International Journal of Science, Environment and Technology, Vol. 5, No 2, 2016, 658 – 665

ISSN 2278-3687 (O)
2277-663X (P)

IMPROVING LIVELIHOOD INITIATIVES THROUGH ENVIRONMENTAL FRIENDLY SOLUTIONS DERIVED FROM LIVESTOCK BYPRODUCT

Gopalbhai Surtia, Paresh Panchal, Mahesh Patel*, Ravikumar RK and Vipin Kumar
National Innovation Foundation-India, Satellite complex, Jodhpur Tekra, Premchand Nagar Road, Satellite, Ahmedabad 380 015
E-mail: mahesh@nifindia.org (**Communication Author*)

Abstract: Worldwide various programs are initiated to enhance income thereby welfare of farming communities. The priority attached to agricultural activities particularly in developing world is enormous as it sustains food security. Efforts are carried out to utilize every opportunity to maximize yield and income in agriculture system including livestock. Society through creative communities can enhance the scope of such intervention strategies. It is in this context, innovations derived from grassroots knowledge holders assume vital. These communities can understand each other, empathize and develop creative solutions. The paper is an attempt to show case development of technology based on livestock by-product and to enhance income generating activity in farmer's field. The cow dung pot and manual machine to manufacture the product on large scale was developed by Shri. Gopalbhai Surtia later refined by Shri Paresh Panchal, grassroots innovator(s) from Gujarat, India.They are creative individuals from informal sector who could visualize and develop solutions by working together. The paper illustrates development of environment friendly solution and a device derived from knowledge, expertise from green grassroots technologies. These creative artisans often look for challenges posed in their closest surrounding and try to address them empathetically. These empathetic technologies can provide an opportunity for diversified occupation thereby gainful income. Policies have to be oriented in strengthening these innovations which can afford meaningful employment based on native skill and knowledge.
Keywords: Grassroots innovator, environment, empathetic technology, livestock.

Introduction

Public systems are trying different means to enhance the scope income generating activities [IGA] nearest to living conditions. Studies had illustrated that sustaining IGA can enhance utilization of knowledge, skill and restores standard of living. Farmers opt for livestock enterprises to improve their economic status and to gain additional income (Singh and Ramkumar, 2014) throughout year. Farming communities on the other hand try by themselves with existing resources to create opportunities and seek solutions as well. During these experimental learning societies also tries to address concern of communities through

*Received Mar 15, 2016 * Published April 2, 2016 * www.ijset.net*

innovative solutions. Gupta (2013) had referred that concept of National Innovation System involving knowledge of informal sector has been reiterated. This study is an attempt to understand genesis of an innovation shared by green grassroots innovators by utilizing livestock byproduct.

Problem statement:

Dung is an available byproduct of livestock, farmers utilize them as manure, fuel, mixed with clay for flooring, plastering mud houses and it has environmental value (Dikshit and Birthal, 2010).There were instances where large number of livestock population was concern in terms of affecting environment (Dikshit and Birthal, 2013). Large campaign has been launched through Biogas plant power production system to maximize return from livestock byproduct (Agrahari and Tiwari, 2014). Studies indicate that surplus bioenergy resource of villages was realized for renewable energy generation system based on gasification and biogas that have no ecological impact (Kalbande et al., 2011). This is important so as to maintain sanitation, economic as well as green environment (Feng et al., 2009). Similar observations by Sarkar and Uddin (2013) illustrated community based waste management system. Mandavgane et al., (2005) identified the usage of cow dung as mosquito repellent.

Changing times and degree of urbanization had resulted in observing and experimenting Dung as raw material for new use or application. Infact national programs were launched like zero waste concepts through biogas technology development (Widodo and Hendriadi, 2005). However, creative idea for enhancing the scope of natural resource management and for addressing community requirements need to continuously emerge. This involves a technology that can able to sustain and match the scale of production as required by market forces. Green grassroots innovators Shri. Gopalbhai Surtia and Shri Paresh Panchal had visualized usage and developed novel technology to address these characteristics. Their idea and implementation can afford low cost solution towards improvising livelihood options and to enhance environmental value of dung at farmer's field.

Methodology:

The research study is based on the experimental learning and ability of deriving solutions by Green grassroots innovators from regions of Gujarat in utilizing livestock byproduct. The nature of their observations, interaction between two creative artisans from informal sector and challenge infront of them were evaluated through personnel observation, interaction. The study shares innovative manual cow dung making machine and its novel features which can augment source of income. Further, evaluation was made with respect togermination and

growth of *Cyamopsis tetragonoloba*– Guar in natural cow dung plot as value added product.Daily observations were made for a period of 8 days and data was recorded in terms of seed germination and overall growth. These observations were shared and illustrated to mainstreaming creative knowledge derived from green grassroots innovators by enhancing environmental value of dung.

