MYCELIAL FORMS OF *MORCHELLA CONICA* PERS. ON THE NUTRITIONS WITH POLLEN AND PROPOLIS

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Summary

In this study, cultural characteristics of mycelium of Morchella conica *Pers. have been determined on the agar plates with some bee products and pollen. Differences of mycel forms, morphologies, development speeds, genres, colours and quality have been noted on colonies formed on the agar plates. Propolis hindered mycel development of fungi on the agar plates to which propolis, honey and royal jelly was added. No trace of sclerotia needed for the fructifications was obtained on the agar plates.*

Key words: Morchella conica, *mycel development, bee product, pollen.*

Introduction

Researches concerning mycelium physiology and ecological functions of *Morchella* taxons have been done for some years (KARABOZ et al., 1988; ARKAN, 1992; VOLK, 1990; GÜLER, 1993). Suggestions about a continuous breeding of these species remain to be both vague and far from being sufficient (OWER et al., 1986; OWER et al., 1988).

It has been announced that *Morchella* fructifications can be formed prior to the formation of sclerotia. Yet the efforts of mushroom growers who follow the instructions given to be applied in their production patents for the development of sclerotia and the efforts of researchers could not exceed the limits of being futile. Finding solutions to problems about growing sclerotia in large amounts and under specific conditions is of primary importance in producing *Morchella* (VOLK et al., 1989).

In this research, the effects of pollen and propolis additions to solid agar plates on the mycel development of *Morchella conica* with the purpose of obtaining high quality mycel and sclerotia have been studied.

Material and Method

The research material was composed of *Morchella* fructifications collected from Kars-Göle region in May of 1991. According to the literature within our research, the species to which the sample obtained belonged was identified as *Morchella conica* (GÜCIN, 1987; SVERCEK, 1983; GÜCIN et al., 1982).

A year and a week old mycel forms of this material have been inoculated to be used. These mycelial forms have

been obtained in petri dishes that contain potato dextrose agar (PDA) under 19°C with multi ascospor germination (FRITSCHE, 1972). Agar disc transformations (OEI, 1991) of the mycelia occurred in PDA plates and petri dishes which completed their colonization were refrigerated under 19°C.

Experiments being performed with pollen and propolis obtained from Bursa-Mudurnu region are prepared with 5 repetitions in the mycel laboratoires of our department. The averages (M), standard deviations (S) and variations (VAR.) (SOKAL et al., 1969) of daily measurements taken in the colonization period of primary cultures have been estimated. The estimated calculations are presented in Table 1. The control group and agar plates enriched with pollen and propolis are presented in Scheme 1.

Scheme 1 - Agar plates used in this research

PDA: Control (50 g/l potato dekstroz agar)	
PDA + pollen 25%:	50 g PDA + 12,5 g pollen
PDA + pollen 10%:	50 g PDA + 5 g pollen
PDA + propolis:	PDA + 2,5 EEP propolis
	PDA + 5,0 EEP propolis
	PDA + 7,5 EEP propolis

The propolis extract forming the base of this research was obtained by solidifying the raw propolis collected from the hives in the freezing section of the refrigerator. Next, it was ground via a mill. The necessary amount (2,5-5,0-7,5) was weighed and put into collection cups, and 50 cc of ethil alcohol of 96% was added into them. Secondly, these collection cups were covered with parafilm and stored under 30 °C in an incubator for 24 hours. Finally, they were kept in a mixer heater under 30 °C for 12 hours. The mixture was filtered twice with Whatman Number 1 and Number 4 filter paper. The amount of propolis that dissolved and remained undisolved were calculated. The saturation obtained through the above mentioned method was called Ethanol extract of Propolis (EEP) (PALOS et al., 1976). After adding a litre of distilled water to the EEP, it was refrigerated at +4 °C until it would be used.

