



ISTITUTO AGRARIO  
DI SAN MICHELE ALL'ADIGE

- 38010 San Michele all'Adige (TN), Via E. Mach 1- Tel. 0461/615111 Fax 0461/615218  
- [www.fondazioneedmundmach.it](http://www.fondazioneedmundmach.it) -

listed in the provincial register of private legal entities under no. 231 - VAT no. 02038410227 -

**OPEN TENDER PROCEDURE FOR THE EXECUTIVE DESIGN, SUPPLY,  
INSTALLATION AND COMMISSIONING OF AN AUTOMATED CONTROLLED-  
CONDITION PLANT PHENOTYPING SYSTEM**

**CUP C49H18000000001**



*Investiamo nel vostro futuro*

**BID ASSESSMENT PARAMETERS AND CRITERIA**

**TABLE OF CONTENT**

PREMESSE .....	2
1. OFFERTA TECNICA.....	4
2. CRITERI E SOTTOCRITERI DI VALUTAZIONE DELLE OFFERTE TECNICHE.....	5
3. MODALITÀ DI ATTRIBUZIONE DEL PUNTEGGIO TECNICO.....	14
4. MODALITÀ DI ATTRIBUZIONE DEL PUNTEGGIO ECONOMICO E TOTALE.....	x

[A1]



## FOREWORD

This document, which is appended to the call for tenders of which it constitutes an integral and substantial part, describes the procedures to be followed when submitting the technical proposal, the criteria for the technical evaluation of bids, the corresponding sub-criteria, the motivational criteria, the weights and sub-weights required by the Evaluation Board for the assessment of the technical proposals for the above tender procedure. It also describes the methods used to allocate the technical, economic and overall scores.

The tender is awarded using the **criterion of the most economically advantageous bid, identified on the basis of the best value for money**, pursuant to articles 16 and 17 of Provincial Law 2/2016 and article 95 of Italian Legislative Decree 50/2016.

The highest awardable score is **100** points, broken down as follows:

- a) **Technical proposal up to 70 points.**
- b) **Economic proposal up to 30 points.**

More specifically, the criteria for the technical assessment of the proposals, the corresponding sub-criteria, the motivational criteria, the weights and sub-weights can be summarised as follows:

TECHNICAL PROPOSAL		
<b>A</b>	<b>INTEGRATED PHENOTYPING SYSTEM</b>	<b>70</b>
<b>A.1</b>	<b>GROWTH CHAMBER PERFORMANCE</b>	<b>11</b>
A.1.1	Lighting quality and control	2
A.1.2	Relative humidity control	2
A.1.3	Temperature control	2
A.1.4	Combined environmental control	3
A.1.5	Performance of the air diffusion system	2
<b>A.2</b>	<b>PERFORMANCE OF THE AUTOMATED PLANT TRANSPORTATION SYSTEM</b>	<b>4</b>
A.2.1	Maximum throughput, movement flexibility, maximum level of vibration	2
A.2.4	Sturdiness and need for maintenance	2
<b>A.3</b>	<b>PERFORMANCE OF THE AUTOMATED IRRIGATION AND WEIGHING SYSTEM</b>	<b>6</b>
A.3.1	Irrigation system flexibility for different pot formats/tray sizes; maximum volume, minimum volume, irrigation precision and accuracy	3
A.3.2	Type of weighing system, maximum throughput, weighing precision and accuracy	3
<b>A.4</b>	<b>CHARACTERISTICS OF THE VISIBLE LIGHT (RGB)</b>	<b>6</b>



