STUDIES ON THE *CEPHALIOPHORA IRREGULARIS* THAX.

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Abstract

Cephaliophora irregularis Thax. *is reported for the first time in Pakistan. From the cultural studies of* C. irregularis *it was noticed that the cardinal temperatures for growth are* 20, 30, 35 *and* 40 *C. The sporulation was abundant only on DA between* 25 *and* 40 *C. Maximum growth and sporulation was at* 6.1-7.5 *pH range while on MEA the sporulation was at pH* 9.1 *only.*

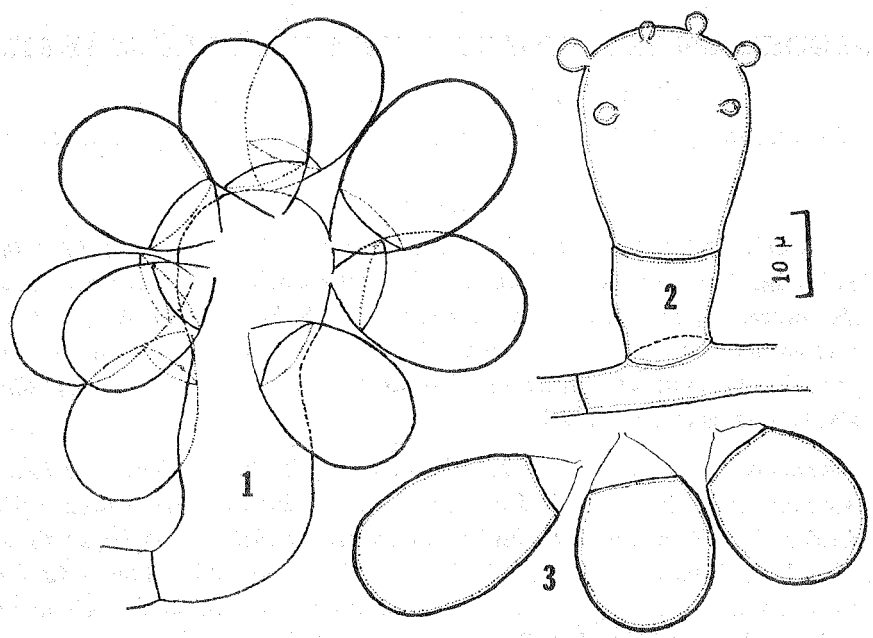
Cephaliophora irregularis was first described by Thaxter (1903) who found it growing on mouse dung collected in Puerto Rico. Since then it has been reported on dead and moist wood from India (Subramanian 1953), from Japan (Tubaki 1956) and was isolated more recently from soil in Germany by Bunschoten, from cacao beans in London by Elphick and from garden soil collected in Great Falls, Virginia, U.S.A. by Goos (1964).

During the recent study of coprophilous mycoflora of West Pakistan an interesting and 'rare' fungus was found twice growing on dung of herbivorous animals. It was identified as *Cephaliophora irregularis* Thax.

Description of the Fungus

The fungus grows rapidly on most common agar media at 30-35 C, completely filling a 9 cm Petri plate in about four days. Colonies are salmon coloured with abundant sporulation on dung decoction agar only. Conidia are borne in heads on the inflated more or less clavate tips, known as ampullae, of conidiophores of variable length. The conidiophores are often reduced to ampullae which may be septate or aseptate, 27.5 - 52.5 x 14.5 - 21.2 μ. Conidia blastogenous, arising more or less simultaneously as blown out points on ampullae, obovoid, hyaline under the microscope, 21-30 x 12-18 μ, 1-septate, septum nearer the lower narrow end, the apical cell of conidia large and viable with wall about 1 μ in thickness, the basal cell without protoplasm at maturity, with a wall thinner than that of the upper cell and usually collapses after the discharge (Figs. 1-3).

Isolated from cow dung in moist chamber collected on 30.9.67 by Miss Aisha Khatoon from Lyallpur (MHL 1115); on sheep dung which was crushed and



Figs. 1-3. *Cephaliophora irregularis* Thaxter (MHL 1115)
1. An ampulla with mature conidia.
2. An ampulla showing the development of conidia.
3. Mature detached conidia.

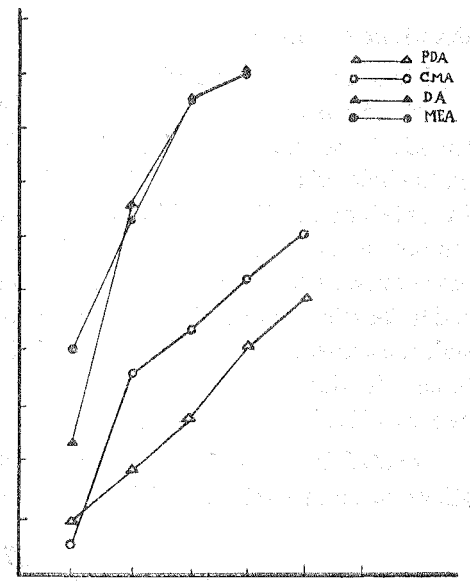


Fig. 4. The effect of media on the colony diameter of *C. irregularis*. Potato dextrose agar (PDA); corn meal agar (CMA); dung decoction agar (DA); and malt extract agar (MEA).

covered with a thin layer of dung decoction agar in a Petri plate, collected on 1.5.68 by Mr. S. Mahmood from Lyallpur (MHL 1080).

One of the above isolates (MHL 1115) was grown in pure culture, with the aim of conducting cytological studies. However, when it was subcultured for this purpose, it failed to sporulate on malt extract agar at room temperature. Therefore, physiological studies were conducted in order to find the best conditions for its growth and sporulation in culture. This paper records its taxonomic characters and the effect of temperature, pH and different media on its growth and sporulation.

