

Cow Dung for Reducing Aluminium Toxicity in Soil and Cow Importance from Vedic Scriptures

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Abstract—Aluminium is third most abundant element present in earth crust and if suppose it's concentration increases in soil and water than it affects plant root in which aluminium concentration is high and also if in water it concentration increases than normal than it's affect the aquatic life. In both the case aluminium toxicity is harmful to living being. But aluminium become soluble and finally movable when pH of soil decreases or soil become more acidic in nature and hence it's concentration increases which result in increase of aluminium toxicity which affect the normal growth of plant's roots which ultimately affects the plants growth. In this research work cow dung was used for treatment of polluted soil which was polluted by sulphuric acid. Due to addition of sulphuric acid Ph of soil lowers down but with the addition of cow dung pH of soil increases which is good sign of treatment for soil. Now as we know that aluminium becomes soluble or it's concentration increases at lower Ph value. In this soil was made acidic with the help of sulphuric acid which result in increase of aluminium toxicity but with the addition of cow dung Ph value of polluted acidic soil increases and hence aluminium toxicity can be reduced with the help of cow dung. The historical importance of Indian Cow from vedic scriptures and her effective utilization of panchgavya (mixture of urine, milk, ghee, curd and dung of Indian Cow) and individual products mentioned in various vedic book like Bhagwat Geeta, Mahabharat, etc were studied which was suggested by the known holly persons who were using cow dung as a medicine, as a thermal insulator, as a plaster, flooring etc.

Keywords— Aluminium, concentration, toxicity, plant's roots, pH, sulphuric acid, vedic scriptures, panchgavya, cow dung, medicine, thermal insulator, plaster, flooring.

1. Introduction

Due to acidic soil production of crops decreases as aluminium toxicity increases as it affects the plant roots growth ultimately affecting the plant growth[1] In highly

acidic soil plants roots get affected and they are unable to absorb nutrient from the soil.

The land, ground water and surface water all are very important in maintaining ecosystem and if any one of them is polluted it's pollutes the environment. Now suppose land is polluted with some pollutants like pesticides than it is further consume by plants which in turn consumed by animal and human being thus entering the ecosystem which will further introduce problem of decrease in immunity of human being. Hence due to decrease immunity chances of people being affected by diseases increases and for that best example is that of Bhopal gas tragedy. In this tragedy methylisocyanate (MIC) gas was released which was toxic in nature which kills many peoples. [2]

If we live in peace and harmony with nature the nature will give us positive result. For example with the organic fertilizers soil fertility also increases but also various other properties of soil like water holding capacity, porosity, softness, etc increases for longer duration but with chemical fertilizer productivity is high but quality of food grains, fruits, etc is less as compared to organic fertilizers applied soil. So human activities motives should have consideration for environment protection also which will have good result in future for future generation. For example for treating any polluted medium the treatment should consider maximum portion of bioremediation as it not only helpful for protection of environment but also helpful for maintaining ecosystem. [3]

Cow dung is very helpful as micro organisms present in Cow dung are helpful for decreasing the value of total petroleum hydrocarbons and also helps in improving the soil properties like pH and electrical conductivity. This method not only decreases the amount of pollutants in soil but also helpful in increasing nutrients of soil as well as helpful in enhancement of soil properties like water holding capacity, softness etc for enhances growth of plant. [4]

Panchgavya meaning mixture of mixture of urine, milk, ghee, curd and dung of Indian Cow. It is used for treatment of diseases like cancer, skin diseases, etc. [5]. Finally it can be said that cow plays important role in protection of environment.

2. Literature Review

Indian cow is of great importance in Indian society. Indian cow is considered as holy since ancient time. Its dung is known as best manure and best soil fertilizers throughout the world. Indian Cow has been considered as symbol of wealth since ancient time. The crop grown in soil which has used cow manure have high yield and have better quality grains as compared to artificial manure. In this research property of soil was checked before and after adding of cow dung.

