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Effect of Plant Part Extracts on Spore Germination of Puccinia Purpurea Cook

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Abstract:
Plant part extracts were applied for the control of diseases caused by microorganisms. Hence, the present investigation deals with aqueous plant extracts of three plants which were screened for their fungitoxicity against spore germination and germ tube length of *Puccinia purpurea* Cook. Chemical fungicide Hexaconazole 0.05% used as a standard check was found better retardants for spore germination and germ tube length. The result showed that aqueous extract of *Pongamia glabra* vent parts at 6, 12 and 24 hour incubation period had strong fungitoxicity followed by extract of *Tridex procumbens* L and *Lantana camera* L parts in reducing the spore germination. All plant part extracts of selected plants effect on spore germination and germ tube length over control.

Keywords: *Puccinia purpurea* cook, Spore germination, Plant extracts, *Pongamia glabra*, Hexaconazole, Fungitoxicity

Introduction:

Diseases of plants and animals caused by pathogenic bacteria and fungi are common throughout the world. Microbial diseases of plants cause malfunction i.e reduce the yield or the survival capability resulting in death. Jowar is the most important food and fodder crop of dryland agriculture. It is a staple food for poor and rural people in Asian and African. *Puccinia purpurea* Cook is the causal organism of Sorghum rust. The uredial stage is the most potential source to start and spread the diseases to the epidemic from during some years (Naik *et.al* 1984). Control of plant diseases by chemicals cause environmental pollution and it is hazardous both for plants and animals. In such a situation, several higher plants have shown success in plant disease control. Patil in the year 1996 reported that Hexaconazole (Contaf) at 0.05 % (1 ml per liter of water) were the most effective fungicide against the disease. The extracts of plants exhibited marked effect on germination of fungal spore as well as (Singh *et. al* 1990, Dubey1991). Many plants have been reported to contain antifungal substances (Grainge *et.al.*1984). Therefore, the aim of the present investigation is to find out the effect of plant part extracts of on spore germination and germ tube length of *Puccinia purpurea* Cook.

Material and Methods:

Healthy parts of selected plants like, *Pongamia glabra* vent, *Tridex procumbens* L, and *Lantana camara* L were collected from agricultural fields. About 20 grams of plant parts like root, stem, leaf and flower etc. were weighted and washed with running water for several times and then weep with blotting paper. They were crushed in a mortar and pestle with 20ml distilled water. The extract was filtered through

four layered muslin cloth and filtrate was then passed through whatman's filter paper no. 3.Filtrate centrifuge at 1600 rpm for five minutes. This filtrate was considered as stock solution and then made up 1 %, 2 % and 3 % concentrations by adding distilled water. Dadke (1996) in his field evaluation of fungicides reported that, hexaconazole (0.05%) was effective in controlling the rust of soybean followed by triadimefon (0.1%), propiconazole (0.1%), difenconazole (0.1%) and mancozeb (0.25%). The fungicides Hexaconazole (0.05%) were used at recommended doses to know their efficacy on spore germination (standard check). For control distilled water was used. The fungal spores of *Puccinia purpurea* Cook was isolated from diseased soybean leaves and used as test organism.

All the experiments were laid under laboratory conditions. The effect of plant part extract on fungal spore germination was studied on slide. For this taken single drop of different concentrations of plant extract on different slides. Fresh spores collected from single pustule with the help of dissecting needle were placed in the drop of plant part extract. In such a way that 20-30 spores per microscopic field could be easily observed. All the slides were kept on moist blotting paper in Petri plates to maintain humidity for 6 hour, 12 hour and 24 hour respectively. Percentage of spore germination in four microscopic fields was calculated and the germination effects were recorded. Counted the total number of spores and germinated spores along with germ tube length under the single field of microscope (10 X 45). Mean of three observations were considered as replication I. Same was considered for replication II & III. The figures noted in observation table 1 and 2 are the mean of three replications.

