

Operating Instructions for the MycoHarvester Version V



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APPLICATION

The MycoHarvester 5 is designed to remove powdery fungal spores safely and efficiently from conidiated grains such as rice. It is suitable for small-scale, non-continuous preparation of samples of beneficial microbial agents, in genera such as *Metarhizium*, *Beauveria*, *Paecilomyces* and similar powdery fungi; it has also been used with several species of *Trichoderma* that have hydrophilic cell walls. Spores (usually conidia) are concentrated to preparations that are easy to desiccate, formulate and package. Extracts conform to the high quality particle size specification and should contain no large (>100 µm) particles, which may for example block sprayer filters and nozzles. See our web site (www.mycoharvester.info) for updated specifications for more background information.

ASSEMBLY (and transportation)

The MycoHarvester is supplied partially assembled. Start by ensuring that the motor housing is well secured to the frame (4 wing nuts). Then placing both on their side, screw in the 4 metal adjustment feet to the base of the frame (see Figure 1). After opening the motor housing (2 black handles) insert remaining feet into the two available holes and fasten with 10 mm nuts (see Figure 2). The substrate (fluid-bed) column, via its removable half-tube clamp, must be attached to the right hand side of machine with 2 wing nuts. The cyclone unit must be lowered into the centre of the frame and fixed with 4 wing nuts: 3 at the top, 1 at the rear.

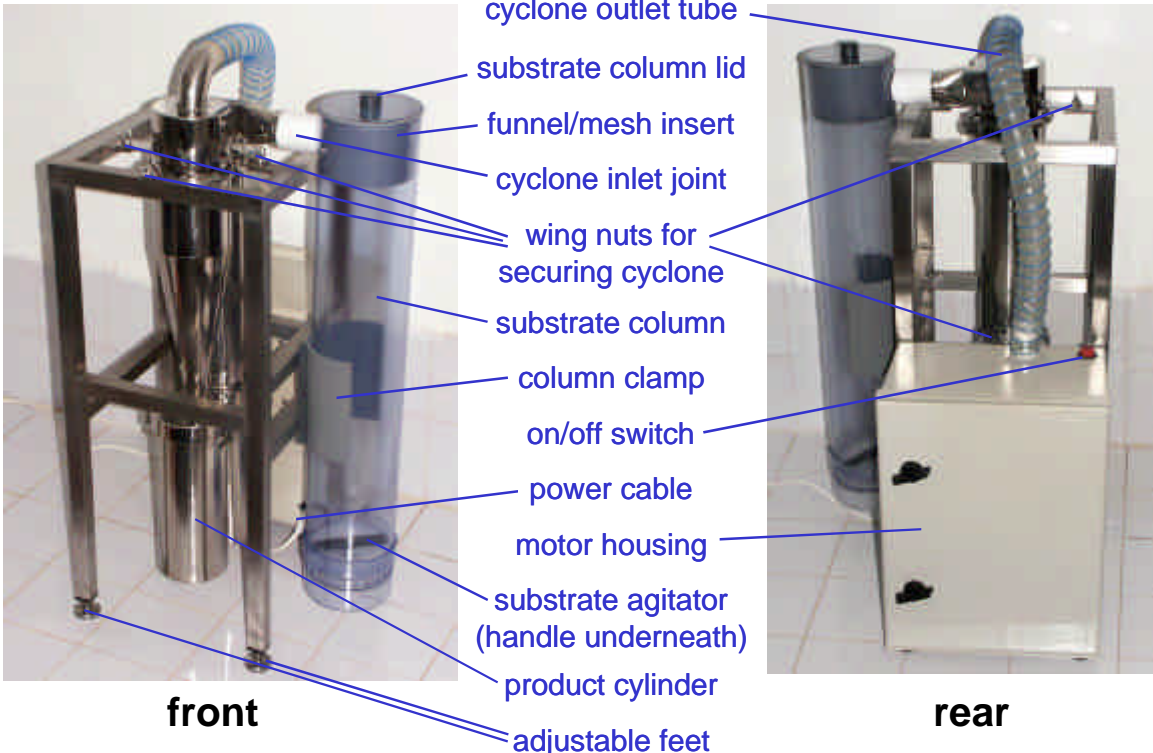


Figure 1. Assembly of the MH5 spore separator

OPERATION

A respirator (filtering particle sizes of >1 µm), disposable/washable coveralls and gloves should be worn when working with fungal conidia or any other dusty, proteinaceous material.

The conidiated substrate should be air dried to between 10% and 20% moisture content to permit efficient extraction of conidia.

