

TECHNICAL SPECIFICATION AND EVALUATION MATRIX

Imaging system for physiological and multispectral plant phenotyping

Contracting authority	University of Rostock – Chair of Crop Genetics
Place of delivery	Justus-von-Liebig-Weg 8, 18059 Rostock
Floor / room	[to be completed by the procurement office before publication]
Evaluation model	Quality 85% (max. 340 points) · Price 15% (max. 60 points) · Total max. 400 points

1. Subject Matter and Scientific Purpose of the Procurement

The procurement concerns a compact, non-invasive imaging system for the quantitative physiological and multispectral phenotyping of crop plants. The system will be used in particular to investigate genetic differences in responses to abiotic and biotic stress factors and will be applied directly in the Chair's ongoing projects. The principal areas of focus are drought, heat, salt stress, flooding, frost and combined stress conditions. In particular, high-resolution recording of photosynthetic performance and other physiological traits is required, as is the repeated, non-destructive examination of the same plants during stress and recovery phases.

This specification is formulated in terms of functions and performance. Product names and manufacturers' names do not form part of the requirements. Equivalent systems are permitted, provided that compliance with all mandatory requirements is demonstrated.

2. Minimum Requirements (Mandatory Requirements)

All mandatory requirements are exclusion criteria. They will be assessed solely as "compliant" or "non-compliant/not demonstrated" and will not additionally be awarded points as qualitative added value. Evidence must be provided by means of technical data sheets, meaningful manufacturer documentation or equivalent supporting documents, with the exact reference indicated.

No.	Mandatory requirement
M1	Non-invasive imaging-based physiological plant phenotyping with repeated, non-destructive measurement of the same plants or plant organs.
M2	Imaging measurement of photosynthetic efficiency and chlorophyll fluorescence; PAM and OJIP/Kautsky measurements must be possible using the same device/system.
M3	OJIP curve acquisition at a minimum of 30 frames per second and an image resolution of at least 3.1 MP.
M4	Quantitative determination of at least the parameters F0, Fm, Fv/Fm and Φ_{PSII} .
M5	Colour and multispectral imaging in addition to fluorescence, including at least one NIR channel.
M6	Image resolution of at least 12 MP for measurements of photosynthetic efficiency and for colour and multispectral measurements.
M7	Usable imaging area of at least 50 cm × 50 cm.
M8	One common camera and one common lens for all required imaging measurements, so that the measurement data are acquired in the same spatial reference.
M9	Software-controlled focusing unit.
M10	Standardised lighting conditions, including measuring/saturation light and adjustable actinic light, for reproducible fluorescence measurements.
M11	Control and analysis software for data acquisition, image analysis and data export; the analysis software must be supplied free of charge with the imaging system and without additional mandatory licence fees.
M12	Complete operational solution, including all hardware and software components required for its intended operation.

No.	Mandatory requirement
M13	Installation, commissioning, functional testing and basic user training at the place of delivery.

3. Delivery

Delivery shall be made free to the place of use in accordance with DPU (Incoterms 2020)

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If delivery is not possible, this must be stated in the tender. A collection address must be provided.

4. Payment Terms

The University of Rostock intends to make payment for the delivery, installation and acceptance of the supplies/services. If this is not possible by 30 November 2026, the following payment schedule shall be agreed:

100% following submission of an absolute bank guarantee after award of the contract. The invoice and the corresponding guarantee must be received by the University of Rostock by 30 November 2026.

Payment in accordance with the payment terms is subject to the condition precedent that an absolute, unlimited, irrevocable bank guarantee payable on first demand and without defences is submitted.

The bank guarantee must be issued by a credit institution authorised in the European Union and must cover 100% of the contract value, including VAT.

The guarantee must ensure that the guarantor credit institution is obliged, upon the contracting authority's first written demand, to make payment without delay, waiving the defences of avoidance, set-off, prior action against the principal debtor (Section 771 of the German Civil Code (BGB)) and any other defences arising from the principal obligation, provided that the contracting authority declares that the contractor has failed, in whole or in part, to fulfil its contractual obligations.