Results and Discussion

(1) Ideation of Cow Dung Pot: Enhancing environmental value of Dung

Innovator *Shri. Gopalbhai Surtia* developed an eco- friendly pot by mixing cow dung and agriculture waste, which are completely biodegradable. The innovation lies in the idea and achieving optimum combination of mixers of cow dung and natural binders used. This makes the pot sturdy and resistant to pest for plant samplings. Grassroots innovator had noticed availability of bulk raw material Dung, livestock byproduct in his region. This had led to ideation of utilizing this large quantity of biowaste into a product that is eco-friendly. The nature of his observation to overcome challenge faced by society and to make a customized product in relevant to other parts of his premise needs to be distinguished. The innovator acted as an interface so as to develop valuable product that enriches ecological value of dung. It is increasingly difficult to produce similar rural experimental stations, production systems for formal institutions to work upon (Gupta, 1995) and it is appropriate to look for societal learning (Ravikumar et al., 2016). The nature of problem posed by community and to address them empathetically by grassroots innovators and outstanding traditional knowledge holders has been observed (Devgania et al., 2015). These models of sharing innovative solutions that are cost effective based on locally available resources have to be reinforced.

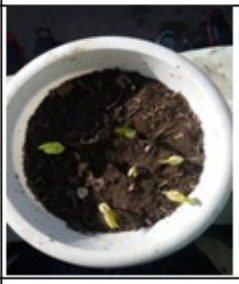
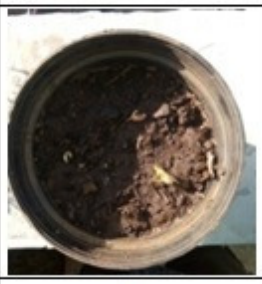
Fig. 1. Natural Cow Dung Pot and Manual Cow Dung Pot making machine

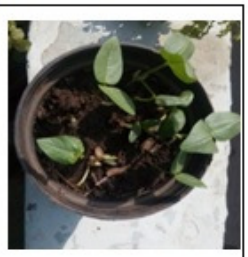
(2) Illustrated model of co-creation to meet larger social demand:

The demand for making the manual cow dung pot was expected to be more as there are large quantities of farm waste available. Tailor-made technological alternatives are necessary for aiding farming system as it can enhance the desire of educated youth to sustain agriculture (Kadivendi et al., 2015). With the help of *Shri Paresh Panchal*, both innovators developed and refined a manual cow dung pot making machine (Fig 1). This had helped to streamline and standardize the production process of cow dung pots. The machine can be manually operated and can yield atleast 100 pots per hour. The competitive advantages of the machine are easy to operate, less or no maintenance cost and development of uniform quality pots. Presently the green grassroots innovators had developed three different size of pots through this machine. These innovations from low income contexts can meet the demand of wealthier market as well (Simula et al., 2015). The study illustrated a model wherein innovators or creative individuals from non-formal sector can able to relate each other's idea and foresee relevant solutions to thwart common problem ailing society.

(3) Utility of environment friendly product: comparative study of germination

Table 1. Nature of Seed Germination

SN	Observation Day's	Organic pot	Clay pot	White plastic pot	Black plastic pot
		Number of seeds germinated			
1	2 days	5	2	3	0
					
2	3 days	12	8	7	6
					
3	4 days	13	10	9	8
					
4	5 days	14	13	10	10
					
5	6 days	15	13	11	10

					
6	8 days	15 	14 	11 	10 

Innovators found problem of using plastic bag in nurseries not tenable given the environmental hazard of using non-biodegradable material. The study was conducted to analyse the effect of cow dung pot on seed germination and growth of *Cyamopsis tetragonaloba*–Gawar (Table 1). In this experiment seeds were grown in four pots made of different pot material. Organic pot (cow dung+grass), ordinary pot (clay), black and white pots made up of plastic were used during experimentation. All four pots were filled with same type of soil and 15 seeds were sown at similar depth in each of the pot. They were watered regularly and given similar environmental conditions. The observations were noted and found that on day 2 of experiment, maximum seed germination was noted in organic pot (cow dung pot). Towards end of observation period 100 percent germination was noticed in organic pot. Infact cow dung as organic manure has been illustrated (Wisdom et al., 2012). It was clearly observed that maximum seeds germinated in cow dung pot in comparison to others. These features indicated blending of biodegradable material by innovator(s) had positive impact over seed germination and plant growth.

