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WEATHER PREREQUISITES FOR FRUCTIFICATION OF *PHELLORINIA* MUSHROOM

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Abstract

Phellorinia mushroomisof high gastronomic value but has been defying attempts of its domestication. Weather parameters viz. air temperature, relative humidity and total rainfall were analyzed and found that average air temperature 29.1- 41.2°C, relative humidity between 44 to 90%, and sufficient rainfall required for sporophore initiation and development. These weather prerequisite will be of significance for domestication of edible mushroom *Phellorinia*.

Key words: *Phellorinia, Rainfall, Relative humidity and Temperature* .

Introduction

The genus *Phellorinia* is monotypic with the type species *Phellorinia herculeana* (Pers.) Kreisel (Kriesel, 1961), described by Miles Joseph Berkeley in 1843 (Berkeley, 1843) as *P. inquinans*. The species *P. herculeana* is well distributed in western Rajasthan (India), Pakisthan and Baluchistan and grow abundantly in rainy season (Bohra *et al.* 2001; Gehlot and Singh, 2015a & b). It comprisesof edible species under adverse ecophysiological conditions, as independent saprotroph. *P. herculeana* is known for its nutritional and medicinal value among the rural folk. The fruiting bodies of *P. herculeana*are gathered from sand dunes of Thar Desert in month of July to September (Rainy season) by local people for consumption as vegetable, medicine and business purpose (Gehlot, *et al.* 2016).

Despite of high Nutraceutical and Pharmaceutical properties, *P. herculeana*is defying attempts of its domestication. Mycologists have been making sustained efforts since long for cultivation but couldn't domesticateit till date. Many researchers (Bohra *et al.*, 2003; Doshi *et al.*, 1999; Sharma *et al.*, 2015) have made sustained efforts to cultivateit under controlled environmental conditions but the optimum conditions that are favorable for sporophore (Basidiocarp) development have not been clearly determined and till date no one achieved success in domesticating*Phellorinia* under controlled conditions.

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This call for continued studies on the basic biology and life cycle of *Phellorinia* with comprehensive study of ecological factors especially soil characteristics and weather prerequisites of natural growing sites.However, soil characteristics of natural growing sites of *Phellorinia* have been studied by Manikandan *et al.* (2011) and Gehlot and Singh (2015b) but information regarding precise weather prerequisites like air temperature, relative humidityand rainfall in this region has not been studied. Therefore, the present studies were conducted to work out weather prerequisites for fructification in *Phellorinia* under natural growing sites of Jodhpur district of Rajasthan.

Materials and Methods

Weather datanamely air temperature, relative humidity and total rainfall were collected from meteorological station, Central Arid Zone Research Institute, Jodhpur. Weather data were analyzedfrom January to December, 2015. The numerical daily data were converted into average value of seven days pertaining to meteorological week (M.wk). Meteorological week (M.wk) data was computed and plotted on graphs.

Result and Discussion

Meteorological data of the year, 2015 is presented in table 1. Specimens of *Phellorinia* were observed andcollected in the vicinity of the site during 26th to 36th meteorological weeks (M.wk) only. Therefore, weather

data of three preceding and three subsequent weeks *i.e.* 23th to 39th week were taken into consideration and correlated with the initiation and development of the fruiting bodies of *Phellorinia*.

A graphical representation of the maximum and minimum air temperatures during this period is depicted in fig-1. The data exhibited wide variation, the maximum temperature varied from 29.1to 41.2°C and the minimum from 24 to 30.3 °C during the period. The maximum and minimum relative humidity varied considerably from 44.7 to 90% and 20.7 to 76%, respectively (fig-2).The firstrainfall was received during the 23th M.wk and subsequent rainfall in 24th to 34th M. wk was recorded. There was no rainfall from 35th to 38th M.wk. The minimum rainfall of 0.5 mm was received in 25th M. wk and the maximum of 13.5mm was recorded in 30thM.wk (fig.3).

The sporophore observed during 26th to 36th M. wki. e. 22 June to 6 September, 2015.During these 11 weeks, the maximum temperature varied from 29.1 to 38.9°C and minimum temperature from 24.9-28.8°C. The maximum relative humidity varied 61-90 % and the minimum from 31-76 %. Gehlot and Singh (2015b) observed that *Phellorinia* exhibited luxuriant growth and fructification at 39.6-43.2 °C air temperature, 38-55 % relative humidity, and 3.9-5.8% soil moisture.

