Fungal Genetics Reports

Volume 10 Article 13

Mite control for Neurospora lobs

R. E. Subden

S. F.H. Threlkeld

Mite control for Neurospora lobs

Abstract

Mite control

Subden R.E. and S.F.H. Threlkeld. Mite control for Neurospora lobs.

As far back as 1939 (Lindegren 1939 Bot. Gaz. 100:592) mites have been known to infest and contaminate fungal cultures. Mites are also known to infest Drosophila cultures. Most of the mites concerned are of the genus Tarsonemus (Fig. 1) and a few are Tetranychus or Tyroglyphus. Being phytophagous they eat Neurospora culture in one tube, proliferate there, and then migrate to the next. Because they are only 130 μ long they can enter cotton plugged test tubes and flasks or covered petri dishes. They carry conidia of contaminants or other Neurospora stocks rendering all of the laboratory stocks suspect with respect to their genetic integrity.

Lindane or gammexane (I-Z-3-4-5-6 hexachloro cyclohexane) has been used but is only moderately effective and being toxic as well as carcinogenic, is quite dangerous. Sodium or ammonium hydroxide vapour will clean out an incubator but apparently does not affect established mite colonies. Dipping the plugs in glycerine is effective but tedious and messy.

The proposed method of an absolute control programme consists of 2 parts: (I) killing all adults, nymph.1 instars and eggs by freezing. (2) chemical prophylaxis.

Mites will supercool to about -10°C whereupon a crystal lattice forms throughout the body, followed by a decrease in translucence or increase in opacity. The kill remains low at temperatures above -15°C; so care should be taken to treat stocks at -17.8°C (0°F). Presumably the effect is chemical rather than physical (Salt 1961 Ann. Rev. of Ent. 6:64) so the rate of cooling is unimportant although for our experiments the rate is described in (Fig. 2). To achieve 100% kill and prevent selection for freeze-resistant or cold-hardy mites, 24 hrs. should be the minimum freezing time (Fig. 3). Conidia have almost 100% survival (even at -180°C). Ascospore survival following treatment at this temperature (-17.8°C) is poor. However, crosses that are mite infested are generally rejected so ascospore survival is less important than conidial survival.

Prophylactic measures consist entirely of treatment with Kelthane AP (I, I-bis (chlorophenyl) 2,2,2-trichoro-ethanol), which con be obtained from any Rohm and Haas dealership or from their head office in Philadelphia. It has the desirable properties of: low LD_{50} for mites, high LD_{50} for man, a specific acaracide (has little effect on most insects or even related mite genera) and can be obtained in a wettable powder that is not irritating to the skin. Toxilogical investigations on Kelthane were carried out at the Medical College of Virginia (Smith et al. 1959 Tox. and Appl. Pharm. 1: 119). All work to date has revealed encouragingly good results (1/4 the oral toxicity of DDT to mammals). It is reported that, although residual effects of Kelthane on mites is fair, a bi- or tri-annual treatment is recommended. Culture and cross racks, incubator shelves and walls, and window perimeters should all be wiped down with Kelthane AP. This acaracide affects only the adults so it should be carried on in conjunction with the freezing programme which kills the eggs. Tarsonemus is particularly sensitive to dryness so dehymidifierr are also preventitives.

Absolute control of infested cultures can be obtained by freezing at -18°C for 24 hrs. and Kelthane treatment of all equipment except tubes, plugs and media.

Fig. 1 Male Mite

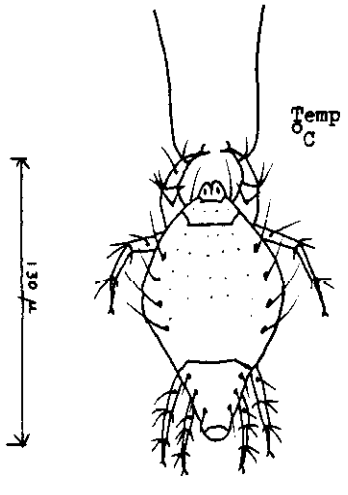


Fig. 2 Freezing Rate

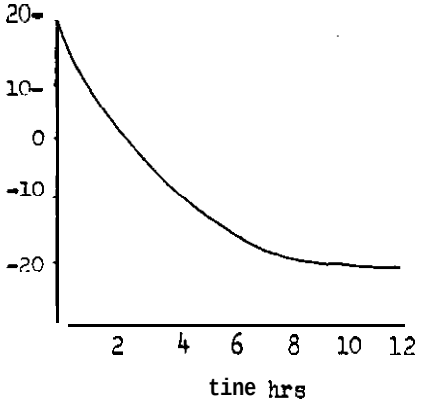
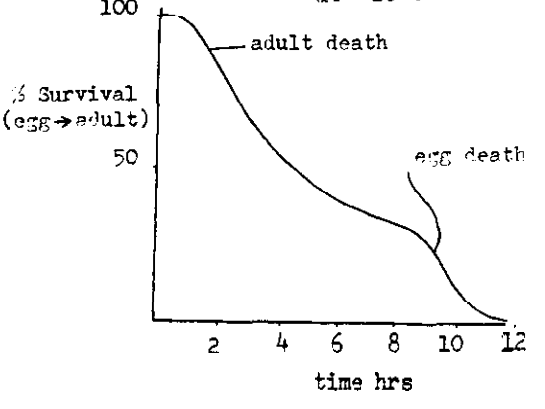


Fig. 3 % Survival of Mixed Population at -18°C



- - - Department of Biology, McMaster University, Hamilton, Ontario, Canada.