of oil palm seedling production. The experiment was arranged in a randomized complete block design (RCBD) with 5 growing media treatments: (1) soil coir dust (1:1), (2) soil palm ash (1:1), (3) soil palm ash (2:1), (4) soil coir dust palm ash (1:1:1), and (5) soil coir dust palm ash (2:1:1). The results showed that the incorporation of oil palm ash increased the pH, available phosphorus, and exchangeable potassium of the growing media. Different growing media compositions did not significantly affect seedling growth in terms of stem diameter, plant height, or leaf number. However, the soil palm ash (1:1) treatment significantly increased root dry weight and potassium uptake, indicating that oil palm ash serves as an effective source of plant-available

Keywords : oil palm ash, growing medium, oil palm seedling, nutrient uptake, economic return





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Effects of sugarcane filter cake residue and chemical fertilizers on improving cassava production efficiency in Chonburi Province

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Abstract

This research aimed to evaluate the effectiveness of filter cake application in combination with chemical fertilizers on cassava yield and economic returns under sandy soil conditions. The experiment was conducted on a farmer's field in Bo Thong District, Chonburi Province, using a Randomized Complete Block Design (RCBD) with four replications and 6 treatments: no fertilizer application; chemical fertilizer based on soil analysis at a rate of 16-4-16 kg N-P₂O₅-K₂O per rai; filter cake at 1,000 kg per rai; and filter cake at the same rate combined with chemical fertilizers at rates of 16-4-16, 12-4-16, and 8-4-16 kg N-P₂O₅-K₂O per rai. Cassava cultivar Rayong 9 was planted on February 25, 2025, and yield data were collected at 11 months after planting 22 January 2026. The results showed that the application of chemical fertilizer based on soil analysis at 16-4-16 kg N-P₂O₅-K₂O per rai produced the highest fresh root yield and starch yield, at 5,295 and 1,576 kg per rai, respectively, and resulted in the highest net income of 5,802 baht per rai. The application of filter cake at 1,000 kg per rai combined with chemical fertilizers at the three rates produced fresh root yield, starch yield, and net income that were not significantly different among treatments, with fresh root yield ranging from 4,764 to 5,279 kg per rai, starch yield from 1,377 to 1,552 kg per rai, and net income from 4,429 to 4,956 baht per rai. The no-fertilizer treatment resulted in the lowest fresh root and starch yields, while the application of filter cake alone provided the lowest net income. The study concludes that the combined application of filter cake at 1,000 kg per rai with chemical fertilizers can reduce nitrogen fertilizer use by up to 50% while maintaining acceptable yield and economic returns, making it suitable for cassava production in sandy soils of farmer areas.

Keywords : Cassava, Sugarcane filter cake, sustainability





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Effects of Xylanase and Cellulase Supplementation in Azolla-Based Diets on Growth Performance, Feed Efficiency, Proximate Composition, and Production Cost of Hybrid Catfish (*Clarias macrocephalus* × *Clarias gariepinus*)

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Abstract

This study aimed to investigate the effects of dietary supplementation with xylanase and cellulase in Azolla-based diets on growth performance, feed utilization, chemical composition, protein and lipid retention, and feed cost of hybrid catfish (*Clarias macrocephalus* × *Clarias gariepinus*). The experiment was conducted using a Completely Randomized Design (CRD) with three dietary treatments, each consisting of three replicates: an Azolla-based diet (T1), an Azolla-based diet supplemented with 0.5% cellulase (T2), and an Azolla-based diet supplemented with 0.5% xylanase (T3). Fish were fed the experimental diets for five weeks.

The results showed that there were no significant differences ($p > 0.05$) among the dietary treatments in terms of average body weight, weight gain, specific growth rate (SGR), survival rate, whole-body chemical composition, feed conversion ratio (FCR), feed efficiency (FE), feed cost, or protein and lipid retention. However, fish fed the Azolla-based diet supplemented with 0.5% xylanase (T3) exhibited a tendency toward higher final body weight, weight gain, SGR, FE, and protein and lipid retention, while lowering of FCR and feed cost. These findings suggest that dietary supplementation with xylanase may improve nutrient utilization from Azolla-based diets and enhance production efficiency in hybrid catfish, although no statistically significant differences were observed under the experimental conditions of this study.

Keywords : Azolla, xylanase, cellulase, hybrid catfish, feed utilization