Teresa Mossor-Pietraszewska (2001): Have discussed that aluminium toxicity limits the plant growth and the main thing affected of root is cell plasma membrane at its apex. [6]

P. Agamuthu, Y.S. Tan, S.H. Fauziah (2013): Have discussed that the cow dung can play an important role in treatment of soil polluted with lubricant oil and concluded that bioremediation can play an important role in treating soil polluted with petroleum hydrocarbon. [7]

Uwumarongie-Ilori, E.G Aisueni N.O, Sulaiman-Ilobu, B.B ,Ekhatior, F. Eneje, R. C. and Efetie-Osie, A. (2012): They have discussed that in cases of metal contamination ,accumulation of heavy metals from regular application of inorganic fertilizer to soils cultivated with oil palm, cow dung can be used to immobilize the heavy metals in the contaminated soil. [8]

K. Prapagar, S.P. Indraratne and P. Premanandharajah (2012): The study revealed that addition of gypsum and organic amendments (CD, PH) acted as ameliorant to saline-sodic soils. It also revealed that individual or combined effect of gypsum and simple leaching was more effective in changing EC and SAR. Gypsum application in combination with organic amendments improved the soil chemical properties by reducing the EC, SAR (Sodium Adsorption Ratio) and pH, than the applying gypsum alone. [9]

P. M. V. Subbarao and V. K. Vijay: They have discussed the importance of cow dung in production of biogas which can be used for running vehicles after removing carbondioxide from biogas. [10]

Now days living creature's likes animals, birds, etc are on the verge of extinct which helps in maintaining the ecosystem. For example cows which plays very important role in protection of environment as they feed on the dry and wet both grasses and helps in solid waste management. They also provide with milk, and from that milk ghee, curd, etc are produced which provide the human being with good variety of food.

3. Materials and Methods

Soil samples, salt, distilled water, pH meter, fresh cow dung, electrical conductivity instrument, chemical required for testing pH and electrical conductivity of soil

and plastic samples bottles were required for doing experiment.[11]

From college campus only red garden soil was taken and in 5 plastic pots 2 kg each soil was taken and in five plastic pot acidic water of Ph 1.2 was added to soil samples and immediately small amount of soil was taken for measuring pH and electrical conductivity and than cow dung was added in succession of 200g, 400g, 600g, 800g and 1000g in acidic soils plastic pots and than after 15 days and 40 days soil Ph and electrical conductivity was measured.[12]

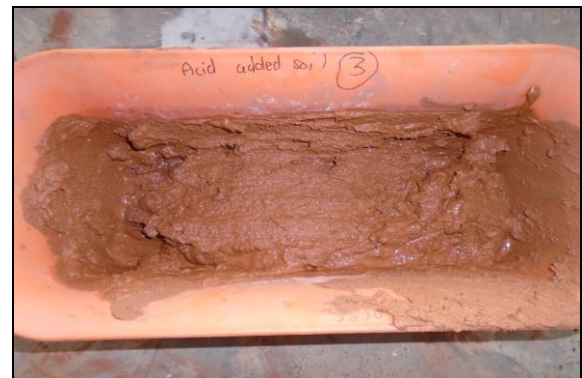


Fig. 1: Plastic pot containing acidic solution added soil



Fig. 2: Plastic pot containing acid added soil with cow dung added



Fig. 3: Plastic pot containing acid added soil mixed with cow dung

For knowing the importance of cow from vedic scriptures books like Bhagwat Geeta, Shrimad Bhagvatam, Saint Tukaram Gatha, Nyaneshwari, Puranas, websites related to vedic scriptures were viewed and studied.

