

Technical Working Party on Testing Methods and Techniques**TWM/2/13****Second Session****Virtual meeting, April 8 to 11, 2024****Original:** English**Date:** April 2, 2024

APPLICATION OF IMAGING ANALYSIS ON DUS TEST*Document prepared by an expert from China**Disclaimer: this document does not represent UPOV policies or guidance*

The annex to this document contains a copy of a presentation “Application of Imaging Analysis on DUS Test”, to be made by an expert from China, at the second session of the Technical Working Party on Testing Methods and Techniques (TWM).

[Annex follows]



Application of Imaging Analysis on DUS Test



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**Kunming Subcenter for Tests of New Varieties of Plants,
Ministry of Agriculture and Rural Affairs, P.R. China.**

Date: Apr. 2024

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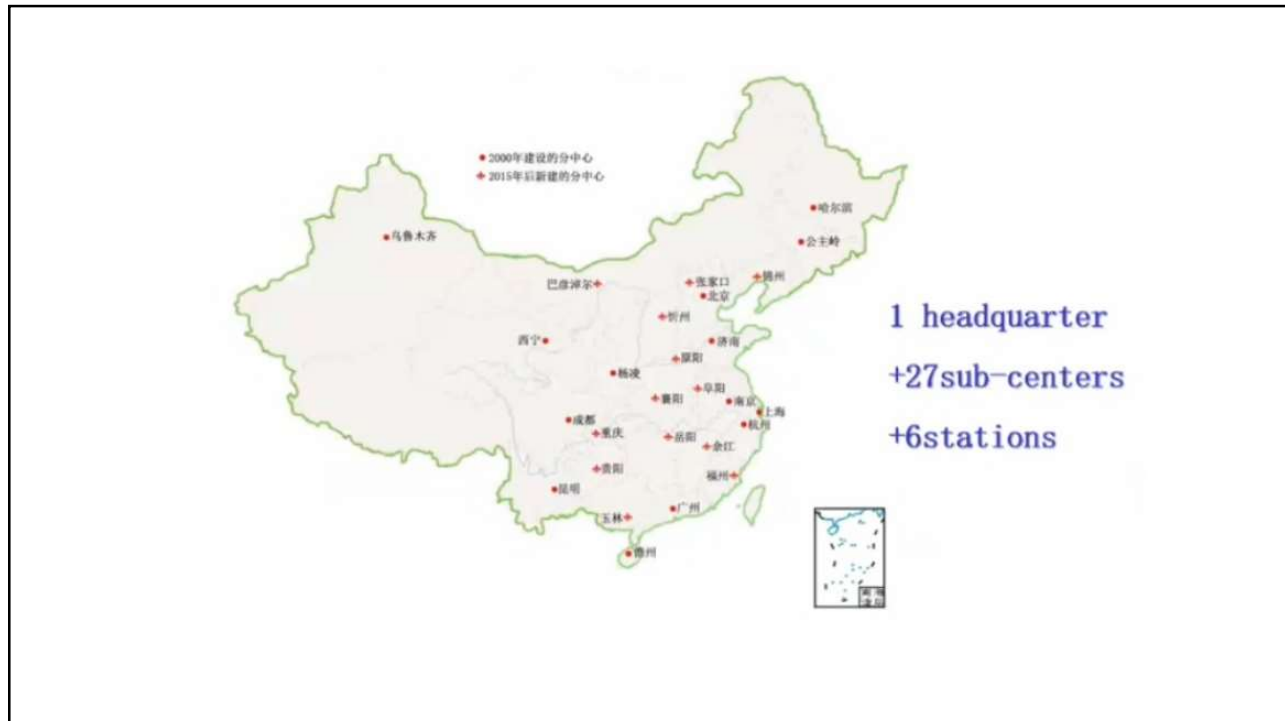


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- **Brief Introduction to Kunming Sub-Center**
- **Maize DUS Testing**
- **Seed Quality Testing**
- **Color Measuring**
- **Some Reflections**

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<h3>Basic Facilities</h3> <ul style="list-style-type: none"> > Greenhouse: 5,606.4m² > Isolation Greenhouse: 320m² > Net House: 40,921m² > Plastic Greenhouse: 1,008 m² > Middle-term Seed Storage Bank: 340.99m³ > Laboratory: 502m² 	<h3>Information Platform</h3> <ul style="list-style-type: none"> > WiFi Controlled Water-Fertilizer System > Zigbee Management System > Database for Variety Testing > Management Center for Propagating Materials > Collecting and Analysis System of Phenotypic Data > Electronic Archive Management System 	
<p>≈ 700 candidate varieties for DUS test annually (assigned by MARA or demanded by breeders)</p> <p>> 100 enterprises enjoying our testing services</p>		

