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IN VITRO ANTIFUNGAL ACTIVITY OF *BRYUM CAPILLARE* (A MOSS) EXTRACT AGAINST *DRECHSLERA MAYDIS*

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Abstract: The present study investigated with the effect of cold and boiled water crude extract of *Bryum capillare* against a plant pathogen *Drechslera maydis*. The results revealed that the colony diameter and fresh weight of test fungi was reduced in response to all concentrations ranged from 10-100 per cent especially the boiled water extract had strong antifungal activity with significant inhibition on the growth of test fungi. Findings in this study showed that *B.capillare* may have some potent active chemicals which showed antifungal activity resulting suppression of fungal growth. Further this study will also unlock the naturally occurring antifungal phytochemicals in this moss which can be further used as biocontrol agents against plant diseases.

Keywords: Antifungal activity, *Bryum capillare*, *Drechslera maydis*, Phytochemical

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INTRODUCTION

Bryophytes belong to the group of the oldest know land plants, which includes liverworts, hornworts and mosses. More than 22000 members of the mosses are exist in the world [1]. One of the features that helped bryophytes to survive and maintain their place in today's flora is their content of biologically active compounds. They are used in pharmaceutical products, horticulture, household purposes and are also ecologically important as good indicators of environmental condition [2, 3].

Bryophytes also have an anticancer and antimicrobial activity due to their unique chemical constituents [4]. A few moss genera *Atrichum*, *Dicranum*, *Minium*, *Polytricum*, *Sphagnum*, *Porella* and *Reboulia* prevent the soil erosion due to their trample-resistant structure and regenerative ability [5]. Compounds like polygodial from *Porella*, Norpiguisone from *Conocephalun conicum* and Lunularin from *Lunularia cruciata*, 4-hydro 3- methoxybibenzyl and b- pinine-alloromadendrine from *Plagiochila stevensoniana* are useful as antimicrobial compounds [6]. The antifungal activity *of Herberta aduncus* against *Botrytis cinerea, Rhizoctonia soloni, Pythium debaryanum* is well illustrated [7]. Deora *et al*. [8] determined the antifungal activity of a moss against certain phytopathogenic fungi**.**

MATERIAL AND METHODS

Collection of plant material and preparation of extract:

The plant material was collected in rainy season (2013) from Mt. Abu, Distt. Sirohi (Rajasthan.) around Nakki Lake, Guru Shikhar and Sunset point in both vegetative and sporophytic phase. The whole plant was washed with distilled water to remove soil particles in the laboratory before extract preparation. For cold water extract preparation, weighted plant material was gridded in mortar and pestle with equal amount of cold water till the formation of fine paste, and then it was centrifuged and filtered. This filtrate was used as 100 per cent crude extract, it was then serially diluted by double distilled water to prepare various concentration from 10-100.The same method was adopted for boiled water extract preparation except grinding the plant material with boiling water instead of cold water.

Test organism:

The pure culture of test fungi *Drechslera maydis* was obtained from the Department of Pathology RCA, (Udaipur, Rajasthan) India. This test organism was sub-cultured in laboratory at 25ºC temperature to obtain its pure isolates.

Screening of antifungal activity:

Antifungal activity of bryophyte fraction was determined by using pour plate method. The plant extracts of 10 ml each were first poured into Petri dishes. Then, 10 ml molten PDA was poured

aseptically on the plant extract in the Petri dishes and swirled round for even dispersion of the extract into the agar. The extracts were incorporated at different concentrations of 100, 80, 60, 40, 20 and control. A 5 mm mycelium agar disc of *D. maydis* was released into the poisoned agar/ extracts incorporated into PDA. The treatments were replicated three times, incubation period for antifungal activity was 72 hrs. The average diameter of resultant colony was measured after incubation. The growth of *D. maydis* mycelium on PDA without any amendment was used as control. The percent inhibition of mycelial growth by plant extract was calculated by using the formula given by Vincent (1927).

