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B&B e-Paper No. 8:

## Biofertilizers and Biopesticides (B&B) for Sustainable Agriculture No. 8

### A Full Range of Customized Services from ATRI Agro-Microbial Plant in Taiwan

Beneficial Microorganisms has been used to fight plant diseases in agriculture for centuries and drawn more attention because consumers are becoming increasingly concerned about food safety. It has been suggested that in an era of rapid climate change with anticipated increases in crop pests and diseases, maximizing microbial functions in agroecosystems has become indispensable for the future of global sustainable agriculture. Microbial products, such as biofertility inoculants and biocontrol products, are therefore expected to attract more investments. The application of microorganisms in agriculture, from discovery a functional strain to successfully commercializing microbial products, however, is a challenging task. In order to facilitate these transition between laboratory and field application. Agricultural Technology Research Institute (ATRI) opened a agro-microbial agents plant in March, 2020 at Pingtung Agricultural Biotechnology Park (PABP), Taiwan.

Currently, a number of fermenters were installed, the liquid state fermentation system from the scale of starter (10 litre), medium (100 litre) to the industrial (1,500 litre)(Fig.1.) and the solid state fermentation system (Fig.2.). The minimum efficient scale of fermenter in industry (notably the 1,500 liter) allows a flexible and quick-to-market test, and shall provide services for producing microbial products such as probiotics in animal feed and aquaculture; and biofertilizers, and biopesticides in agriculture.



Fig. 1. Starter (10 litre) (left), medium (100 litre) and industrial (1,500 litre) (right) of liquid

state fermentation system.

The Standard Operating Procedures (SOP) for the commercial production of *Bacillus subtilis*, *Streptomyces* spp. and *Bacillus velezensis* has been established. For example, the pilot-scale fermentation of *B. velezensis* has reached  $9 \times 10^9$  CFU/ml, and the bacterial concentrate up to  $8 \times 10^{10}$  CFU/g with our spray drying method. This product met the commercial specifications indicates that the industrial process of microbial production in our plant is well established.

In the meanwhile, the facility of microbial product plant has fulfilled the requirements of Taiwan's safety standards and passed the safety inspection. The application for factory registration is started. Technical services, such as OEM, ODM production and pilot run production, can be carried out to assist cooperative partners processing production validation testing, optimizing fermentation process, and approaching formula adjustment from lab scale, pilot trail to mass production. The product development process of new microbial products can be accelerated and more diversity microbial products can be expected to be commercialized in the near future with an assist from Agro-Microbial Products Plant of ATRI.



Fig. 2. Spray dryer (left) and solid state fermentation system (right).



Fig. 3. Samples of microbial agents granules (right) from fluidized bed granulator (left).

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