Conclusions

Green grassroots technologies derived from creative individuals from informal society can able to address diversified needs of farm solutions. The research study had illustrated that empathetic nature of grassroots innovators in developing value added product. This had enhanced the environmental value of livestock byproduct Dung. Stakeholders need to reinforce their commitment to imbibe values, knowledge from informal society to sustain frugal innovations. These low cost locally available technologies can provide opportunity for

diversified farm income and enable inclusive growth of development. The research also showcased a model of co-creation among grassroots innovators and their ability to act as interface to produce environment friendly value added product.

REFERENCES

[1] Agrahari RP and Tiwari GN. 2014. Comparative study of Biogas production: Utilization of organic waste, International Journal of Environment and Resource, 3(1):1-6. DOI: 10.14355/ijer.2014.0301.01.

[2] Devgania BS, Khordia D, Chodvadiya MB, Patel R, Patel D, Kinhekar AS, Singh PK, Kumar V, Bhojne GR, Ravikumar RK, Kumar V . 2015. Reverence of community towards grassroot livestock innovation: Responding to stakeholders need against sub-clinical mastitis in Amreli District, Gujarat, India. Adv. Anim. Vet. Sci. 3(12): 689-693.
DOI | http://dx.doi.org/10.14737/journal.aavs/2015/3.12.689.693

[3] Dikshit AK and Birthal PS. 2013. Positive environmental externalities of livestock in mixed farming systems of India, Agricultural Economics Research Review, 26(1): 21-30.

[4] Dikshit AK and Birthal PS. 2010. Environmental value of dung in mixed crop-livestock systems, Indian Journal of Animal Sciences, 80(7): 679-682.

[5] Feng T, Cheng S, Min Q and Li W. 2009. Productive use of bioenergy for rural household in ecological fragile area, Panam county, Tibet in China: The case of residential biogas model, Renewable and sustainable energy reviews,13: 2070-2078.
DoI doi:10.1016/j.rser.2009.02.001.

[6] Gupta AK. 2013. Policy Gaps for promoting Green grassroots innovations and Traditional knowledge in developing countries, Learning from Indian Experience, Working Paper No.2013-02-02, Indian Institute of Management, Ahmedabad.

[7] Gupta AK. 1995. Survival under stress: Socioecological perspectives on farmers' innovations and risk adjustments. In. Warren M., Slikkerveer, L.J. and Borkensha, D (Eds). The cultural dimension of development, Intermediate Technology Publications Ltd., London. Pp. 407-418.

[8] Kalbande SR, Kamble AK and Gangde CN. 2011. Bioenergy assessment and its integration for self sufficient renewable energy village, Karnataka J. Agric. Sci. 24(2): 207-210.

[9] Kadivendi M, Rakesh Maheswari, Ravikumar RK, Chauhan MM, Kinhekar AS, Vivek Kumar and Vipin Kumar, 2015. Integrated Approach for Engaging Farming Community -

Opportunities and Challenges for Low Cost Inputs, International Journal of Agriculture Innovations and Research, 3(6): 1691-1695.

[10] Mandavgane SA, Pattalwar VV and Kalambe AR. 2005. Development of cow dung based herbal mosquito repellent, Natural Product Radiance, 4(4): 270-273.

[11] Ravikumar RK, Dutta L, Kinhekar AS, Kumar V 2016. People's knowledge for addressing societal needs: Lessons learnt while engaging farming communities as a part of research system. Adv. Anim. Vet. Sci. 4(1s): 1-8.

DOI | http://dx.doi.org/10.14737/journal.aavs/2016/4.1s.1.8

[12] Sarkar, SK and Uddin MK. 2013. Community based waste management and its utilization for sustainable environment, Bangladesh Journal of Animal Science, 42(2):165-173.

[13] Simula H, Hossain M and Halme M. 2015.Frugal and reverse innovations- Quo Vadis? Special section: Design for well-being, Current Science, 109 (9): 1567-1572.

[14] Singh A and Ramkumar S. 2014. Factors influencing Self-help group members for selecting livestock rearing as an income generating activity.Res. J. Animal Hus.& Dairy Sci.,5(2) : 84-87

[15] Widodo TW and Hendriadi A. 2005. Development of Biogas processing for small scale cattle farm in Indonesia. International Seminar on Biogas Technology for Poverty Reduction and sustainable development, 18-20 Oct, Beijing, China. Pp.1-7.

[16] Wisdom GOS, Ndana RW and Abdulrahim Y. 2012. Comparative study of the effect of organic manure cow dung and inorganic fertilizer N.P.K on the growth rate of maize (*Zea mays* L), International Research Journal of Agricultural Science and Soil Science, 2(12):516-519.