RESEARCH ARTICLE

EVALUATION OF DIFFERENT COW URINE CONCENTRATIONS ON GERMINATION PERFORMANCE AND SEEDLING GROWTH OF SELECTED LEGUMES

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ABSTRACT:
Cow urine has been used in India from ancient time for various organic formulations of human and agricultural concerns. Keeping in view of the importance of cow urine, the present work was carried out. The experiment was conducted to study the effect of different concentrations of cow urine on seeds of some leguminous plants. The observations like germination percentage, average root length, average shoot length was recorded up to two weeks. Considering the different cow urine concentrations 0.5 % and 1% concentration were found more effective in these agricultural crops.

KEYWORDS: *Cow Urine, Seed Germination, Seedling Growth, Legumes.*

INTRODUCTION:

In the past years, inorganic fertilizer becomes advocated for crop production to make low inherent fertility of soil. But, high price and scarcity of inorganic fertilizer as well as possible cause of soil acidity and nutrient imbalance pose a constraint to use of inorganic fertilizer. Nutrient imbalance and soil bodily degradation hinder sustainable use of inorganic fertilizers in the tropics. There are sure risks of inorganic fertilizers along with eutrophication (1), accelerated acidity and lack of microorganism in soil (2). In order to sustain soil fertility for a long period of time the use of organic manure is been advocated. This is because the nutrients contained in organic manures are released more slowly and are stored for a longer time in the soil, thereby ensuring a long residual effect, also reported that manures provide a source of all necessary macro and micronutrients in available forms, thereby improving the physical and biological properties of the soil. There are different types of organic manure including cow dung, compost, green and farm yard manure etc. suitable for agriculture use (3, 4, 5).

The usage of cow urine is understood for a long time in India. The cow urine is most effectively used towards ailments of diseases as therapeutic marketers. However additionally it has several other

uses as in agriculture sectors. It produces best quality of grains, fruits, and vegetables by becoming the best type of manure. The noteworthy aspects of cow urine are its green nature, easy accessibility and more than one makes use of. Cow urine has been defined as a liquid with innumerable healing values, able to curing numerous incurable diseases in human beings and also in plants (6, 7).

It has been considered that cow urine is very useful in agricultural operations as a biofertilizer and biopesticide. It is rich source of macro and micronutrients; disinfectant and prophylactic properties thus purify the atmosphere and improve soil fertility. Cow urine therefore, could be an effective tool to address multi nutrient deficiencies in most of soils in the country. It has been found out that cow urine plays a significant role in production of vegetables and control of diseases (8, 9, 10).

Cow urine is reported as a growth enhancer of plants and widely used as a biofertilizer for different crop plants. Many studies were conducted on the application of different rates of cow urine and for crop production. The use of cow urine as biofertilizer in soybean (11), mango (12), vegetable crops (13, 14), maize (15, 16), rice (17, 18) showed significant positive results in the terms of growth and yield. To know the effect of cow urine on seed germination and seedling growth of leguminous plants, present study was carried out.

MATERIALS AND METHODS:

Plant material:

Seeds of Soybean (*Glycine max* L.) Kidney bean (*Phaseolus vulgaris* L.), Mung (*Vigna radiata* L.) and Chickpea (*Cicer arietinum* L.)

Preperation of cow urine concentration:

Fresh and clean cow urine taken and filtered with Whatmann No.1 paper and prepared the different concentration (0.5%, 1%, 2%, 3%, 4%) with the help of distilled water. The prepared concentration of cow urine was stored and used for treating the seeds of Soybean, Kidney bean, Mung and Chickpea.

Seed germination study:

Petri plate technique was followed for germination studies. The germination rate was recorded every 2-day for 8 day-period. Sterilized Whatmann No.1 filter paper was kept in the sterilized petriplates. Seeds were sterilized with 0.1% HgCl_2, washed with distilled water for several times and then 10 seeds of each type in triplicate number were kept for germination in petriplates. A control was maintained with distilled water. Seeds were incubated under continuous dark at 23 °C ± 2 °C (Celsius) in controlled temperature room. The papers were changed with the same treatment each 2 day to prevent unwanted accumulation of elements. The seeds were moistened with the appropriate solutions of cow urine and kept wet throughout the experiment. Seeds were considered as germinated when the radicle had protruded 2 mm through the seed coat (19).

