Journal of Agroecology and Natural Resource Management
Print ISSN: 2394-0786, Online ISSN: 2394-0794, Volume 1, Number 2; November-January, 2014 pp. 40-43

http://www.krishisanskriti.org/janrm.html

Enhancing the Seed Germination and Vigour in Coarse Cereals by Bovine Urines

S. Ambika[*], K. Balakrishnan[1] and K. Sujatha[2]

Ph.D Scholar[*], Department of Seed Science and Technology,
Professor and Head[1], Department of Seed Science and Technology,
Professor[2], Department of Seed Science and Technology,
Agricultural College and Research Institute, Madurai-625104

Abstract: *The experimentwas conducted at Department of Seed Science and Technology, Agricultural College and Research Institute, Madurai during 2014-2015, to find out the effect of pre sowing treatments with bovine urines of cow, buffalo, sheep, goat and pig. The paddy, maize, sorghum, cumbu and irungu cholam seeds (local type) were soaked for 3h with different concentrations of 5 and 10% along with control (dry treatment). The seed quality parameters viz., speed of germination, germination percentage, seedling length (cm)and vigour index were evaluated. Among the bovine urines treatment best performance was observed in cow urine (5%) in all the cereals.*

Keywords: *Bovine urines–coarse cereals-cow urine-presowing seed treatment-vigour index.*

1. INTRODUCTION

In the 21st century, climate changes, water scarcity, increasing world population, rising food prices, and other socio economic impacts are expected to generate a great threat to agriculture and food security worldwide, especially for the poorest people who live in arid regions.A coarse cereal refers to cereals other than Wheat and Rice or those used primarily for animal feed or brewing.These grains are warm–season cereals valued for their food, feed and fodders uses in various parts of world.These are largely grown in the semi arid tropical regions of Asia and Africa under rain fed farming system with little external inputs.Coarse cereals includes Maize, Sorghum, Oats, Barley, Pearl millet and other minor millets.

Due to environmental concerns, there is an ongoing need to reduce the use of chemical fertilizers and pesticides in agriculture and horticulture and alternative to chemicals are being sought to improve crop establishment and health. One option is the use of organics nutrients or growth regulators to seed or roots, which may promote plant growth or provide diseases control through a variety of mechanisms, including supply of organic nutrients production of plant hormones, antibiotic or enzyme; induced systemic resistance; direct parasitim of plant pathogen or deleterious micro-organisms; or competition with pathogen for or nutrients. Further, organic seed is a crucial link in the chin from research to organic seed production and ultimate supply of high quality seed at reasonable price to the commercial seed producing farmers for promotion of organic seed production. Hence,the safe and feasible approach is the treatment of seeds with organics which are safe, ecofriendly, economical and easily available. Seed hardening provides hardiness to high temperature, low moisture especially in semi arid tropics. It promotes faster germination, higher seedling vigour leading to higher crop productivity. The main benefits of organic seed treatments include increased phosphate levels, nitrogen fixation and root development.Hence, an attempt was made to find out the influence of presowing seed treatment on coarse cereals in rain fed upland conditions.

Cow urine contains about 1.0% Nitrogen traces of P_2O_5 and 1.0% of K_2O. Approximately 2400-2500 litres of urine are produced per year per animal (Yawalker *et al*., 1996). If this urine were not conserved, nitrogen in the urine, which is mainly in the form of urea, would be quickly lost as ammonia. It is also considered as a natural disinfectant and pest repellent and forms the main component of Panchagavya (an organic crop booster prepared and sprayed by Indian farmers) (Tharmaraj *et al.*, 2011). Apart from cattle, urine of other farm animals are rich in major nutrients (Table 1) and is available in plenty which can be used for presowing seed treatment to enhance germination. Bovine urines contain growth regulators, nutrients, trace element. Organic seeds treatment is more affordable so even small scale farmers can practice.

Table 1: NPK content of different animal urine

Animal	Major nutrients in urine (%)		
	N	P	K
Cattle (Cow & buffalo)	1.21	0.01	1.35
Goat	1.47	0.05	1.96
Pig	0.38	0.1	0.99
Horse	1.2-1.5	-	1.3-1.5

(Subramaniyam, 2005)

