WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.074
Volume 8, Issue 6, 1555-1562. Research Article ISSN 2277– 7105

EFFICACY OF COW URINE AS A PLANT GROWTH ENHANCER AND EVALUATION OF ITS ANTIMICROBIAL ACTIVITY AGAINST *AEROMONAS HYDROPHILA*

Runa Paul[1]*, Divya Yadav[1], Meghashree Yadav[1] and Anju Singh[1]

Department of Zoology, St. Aloysius' College (Autonomous), Jabalpur, (M. P).

Article Received on
21 March 2019,

Revised on 11 April 2019,
Accepted on 01 May 2019,

DOI: 10.20959/wjpr20196-14985

***Corresponding Author**
Runa Paul
Department of Zoology, St. Aloysius' College (Autonomous), Jabalpur, (M. P).

ABSTRACT

Aim- Numerous plants and animal origin resources have been reported to have antimicrobial activity and can enhance plant growth also. The present research work was undertaken to investigate the antimicrobial activity of cow urine against gram negative bacteria *Aeromonas hydrophila* and also to determine efficiency of cow urine as a plant growth enhancer. **Methods-** The antimicrobial activity of various concentrations (0, 100, 300, 500, 700 & 1000µl) of fresh cow urine and photo activated urine was determined by spectrophotometric method. The pot culture method was also performed to find out the efficacy of various concentrations of cow urine (0%, 1%, 2%, 3%, 4% & 5%), on growth of gourd and brinjal plants. Each pot containing seeds was watered two times a day with different concentrations of cow urine and the control pots were watered only with tap water. After 25 days' various parameters were determined such as plant height, shoot length, root length, number of leaves and branches to detect the plant progress. **Result & Discussion-** The results indicated that fresh cow urine with highest concentration has better antimicrobial activity as compared to photo activated urine with highest concentration. The effect of cow urine on plant growth was also evaluated with *Lagenaria siceraria* (gourd) and *Solanum melongena* (brinjal) plants, it was seen that plant height, number of leaves and number of branches of gourd and brinjal was increased by increasing the concentration of cow urine and length of time. **Conclusion**-Thus we concluded that the cow urine possesses antimicrobial activity and also have favorable impact on the production of gourd and brinjal plants.

KEYWORDS: Cow urine, *Aeromonas hydrophila*, Antimicrobial, *Lagenaria siceraria Solanum melongena.*

INTRODUCTION

Cow urine has a great pharmacological importance, its medicinal utility has been greatly mentioned in depth in Ayurveda.[1] Cow urine is found to be effective against reversal of certain cardiac and kidney diseases, indigestion, stomach ache, edema, skin diseases etc.[2] Drugs are not only expensive and inadequate for the treatment of diseases in developing countries, but also have side effects. Therefore, there is a need to develop new infection fighting strategies to control microbial infections.[3] Cow urine contains 95% water, 2.5% urea, and remaining 2.5% a mixture of salts, hormones, enzymes and minerals.[4] Vegetable plants suffer from diseases caused by various kinds of pathogens such as bacteria, fungi, viruses, nematodes and mycoplasma. Among these, fungi are considered as most aggressive pathogens causing qualitative and quantitative damage.[5]

Cow urine is a good source of nitrogen, phosphate, potassium, calcium, magnesium, chlorite and sulphate. Application of cow urine besides improving the soil texture and working as a plant hormone also been reported to correct the micro-nutrient deficiency, being organic in nature it is also likely to increase the fertilizer use efficiency.[6]

Cow urine has certain volatile and non-volatile components, which might have very high antimicrobial activity.[7] After photo-activation and purification cow urine made free from microbes and it gains massive toxic potential to kill drug resistant bacterial strains. Cow urine exhibits both antioxidants and antimicrobial activities which were confirmed. Its acts as a bio-enhancer of some antimicrobial drugs. Essentially, cow urine are used as disinfectant and for purification.[8]

MATERIAL AND METHODS

According to[5] method with some modification

Disease free cow urine was collected for antimicrobial activity and for the growth of *Solanum melongena*(brinjal) and *Lagenaria siceraria*,(gourd). Sterile container was used for the collection of fresh cow urine. Fresh cow urine sample was obtained from local cattle yard in Jabalpur. For the experimental purpose, photo-activated urine was prepared and maintained for 72 hrs in sunlight in a sealed transparent glass bottle. The urine sample was then filtered

by using Whatmann No-1 filter paper to make it free from debris and precipitated material. The samples prepared were stored at 4°C for further use.