	<b>MEASUREMENT MODULE</b>	
A.4.1	3D canopy reconstruction system	3
A.4.2	Characteristics of the imaging system	3
<b>A.5</b>	<b>FUNCTION EXTENDIBILITY (KINETIC CHLOROPHYLL FLUORESCENCE IMAGING, HYPERSPECTRAL IMAGING)</b>	<b>13</b>
A.5.1	Lighting quality in the supplementary modules	1
A.5.2	Arrangement for and ease of full integration of supplementary sensors in the phenotyping system	3
A.5.3	PAM fluorometer and corresponding lighting sources for kinetic chlorophyll fluorescence imaging	7
A.5.4	Environmental uniformity in the measurement booths	2
<b>A.6</b>	<b>DATA ACQUISITION AND STORAGE SYSTEM</b>	<b>4</b>
A.6.1	Level of system and data integration	2
A.6.2	System user-friendliness and flexibility	2
<b>A.7</b>	<b>DATA ANALYSIS SOFTWARE</b>	<b>9</b>
A.7.1	Completeness and versatility	3
A.7.2	Analysis system automation	3
A.7.3	User-friendliness and documentation	3
<b>B.1</b>	<b>EXTENT OF USE IN THE SCIENTIFIC FIELD</b>	<b>2</b>
B.1.1	Number and quality of publications in sector journals obtained with the use of similar systems	2
<b>C.1</b>	<b>SYSTEM INSTALLATION SUPPORT, STAFF TRAINING, AFTER-SALES ASSISTANCE, WARRANTIES AND DELIVERY TIMES</b>	<b>15</b>
C.1.1	Schedule for the phenotyping system installation and start-up phase	3
C.1.2	FEM staff training programme	3
C.1.3	Technical assistance, servicing and maintenance	3
C.1.4	Extension of full-risk warranty beyond 24 months	2
C.1.5	Contract execution timeframe	4
<b>TOTAL TECHNICAL PROPOSAL SCORE</b>		<b>70</b>



## 1. TECHNICAL PROPOSAL

ENVELOPE B “Technical proposal” must be prepared as described below and include the following documents:

- a) **A DENOMINATED "PROJECT LAYOUT" DOCUMENT: CONTAINING THE REPRESENTATION, EVEN GRAPHIC, AND COMPLETE WITH PLANT ENGINEERING, OF THE EXECUTIVE DESIGN OF THE SUPPLY, ACCORDING TO THE CHARACTERISTICS OF THE PROPOSED PHENOTYPYTER AND GROWTH CHAMBER, INCLUDING QUOTAS, MEASURES , CONNECTIONS AND ANY OTHER NECESSARY PARTS AND DETAILS FOR THE PRODUCTION AND INSTALLATION OF THE WHOLE FURNITURE;**
- b) **A “TECHNICAL SPECIFICATIONS” DOCUMENT CONTAINING A TECHNICAL REPORT PROVIDING A DESCRIPTION OF THE PROPOSED SOLUTION ABLE TO PROVIDE EVIDENCE THAT IT POSSESSES THE MINIMUM TECHNICAL CHARACTERISTICS REQUIRED.** More specifically, this report and any appended documentation, (technical files, declarations of conformity, etc.) must allow the Evaluation Board to perform a systematic, quantitative verification of the minimum technical characteristics indicated in the tender specifications - PART II – TECHNICAL SPECIFICATIONS and should preferably be submitted on A4 paper using Arial 12 characters with single-line spacing, on a total of no more than 50 sides.
- c) **AN “AMELIORATIVE TECHNICAL SPECIFICATIONS” DOCUMENT CONTAINING A TECHNICAL REPORT ILLUSTRATING ALL THE CRITERIA AND SUB-CRITERIA USED TO ASSESS THE TECHNICAL PROPOSALS** containing, for each one, the information indicated in paragraph 2 (“N.B.” section) and any information deemed necessary for a better understanding and appreciation of the bid by the Evaluation Board as indicated in this document. More specifically, this technical report must be broken down into separate chapters/ paragraphs corresponding to the criteria and sub-criteria used for the technical assessment of the bids (A - A.1, A1.1., A.1.2, A1.3, A.1.4, A.2, A.2.1, etc.) and should preferably be submitted on A4 sheets using Arial 12 characters and single-line spacing, on a total of no more than 50 sides.
- d) **A COPY OF ALL THE DOCUMENTATION COMPRISING THE TECHNICAL PROPOSAL IN ELECTRONIC FORM ON AN UNMODIFIABLE STORAGE DEVICE (CD-ROM OR DVD).**

### **N.B.:**

1. The technical, organisational and managerial characteristics described in the tender specifications constitute binding and mandatory conditions. Bidders whose technical proposals do not meet the minimum requirements will be disqualified. The commitments taken on with the documentation constituting the technical proposal will also constitute contractual obligations in compliance with the description provided in the tender specifications, whose content constitute mandatory minimum characteristics.
2. The technical proposal is constituted by the documents indicated above, i.e. the “technical specifications” and the “ameliorative technical specifications”. These documents must be signed by the company’s legal representative or an individual vested with the powers required to validly commit it (in the case of joint bids, they must be signed by the legal representatives of all participating companies or the individuals vested with the powers required to validly commit them). Any appended documents must also be signed by the company’s legal representative or an individual vested with the powers required to validly commit it (again, in the case of joint bids, they must be signed by the legal representatives of all participating companies or the individuals vested with the powers required to validly commit them).



