

EFFECT OF MAGNESIUM MONOPEROXYPHALATE AGAINST PAENIBACILLUS LARVAE LARVAE SPORES

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Summary

The authors searched for effective and environment friendly disinfecting preparation for the control of *Paenibacillus larvae* spores.

Magnesium monoperoxyphthalate hexahydrate (MMPP) was found useful. It is a component of commercial preparation Dismozon® pur. The efficacy of MMPP is significantly higher than efficacy of NaOH in room temperature.

Introduction

Paenibacillus larvae (P.I.I.) spores are very hard-wearing. Live spores in old hive parts, combs, honey and honey containers may induce clinical foulbrood of honeybees.

Recovery of foci of American foulbrood is very difficult because the spores of P.I.I. are highly resistant to common physical and chemical methods of disinfecting. We looked for an effective and environment-friendly procedure of P.I.I. spores' liquidation.

After screening of more commercial preparations, for this purpose ingredient Magnesium monoperoxyphthalate hexahydrate (MMPP) was found useful. It is a component of commercial preparation Dismozon® pur made by Bode Chemie, Hamburg. This substance works on the basis of active oxygen.

This is a disinfectant with excellent biodegradability.

Method

We tested efficacy of 1% MMPP solution against P.I.I.'s spores during 4 hours' exposure at normal temperature. The efficacy of MMPP was compared to efficacy of 5% solution of potassium lye (KOH) by the same exposure time at normal and high temperature (80°C).

Samples were after exposure cultivated on nutritive medium MYPGP agar with growth suppression of non-target microbes by nalidixic acid (30 mg/liter)

1. Comparison of anti P.I.I. spores effect in liquid medium.
P.I.I. spores concentrate ($6 \cdot 10^6$ /ml) was mixed into disinfecting solution and cultivated 10 min, 1 h, 4 h and 6 h before testing.
2. Wood surface disinfecting effect of MMPP 1%
Sterile wood plates were contaminated with P.I.I. spores, exposed 4 h in MMPP solution and next 24 h in laboratory conditions. After exposure wooden surface was wiped using a tampon and tested.
3. Wood structure disinfecting using MMPP 1%

Sterile wood plates were contaminated with P.I.I. spores, exposed 4 h in MMPP solution and next 24 h in laboratory conditions. After exposure wooden block was rubbed by rasp into 3 mm depth and ooden shaving was shaken in physiological solution 1 h.

Results

1. Comparison of anti P.I.I. spores effect in liquid medium

P.I.I. spores starting concentration: $6 \cdot 10^6$ /ml

| Exposure | MMPP 1% 20°C | NaOH 5% 20°C | NaOH 5% 80°C |
|----------|-----------------|-----------------|-----------------|
| 10 Min | $2 \cdot 10^4$ | $4 \cdot 10^6$ | n.d. |
| 1 H | n.d. | $4 \cdot 10^6$ | n.d. |
| 4 H | n.d. | $2 \cdot 10^6$ | n.d. |
| 6 H | n.d. | $2 \cdot 10^6$ | n.d. |

n.d. = not detected (detection limit = 10^2 CPU/ml)

2. Wood surface disinfecting effect of MMPP 1%

P.I.I. spores starting concentration: $6 \cdot 10^6$ /ml

| Exposure | Control | MMPP 1% |
|----------|----------------|------------|
| 28 H | $4 \cdot 10^6$ | n.d. |

3. Wood structure disinfecting effect of MMPP 1%

P.I.I. spores starting concentration: $6 \cdot 10^6$ /ml

| Exposure | Control | MMPP 1% |
|----------|----------------|------------------|
| 28 H | $5 \cdot 10^6$ | $1,6 \cdot 10^3$ |

Discussion

The efficacy of MMPP is significantly higher than efficacy of NaOH in room temperature.

The disinfecting effect of MMPP against P.I.I. spores in solution and on the surface is very good. The spores in wooden structure are better protected and the disinfecting effect is lower.

MMPP is the active ingredient of commercial product Dismozon(r) pur produced by BODE Chemie Hamburg.

Topic of our future research is development of technological procedures for disinfecting of beekeeping devices and honey containers

The advantage of MMPP is a minimal risk for staff during the usage and fast degradation of the disinfecting solution into harmless substances, which can be disposed of to sewerage.

The disadvantage is relatively short applicability of solution (within 24 hours after dissolution of crystalline substance) and rather high price.

Conclusion

MMPP as active ingredient of commercial product Dismozon® pur is promising environment friendly oxygen-active surface disinfectant with wide areas of application in beekeeping.