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Theme Overview: Navigating Emerging Technologies in Specialty Crops: Production, Labor, and Ethical Considerations

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Recent agricultural technological developments have generated high expectations for risk management, profitability, and sustainable use of resources in farm operations. For decades, the U.S. agricultural sector has been at the forefront of technology adoption, with automation and mechanization (AM) assisting operations to become more competitive and more efficient while tackling everyday challenges related to managing production risk, lowering labor costs, and addressing labor shortages. Examples abound in row crop production (air drills, combines, planters), fruit and vegetable production (robotic operations in apple and citrus orchards, robotic strawberry harvest), nursery production (plant-moving robots) and dairy operations (automatic milking systems).

This *Choices* theme covers ongoing economic considerations and challenges in the specialty crops industry. From production practices and innovations and the tree fruit industry to applications of mechanization and automation in the nursery industry, the first set of articles highlights developments and discusses challenges and approaches with an emphasis on labor needs of the respective industries. Vougioukas et al. focus on biological and technical changes needed in orchard management to facilitate robotic apple harvest and discuss challenges and potentials for automatic fruit harvesting. Karkee et al. examine the status of various mechanization developments and orchard management practices needed for apple cultivation, particularly in pruning and thinning, which can help growers to ameliorate labor scarcity and improve profitability. Another industry lately receiving attention due to increased production costs, including production inputs and labor costs, is the nursery industry. Bampasidou and Fields present automation and mechanization efforts in this industry in an effort to address increasing labor needs and persistent labor shortages.

Articles in this Theme:

Finally, Goldgaber and Mandalika focus on ethical issues regarding artificial intelligence (AI) in agriculture. While the potential benefits of AI applications are significant, implementing these applications requires care and consideration to ensure that the technology is used in a responsible and sustainable manner. Incorporating AI into the agriculture and agricultural processing industries raises questions about several labor-related issues, including the potential de-skilling of employees, employee replacement, and lack of knowledge. These issues are further compounded by the fact that the farm workforce is diverse. Along with investigating outcomes such as productivity and economic indices, researchers working on AI integration need to consider the adoption of frameworks that integrate ethical considerations with machine learning and AI in agriculture.

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