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STUDIES ON THE PHYLLOPLANE MYCOFLORA OF OAK TASAR FOOD PLANT (QUERCUS SERRATA THUNB.) AND THEIR IMPACT ON REARING PERFORMANCE OF OAK TASAR SILKWORM ANTHERAEA PROYLEI JOLLY

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ABSTRACT

The aerial surface of Oak tasar food plant (Quercus serrata Thunb.) belong to the family Fagaceae, growing under natural conditions in Umrangso area of Dima Hasao district of Assam , boarding the hill regions and usually covered with large and varied populations of micro-organisms. The Oak tasar silkworm (Antheraea proylei Jolly.) is a bivoltine .Oak tasar food plant (Quercus serrata Thunb.) is a primary food plant of oak tasar silkworm. Its leaves provide a unique environment to their surface occupants and the typical leaves exudates influence the growth and development of the varieties of leaf surface micro-organisms. These microflora play an important role in supplying different types of nutrients to the plants as well as the silkworms.The present study deals with the isolation of the leaf surface mycoflora of Oak tasar leaves in different ages of leaves namely-tender,semi-mature, and mature leaves during the two rearing seasons i.e spring and autumn. 11 fungi have been isolated and indentified from the Oak tasar leaves during the two seasons. Aspergillus niger was the dominant species and Alternarea alternata was the co-dominant species in both the seasons while Penicillum species was prevalent during autumn. Studies on the rearing Oak Tasar silkworm during the corresponding seasons revealed better performance during spring season with a higher ERR(65.1%)and SR(10.17%) as compared to the autumn season.

KEYWORDS: phylloplane mycoflora, Quercus serrata, Antheraea proylei, ERR, SR.

INTRODUCTION

The leaf surface has been termed “Phylloplane” and the zone on leaves inhabited by microorganisms as “phyllosphere” by various workers.(Last,1955; Ruimen,1956 and Kerling, 1958). It is now well established that a large of micro-organisms inhabit the phylloplane of crop plants (Leben,1965; Preece and Dickinson,1967). The importance of assessing the microbial ecology, the aerial plant surface has now been recognized (Dickinson,1967; Pandey et al., 1989; Hollowman (1967); Kumar and Gupta (1976); Rai and Singh (1977). Tiwari and Sahu (1986;1987;1989;1991) have reported different kinds of mycoflora in different types of plants. In the present investigation, an attempt has been made to isolate and identify microfungi from the tender, semimature and mature leaves of Oak (Quercus serrata) plant which is a primary food plant of oak tasar silkworms(Antheraea proylei Jolly.).

MATERIALS AND METHOD

Tender semimature and mature oak leaves were collected randomly from REC Farm at Umrangso during 2013 in different seasons i.e spring and autumn during oak tasar silkworm rearing. The method of sampling of leaves as described by Kamal and Singh (1970) was followed during the collection of leaves. Serial washing technique of Kamal and Singh (1970) was used in which leaf discs were cut out from different categories of leaves with the help of sharp sterilized borer. Pieces of different categories of leaves were placed separately in 20ml of sterilized distilled water in 250 ml of erlenmeyer flasks and were shaken for 20 minutes at 120 rpm. The extract of the detachable fungal propagules from the leaf surface was determined by plating 1ml solution from washing to the Petri plates containing PDA media. The cut out leaf discs upper and lower surface were impringed on the surface of petridishes containing PDA media. The Petri dishes were incubated at 30±1°C for 4 days and then the plates are examined for the development of fungal colonies. The Experiment was conducted in two seasons viz spring and autumn. The isolated fungi were identified with the help of ‘A manual of soil fungi by Gilman(1965) and “Illustrated genera of Imperfect fungi” by H.L.Baranatt (1960). Observation of the fungal isolates from Phylloplane of oak tasar food plant during

different seasons is presented in table 1 and 2. rearing data and economic parameters viz. effective rate of rearing cocoon weight , shell weight, silk ratio SR% were assessed during the two rearing seasons are shown in table 3.

Table 1: Fungal isolates from the phylloplane of oak tasar food plant Quercus serrata Thunb. During Spring (March- April, 2013) at Umrangsu, Dima Hasao, Assam.

Climatic factors	Status of leaf	Type of surface	No. of samples	Fungal isolates	% of occurence
Temp. (°C) Max. 31.06 Min. 18.05 RH Max. 70.86 Min. 55.41 Rainfall 427 mm (9days)	Tender	Upper	10	Aspergillus niger	70.50
				Alternaria alternata	18.00
				Mucor sp.	11.50
		Lower	10	Aspergillus niger	65.50
				Alternarea alternata	12.50
				Mucor sp.	11.50
				Curvularia sp.	10.50
	Semimature	Upper	10	Aspergillus niger	61.50
				Alternaria alternata	15.50
				Mucor sp.	14.50
		Lower	10	Curvularia sp.	8.50
				Aspergillus niger	57.50
				Alterrnaria alternata	15.50
				Mucor sp.	12.50
				Curvularia sp.	9.50
				Fusarium sp.	5.00
	Mature	Upper	10	Aspergillus niger	55.50
				Alternaria alternata	22.50
				Mucor sp.	12.50
				Curvularia sp.	3.50
				Fusarium sp.	6.00
		Lower	10	Aspergillus niger	45.50
				Aspergillus fumigatus	16.50
				Aspergillus flavus	3.50
				Alternaria alternata	12.50
				Mucor sp.	10.00
				Curvularia sp.	5.50
				Fusarium sp.	6.50

Table 2: Fungal isolates from the phylloplane of oak tasar food plant Quercus serrata Thunb. During Autumn (Sept –Oct, 2013) at Umrangsu, Dima Hasao, Assam.

