

AST-SL02 Root Scanner



I. Instrument Usage:

The root system analysis system is used for professional root system analysis after root washing, and it can also be used for root system phenotypic analysis of plants in root box culture. It can analyze parameters such as root length, diameter, area, volume, and root tip count. It is highly functional, easy to operate, and the software can analyze the morphology and overall structure distribution of plant root systems. It is widely used in root system morphology and structure research.

II. Instrument Principle:

The root system analysis system uses a high-quality graphic scanner to obtain high-resolution color or black-and-white images of plant roots. The scanner is equipped with a dedicated dual-light source illumination system below and on the cover, and a

dual-light source calibration area is reserved on the scanning panel. In addition, it is equipped with different-sized dedicated, high-transparency root placement trays. During scanning, the light sources under the scanning panel and in the upper cover simultaneously scan the root samples in the high-transparency root tray, thus avoiding the influence of shadows and unevenness that may occur during root scanning, effectively ensuring the quality of the obtained images.

This root system analysis software can read TIFF and JPEG standard format images. For the obtained images, using a software that inserts a decryption key to decrypt, the high-quality root system images obtained through scanning are analyzed. Non-statistical methods are used to measure and calculate basic morphological parameters such as the length, diameter, area, volume, and root tips of the overlapping parts of the cross-over roots. Thus, it can meet the needs of researchers for studies on different categories and levels of plant root systems.

III. Technical Specifications:

1. Equipped with a high-resolution 4800×9600 A4 extended dual-light source color scanner. The root system reflection sheet size is 355.6mm×215.9mm, the transparent scanning sheet size is 320.0mm×203.2mm, and the minimum pixel size is 0.005mm×0.0026mm.

2. Analyzable measurements:

- (1) Total root length;
- (2) Branch frequency;

- (3) Average root diameter;
- (4) Median root diameter;
- (5) Maximum diameter;
- (6) Total root area;
- (7) Total projected area;
- (8) Total root volume;
- (9) Root tip count;
- (10) Fork count;
- (11) Overlap count;
- (12) Root diameter grade distribution parameters;
- (13) Can customize non-uniformly spaced segments of diameters, automatically measure the length, projection area, surface area, volume, etc., and their distribution parameters of each diameter segment.
- (14) Can perform color analysis of roots, output the diameters, lengths, projection areas, surface areas, volumes of different colored root systems.
- (15) Can perform topological analysis of roots, automatically determine the connection number, relationship angles, etc., and can independently automatically analyze the length, area, volume, etc. of any segment of the root, and can display and mark the corresponding parameters of any diameter segment of the root system (can customize non-uniformly spaced)
- (16) Can perform root bifurcation trimming, merging, connection, etc. corrections, and the correction operation can be rolled back to quickly obtain 100% correct results.
- (17) Can automatically measure the fractal dimension of the root system using the box



dimension method. Can analyze the number of root nodules and objectively determine the contribution of rhizobacteria.

(18) Batch root system analysis, batch saving, can summarize the overall data and save it in a table, or save the detailed data of each root system.

(19) Extract analysis characteristics of the ground angle and horizontal angle.

(20) Each analysis image, distribution map, result data can be saved and output to an Excel table, and can output analysis marking diagrams.

(21) The instrument has cloud platform support, can save the analysis data to the cloud and view it anytime and anywhere.

(22) Built-in bilingual display in Chinese and English, one-click switch, seamless connection.

IV. Image Capture System Parameters

Scanning element: 6-line alternating micro-lens CCD

Maximum sheet size: A4

Interface type: USB2.0 Optical resolution (dpi): 4800 x 9600 dpi

Maximum resolution: 12800 x 12800 dpi

Minimum pixel size: $\geq 0.005\text{mm} \times 0.0026\text{mm}$

Scanning light source: White cold cathode fluorescent lamp CCFL, Color bit number: 48 bits

Scanning range: 216 x 297mm

Scanning speed: Reflection copy, A4, 300 dpi: Monochrome: 11 seconds, Color: 14

seconds

Film scanning, 35mm, 2400 dpi: Positive film: 47 seconds, Negative film: 44 seconds

V. Other

1. This product requires a computer. It is recommended to select a brand computer (Intel Core i5 with 9th generation or above CPU / 16GB memory / 21.5" color display / wireless network card, 4 or more USB 2.0 ports, operating environment Windows 10 Professional or Ultimate version).
2. An A3-sized dual-lamp color scanner can be optionally equipped. The scanning area for reflected drafts is 305mm × 431.8mm, and the root system scanning area is 304.8mm × 406.4mm.
3. The software is only compatible with Windows 10 and above systems.