4. Result and Discussion

4.1 Result and discussion for treatment of acidified soil

In this as soil is acidified by sulphuric acid than on addition of cow dung there is increase in pH value which shows that cow dung can be used in treatment of acidified soil when acid rainfall occur or when some industries directly discharge their acidic effluents on soil which result in pollution of soil. In this test initial soil Ph was 6.02 and electrical conductivity was 0.117 Ms/cm and afterward acid was added in order to pollute the soil which lowers the pH thus making the soil more acidic in nature which is harmful for normal plant growth and also on addition of cow dung electrical conductivity of soil sample increases which shows positive sign of freely available nutrients ions from cow dung helpful for plant growth. Due to addition of acids metal like arsenic precipitates and freely movable which can pollute the soil, ground water and near by water bodies and if living being consumes that polluted water than their immunity will decrease and chances of getting cancer increases. Hence with the research work done it can be concluded that cow dung can be used for protection of environment. From figure no 4 aluminium concentration increases rapidly after pH value 4 which ultimately results in increase of aluminium toxicity, which ultimately affects the normal plant growth, now in this research work cow dung was used for treatment of acidic soil which help in increasing the Ph of acidic soil as Ph is increasing the soluble aluminium concentration will definitely decrease and hence it will be helpful in minimizing the aluminium toxicity, from this it can be concluded that cow dung be used for treatment of toxicity created by aluminium.

From table no 1 and 2, pH of acidic soil increases after fifteen days and forty days which is a good sign for reducing aluminium toxicity

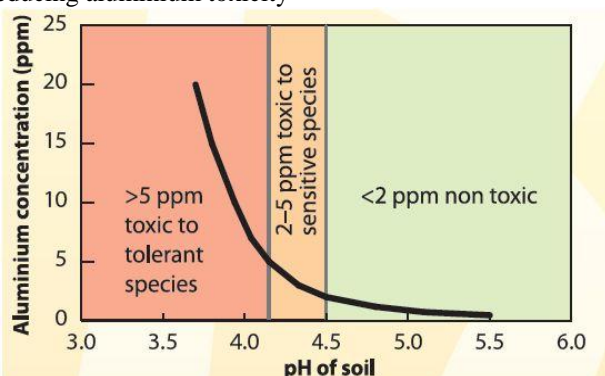


Fig. 4: Showing concentration of aluminium on different values of Ph of soil Source: <http://soilquality.org.au/factsheets/soil-acidity>

Table 1: pH and Electrical conductivity of acidified soil samples after addition of cow dung after 15 days

Fresh Cow Dung Ph =6.62 and EC =1.910				
Normal Soil pH and Electrical conductivity of soil is Ph =6.02 and EC =0.117				
Acidified Soil Ph = 3.38, EC = 2.19				
pH and Electrical conductivity of soil after addition of cow dung after 15 days				
Sr.No	Sample Name	Cow Dung Added (gram)	Ph	EC(Ms/cm) milliSiemens / centimeter
1	AAS1	200	4.38	1.924
2	AAS2	400	4.4	2.01
3	AAS3	600	4.42	2.05
4	AAS4	800	4.49	2.36
5	AAS5	1000	4.6	2.46

Table 2: pH and Electrical conductivity of acidified soil samples after addition of cow dung after 40 days

pH and Electrical conductivity of soil after addition of cow dung after 40 days				
Sr.No	Sample Name	Cow Dung Added (gram)	Ph	EC(Ms/cm) milliSiemens / centimeter
1	AAS1	200	4.33	2.38
2	AAS2	400	3.86	2.4
3	AAS3	600	4.02	2.3
4	AAS4	800	4.28	2.63
5	AAS5	1000	4.41	2.92

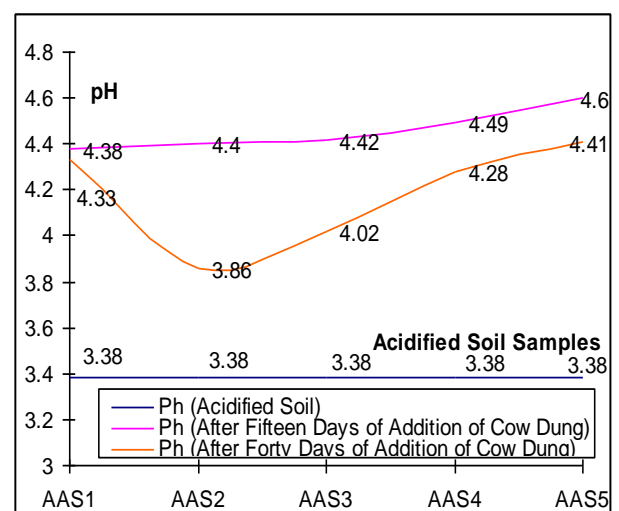


Fig. 5: Chart showing effect on pH of 5 acidified soil samples after polluting and after treatment period of 15 days and 40 days.

