Soil Saccharase (S-SC) Activity Assay Kit

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

Operation Equipment: Spectrophotometer

Catalog Number: BC0240

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	Preservation Condition
Reagent I	Self-supplied reagent	2-8℃
Reagent II	Liquid 15 mL×1	2-8℃
Reagent III	Powder×2	2-8℃
Reagent IV	Liquid 35 mL×1	2-8℃
Standard	Powder×1	2-8℃

Solution Preparation:

1. Reagent I: Self-supplied toluene.

2. Reagent III: Dissolve with 15 mL of distilled water one of the bottle before using, and unused liquid can be stored at 2-8℃ for 2 weeks.

3. Standard: Containing 10 mg of anhydrous glucose (dry weight loss<0.2%). Dissolve the standard with 1 mL of distilled water to generate a 10 mg/mL glucose solution standard, store at 2-8℃ and use within two weeks or dissolve the standard with saturated benzoic acid solution stored for a longer time.

Product Description:

Soil Saccharase (S-SC) can hydrolyze saccharose into corresponding monosaccharides and can be absorbed by the body. The enzymatic product is an important index for evaluating soil fertility, which is closely related to the content of organic matter, nitrogen and phosphorus in soil, the number of microorganisms and soil respiration intensity.

S-SC catalyzes saccharose to form reduced sugar. The reduced sugar can react with 3,5-dinitrosalicylic acid to form a brownish red amino complex which can be detected by colorimetric assay at 540 nm. In this kit, the soil saccharase activity can be determined by measuring the color depth at 540 nm indirectly.

Reagents and Equipments Required but Not Provided:

Spectrophotometer, mortar/water bath, desk centrifuge, transferpettor, 1 mL glass cuvette, 30 mesh sieve (or smaller), methylbenzene (express delivery not allowed, >98%，AR), ice and distilled water.

Procedure:

I. Sample preparation

Fresh soil samples are naturally air-dried or oven to dry at 37℃, then sieved by 30 ~ 50 mesh sieve.

II. Determination procedure

1. Preheat spectrophotometer for 30 minutes, adjust the wavelength to 540 nm, set zero with distilled water.
2. Standard preparation: Dilute the 10 mg/mL glucose solution standard to 0.5, 0.4, 0.3, 0.2, 0.1 mg/mL with distilled water.
3. Add reagents as the following table.

Reagent	Test tube (T)	Contrast tube (C)	Standard tube (S)	Blank tube (B)
Dry soil sample (g)	0.1	0.1	-	-
Reagent I (μL)	15	15	-	-
The soil samples are all wetted by oscillating mixing, and let stand at 37°C for 15 minutes.				
Reagent II (μL)	250	250	-	-
Reagent III (μL)	750	-	-	-
Distilled water	-	750	-	-
Mix thoroughly. Incubate at 37°C water bath for 24 hours. Centrifuge at 10000 ×g for 5 minutes at 4°C and take the supernatant. The supernatant is diluted 10 times and test (add 0.9 mL of distilled water into 0.1 mL of supernatant). Dilute it again if the OD >1.5.				
Supernatant (μL)	200	200	-	-
Standard (μL)	-	-	200	-
Distilled water	-	-	-	200
Reagent IV (μL)	500	500	500	500

Mix thoroughly, put in boiling water for 5 minutes (cover tightly to prevent water loss). Cooling with flowing water, then mix thoroughly. Detect the absorbance at 540 nm and note as A_T, A_C, A_S, A_B. Calculate $\Delta A_T=A_T-A_C$, $\Delta A_S=A_S-A_B$. Each test tube should be provided with one contrast tube.

III. S-SC activity calculation:

1. Standard curve established: According to the concentration of the standard tube (x) and absorbance ΔA_S (y), establish standard curve. According to the standard curve, take the ΔA_T (A_T-A_C, y) to the equation to acquire the sample concentration x(mg/mL).
2. Unit definition: One unit of enzyme activity is defined as the amount of enzyme catalyzes the production of 1 milligram of reduce sugar in the reaction system per day every gram soil sample.
   S-SC (U/g soil sample) = x×10×Vrv÷W÷T = 101.5×x

   10: Dilution multiple;
   T: Reaction time, 1 day;
   Vrv: Total reaction volume, 1.015 mL;
   W: Sample weight, 0.1 g.

Recent Product Citations:

[1] Hou Q, Wang W, Yang Y, et al. Rhizosphere microbial diversity and community dynamics during potato cultivation[J]. European Journal of Soil Biology, 2020, 98: 103176.

[2] Bian X, Yang X, Zhang K, Zhai Y, Li Q, Zhang L, Sun X. Potential of Medicago sativa and Perilla frutescens for overcoming the soil sickness caused by ginseng cultivation. Front Microbiol. 2023 Apr 5;14:1134331. doi: 10.3389/fmicb.2023.1134331. PMID: 37089541; PMCID: PMC10113677.

[3] Niu T, Xie J, Li J, Zhang J, Zhang X, Ma H, Wang C. Response of rhizosphere microbial community of Chinese chives under different fertilization treatments. Front Microbiol. 2022 Nov 21;13:1031624. doi: 10.3389/fmicb.2022.1031624. PMID: 36478855; PMCID: PMC9719922.

[4] Guan TK, Wang QY, Li JS, Yan HW, Chen QJ, Sun J, Liu CJ, Han YY, Zou YJ, Zhang GQ. Biochar immobilized plant growth-promoting rhizobacteria enhanced the physicochemical properties, agronomic characters and microbial communities during lettuce seedling. Front Microbiol. 2023 Jul 5;14:1218205. doi: 10.3389/fmicb.2023.1218205. PMID: 37476665; PMCID: PMC10354297.

[5] Guo QQ, Xiao MR, Zhang GS. The persistent impacts of polyester microfibers on soil bio-physical properties following thermal treatment. J Hazard Mater. 2021 Oct 15;420:126671. doi: 10.1016/j.jhazmat.2021.126671. Epub 2021 Jul 16. PMID: 34329074.

[6] Liu T, Wang S, Chen Y, Luo J, Hao B, Zhang Z, Yang B, Guo W. Bio-organic fertilizer promoted phytoremediation using native plant leymus chinensis in heavy Metal(loid)s contaminated saline soil. Environ Pollut. 2023 Jun 15;327:121599. doi: 10.1016/j.envpol.2023.121599. Epub 2023 Apr 8. PMID: 37037280.

References:

[1] Gao M, Song W, Zhou Q, et al. Interactive effect of oxytetracycline and lead on soil enzymatic activity and microbial biomass[J]. Environmental toxicology and pharmacology, 2013, 36(2): 667-674.

[2] Zhang F, Qiao Z, Yao C. et al. Effects of the novel HPPD-inhibitor herbicide QYM201 on enzyme activity and microorganisms, and its degradation in soil[J]. Ecotoxicology, 2021, 30(1): 80-90.

Related Products:

BC0280/BC0285	Soil Alkaline Phosphatase(S-AKP/ALP) Activity Assay Kit
BC0110/BC0115	Soil Polyphenoloxidase Activity Assay Kit
BC4040/BC4045	Soil Neutral Invertase(S-NI) Activity Assay Kit
BC4030/BC4035	Soil β-1,4-Glucanase Activity Assay Kit
BC4010/BC4015	Soil β-Xylosidase(S-β-XYS) Activity Assay Kit