



ANTIFUNGAL EFFECT OF COW URINE AGAINST PHYTHOPHTHORA ARECA CAUSING FRUIT ROT OF ARECANUT

J. S. Ambhore, P. M. Ningdale, and G.S.Bhagat

Indraraj College of Arts, Commerce & Science, Sillod-431112, Dist: Aurangabad.
Dr. Babasaheb Ambedkar Arts, Commerce & Science College, Mahad, Dist Raigad.
S. D. College, Soygaon, Dist Aurangabad

ABSTRACT

Arecanut (*Areca catechu* L.) an economically commercial important plantation crop grown in the Konkan region of Maharashtra Arecanut is severely affected by Koleroga, *Phytophthora arecae*, L. (L.C. Coleman). Fruit rot disease occurs under congenial environmental conditions during monsoon; the disease becomes severe and leads to dropping of young buttons, rotting of dropped nuts. The present investigation was undertaken to determine the inhibitory effect of cow urine against *Phytophthora arecae* isolated from infected nuts. The effect of various concentrations of cow urine *i.e.* 5%, 10%, 15%, 20%, 25%, and 30% was tested against the mycelial growth of *Phytophthora arecae* by poisoned food technique. The extent of growth of a causal organism in the poisoned plate was recorded and compared with the control. The inhibitory effect was recorded higher. It can be concluded that *in vivo* cow urine has got potential to inhibit *Phytophthora arecae* causing koleroga of Arecanut *in vitro*.

KEYWORDS: Cow urine; *Phytophthora arecae*; Poisoned food technique, Antifungal activity.

INTRODUCTION

Arecanut is an important commercial crop in the Konkan region of Maharashtra, the rainfall is a high and hilly coastal area, hence this region is suitable for cultivation for Arecanut. The area of shrivardhan is bounded partly by the watershed of the major sahydrian scrap, adjoining on the west by the Arabian Sea and the other side foothills zone. The Arecanut cultivars exhibit susceptibility to disease caused by fungi, bacteria, and viruses which account for a considerable reduction in yield. Among the disease of areca nut koleroga (fruit rot) is the most important disease resulting in a drastic reduction in yield up to 80-90% and deterioration of the quality of plant and fruit. The typical symptoms of koleroga include rotting and excessive shedding of immature fruit, the appearance of the water-soaked lesion on the surface of the infected nut, losses their luster, lesion spread and cover entire nuts (Anandraj *et al.*, 1989) A felt of white mass develop on the fallen nuts. The koleroga is a soil-born major fungal fruit rot disease of Arecanut (*Areca catechu*) caused by *Phytophthora areca* (Coleman L.C.-1910), Chopdappa O. Brayford., Smith, T and Food, J. (2003). It occurs as an epidemic in the Konkan region of Maharashtra (India) on large scale in this area, during the southwest monsoon in all areas where there is heavy rainfall, high humidity, the temperature ranges between 22-28°C. The disease first makes its appearance after the monsoon period. The first symptom is the appearance of a water-soaked lesion on the nut surface near calyx (Nair, M.K-1989). The patches enlarge and nut darkens and they shed in the large number. The fallen nuts soon develop whitish mycelial mass all over the surface. The nuts of all ages are attacked and if unchecked, invade crown causing the leaves and bunches to wither. Sometime the infected nuts may not be shed

and remain mummified in the bunches. From the historical period in India, cow urine has been used for different purposes. It is observed that cow urine has an inhibitory effect against several plant pathogens *Sclerotia*, *sclerotiorum*, *Fusarium solani* sp., *Cucurbitae*, *Bipolaris Sorokiniana*, and *Xanthomonas oryzae* P.v.

The koleroga is Areca nut diseases that have played a significant role in the reduction of yield and economy. Different types of chemicals have been used to control plant diseases, these chemicals have resulted in certain hazardous effects. Hence researchers try to find out natural products as alternate for disease control. The uses of natural products are risk-free when compared to synthetic chemicals. It has been experimentally shown that the cow urine has got agricultural importance in terms of control of insects and fungi. Cow urine is shown to control root-knot nematode in tomato (Abubkar *et al.*, 2004) and melon aphids and pickle worms in watermelon cultivation (Burubai and Eribo-2012), cow urine alone or in combination with plant extracts is shown to inhibit several plant pathogenic fungi and bacteria (Basak *et al.*, 2002a., Basak *et al.*, 2002b., Akhter *et al.*, 2006., Murugan *et al.*, 2012) In the present investigation, we have studied the effect of different concentration of cow urine against *Phytophthora areca* isolated from the infected nut of areca nut palm which was present in the areca nut research Centers garden at Shrivardhan

MATERIALS AND METHODS

Collection of Cow Urine

The cow urine was collected in the morning in a sterile container and brought in the laboratory. The cow urine was filtered through what man no 1 filter paper to get rid

of debris and precipitated material and use for further study.

Collection of disease sample

The disease samples of koleroga of areca nut were collected from Arecanut Research Centre, Shrivardhan, Dist. Raigad. The infected material was collected separately in polythene bags and labeled properly with the date and brought to the laboratory.