After the addition of pollen and propolis to the agar plates, the mycel development was traced as not only threadlike, cottonlike, woollike and becoming dense with aerial and substrat hyphae but also raylike and circular.

a) In control groups of PDA we observed threadlike mycelia which were similar to raylike forms, colonizing by limited density maximum rate of development. White mycelia which formed a thick layer on the mycelial disc that was inoculated covered these groups within 6 days by their regular spread in the agar plates. Aerial and forming tissues were traced in the vegetative mycel development of colony surface of the control group (Figure 1, 2).

Table 1

Measurement results showing the radial growth rates of *Morchella conica* Pers. mycelia in PDA agar plates which have been subjected to an addition of pollen with various concentrations

	1 day			2 day			3 day			4 day			5 day		
Agar plates	M	S	Var.	M	S	Var.	M	S	Var.	M	S	Var.	M	S	Var.
PDA*	0	±0.00	0	19	±1.74	16-21	35	±2.93	30-39	52	±1.60	49-54	70	±0.00	0
pollen 25%	0	±0.00	0	8	±0.49	8-9	16	±2.28	14-20	29	±1.72	27-32	36	±1.67	34-39
pollen 10% (USA)	13	±0.49	12-13	18	±0.64	17-19	26	±0.80	26-28	35	±1.85	33-30	43	±2.24	41-47
pollen 10% (Turkey)	11	±0.49	10-11	17	±0.75	16-18	26	±1.20	24-27	34	±2.14	31-37	43	±3.19	38-47
	6 day			7 day			8 day			9 day			10 day		
Agar plates	M	S	Var.	M	S	Var.	M	S	Var.	M	S	Var.	M	S	Var.
PDA*															
pollen 25%	43	±3.07	40-48	52	±1.90	50-55	55	±2.28	51-58	55	±2.28	56-68	68	±4.12	58-70
pollen 10% (USA)	53	±1.36	52-56	63	±1.17	61-64	70	±0.00	0						
pollen 10% (Turkey)	53	±3.82	47-57	61	±3.88	56-67	69	±1.60	66-70						

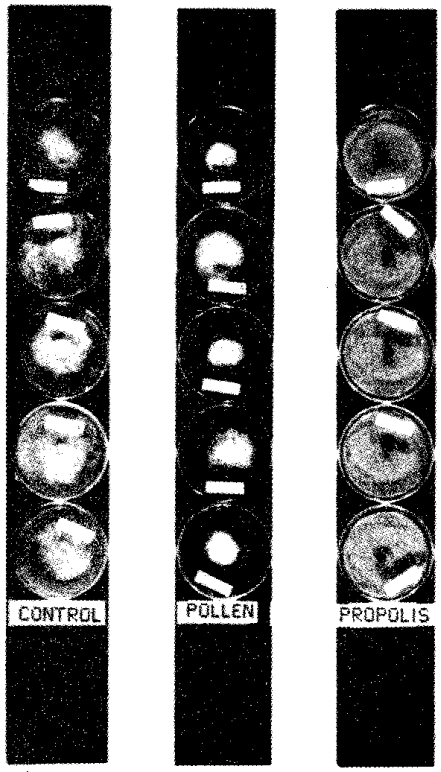

Fig 1 - The control group mycel development in the PDA plates to which concentrated pollen of 25% and propolis have been added