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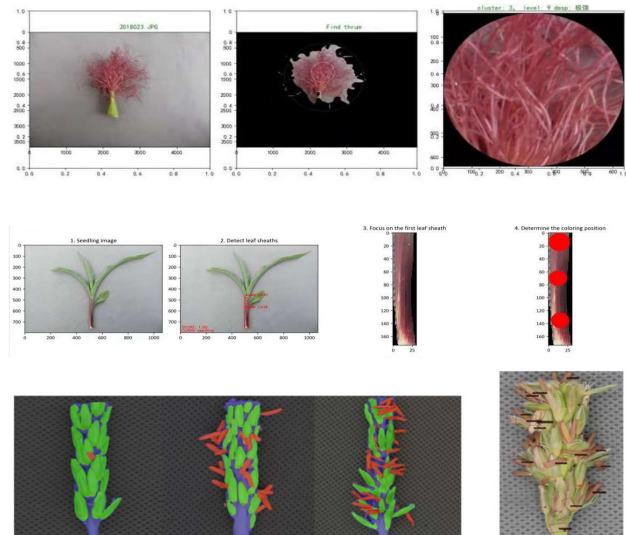
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1. Intelligent analysis technology for maize characteristics of anthocyanin coloration

- ✓ Our team is currently conducting intelligent analysis research on the anthocyanins coloration of maize silk, leaf sheaths, glume base, middle part of glume, and glume top, etc..



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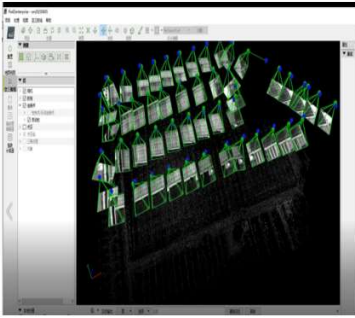
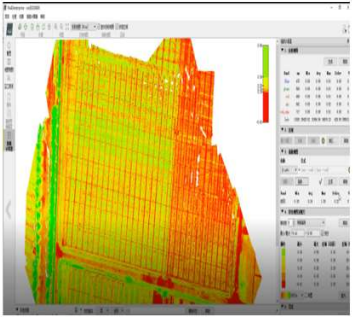


Image acquisition



Trajectory restoration



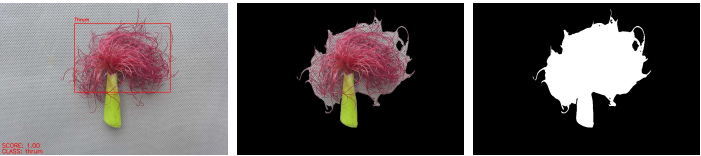
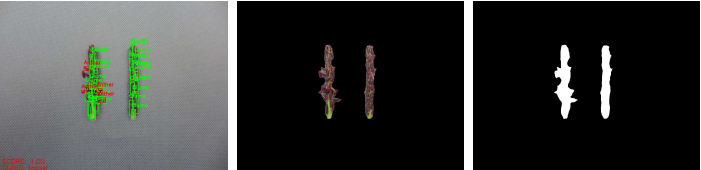

Data analysis and output

4. Drone platform for analysis of maize canopy characteristics

- ✓ Our team integrated hyperspectral, thermal imaging, LiDAR and other sensors into the drone platform, and is currently conducting high-throughput analysis research on maize vegetation index, coverage, green degree, plant height and other canopy characteristics. The next step is to conduct research on disease resistance, *ect.*

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accuracy rate > 90%

	characteristics
1	ear: anthocyanin coloration of silks
2	ear: shape
3	ear: number of colors of grains
4	ear: type of grain
5	ear: color of top of grain
6	ear: color of dorsal side of grain
7	ear: shape of grain
8	ear: anthocyanin coloration of glume of cob