The effect of cow urine

In this investigation, we performed a poisoned food technique to determine the antifungal effect of cow urine. The Potato Dextrose Agar (PDA) medium was amended with different concentration of collected cow urine i.e. 5% 10% 15%, 25% & 30% and mix thoroughly by stirring were sterilized by autoclaving and poured into sterile labeled Petri plates each set of experiment was replicated

thrice and the plates were incubated. The control was maintained in which distilled water was used instead of cow urine. The fungal disc of 5mm diameter was taken from actively growing 5 days old culture of *P. areca* by using cork borer and culture disc were inoculated aseptically on PDA plates poisoned with different concentration of cow urine.

The plates were incubated at 28°C ±2°C in the BOD incubator for nine days. The observations for colony diameter of the test fungus were recorded at 3, 5, 7 & 9 days of inoculation (Rakesh *et al.*, 2013b). Antifungal activity was recorded in terms of inhibition of mycelial growth (%). Percent inhibition of mycelial growth was calculated by the following formula of Horsfull (1956) data obtained on percent inhibition were subjected to statistical analysis.

Sr No	Conc. (%)	Mycelial growth at 3 DAI (mm)	Percent reduction over control	Mycelial growth at 5 DAI (mm)	Per cent reduction over control	Mycelial growth at 7 DAI (mm)	Percent reduction over control	Mycelial growth at 9 DAI (mm)	Percent reduction over control
1	0		10.667		25.333		45.000		79.333
2	5	5.000	53.126	18.333	27.632	38.000	15.556	70.667	10.924
3	10	5.000	53.126	18.333	27.632	30.000	33.333	49.333	37.815
4	15	5.000	53.126	16.000	36.841	29.667	34.073	41.667	47.474
5	20	5.000	53.126	15.333	39.474	22.000	51.111	29.667	62.604
6	25	5.000	53.126	10.667	57.893	15.667	65.184	20.000	74.79
7	30	5.000	53.126	5.000	80.263	6.000	86.667	11.667	85.294

TABLE 1: Effect of different concentrations of cow urine on the mycelial growth of *P. arecae*

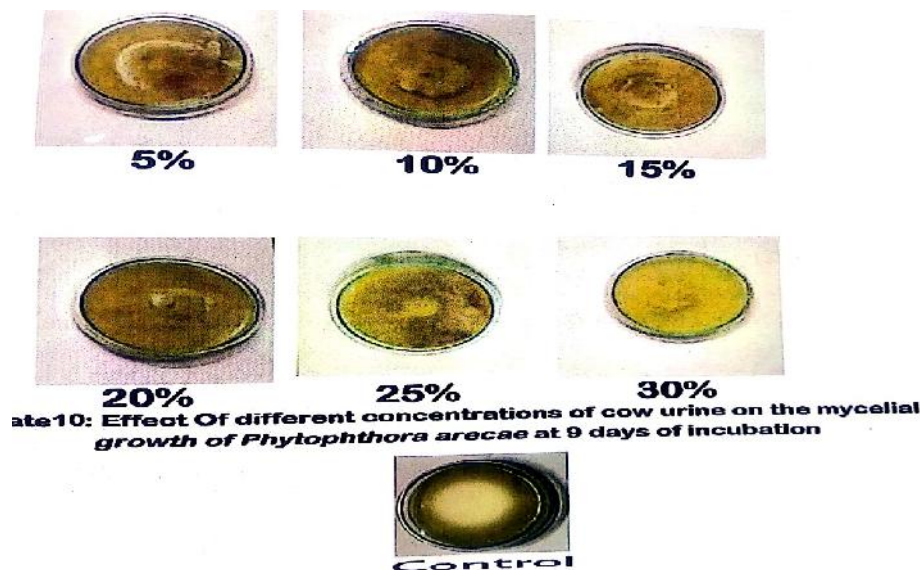
Where,

- X = Per cent condition
- Y = Growth of fungous in control (cm)
- Z = Growth of fungus in treatment (cm)

RESULTS AND DISCUSSION

The diameter of the fungal colony in the poisoned plate was lesser when compared to colony diameter of in control plates, which indicate the antifungal potential of cow urine. During the experiment, it is observed that the inhibition of mycelial growth of *P. Areca* was greater with cow urine.

The inhibition of test fungi was concentration-dependent. The higher concentration of cow urine viz 25 and 30 % maximum inhibited the mycelia growth of *P. areca* at 3,5,7, and 9, day of incubation. Similarly followed cow urine (15 and 20%) significantly inhibited the mycelia growth of the organism at all stages of observation.