The guarantee shall remain valid until proper acceptance of the subject matter of the contract and shall be returned to the contractor following full acceptance, provided that the contracting authority has no outstanding claims.

5. Delay/Contractual Penalty

1. The contractor undertakes to provide the agreed delivery in full and within the agreed time limit.
2. In the event of culpable failure to meet the contractually agreed delivery and installation deadlines, or failure to fulfil other material contractual obligations, a contractual penalty shall become payable.
3. The contractual penalty shall amount to 0.05% of the net contract value for each calendar day of delay, subject to a maximum total of 8% of the net contract value.
4. The contracting authority may assert the contractual penalty up to the date of final payment. No express reservation upon acceptance or receipt of the delivery is required.
5. Any contractual penalty incurred shall be set off against claims for damages by the contracting authority arising from the same breach of duty. Any further claims for damages shall remain unaffected.

6. Tender Evaluation

The tender evaluation shall be conducted in two separate stages. First, the minimum requirements set out in Section 2 will be assessed. Only tenders that comply with, and provide verifiable evidence of compliance with, all mandatory requirements will be evaluated in terms of quality and price.

Admissible tenders will be evaluated on the basis of 85% quality and 15% price. A maximum total of 400 evaluation points may be achieved: 340 quality evaluation points and 60 price evaluation points. The contract will be awarded to the eligible tender achieving the highest total score.

6.1 Evaluation System for the Qualitative Criteria

Objective added-value thresholds carrying 1 to 4 points are defined for each qualitative criterion. If evidence is not provided even for the 1-point threshold, 0 points will be awarded. Mere compliance with a mandatory requirement does not give rise to a quality score. The raw points achieved are multiplied by the respective

weighting factor. The weighting factors total 85; where 4 points are achieved for each criterion, a maximum of 340 quality evaluation points is obtained.

Principle of evidence: Only characteristics substantiated in the tender will be taken into account. Added value that is not demonstrated, or not demonstrated unambiguously, will not be evaluated.

Q1 – Enhanced Chlorophyll Fluorescence and Photosynthesis (Weighting Factor 20)

Points	Objective added-value benchmark
1	OJIP acquisition ≥ 40 frames/s at ≥ 3.1 MP or at least two additional quantitative PSII/photosynthesis parameters beyond F0, Fm, Fv/Fm and Φ PSII.
2	OJIP acquisition ≥ 50 frames/s at ≥ 3.1 MP and at least two additional quantitative parameters; user-adjustable measurement protocols.
3	OJIP acquisition ≥ 60 frames/s at ≥ 3.1 MP and at least four additional quantitative parameters; freely configurable measurement sequences.
4	OJIP acquisition ≥ 60 frames/s at ≥ 5 MP and at least six additional quantitative parameters; freely configurable, automatable measurement sequences, including time series.

Q2 – Additional Multispectral and Pigment-Related Imaging (Weighting Factor 15)

Points	Objective added-value benchmark
1	In addition to the mandatory NIR channel, at least one further defined spectral channel or pigment-related index is demonstrated.
2	In addition, at least two further spectral channels/indices, including Red Edge, are demonstrated.
3	In addition, Red Edge and at least three further visible or pigment-related channels/indices are demonstrated; joint data export is possible.
4	In addition, Red Edge and at least four further channels/indices are demonstrated; fluorescence, colour and spectral data can be spatially registered automatically and evaluated jointly.

Q3 – Image Quality and Measurement Range Above the Minimum Level (Weighting Factor 10)

Points	Objective added-value benchmark
1	Resolution ≥ 14 MP or usable imaging area ≥ 55 cm $\times$ 55 cm.
2	Resolution ≥ 14 MP and usable imaging area ≥ 55 cm $\times$ 55 cm.
3	Resolution ≥ 16 MP and usable imaging area ≥ 60 cm $\times$ 60 cm; leaves and whole plants can be measured without changing the camera/lens.
4	Resolution ≥ 20 MP and usable imaging area ≥ 60 cm $\times$ 60 cm; additionally, documented geometric calibration or pixel-accurate registration of all imaging modalities.

