POTENTIAL OF Piper betle OIL FOR THE CONTROL OF POSTHARVEST FUNGI

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Global concerns on the excessive use of synthetic pesticides increase through the years because of the deleterious effects to human health as well as to the environment. Thus, efforts to look for alternative treatments towards foods and environmental protection are continuously being undertaken. Protection of foods after harvest faces great challenge because serious contributory factors to quality deterioration multiply so fast even in exponential form. Examples of which are the fungi that are associated with the postharvest decay of agricultural commodities such as fruits, vegetables, grains and many more. Synthetic pesticides are commonly applied directly on foods to arrest these unwanted biological agents but with the increased awareness on the serious health and environmental hazards caused by the synthetic chemicals, the search for natural plant-based material that would preserve the quality of fruits, vegetables and grains has gained so much interest including the present study.

This study evaluated the potential of *Piper betle* oil in controlling the proliferation of postharvest fungi affecting the quality of grain such as *Aspergilus flavus, A. niger, Penicillium digitatum, P. citrinum, P. italicum, Fusarium moniloforme.* These fungi are reported to be producers of mycotoxin which are harmful to human. Likewise, the potential of *P. betle* oil in controlling major postharvest fungi such as *Lasiodiplodia theobromae*, *Colletetrichum gloesporoides*, *C. musae*, from fruits was evaluated. These fungi are the causal-organisms for the development of postharvest diseases in fruits such as stem-end rot, anthracnose and diseases in mangoes and bananas. These fungi were isolated and purified using the standard microbiological procedures.

Results of the study showed that *P. betle* oil is a very versatile natural product because it shows potential in controlling wide arrays of fungi that cause postharvest problems in fresh agricultural commodities as shown in the following data.

Figure 1 shows the efficacy of *P. betle* oil in eradicating or inhibiting the growth of stored grain fungi in agar media. Results showed that *F. moniliforme, P. digitatum, A. flavus, P. citrinum* and *P. italicum* grow significantly from the first day of incubation period until seven days of observation in the control or untreated cultural media. On the other hand, the growth of these fungi was inhibited when *P.betle* oil was applied in the culture media. Therefore, *P. betle* inhibited the growth of these fungi that cause quality deterioration on stored grain

thus protecting stored grain from deleterious effects such as mycotoxin production.

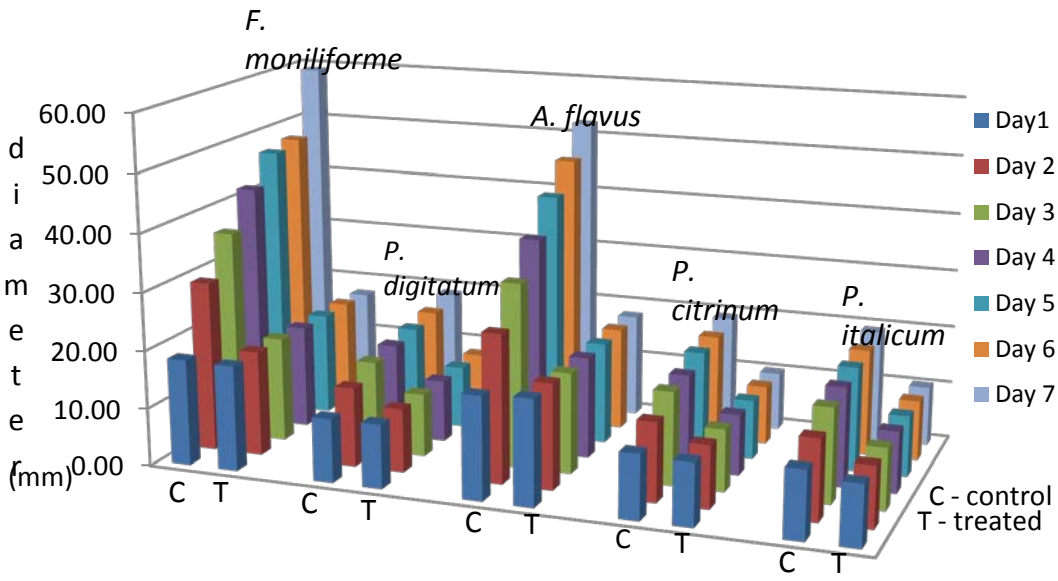

Figure 1. Effect of P. betle oil on the growth of stored grain fungi in progress of incubation period.

P. betle was also found effective in suppressing or controlling the growth of major postharvest fungi of fruits such as *L. theobromae*, *C. gloesporoides*, and *C. musae* as shown in succeeding figures.

Figure 2 shows that the *P.betle* oil is a good protectant and completely inhibited the growth of *L. theobromae*. There was no observed growth on the mycelia of *L. theobromae* in the culture media treated with 25% *P. betle* oil even up to seven days. However, it's growth was very pronounced in the culture media without *P. betle* oil.