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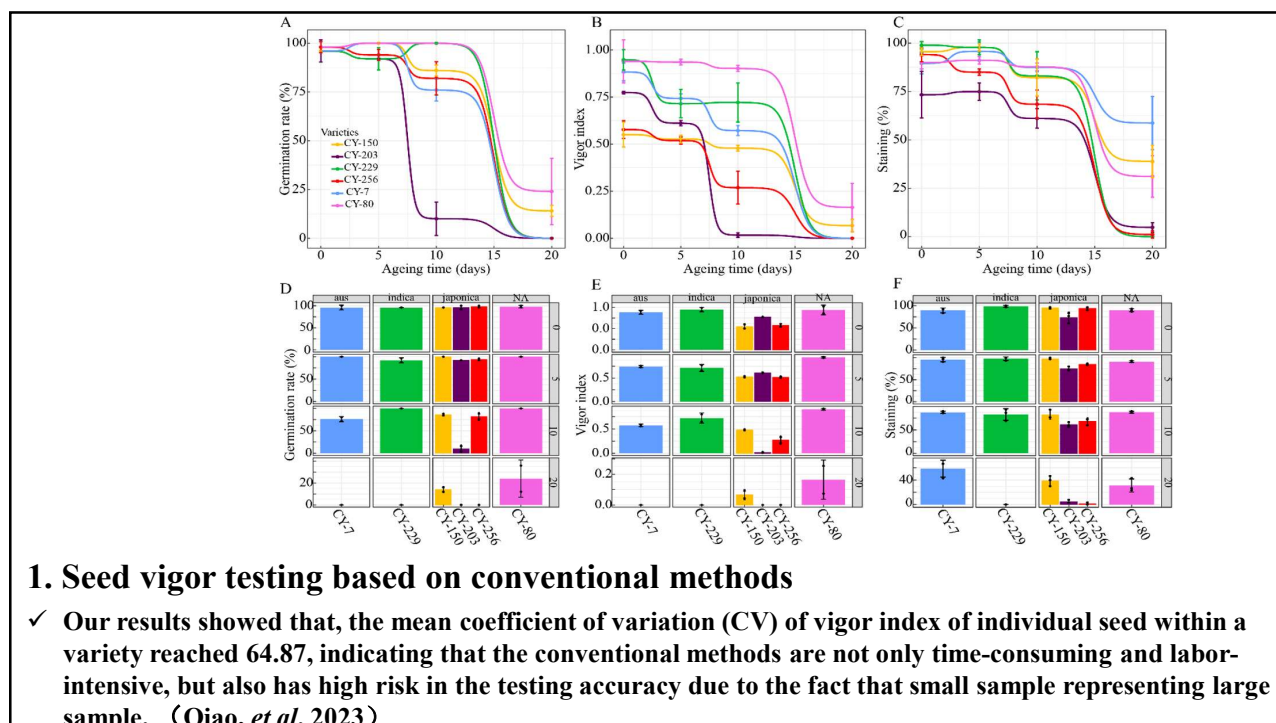


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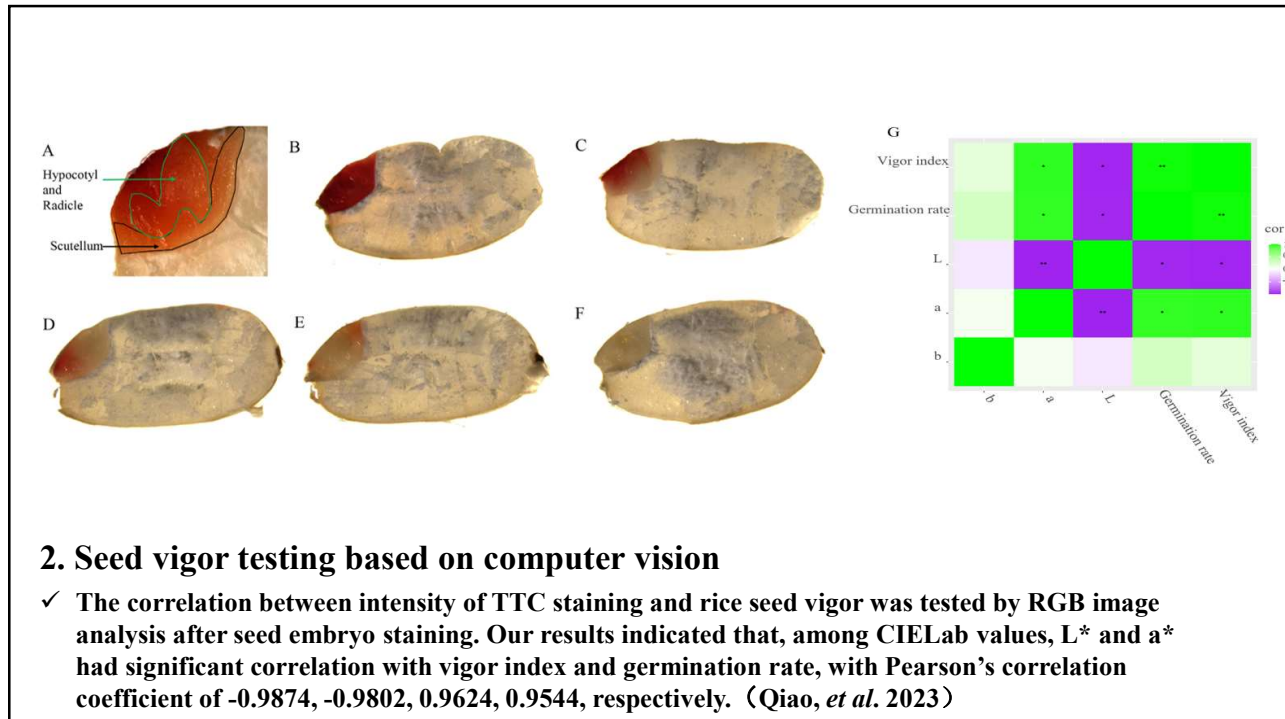