Result and Discussion:

Aqueous plant part extracts was tested against spore germination and germ tube length of *Puccinia purpurea* Cook. One standard check Hexaconazole 0.05 % and distilled water as a control. The results were presented in table 1. The treatment with plant part extracts of all plants found to be significantly superior over the control. The treatment with 0.05% Hexaconazole found to be significantly superior over all other treatments 0% spore germination was recorded at 6, 12 and 24 hour. The 3% aqueous root extract of *Pongamia glabra* vent and *Tridex procumbens* L was found to be significantly superior over all other treatments recorded 22.45,24.83 and 25.75 percent as well as 24.07,29.72 and 29.92 percent spore germination respectively, at 6,12 and 24 hour incubation period. Plant part extracts of *Lantana camara* L was also effective in reducing the spore germination. The highest spore germination percentage was recorded in control at 6,12 and 24 hours after incubation period.

The data of table 2 showed that significant reduction in length of spore germ tube over control by all plant part extracts. Maximum inhibition of germ tube length was recorded in *Pongamia glabra* vent root and *Lantana camara* L stem extract and minimum inhibition of germ tube length was recorded in all three plant leaf extracts at 6 to 24 hour incubation period with 1%, 2% and 3% concentrations. *Parthenium hysterophorus* L.

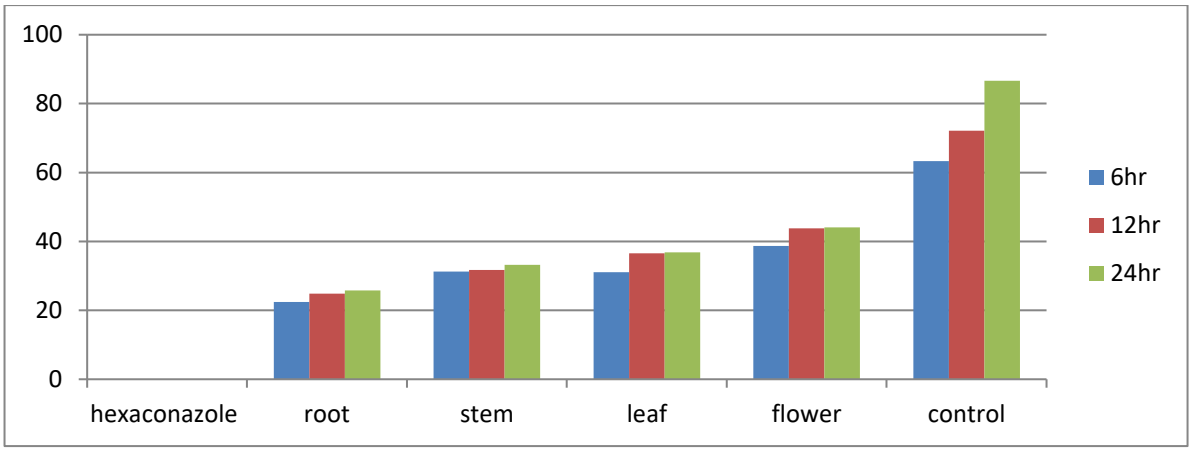

Fig.1 Effect of *Pongamia glabra* vent parts extract on in vitro spore germination of *Puccinia purpurea* Cook. Lines indicate percent germination. Data points represent the mean values after 6, 12 and 24 hour incubation period at 3% concentration

