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# Section Agricultural Science and Technology

A vertical strip on the left side of the page shows a microscopic image of plant cells, likely from a leaf, stained with a blue dye. The cells are irregular in shape and show distinct cell walls and internal structures.

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# Section Information

The “Agricultural Science and Technology” section of *Applied Sciences* welcomes the submission of high quality, multidisciplinary, original research and review articles related to all aspects of Agricultural Science and Technology. Applied agricultural sciences: crop production, crop protection, food sciences and food technology, irrigation, agricultural statistics, and bioinformatics. Applied agricultural technology: farm structure, farm power and machinery, irrigation and drainage, engineering of land and water resources, aquaculture and fisheries, renewable energy, agro-industrial engineering, horticultural and greenhouse engineering, pre- and post-harvest engineering, environment and agricultural information technology, etc.

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# Selected Papers

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## Shell Waste Management and Utilization: Mitigating Organic Pollution and Enhancing Sustainability

**Authors:** Natalija Topić Popović, Vanesa Lorencin, Ivančica Strunjak-Perović and Rozelindra Čož-Rakovac

**Abstract:** Every year, close to 8 million tons of waste crab, shrimp and lobster shells are produced globally, as well as 10 million tons of waste oyster, clam, scallop and mussel shells. The disposed shells are frequently dumped at sea or sent to landfill, where they modify soils, waters and marine ecosystems. Waste shells are a major by-product, which should become a new raw material to be used to the best of their potential. There are a number of applications for waste shells in many fields, such as agriculture, medicine, chemical production, construction, environmental protection, cosmetic industry, food and feed industry, and a plethora of other (often niche) applications, which are being developed by the day. This review provides a broad picture of crustacean and mollusc shell waste management and reutilization possibilities, reviewing well established, current, and potential strategies, particularly from the standpoint of sustainability challenges and energy demand.

<https://doi.org/10.3390/app13010623>

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## Data Augmentation Method for Plant Leaf Disease Recognition

**Authors:** Byeongjun Min, Taehyun Kim, Dongil Shin and Dongkyoo Shin

**Abstract:** Recently, several plant pathogens have become more active due to temperature increases arising from climate change, which has caused damage to various crops. If climate change continues, it will likely be very difficult to maintain current crop production, and the problem of a shortage of expert manpower is also deepening. Fortunately, research on various early diagnosis systems based on deep learning is actively underway to solve these problems, but the problem of lack of diversity in some hard-to-collect disease samples remains. This imbalanced data increases the bias of machine learning models, causing overfitting problems. In this paper, we propose a data augmentation method based on an image-to-image translation model to solve the bias problem by supplementing these insufficient diseased leaf images. The proposed augmentation method performs translation between healthy and diseased leaf images and utilizes attention mechanisms to create images that reflect more evident disease textures.

<https://doi.org/10.3390/app13031465>



## Modelling and Control Methods in Path Tracking Control for Autonomous Agricultural Vehicles: A Review of State of the Art and Challenges

**Authors:** Quanyu Wang, Jin He, Caiyun Lu, Chao Wang, Han Lin, Hanyu Yang, Hang Li and Zhengyang Wu

**Abstract:** This paper provides a review of path-tracking strategies used in autonomous agricultural vehicles, mainly from two aspects: vehicle model construction and the development and improvement of path-tracking algorithms. Vehicle models are grouped into numerous types based on the structural characteristics and working conditions, including wheeled tractors, tracked tractors, rice transplanters, high clearance sprays, agricultural robots, agricultural tractor-trailers, etc. The application and improvement of path-tracking control methods are summarized based on the different working scenes and types of agricultural machinery. This study explores each of these methods in terms of accuracy, stability, robustness, and disadvantages/advantages. The main challenges in the field of agricultural vehicle path tracking control are defined, and future research directions are offered based on critical reviews. This review aims to provide a reference for determining which controllers to use in path-tracking control development for an autonomous agricultural vehicle.

<https://doi.org/10.3390/app13127155>



## Remote Sensing for Sustainable Pistachio Cultivation and Improved Quality Traits Evaluation through Thermal and Non-Thermal UAV Vegetation Indices

**Authors:** Raquel Martínez-Peña, Sergio Vélez, Rubén Vacas, Hugo Martín and Sara Álvarez

**Abstract:** Pistachio (*Pistacia vera* L.) has earned recognition as a significant crop due to its unique nutrient composition and its adaptability to the growing threat of climate change. Consequently, the utilization of remote sensing techniques for non-invasive pistachio monitoring has become critically important. This research was conducted in two pistachio orchards located in Spain, aiming to assess the effectiveness of vegetation indices (VIs) in estimating nut yield and quality under various irrigation conditions. To this end, high-resolution multispectral and thermal imagery were gathered using a Micasense ALTUM sensor carried by a DJI Inspire 2 drone in order to calculate the NDRE (normalized difference red edge index), GNDVI (green normalized difference vegetation index), NDVI (normalized difference vegetation index), and CWSI (crop water stress index).

<https://doi.org/10.3390/app13137716>

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## AI, IoT and Remote Sensing in Precision Agriculture

Guest Editor: Prof. Dr. Antonio López-Quílez



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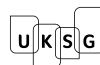
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