3. Bidders are asked to submit all of the documentation constituting the technical proposal as electronic files (letter C) in order to facilitate the Evaluation Board's consultation of the technical proposal, as certain preliminary investigation tasks may be delegated to one or more Board members.
4. Failure to submit the required documentation and declarations will make it impossible for the Evaluation Board to perform the necessary assessment. In this case, without prejudice to the need to verify compliance with the minimum technical characteristics required, in the absence of which the bidder will be disqualified, the Evaluation Board will assign an assessment coefficient of zero (i.e. a score of zero) to any criteria for which the assessment documents have been omitted. The Board shall be entitled to request supplementary information or clarifications (including in the form of a practical demonstration of the equipment on the bidder's premises), provided they do not constitute a substantial additions to the proposal.
5. Failure to submit the technical proposal shall lead to the bidder's disqualification from the tender procedure.
6. On pain of disqualification, the technical proposal must not include any direct or indirect reference to the economic aspects of the submitted proposal;
7. Duplicate bids (with alternative proposals) or conditioned bids are not deemed to be valid and shall therefore be excluded.

## 2. CRITERIA AND SUB-CRITERIA FOR THE EVALUATION OF TECHNICAL PROPOSALS

Technical proposals may be attributed a maximum of **70 points**, broken down as follows:

### A. Article 1 - INTEGRATED PHENOTYPING SYSTEM

For this criterion, the Evaluation Board may allocate a **maximum of 70 points**, broken down as indicated below:

#### A.1 - GROWTH CHAMBER

For this criterion, the Evaluation Board may allocate a **maximum of 11 points**, broken down as indicated below:

##### A.1.1 – Lighting quality and control

**up to 2 points**

The Evaluation Board will award a score of up to 2 (two) points to bids in which the lighting system exceeds the minimum requirement ( $250 \mu\text{M m}^{-2} \text{s}^{-2}$ ) indicated in the tender specifications. Lighting control ranges with values declared by the bidder that are greater (but include the minimum range) and that satisfy the above specifications will be awarded higher scores. A detailed technical description of how the values were obtained (procedure, tool used, number and location of measurement points, etc.) must also be provided.

#### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.1.1)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the type of light source and spectrum, the maximum light intensity for each type of LED and the total maximum light intensity, the accuracy and homogeneity of the lighting in points that are representative of the entire growth area, the type of programmes (maximum number of steps, minimum lighting range per step, possibility of continuous variation), whether it can be programmed with dynamic light patterns and the procedures used for the determination as specified in the tender specifications.



### **A.1.2 - Relative humidity control**

**up to 2 points**

When scoring this criterion, the Evaluation Board will consider as the minimum requirement, at full capacity with plants 130 cm tall, the constant maintenance of relative humidity (RH) values set by the user within a minimum range of 50% - 70%, with a maximum tolerated variation of +/- 5% of the value set. Relative humidity (RH) control ranges with values declared by the bidder that are greater (but include the minimum range) and that satisfy the above specifications will be awarded higher scores. A detailed technical description of how the values were obtained (procedure, tool used, number and location of measurement points, etc.) must also be provided.

#### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.1.2)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the guaranteed maintenance RH range, accuracy and homogeneity in points that are representative of the whole growth area, the type of programmes (maximum number of steps, minimum RH range per step, possibility of continuous variation), and the procedures used for the determination (procedure, tool used, number and location of measurement points, etc.) as specified in the tender specifications.

### **A.1.3 - Temperature control**

**up to 2 points**

When scoring this criterion, the Evaluation Board will consider as the minimum requirement, at full capacity with plants 130 cm tall, the constant maintenance of temperature values set by the user within a minimum range of 18°C - 30°C, with a maximum tolerated variation of +/- 5% of the value set. Temperature control ranges with values declared by the bidder that are greater (but include the minimum range) and that satisfy the above specifications will be awarded higher scores. A detailed technical description of how the values were obtained (procedure, tool used, number and location of measurement points, etc.) must also be provided.

#### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.1.3)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the guaranteed maintenance temperature range, accuracy and homogeneity in points that are representative of the whole growth area, the type of programmes (maximum number of steps, minimum RH range per step, possibility of continuous variation), and the procedures used for the determination (procedure, tool used, number and location of measurement points, etc.) as specified in the tender specifications.