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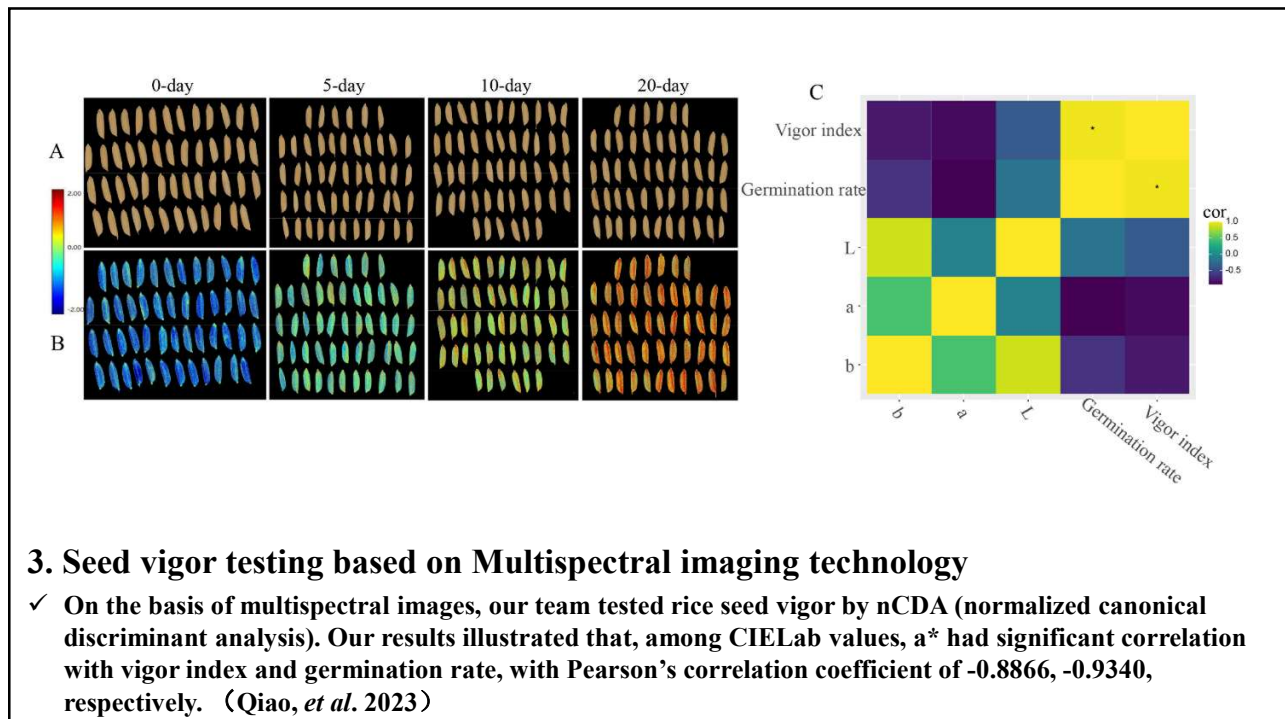
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