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USE OF URINE AND DUNG SAMPLES OF COW AND GOAT FOR BIOLOGICAL CONTROL OF PHYTOPATHOGENIC FUNGUS *COLLETROTRICHUM FALCATUM*

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Abstract: The present study edge on comparative efficiency and in *vitro* activity of urine and dung samples of *Bos Taurus* (cow) and *Capra aegagrus hircus* (goat) for controlling of Red Rot disease of sugarcane by determining Mycellial growth percentages (MGI) of *Colletrotrichum falcatum.* The study was carried out on is *Colletrotrichum falcatum* obtained from Department of Plant Molecular Biology and Biotechnology of ASPEE College of Horticulture and Forestry, Navsari Agricultural University. Results showed that percentage inhibition of mycellial growth suppressed and varied greatly with respect to different samples and days of incubation. In case of cow urine poisoned media highest percentage of MGI was recorded 44.40% and in cow dung poisoned media in MGI was recorded 19.63%. In case of goat highest percentage of MGI was recorded in goat urine poisoned media was 29.71%, while 18.68% MGI is showed in dung poisoned media. All samples of cow urine gave highest MGI activity. The activity of MGI was found maximum after 5 days of inoculation in all kinds of bio matters. These all are row natural products not only use as an organic fertilizer but can also be used as a natural fungicide after adjusting the pH 7.0. In vitro trials in field need to ascertain these natural products efficiency in the control of *Colletrotrichum falcatum.*

Keywords: Red rot disease*, Bos Taurus, Capra aegagrus hircus,* Antifungal, Sugarcane*, Colletotrichum falcatum.*

Introduction

Sugarcane (*Saccharum officinarum* L.), belonging to the family *Poaceae*, is an economically important cash crop grown in the tropics and sub-tropical areas of India. Among the sugarcane diseases such as fungal, bacterial, viral and phytoplasmal diseases, fungal diseases are gaining international importance [1].

Fungal diseases such as red rot, smut, and wilt have become a major problem for the sugarcane growing countries. Red rot disease causes economic loss to the crop and it has a major incidence in sugarcane growing areas such as tropical and subtropical parts of India. Red rot disease often called "Cancer of sugarcane is caused by *Colletotrichum falcatum*

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Went. The varietal incidence of the disease varies from 2–64% depending upon the variety and locality. Red rot is responsible for the failure of many popular varieties in different countries. The disease was first described from Java (now Indonesia) by Went (1893), who called the fungus, *C. falcatum*.

In India, the estimated loss in crop production due to fungal diseases is about 18-31% losses recorded due to sugarcane diseases. It causes severe loss in yield and quality of the susceptible cultivars in the Indian sub-continent. It can reduce cane weight by up to 29% and loss in sugar recovery by 31%. Red rot pathogen hydrolysed the stored sucrose by producing the enzyme Invertase which breaks the sucrose molecule into its components namely glucose and fructose [2].

The use of chemical fungicides results in the development of fungal resistance to the chemicals and environmental hazards. In addition, the spread of multidrug-resistant strains of pathogenic fungus and gradual narrowing the availability of drugs makes it essential to discover new classes of antifungal compounds that inhibit these resistant mechanisms. This has led researchers to investigate for new therapeutic alternatives, particularly among medicinal plants with potential antifungal properties [3].

Thus, current thinking about plant and environment protection suggests alternatives to pesticides and use of other strategies in addition to well-known disease management methods such as crop rotation, use of resistant cultivars, planting of disease free seeds, biological control etc. for control of fungal diseases [4].In India, organic farming was a well-developed and systematized agricultural practice during the past and this ‘ancient wisdom’ obtained through Indian knowledge systems such as ‘Vedas’ specify the use of ‘panchagavya’ in agriculture for the health of soil, plants and humans. In Sanskrit, panchagavya means the blend of five products obtained from cow and goat are dung, urine, milk, curd and ghee [5]. The *Vriskshayurveda* systematizes the use of panchagavya. Few farmers in the southern parts of India have used modified formulations of panchagavya and found them to enhance the biological efficiency of the crop plants and the quality of fruits and vegetables.

Materials and Methods

Test pathogen

In this study *Colletotrichum falcatum* was obtained from Department of Plant Molecular Biology and Biotechnology of ASPEE College of Horticulture and Forestry, Navsari Agricultural University. Test fungus was maintained on potato dextrose agar at 4°C refrigerator.

Collection of urine and dung samples of Cow and Goat

The urine and dung of cow and goat was collected in a sterile container. The urine and dung samples were collected from *Gir* cow and *Sirohi* goat. The urine and dung was taken into the laboratory and filtered through filter paper and stored in airtight container for further research work.

Before conducting the experiment the urine and dung samples were neutralized at pH 7.

