

Apr 18th, 6:00 PM - 7:00 PM

The Effect of Coriander Extract on the Replication of T2 Bacteriophage

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CORIANDER SEED EXTRACT ENHANCES THE YIELD OF T2 BACTERIOPHAGE IN E. COLI BY STIMULATING THE PRODUCTION OF CYCLIC AMP

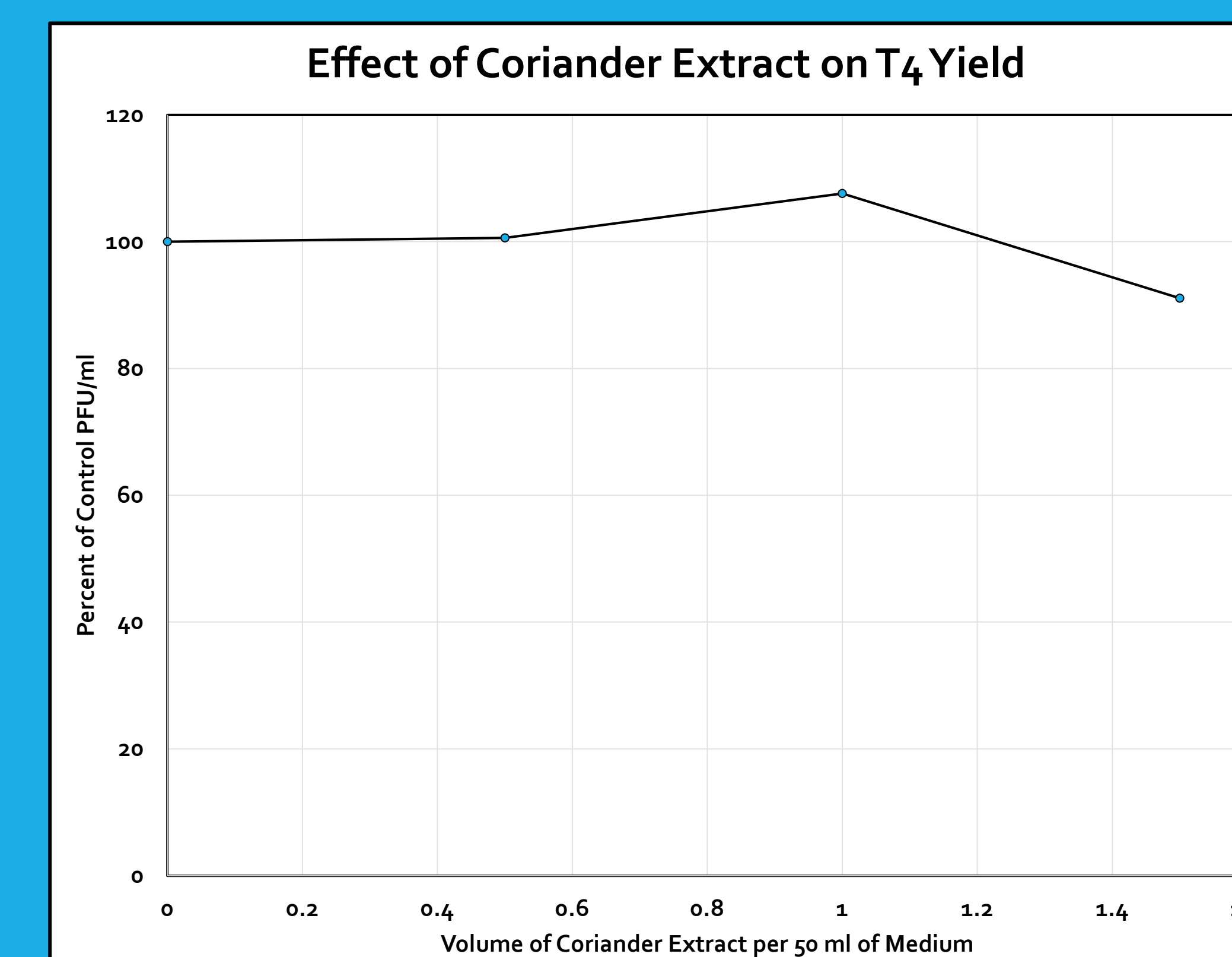
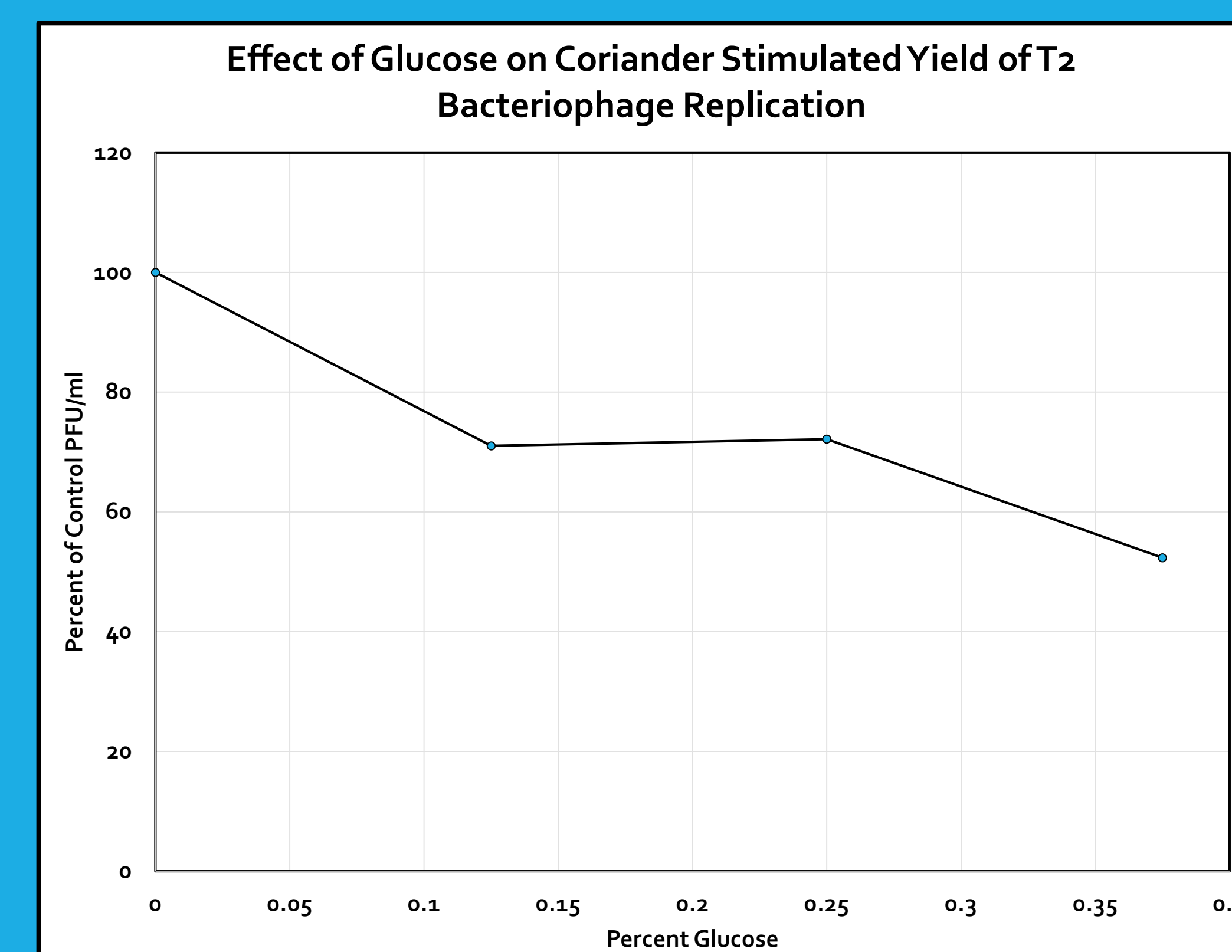
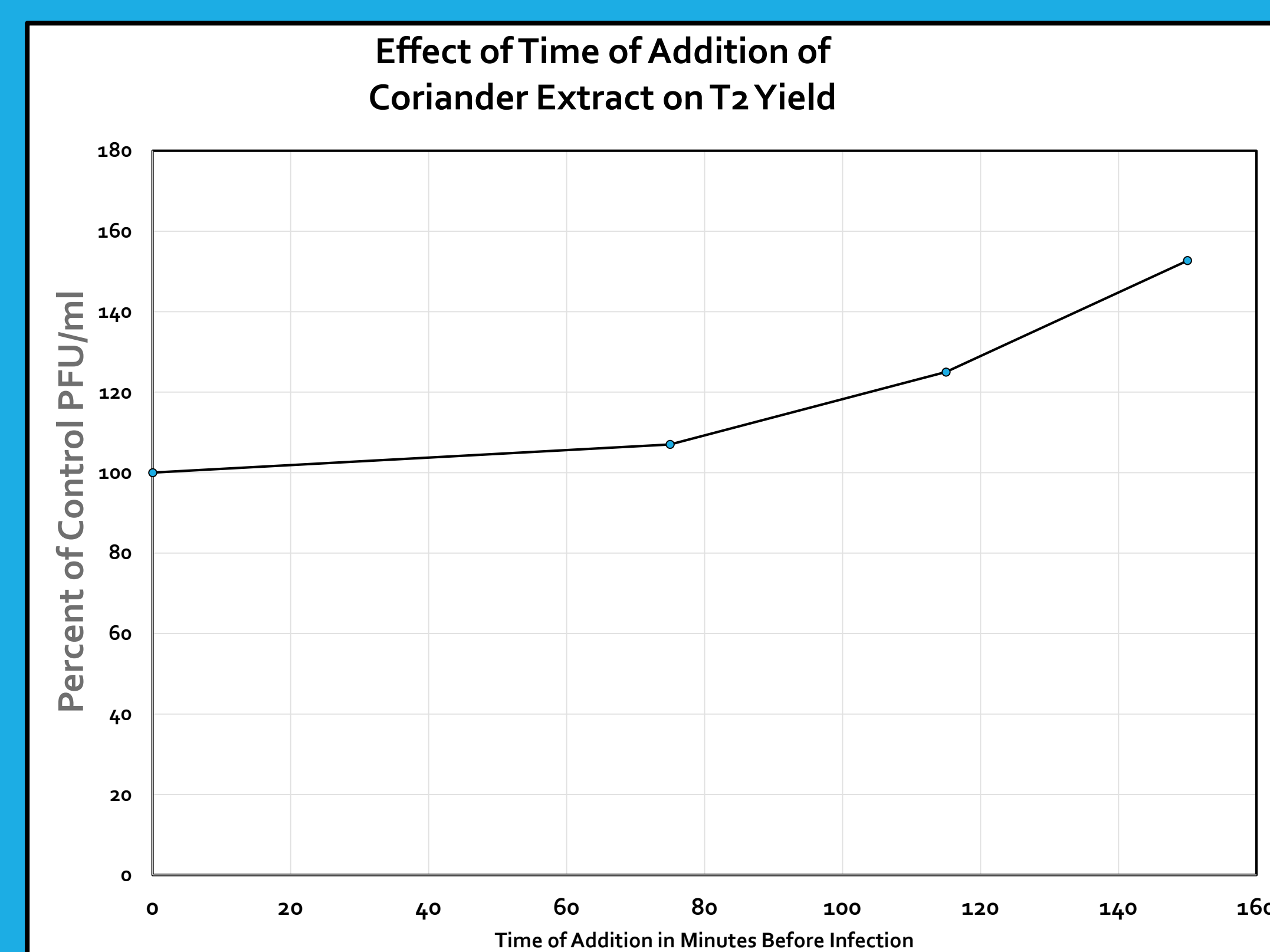
