Sucrose Synthetase (SS) Activity Assay Kit

Note: Before the experiment, it is recommended to select 2-3 sample with large expected differences for pre-experiment.

Operation Equipment: Spectrophotometer/microplate reader

Catalog Number: BC0585

Size: 100T/48S

Product Composition: Before use, please carefully check whether the volume of the reagent is consistent with the volume in the bottle. If you have any questions, please contact Solarbio staff in time.

Reagent name	Size	Storage
Extract Solution	Solution 50 mL×1	2-8℃
Reagent I	Solution 2.5 mL×1	-20℃
Reagent II	Powder10 mg×1	2-8℃
Reagent III	Solution 2 mL×1	2-8℃
Reagent IV	Solution 25 mL×1	2-8℃
Reagent V	Solution 6 mL×1	2-8℃

Solution preparation:

Reagent II: Add 1 mL of distilled water to prepare 10 mg/mL sucrose solution when the solution will be used. Then dilute it with distilled water to 500 μg/mL for use.

Product Description

Sucrose is the main form of transport of photosynthetic products from source (leaf, etc.) to "sink" organs. Sucrose synthetase (SS, EC 2.4.1.13) catalyzes the synthesis of sucrose from free fructose and glucose in plants.

SS catalyzes the reaction between free fructose and glucose donor UDPG to generate sucrose, and the reaction between sucrose and resorcinol can show color changes. There is a characteristic absorption peak at 480 nm, and the enzyme activity of SS is proportional to the color.

Reagents and Equipment Required but Not Provided

Spectrophotometer/microplate reader, water-bath/constant temperature incubator, desk centrifuge, adjustable pipette, micro glass cuvette/ 96 well plate, mortar/homogenizer, ice.

Procedure

I. Sample preparation:

According to the ratio of tissue weight (g) to extraction solution volume (mL) of 1:5-10 (it is recommended to weigh about 0.1g of tissue and add 1mL of Extract solution), perform ice bath homogenization. Centrifuge 8000×g at 4 ℃ for 10 minutes, take the supernatant, and place it on ice for testing.

II. Measuring operation table

1. Preheat spectrophotometer more than 30 minutes, adjust wavelength to 480 nm and set zero with distilled water.
2. Sample determination (add the following reagents in sequence in the 1.5 mL EP tube):

Reagent Name (μL)	Test tube (T)	Contrast tube (C)	Standard tube (S)	Blank tube (B)
Sample	10	10	-	-
Distilled water	-	45	45	55
Reagent I	45	-	-	-
Reagent II	-	-	10	-
Mix well and incubate for 10 min at 25ºC.				
Reagent III	15	15	15	15
Boil in the boiling water bath for about 10 minutes (cover tightly to prevent water loss) and cool.				
Reagent IV	210	210	210	210
Reagent V	60	60	60	60

Mix well, 80℃ water bath (wrap the sealing film to prevent bursting) for 20 minutes, cool down, and centrifuge at room temperature for 10 minutes at 12000rpm. Draw 200 μL of supernatant into a micro glass cuvette or 96 well plate, and measure the absorbance values of each tube at 480nm. (The standard tube and the blank tube are only one tube. Set a contrast tube to each test tube.)

Calculate $\Delta A_T=A_T-A_C$，$\Delta A_S=A_S-A_B$。

III. Calculation of SS vitality unit

1) Calculate by protein concentration:

Unit definition: One unit of enzyme activity is defined as the amount of enzyme catalyzes the production of 1 μg of sucrose per minute every milligram of tissue protein.

SS activity(U/mg prot)=$(C_S\times Vs\times\Delta A_T\div\Delta A_S)\div(Vs\times Cpr)\div T=50\times\Delta A_T\div\Delta A_S\div Cpr$

2) Calculate by sample weight:

Unit definition: One unit of enzyme activity is defined as the amount of enzyme catalyzes the production of 1 μg of sucrose per minute every gram of tissue.