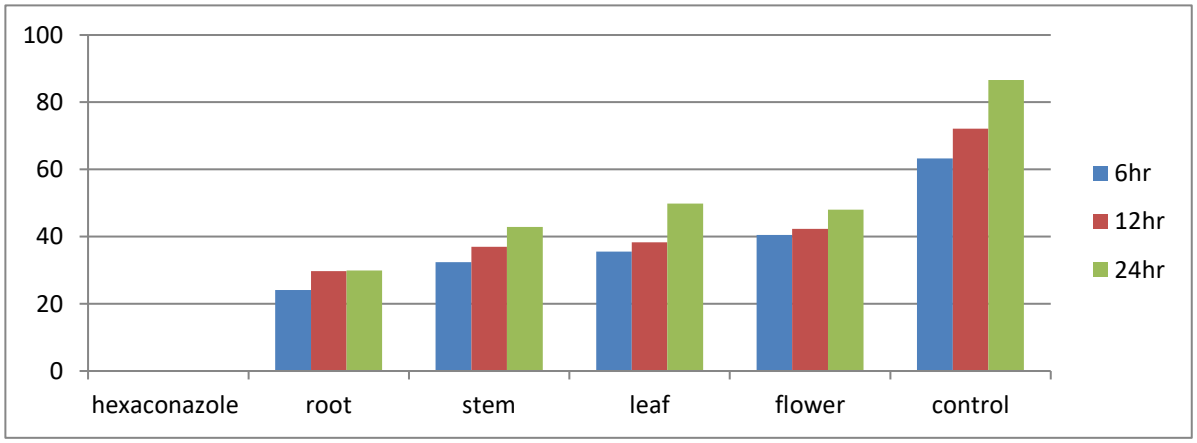

Fig.2 Effect of *Tridex procumbens* L parts extract on in vitro spore germination of *Puccinia purpurea* Cook. Lines indicate percent germination. Data points represent the mean values after 6, 12 and 24 hour incubation period at 3% concentration.

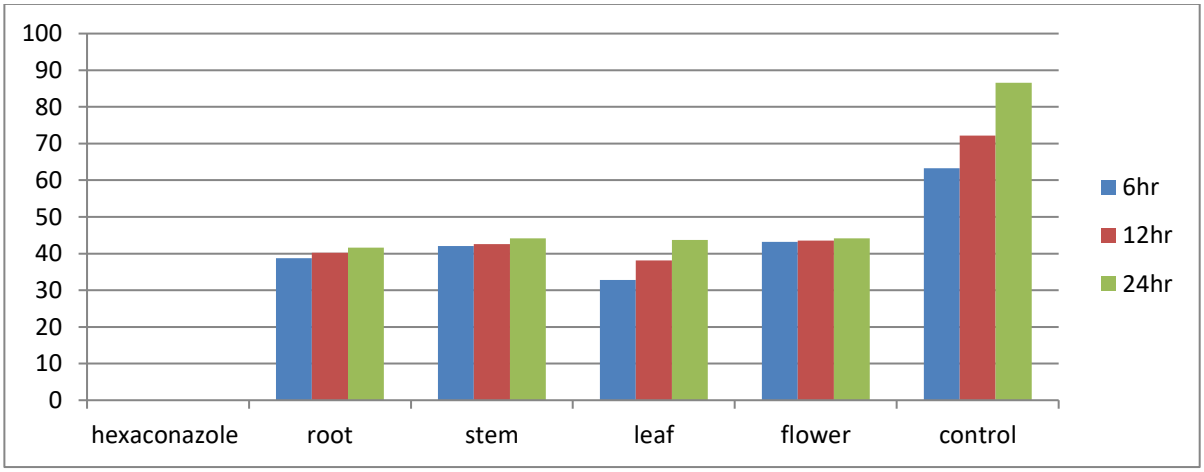

Fig.3 Effect of *Lantana camara* L parts extract on in vitro spore germination of *Puccinia purpurea* Cook. Lines indicate percent germination. Data points represent the mean values after 6, 12 and 24 hour incubation period at 3% concentration.

Spore germination was observed at all *Pongamia glabra* vent(fig.1), *Tridex procumbens* L(fig.2) and *Lantana camara* L(fig.3) part level evaluated. There was a significant decrease in germination with increase in concentrations, while increase in germination with increase in an incubation period. As compare to fig.1, fig.2 and fig.3 indicate that 3% aqueous root extract of *Tridex procumbens* L and *Lantana camara* L at 6,12 and 24 hour incubation period. These results from the present study suggest that these plant part extracts may be used to prevent the growth of fungus. This study also justify the plant part extracts of *Pongamia glabra* vent, *Tridex procumbens* L and *Lantana camara* L having better effect against *Puccinia purpurea* Cook. This investigation also recommends that further studies need to be carried out the phytochemical compounds responsible for antifungal activity of these plant parts.

