

Trichoderma Coir Pith Cake - A New Product For plant Disease Management

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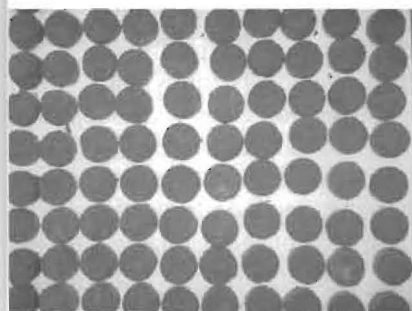
One of the major impediments in plant disease and pest management is the lack of economically feasible appropriate method of delivery of biocontrol agents (BCAs). The success of production and commercialization of biocontrol products depends upon various factors like bio-efficacy, shelf life with high population counts, multipurpose use, easy handling and storage, cost effectiveness and all the more, suitable, easily available and economical substrate with required nutrient balance. Different types of agricultural wastes / crop residues have been found to be effective carrier media for mass multiplication and field application of BCAs. Development of efficient biocontrol products using readily available and cheap agricultural wastes/by-products like coir pith is a dynamic process. It is reported that the estimated annual production of coir pith from coconut industries in India is about 7.5 million tonnes. Though coir pith is used to some extent for some purposes, a large quantity remains unutilized as a waste.

Several bacteria and fungi have been identified as effective BCAs for integrated pest and disease management. Among the antagonistic microbes *Trichoderma* sp. have gained wide popularity due to its ability to control many fungal pathogens of a variety of crop plants and as a plant growth promoting agent. *Trichoderma* sp. can be grown in a number of solid and liquid culture media. Potato dextrose broth, molasses, potato jaggery broth and coconut water are some of the commonly used media for multiplication of BCAs.

Talc powder is commonly used as a carrier material for commercial production of BCAs. Talc being an inert material does not provide any nutritive base for multiplication of beneficial microbes. Moreover talc formulation has a short shelf life. Considering some such disadvantages and cost of production, recently a dry cake like product of *Trichoderma* using coir pith, which is available in large quantity as a by-product of coconut industry, has been successfully developed with comparatively long

shelf life and high population count. This product is named as *Trichoderma Coir Pith Cake*.

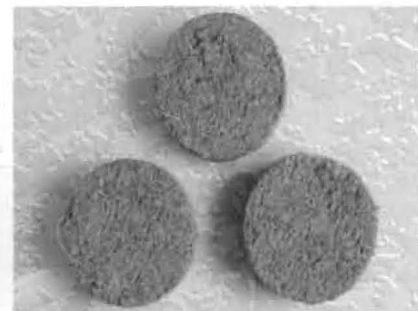
Trichoderma coir pith cake (TCPC) was prepared using *T.harzianum* biomass grown in potato jaggery broth, coir pith and maida. Potato jaggery medium was prepared following the method of preparation of potato dextrose broth except for the use of 20 g jaggery instead of dextrose. Cheap culture media like diluted coconut water can also be used for mass production of *Trichoderma*. Empty liquor bottles of 375 ml capacity with flat sides were used for the multiplication of *T.harzianum* (100 ml medium/bottle). The fungal biomass along with medium was thoroughly mixed and the *T.harzianum* biomass slurry was then mixed with moistened and sterilized coir pith and maida paste prepared by boiling maida flour in water. Maida served as binding-cum-nutrient material for TCPC. Thus the mixture for the preparation of TCPC consisted of only 3 ingredients @ 500 g sterilized coir pith + fungal biomass prepared in 100 ml medium + a paste of 70 g maida.



Trichoderma coir pith cakes (TCPC)



Trichoderma coir pith cups



TCPC-before activation



TCPC with abundant growth of *Trichoderma* -after activation

Each piece of TCPC was prepared by manually compressing 30 g of the mixture in a kitchen press. Simple pedal or electrically operated machine with a capacity to produce several cakes at a time can also be designed and made for commercial production. The wet cakes were dried in an oven at low temperature so that the final moisture content of dried TCPC was around 7% and the weight of each cake was about 5 g. The dried TCPCs can be filled in polythene bags, sealed and stored at room temperature.

The viability of *Trichoderma* could be maintained in dry TCPC for a long period compared to talc formulation. The shelf life of TCPC was found to be 10-12 months with the recommended standard for *Trichoderma* population in formulations. Dry TCPC can be activated by a simple process of moistening the cake at the time of application in the field for management of diseases. When TCPCs were activated by soaking in water and incubated at room temperature for 2-3 days, *Trichoderma* grew very fast and the whole cake was covered with a thick and fluffy green growth. Maida has been found to be a very good nutrient base for fast multiplication and luxurious growth of *Trichoderma* in activated coir pith cake. Thus dry TCPC, which can be easily activated by a simple process, is found to be a successful formulation for commercial production. *Trichoderma* coir pith cups were also prepared following the same production technology of

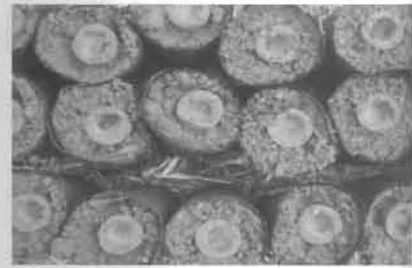
TCPC for bio-priming or sowing of seeds in nurseries for disease management as well as for plant growth promotion. Pesticide slow release cake (PSRC) is yet another product prepared using coir pith as base material for slow release of pesticides to target sites with very negligible quantity of loss of pesticide compared to conventional methods of application. Field testing of PSRC is in progress.

Application of TCPC to the crown of coconut palms @ two cakes per palm in the leaf axils adjacent to the spindle leaf just before the onset of south-west monsoon and thereafter at bimonthly interval till December was found to be very effective as a prophylactic treatment in the integrated management of bud rot



Treatment of TCPC in coconut leaf axils

disease caused by *Phytophthora palmivora*. Continuous application of TCPC during rainy season for about 3-4 years is expected to help in the build up of *Trichoderma* population in coconut crown which will inhibit/suppress *P.palmivora* and thereby controlling bud rot disease without any other treatment. As *Phytophthora* is a soil-borne fungus, application of TCPCs in the soil at the base of palms also will help to suppress soil population of



Trichoderma coir pith cups kept in potting mixture filled in polythene bags

the pathogen. *Trichoderma* coir pith cups were used successfully as one of the components in integrated management of *Phytophthora* infection of cocoa seedlings in nurseries during rainy season. Coir pith cakes loaded with suitable BCAs may also be tried for the management of leaf rot disease of coconut which is a serious problem in root (wilt) disease affected areas causing heavy yield loss.

TCPC, an eco-friendly product has several advantages compared to many other formulations like easy to prepare, store, transport and to handle at the time of application, light weight, availability of nutrients for fast multiplication of BCAs, simple activation process for fast and active growth with abundant mycelia and spores and long shelf life. The technology developed for production of TCPC can also be used as such or with slight modifications for commercial production of various other BCAs utilizing coir pith or other agricultural by-products/wastes. Shape and size of final product can also be changed according to the requirements for pest and disease management of various plants. Thus, this technology has wide scope not only in producing cost effective and high quality bio-control agent formulations but also in the proper utilization of agricultural wastes and in generating employment opportunities in small scale industry sector.