Soil Catalase(S-CAT) Activity Assay Kit

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

Operation Equipment: Spectrophotometer

Catalog Number: BC0100

Size:50T/24S

Components:

Reagent name	Size	Preservation Condition
Reagent I	Liquid 0.5 mL×1	2-8℃
Reagent II	Powder ×1	2-8℃
Reagent III	Liquid 6 mL×1	2-8℃

Solution Preparation:

1. Reagent I: The liquid is placed in an EP tube inside the bottle and needs to be centrifuged before use. Before use, take 0.05 mL of Reagent I and add 9.95 mL of distilled water to dilute it for use or prepare it in proportion. The left reagent can be stored at 2-8°C for one week.
2. Reagent II: Add 2 mL of distilled water before using to dissolve it. The left reagent can be stored at 2-8°C for four weeks.

Product Description:

Soil catalase (S-CAT) is an important enzyme of soil microbial metabolism, which plays an important role in the removal system of H_2O_2.

Since the absorbance at 240 nm is proportional to the amount of H_2O_2, the activity of S-CAT can be quantified by measuring the decrease in the absorbance of the reaction solution at 240 nm.

Reagents and Equipment Required but Not Provided.

Spectrophotometer, table centrifuge, transferpettor, water bath, 1 mL quartz cuvette, mortar, 30-50 mesh sieve, ice and distilled water.

Procedure:

I. Sample processing:

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 wavelength to 240 nm and set zero with distilled water.
2. Add reagents with the following list:

Reagent	Test Tube (T)	No Substrate Tube (NSu)	No Soil Tube (NSo)
Air-dried soil sample (g)	0.1	0.1	-

Reagent I (μL)	1000	-	1000
Distilled water (μL)	-	1000	-
Shake and culture at 25℃ for 20 minutes.			
Reagent II (μL)	25	25	25
Mix thoroughly, centrifuge at 8000 ×g for 5 minutes at 25℃ and take all the supernatant.			
Reagent III (μL)	120	120	120

Mix thoroughly, detect the absorbance of each tube at 240 nm and noted as A_T, A_{NSU}, and A_{NSO}. Each test tube should be provided with a no substrate tube, and the no soil tube only need test once or twice.

III. Calculation

Unit definition: One unit of enzyme activity is defined as the amount of enzyme catalyzes the degradation of 1 mmol of H_2O_2 in the reaction system per day at 25℃ every gram of dry soil sample.

S-CAT activity (U/g) = $[(A_{NSo} - A_T + A_{NSu}) \times Vra \div (\varepsilon \times d) \times 10^3] \div W \div T = 18.9 \times (A_{NSo} - A_T + A_{NSu})$

Vra: Total volume of the reaction system, 1.145×10^{-3} L;

ε: Molar extinction coefficient of hydrogen peroxide, 43.6 L/mol/cm;

d: Cuvette aperture, 1 cm;

T: Reaction time, 20 minutes=1/72 day;

W: Sample mass, 0.1 g.

Note:

If the absorbed supernatant is still partly turbid, centrifuge it again after adding Reagent III.

Recent Product citations:

[1] Ali M, Song X, Wang Q, Zhang Z, Zhang M, Chen X, Tang Z, Liu X. Thermally enhanced biodegradation of benzo[a]pyrene and benzene co-contaminated soil: Bioavailability and generation of ROS. J Hazard Mater. 2023 Aug 5; 455:131494. doi: 10.1016/j.jhazmat.2023.131494. Epub 2023 Apr 25.

[2] Ahsan T, Tian PC, Gao J, Wang C, Liu C, Huang YQ. Effects of microbial agent and microbial fertilizer input on soil microbial community structure and diversity in a peanut continuous cropping system. J Adv Res. 2023 Nov 28: S2090-1232(23)00367-3. doi: 10.1016/j.jare.2023.11.028. Epub ahead of print. PMID: 38030126.

[3] Huang J, Ye J, Gao W, Liu C, Price GW, Li Y, Wang Y. Tea biochar-immobilized Ralstonia Bcul-1 increases nitrate nitrogen content and reduces the bioavailability of cadmium and chromium in a fertilized vegetable soil. Sci Total Environ. 2023 Mar 25; 866:161381. doi: 10.1016/j.scitotenv.2022.161381. Epub 2023 Jan 5. PMID: 36621509.

[4] 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.

[5] 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.

References:

[1] Yang L F, Zeng Q, Li H B, et al. Measurement of Catalase Activity in Soil by Ultraviolet Spectrophotometry[J]. Chinese Journal of Soil Science, 2011, 42(1):207-210.

[2] Johansson L H, Borg L A H. A spectrophotometric method for determination of catalase activity in small tissue samples[J]. Analytical biochemistry, 1988, 174(1): 331-336.

Related Products:

BC0280/BC0285 Soil Alkaline Phosphatase (S-AKP/ALP) Activity Assay Kit
BC0110/BC0115 Soil Polyphenol Oxidase (S-PPO) Activity Assay Kit
BC0120/BC0125 Soil Urease (S-UE) Activity Assay Kit
BC0140/BC0145 Soil Acid Phosphatase (S-ACP) Activity Assay Kit