Antifungal activity of urine and dung samples of cow and goat against C. falcatum

In present study, antifungal activity of urine and dung samples of cow and goat against *C. falcatum* were determined on Cow Urine Potato Dextrose Agar (CUPDA), Cow Dung Potato Dextrose Agar (CDPDA), Goat Urine Potato Dextrose Agar (GUPDA) and Goat Dung Potato Dextrose Agar (GDPDA). The CUPDA medium was prepared from 750ml potato dextrose extract and 250ml of cow urine. The CDPDA was prepared by addition of 2% cow dung in potato dextrose agar. The GUPDA medium was prepared from 750ml potato dextrose extract and 250ml of goat urine. The GDPDAwas prepared by addition of 2% goat dung in potato dextrose agar. Then media was sterilized in autoclave at 120°C for 15min. After autoclave, media was allowed to cool down up to 40-45°C. In each Petri dish the 20ml sterilized medium was poured for solidification and used for the further experimental processes. The 7-day old grown colony of test isolate mycellial discs of 5mm diameter was transferred in center of all growth media plates namely of CUPDA,CDPDA,GUPDA, GDPDA and PDA. The PDA plates were served as control. Inoculated plates were placed in plastic bags and incubated at 28±2°C in the dark. There were four replicate plates of each medium per isolate. In incubator plates were arranged in a random complete block design. The diameter of each of the test isolate was recorded at 3,5,7, and 10 days after inoculation in centimeters at two axes perpendicular to one another. Average colony diameter in centimeters was recorded and percent Inhibition of Mycelial growth was calculated using formula given below,

% MGI = MGC-MGT/MGC×100

Where, MGI = Mycellial growth inhibition,

MGC = Mycellial growth in control subtracting the diameter (mm) of inoculum disc,

MGT = Mycellial growth in treatment the subtracting diameter (mm) of inoculum disc.

Results and Discussion

The present study was carried out to determine inhibitory effect of cow and goat urine and dung samples against isolate of *Colletotrichum falcatum*. The growth of *Colletotrichum*

falcatum on different media at different days after inoculation is presented in Figure no.1. The growth of *C. falcatum* was recorded in terms of millimeter. It was revealed from the data that the Mycellial growth of test fungus was found to be significantly reduced on potato dextrose agar plate poisoned with cow urine as compared to cow dung, goat urine and goat dung poisoned media. Experiments on Cow urine alone or combination of cow urine with plants showed inhibition of *Sclerotinia sclerotiorum* causing *Sclerotinia* rot in cucumber [6,7], *Bipolaris sorokiniana* causing leaf blight of wheat [8], *Xanthomonas oryzae* pv. *oryzae* causing leaf blight of paddy [9] and *Fusarium oxysporum* f.sp. *zingiberi*, *Ralstoniasolanacearum* and *Pythium aphanidermatum* causing rhizome rot of ginger [10]. It was reported that cow urine has antifungal activity against *F. tsemitectum* and cow urine mixed with leaf extracts of *C. procera*, *V. negundo* and *C. alata* completely (100%) inhibited the Mycellial growth of the pathogen [11]. Cow urine at different concentrations reported to had significant effect on all growth characteristics of *F. lateritium* [12].

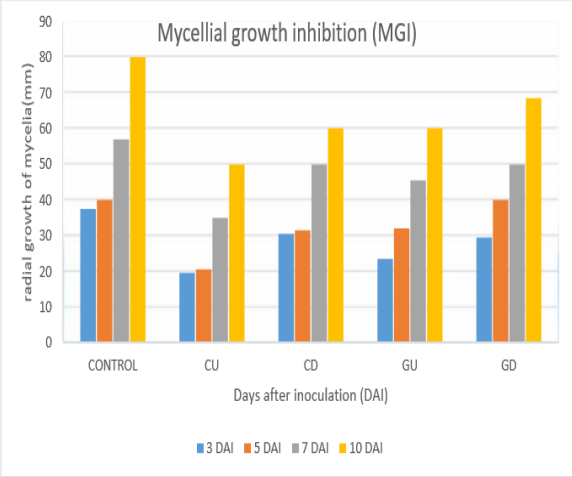

Figure 1: Growth of *C. falcatum* isolates on PDA (Potato dextrose Agar), CUPDA (Cow Urine Potato Dextrose Agar) and CDPDA (Cow Dung Potato Dextrose Agar), Goat Urine Potato Dextrose Agar (GUPDA) and Goat Dung Potato Dextrose Agar (GDPDA) at different interval (a) 3 days (b) 5 days (c) 7 days and (d) 10 days after inoculation.

MYCELIAL GROWTH INHIBITION (%)					
	3 DAI	5 DAI	7 DAI	10 DAI	MEAN
COW URINE	47.29	54.44	38.39	37.5	44.405
COW DUNG	17.56	18.01	19.2	23.75	19.63
GOAT URINE	36.48	31.42	27.2	23.25	29.58
GOAT DUNG	20.27	20.1	20	14.37	18.685

Table 1: Effect of cow urine and dung, goat urine and dung supplemented media on the Mycellial growth inhibition (%) of *Colletotrichum falcatum*at at different interval (a) 3 days (b) 5 days (c) 7 days and (d) 10 days after inoculation.

In present study the result indicate that cow urine significantly decreased the mycellial growth even after 10 days of inoculation in comparison to cow dung and goat urine and dung samples. The growth of mycelia inhibition was varied after 3, 5, 7 and, 10 days of inoculation. In case of cow urine, in most of the treatments showed the maximum activity at 5 days after inoculation then the activity of cow urine is found to be reduced. While cow dung showed minimum mycelia growth at initial day after inoculation, then gradually increased the activity as days of proceeding. It may be due to the evaporation of some volatile components from cow urine, while cow dung showed minimum mycellial growth inhibition at initial day after inoculation, then successively increased as day was proceeding. goat dung and goat urine also shows a Mycellial growth inhibition but in lesser extent than cow urine and dung respectively.

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