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## The State of the Art

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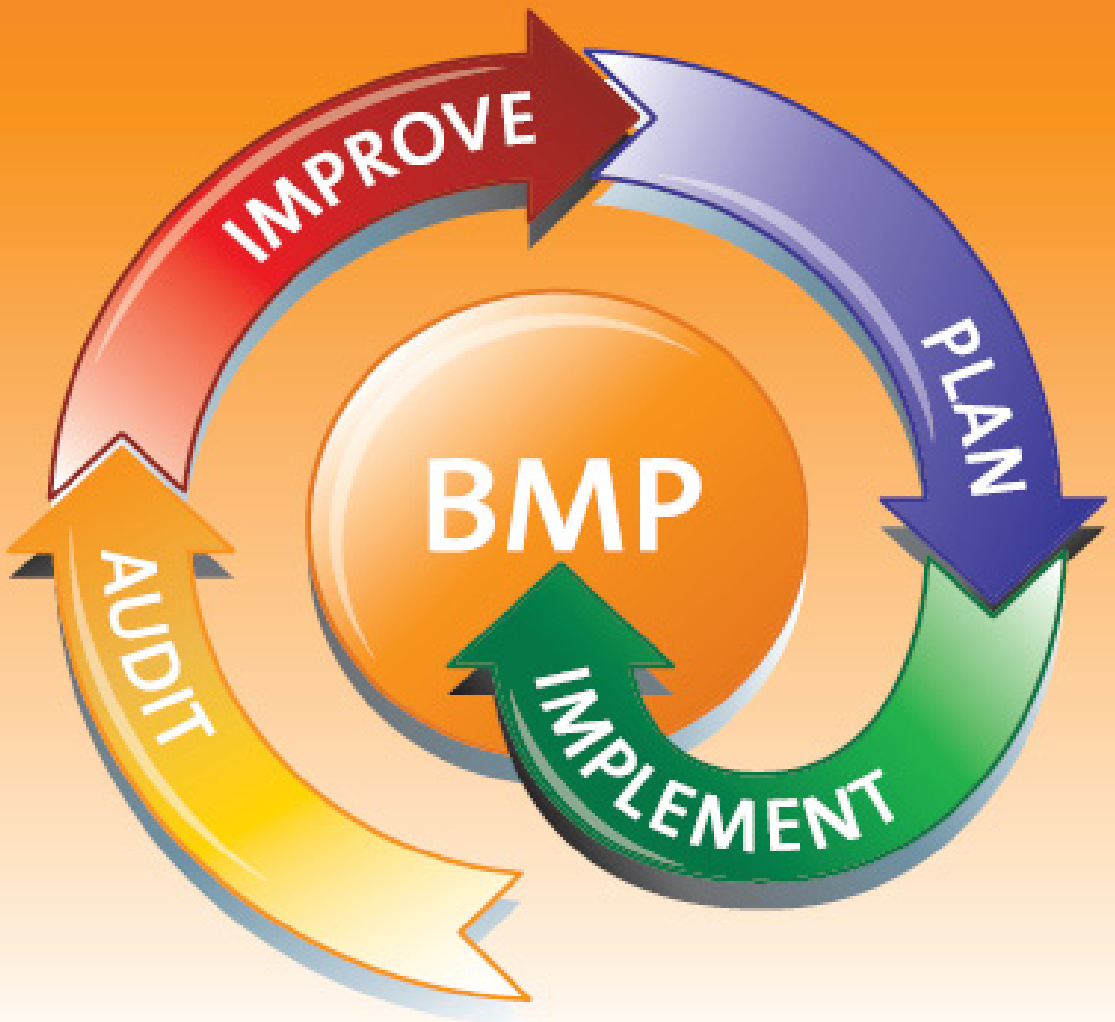


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**The effect of composting on *Synchytrium endobioticum*, the organism causing potato wart disease**

S Steinmöller, C Büttner
*Humboldt University Berlin, Lentzeallee 55, D-14195 Berlin, Germany*
*Email: s.steinmoeller@bba.de*

P Müller
*BBA, Stahnsdorfer Damm 81, 14532 Kleinmachnow, Germany*

## INTRODUCTION

During the fiscal year 2004/2005 c. 6.2 million tonnes of potatoes were processed industrially in Germany (Hambloch *et al*., 2005). During this processing different wastes accumulate which are potentially suitable for use on arable farmland (Steinmöller, 2003). Potato processing waste might be contaminated with *Synchytrium endobioticum*, the causal agent of potato wart disease. For this reason, waste must be sanitized before being applied to agricultural fields. The German Biowaste Ordinance sets out composting as an appropriate measure to sanitize waste, in addition to fermentation and pasteurization.

Given parameters for composting processes are 2 wk at temperatures around 55°C and 1 wk at around 65°C. So far, no research has been carried out to estimate the suitability of this processes to eradicate relevant quarantine organisms, such as *S. endobioticum*, in potato wastes.

The present study is aimed at finding out whether *S. endobioticum* can be totally eradicated by composting.

## METHODS

Quartz sand contaminated with resting spores of potato wart disease pathotype 1 was introduced through special carriers into the substrate to be composted. The substrate was a mixture of pulp and garden compost, at a ratio of 2:1. The carriers consisted of PE-canes (volume 120 ml), where lid and base had been removed. Instead, a poly-ethylene gauze with a pore size of 17 µm was attached with a PE-ring. Additional adhesive tape was used to secure the steadiness of the carriers.

Examinations of the eligibility of this carriers showed that resting spores of the pathogen were satisfactorily contained in the carrier. The heading of the substrate in the carriers was comparable to the surrounding substrates.

Composting was conducted in two 60-litre composters. The first run lasted for 2 wk and for 2 months, respectively. Temperatures were held below 50°C. Further composting runs lasted for 12 and 21 days. Temperatures reached 65°C during that time.

Carriers containing contaminated quartz sand were arranged on three levels in the composters. Altogether, 27 carriers were used per run and composter.

To evaluate the experiment, resting spores of the causal agent were recovered from the composted substrate using a sieve washer and then examined under the microscope. Under the microscope, definitive differentiation between viable and dead resting spores is extremely difficult (Langerfeld, 1984). For this reason, only completely empty resting spores were considered dead.

These examinations were paralleled by a bioassay on potato tubers (tube test). Therefore, potato tubers with a small sprout were fixed under a plastic tube. Subsequently, the tube was filled with the composted substrate and incubated at 15°C and 16 h light. After 3 months the potato tubes were examined for newly grown proliferations.

## RESULTS

During the microscopical examinations, viable resting spores were found after 2 wk and 2 months composting with temperatures held under 50°C.

The percentage of completely emptied (dead) resting spores enhanced after composting for 2 months compared favourably with composting for 2 weeks.

The bioassay resulted in the development of sporadic warts on the test plants after 2 wk of composting, whereas no warts could be found after 2 months composting. However, results from the bioassay are of unreliable because it is very difficult to standardize the test. Only a few control plants in untreated contaminated quartz sand showed warts.

Evaluation of composting for 12 and 21 days held above 65°C is still under way.

## REFERENCES

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