

**Cite this as:** Jinxian TAO, Xiaoli LI, Jingfei ZHANG, Muhammad SHOAIIB, Muhammad Adnan ISLAM, Ibrar AHMAD, Yong HE, Sitan YE, Yujie WANG, Binhui LIAO, Mostafa GOUDA, 2026. Improving RGB image recognition in the YOLO11n algorithm for accurate detection of tea plant diseases. *Journal of Zhejiang University-SCIENCE B*, 27(5):482-498.  
<https://doi.org/10.1631/jzus.B2500693>

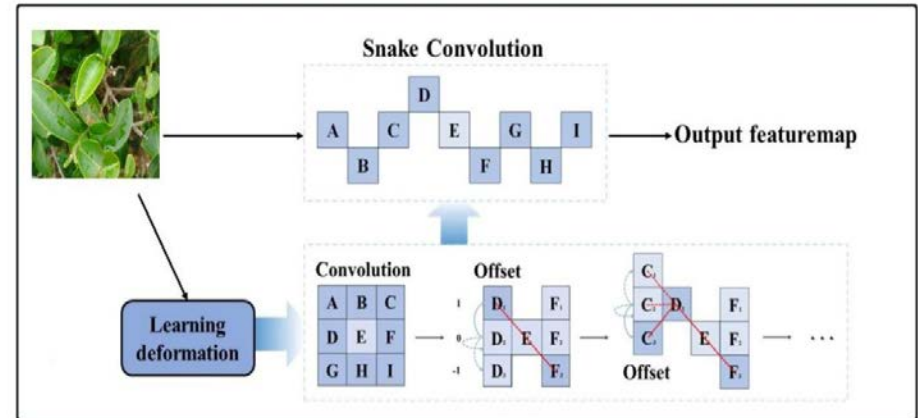
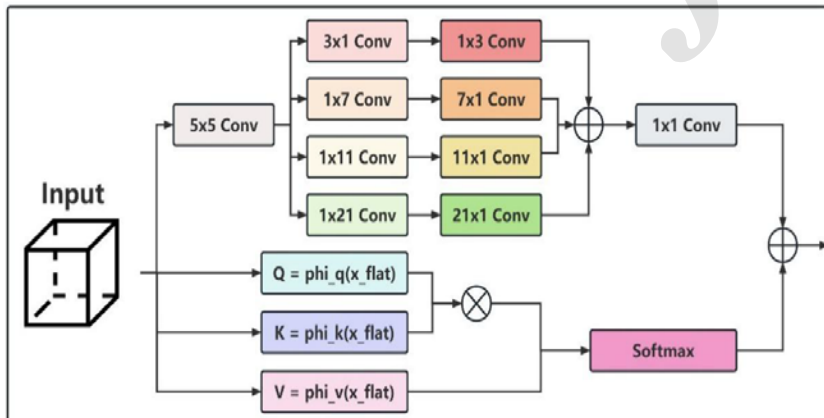
# Improving RGB image recognition in the YOLO11n algorithm for accurate detection of tea plant diseases

**Key words:** Tea disease detection; YOLO11n; Convolutional module; Attention mechanism; Loss function

# Research Summary

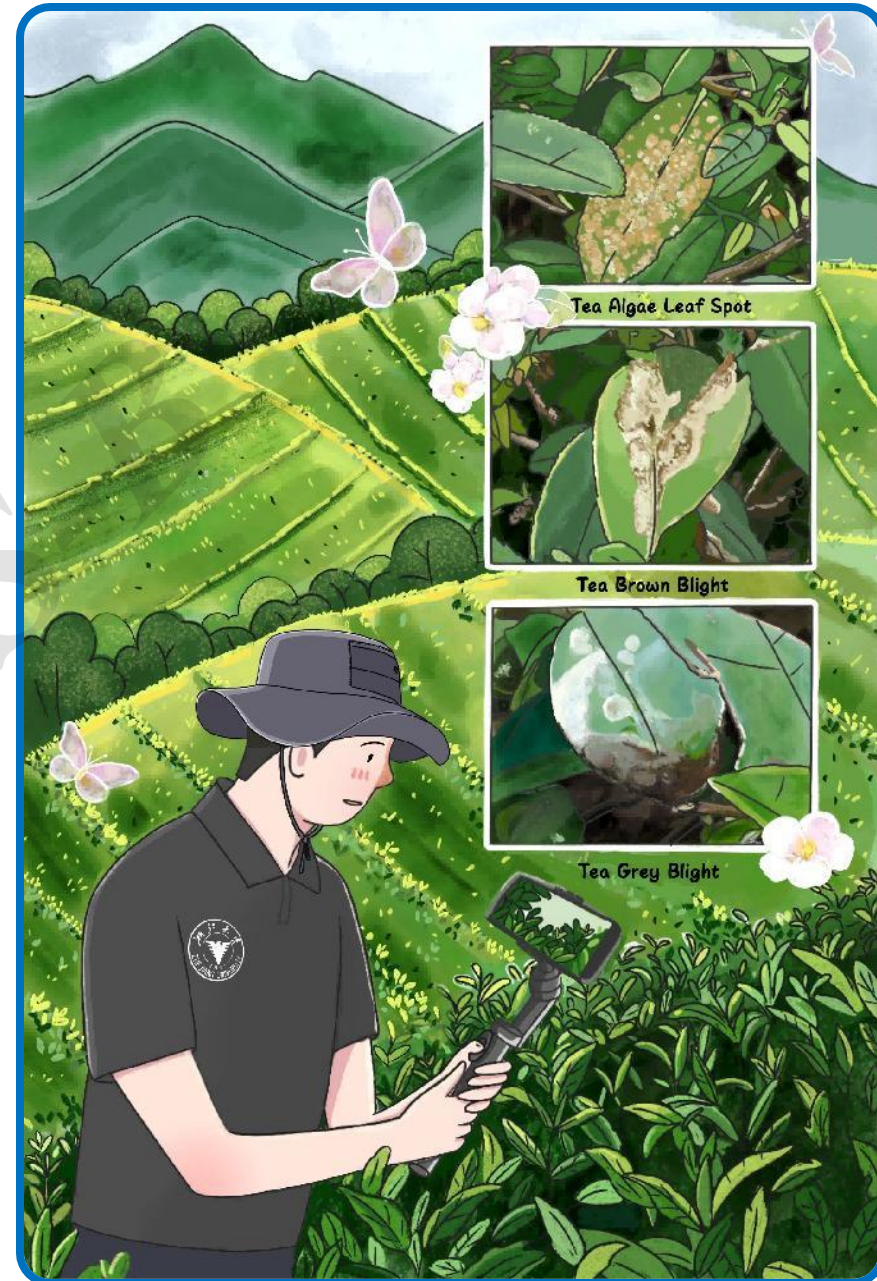
This research article aims to address the poor robustness and high computational complexity of tea disease detection models in natural field conditions, and summarized the key roles they played in the following aspects:

- Image processing, image enhancement
- Attention mechanism, convolution module, loss function
- Ablation experiments and comparative experiments



# *Innovation points*

- **Dataset** of Longjing tea disease with 3 disease types was built.
- **Modules** of AML attention mechanism, Dynamic Snake convolution, SloU loss function were integrated.
- **Experiments** of ablation and comparison were conducted to verify the performance improvement of the enhanced model.



# ***Innovation points***

**A series of comprehensive tables were generated to summarize the performance metrics of component models in each experiment.**

**Table 1 | Ablation experiment.**

**Table 2 | Experimental comparison between ADS-YOLO and YOLO11n.**

**Table 3 | Comparison experiment with additional models**