Q4 – Illumination and Experimental Flexibility (Weighting Factor 10)

Points	Objective added-value benchmark
1	Adjustable actinic light at a minimum of two wavelengths.
2	Adjustable actinic light at a minimum of three wavelengths.
3	Adjustable actinic light at a minimum of three wavelengths, including far-red; intensities adjustable by the user.
4	Adjustable actinic light at a minimum of four wavelengths, including far-red; intensities and timed light sequences freely programmable and recordable.

Q5 – Space Requirements and Infrastructure Requirements (Weighting Factor 15)

Points	Objective added-value benchmark
1	The operational configuration requires no more than 6 m ² of floor space; no structural modifications are required.

Points	Objective added-value benchmark
2	The operational configuration requires no more than 3 m ² of floor space and no more than one external functional module; no structural modifications are required.
3	The operational configuration requires no more than 2 m ² of floor space and no permanently installed transport or irrigation infrastructure.
4	The operational configuration requires no more than 1.5 m ² of floor space and operates without external conveying, irrigation or permanently installed ancillary infrastructure.

Q6 – Enhanced Software, Raw-Data and Analysis Functions (Weighting Factor 10)

Points	Objective added-value benchmark
1	In addition to the free-of-charge analysis software: adjustable measurement protocols and export of quantitative results in at least one open format.
2	Additionally: access to raw data, batch processing and export in at least two open formats.
3	Additionally: automated batch or time-series analysis and joint evaluation of multiple imaging channels.
4	Additionally: freely configurable protocols, automated batch and time-series analysis, access to raw data, joint multimodal analysis and a documented application programming interface or scriptable export workflow.

Q7 – Additional Training, Pilot and Support Services (Weighting Factor 5)

Points	Objective added-value benchmark
1	At least one additional on-site training day beyond the basic instruction; technical support channel specified.
2	At least two additional training days; software and analysis workflow covered; technical support channel specified.
3	At least two additional training days, including a supervised pilot experiment; maintenance/service options specified.
4	At least three additional training days, including a supervised pilot experiment; software/analysis workflow, technical support channel, response times and maintenance/service options specified on a binding basis.

6.2 Quality Evaluation Matrix

The “Rationale/Reference” column shall be completed exclusively by the procurement office/contracting authority as part of the tender evaluation.

No.	Qualitative criterion	Points / 0–4	Weighting / factor	Weighted / points	Rationale/reference / (contracting authority only)
Q1	Enhanced chlorophyll fluorescence and photosynthesis		20		
Q2	Additional multispectral and pigment-related imaging		15		
Q3	Image quality and measurement range above the minimum level		10		
Q4	Illumination and experimental flexibility		10		
Q5	Space requirements and infrastructure requirements		15		
Q6	Enhanced software, raw-data and analysis functions		10		
Q7	Additional training, pilot and support services		5		
	Total quality		85	max. 340	

Weighted quality evaluation points per criterion = raw points awarded (0–4) × weighting factor.

6.3 Price Evaluation

No maximum budget is assumed for the price evaluation. The evaluation shall be based exclusively on the actual eligible total tender prices for the fully functional configuration, including all ancillary services relevant to the price.

Price evaluation points = $60 \times (P_{\text{lowest}} / P_i)$

P_{lowest} denotes the lowest eligible total tender price and P_i denotes the eligible total tender price of the tender being evaluated. The lowest-priced eligible tender receives 60 points. All other tenders receive proportionally fewer points.

Tender	Eligible total tender price, net	Calculation	Price points (max. 60)
Lowest-priced eligible tender	P_{lowest}	$60 \times P_{\text{lowest}} / P_{\text{lowest}}$	60.00
Tender i being evaluated	P_i	$60 \times P_{\text{lowest}} / P_i$	[Result]

6.4 Overall Evaluation

Overall evaluation points = sum of the weighted quality evaluation points + price evaluation points. In the event of a tie, the ranking rule stipulated in advance in the procurement documents shall apply.

Evaluation area	Weighting	Maximum points	Points achieved
Quality	85%	340	
Price	15%	60	
Total	100%	400	