1. Make sure **all MycoHarvester parts are dry** before use.
2. Turn on unit: a red switch located top left-hand side of motor housing. **Do not operate the motor without the cyclone assembly and collecting cylinder in position.**
3. Remove the substrate column lid, leaving the funnel/mesh insert in place.
4. Slowly and carefully pour conidiated rice (maximum 500g) onto the substrate column with the motor operating.
5. Slowly slide back the column lid the substrate column lid.
6. Operate fluid bed for maximum of 5 min., or until conidial dust is no longer visible entering the cyclone unit. Shorter periods (1-2 minutes per batch) are typically required if rice is sufficiently dry. Agitate rice occasionally using the handle attached to the bottom of the fluid bed.
7. **Pay special attention to the sound made by the motor during operation; a change in pitch may indicate that one of the passages is becoming blocked and that the motor is labouring. If this occurs, switch off the motor and carry out the cleaning schedule (below).**
8. Turn off motor before emptying the substrate column. Remove the lid and mesh insert, then carefully remove it from the clamp and tip out cleaned substrate.
9. Depending on the conidial yield of the fungal isolates being produced, up to 4 kg (8 x 500 g batches) of substrate can be processed in sequence before emptying the cyclone.
10. Good quality spore powder is found in the front collecting cylinder. Remove collecting cylinders by carefully pushing down 2 clips on each side. Then gently brush any spores from the top of the cyclone housing. Be careful to **replace the black gasket**: slotted on around the top of the collecting cylinders.
11. Larger particles such as substrate and mycelium collect in the rear cyclone, but this may also contain a high proportion of clumped spores. These larger particles, are therefore often reprocessed (usually with the following batch of substrate). Otherwise, the residue may be used for preparations of certain fungi, or discarded.
12. Harvested spores may require further drying (using a desiccator or a dry room) to maximise storage (*e.g.* some *Metarhizium* isolates <5% moisture content) before packaging.

REPROCESSING LOW GRADE SPORE EXTRACTS

- 1 The specifications of crude spore extracts can often be improved if reprocessed after mixing with a dry, non-dusty granular substrate such as uncooked grain.
- 2 Switch on motor and pour in the spore mixture slowly and carefully.
- 3 Replace lid carefully and leave motor on for one minute (or until all material has been drawn out of the fluid bed column).
- 4 Continue from step 7 (above).

N.B. The particle size of reprocessed material may be of lower quality than standard extraction directly from grain surfaces. Product quality is most likely to be impaired if the material to be reprocessed is introduced too quickly.

CLEANING and MAINTENANCE

Ensure that this is done with adequate ventilation, the use of appropriate protective clothing and dust masks.

All pipe work and the area around the cyclone inlets should be inspected regularly for build-up of powdery deposits. Be careful not to loose the gaskets at the top of the collecting cylinders: these are essential for satisfactory operation.

After operation, remove cyclone unit and substrate column. Wash using an effective sterilising cleaning fluid; rinse and dry thoroughly. A 5% sodium hypochlorite solution is commonly suitable; alternatively, proprietary bleaches can also be used, but concentrations vary between different products. Scientists at CABI and other collaborating institutes have also found 'Virkon'[®] to be a useful product. It is always important to check that the material used is compatible with the plastics and effective. If required, the stainless steel cyclone unit (and the silicone gasket) can be autoclaved, but it is important to remove the plastic inlet joint. The cyclone can be opened easily with the circular clip (shown in Fig. 2); when re-assembling it is important to align the two halves as shown. Make sure **all parts are dry** before use.

There two filters in the MycoHarvester motor unit (Fig. 2). Usually it is only the main fan motor filter should be inspected frequently (after every 10 hours of use), and must be cleaned regularly. This may be washed in cool water but must be allowed to thoroughly dry before reusing. The outlet filter only needs replacing very rarely. Motors should give at least 100 hours of use (and almost certainly much longer). However their life span will be impaired seriously if operated with a clogged machine for long periods. The motor has an automatic thermal cut-out; should it over-heat, switch off at mains, wait for it to cool and check for any blockages (*e.g.* are all the pipes and filters clean?) before restoring power.