The fructification in *Phellorinia* occurred during 26to 36 M.wk and it indicates that the prevalent air temperature, relative humidity and persistent rains during the period must have favored the sexual life cycle of the*Phellorinia*from either over wintered spores or dormant mycelium presented in soil as inoculums. The over wintering spores and dormant mycelium lying in the soil in the vicinity of the observation sites might have received a triggering shock due to sufficient rains in preceding week 23-25th M. wkresulting in absorption of water and change in their osmotic pressure. Sufficient water in the soil is a prerequisite for promoting sexual cycle in *Phellorinia* have also been emphasized by Doshi and Bohra (2000). Rains in three preceding week *i.e.*, 23th to 25th M.wk, Rains in three preceding weeks also helped in removal of nutrients from organic matter present in soil by leaching of soil. Such a prerequisite has also been reported to promote differentiation in the sexual cycle of *Phellorinia* under artificial cultivation by Doshi and Bohra, (2000).

Sufficient rainfall inprior to *Phellorinia* appearance under natural conditions appear to be the

Table 1: Meteorological data of the year - 2015.

Meteorological Week	Date (2015)	Temperature (°C)		Relative Humidity (%)		Total Rainfall (mm)
		Max.	Min.	Max.	Min.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	1 - 4 January	23.0	12.3	79.0	43.0	0
2	5 -11 January	27.1	9.1	76.0	24.0	0
3	12 -18 January	24.2	9.5	83.0	37.0	0
4	19 -25 January	23.3	11.8	78.0	45.0	0
5	26 Jan – 1 February	22.8	8.9	66.0	19.0	0
6	2 - 8 February	27.3	12.2	69.4	26.3	0
7	9 - 15 February	28.1	12.7	66.4	24.9	0
8	16 - 22 February	33.6	17.2	73.6	24.4	0
9	23 February - 1 March	29.9	15.6	49.1	22.7	0.1
10	2 - 8 March	27.3	14	76.9	29.3	1.3
11	9 - 15 March	29.8	16.3	59.7	27.7	0.4
12	16 - 22 March	32.6	17.9	63.0	18.0	0
13	23 - 29 March	40.0	23.8	45.1	12.6	0
14	30 March - 5 April	35.8	21.9	62.3	29.6	2.5
15	6 - 12 April	35.4	22.3	54.0	22.0	1.6
16	13 - 19 April	36.7	24.2	51.0	21.0	0
17	20 - 26 April	42.0	26.6	38.0	9.0	0
18	27 April - 3 May	42.4	27.5	35.0	11.0	0
19	4-10 May	42.5	26.3	34.0	11.0	0
20	11-17 May	40.7	26.1	50.0	20.0	0
21	18-24 May	43.5	30	55.0	20.0	0
22	25-31 May	42.6	30.4	55.0	19.0	0
23	1-7 June	40.7	25.9	44.7	20.7	0.5
24	8-14 June	38.7	28.8	60.6	46.4	2.5
25	15-21 June	41.2	30.3	57.9	29.6	0.2
26	22-28 June	38.3	27.6	74.6	50.0	3.2
27	29 June – 5 July	38.5	28.8	66.1	39.3	0.3
28	6-12 July	37.4	28.3	71.0	45.0	2.6
29	13-19 July	38.0	28.7	69.0	40.0	0.2
30	20-26 July	35.2	26.2	85.0	70.0	13.1
31	27 July - 2 August	29.1	24.4	90.0	76.0	8.8
32	3-9 August	34.8	26.4	80.0	50.0	0.3
33	10-16 August	33.7	26.3	86.0	67.0	11.1
34	17-23 August	33.5	26.0	82.0	56.0	1.6
35	24-30 August	34.4	25.7	80.0	50.0	0
36	31 Aug – 6 September	35.6	25.0	70.0	38.0	0
37	7-13 September	37.6	25.9	61.0	31.0	0
38	14-20 September	38.9	27.5	64.0	34.0	0
39	21-27 September	33.3	24.0	82.0	50.0	2.8

Continued .....

Continue .....

