

Assessing the effects of MCC protective barrier on sustaining SOS3 bacterium viability when combined with chemical fertiliser

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Research questions

1. Does adding MCC to SOS3 bacterium culture sustain the cell viability when combined with chemical fertiliser?
2. If MCC sustains the bacterial cell viability, what's the shelf life of the mixture when stored at room temperature?

Treatments

1. Control (bacteria culture without MCC) + nitrophoska
2. MCCB (Bacteria culture mixed with MCC) + nitrophoska

Experimentation

The experiment started on 4 November 2019

Equipment: incubator, laminar airflow, autoclave, shaker, vortex, balance

Method:

1. Mixed 30 g of MCC powder with 100 mL of SOS3 culture, shook at 250 rpm for 1 hr at 30°C, then poured the mixture into Petri-dishes as a thin layer and dried it in a laminar airflow overnight. The slurry mixture became a powder when dried, hereafter called MCCB.
2. Combined 9 g of ground nitrophoska NPK fertiliser with 0.9 g of MCCB powder or 3.3 mL of SOS3 culture (control), shook well to homogenise the mixture, and kept it in a screw cap container at room temperature (25°C). For cell stability during storage, the cell viability was determined monthly (weekly in the first month).
3. To test cell viability, 0.5 g of combined nitrophoska and MCCB or control were dissolved in 4.5 mL water. The cell suspension was serially diluted in water and was spread onto pre-dried R2A agar. The number of colonies formed on the plates was counted after incubation for two days at 30°C.

Preliminary Results

A direct mix of SOS3 culture with chemical fertiliser showed no positive outcome. Living microorganisms are killed by chemical fertiliser salts almost instantly.

MCCB blend with chemical fertiliser is showing a stable viability of microorganisms for the experimentation period (see Fig. 1 below).

Experimentation will continue for 6 months.

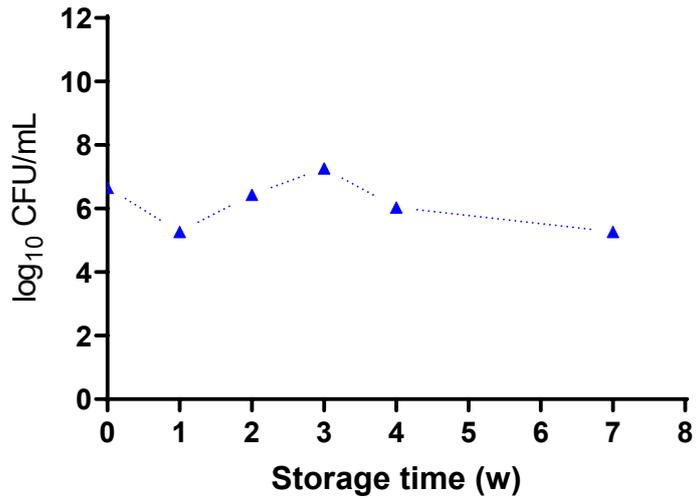


Fig. 1. Viability of SOS3 cells mixed with MCC in the chemical fertiliser blend after 7 weeks storage at room temperature.

Preliminary Conclusions

MCC protective carrier provides strong isolation of microorganisms from damaging environment including chemical salts (traditional fertilisers). Non-spore-forming SOS3 strain can be used in a blend with chemical fertilisers when 6+ months of shelf life is confirmed.