



Elite Scientific Instruments Sdn. Bhd.,
A-LG-03, Block A , Section 1, Serdang Perdana Selatan
43300 Seri Kembangan,
Selangor Darul Ehsan
Tel : (603) 8945 6100 Fax : (603) 8945 7100

Course Title	: CO₂ Response Curve	Course Duration	: 2 day (s)
Course Code	: CRC	Course Venue	: TBA
Course Category:	Plant Physiology Systems		
Course Level	: Refresher	Course Fee	: RM 500 per person

➤ **Objective of Training**

At the end of the course, the participants will be able:

- 1) To perform the CO₂ response curve on the plants of interest with the correct settings accordingly.
- 2) To interpret the response curves obtained and related the measured parameters to the leaf biochemical and physiological performance.

➤ **Background facilities**

The training workshop will be completed in two sessions, Theory Session on Day 1 and Practical Session on Day 2 to ensure all participants have a good comprehension regarding the subject matter. The venue for the training course will be announced **one month** before the scheduled date of the workshop.

➤ **Background of Speaker**

This course will be given by our Plant Science Consultant, **Dr Muhammad Nazmin bin Yaapar** who has a wide knowledge and experience in general plant physiology and rice science research. Dr Muhammad Nazmin Yaapar is affiliated to the Department of Crop Science, Universiti Putra Malaysia, where he is currently working as a Senior Lecturer. He has experience in teaching various plant science subjects at university level including agriculture botany, weed science, crop nutrition, rice production and crop physiology. He has authored and co-authored several national and international publications and also working as a reviewer for reputed professional journals. Moreover, he is having an active association with a photosynthesis research team in the United Kingdom. He has been regularly recognised by the local media as the reference scientist particularly in rice cultivation and crop improvement.

➤ **Introduction**

CO₂ is indeed an important subject matter by itself as it is one of the inputs to perform photosynthesis thus determining the resulting sugar manufactured. However, the activity of carbon fixation is primarily depended on the abundance and activity of the Rubisco which is the enzyme responsible for catalysing the reaction. The carboxylation speed of Rubisco tells valuable information about the leaf anatomical, biochemical and physiological properties and these differ depending on the individual leaf capability. By performing the CO₂ response curve on the leaf in question, one can gain insight on various parameters such as maximum assimilation, maximum carboxylation rate, maximum electron transport rate, stomatal and mesophyll limitations.

➤ **Target Group**

This training is designed especially for researchers, academicians, sociologists, environmentalists, plantation managers and also other people involved in the study of plant physiology and crop improvement.

➤ **Course Outline**

Slot 1: The Story of CO₂ and RuBisCO

- Light-Dependent Reaction
- Light-Independent Reaction (Calvin Cycle)
- Components of Calvin Cycle and connection to the light-dependent reaction
- The journey of CO₂ from the atmosphere to the stroma of the chloroplast
- Q & A session

Slot 2: ACi Curve

- **CO₂ compensation point:** The value of C_i where photosynthesis and respiration are in balance.
- **Carboxylation efficiency:** The initial slope provides an *in vivo* measure of the carboxylation efficiency. If measuring a C₃ leaf, the slope is proportional to the maximum activity of RuBisCO. This is sometimes called the mesophyll conductance.
- **Stomatal limitations:** Stomatal limitation of photosynthesis can be quantified with CO₂ response curves.
- **Carboxylation limitations:** Within the mesophyll, carboxylation limitations can be separated from electron transport limitations
- Q and A session

Slot 3: Machine handling and Generating ACi curves

- Components of the equipment and functions
- Prepping the plants prior to ACi curve routine
- Generating ACi curve

Slot 4: Data Interpretation and Analysis of Result

- Utilising the logged data in the curve fitting tools
- Interpret the resultant individual parameters and the biphasic or triphasic ACi curves

Slot 5: Troubleshooting and Caveats

- Common errors in doing ACi curves
- Having confidence in the response curves obtained



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➤ **Tentative program**

Date & Time	Activities	Venue
<u>Day 1</u>		
8:00 AM	Registration	
9:00 AM	Slot 1: <i>The Story of CO₂ and RuBisCO</i>	
10:30 AM	Break	
11:00 AM	Slot 2: <i>ACi Curve</i>	
1:00 PM	Lunch break	
2:00 PM	Slot 3: <i>Machine handling and Generating ACi curves</i>	
4:30 PM	Dismiss	
<u>Day 2</u>		
8:00 AM	Slot 4: <i>Data Interpretation and Analysis of Result</i>	
10:00 AM	Break	
10:30 AM	Slot 5: <i>Troubleshooting and Caveats</i>	
	Closing ceremony / Photo session/ Lunch break/	
12:00 PM	Dismiss	