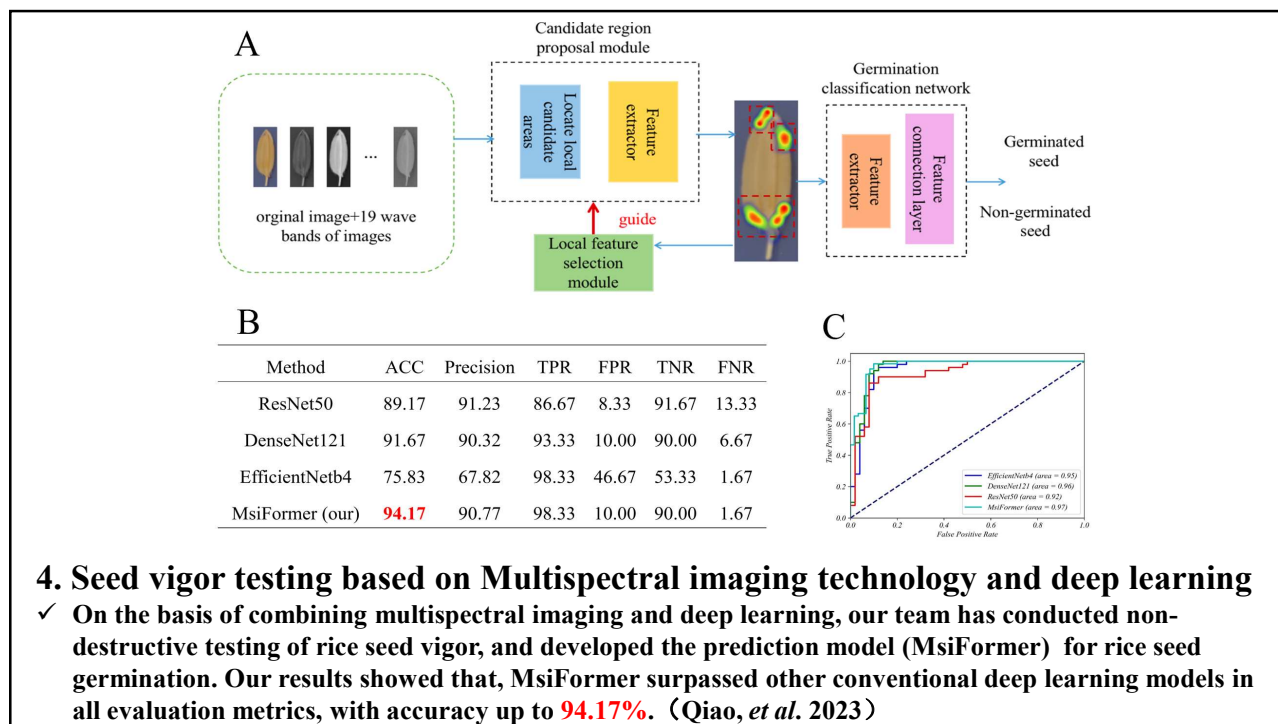
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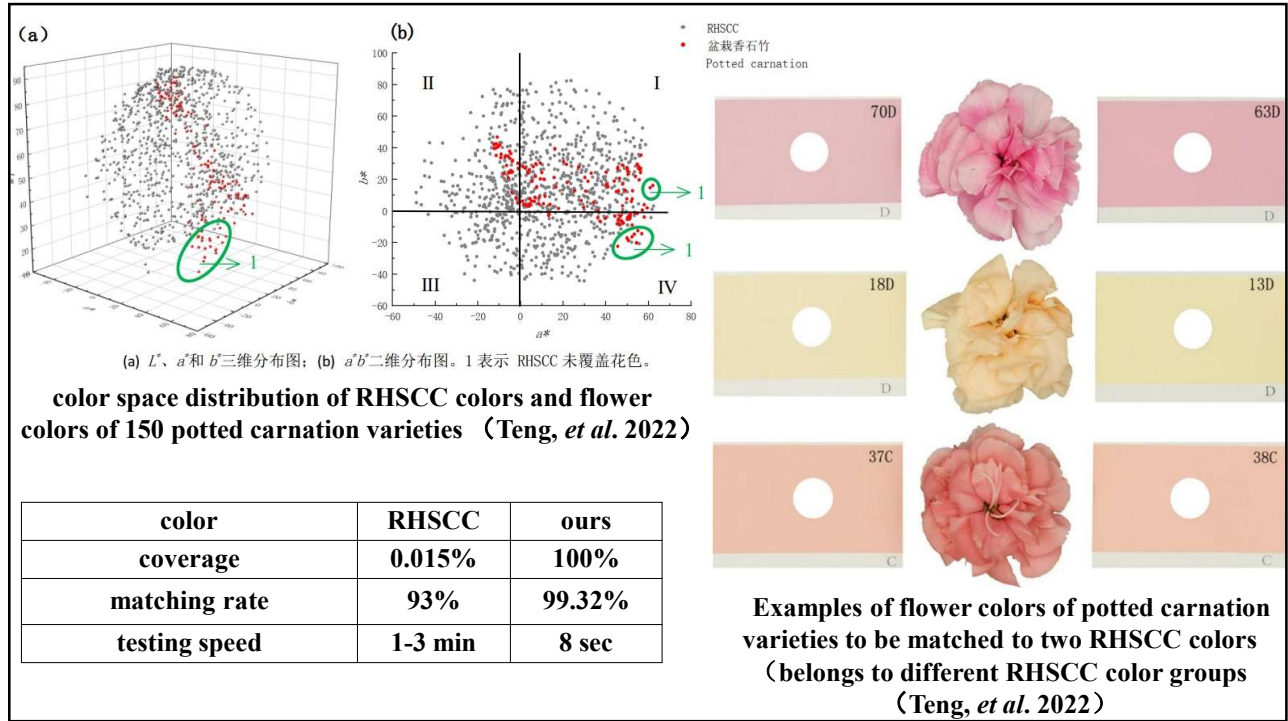