Seedling growth study:

After two-week period, shoot length was immediately measured by caliper. The experiment was repeated three times to take average results.

RESULTS AND DISCUSSION:

The effect of Cow urine on germination percentage of these some agricultural crops is depicted in table 1. The study revealed that 0.5 and 1 % concentration of cow urine shows highest germination percentage in all these agricultural crops. As compared to control the germination percentage is increases in all these crops. The root and shoot length of these crops are presented in table 2 and 3.

In Soybean and Chickpea crops 0.5 % concentration of cow urine shows highest root and shoot length but at 3 % and 4% concentration shows lowest root and shoot length. But in other crops like Kidney bean and Mung 4 % concentration of cow urine shows highest root and shoot length but at 2 % concentration shows lowest root and shoot length. The results are similar with the study of Oliveira *et al.* (20) who reported that the increase in cow urine concentrations increased the performance of lettuce characteristics. The corelated results were also obtained by Patil *et al.* (13) in summer green gram, Rajesh and Jayakumar (21) in Okra, Singh *et al.* (17) for rice and Veeresha *et al.* (16) in maize.

The effect of cow urine on root and shoot length is entirely dose dependent. The higher concentrations treatment showed comparatively inhibiting growth compared to treatments with a lower urine concentration and control dose. This finding contradicts those of other authors who observed a strictly dose dependent response (8, 22). It is unclear at this point why a lower concentration appeared to be more effective compared to higher urine concentrations.

The results of the present study show similarity with the study of Tharmaraj (23) who reported the improved growth and productivity of the plants with use of cow urine and dung as growth media. It is evident from the results that the seed germination and seedling increased with increase in concentration of cow urine. Similar findings with use of cow urine spray as growth promoter were observed in *Arachis hypogaea* (24) and *Abelmoschus esculentus* (L.) (21). The increased seed germination and growth was also recorded in many crops by Damodar and Shinde (12), Devakumar *et al.* (15), Kgasudi and Mantswe (10) and Kabir *et al.* (18).

Table 1: Effect of Cow urine on percentage of seed germination of Soybean, Kidney bean, Mung and Chickpea

Concentration (%)	*G. max*	*P. vulgaris*	*V. radiata*	*C. arietinum*
Control	49.97 ± 0.80 NS	89.94 ± 1.44 NS	89.94 ± 1.44 NS	99.93 ± 1.60 NS
0.5	89.94 ± 1.44 *	99.93 ± 1.60 NS	99.93 ± 1.60 NS	99.93 ± 1.60 NS
1.0	79.95 ± 1.28 *	99.93 ± 1.60 NS	99.93 ± 1.60 NS	89.94 ± 1.44 *
2.0	49.97 ± 0.80 NS	99.93 ± 1.60 NS	99.93 ± 1.60 NS	89.94 ± 1.44 *
3.0	49.97 ± 0.80 NS	99.93 ± 1.60 NS	99.93 ± 1.60 NS	79.95 ± 1.28 **
4.0	49.97 ± 0.80 NS	99.93 ± 1.60 NS	99.93 ± 1.60 NS	69.96 ± 1.12 **

NS = Not Significant ($p > 0.05$); * = Significant at $p < 0.05$; ** = Highly Significant at $p < 0.01$

