

This month's Update From The Field topic is horticulture and orchard safety. According to Safe Ag Systems, the top five most common hazards in horticulture are muscular stress, machinery (equipment and plant), trips and falls, hazardous chemicals, and UV radiation. Below, you'll find a few articles that dive deeper into these topics. As always, feel free to reach out directly to request access to the full-text version of these articles!

1. Sexsmith, K., Palacios, E. E., Gorgo-Gourovitch, M., & Huerta Arredondo, I. A. (2022). Latino/a Farmworkers' Concerns about Safety and Health in the Pennsylvania Mushroom Industry. *Journal of agromedicine*, 27(2), 169–

182. <https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdoi.org%2F10.1080%2F1059924X.2021.1935374&data=05%7C02%7Ctabitha-kuehn%40UIOWA.EDU%7C5b17efb940ab4b87b96808dc6f706397%7C1bc445959aba4fc3b8ec7b94a5586fdc%7C1%7C0%7C638507775711301897%7CUnknown%7CTWFpbGZsb3d8eyJWljojMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikk1haWwiLCJXVCi6Mn0%3D%7C0%7C%7C%7C&sdata=ZEf4tYn5To13o1vHHgzQVLvsnGqvA07JBdKUqNbYlol%3D&reserved=0>

a. The purposes of this study were to analyze Latino/a immigrant mushroom workers' perceptions of how the workplace environment shapes occupational safety and health, examine whether and how those perceptions differ by gender, and identify future areas for research on occupational safety and health in the mushroom industry. Researchers conducted structured interviews with 15 women and 45 men on 6 Pennsylvania mushroom farms to obtain their descriptions and perspectives of safety and health risk factors in their workplaces. Approximately one third of respondents had suffered an injury at work, and nearly half felt that there are workplace factors that affect their health and safety. The study found that Latino/a mushroom farmworkers perceive risks that are posed by the indoor infrastructure of mushroom production houses, including poorly maintained wooden walkways and cool indoor temperatures, and by the organization of mushroom production work, including the application of chemicals including pesticides, physical demands of the job, use of small knives, contact with compost, and the piece rate payment system. Workers commonly discussed back pain and believed it was associated with the organization of work. Women in the sample were more likely to be concerned about slips and falls than men and less likely to be concerned about aches and pains. Mushroom farm infrastructure and the specific demands of the jobs pose occupational safety and health risks to Latino/a farmworkers that merit further study to develop adequate public health interventions. Future research should obtain gender-disaggregated objective reports of injury, aches and pains, and discomfort and test for relationships between these reports and the indoor infrastructure and conditions of mushroom production work.

2. Salazar, M. K., Keifer, M., Negrete, M., Estrada, F., & Synder, K. (2005). Occupational risk among orchard workers: a descriptive study. *Family & community health*, 28(3), 239–

252. <https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdoi.org%2F10.1097>

<https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdoi.org%2F10.1038%2Fs41598-022-08705-z&data=05%7C02%7Ctabitha-kuehn%40UIOWA.EDU%7C5b17efb940ab4b87b96808dc6f706397%7C1bc445959aba4fc3b8ec7b94a5586fdc%7C1%7C0%7C638507775711310313%7CUnknown%7CTWFpbGZsb3d8eyJWljojMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikk1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=Yv0N2eCh3UNNkkJAdHVqPKUffjpwLltmYZYHCIFdOMo%3D&reserved=0>

a. Orchard workers are exposed to an array of occupational health and safety hazards that result in injury, illness, and, in some cases, death. The purpose of this qualitative study was to identify and explore factors that contribute to occupational risks related to orchard work. Twenty-five Hispanic orchard workers were interviewed. They reported that the most common type of accident was falls, usually from a ladder; and the most common injuries were strains and sprains. Three broad categories of factors that contributed to the occurrence of such injuries were Knowledge, Attitudes and Behaviors; Work-Related Factors; and Factors External to Work.