### **A.1.4 – Combined environmental control**

**up to 3 points**

When rating this criterion, the Evaluation Board will consider as an ameliorative characteristic, and therefore deserving the score, at full capacity with plants 130 cm tall, the constant maintenance of temperature and humidity values (in any case not exceeding +/-5%) also in the four possible extreme value combinations: Constant temperature with variations in RH and lighting (i.e.: (1) RH=min and



I=min; (2) RH=min and I=max; (3) RH=max and I=min; (4) RH=max and I=max;) and constant humidity in the four possible extreme value combinations for temperature and lighting (i.e.: (1) T=min and I=min; (2) T=min and I=max; (3) T=max and I=min; (4) T=max and I=max;)

**N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.1.3)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the measured temperature and humidity variations in the various extreme combinations indicated above, accuracy and homogeneity in points that are representative of the whole growth area, and the procedures used for the determination (procedure, tool used, number and location of measurement points, etc.) as specified in the tender specifications.

**A.1.4 - Performance of the air diffusion system**

**up to 2 points**

When rating this criterion, the Evaluation Board will consider the values that describe the degree of air flow homogeneity and the air speed range in points that are representative of the entire growth area, and the score will be awarded by Board members according to the values declared by the bidder, favouring greater homogeneity and a more limited speed range. A detailed technical description of how these values were obtained (procedure, tool used, number and location of measurement points, etc.) must also be provided.

**N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.1.4)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the guaranteed maintenance air flow range, accuracy and homogeneity in points that are representative of the whole growth area, the type of programme (maximum number of steps, minimum flow range per step, possibility of continuous variation), and the procedures used for the determination (procedure, tool used, number and location of measurement points, etc.) as specified in the tender specifications.

**A.2 – PERFORMANCE OF THE AUTOMATED PLANT TRANSPORTATION SYSTEM**

For this criterion, the Evaluation Board may allocate a **maximum of 4 points**, broken down as indicated below:

**A.2.1 - Maximum throughput, movement flexibility, maximum level of vibration**

**up to 2 points**

When rating this criterion, the Evaluation Board will allocate a higher score to the automatic plant transportation system with the best combination of maximum throughput, flexibility in the movement of plants and pots of different sizes and weights and maximum level of vibration, favouring systems with the greatest maximum throughput, the greatest range of pot types (in terms of weight and size) compatible with the system and the lowest level of vibrations/shocks the plants are subject to during movement. A detailed technical description of how these values were obtained for the magnitudes indicated (procedure, tool used, number and location of measurement points, etc.) must also be provided.





**N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.2.1)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the maximum throughput, the pot types and sizes, the mean and maximum accelerations the plants are subject to during movement, and the procedures used for the determination (procedure, tool used, number and location of measurement points, etc.) as specified in the tender specifications.

**A.2.2 – Sturdiness and need for maintenance**

**up to 2 points**

When rating this criterion, the Evaluation Board will award a higher score to the automated plant transportation system that presents the greatest sturdiness and needs the least maintenance. A detailed list of the transportation system parts requiring routine maintenance, the number of each type of part requiring maintenance at each intervention, the frequency of maintenance and the cost over time of the different types of maintenance must be submitted.

**N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.2.2)**

For the scoring of this criterion, the bidder must submit a detailed list of the transportation system parts requiring routine maintenance, the number of each type of part requiring maintenance at each intervention, the frequency of maintenance and the cost over time of the different types of maintenance.

**A.3 – PERFORMANCE OF THE AUTOMATED IRRIGATION AND WEIGHING SYSTEM**

For this criterion, the Evaluation Board may allocate a **maximum of 6 points**, broken down as indicated below:

**A.3.1 – Irrigation system flexibility in terms of different pot formats/plant sizes; maximum volume, minimum volume, irrigation precision and accuracy.**

**up to 3 points**

When rating this criterion, the Evaluation Board will award a higher score to the automated plant irrigation system presenting the best combination of flexibility in the irrigation of plants and pots of different sizes and weights, the maximum and minimum irrigation volume and irrigation precision and accuracy, favouring those systems with the greatest range of pot types (weights and sizes) compatible with the system, the highest maximum volume and the lowest minimum volume and the greatest irrigation precision and accuracy. A detailed technical description of how these values were obtained for the magnitudes indicated (procedure, tool used, number and location of measurement points, etc.) must also be provided.

**N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.3.1)**





For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the pot types and sizes, the maximum volume that can be dispensed by the system per unit of time, the minimum volume, irrigation precision and accuracy, and the procedures used for the determination (procedure, tool used, number and location of measurement points, etc.) as specified in the tender specifications.

