Sucrose Phosphoric Acid Synthetase (SPS) Activity Assay Kit

Note: Take two or three different samples for prediction before test.

Detection instrument: Spectrophotometer

Catalog Number: BC0600

Size: 50T/24S

Components:

Extract solution: 30 mL ×1. Storage at 4℃.

Solution I: 5 mL×1. Storage at -20℃.

Solution II: powder 10 mg×1. Storage at 4℃. Add 1 mL distilled water to form 10 mg/mL sucrose solution. Dilute the 10 mg/mL sucrose solution to 500 μg/mL with distilled water when the solution will be used.

Solution III: 5 mL ×1. Storage at 4℃.

Solution IV: 40 mL×1. Storage at 4℃.

Solution V: 10 mL×1. Storage at 4℃.

Product Description

Sucrose is not only an important photosynthetic product, but also a major transport material in plants. Moreover, it is one of the storage forms of carbohydrates. Sucrose phosphate synthase (SPS) takes fructose-6-phosphate as the receptor, the sucrose produced by the reaction forms sucrose phosphate under the action of sucrose phosphatase. Sucrose phosphate synthase-sucrose phosphatase system is generally regarded as the main route of sucrose synthesis.

Sucrose phosphate synthase catalyzes fructose-6-phosphate to form sucrose phosphoric acid. The reaction between sucrose and resorcinol can present color change, which has a characteristic absorption peak at 480nm and the enzyme activity is proportional to the depth of color.

Reagents and Equipment Required but Not Provided

Spectrophotometer, water-bath, table centrifuge, adjustable pipette, 1 mL glass cuvette, mortar/homogenizer, ice and distilled water.

Procedure

I. **Sample Extraction:**

The tissue mass (g): Extract solution volume (mL) is 1:5-10 (We recommend weigh about 0.1 g of tissue and add 1 mL of Extract solution). conduct ice-bath homogenate. Centrifuge at 8000 ×g for 10 minutes at 4℃, take the supernatant and placed on the ice for test.

II. **Determination procedure:**

1. Preheat the spectrophotometer 30 minutes, adjust the wavelength to 480 nm and set zero with distilled water

2. Add reagents into 1.5 mL centrifuge tube with the following list:

Reagent Name (μL)	Test tube (T)	Control tube (C)	Standard tube (S)	Blank tube (B)

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Sample	30	30	-	-
Distilled water	-	150	150	180
Reagent I	150	-	-	-
Reagent II	-	-	30	-
Blending, water bath for 10 minutes at 25℃.				
Reagent III	50	50	50	50
Boil in boiling water bath for about 10 minutes (entangling sealing film to prevent explosion cover) and cool.				
Reagent IV	700	700	700	700
Reagent V	200	200	200	200

Mix thoroughly, react in the water-bath for 20 minutes at 80℃ (entangling sealing film to prevent explosion cover). After cooling, with distilled water to zero, measure the absorption value of each tube at 480 nm. Calculate $\Delta A_T = A_T - A_C$, $\Delta A_S = A_S - A_B$.

Note: (1) as far as possible within 30 minutes to complete the determination;

(2) Blank tube and standard tube only need to determine 1-2 times

III. Calculation of SPS activity unit

1. Calculate by the concentration of protein

Unit definition: One unit is defined as an enzyme activity that per minute per milligram of tissue protein catalyze to produce 1 μg of sucrose.

SPS activity (μg/min/mg prot) $=(C_S \times V1 \times \Delta A_T \div \Delta A_S) \div (V1 \times Cpr) \div T = 50 \times \Delta A_T \div \Delta A_S \div Cpr$

2. Calculate by the sample fresh weight

Unit definition: One unit is defined as an enzyme activity that per minute per gram of tissue catalyze to produce 1μg sucrose.

SPS activity (μg/min/g fresh weight) $= (C_S \times V1 \times \Delta A_T \div \Delta A_S) \div (W \times V1 \div V2) \div T = 50 \times \triangle A_T \div \triangle A_S \div W$

C_S: Standard tube concentration, 500 μg /mL;

V1: Add the sample volume into the reaction system, 0.03 mL;

V2: Add the extraction liquid volume, 1 mL;

Cpr: Sample protein concentration, mg/mL;

W: Sample fresh weight, g;

T: Reaction time, 10 minutes.

3. Try to complete the determination within 30 minutes.

Recent Products Citations:

[1] Li M, Li H, Zhu Q, Liu D, Li Z, Chen H, Luo J, Gong P, Ismail AM, Zhang Z. Knockout of the sugar transporter OsSTP15 enhances grain yield by improving tiller number due to increased sugar content in the shoot base of rice (Oryza sativa L.). New Phytol. 2024 Feb;241(3):1250-1265. doi: 10.1111/nph.19411. Epub 2023 Nov 27. PMID: 38009305.

[2] 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.

[3] 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.

[4] Fan W, Zhang Y, Wu Y, Zhou W, Yang J, Yuan L, Zhang P, Wang H. The H+-pyrophosphatase IbVP1 regulates carbon flux to influence the starch metabolism and yield of sweet potato. Hortic Res. 2021 Feb 1;8(1):20. doi: 10.1038/s41438-020-00454-2. PMID: 33518705; PMCID: PMC7847997.

[5] 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.

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] Steven C Huber. Interspecific Variation in Activity and Regulation of Leaf Sucrose Phosphate Synthetase [J]. Zeitschrift für Pflanzenphysiologie, 1981, 102(5): 443-450.

Related Products:

BC0580/BC0585	Sucrose Synthetase(SS) 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 (CWI) Activity Assay Kit

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