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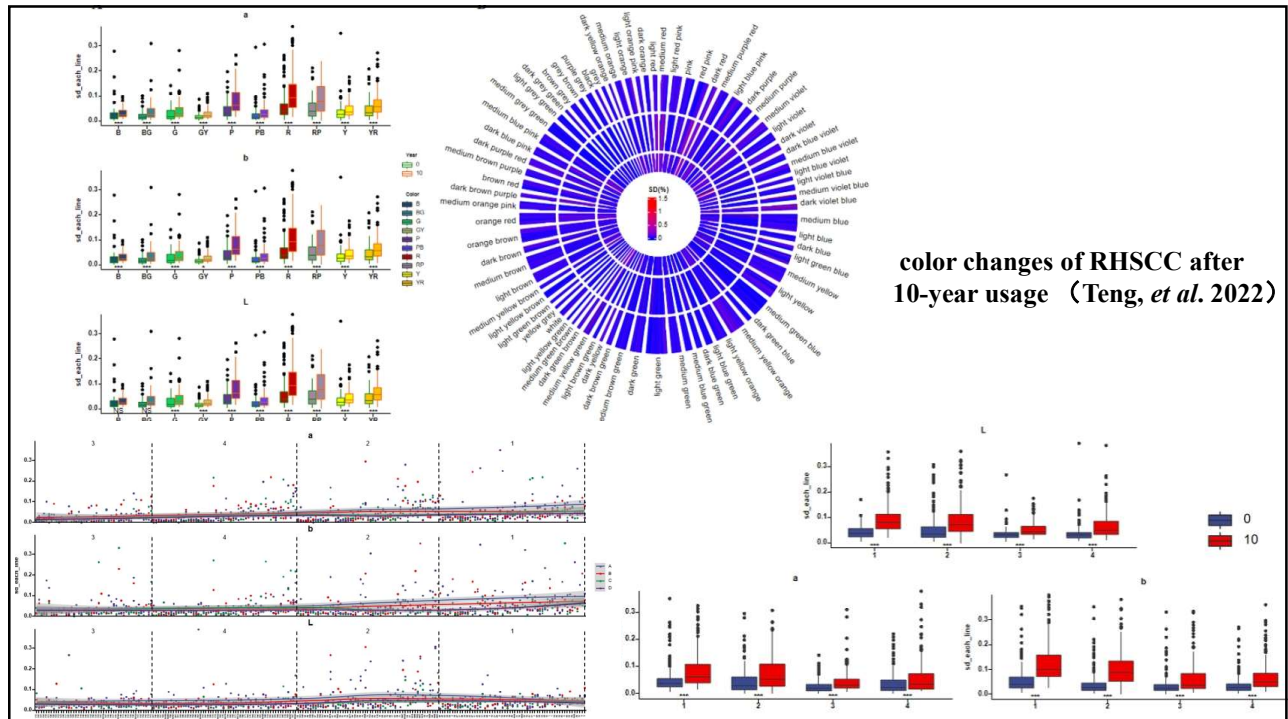
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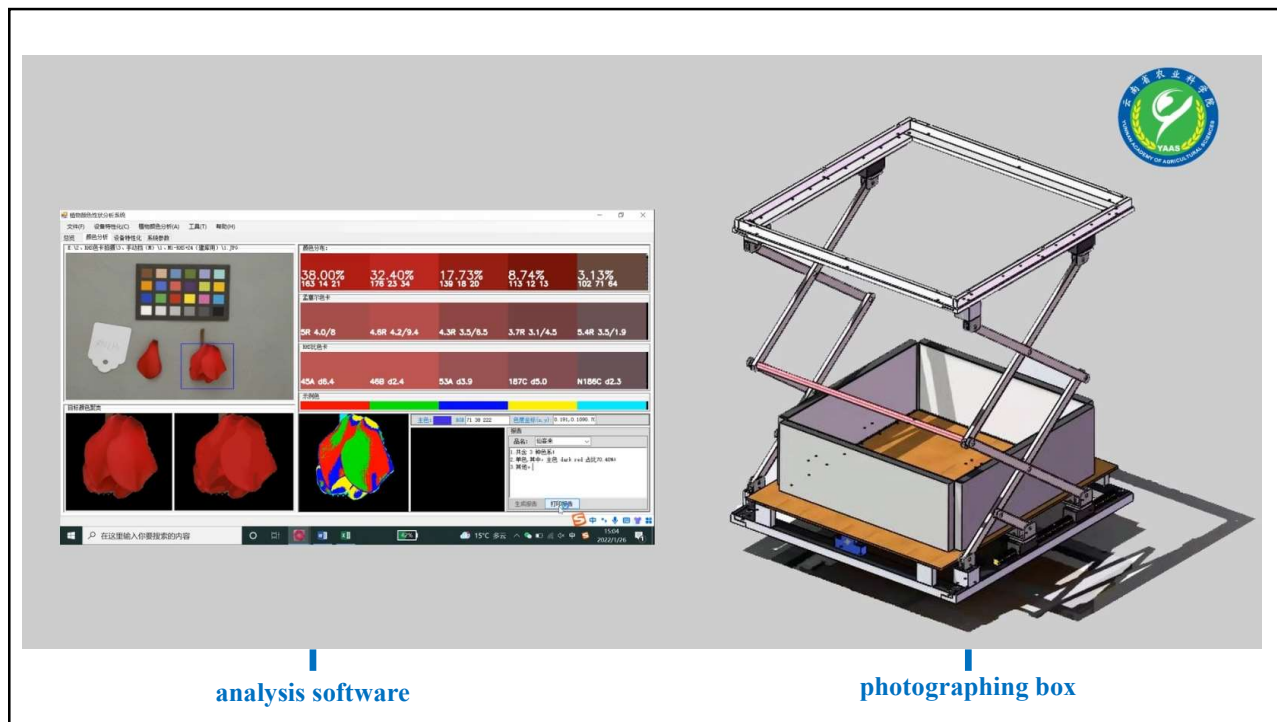
