It should be noted with regard to the exceptionally small genome size of this species, that those frogs living in extremely arid habitats generally have a reduced DNA content[15,16]. The low genome sizes presumably exert an influence on the cell volume, the minimum mitotic cycle and the rate of oxidative metabolism, among other things[5,14]. This again shortens the duration of the embryonic and larval development, an essential adaptation for survival in temporary waters. Comparative investigations with the technique of DNA reassociation kinetics must reveal which of the DNA sequences in *Pyxicephalus* is present in lesser quantity than in other species of the family Ranidae.

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Effect of *Lantana camara* L. extract on fern spore germination

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Summary. Extracts of root, stem, leaf and inflorescence of *Lantana camara* Linn., (Verbenaceae) inhibited exine bursting, rhizoid initiation and protonemal initiation of spores of the fern *Cyclosorus dentatus* (Forsk.) Ching. The leaf extract was found to be qualitatively and quantitatively most potent in its inhibitory effect. Attention is drawn to the fact that further spread of *Lantana camara* at Mt. Abu, Rajasthan, India may lead to the complete destruction of the sizeable pteridophytic component in this locality, the richest vegetationally in Rajasthan.

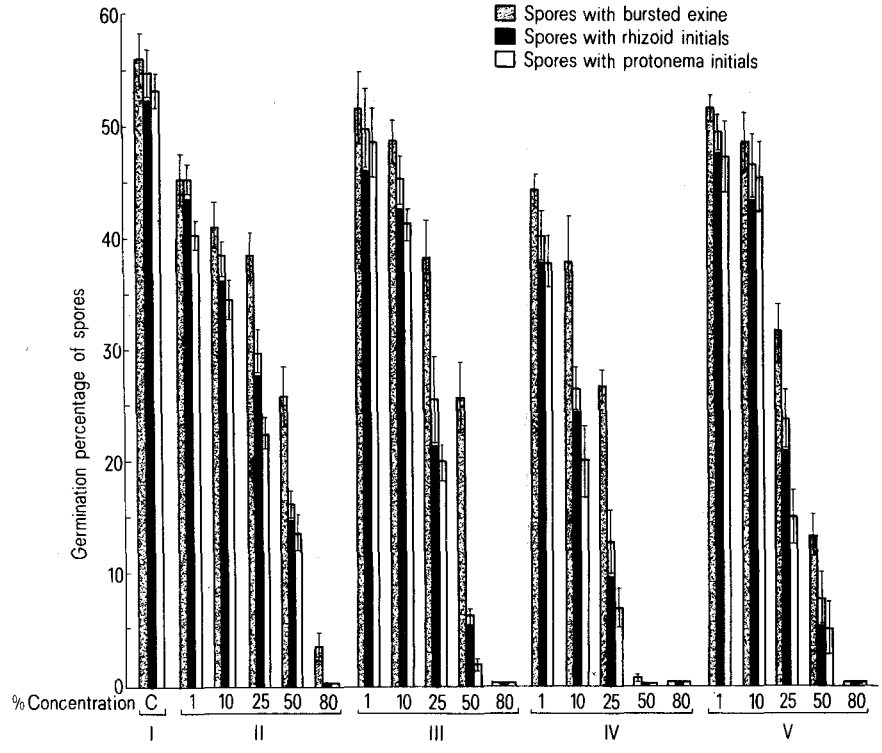
The phenomenon of allelopathy, has been known for a long time[1,2]. However, it has been investigated exclusively with reference to flowering plants, there being no account so far of the allelopathic potential of flowering plants on spore germination and the gametophytic phase of ferns. Our attention was drawn to this by the continuing depletion of the pteridophytic component in the vegetation of Mt. Abu, a hill station in the south west of Rajasthan, India, which coincided with the spread of *Lantana camara* L. (Verbenaceae) introduced at this station during the last decade. The fact that the dense spread of this robust shrub did not alter materially such environmental parameters as moisture, light, temperature etc. with regard to the growth of ferns at Mt. Abu indicated that perhaps an allelopathic effect on spore germination and the gametophytic phase was responsible for the continuing decline in density of the ferns, since otherwise pteridophytes are well adapted ecologically to growing here [3-7]. Subsequent experiments conducted in this laboratory have confirmed this.