(1)	(2)	(3)	(4)	(5)	(6)	(7)
40	28 Sept- 4 October	37.7	22.2	59.0	41.0	0
41	5 - 11 October	38.4	21.3	60.0	60.0	0
42	12-18 October	38	21.2	67.0	67.0	0
43	19-25 October	37.1	21.2	55.0	55.0	0
44	26 Oct - 1 November	31.9	19.5	59.0	56.0	0
45	2 - 8 November	32.7	20.2	61.0	28.0	0
46	9 - 15 November	32.9	18.2	66.0	26.0	0
47	16 - 22 November	31.4	16.2	42.0	17.0	0
48	23 - 29 November	30.1	16.3	53.0	25.0	0
49	30 Nov - 6 December	29.0	12.3	76.0	23.0	0
50	7 - 13 December	28.3	10.6	66.0	25.0	0
51	14 - 20 December	24.3	8.4	59.0	20.0	0
52	21 -27 December	24.0	9.2	53.0	20.0	0
53	28 - 31 December	30.2	11.8	60.0	20.0	0

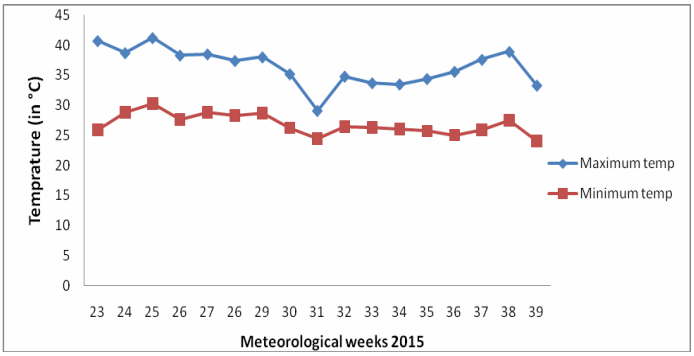

Fig.1: Air temperature variation during mushroom fructification

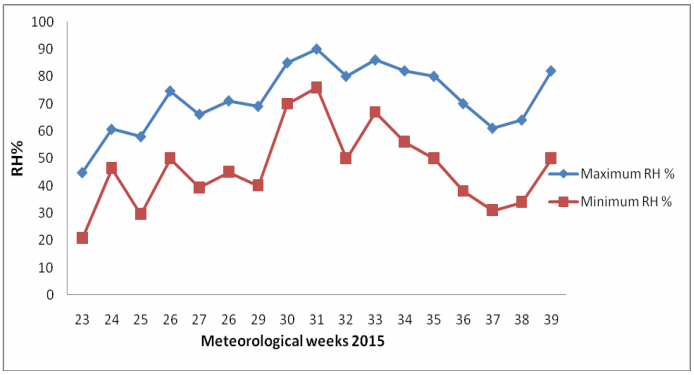

Fig. 2: RH (%) variation during mushroom fructification

limiting factors and prerequisite for initiation of sexual cycle in *Phellorinia*. Although the air temperatures were favorable during the entire period of observations but sporophore does not appear to be limited factor for *Phellorinia* fructification.

The data from 1 to25 M.wk and 37 to 52 M.wk exhibited favorable air temperatures and relative humidity but *Phellorinia* but the sexual cycle didn't trigger. It might explain

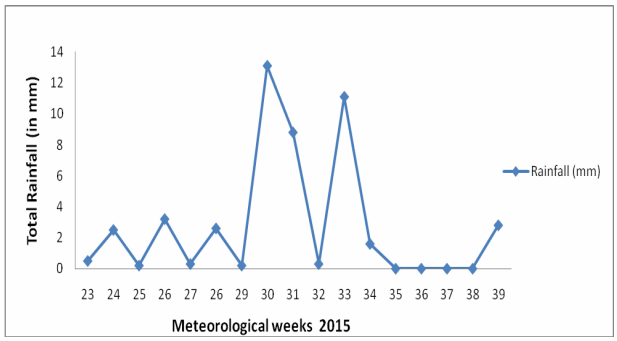

Fig. 3: Total rainfall during mushroom fructification

so as to why *Phellorinia* grow only in 26 to 36 M.wk due to availability of sufficient water in soil. Despite rainfall in 9th, 10th, 11th, 14th and 15th, M. wk, *Phellorinia* failed to produce sporophore due to unfavorable temperature.

Fruiting bodies of *Phellorinia* could not be collected after 36M.wk, despite all favorable condition available in 39th M. wk. because majority of the overwintering spores and active mycelium completed life cycles in the form of basidiocarps and produced next generation spores which require sufficient dormant period (over wintering period). Nevertheless, activemycelium also converted into dormant stage.

Present studies give sufficient clues for further controlled experimentation by maintaining air temperature near to 29.1- 41.2°C, relative humidity between 44 to 90% and sufficient availability of water in substrates to conduct domestication trials under controlled conditions.

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