RESULTS AND DISCUSSION

Antifungal activity of *Bryum capillare* extract against *Drechslera maydis* was assayed and results are presented in Table.1 and Table2. The observations revealed that significant reduction in the growth of test fungi was reported in all concentration ranging from 10-100 per cent. Among the two extracts tested, boiled water extract at 100 per cent concentration caused significant inhibition of growth. Data on per cent inhibition, colony diameter and fresh weight were varied in the extract of boiled water and cold water. It was observed that per cent growth inhibition was (73.51) and (77.54) in the cold water and boiled water extract respectively. Similarly marked differences were observed in colony diameter and fresh weight of the test organism. It was reported that colony diameter was (9.83 mm) and (8.03 mm) respectively in cold water and boiled water whereas fresh weight was (44.5 gm) and (41.43 gm) in both cases at 100 per cent concentration.

Data on percent inhibition were comparatively low and colony diameter, fresh weight was high suggested that lower concentration of extract did not inhibit the growth of test organism. The per cent inhibition, colony diameter, and fresh weight in cold water was 13.90,31,96 mm and87.7gm respectively whereas it was 21.53 per cent, 28.06 mm and 77.76 gm in boiled water at 10 per cent concentration.

The results of this work corresponded to the findings of Deora and Bhati [9] who reported that extracts of certain bryophytes such as *Plagiochasma articulatum, Anthoceros longii, Fissidens bryoides* showed antibiotic property against *Agrobacterium tumifacians*. Deora and Suhalka [10] also evaluated the antifungal activity of *Riccia gangetica* (a moss) extract against phytopathogenic fungi *Fusarium moniliforme*.

Table. 1 Effect of Cold water crude extract of *Bryum capillare* against *Drechslera maydis*

Extract Concentration (%)	Mean Colony diameter (mm)	Fresh weight (gm)	Percent Inhibition (%)
Control	37.1333	92.3	0
10	31.9667	85.7	13.9067
20	26.7333	74	27.9967
40	22.2333	69.8667	40.1167
60	15.2333	60.5	58.9700
80	11.3333	54.0667	69.4767
100	9.8333	44.5	73.5100