3. Gao, R., Yan, H., Duan, J., Gao, Y., Cao, C., Li, L., & Guo, L. (2022). Study on the nonfatigue and fatigue states of orchard workers based on electrocardiogram signal analysis. *Scientific reports*, 12(1),

4858. <https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdoi.org%2F10.1038%2Fs41598-022-08705-z&data=05%7C02%7Ctabitha-kuehn%40UIOWA.EDU%7C5b17efb940ab4b87b96808dc6f706397%7C1bc445959aba4fc3b8ec7b94a5586fdc%7C1%7C0%7C638507775711314919%7CUnknown%7CTWFpbGZsb3d8eyJWljojMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikk1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=TaZ%2BOvdP0RulW4qxwL9CEjphFWLVFhS3pSZ%2Fon3tcel%3D&reserved=0>

a. In recent years, fatigue has become an important issue in modern life that cannot be ignored, especially in some special occupations. Agricultural workers are high-risk occupations that, under fatigue conditions over a long period, will cause health problems. In China, since very few studies have focused on the fatigue state of agricultural workers, we were interested in using electrocardiogram (ECG) signals to analyze the fatigue state of agricultural workers. Healthy agricultural workers were randomly recruited from hilly orchards in South China. Through the field experiment, 130 groups of 5-min interval ECG signals were collected, and we analyzed the ECG signal by HRV. The time domain (meanHR, meanRR, SDNN, RMSSD, SDSD, PNN20, PNN50 and CV), frequency domain (VLF percent, LF percent, HF percent, LF norm, HF norm and LF/HF) and nonlinear parameters (SD1, SD2, SD1/SD2 and sample entropy) were calculated and Spearman correlation coefficient analysis and Mann-Whitney U tests were performed on each parameter for further analysis. For all subjects, nine parameters were slightly correlated in nonfatigue and fatigue state. Six parameters were significantly increased and ten HRV parameters were significantly decreased compared the nonfatigue state. As for males, fifteen parameters were significantly different, and for females, eighteen parameters were significantly different. In addition, the probability density functions of SDNN, SDSD, VLF%, HFnorm and LF/HF were significantly different in nonfatigue and fatigue state for different genders, and the nonlinear parameters become more discrete compared the nonfatigue state.

Finally, we obtained the most suitable parameters, which reflect the fatigue characteristics of orchard workers under different genders. The results have instructional significance for identifying fatigue in orchard workers and provide a convincing and valid reference for clinical diagnosis.

4. Keifer, M., Salazar, M. K., & Connon, C. (2009). An exploration of Hispanic workers' perspectives about risks and hazards associated with orchard work. *Family & community health*, 32(1), 34–

47. <https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdoi.org%2F10.1097%2F01.FCH.0000342815.49649.46&data=05%7C02%7Ctabitha-kuehn%40UIOWA.EDU%7C5b17efb940ab4b87b96808dc6f706397%7C1bc445959aba4fc3b8ec7b94a5586fdc%7C1%7C0%7C638507775711318895%7CUnknown%7CTWFpbGZsb3d8eyJWljojoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTil6lk1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=d1u5kDHIHEodTen2QxJC9qT%2BIXdd6NH8QyoYIRI7o4Q%3D&reserved=0>

a. Orchard workers are a population at risk for serious and disabling occupational injuries and illnesses. The purpose of this descriptive, exploratory study was to gather information about orchard workers' perceptions and experiences related to their work to better understand factors that contribute to their occupational risk. The sample consisted of 180 Hispanic orchard workers from 3 counties in Washington State; about a third of these reported at least 1 occupational injury. A Likert scale was used to gather workers' perceptions about individual, work-related, and environmental factors that have the potential to contribute to the occurrence of occupational injuries and illnesses. Psychosocial factors emerged as particularly important influences on workers' health and safety. Injured workers were more likely than noninjured workers to feel (1) that they are more likely to be fired, (2) that the "boss cares more about the fruit than the worker," (3) that their employer was demanding, and (4) that orchard work was dangerous. There is a compelling need to develop and test interventions that address factors that adversely affect orchard workers' health and safety.