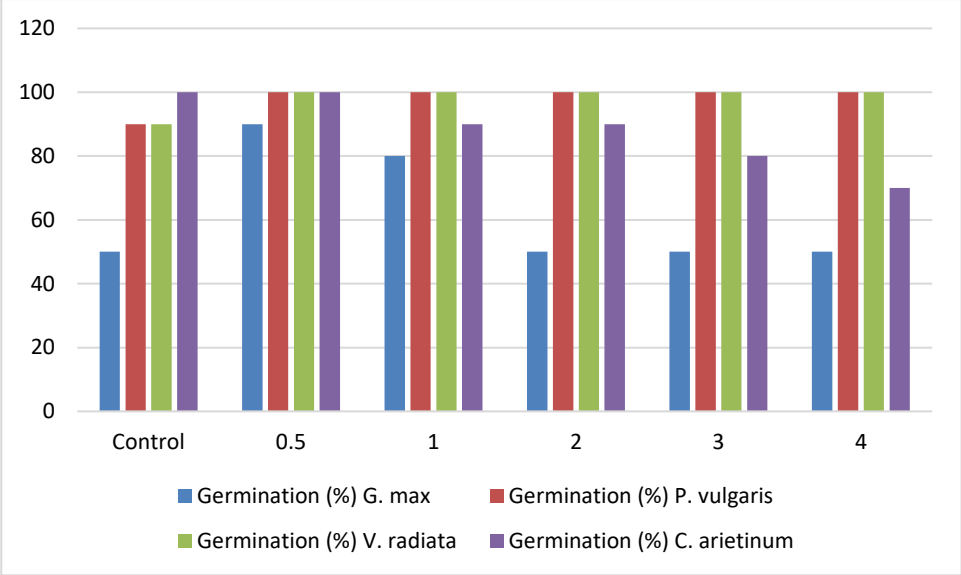

Figure 1: Effect of Cow urine on percentage of seed germination of Soybean, Kidney bean, Mung and Chickpea

Table 2: Effect of cow urine on root growth (length in cm) on Soybean, Kidney bean, Mung and Chickpea at seedling stage

Concentration %	*G. max*	*P. vulgaris*	*V. radiata*	*C. arietinum*
Control	6.50 ± 0.11 NS	4.00 ± 0.07 NS	4.00 ± 0.07 NS	7.59 ± 0.13 NS
0.5	7.99 ± 0.13 *	4.50 ± 0.08 *	6.00 ± 0.10 **	7.20 ± 0.12 NS
1.0	6.79 ± 0.11 NS	6.00 ± 0.10 **	4.30 ± 0.07 NS	6.10 ± 0.10 *
2.0	5.80 ± 0.10 *	3.80 ± 0.06 NS	3.90 ± 0.07 NS	5.80 ± 0.10 **
3.0	4.90 ± 0.08 **	8.29 ± 0.14 **	3.50 ± 0.06 *	5.50 ± 0.09 **
4.0	6.19 ± 0.10 NS	9.19 ± 0.15 **	8.50 ± 0.14 **	4.40 ± 0.07 **

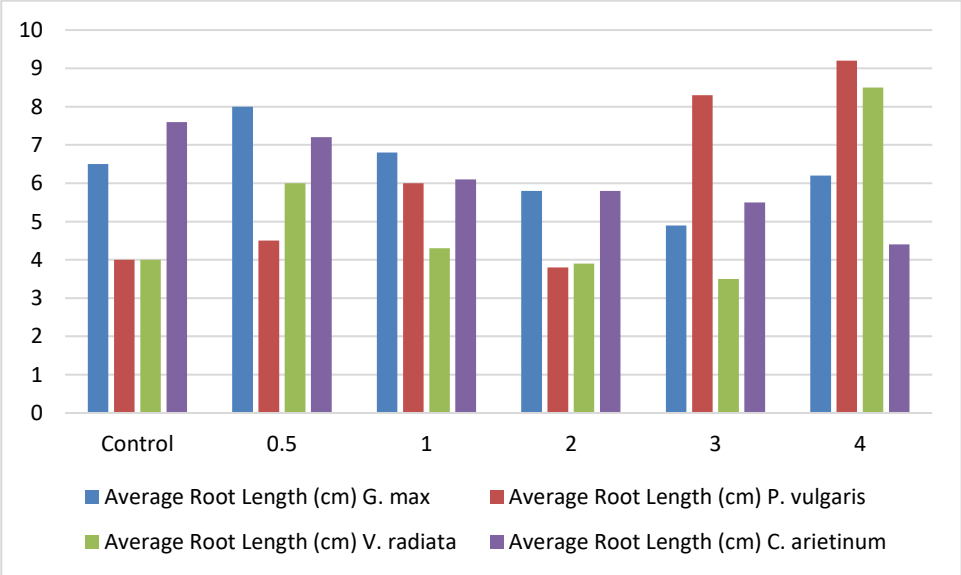

Figure 2: Effect of cow urine on root growth (length) on Soybean, Kidney bean, Mung and Chickpea at seedling stage