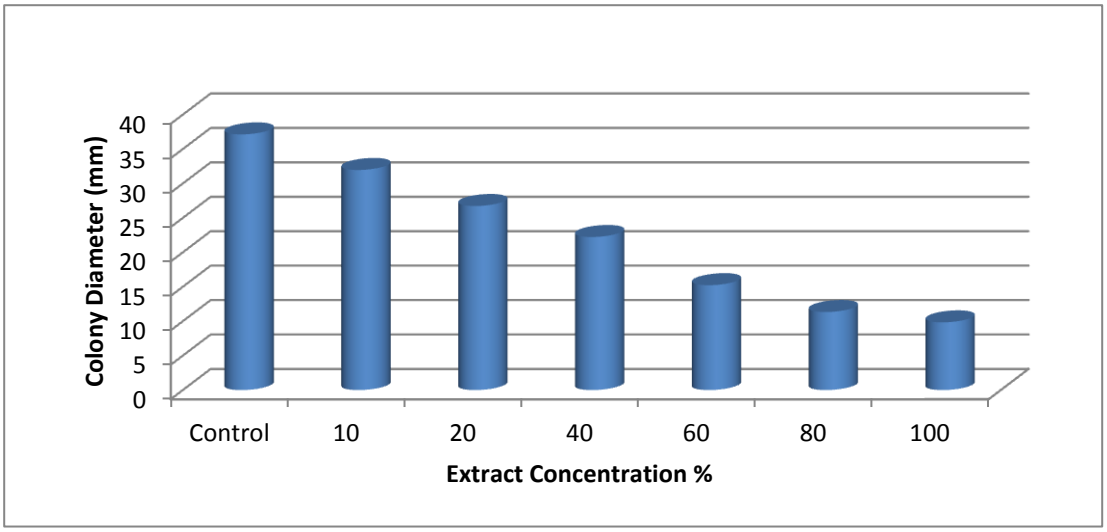

Fig.1 A

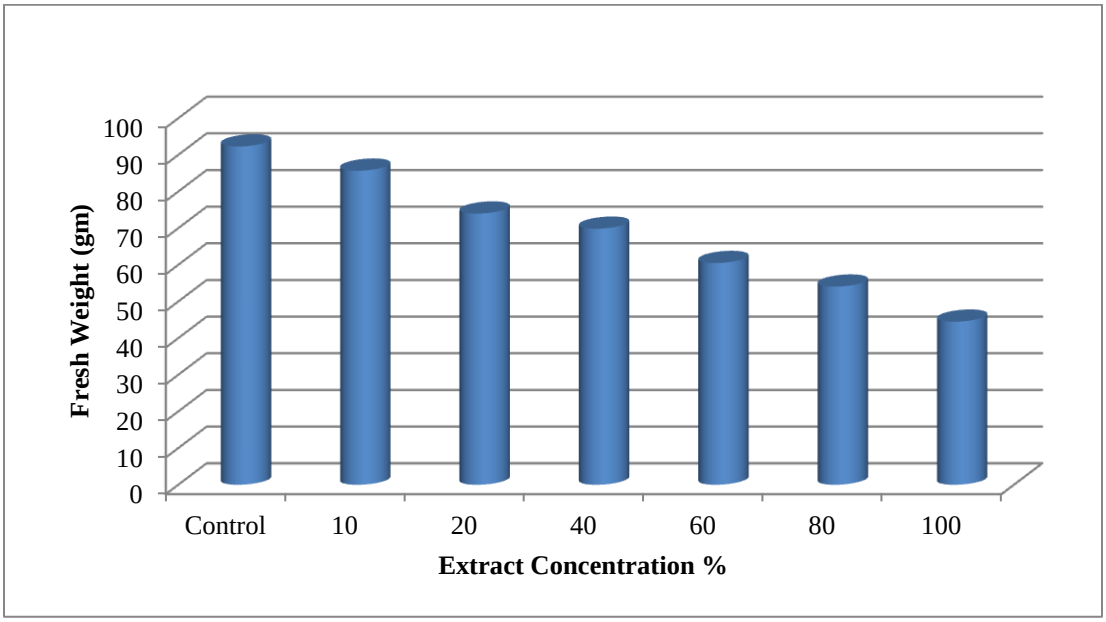
Fresh Weight (gm)
100
90
80
70
60
50
40
30
20
10
0
Control
10
20
40
60
80
100
Extract Concentration %

Fig.1B

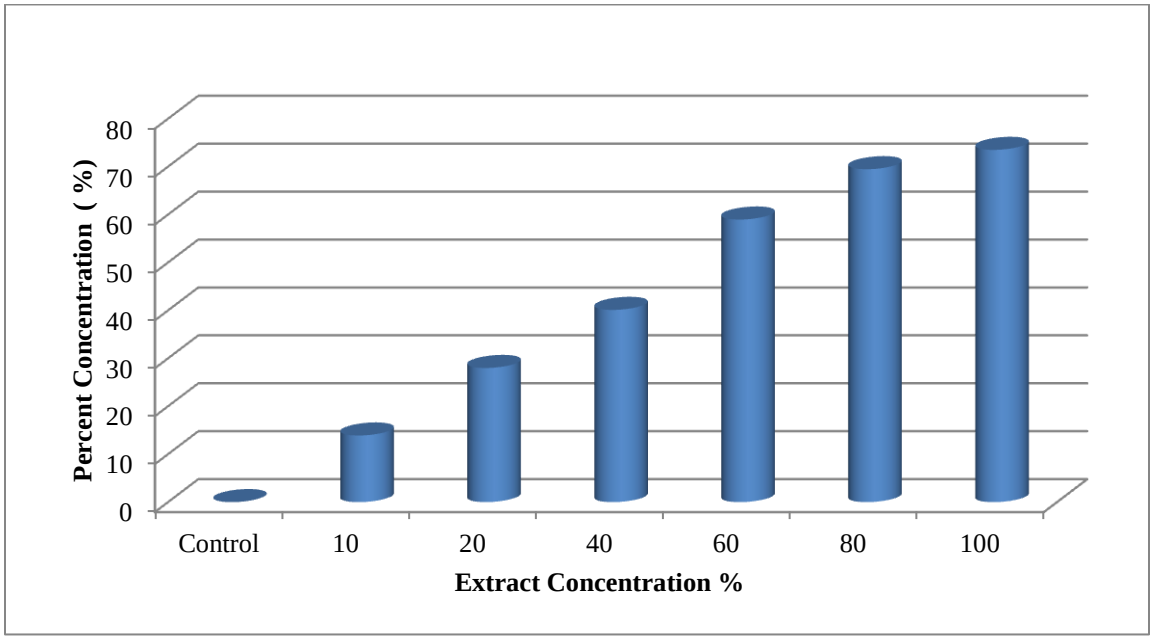
Percent Concentration (%)
80
70
60
50
40
30
20
10
0
Control
10
20
40
60
80
100
Extract Concentration %