The inhibitory effect of cow urine against plant pathogens was well studied by several workers. Basak *et al.* (2002) reported the inhibitory activity of cow urine against *Sclerotinia sclerotiorum* causing sclerotinia rot in cucumber. Another study by Basak *et al.* (2002) reported the effect of cow urine against *Fusarium solani* f.sp. Cucurbita causing root rot disease of cucumber. Neutiyal *et al.* (2000) reported the cow urine and dung were two important bio matters which could be used methodically to get a better result in controlling several pathogenic fungi like *Alternaria alternate*, *Rhizoctonia solani*, *Sclerotium rolfisil*, *Penicillium* sp., etc. effective in controlling. Chaure (2005) also reported that cow urine inhibited the mycelial growth of *Rhizoctonia solani* in all concentrations up to 10 days of incubation. B. Hudge (2007) reported 20 to 30% concentration of cow urine also reduces the mycelia growth of *A. alternate*. K.N. Rakesh *et al.* (2013) reported that cow urine can be used to control rhizome rot of ginger. (Ningdale M.S., Ambhore J.S. and Meshram M.R. -2018) Showed inhibitory effect of different concentrations of some plant extract against causal organism *P. arecae*. In the present study, we have checked the inhibitory effect of cow urine against the *P. area* isolated from the infected nut of areca nut palm. The cow urine was found to be effective against the koleroga as evidenced by inhibition of mycelial growth of the causal organism on poisoned plates. Now a day's management of the koleroga disease by the use of pesticides is not much beneficial due to breakdown of resistance, residual problem, and hazardous effect on non-targeted organisms. Hence it is essential to find alternatives for controlling the fruit rot of areca nut.

CONCLUSION

It was revealed from the study that; Cow urine has shown inhibitory activity against the mycelia growth of *Phytophthora areca*. The cow urine can be employed in the field to control of koleroga diseases in areca nut. Further studies in field conditions are to be conducted to determine the antifungal effect of these cow urine extracts. The use of cow urine is a cost-effective and eco-friendly approach to control phytopathogenic fungi.

REFERENCES

Abubkar, U., Adamu, T., Manga, S.B. (2004) Control of *Meloidogyne incognita* (Kofoid and White) Chitwood (root rot of nematode) of *Lycopersicon esculentus* (tomato) using cow urine. Afr. J. Biotechnol 3:379-381.

Akhter, N., Begum, F., Alam, S., Alam, M.S. Inhibitory effect of different plant extracts, cow dung and cow urine on conidial germination of *Bipolaris sorokiniana*. J. bio-sci., 2006; 14: 87-92.

Anandraj, M., Arora, P. and Nagarajan, S. (1991) A linear model for predicting the prevalence level of koleroga

disease of areca nut four in advance. Indian J. of Plant Prot. 20:75-76

Basak, A.B., Lee, M.W., Lee, T.S. (2002) In vitro inhibitory activity of cow urine and dung to *Fusarium solani* f.sp. cucurbitae. Microbiology 30: 51-54.

Basak, A.B., Lee, M.W., Lee, T.S. (2002) Inhibitive activity of cow urine and cow dung against *Sclerotinia sclerotiorum* of Cucumber. Mycobiology 30: 175-179. 16.

Burbai, W., Eribo, M. (2012) Influence of incubation periods and dosage on the bioefficacy of cow urine against melon aphids (*Aphis gossypii*) and pickle worms (*Diaphania hyalinata*) in watermelon cultivation. Res J of Appl Sci Engg and Technol 4: 269-272.

Chaure, P.S. (2005) Investigation of leaf blight of cotton (*Gossypium* sp) caused by *Rhizoctonia solani* Dissertation submitted to M.A.U. Parbhani (M.S)

Chopdappa, O. Brayford, Smith, T and Food, J. (2003) Identify of *Phytophthora* associated with areca nut and its relationship with rubber and cardamom isolated based on RFLP of PCR-AFLP fingerprints. Current science vol 85, no 5

Coleman, L.C. (1910) Disease of Arecanut pam Koleroga or rot diseases Ann. Mycol 8:591-626.

Horsfall, J.G. (1956) Principal Fungicide Action. Cronica Botanica (U.S.A) Pub. 207.

Murugan, A.M., Shanthi, S., Arunachalam, C., Sivakumar, N., Elamathy, S., Rajapandian, K. (2012) Study on cow urine and *Pongamia pinnata* Linn seed in the farmyard: A natural, cost-effective, eco-friendly remedy to bacterial leaf blight (BLB) of paddy. Afr J Biotechnol 11: 9591 - 9598.

Nair, M.K. (1989) Koleroga (Mahali) of Arecanut. Central Plantation Crop Research Institute (ICAR Kasargod, Kerala, extension folder No. 17.)

Ningdale, M.S., Ambhore, J.S. and Meshram, M.R. (2018) In Vitro Evaluation of Plant Extracts Against *Phytophthora Arecae* on Arecanut (*Areca Catechu* L.) In the Konkan Region of Maharashtra. IAJPS 2018 (Suppl.), 05 (01), S78-S83

Rakesh KN, Dileep N, Junaid S, Kekuda PTR, Vinayaka KS, Nawaz NAS; Inhibitory effect of cow urine extracts of selected plants against pathogens causing rhizome rot of ginger. Science Technology and Arts Research Journal, 2013; 2(2):92-96.