Climatic factors	Status of leaf	Type of surface	No. of samples	Fungal isolates	% of occurence
Temp. (°C) Max. 31.81 Min. 22.46 RH Max. 83.03 Min. 55.79 Rainfall 817 mm (9days)	Tender	Upper	10	Aspergillus niger	55.50
				A.fumigatus	16.50
				A.alternata	15.50
				Mucor sp.	12.50
		Lower	10	A. niger	52.50
				A.fumigatus	19.50
				A.alternata	15.50
				Mucor sp.	6.50
				Fusarium sp.	6.00
	Semimature	Upper	10	A.niger	52.50
				A.fumigatus	17.50
				A.alternata	13.50
				Mucor sp.	8.50
				Penicillium sp.	8.00
		Lower	10	A.niger.	45.50
				A.fumigatus	15.50
				A.alternata	12.50
				Mucor sp.	6.50

				Penicillium sp.	6.50
				Curvularia sp.	9.00
				Fusarium sp.	4.50
	Mature	Upper	10	Aspergillus niger	45.50
				A.fumigatus	9.50
				A.flavus	4.50
				A.alternata	15.50
				Curvularia sp.	5.50
				Penicillium sp.	5.00
				Fusarium sp.	5.50
				Verticillium sp.	4.50
				Mucor sp.	4.50
		Lower	10	Aspergillus niger	45.50
				Aspergillus fumigatus	6.50
				Aspergillus flavus	3.50
				Alternaria alternata	14.50
				Mucor sp.	4.00
				Curvularia sp.	4.50
				Penicillium sp.	5.50
				Verticillium sp.	3.50
				Fusarium sp.	5.50
				Colletotrichum sp.	3.50
				Cladosporium sp.	3.50

Table 3: Rearing Performance of Antheraea proyeli Jolly.

Crop	Worm brushed	Larval period(days)	Wt of mature larva		Coccons harvested	ERR %	Av cocoon wt		Av shell wt		SR%		SR% (Av)
			♂	♀			♂	♀	♂	♀	♂	♀	
Spring 2013	1000	34-38	15.72	17.15	651	65.1	5.24	7.0	0.534	0.71	10.2	10.14	10.17
Autmn 2013	1000	34-40	15.67	17.07	324	32.4	5.03	6.9	0.49	0.65	9.74	9.42	9.58

RESULT AND DISCUSSIONS

Eleven number of fungi were isolated and identified from the leaf of oak tasar plant (Q. serrata L.) in different ages of leaves namely tender, semimature and mature leaves during the two rearing seasons spring and autumn.They were Aspergillus niger, A. fumigatus, A. flavus, Alternarea alternata, Curvularia sp., Mucor sp., Penicillium sp., Verticillium sp., Fusarium sp., Colletotricum sp., Cladosporium sp. The dominant fungal species which were isolated by Gupta and Khulbe(1991) throughout the year from the oak leaf litter inculed Mucor hiemalis, Aspergillus flavus, Penicillium spp, Fusarium solani, Phoma humicola etc. The fungi population showed increasing ability to colonise the leaves in order to their maturity. Aspergillus niger was the dominant species and Alternaria alternata was the co-dominant species in the both seasons while Penicillum species was prevalent during autumn season. It is observed that the environmental factors, atmospheric temperature, relative humidity, and rainfall seems to play a detrimental role in the quality and quantity of leaf surface mycoflora. Maximum number of fungi were recorded when the temperature was 31.81°C and the relative humidity was 83.03 %. The minimum number of mycoflora occurred during the spring season due to relatively low temperature (31.06°C) and relative humidity (70.86). According to Gregory (1961), Kumar and Gupta (1976), Pandey et al(1998), Sahu and Tiwari(1988), Tiwari(1977), Tiwari and Sahu(1989,1987), Sahu et al.,(1986) environmental factors are most important physical factors which affect the occurrence of micro-organisms on the leaf surface. The dominancy of Aspergillus spp. was also reported by Rajan et al.(1952), Singh and Baruah (1979) and Mishra and Shukla(1989). This may be due to richness of Aspergillus in the air over oak plantation field and their ability to colonise the leaf surface of the oak plants more easily than by others. Berustein and Feinberg (1947), Al Doory (1970), Agarwal et al. (1969), recorded marked seasonal periodicity of Aspergillus spp. This is however contrary to the findings of the Dickinson (1967), Pandey et al(1989) Sahu and Tiwari(1988), Sahu et al(1986) Tiwari (1977) and Tiwari and Sahu (1986,87,91) who reported Alternaria and Cladosporiium as dominant spp in Raphanus sativa ,Brassi campestris and Datura alva leaf surface. The dominance of Aspergillus fumigates over the leaf surface of the oak plants recorded in the present investigation may be due to leaf surface

morphology nutrient exudates of the leaves , local environmental factors, presence of more spores of this fungus in the air over the plantation, etc. Better performance was observed in spring season.ERR 65.1% and SR 10.17%.

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