Fig.1 C

Table.2 Effect of Boiled water crude extract of *Bryum capillare* against *Drechslera maydis*.

Concentration (%)	Mean Colony diameter (mm)	Fresh weight (gm)	Percent Inhibition (%)
Control	35.7667	89.1333	0
10	28.0667	77.7667	21.5334
20	21.5	67.9333	39.8800
40	18.3667	62.6667	48.6400
60	13.4333	56.2667	62.4333
80	10.4	52.2333	70.9167
100	8.0333	41.4333	77.5400

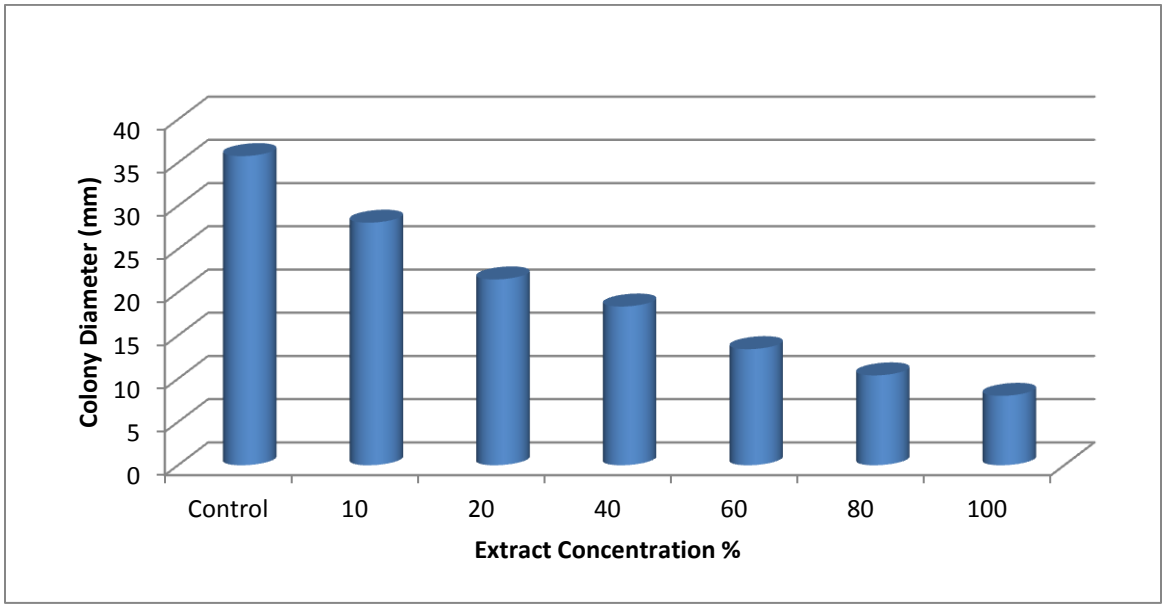

Fig 2 A

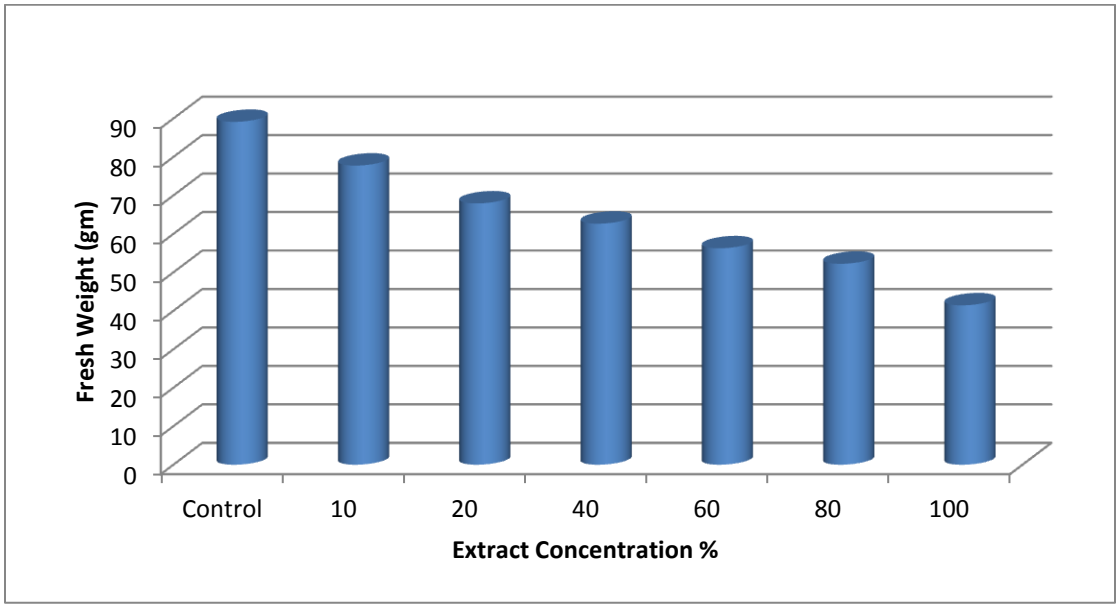

Fig 2 B

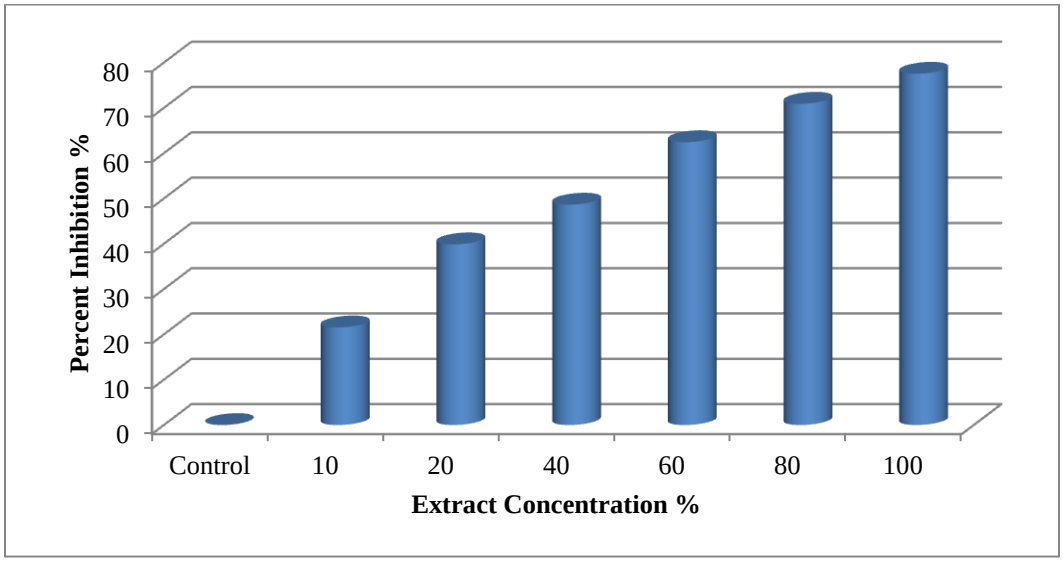

Fig 2C

CONCLUSION

From the present study it was concluded that per cent inhibition and minimum fresh weight and colony diameter at higher concentrations suggest that some antifungal potent chemicals are present in *Bryum capillare* which have inhibited the growth test fungi. Further this study will also unlock the naturally occurring antifungal phytochemicals in this moss which can be further used as biocontrol agents against plant diseases.

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