2. MATERIALS AND METHODS

Genetically pure seeds of ragi and varagu were obtained from Central Farm, Tamil Nadu Agricultural University, Coimbatore were used for the study. The experiment was conducted atDepartment of Seed Science and Technology, Agricultural College and Research Institute, Madurai during 2013 maize CoHM6 hybrid, Sorghum variety of K8, Paddy variety of MDU 5, Pearl millet Hybrid, Irungu cholam variety of local. Seeds were treated with different bovine urines *viz.*,Cow, Buffalo, Goat and Pig at the concentration of 5 and 10% along with water and dry seed as control. Seeds were soaked for 3 h and shade dried. The seeds were tested for the standard germination test adopting between paper (BP) method as per the ISTA rules (Anon., 1996). The germination room maintained at 25 ± 2°c temperature and 90 ± 3 % RH. The seeds showing radical protrusion were counted daily from third day after sowing until fourteenth day. The speed of germination was calculated using the formula by Maguire, 1962. Hundred seeds were placed in between paper using four replications and per cent germination was recorded after fourteenth days (final count). At the time of germination count, ten normal seedlings were selected at random from each replication and used for measuring the root length of seedlings. Root length was measured from the point of attachment of seed to the tip of primary root. The mean values were recorded and expressed in centimeter. The seedlings used for measuring root length were also used for measuring shoot length. The shoot length was measured from the point of attachment of cotyledon to the tip of the leaf and the mean values were recorded and expressed in centimeter. Vigour index values were computed using the following formula and the mean values were expressed in whole number (Abdul-Baki and Anderson, 1973). Vigour index = Germination (%) × Total seedling length (cm).

3. RESULTS AND DISCUSSION

All the bovine urines had a significant increase on the observed parameters. Among the bovine urines treatments, maizeseeds treated with cow urine (5%) recorded increased speed of germination (11.5), germination percentage (97 %), seedling length (43 cm) and vigour index (4171) compared to control (9.3, 85, 37.4 and 3179) for speed of germination, germination percentage, seedling length and vigour index, respectively). In paddy also seeds treated with cow urine (5%) performed better in increased speed of germination (8.7), germination percentage (94 %), seedling length (21.5 cm) and vigour index (2021) where as control recorded significant reduction in all the parameters(7.6, 82, 17.5 and 1435) for speed of germination, germination percentage, seedling length and vigour index, respectively). In sorghum the seeds treated with cow urine (5%) recoreded better performance compared to control. The percentage increase over control forspeed of germination, germination percentage, seedling length and vigour index was 16.8, 14.6,13.3 and 26%, respectively. In cumbu seeds treated with cow urine (5%) recorded increased speed of germination (11.5), germination percentage (92 %), seedling length (19.5 cm) and vigour index (1794) compared to control (9.5, 75, 16.5 and 1238) for speed of germination, germination percentage, seedling length and vigour index, respectively). In irungu cholam also seeds treated with cow urine (5%) performed better in increased speed of germination (10.5), germination percentage (90 %), seedling length (22.1 cm) and vigour index (1989) where as control recorded significant reduction in all the parameters(8.3, 77, 18.1 and 1394) for speed of germination, germination percentage, seedling length and vigour index, respectively). Among the two concentrations of bovine urine (5 % and 10 %) the maximum physiological parameters observed in 5 % concentration. The 10 % concentration was inhibitory to all the parameter observed.

Milch animal urine (cow / buffalo) contains about 1.0 per cent nitrogen traces of P_2O_5 and 1.0 per cent of K_2O and approximately 2400-2500 liters of urine are produced per year per animal (Yawalker *et al*., 1996). The reason for increased seed physiological parameters observed in the study may be due to the fact that bovine urine contains physiologically active substances *viz*., growth regulators, nutrients (Kamalam Joseph and Rajappan Nair, 1989; Chawla, 1986) and trace elements (Munoz, 1988). Illango *et al*., (1999) reported increased total chlorophyll content (1.80mg g^{-1}fresh weight) and soluble protein (2.78 mg g^{-1}) upon soaking *Albizia lebbeck* seeds in cow urine in comparison to check (1.66 mg g^{-1} and 2.5 mg g^{-1}). Significantly higher plant height (74.21cm), leaf dry weight, more number of tillers (137.4) were recorded 60 days after sowing, higher leaf area duration (2.47), higher straw yield (3388 kg / ha) was recorded for wheat seeds soaked in 10 per cent cow urine (Shivamurthy, 2005). The cow's urine treatment with 1 : 10 concentration was found very suitable to treat seeds of finger millet for good germination and seedling vigour (http : // www. Greenconserve.com / Green % 20 foundation % 20 project % 20 Research.htm). Shankaranarayanan *et al.* (1994) reported that soaking of tamarind seeds in 10 per cent cow urine or cow dung solution for 24 hours increased the germination and vigour index as compared to that of untreated seeds. Our results were similar to observations in *Albizia lebbeck* (Ilango *et al.*, 1999), jamun (Swamy *et al.*, 1999), asparagus (Misra *et al.*, 2002), Shivamurthy (2005) in wheat and Sivasubramaniyam *et al.* (2012) in pulses.

4. CONCLUSION

It could be concluded that, cow urine (5 %) can be recommended as organic pre-sowing seed treatment for increasing the vigour in coarse cereals and paddy.