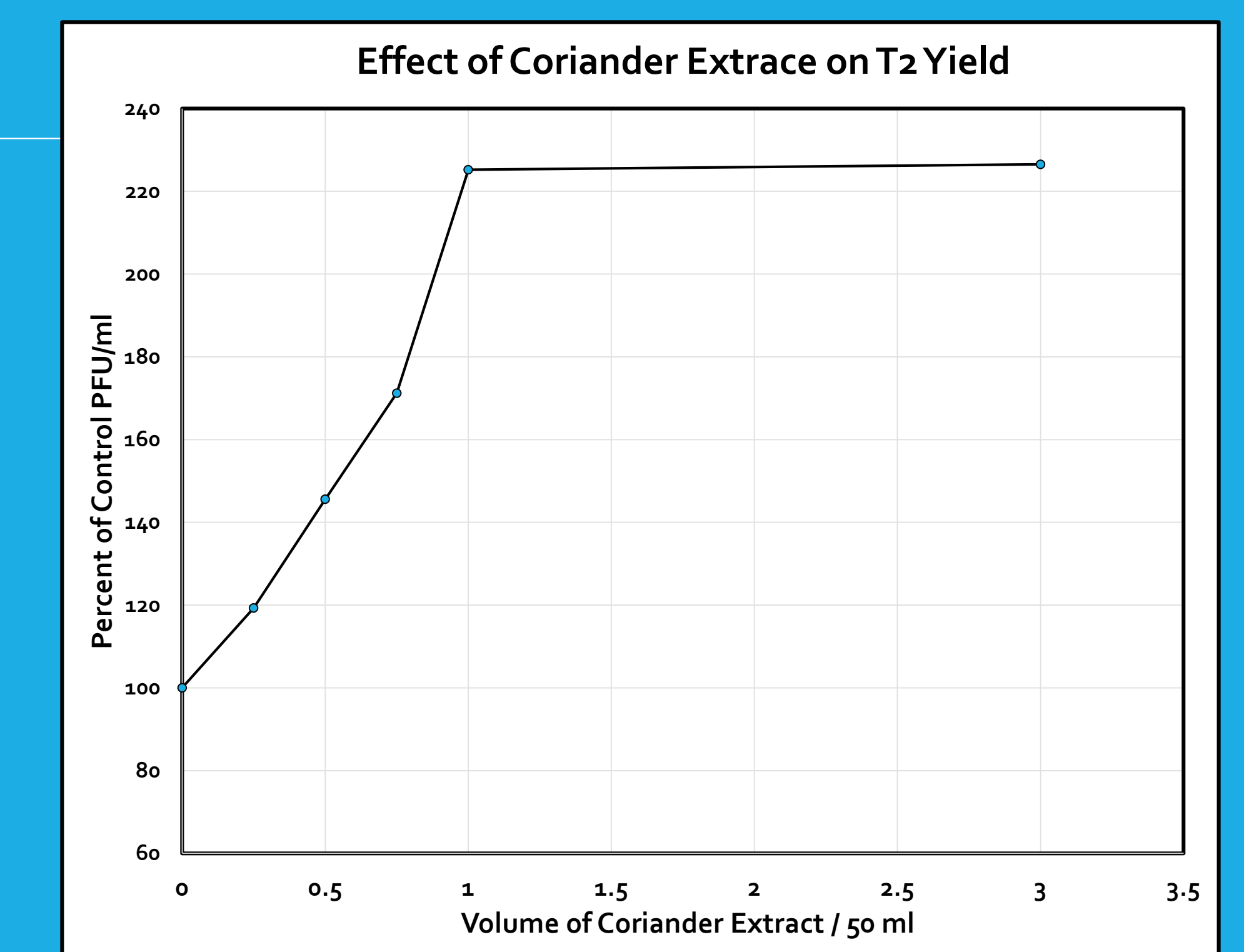
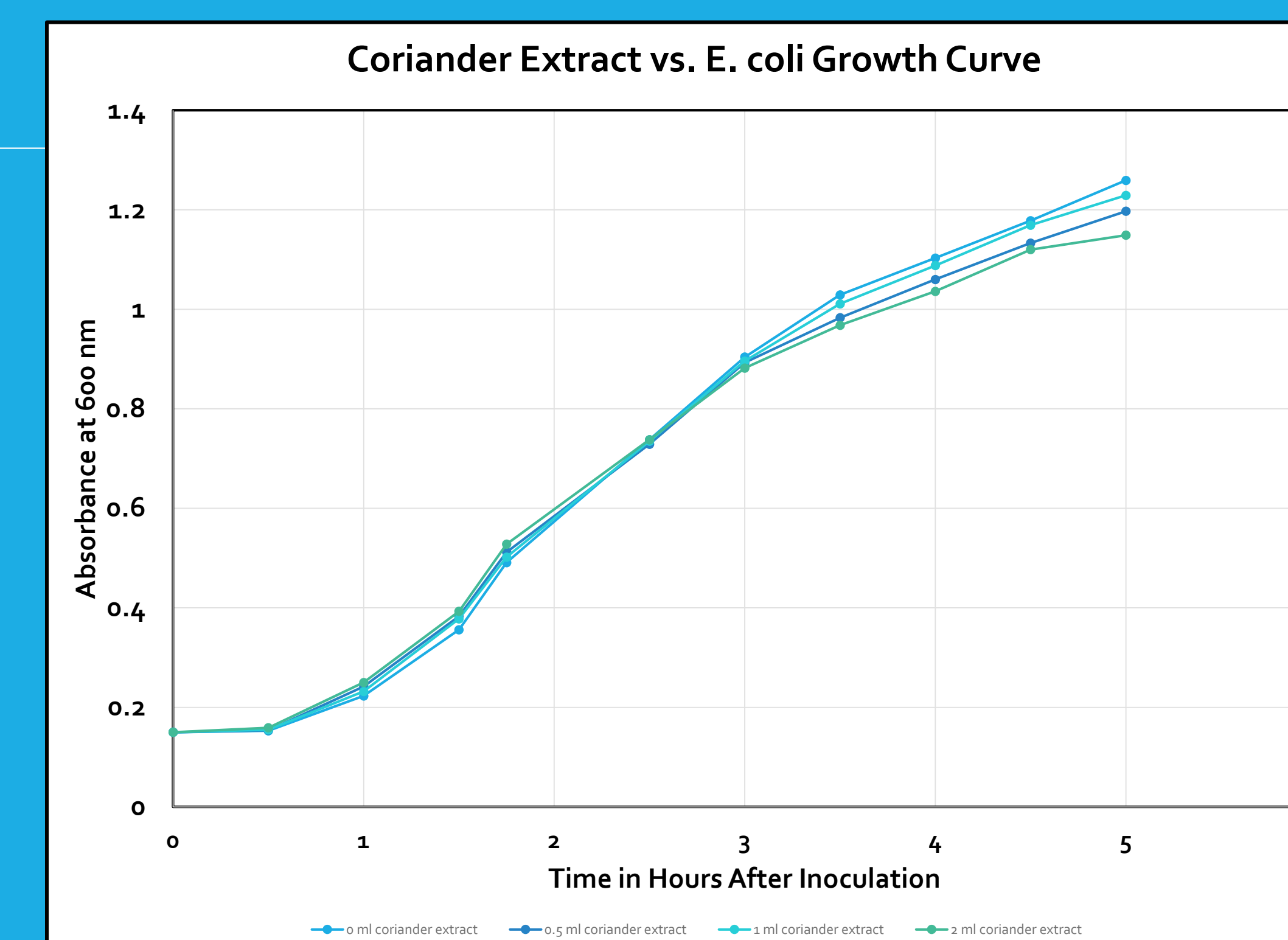
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INTRODUCTION