### **A.3.2 – Type of weighing system, maximum throughput, weighing precision and accuracy**

**up to 3 points**

When rating this criterion, the Evaluation Board will award a higher score to the automated plant+pot weighing system with the best weighing system and the greatest weighing capacity, precision and accuracy, thereby favouring systems with at least two scales, the highest capacity, and the best weighing precision and accuracy. A detailed technical description of how these values were obtained for the magnitudes indicated (procedure, tool used, number and location of measurement points, etc.) must also be provided.

#### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.3.2)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the number and types of scales, the maximum capacity of each scale, the weighing precision and accuracy at (1) maximum capacity, (2) at 10 g and (3) at 6 kg, and the procedures used for the determination, as specified in the tender specifications.

### **A.4 – CHARACTERISTICS OF THE VISIBLE LIGHT (RGB) MEASUREMENT MODULE**

For this criterion, the Evaluation Board may allocate **a maximum of 6 points**, broken down as indicated below:

#### **A.4.1 – 3D canopy reconstruction system**

**up to 3 points**

When rating this criterion, the Evaluation Board will award a higher score to the automated 3D canopy reconstruction system with the best acquisition system, favouring systems with two RGB chambers built into a plant rotation system that permits the acquisition from any number of lateral views over systems with 3 fixed acquisition chambers. A detailed description of the system (number of chambers, presence/absence of rotation systems, minimum angle of rotation between two acquisitions) must also be provided.

#### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.4.1)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the number and types of



chambers, the presence/absence of rotation systems, the minimum angle of rotation between two acquisitions, and the procedures used for the determination as specified in the tender specifications.

#### **A.4.2 – Imaging system characteristics**

**up to 3 points**

When rating this criterion, the Evaluation Board will award a higher score to the lighting system with the highest camera resolution and greatest measurement range (surface measured, focal distance range) with plants of 0 cm (e.g. rosette plants such as *Arabidopsis thaliana*) and of 130 cm (e.g. arboreal species such as vines, apple trees and the like). A detailed description of the surface area values measured with the two types of plant and the optimum focal range and the procedures used for the determination (procedure, tool used, number and location of measurement points, etc.), as specified in the tender specifications, must also be provided.

#### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.4.3)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the measurement surface area and the optimum focal range for the imaging analysis with both types of plant, and the procedures used for the determination (procedure, equipment used, number and location of measurement points, etc.) as specified in the tender specifications.

#### **A.5 – FUNCTION EXTENDIBILITY (KINETIC CHLOROPHYLL FLUORESCENCE IMAGING, HYPERSPECTRAL IMAGING)**

For this criterion, the Evaluation Board may award a **maximum of 13 points**, broken down as indicated below:

##### **A.5.1 – Lighting quality in the supplementary modules**

**up to 1 point**

When rating this criterion, the Evaluation Board will award a higher score to the system with the best lighting quality in the two supplementary modules without fluorimeters destined for function extension through integration of fluorimeters for kinetic chlorophyll fluorescence and hyperspectral imaging, favouring systems with greater lighting intensities that exceed the minimum specifications. A detailed technical description of the system (procedure, tool used, number and location of measurement points, etc.) must also be provided.



**N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.5.1)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the lighting characteristics for each of the two boxes in terms of spectral composition and lighting intensity at the height of the rosette of the shorter plants (0 cm) and the foliage of the taller plants (130 cm), and the procedures used for the determination as described in the tender specifications.

**A.5.2 – Arrangement for and ease of full integration of supplementary sensors in the phenotyping system**

**up to 3 points**

When rating this criterion, the Evaluation Board will award higher scores to the systems with the best arrangement for and ease of complete integration (hardware and software, preferably of the “ready-to-plug” kind without supplementary costs) in the phenotyping system of hyperspectral and kinetic chlorophyll fluorescence fluorometers (not necessarily supplied by the bidder). A detailed description of the degree/conditions of integrability of both the software and the hardware (1) of the hyperspectral and kinetic chlorophyll fluorescence fluorometers of the bidder (not necessarily provided by the bidder), (2) of generic hyperspectral and kinetic chlorophyll fluorescence fluorometers of other bidders must also be provided.