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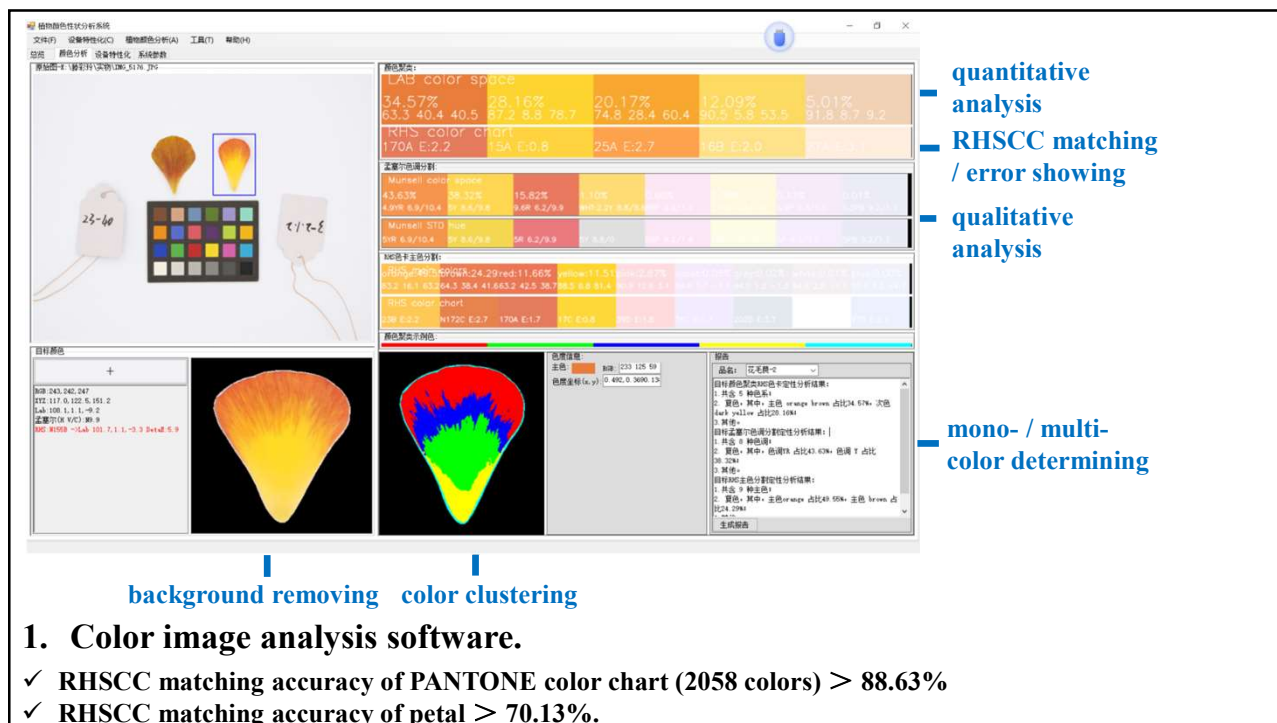
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analysis software

