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Biomass Production Improvement of Beauveria bassiana at Laboratory Scale for a Biopesticide Development

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Abstract : Beauveria sp. has been used as an entomopathogenic microorganism for biological control of various plant pests such as whitefly, thrips, aphids and chrysomelidaes (including Cerotoma tingomariana species), which affect soybean crops in Colombia´s Altillanura region. Therefore, a biopesticide prototype based on B. bassiana strain Bv060 was developed at Corpoica laboratories. For the production of B. bassiana conidia, a baseline fermentation was performed at laboratory in a solid medium using broken rice as a substrate, a temperature of 25±2 °C and a relative humidity of 60±10%. The experimental design was completely randomized, with a three-time repetition. These culture conditions resulted in an average conidial concentration of 1.48x10^10 conidia/g, a yield of 13.07 g/kg dry substrate and a productivity of 8.83x10^7 conidia/g*h were achieved. Consequently, the objective of this study was to evaluate the influence of the particle size reduction of rice (<1 mm) and the addition of a complex nitrogen source over conidia production and efficiency parameters in a solid-state fermentation, in a completely randomized experiment with a three-time repetition. For this aim, baseline fermentation conditions of temperature and humidity were employed in a semisolid culture medium with powdered rice (10%) and a complex nitrogen source (8%). As a result, it was possible to increase conidial concentration until 9.87x10^10 conidia/g, yield to 87.07 g/g dry substrate and productivity to 3.43x10^8 conidia/g*h. This suggested that conidial concentration and yield in semisolid fermentation increased almost 7 times compared with baseline while the productivity increased 4 times. Finally, the designed system for semisolid-state fermentation allowed to achieve an easy conidia recovery, which means reduction in time and costs of the production process.

Keywords : Beauveria bassiana, biopesticide, solid state fermentation, semisolid medium culture
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