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A smart decision framework for the prediction of thrips incidence in organic banana crops

Various pests which diminish the quality of the fruit have a big influence on the organic banana production in the Piura region of Peru (and not only) and prevent it from being sold on the international market. In this study, a framework for facilitating the prediction of the pest incidence in organic banana crops is developed. To achieve this, a data acquisition system with smart sensors is implemented to monitor the meteorological variables that influence the growth of the pests. The proposed framework is utilised for the assessment of various mathematical representations of the pest incidence. These models are adapted from population growth functions and built in such way as to predict the behaviour of the insects at non-regular time intervals. A hybrid approach, combining mechanistic and data-based methods is utilised for the development of the models. Both linear and nonlinear dynamic relationships with the temperature are assumed. The results show that nonlinear model representations have greater accuracy (a fit index of more than 70%), which provides a basis for improving pest management actions on the organic banana farms.

Ecological Modelling

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Environmental Science

Primero (Q1)

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Effect of Swell-Drying on Mango (*Mangifera indica*) Drying Kinetics

Swell-Drying operation (SD) was applied on mangoes to evaluate its effect on drying kinetics: starting accessibility (δW), apparent drying coefficient (Dapp), and time to obtain a final moisture content of 20% d.b (tf = 20% d.b). Swell-drying consisted of (1) submitting fresh mangoes to a first pre-drying stage under Convective Air Drying (CAD) until a moisture content of 37% d.b; (2) applying Instant Controlled Pressure Drop (DIC) treatments on pre-dried mangoes by following a central composite rotatable design (steam pressure: 0.2–0.6 MPa and treatment time: 5 and 55 s); and (3) apply post-drying of mangoes under CAD. In both cases, CAD was performed at 60 °C and airflow of 1 m/s. Results showed that both the treatment time and the steam pressure impacted the Dapp and the δW .

By comparing to the control, SD (0.54 MPa and 48 s) increased the Dapp and δW to 12.2 and 2.7 times, respectively. Moreover, SD triggers a significant reduction in post-drying time (tf = 20% d.b), being this of 2.4 h vs. 30.8 h. These results could be linked to the expansion of the internal pores of mangoes generated by the instant autovaporization of residual water triggered by DIC treatment.

Foods

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Agricultural and Biological Sciences, Health Professions, Immunology and Microbiology, Social Sciences

Primero (Q1)

Luis Alberto Casaverde Pacherez, Carmen Téllez Pérez, Colette Besombes, Daniel Marcelo Aldana, Karim Allaf and Edilberto Vásquez Díaz

Agrarian contracts, relations between agents, and perception on energy crops in the sugarcane supply chain: The Peruvian case

Peruvian regions for sugarcane planting produce sugarcanes throughout the year with a high average productivity. The objective of this article is to analyze the role of agents in the sugarcane supply chain to Peruvian mills and their relationship with the practice of agrarian contracts to sugarcane production. The perception of landowners and farmers about bioenergy and their predisposition to plant energy crops is also investigated. Field interviews are conducted with the main agents of the sugarcane production chain in the major producing regions. Statistical analysis of data from field interviews indicates that the relationship between owners and sugarcane producers is of land leasing. Intermediate agents act as a fundamental part of the sugarcane supply chain. The sharecropping or sugarcane purchase contract is an instrument that is established between middlemen and small independent producers, whether they are owners or tenants. The middlemen participation in commercialization can reach 30–40% of the sugarcane production. Most mills prefer to produce sugarcane in own lands. A relatively high degree of inequity in favor of the middlemen appears in the intermediation process because, in general, the mills prefer this intermediation in their commercial practice. A large number of landowners and tenants are familiar with notions of energy crops, particularly in relation to sugarcane and have a positive vision about them for the environmental sustainability. However, their interest in planting bioenergy crops is less.

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Friendly and equitable relations between agents will provide more economic and social stability to the Peruvian sugarcane agroindustry.

 Open Agriculture


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 Agricultural and Biological Sciences

 Segundo (Q2)

Patricia José de Almeida, Carlos T. Salinas, Óscar J. Pérez-Huiman, Reynaldo Rafael Raygada Watanabe, Daniel Marcelo Aldana

Eco-friendly additive construction: Analysis of the printability of earthen-based matrices stabilized with potato starch gel and sisal fibers

 3D printing for construction purposes is a disruptive technology with the potential for rapid and massive applications making it a feasible alternative for social housing, temporary shelters after disasters, and, recently, for extraterrestrial habitats. However, most of the matrices used for construction by 3D printing are based on hydraulic cement as the main constituent, which is not easily available in remote locations and is an important greenhouse gases generator. Therefore, a good understanding to formulate and evaluate alternative matrices using soil and organic materials with the required fresh and hardened-state properties compatible with this emerging technology is needed. This article studies the printable capabilities of eco-friendly earthen-based matrices which uses

potato starch as a natural stabilizer for raw soil mortars aiming to obtain 3D printed filaments with adequate fresh and hardened-states properties. The aqueous starch gel was combined with sisal fibers in the printing mixture to control shrinkage cracking problems during hardening. The optimization of the dosage of the stabilizer was carried out considering different tests in fresh and hardened printed filaments namely, pumpability and extrudability, stacking, shear vane, shrinkage cracking, Vicat needle, compression strength, and capillarity absorption tests. The results indicate that printable earthen-based matrices reinforced with 1 % of sisal fibers by weight of soil and stabilized with aqueous starch gels with concentrations up to 5 % (w/w) showed improved workability and minor cracking and can be used for 3D printing. These promising results in the field of material science combined with novel 3D printing technology that is also presented in the article open new lines of research for eco-friendly alternatives for the construction industry.

 Construction and Building Materials

 0.1016/j.conbuildmat.2022.128556


 Engineering, Materials Science

 Primero (Q1)

Guido Silva, Robert Ñañez, Diana Zavaleta, Valeria Burgos, Suyeon Kim, Gaby Ruiz, Miguel A. Pando, Rafael Aguilar, Javier Nakamatsu

FACULTAD DE CIENCIAS ECONÓMICAS Y EMPRESARIALES

Decentralizing investment: Evidence from municipal organization after close elections

 I use close municipal elections in a nonparametric regression discontinuity framework to study the organizational dimension of local public investment following a decentralization reform in Peru. National political organizations' mayors winning by very narrow margins approve and execute larger investments than those of other types of parties; they also choose structures, systems, and personnel more conducive to active investment, engage in beneficial contracting relationships with outside funding sources, and achieve more stable financial and social performance. Evidence on the consequential influence of national parties only after the decentralization reform, with their aggregate investment implications, is discussed.

 Journal of Economics and Management Strategy


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 Business, Management and Accounting, Economics, Econometrics and Finance

 Primero (Q1)

 Gabriel Natividad

Breaking the poverty cycle? Conditional cash transfers and higher education attainment

 This paper analyses the effects of the Peruvian 2005 Juntos Conditional Cash Transfer, program on higher education attainment and by gender. Based on the Young Lives Survey and using matching techniques, we find that Juntos has a positive effect on higher education attainment. Recipients are 8.5 percentage points more likely to attain technical studies, and this positive result remains regarding the matching technique used. Moreover, after controlling for community and cognitive test variables, recipients are 11.4 percentage points more likely to attain university studies. The positive effect of Juntos, however, is only for men and not for women revealing a gender gap in higher education attainment among Juntos recipients.

 International Journal of Educational Development

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 Social Sciences

 Primero (Q1)

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