sssSucrose 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

Catalog Number: BC0580

Size: 50T/24S

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 30 mL×1	2-8℃
Reagent I	Solution 4 mL×1	-20℃
Reagent II	Powder10 mg×1	2-8℃
Reagent III	Solution 3 mL×1	2-8℃
Reagent IV	Solution 40 mL×1	2-8℃
Reagent V	Solution 10 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, water-bath/constant temperature incubator, desk centrifuge, adjustable pipette, 1 mL glass cuvette, mortar/homogenizer, ice and distilled water.

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	30	30	-	-
Distilled water	-	150	150	180
Reagent I	150	-	-	-
Reagent II	-	-	30	-
Mix well and incubate for 10 min at 25ºC.				
Reagent III	50	50	50	50
Boil in the boiling water bath for about 10 minutes (cover tightly to prevent water loss) and cool.				
Reagent IV	700	700	700	700
Reagent V	200	200	200	200

Mix well, 80℃ water bath (wrap the sealing film to prevent bursting) for 20 minutes. Determine the absorbance of each tube at 480 nm after cooling. (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, 0.03 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] Yang F, Zhao R, Suo J, Ding Y, Tan J, Zhu Q, Ma Y. Understanding quality differences between kiwifruit varieties during softening. Food Chem. 2024 Jan 1;430:136983. doi: 10.1016/j.foodchem.2023.136983. Epub 2023 Jul 24. PMID: 37527582.

[2] Miao L, Li Q, Sun TS, Chai S, Wang C, Bai L, Sun M, Li Y, Qin X, Zhang Z, Yu X. Sugars promote graft union development in the heterograft of cucumber onto pumpkin. Hortic Res. 2021 Jul 1;8(1):146. doi: 10.1038/s41438-021-00580-5. PMID: 34193850; PMCID: PMC8245404.

[3] Si C, Yang S, Lou X, Zhang G, Zhong Q. Effects of light spectrum on the morphophysiology and gene expression of lateral branching in Pepino (Solanum muricatum). Front Plant Sci. 2022 Sep 23;13:1012086. doi: 10.3389/fpls.2022.1012086. PMID: 36212344; PMCID: PMC9540516.

[4] Wang C, Zhou J, Zhang S, Gao X, Yang Y, Hou J, Chen G, Tang X, Wu J, Yuan L. Combined Metabolome and Transcriptome Analysis Elucidates Sugar Accumulation in Wucai (Brassica campestris L.). Int J Mol Sci. 2023 Mar 2;24(5):4816. doi: 10.3390/ijms24054816. PMID: 36902245; PMCID: PMC10003340.

[5] 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.

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