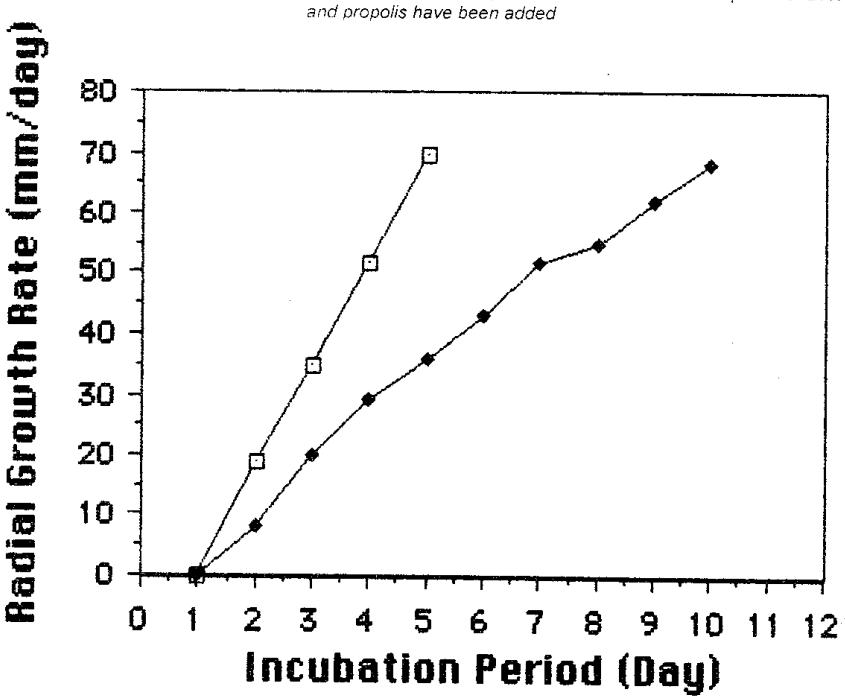

Figura 2 - Mycel development curve of control group and PDA plates to which concentrated pollen 25% have been added in the prepared PDA agar plate

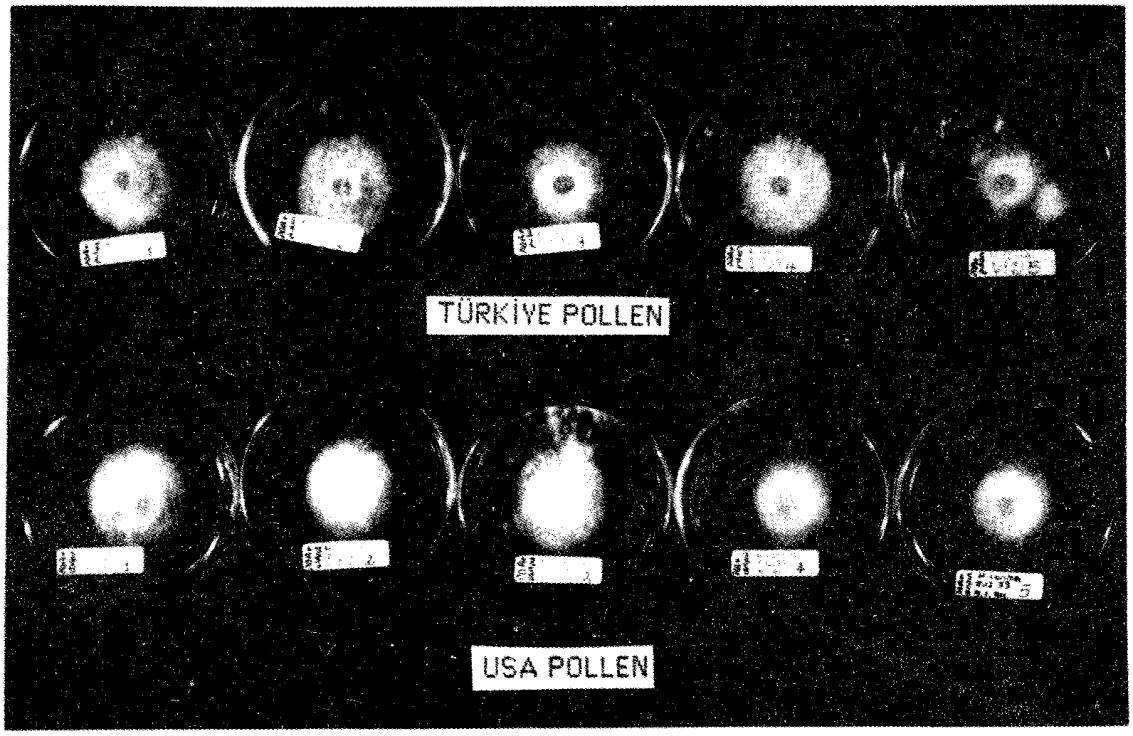

Figure 3 - The mycel development in the control group and PDA agar plate to which concentrated pollen 10% has been added