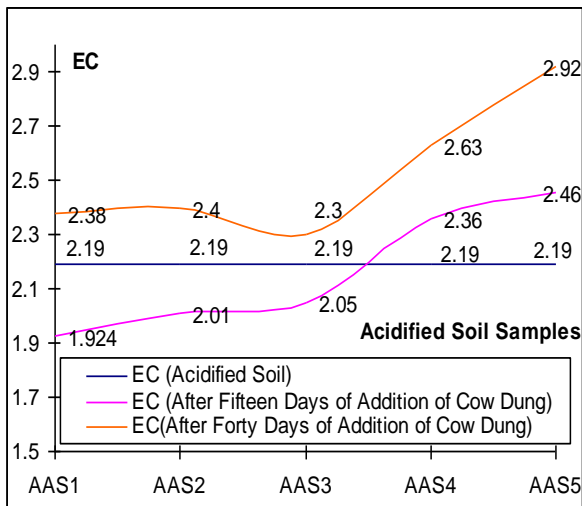


Fig. 6: Chart showing effect on EC of 5 acidified soil samples after polluting and after treatment period of 15 days and 40 days.

From the above graphs it can be concluded that cow dung helps in increasing the pH of acidified soil.

4.2 Importance of Cow from vedic scriptures.

Krsi-go-raksya-vanijyam vaisya-karma svabhava-jam

The Supreme Personality of Godhead has instructed in the Bhagavad Gita, "Farming, Cow Protection & Trade are the natural work for the vaisyas. - Bhagavad Gita (18.44). This verse states it is the duty of business class people and farmers to protect cow which is said by the Supreme Personality of Godhead.[13]

Obstructing provision of water to thirsty cows should be considered equal to the sin of killing Brahmins which is stated in Mahabharata, Anushasana Parva 24-7 which convey us that if we are not providing water to thirsty cow than it will be equal to the sin of killing of Brahmins or holy person. [14]

Caitanya Mahaprabhu confirms:

go-ange yata loma tata sahasra vatsara

go-vadhi raurava-madhye pace nirantar

Cow killers and cow eaters are condemned to rot in hell for as many thousands of years as there are for each hair on the body of every cow they eat from. In this verse the importance of cow can be understood that if we kill cow than we have to live for long span in hell [15].

A guru, a teacher, a father, a mother, a brahman, a cow and a yogi all should never be killed [16]. By doing service

of the cow and using cow products, awareness and spirit, both enhance [17].

5. Conclusion

It can be concluded that cow dung helps in increasing the Ph of acidified soil, ultimately helps in treatment of polluted soil. Hence it can be used for minimizing the aluminium toxicity as it help in increasing the Ph value of acidic soil. It helps in supplying nutrients to polluted soil. The cow dung remediation for polluted soil is not only beneficial to farmers whose soil got polluted with the help of chemical pesticides or becomes acidic in nature, but also beneficial to those people who want to live in harmony and peace with nature. It is an eco-friendly method of treatment which is cheaper one. Cow dung is used for biogas manufacturing, plastering, sacred ceremonies, etc. Cow importance's is also mentioned in olden Vedic scriptures and hence cow should be protected in our society. Now further work should be done in case of bioremediation by cow dung.

List of Symbols & Abbreviations

- 1) AAS1 – Acid Added Soil 1
- 2) AAS2 – Acid Added Soil 2
- 3) AAS3 – Acid Added Soil 3
- 4) AAS4 – Acid Added Soil 4
- 5) AAS5 – Acid Added Soil 5
- 6) EC – Electrical Conductivity
- 7) PH - Potential Of Hydrogen
- 8) SAR - Sodium Adsorption Ratio
- 9) MIC - Methylisocyanate

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