SS activity (U/g weight) =$(C_S\times Vs\times\Delta A_T\div\Delta A_S)\div(W\times Vs\div Ve)\div T=50\times\Delta A_T\div\Delta A_S\div W$

C_S: Concentration of standard tube ,500 μg/mL;

Vs: Add the sample volume into the reaction system, 0.01 mL;

Ve: Add extract solution volume, 1 mL;

Cpr: Concentration of sample protein, mg/mL;

W: Sample weight, g;

T: Reaction time: 10 minutes.

Note:

Try to complete the determination within 30 minutes.

Recent Product Citations:

[1] Han W, Wang Y, Li H, Diao S, Suo Y, Li T, Sun P, Li F, Fu J. Transcriptome and Metabolome Reveal Distinct Sugar Accumulation Pattern between PCNA and PCA Mature Persimmon Fruit. Int J Mol Sci. 2023 May 11;24(10):8599. doi: 10.3390/ijms24108599. PMID: 37239943; PMCID: PMC10217969.

[2] Zhang C, Chen X, Liu W, Ji Y, Yang Y, Chen J, Li P, Li D. Differential expression analysis of sugar accumulation-related genes during chestnut nut development. J Plant Physiol. 2023 Mar;282:153918. doi: 10.1016/j.jplph.2023.153918. Epub 2023 Jan 18. PMID: 36738603.

[3] Shi Y, Zhao Y, Yao Q, Liu F, Li X, Jin X, Zhang Y, Ahammed GJ. Comparative Physiological and Transcriptomic Analyses Reveal Mechanisms of Exogenous Spermidine-Induced Tolerance to Low-Iron Stress in Solanum lycopersicum L. Antioxidants (Basel). 2022 Jun 27;11(7):1260. doi: 10.3390/antiox11071260. PMID: 35883751; PMCID: PMC9312307.

[4] Wu J, Chen H, Chen W, Zhong Q, Zhang M, Chen W. Effect of ultrasonic treatment on the activity of sugar metabolism relative enzymes and quality of coconut water. Ultrason Sonochem. 2021 Nov;79:105780. doi: 10.1016/j.ultsonch.2021.105780. Epub 2021 Oct 6. PMID: 34628309; PMCID: PMC8501503.

[5] Kang L, Wu Y, Zhang J, An Q, Zhou C, Li D, Pan C. Nano-selenium enhances the antioxidant capacity, organic acids and cucurbitacin B in melon (Cucumis melo L.) plants. Ecotoxicol Environ Saf. 2022 Aug;241:113777. doi: 10.1016/j.ecoenv.2022.113777. Epub 2022 Jun 20. PMID: 35738099.

References:

[1] Schrader S, Sauter J J. Seasonal changes of sucrose-phosphate synthase and sucrose synthase activities in poplar wood (Populus× canadensis Moench ‘robusta’) and their possible role in carbohydrate metabolism[J]. Journal of Plant Physiology, 2002, 159(8): 833-843.

[2] Nomura T, Akazawa T. Enzymic mechanism of starch synthesis in ripening rice grains: VII. Purification and enzymic properties of sucrose synthetase[J]. Archives of biochemistry and biophysics, 1973, 156(2): 644-652.

[3] Pressey R., Potato sucrose synthetase: purification, properties, and changes in activity associated with maturation[J]. Plant physiology, 1969, 44(5): 759-764.

Related products:

BC0600/BC0605	Sucrose Phosphoric Acid Synthetase(SPS) Activity Assay Kit
BC2460/BC2465	Plant Sucrose Content Assay Kit
BC0560/BC0565	Acid Invertase(AI) Activity Assay Kit
BC0570/BC0575	Neutral Invertase(NI) Activity Assay Kit

BC4310/BC4315	Sucrose Synthetase (SS, Cleavage Direction) Activity Assay Kit
BC4320/BC4325	Solid-Acid Invertase (B-AI) Activity Assay Kit