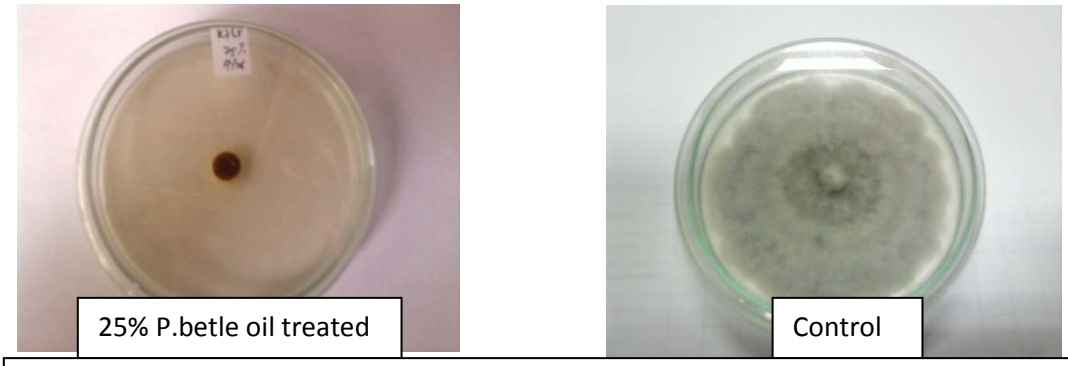

Figure 2. Effect of P.betle oil on the growth of *L. theobromae* after 7 days of incubation.

The same observation was noted on the effect of *P. betle* oil in *C. musae* as shown in Figure 3. There was very evident growth of *C. musae* in untreated culture media while this organism did not grow in culture media treated with 25% *P. betle* oil even up to seven days.

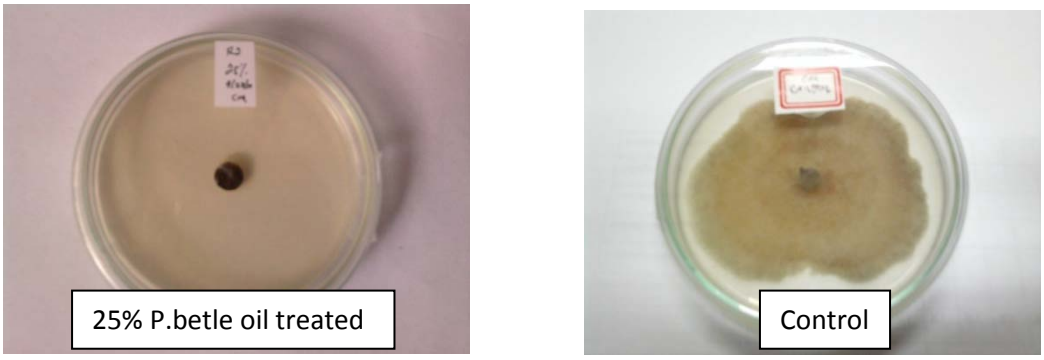

Figure 3 . Effect of P.betle oil on the growth of *C. musae* after 7 days of incubation.

Figure 4 shows the efficacy of *P. betle* in controlling the growth of *C. gloeosporioides*. It was very visible that *P. betle* oil controlled the growth of this organism even for two weeks observation period.

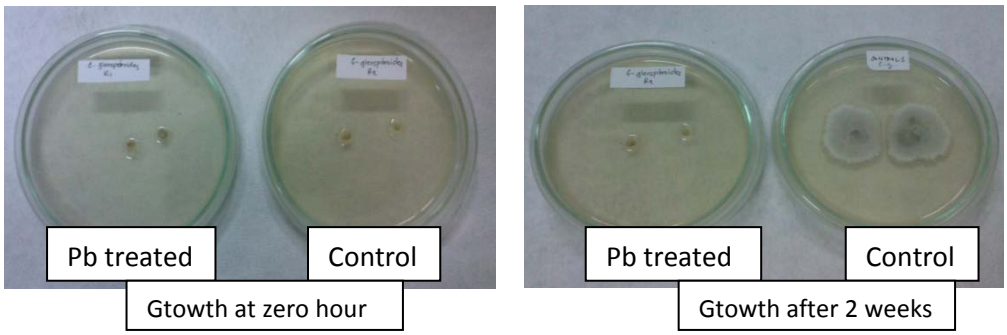

Figure 4 . Effect of P.betle oil on the growth of *C. gloeosporioides* after two weeks of

These results, therefore, indicate that *P. betle* oil has a great potential to be developed as a novel fungicidal agent against fungi that cause major quality deterioration on grains and tropical fruits. It gives protective effect on the proliferation of these destructive microorganisms, thereby, prolonging the postharvest life of grains and fruits in the region. Betle leaf oil is a natural product so it is a viable alternative to methyl bromide in the control of postharvest fungi.