Materials and Methods

The culture of *Cephaliophora irregularis* used for physiological studies was obtained from cow dung (MHL 1115).

Four media, 2.5 per cent Difco malt extract agar (MEA), 1.7 per cent Difco corn meal agar (CMA), potato dextrose agar (PDA) and dung decoction agar (DA) were used in these studies.

The composition of PDA and DA was as follows:

PDA: Potato starch, 20 g; dextrose, 20 g; agar, 20 g; water, 1000 ml.

DA: Dung decoction was prepared by adding 80 g of cow dung to 1000 ml of water. The medium was prepared by adding 20 g of agar to 1000 ml of dung decoction.

To study the effect of temperature and pH, 8 different temperature ranges 10, 15, 20, 25, 30, 35, 40 and 45 C and seven pH levels of the media *i.e.*, 4.1, 5.0, 6.1, 7.5, 8.5, 9.1 and 9.8 were used. The pH was adjusted before sterilization of the media by using either N/10 HCl or N/10 NaOH. Two media CMA and DA were used for temperature and pH studies.

Results and Discussion

Culture media

C. irregularis was grown on four different non-synthetic media *i.e.*, PDA, CMA, MEA and DA. The rate of growth was much faster on DA and MEA and the colony filled 9 cm dishes within four days. However, on PDA and CMA, the rate of growth was little slower as compared to DA and MEA. The growth on MEA was very thick and cottony while on DA the growth was not so dense. On PDA, and MEA the growth was thin and loose. The sporulation took place only on DA. There was no sporulation on any other media. The rate of growth on different media is shown graphically in Fig. 4.

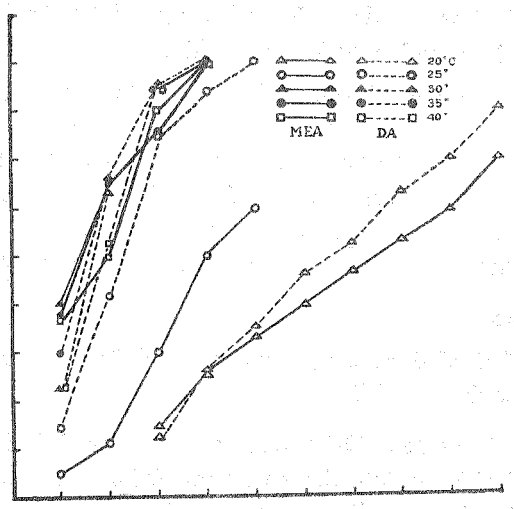


Fig. 5. The effect of temperature on the colony diameter of *C. irregularis* on dung decoc tion agar (DA) and malt extract agar (MEA).

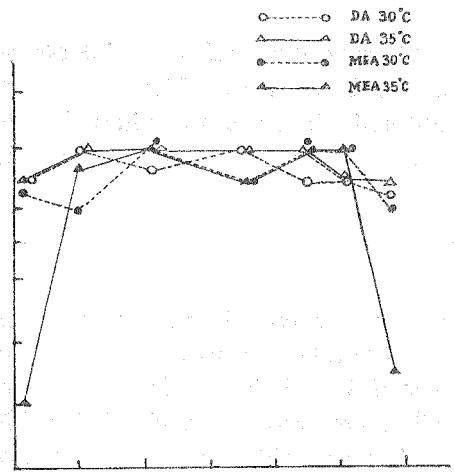


Fig. 6. The influence of difference pH levels on the colony diameter of *C. irregularis* after four days of growth on malt extract agar (MEA) and dung decoction agar (DA).

Temperature

The effect of temperature on growth and sporulation of *C. irregularis* was studied at temperature ranging from 10-45 C on DA and MEA. The colony diameter was recorded at the intervals of 24 hrs. There was no growth at 10, 15 and 45 C. The growth started within 24 hrs at 25, 30, 35 and 40 C, whereas at 20 C the lag period extended for more than 48 hrs, on both the media. The maximum growth rate was noted at 30 and 35 C while at 40 C the growth rate was little slower in the beginning but later it was almost equal to the rate of growth at 30 and 35 C (Fig. 5). At these three temperatures, the fungus filled 9 cm dish within four days. The fungus sporulated only on DA at 30 and 35 C after 3 days. The sporulation did occur at 25 and 40 C but after a week or more.

pH

The maximum growth of the fungus took place between 6.1-9.1 range on DA and MEA at 30 and 35 C. The rate of growth was almost the same between this pH range on both the media. However, at pH levels lower than 6.1 and higher than 9.1 growth was little slower. The sporulation was only on DA between pH range 6.1-7.5 at 30 C, and 35 C but there was sporulation on MEA only at pH 9.1 at 35 C. On other pH levels there was no sporulation. On DA the fungus sporulated abundantly while on MEA the sporulation was very little. The growth is compared at different pH levels, after four days' incubation (Fig. 6).

The cultural studies conducted show that the fungus prefers somewhat higher temperatures. This may perhaps be the reason why it has been collected and reported only once over the years from temperate North America and twice from Europe (Goos 1964) although their coprophilous mycoflora have been studied extensively, whereas it has been isolated twice within a short period of about seven months from subtropical Pakistan. This supports the contention of these authors that the absence of reports, on this species is probably more because of the little amount of work done on the tropical and sub-tropical coprophilous fungi rather than their actual rarity.

The authors wish to record their thanks to Dr. Emory, G. Simmons for giving the reference of the paper by Subramanian.

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