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Studies on Antifungal Activity of *Datura stramonium* L Extract on Inhibition of Spore Germination of *Puccinia triticina* Eriks

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Abstract: *Inhibition of spore germination of Puccinia triticina was tested using aqueous extract of Datura stramonium. Many plants show antifungal activity against many pathogens. These plant contents alkaloids, phenols, steroids, tannins etc. as a chemical compound. The experiment was carried out to check the effect of Datura stramonium against inhibition of spore germination of Puccinia triticina. The aqueous extracts of leaf, stem, root and flower of Datura stramonium were tested under laboratory condition against spore germination by hanging drop technique. Hexaconazole (0.05%) used as a standard check and distilled water as a control. Aqueous leaf extract (2% and 3%) showed superior inhibition of spore germination than the extracts of root, stem and flower. Maximum inhibition was recorded 86.89 and 82.27% % over control in 2% and 3% leaf extract. Rest of the treatments showed better inhibition than the control. The Datura stramonium is a possible source of fungicide to manage many pathogenic fungi.*

Keywords: Datura, Aqueous extract, Spore inhibition, Alkaloids, Hexaconazole

I. Introduction

Wheat (*Triticum aestivum* L) is one of the most important staple food crops extensively grown throughout the world. Wheat is the prime gift of the old world to the new world. Wheat is occasionally infected by rust. Leaf rust is caused by *Puccinia recondite* f.sp. *tritici* (now known as *Puccinia triticina* Eriks). Leaf rust appears as small circular to oval brown pustules on the upper surface of the leaf. These pustules are scattered across the leaves randomly. Spores develops on leaves and leaf sheaths, they do not from on the upper stem or heads of wheat plants.

In recent years there has been an increased used of agricultural chemicals. Thus, agricultural chemicals have no doubt increased crop yield but they contribute environmental pollution. They have many adverse effects on flora and fauna. Microbial diseases of plants cause malfunction i.e. reduce the yield or the survival capability resulting in death. 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. In such a situation several higher plants have shown success in plant disease control. The extracts of plants exhibited marked effect on germination of fungal spores as well (Singh *et al*. 1990, Dubey 1991). Deng (1976) observed that optimal conditions for uredospore germination were found to be at 22^0c and 100 % relative humidity. Many plants have been reported to contain antibacterial and antifungal substances (Grainge *et.al* 1984). De *et al*, (2009) reported secondary metabolites play an important role in defense mechanism against microorganism.

II. Materials And Methods

Survey of the plants showing antifungal property was carried out from surrounding area. Healthy parts of *Datura sramonium* 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 was centrifuged at 1600 rpm for five minutes. This filtrate

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was considered as stock solution and then made up 1%, 2% and 3% concentrations by adding distilled water. The fungal spores of *Puccinia triticina* was isolated from diseased wheat leaves and used as test organism.

All the experiments were laid under laboratory conditions. The effect of plant 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 extract. All the slides were kept on moist blotting paper in petri plates to maintain humidity for 6 hour respectively. Percentage of spore inhibition was calculated and the germination effects were recorded. Counted the total number of spores and germinated spores under the single field of microscope (10 ×45). Also the percent inhibition was calculated by using the formula given by Vincent (1927).

$$PI = \frac{G - T}{C} \times 100$$

Where, PI= Percent inhibition.
C= Number of spores germinated in control.
T= Number of spores germinated in treatment.

Mean of three observations were considered as replication I. Same was considered for replication II & III. The figures noted in observation table no. 01 are the mean of three replications.

III. Result and Discussion

Aqueous plant part extracts were tested against spore inhibition of *Puccinia triticina*. The Data was analyzed and tabulated. The treatment with 0.05% Hexaconazole found to be superior over all other treatments showed 100% spore inhibition. Aqueous leaf extract (2% and 3%) of *Datura stramonium* showed better retardance of spore germination i.e. 80.56 and 87.26 % inhibition when observation were recorded at 6 hour incubation period.

Environment is deteriorating day by day due to toxic chemicals. By considering the results of *Datura stramonium* part extracts are the reliable source to the farmers for assessment of wheat rust in organic farming. This investigation also recommends that further studies need to be carried out to elucidate the phytochemical compounds responsible for antifungal activity of these plant parts.

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Table 1: Effect of different plant extracts on spore germination % of *Puccinia triticina* Eriks after various incubation period.

Tr. No.	Name of the plant	Plant part used	Concentrations of extract								
			1%			2%			3%		
			Observations after incubation period								
			6h	12h	24h	6h	12h	24h	6h	12h	24h
T1	*Ipomoea carnea* Jacq.	Root	42.33	43.46	47.23	35.93	36.81	38.74	27.47	33.94	34.29
T2		Stem	36.2	38.05	45.93	33.15	35.00	35.46	24.53	25.00	31.95
T3		Leaf	24.15	25.63	38.33	20.5	22.4	23.33	14.81	17.17	19.15
T4		Flower	36.95	37.05	40.22	29.44	31.03	33.71	23.93	28.62	29.17
T5	*Datura stramonium* L	Root	36.95	43.34	48.15	26.58	33.34	33.98	19.21	19.23	20.36
T6		Stem	35.00	35.96	39.16	27.66	31.49	33.99	19.64	21.44	25.19
T7		Leaf	34.39	38.09	41.11	19.44	27.5	28.96	12.74	14.98	17.45
T8		Flower	33.38	40.22	54.17	30.56	30.84	33.98	20.01	21.95	23.00
T9	Hexaconazole(0.05%)		00	00	00	00	00	00	00	00	00
T10	Control (D.W.)		54.62	66.02	86.13	54.62	66.02	86.13	54.62	66.02	86.13