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Table No.1 Effect of different plant part extracts on spore germination (%) of *Puccinia purpurea* cook after various incubation period

Tr. No.	Name of the plants	Plat part used	Concentrations of plant extract								
			1%			2%			3%		
			Observation after incubation period								
			6hr	12hr	24hr	6hr	12hr	24hr	6hr	12hr	24hr
T1	*Pongamia glabra* vent	Root	30.38	30.55	37.5	27.31	28.32	29.44	22.45	24.83	25.75
T2		Stem	49.46	54.82	60.71	34.34	38.33	49.04	31.29	31.74	33.24
T3		Leaf	46.45	46.45	48.88	37.13	39.89	41.21	31.11	36.58	36.86
T4		Flower	31.48	53.87	54.00	42.06	48.62	48.73	38.72	43.82	44.08
T5	*Tridex procumbens* L	Root	43.88	46.63	49.59	40.59	42.59	43.32	24.07	29.72	29.92
T6		Stem	49.09	49.87	51.01	43.91	44.24	44.37	32.4	36.94	42.85

T7		Leaf	39.72	48.71	57.22	39.52	44.04	56.38	35.54	38.26	49.8
T8		Flower	53.9	60.37	60.38	52.78	54.83	57.13	40.46	42.34	48.04
T9	*Lantana camara* L	Root	47.61	48.98	55.33	42.92	42.98	47.41	38.72	40.2	41.66
T10		Stem	51.76	52.59	55.37	48.12	49.00	49.34	42.02	42.59	44.18
T11		Leaf	40.65	46.22	50.47	39.26	40.07	43.13	32.77	38.16	43.7
T12		Flower	48.51	58.14	58.68	44.44	47.51	48.17	43.2	43.55	44.17
T13		Hexaconazole (0.05%)	00	00	00	00	00	00	00	00	00
T14		Control	63.29	72.14	86.62	63.29	72.14	86.62	63.29	72.14	86.62
		SE ±	2.40			2.56			1.93		
		C.D. at (5%)	6.80			7.26			5.47		

Table No.2 Effect of different plant part extracts on spore germ tube length (µm) on *Puccinia purpurea* cook after various incubation period

Tr.No.	Name of the plants	Plat part used	Concentrations of plant extract								
			1%			2%			3%		
			Observation after incubation period								
			6hr	12hr	24hr	6hr	12hr	24hr	6hr	12hr	24hr
T1	*Pongamia glabra* vent	Root	87.97	102.72	112.70	85.13	100.27	113.95	86.86	95.40	98.88
T2		Stem	122.83	135.75	146.52	92.84	120	140.49	130.82	144.36	146.93
T3		Leaf	215.69	215.89	216.45	199.92	213.81	220.90	210.82	217.07	217.90
T4		Flower	163.12	173.67	209.32	173.90	178.25	185.26	166.38	168.05	181.79
T5	*Tridex Procombens* L	Root	103.25	112.08	114.08	96.45	107.49	118.1	95.68	118.11	125.61
T6		Stem	107.21	117.49	127.40	105.96	108.60	121.17	119.50	125.76	131.71
T7		Leaf	190.41	192.55	206.66	194.50	204.98	212.41	198.32	200.41	211.38
T8		Flower	174.9	178.8	188.6	163.2	176.	184.5	167.5	170.5	173.5

			2	1	0	5	45	7	0	5	3
T9	*Lantana camara* L	Root	112.84	120.62	131.65	84.15	130.33	142.28	90.68	112.15	134.50
T10		Stem	84.78	96.94	109.02	97.21	106.45	111.86	89.78	108.95	128.67
T11		Leaf	173.67	188.74	194.41	176.79	177.56	198.53	169.57	186.8	198.33
T12		Flower	170.41	172.56	181.10	166.03	176.94	181.52	160.68	166.86	182.97
T13		Hexaconazole (0.05%)	00	00	00	00	00	00	00	00	00
T14		Control	246.94	257.91	282.7	246.94	257.91	282.7	246.94	257.91	282.7
		SE ±	3.89			4.86			4.14		
		C.D at (5%)	11.01			13.75			11.73		