

Monitoring heat stress in agriculture: the project of the University of Tuscia



Monitoring of Heat Stress in Agriculture

The Project of the University of Tuscia

The **agricultural sector** is one of the most exposed to **adverse weather conditions**, with extreme temperatures that can affect workers' health and productivity. **Heat stress** is a major threat to farm workers, as it can cause fatigue, heat stroke, and an increased risk of injury. With climate change further exacerbating the problem, environmental monitoring becomes essential to ensure occupational safety in this area.

To address this issue, the University of Tuscia has launched a research **project** aimed at **monitoring** the **heat stress** of **agricultural workers**. The goal is to collect accurate data and calculate microclimatic indices in real time to develop effective prevention strategies, improving working conditions in the sector.

The project for the monitoring of heat stress

The initiative of the University of Tuscia is part of the **national Agritech project** and is **financed by the PNRR fund**. Its main purpose is to analyze in depth the exposure to heat in agricultural contexts, both in the open field and in greenhouses, through an advanced real-time monitoring system.

Project objectives:

- Monitor environmental conditions in real time to assess the level of thermal stress;
- Integrate the data collected with information from workers, such as clothing and level of acclimatization;
- Develop tools and strategies to mitigate heat-related risks;
- To raise awareness in the agricultural sector of the importance of heat stress prevention.

LSI LASTEM's solutions for environmental monitoring

LSI LASTEM supported the project by providing **advanced solutions for monitoring heat stress**. It has installed a **fixed weather station** specifically designed **for monitoring thermal stress**, for the continuous control of environmental conditions in the open field and in greenhouses, equipped with sensors for measuring air temperature and humidity, globe temperature and wet bulb temperature. The system calculates the **WBGT** (Wet Bulb Globe Temperature) **index** in accordance with ISO 7243:2017 and transmits the data to a remote server for analysis and reporting, triggering alarms via SMS and e-mail if risk thresholds are exceeded. For temporary monitoring, a **portable weather station** for **microclimatic monitoring** was provided, easily transportable and installable on a tripod, battery-powered with the option of a solar panel for greater autonomy. It also calculates the WBGT index and the Heat Index, sending alarms in real time. Finally, the **Alpha-Log data logger** ensures the acquisition, storage and transmission of data, integrating various advanced communication options and alert systems for the safety of workers.

Future applications and benefits of monitoring

The information collected by **WBGT weather stations** is used not only for the immediate prevention of heat stress, but also to develop new technologies to support workers. Future applications of the project include:

- **Integration with biometric data** for a personalized assessment of thermal risk;
- **Early warning systems** with direct notifications to workers;

- **Development of software and apps** for the autonomous management of WBGT monitoring on farms.

Towards a safer and more sustainable agriculture

The University of Tuscia, with the support of real-time monitoring, is developing a heat stress monitoring **model** that can be **replicated in different contexts**. This project not only contributes to the safety of agricultural workers, but also paves the way for new solutions to address the problem of heat waves in other particularly exposed sectors, such as construction and industry.

Thanks to this initiative, research and innovation come together to make agricultural work safer and more sustainable, ensuring the protection of the health of those who work daily in increasingly extreme climatic conditions.