Coriander, also known as cilantro or Chinese parsley, is an annual herb in the family Apiaceae. All parts of the plant are edible, but the fresh leaves and the dried seeds are the parts most traditionally used in cooking. Coriander has been shown to have anti-bacterial and antiviral activity for viruses of humans in vitro. Increasing concentrations of coriander seed extract added to Luria-Bertani broth have no effect on the growth of E. coli. The addition of E. coli coriander seed extract to Luria-Bertani broth at a concentration of 0.00012 g/ml enhances the yield of T2 bacteriophage up to 125% of the control culture. Increasing amounts of glucose added to E. coli cultures infected with T2 bacteriophage also caused an increase in bacteriophage yield. However, increasing concentrations of glucose added to E. coli cultures treated with coriander seed extract and then infected with T2 bacteriophage caused a decrease in the bacteriophage yield. Even very small concentrations of glucose inactivate adenylate cyclase enzyme activity in E. coli. These results suggest that stimulation of T2 bacteriophage caused by coriander seed extract is due to stimulation of cAMP production and adenylate cyclase enzyme activity in E. coli cells. Like other herbs and spices that enhance T2 bacteriophage yield, coriander seed extract had no effect on T4 bacteriophage yield.

MATERIALS AND METHODS

1.5 grams of ground coriander seed (Spice Islands) was vigorously ground with a glass mortar and pestle in 3 ml of ethanol and 3 ml of LB broth. 44 ml of LB broth was added and the suspension was centrifuged to sediment the undissolved particles. The supernatant liquid was filter sterilized and stored at 4° C no more than 24 hours until use. Growth curves were prepared from E. coli cultures in LB broth with 0.5, 1, or 2 ml of the coriander seed extract per 100 ml of culture. Absorbance was measured at 600 nm. For T2 bacteriophage production, E. coli cultures were prepared with 0.25, 0.5, 0.75, 1, and 2 ml of the coriander seed extract and cultured for 2.5 hours, approximately 1 generation time, before T2 infection. After 10 minutes of infection, the infected cell suspensions were centrifuged for 7 minutes at 1,850 x g at room temperature. The unadsorbed viruses were removed and the infected E. coli cells were resuspended in 50 ml of warm LB broth containing the same concentration of sterile coriander extract in which they were initially cultured. A volume of 0.5 ml of log phase E. coli was added to 5 ml of soft agar and inoculated with 0.1 ml of a serial dilution of T2 bacteriophage diluted in phage dilution buffer. For the effect of glucose on the production of T2 bacteriophage in coriander treated E. coli, the E. coli culture was treated with coriander seed extract at a concentration of 0.5 ml per 50 ml of culture with 0, 0.15, 0.25, and 0.375% glucose.



CONCLUSIONS

Coriander seed extract has no effect on the growth of E. coli.

At concentrations that did not affect E. coli growth, coriander seed extract enhances T2 yield by as much as 125% compared to the control.

The earlier coriander seed extract is added to the infected cells, the greater is the effect on T2 yield. Addition of glucose to coriander seed extract treated E. coli cultures causes a decrease in the yield of T2 bacteriophage.

Even small concentrations of glucose inactivate the activity of adenylate cyclase enzyme.

Coriander seed extract enhances T2 replication by enhancing the production of cyclic AMP.