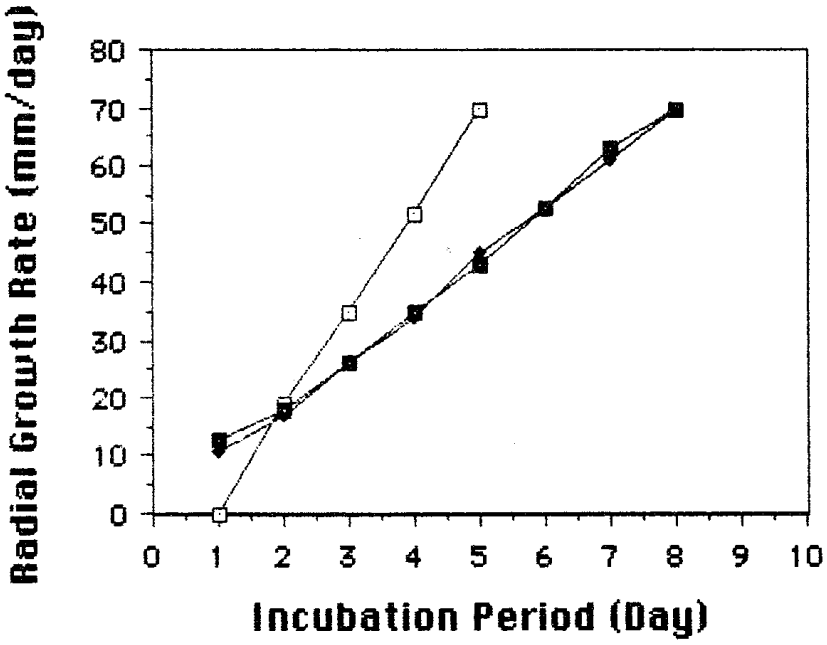

Figure 4 - Mycel development in the control group and PDA agar plate to which concentrated pollen 10% has been added

b) Mycel development rate of groups, to whose PDA plates pollen 25% was added, showed to be lower when compared to that of the control group. Generally colonies which showed a regular development and which existed in circular shapes were evaluated as of being in the dense woollike category. The rate of forming into tissues and the amount of concentration on inoculum discs has been traced as of being at the maximum level in this group. On the 7th and 8th post-vaccination days, sunburn pigmentations have been observed in the colonies (Figure 1-2).

c) With the addition of Turkish origin, concentrated pollen of 10%, a circular and cottonlike mycel development was observed in all the petri dishes. A dense mycel jump of 60% was traced in the irregularly developing hyphae. This group in which no pigmentation was observed has an 8-day period of colonization (Figure 3-4).

d) The mycelia development in the PDA petri dishes formed by the addition of concentrated USA origin pollen 10% were in the form of circular and cottonlike aerial hyphae. The mycel jump in this group is 40% and we have traced density formation to be centrally localized (Figure 3-4).

Discussion

Pollen and propolis, which (KAAL, 1991) were used as contributory materials in our research, are among the rich nutrients. Chemical compositions of polllen and propolis were studied in may researches and the amount of carbohydrates, vitamins, aminoacids and proteins were identified. We have observed that differently oriented nutritious plates had different affects on the *Morchella* mycel development. PDA agarplates, obtained by adding concentrated pollen of 10%, have proved to be in places in which mycel development is affected in a negative way, and it has been observed that the rate of radial growth has slowed down.

No mycel development have been traced in PDA agar plates that were formed by the addition of various concentrations of propolis. It has been observed that propolis has the property of inhibiting *Morchella* mycel development. In a research (HOFMANN et al., 1989) which was mainly based on the effects of propolis on the mycel development, *Plasmopara viticola* was used and no positive affects of propolis were traced. In another research (MILLET-CLERC et al., 1986) propolis was experimented on fungus which caused disease in mankind and it was observed that it had antifungal effects. The symptoms which we traced formed parallels with these results.

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