Microbial culture

The test culture [*A.hydrophila* (1739)] was brought from microbial type culture collection centre (MTCC), Chandigarh, India. The fresh cow urine and photo-activated cow urine were tested against gram negative bacteria (*A.hydrophila*). The culture of *A.hydrophila* was maintained at 4°C in nutrient broth.

Antimicrobial activity

The antimicrobial activity of the fresh cow urine and photoactivated urine was performed by spectrophotometric method. In the test, in which the bacterial strain was put in 5 test tubes and different concentrations of cow urine like 100µl, 300µl, 500µl, 700µl and 1000µl were added in each test tube. Optical density of the bacterial strain was measured by spectrophotometer at 600nm. A decrease in OD values was observed which indicated the antimicrobial activity of cow urine.

Table 1: Preparation of cow urine sample.

Amount of Urine (µl)	Amount of Distilled Water (µl)	Amount of *Aeromonas hydrophila* (µl)	Amount of Broth (ml)
100	900	100	5
300	700	100	5
500	500	100	5
700	300	100	5
1000	0	100	5

Pot Culture Experiment

According to[2] methods with some modification-

The pot culture study was performed to determine the effect of different concentrations of cow urine on growth of gourd and brinjal plants. The seeds of gourd and brinjal were collected from local area of Jabalpur, Madhya Pradesh. The seeds were kept in water for 12hrs and then 5 seeds were sown in various pots containing sterile soil. To obtain sterile soil, it was autoclaved at 15 lbs pressure for half an hour. The pH of the soil was maintained at 7. Each pot was watered two times daily with various concentrations (0%, 1%, 2%, 3%, 4%, and 5%) of cow urine. In control pots, the seeds were watered with tap water only. Three seedlings were randomly uprooted from each treatment and different parameters such as plant

height, number of leaves and number of branches were observed after 25 days to notice the plant progress.

RESULTS AND DISCUSSION

In our study, it was established that the cow urine owns antimicrobial properties. Fresh cow urine is more acidic in nature so it possesses better antimicrobial activity than photo-activated urine. The anti-microbial activity of cow urine is given in table 2 & 3.

Pot culture experiment was performed to find out the effect of cow urine on the external morphology of *Lagenaria siceraria* (gourd*)* and *Solanum melongena* (brinjal) after 25 days. Parameters such as plant height, number of leaves and number of branches were examined in the test and control plants. From the results, it can be seen that plant height, number of leaves and number of branches ofgourd and brinjal was increased by increasing the concentration of cow urine and length of time. In gourd, the largest plant height was 25 cm, maximum number of leaves was 4 and maximum number of branches was 3 at maximum concentration of 5% of cow urine. In brinjal the largest plant height was 9.2 cm, maximum number of leaves was 4 and maximum number of branches was 3at maximum concentration of 5% of cow urine. The results are shown in table 4 & 5.

The present study showed the cow urine at different concentrations had significant effect on the growth of *Lagenaria siceraria (*gourd) and *Solanum melongena* (brinjal). It is clear from the results that the decline in Optical density values was maximum at highest concentration of fresh cow urine against bacterial pathogens as compared to photoactivated urine. Present work is in similar with the findings of[9] who stated that it is clear that vegetative growth of (*Triticum aestivum*) was better with increase in concentration of cow urine and time period.[5] Reported that nutritional effect of various concentrations (5, 10, and 15%) of cow urine on growth of *Trigonella foenum-graecum* (Methi) and *Abelmoschus esculentus* (Bhindi) plants increased with increase in concentration of cow urine and time duration.[10] proved that the use of increasing concentration of the cow urine (5% and 10%) have significant enhancement on production of gladiolus cultivar Candyman as compared to control (water spray) treatment. The present study agrees with the results of[11] that fresh cow urine showed better anti-microbial activity against various bacterial pathogens than photo-activated urine. Similar study was carried out by[3] on photo-activated urine and they observed that cow urine possesses maximum antimicrobial activity and can act as an anti-bacterial agent against gram