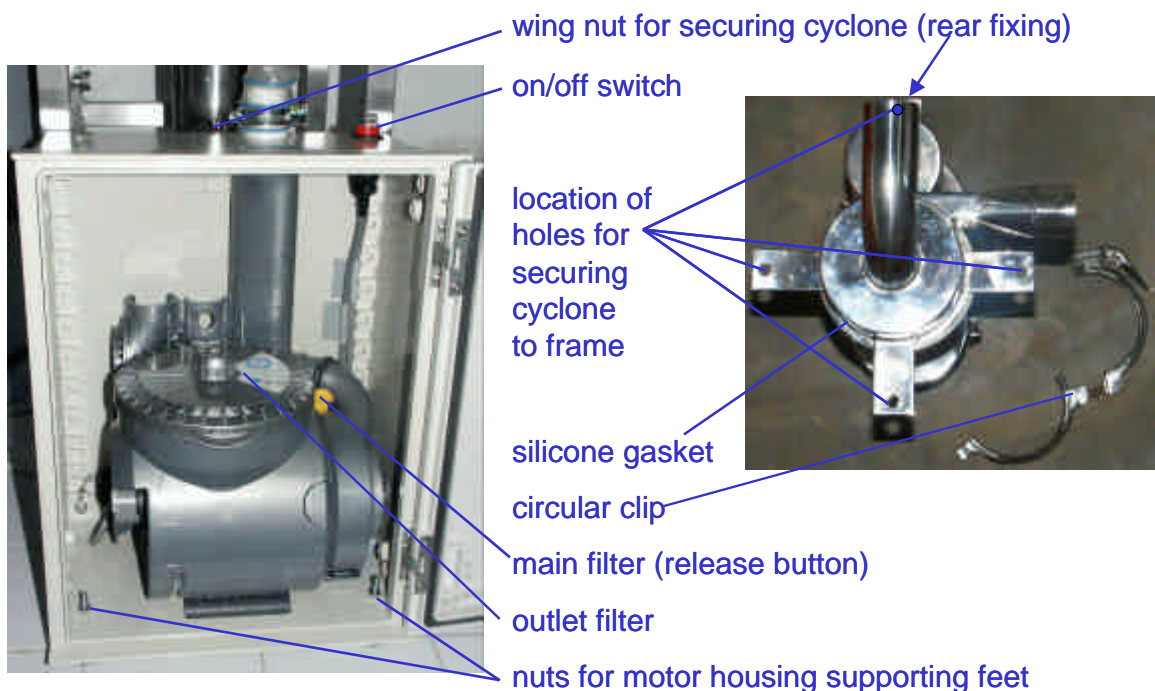


Figure 2. Detail inside fan motor housing (left) and alignment of cyclone mountings (right)

NOTICE

The equipment is covered for a period of one year for manufacturing faults or faulty materials. Use of the equipment in hazardous environments or for purposes other than experimental spore production (*e.g.* commercial work) is excluded from this warranty. Similarly, damage caused by incorrect servicing or mishandling, normal wear and tear (*e.g.* damage or wear of the motor due to excessive and persistent operation) is also excluded. Filters must be cleaned and/or changed on a regular basis.

The manufacturers and distributors accept no responsibility for any damage either to the equipment or any other item or personnel in the environment of the unit occurring during operation. Users must be made aware of the possibility that hazardous micro-organisms may contaminate mass production processes, and spore extraction should always take place under the supervision of trained microbiologists. Due to the hazardous nature of dusty material (including the risks of inhalation, allergy and explosion), appropriate safety precautions must be exercised at all times.

Accessories

The MycoHarvester V is supplied with an extra collecting cylinder. Further collecting cylinders, filters and spare parts are available on request.

Specifications

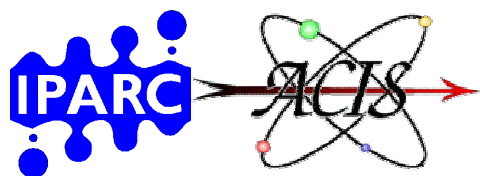
Weight: 21.5 kg (including spare spore cylinder)

Dimensions (unpacked, assembled): 430 x 500 (deep) x 830 mm high

Particle classification: Based on analysis of extractions of aerial conidia of *Metarhizium anisopliae*, the MHV conforms to the particle size specifications established during research by the LUBILOSA Programme. Analysis is most effectively carried out with a laser particle size analyser (*e.g.* the Malvern 'MasterSizer'). For production of stable formulations, the size spectrum of extracted material (by volume) should be:

- <10 µm: >80%
- <100 µm: 100%

Power supply: 220-240 v. a.c. Mk V MycoHarvesters are normally supplied either with 13 amp (rectangular pin¹) or European standard (round pin) plugs. Other standards can be fitted on request, otherwise equipment will be supplied without plug.



Distributor:
Imperial College Consultants
c/o IPARC, Silwood Park, Ascot,
Berks. SL5 7PY, UK

Visit our web site:
<http://www.mycoharvester.info>
Advice and installation of industrial-scale
equipment is available on request.



¹ Standard for: Hong Kong, Ireland, Kenya, Malaysia, UK, Zambia, Zimbabwe and other countries.