**N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.5.2)**

For the rating of this criterion, the bidder must specify, for the equipment proposed, in the required or similar form and providing appropriate supporting documentation, (1) whether it is possible to integrate into the hardware and software of the phenotyper fluorometers supplied by the same bidder, specifying the corresponding timeframes and economic conditions; (2) whether it is possible to integrate into the hardware and software of the phenotyper fluorometers supplied by companies other than the bidder, specifying the corresponding time frames as well as clarifying in detail to what extent the proposed equipment, in the required or similar form (and in particular fluorometer-less modules for the extension of kinetic chlorophyll fluorescence and hyperspectral imaging functions) is currently removed from the ideal “ready-to-plug” condition that could be achieved without additional costs by system users, with the remote support of the bidder’s staff.

**A.5.3 – PAM fluorometer and corresponding lighting sources for kinetic chlorophyll fluorescence imaging**

**up to 7 points**

When rating this criterion, the Evaluation Board will award higher scores to the kinetic chlorophyll fluorescence imaging systems with the best technical characteristics in terms of (1) fluorescence chamber resolution; (2) measurement surface area (3) intensity of the saturating light impulse; (4) actinic light intensity; (5) frequency and wavelength of the pulsed flashes used to measure  $F_o'$ . The Board will give greater importance to the first two criteria (fluorescence chamber resolution and measurement surface area).



### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.5.3)**

For the rating of this criterion, the bidder must specify, for the equipment proposed, in the required or similar form and providing appropriate supporting documentation, the fluorescence chamber resolution and the effective measurement surface area for the imaging analyses with each of the two types of plant (plants with a height of 0 cm, e.g. rosette plants such as *Arabidopsis thaliana* and those with a height of 130 cm, e.g. arboreal species such as vines or apple trees and the like) and the procedures used for the determination as described in the tender specifications.

#### **A.5.4 - Environmental uniformity in the measurement booths**

**up to 2 points**

When rating this criterion, the Evaluation Board will award a higher score to the system that guarantees the measurement booth conditions most similar to those used for plant growth. A detailed technical description of the humidity and temperature values for each series reading (procedure, tool used, number and location of measurement points, etc.) must also be provided.

### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.4.2)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the temperature and humidity deviation during the continuous reading measurements of a complete set of plants (at maximum growth area capacity, for plants with a height of 130 cm), and the procedures used for the determination (procedure, tool used, number and location of measurement points, etc.) as specified in the tender specifications.

#### **A.6 - DATA ACQUISITION AND STORAGE SYSTEM**

For this criterion, the Evaluation Board may allocate **a maximum of 4 points**, broken down as indicated below:

##### **A.6.1 – Level of system and data integration**

**up to 2 points**

When rating this criterion, the Evaluation Board will award a higher score to the system with the best level of data system integration on the basis of the specifications provided by the bidder, in particular with any kinetic chlorophyll fluorescence module. A detailed description of the above must also be provided.

### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.6.1)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the level of system and data integration, using appropriate flow diagrams.



## A.6.2 – System user-friendliness and flexibility

up to 2 points

When rating this criterion, the Evaluation Board will award higher scores to the phenotyping systems with the greatest user-friendliness and flexibility in terms of hardware and setting control and experiment and protocol management. A detailed description of the above must also be provided.

### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.6.2)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the system characteristics with regard to hardware and setting control and experiment and protocol management.

## A.7 - DATA ANALYSIS SOFTWARE

For this criterion, the Evaluation Board may allocate a **maximum of 9 points**, broken down as indicated below:

### A.7.1 – Completeness and versatility

up to 3 points

When rating this criterion, the Evaluation Board will award a higher score to the system with the most complete and versatile analysis software for the visible light, hyperspectral and kinetic chlorophyll fluorescence imaging, on the basis of the specifications provided by the bidder. A higher score will be awarded to the solution with the best level of technology readiness with regard to integrated operability by means of the image acquisition software, without the need to develop supplementary hardware and software solutions. For the assessment of this aspect, the level of acquired data integration (e.g. top view RGB + fluorescence; top view RGB + hyperspectral) will be considered. A detailed description of the above must also be provided.

### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.7.1)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the degree of software completeness and versatility and the level of technology readiness regarding integrated operability.

### A.7.2 – Analysis system automation

up to 3 points

When rating this criterion, the Evaluation Board will award higher scores to the system that provides an automation pipeline for the analysis of the visible light, hyperspectral and kinetic chlorophyll fluorescence imaging data, on the basis of the specifications provided by the bidder. A detailed description of the above must also be provided.



