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STUDIES ON THE LONGEVITY OF TWO SELECTED DERMATOPHYTES

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Survival studies of 2 selected dermatophytes namely *Trichophyton rubrum* and *T. tonsurans* has been carried out in unsterilised, sterilised soil and SDA media at three different temperature condition like 11±1°C, 37°C and room temperature. Unsterilised soil and SDA media were found more suitable for survival of both fungi. 11±1°C temperature was found to be suitable for survival up to two years in all the three conditions. *T. tonsurans* has a longer survival period than *T. rubrum* at three different temperature conditons.

Keywords : Dermatophytes; Longevity; Soil.

Keratinophilic fungi, generally considered as soil saprophytes[1], are not dermatophytes but soil inhabitants. They occur on cornified debris in the soil and degrade keratin and keratinous material. Therefore they play an important ecological role in decomposing such residue. Since they are ecologically restricted to keratin as substratum, these can be recovered regularly from the soil by hair bait technique of Vanbreuseghem[2]. Many of them are closely related to the dermatophytes having properties in common with them and cause human and animal infection. Grin and Ozegovic[3] have discussed long term survival of keratinophilic fungi in sterile soil. Alteras[4] performed survival studies of keratinophilic fungi in garden soil, forest soil and soils of the plains rich in organic matter. Garg[5] made such studies with regard to sterile soil only. In our previous work[6], *Microsporum gypseum, Trichophyton simii, Gymnoascus reessii, Chrysoporium tropicum* and *Cephaliophora irregularis* were tested for their longevity in soil and culture media at three different temperature condition.

In present experiment we selected two more common ring worm pathogens *Trichophyton rubrum* and *T. tonsurans* for survival studies. No work has been done regarding survival studies of these selected fungi any where so far.

The keratinophilic and dermatophytic fungi usually survive in soil. The longevity of spores and the survive capacity of two selected fungi, namely *Trichophyton rubrum* and *T. tonsurans* were tested. *T. rubrum* was isolated from *Tinea corporis* and *Trichophyton tonsurans* was isolated from *Tinea capitis* infection.

For the study of the viability or survival of dermatophytic fungi, garden soil was taken for experimental purposes. The experiment was divided into three aspects :

1. Survival studies in unsterilised soil;
2. Survival studies in sterilised soil; and
3. Survival studies in culture medium (SDA).

Both dermatophytic fungi were tested for their longevity in soil and culture medium at three different temperatures, that is, room temperature (ranging from 16-45°C in a year), culture room temperature (25±2°C) and refrigerator temperature (11±1°C).

For the first aspect of the study, there was no need of autoclaving the soil. For the second aspect, one litre conical flasks were filled up to three quarters with garden soils and were steam sterilised successively for three days at 20 lb pressure for half an hour. These soils were then transferred to pre-sterilised polythene bags with the help of sterilised spatula. Ten-fifteen days old culture of each test fungi with approximately same diameter were then transferred into each of these bags individually and packed tightly with rubber bands. Each plastic bag was labelled, indicating type of soil (unsterilised or sterilised), date of inoculation, name of organism, date of every four-month testing and temperature conditions, etc. These bags were then placed in three different temperature conditions for incubation. For the third aspect, the required quantity of SDA was prepared, poured into tubes and autoclaved. The tubes were also

Table 1. Longevity of Keratinophilic Fungi (*Trichophyton rubrum* and *Trichophyton tonsurans).*

	I Test				II Test				III Test				IV Test				V Test				VI Test			
	BT		DSS		BT		DSS		BT		DSS		BT		DSS		BT		DSS		BT		DSS	
	Tr	Tt	Tr	Tt	Tr	Tt	Tr	Tt	Tr	Tt	Tr	Tt	Tr	Tt	Tr	Tt	Tr	Tt	Tr	Tt	Tr	Tt	Tr	Tt
Unsterilised soil																								
i Room Temp.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	–	+
ii Culture room temp.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
iii. 11 ± 1°C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sterilised soil																								
i Room Temp.	+	+	+	+	+	+	+	+	+	+	+	–	–	–	–	–	–	–	–	–	–	–	–	–
ii Culture room temp.	+	+	+	+	+	+	+	+	+	+	+	–	+	–	–	–	–	–	–	–	–	–	–	–
iii. 11 ± 1°C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
SDA medium																								
i Room Temp.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	–	+	–	+
ii Culture room temp.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
iii. 11 ± 1°C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Tr= *Trichophyton rubrum*

Tt= *Trichophyton tonsurans*

inoculated with known quantity of inoculum of each test fungus individually and incubated at three different temperature conditions.

Definite portions of these inoculated material were taken out aseptically from each bag/tube periodically after every fourth month and tested for viability by direct soil sprinkling method (DSS) and hair bait technique (BT)[2] and the results recorded. '+' sign meant that the fungus was viable and '–' sign meant that the fungus was dead by the time the longevity test was performed.

The data presented in Table 1 indicate that the survival period of *T. rubrum* and *T. tonsurans* was much higher in unsterilised soil as compared to sterilised soil. In unsterilised soil, *T. rubrum* remained viable for two years in both temperature conditions through bait testing and soil sprinkling method.

In sterilised soil condition *T. rubrum* showed viability up to one year (both methods) at room temperature and up to one year and four months at culture room temperature (only through bait testing).

Alteras[1] has discussed the possible reason for the survival of keratinophilic fungi in non-sterile soil. He attributed it to the presence of competition among micro-organisms which form nutrient for the survival of the fungi in the soil for a long term. The present observations agree with the opinion of Alteras[4] that the test fungi can survive for longer periods in soil that is unsterilised as compared to sterilised soil where there are no micro-organisms and the organic content also gets destroyed by sterilisation of soil, making it difficult for the micro-organism to live for longer period in sterilised soil.

T. rubrum and *T. tonsurans* showed viability up to two years at 11 ± 1°C temperature in all the three conditions. At this temperature, the fungi stored after sub-culturing, so it was found that low temperature condition favoured the longevity of fungi in different soil types and media. Sharma and Jain[6] also did a survival study of *Microsporum gypseum, Trichophyton simii, T. terrestre, Gymnoascus reessii* and *Cephaliophora irregularis* in different soil types and at different temperature conditions. They found that these keratinophilic fungi had longer survival periods in unsterilised soil as compared to sterilised soil. The temperature of 11±1°C was found favourable for almost all the test fungi.

In SDA medium which is found to be the best for the growth and sporulation of keratinophilic fungi, *Trichophyton tonsurans*, remained viable up to two years in all the three temperature conditions while *T. rubrum* survived up to two years at culture room temperature and up to one year and eight months (Vth testing) at room temperature condition.

Trichophyton tonsurans showed longer period in unsterilised soil and on SDA medium while *T. rubrum* showed longer survival period in sterilised soil at culture room temperature conditions (only in bait testing) than *T. tonsurans*.

Grin and Ozegovic[3] showed that anthropophilic and zoophilic fungi are normally lysed and destroyed by micro-organisms present in natural soil. Our present study is in striking contrast to their observation and showed that dermatophytes and related keratinophilic fungi, when placed in unsterlised soil, survive and proliferate with ease.

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