Table 3: Effect of cow urine on shoot growth (length in cm) on Soybean, Kidney bean, Mung and Chickpea at seedling stage

Concentration (%)	*G. max*	*P. vulgaris*	*V. radiata*	*C. arietinum*
Control	18.99 ± 0.30 NS	17.99 ± 0.29 NS	16.49 ± 0.26 NS	16.59 ± 0.27 NS
0.5	20.99 ± 0.34 *	15.49 ± 0.25 *	13.49 ± 0.22 **	16.49 ± 0.26 NS
1.0	19.39 ± 0.31 NS	20.49 ± 0.33 *	15.39 ± 0.25 NS	15.49 ± 0.25 *
2.0	18.69 ± 0.30 NS	15.99 ± 0.26 *	15.89 ± 0.25 NS	14.89 ± 0.24 **
3.0	17.49 ± 0.28 *	21.29 ± 0.34 **	19.29 ± 0.31 *	14.49 ± 0.23 **
4.0	18.89 ± 0.30 NS	22.49 ± 0.36 **	21.99 ± 0.35 **	13.89 ± 0.22 **

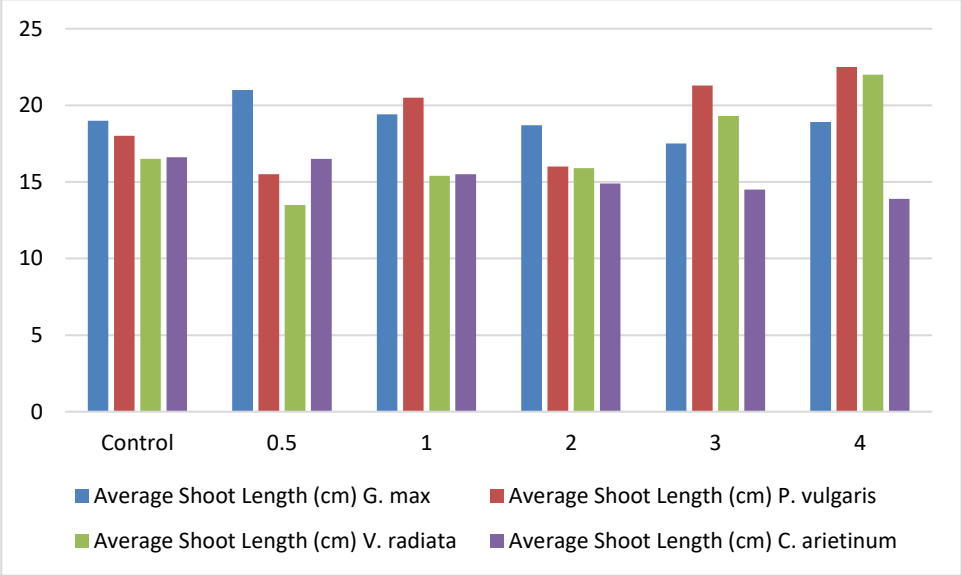

Figure 3: Effect of cow urine on shoot growth (length) on Soybean, Kidney bean, Mung and Chickpea at seedling stage

CONCLUSION:

The present study reveals that cow urine plays a significant role in improving seed germination and seedling growth of leguminous plants. The effect of cow urine on root and shoot length is entirely dose dependent, where lower concentrations of 0.5% and 1% show the highest germination percentage and maximum growth performance across all agricultural crops compared to control. However, higher concentrations exhibit an inhibiting growth effect. Therefore, it is concluded that the application of appropriate lower concentrations of cow urine can be effectively utilized as a potential biofertilizer tool to address multi nutrient deficiencies and enhance sustainable crop production.

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