**N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.7.2)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the automation functions for the analysis of visible light, hyperspectral and kinetic chlorophyll fluorescence imaging data.

**A.7.3 – User-friendliness and documentation**

**up to 3 points**

When scoring this criterion, the Evaluation Board will award a higher score to the system with the most user-friendly and complete software documentation for the visible light, hyperspectral and kinetic chlorophyll fluorescence imaging analyses, on the basis of the specifications provided by the bidder. A detailed description of the above must also be provided.

**N.B.: DOCUMENTATION TO BE SUBMITTED (chapter A.7.3)**

For the scoring of this criterion, the bidder must specify, with regard to the equipment proposed, in the required or similar form and submitting suitable supporting documentation, the level of interactivity and user-friendliness of the visible light, hyperspectral and kinetic chlorophyll fluorescence imaging data analysis pipeline. The level of training required of system users in relation to the analysis functions specified in point A.7.2 must be stated.

**B.1 EXTENT OF USE IN THE SCIENTIFIC FIELD**

For this criterion, the Evaluation Board may award a maximum of 2 points, broken down as indicated below:

**B.1.1 – Number and quality of publications in sector journals obtained with the use of similar systems**

**up to 2 points**

In order to assess the extent of the system's use in research settings, the Board will review the publications in authoritative international scientific journals obtained from the analysis of the data acquired by the measurement system proposed.

**N.B.: DOCUMENTATION TO BE SUBMITTED (chapter B.1.2)**

For the scoring of this criterion, the bidder must submit a detailed description of the publications obtained using the proposed measurement system or similar system (references).

**C. SYSTEM INSTALLATION SUPPORT, STAFF TRAINING, AFTER-SALES ASSISTANCE, WARRANTIES AND DELIVERY TIMES**



For this criterion, the Evaluation Board may award a **maximum of 15 points**, broken down as indicated below

### **C.1.1 Schedule for the phenotyping system installation and start-up phase**

**up to 3 points**

When scoring this criterion, the Evaluation Board will consider the overall level of measurement efficacy expected for the phenotyping system installation and start-up phase, the time dedicated to the phase, and the completeness and quality of the training programme for the use of the phenotyping system. The Evaluation Board will focus in particular on the proposed solutions' ability to minimise the disruption to the FEM during the delicate phenotyping system installation and start-up phase, considering set-up personalisation to satisfy the institution's requirements and the need to perform functional tests for the characteristics indicated in the tender specifications and the need to guarantee FEM staff the acquisition of a thorough theoretical and practical knowledge of the system and all its functions.

#### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter C.1.1)**

For the scoring of this criterion, the bidder must submit a schedule for the phenotyper installation and start-up phase, considering the content of the tender specifications and that:

- a) indicates the anticipated measures specifying all the action taken to minimise the disruption to the FEM, considering the set-up personalisation to meet the requirements of the institution and the need to perform functional tests for the characteristics indicated in the tender specifications;
- b) provides details of the activities envisaged for the phenotyper installation and start-up phase (tests, demonstrative measurements, etc.);
- c) includes a Gantt chart of the timeline for the entire phenotyper installation and start-up phase;
- d) indicates the number and professional roles envisaged for the activities to be performed (provider side and FEM side);
- e) provides any other information deemed necessary in order to describe the phenotyper installation and start-up activities.

### **C.1.2 FEM staff training programme**

**up to 3 points**

When scoring this criterion, the Evaluation Board will consider the completeness and content of the training programme offered to the FEM for use of the phenotyper.

#### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter C.1.2)**

For the scoring of this criterion, the bidder must submit a training programme for FEM staff that:

- a) provides details of the type and duration of the training offered to FEM staff (e.g. how many individuals may take part);





- b) includes any other information deemed necessary in order to describe any staff refresher training services.

### **C.1.3 - Technical assistance, servicing and maintenance**

**up to 3 points**

When scoring this criterion, the Evaluation Board will consider the completeness and content of the technical assistance and maintenance programme offered to the FEM.

#### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter C.1.3)**

For the scoring of this criterion, the bidder must submit a technical assistance and maintenance programme that:

- a) provides details of the nature and duration of the technical assistance provided to the FEM, indicating the improvements vis-à-vis the minimum values required;
- b) provides details of the nature and duration of the servicing, maintenance and calibration service, specifying both frequency and the duration in years, indicating the improvements vis-à-vis the minimum values required;

### **C.1.4 - Extension of full-risk warranty beyond 24 months**

**up to 2 points**

When scoring this criterion, the Evaluation Board will award a higher score to the extension of the full-risk warranty beyond 24 months.