photographing box

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background removing color clustering


1. Color image analysis software.

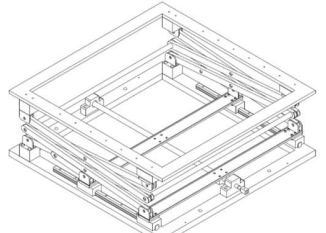
- ✓ RHSCC matching accuracy of PANTONE color chart (2058 colors) > 88.63%
- ✓ RHSCC matching accuracy of petal > 70.13%.

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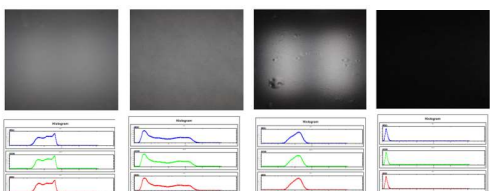


Quick folding storage shooting box (open)

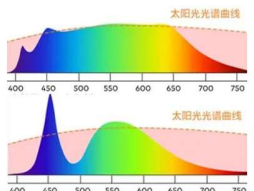




Quick folding storage shooting box (folded)



Imaging effects of different background
(from left to right: gray-PVC, gray-paper, white-PVC, white-paper)



Color rendering of light source
(top: our light source, bottom: ordinary LED light source)

2. Color image acquisition device.
✓ color Ra index > 85, uniformity > 95%.

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lights (D6500): installed on the 4 sides of the bottom.



quick overall storage



height switching (from 20 to 650mm)



portable and movable virtue for field operation



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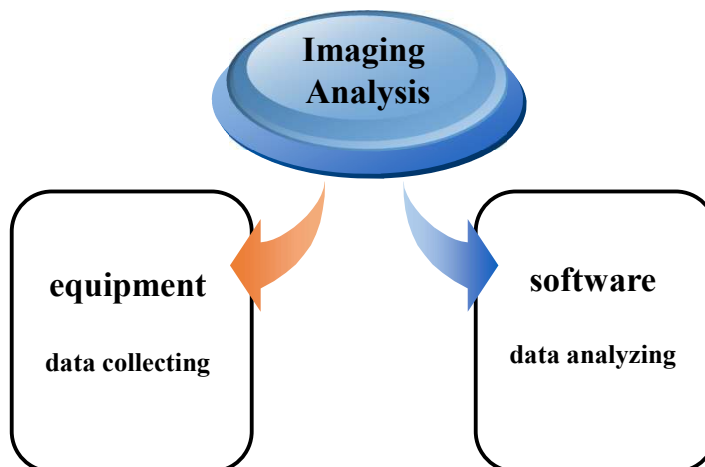


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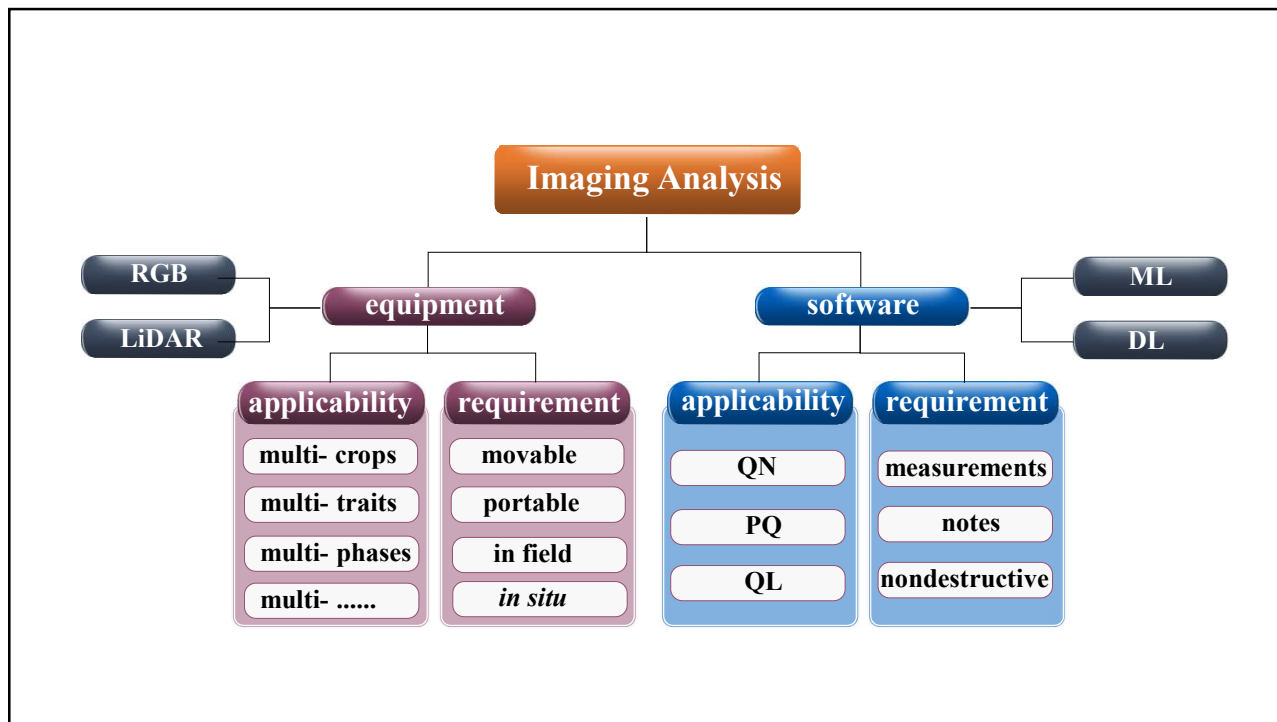


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