Table 1: Effect of bovine urines treatment on speed of germination in Maize, Paddy, Sorghum, Cumbuand Irungu cholam.

	Maize			Paddy			Sorghum			Cumbu			Irungu cholam		
Treaments	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean
Control	9.3	9.3	9.3	7.6	7.6	15.2	8.4	8.4	8.4	9.5	9.5	9.5	8.3	8.3	8.3
Cow urine	11.5	11.2	11.35	8.7	8.4	17.1	10.1	9.6	9.8	11.5	11.2	11.3	10.5	10.1	10.3
Goat urine	11.3	10.8	11.05	8.5	8.3	16.8	9.9	9.1	9.5	11.3	10.9	11.1	10.3	9.8	10.0
Sheep urine	11	10.6	10.8	8.4	8.0	16.4	9.6	9.2	9.4	11	10.5	10.7	10.0	9.4	9.7
Buffalo urine	10.7	10.2	10.45	8.2	7.9	16.1	9.4	8.9	9.1	10.9	10.4	10.6	9.5	9.1	9.3
Pig urine	10.4	10.0	10.2	8.1	7.7	15.8	9.1	8.6	8.8	10	9.80	9.9	9.4	8.7	9.0
Mean	10.7	10.35	10.53	8.25	7.98	16.23	9.42	8.97	9.19	10.7	10.38	10.5	9.67	9.23	9.45
	C	T	C x T	C	T	C x T	C	T	C x T	C	T	C x T	C	T	C x T
SEd	0.15	0.08	0.21	0.11	0.06	0.16	0.13	0.07	0.19	0.15	0.08	0.21	0.13	0.08	0.19
CD (P=0.05)	0.31**	0.18**	NS	0.24**	0.14	NS	0.27**	0.15**	NS	0.31**	0.18**	NS	0.28**	0.16**	NS

Table 2: Effect of bovine urines treatment on germination (%)in maize, paddy, sorghum, cumbu and irungu cholam.

	Maize			Paddy			Sorghum			Cumbu			Irunchu cholam		
Treatments	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean
Control	85	85	85	82	82	82	76	76	76	75	75	75	77	77	77
Cow urine	97	95	96	94	93	46.5	89	87	88	92	88	90	90	88	89
Goat urine	96	93	94.5	92	89	44.5	88	85	86.5	90	85	87.5	88	85	86.5
Sheep urine	94	91	92.5	91	87	43.5	86	81	83.5	87	83	85	86	82	84
Buffalo urine	93	89	91	88	84	43	83	79	81	84	80	82	83	80	81.5
Pig urine	91	87	89	86	83	41.5	80	77	78.5	81	77	79	81	78	79.5
Mean	92.67	90.00	91.33	88.83	86.33	50.00	83.67	80.83	82.25	84.83	81.33	83.08	84.17	81.67	82.92
	C	T	C x T	C	T	C x T	C	T	C x T	C	T	C x T	C	T	C x T
SEd	1.34	0.77	1.90	1.29	0.74	1.82	1.21	0.70	1.71	1.22	0.70	1.73	1.22	0.70	1.72
CD (P=0.05)	2.72**	1.57**	NS	2.61**	1.51**	NS	2.45**	1.41**	NS	2.48**	1.43**	NS	2.47**	1.43**	NS

Table 3: Effect of bovine urines treatment on seedling length (cm) of in maize, paddy, sorghum, cumbu and irungu cholam.

	Maize			Paddy			Sorghum			Cumbu			Irungu cholam		
Treatments	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean
Control	37.4	37.4	37.4	17.5	17.5	17.5	19.5	19.5	19.5	16.5	16.5	16.5	18.1	18.1	18.1
Cow urine	43.0	41.5	42.25	21.5	20.8	21.15	22.5	22.1	22.3	19.5	19.0	19.25	22.1	20.6	21.35
Goaturine	42.2	41.0	41.6	21.1	20.3	20.7	22.3	20.7	21.5	19.1	18.6	18.85	20.8	20.3	20.55
Sheepurine	41.5	40.2	40.85	20.6	19.9	20.25	20.9	20.5	20.7	18.8	18.1	18.45	20.4	19.8	20.1
Buffalo urine	40.6	38.9	39.75	20.1	19.2	19.65	20.7	20.1	20.4	18.4	17.8	18.1	20.0	19.3	19.65
Pigurine	39.7	39.5	39.6	19.5	18.8	19.15	20.3	19.8	20.05	17.7	17.0	17.35	19.6	18.8	19.2
Mean	40.73	39.75	40.24	20.05	19.42	19.73	21.03	20.45	20.74	18.33	17.83	18.08	20.17	19.48	19.83
	C	T	C x T	C	T	C x T	C	T	C x T	C	T	C x T	C	T	C x T
SEd	0.59	0.34	0.83	0.29	0.16	0.41	0.30	0.17	0.43	0.26	0.15	0.37	0.29	0.16	0.41
CD (P=0.05)	1.20**	0.69**	NS	0.59**	0.34**	NS	0.61**	0.35**	NS	0.54**	0.31**	NS	0.59**	0.34**	NS

Table 4: Effect of bovine urines treatment on vigour index in maize, paddy,sorghum, cumbuand irungu cholam.