Material and method. Fresh material of *Lantana camara* was collected locally and after separation roots, stems, leaves and inflorescences of this plant were kept in an oven and dried at 80 °C for 24 h. These plant parts were then chopped into small pieces and 10 g of each of these was soaked in 100 ml of distilled water. This extract of each organ was autoclaved at 15 lb pressure and diluted by the addition of sterile Knop's basal medium to give the desired concentration of the extract (80%, 50%, 25%, 10%, and 1%). Spores of *Cyclosorus dentatus* (Forsk.) Ching, (Thelypteridaceae), a fern occurring at many localities in Rajasthan, were collected from fronds of plants under cultivation at the Botanic Garden, Government College, Ajmer, India. These were sprinkled in separate 7.5 cm petri-dishes containing 15 ml of Knop's basal medium for control and

Allelopathic effect of *Lantana camara* Linn. extract on germination of spores of *Cyclosorus dentatus* (Forsk.) Ching

Plant part extract	Control (Knop's basal medium)			Dilution percentage of the extract by addition of Knop's basal medium														
				1			10			25			50			80		
	EB	RI	PI	EB	RI	PI	EB	RI	PI	EB	RI	PI	EB	RI	PI	EB	RI	PI
Root				44.83 ±3.46	44.83 ±2.39	39.85 ±1.85	40.44 ±3.15	37.57 ±2.20	33.88 ±2.68	37.86 ±2.86	29.32 ±2.68	22.17 ±2.12	25.53 ±4.30	15.92 ±1.89	13.46 ±2.40	03.26 ±1.90	-	-
Stem				50.75 ±4.74	49.35 ±5.23	47.82 ±4.45	48.30 ±2.77	44.56 ±2.84	40.82 ±2.13	37.31 ±5.10	25.02 ±5.46	19.69 ±2.53	25.31 ±4.45	05.72 ±1.00	01.43 ±0.91	-	-	-
	55.35 ±3.52	54.18 ±3.46	52.48 ±2.45															
Leaf				43.43 ±2.00	39.61 ±2.92	37.43 ±3.09	37.45 ±5.53	26.14 ±3.19	19.61 ±4.78	26.16 ±2.05	12.53 ±3.97	06.61 ±2.57	00.54 ±0.28	-	-	-	-	-
Inflorescence				51.04 ±1.49	48.84 ±2.00	46.74 ±4.73	47.92 ±4.16	45.98 ±4.30	44.72 ±4.28	31.12 ±4.20	23.15 ±4.25	14.55 ±3.76	13.05 ±2.74	07.23 ±3.31	04.54 ±3.00	-	-	-

EB, percent spores with bursted exine; RI, percent spores with rhizoid initials; PI, percent spores with protonema initials.



15 ml of each of the above mentioned concentrations of the extracts of various plant parts of *L. camara*. The petri dishes were kept in a culture chamber maintained at 25±2 °C under continuous illumination provided by 2 fluorescent tubes fixed 60 cm above the petri dishes. 2 replicates were used in each case. The data relating to spore germination were recorded after a week.

Results and discussion. The inhibitory effect of various concentrations of extract of root, stem, leaf and inflorescence of *L. camara* on various stages of spore germination - exine bursting, rhizoid initiation and protonemal initiation - have been presented in the table. It is obvious that these phases of spore germination are individually affected by the *Lantana* extract, supporting the suggestion made by Raghavan[8] that the process of spore germination is divisible into several steps each of which is affected individually by environmental variables after initial exine bursting has occurred. Further it is evident from the table that leaf extract is most potent as an inhibitor since, while a 50% extract of root, stem and inflorescence allows a certain percentage of spores to germinate, this process was substantially inhibited by an equal concentration of leaf extract. Also, comparable dilutions of root, stem and inflorescence extract were less potent in their inhibitory activity compared with the leaf extract (table). In view of the known occurrence of phytotoxic substances in plants[9-11] it is suggested that some sporotoxic substance is evidently synthesized metabolically in *L. camara*.

Further work is in progress in this laboratory for identification of the phytotoxic principle in *L. camara* with special reference to spore germination and gametophytic growth of ferns. However, some of the attributes of the extract have been initially ascertained. Thus the pH of the undiluted leaf extract and of the various dilutions with Knop's medium used in these experiments was found to be as below:

	pH-value		pH-value
Undiluted extract	7.81	10% dilution	7.15
50% dilution	7.42	1% dilution	6.82
25% dilution	7.29		

However, the pH alterations due to *Lantana camara* extract do not seem to be a factor in the inhibition of spore germination. Phytochemically the extract has been found to contain phenols as tested by the method of Emerson et al.[12] and alkaloids as demonstrated by Wagner's reagent[13]. Evidently, it is these 2 substances that seem to act as sporotoxic substances. That the extract is heat stable is indicated by the fact that the reported spore inhibition was obtained after autoclaving of the medium containing various concentrations of the extract.

It is imperative at the moment to appreciate the devastation caused by the spread of *Lantana camara* to the already scarce pteridophytic vegetation at Mt.Abu. Unless steps for eradication of this obnoxious weed are taken as a top priority we may soon witness complete extinction of ferns and fern allies at this station which shelters a sizeable pteridophytic flora in this part of India.

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