negative and gram-positive bacteria. The current study agrees with the results of[8] that cow urine showed maximum inhibition zone against various pathogenic bacteria.

Table 2: Demonstrating the optical density value of sample taken (Aeromonas hydrophila) of in which fresh cow urine was inoculated and the Optical density was measured after each hour.

Concentration of cow urine (µl)	Absorbance (Optical density)		
	1st hr	2nd hr	3rd hr
100	0.015	0.010	0.009
300	0.014	0.010	0.008
500	0.014	0.009	0.005
700	0.012	0.004	0.003
1000	0.010	0.003	0.002

Table 3: Demonstrating the optical density value of sample taken (*Aeromonas hydrophila*) of in which photoactivated cow urine was inoculated and the Optical density was measured after each hour.

Concentration of cow urine (µl)	Absorbance (Optical density)		
	1st hr	2nd hr	3rd hr
100	0.081	0.065	0.026
300	0.056	0.035	0.016
500	0.048	0.027	0.014
700	0.029	0.025	0.009
1000	0.027	0.022	0.008

Table 4: Effect of cow urine on external morphological characters of *Lagenaria siceraria* (gourd) by pot culture experiment after 25 days.

S.No	Concentration of cow urine	Plant height (cm)	Number of leaves (cm)	Number of branches (cm)
1.	Control	19.3±0.15	2.0±1.0	2.0±1.0
2.	1%	14.9±0.36	2.3±0.57	2.3±0.57
3.	2%	14.4±0.26	3.3±0.57	3.3±0.57
4.	3%	19.1±0.15	2.6±0.57	2.6±0.57
5.	4%	19.3±0.15	2.6±0.57	2.6±0.57
6.	5%	24.6±0.57	3.6±0.57	3.6±0.57

Table 5: Effect of cow urine on external morphological characters of *Solanum melongena* (brinjal) by pot culture experiment after 25 days.

S.No	Concentration of cow urine	Plant height(cm)	Number of leaves(cm)	Number of branches(cm)
1.	Control	6.2±0.2	2.3±0.6	2.3±0.6
2.	1%	8.3±0.2	2.3±0.6	2.3±0.6
3.	2%	9.1±0.1	2.3±0.6	2.3±0.6
4.	3%	8.2±0.2	2.6±0.6	2.6±0.6
5.	4%	7.7±0.15	2.6±0.6	2.6±0.6
6.	5%	9.1±0.15	3.3±0.6	3.3±0.6

Figure 1: Effect of various concentrations (1%, 2%, 3%, 4%, 5% and 0%) of cow urine on *Solanum melongena* (brinjal) plant growth after 25days.

Figure 2: Effect of various concentrations (1%, 2%, 3%, 4%, 5% and 0%) of cow urine on *Lagenaria siceraria* (gourd) plant growth after 25days.

CONCLUSION

This study concluded that fresh cow urine showed noteworthy anti-microbial activity against photo-activated urine due to its low pH value. The external morphology of the two plants increased when exposed in different concentration of cow urine. Therefore, cow urine is a better substitute to artificial chemicals used, as they are costly and harmful to the society and surroundings. Thus, the cow urine can be used as bio fertilizer which in turn will improve soil fertility, crop production and soil texture. it can be concluded that cow urine could be a potent source to improve soil fertility, crop productivity and quality.

ACKNOWLEDGEMENT

The authors are thankful to Principal and all staff members of the Zoology department, St. Aloysius' (Autonomous) College, Jabalpur for their support and for providing all necessary lab facilities.

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