	Mazie			Paddy			Sorghum			Cumbu			Irungu cholam		
Treatments	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean	5%	10%	Mean
Control	3179	3179	3179	1435	1435	1435	1482	1482	1482	1238	1238	1238	1394	1394	1394
Cow urine	4171	3943	4057	2021	1934	1978	2003	1923	1963	1794	1672	1733	1989	1813	1901
Goaturine	4051	3813	3932	1941	1807	1874	1962	1760	1861	1719	1581	1650	1830	1726	1778
Sheepurine	3901	3658	3779	1875	1731	1803	1797	1661	1729	1636	1502	1569	1754	1624	1689

Buffalo urine	3776	3462	3619	1769	1613	1691	1718	1588	1653	1546	1424	1485	1660	1544	1602
Pigurine	3613	3437	3525	1677	1560	1619	1624	1525	1575	1434	1309	1372	1588	1466	1527
Mean	3782	3582	3682	1786	1680	1733	1764	1657	1710	1561	1454	1508	1703	1595	1649
	C	T	C x T	C	T	C x T	C	T	C x T	C	T	C x T	C	T	C x T
SEd	54	31	76	25	14	36	25	14.	35	22	12	31	24	14	34
CD (P=0.05)	110 **	63**	NS	52**	30**	NS	51**	29**	NS	45**	26**	NS	49**	28**	NS

REFERENCES

[1] Abdul-Baki, A. A. and J. D. Anderson. 1973. Vigour deterioration of soybean seeds by multiple criteria. *Crop Sci.*, **13:** 630-633.

[2] Annon, 1996. International rules for seed testing. *Seed Sci. Technol.*,**24:**1-228.

[3] Chawla, O. P., 1986. Advances in biogas technology. ICAR Publ. New Delhi, pp. 109.

[4] Illango, K., K. Mallika Vanangamudi, A.Vanangamudi, Venkatesh, R. S. Vinayarai and S. Balaji. 1999, Effect of growth stimulants on seed germination and seedling vigour in *Albizia lebbeck* (L). Benth. *Seed Res.*, **27(2):** 188-190.

[5] K. Sivasubramaniam, K. Balakrishnan and K. Selvarani. Evaluation of Bovine Urines as Pre-sowing Seed Treatment in Enhancing Seed Germination and Vigour of Pulses. *Mysore J. Agric, Sci.*, **46 (4):** 751-759, 2012.

[6] Kamalam Joseph and Rajappan Nair, 1989, Effect of seed hardening on germination and seedling vigour in paddy. *Seed Research*, **17(2):** 188-190.

[7] Misra, S. K., S. K.Virender Singh, Pareek and V. Singh. 2002. Standardization of propogation techniques in asparagus. *Annals of Agric. Res.*, **23(4):** 608-610.

[8] Munoz, A. M., 1988. Increasing the vigour of rice seeds with trace element application. *Arrazy*, **37:** 20-27.

[9] Sankaranarayanan, R., Vijayakumar, M. and Rangasamy, P., 1994, Cow urine for ideal seed germination in tamarind. *Indian Horticulture***, 38(4):** 15.

[10] Shivamurthy, D., 2005.Effects of method of planting and seed treatments on performance of wheat genotypes under rainfed condition. *M.Sc.Thesis.* Department of Agronomy, College of Agriculture, Dharwad, University of Agricultural Sciences, Dharwad, Karnataka, India.

[11] Subramanian, A., 2005. Effect of Panchagavya on*Escherchia coli* in procured milk. *Ind. Veterinary J.*,**82:** 799-800.

[12] Swamy, G. S. K., P. B. Patil, S. I. Athani and D. S. Prabhushankar. 1999. Effect of organic and inorganic substances on germination of Jamun (*Syzygium cumini*) seeds. *Advances in Agricultural Research in India*, **11**: 89-91.

[13] Tharmaraj, K., P. Ganesh, R.Suresh Kumar, A. Anandan and K. Lolanjinathan. 2011. A critical review on Panchagavya– a boon to plant growth. *Int. J. Of Pharma and Biol. Arch.*, **2**(6): 1611-1614.

[14] Yawalkar, K. S., J. P. Agarwal and S. Bokde. 1996. Manures and Fertilizers, Agri-Horticultural Publishing House, Nagpur: pp. 29-82.