#### **N.B.: DOCUMENTATION TO BE SUBMITTED (chapter C.1.4)**

For the scoring of this criterion, the bidder must submit a detailed description of the full-risk warranty service and its duration in years.

### **C.1.5 – Guaranteed maximum delivery timeline**

**up to 4 points**

When scoring this criterion, the Evaluation Board will award 2 points to bidders that guarantee delivery and installation within 4 months of contract conclusion and 4 points to bidders that guarantee delivery and installation within 3 months of contract conclusion.



### 3 METHOD OF ATTRIBUTION OF THE TECHNICAL SCORE.

#### RIPARAMETERISATION

The Technical Commission evaluates the technical offers in one or more confidential sessions following the following procedure:

- a) analysis of the technical documentation (technical offers - with verification of compliance with the minimum technical characteristics of the equipment offered with respect to the provisions of the special tender specifications - otherwise the exclusion of the economic operator is ordered);
- b) attribution of technical assessment scores exclusively based on the provisions of paragraph 2.

If the Technical Commission deems it necessary to obtain clarifications regarding the technical offers presented, it formulates the relative request, assigning a peremptory term (minimum 2 working days) for the formulation of the response. In this case, if the economic operator concerned does not provide the requested clarifications within the assigned deadline or provides inadequate answers with respect to the questions asked, the Technical Commission will find it impossible to carry out the technical assessment in whole or in part. In this eventuality the Commission of selection assigns, for the corresponding criteria and / or under criteria of which the evaluation elements have been omitted, a score equal to zero (without prejudice to the need to demonstrate the possession of the minimum technical characteristics required and specified in the special specification of contract, failing which the exclusion of the offering economic operator is ordered).

The technical commission for the attribution of the scores relative to the discretionary criteria can use a grid of judgments: the score will be calculated through the average of the coefficients, variable between 0 and 1 attributed by the individual members of the technical commission as reported:

<b>giudizio</b>	<b>coefficiente</b>
Excellent	1,0
Good	0,8
Appreciable	0,5
Partially appreciable	0,3
Not appreciable	0,0

Once the work of examining and evaluating the technical offers has been completed, the Technical Commission draws up a table showing the scores assigned for each sub-criterion and evaluation criterion and referring to all the economic operators offering and admitted.

The Technical Commission therefore carries out the operations of reparameterization of the total technical score taking into consideration only the admitted bids and then proceeds to the calculation of the rescheduled technical score attributed to each bidder economic operator admitted to this phase by drawing up the definitive ranking.

For the calculation of the technical score the Technical Commission then applies the following method:

- 1) calculate the total technical score assigned to each bidder by adding, for each of them, the corresponding scores assigned for all the technical evaluation criteria
- 2) proceed to the re-parameterization of the total scores attributed by assigning to the offer with the highest technical score the maximum score attributable (equal to 70 points) and proportioning to it the others according to the following formula:

$$\mathbf{Pr(a)t = (Pa/Pmax) \times Pmax(t)}$$



dove

<b>Pr(a)t</b>	Reprocessed score of the provision of the offer (a) with respect to the technical evaluation criteria
<b>P(a)t</b>	Technical score obtained by the competitor (a)
<b>Pmax</b>	Maximum score awarded
<b>Pmax(t)</b>	Maximum total score attributable to the technical evaluation criteria (70 points)

Once the technical score calculations have been completed as described above, the Technical Commission draws up a ranking list showing the scores attributed to the economic operators offering and admitted to this phase.

**ATTENTION:**

1. In the calculation of the technical and economic score all the counts are carried out taking into account three decimal digits, rounded up if the fourth decimal is equal to or greater than five, or by default if lower.
2. The re-dimensioning operation is carried out without taking into account the technical offers, however excluded.
3. It will not be done the resetting of the score in case of presentation of only one offer.

The ranking of the bids submitted will be drawn up once the scoring of the criteria and sub-criteria listed herein has been completed.

\*\*\*

<b>DOCUMENT DEVELOPMENT</b>			
<b>Subject</b>	<b>Authored by</b>	<b>Checked/reviewed by</b>	<b>Approved by</b>
Tender specifications - Administrative regulations	A. Paoletto	F. Calliari	F.Calliari
Technical specifications	C. Varotto, M. Faralli	D. GIANELLE	F.Calliari

Dott. Fabio Calliari  
*digitally signed*

