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Research Article

Communication Media Usage and Uptake Patterns of Rhizobium Inoculant Technology in the Northern Region of Ghana

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This study was done in the Northern Region of Ghana (Tolon and Savelegu) in 2017. Primary data on the influence of communication media usage on uptake patterns of rhizobia inoculant technology was collected among 210 respondents using questionnaires. Secondary data was also obtained from SARI, IITA as well as IFDC offices respectively. Descriptive statistics namely percentages and frequencies as well as two-way ANOVA were used to analyse the data. The study revealed that farmers' level of education, farming experience, marital status and age were significantly related to the communication methods used to access information on rhizobia inoculant, at 5% level of probability; and influence respondents' decision to use rhizobia inoculant. The results of the study revealed that the types of communication methods used by respondents have significantly influenced respondent's awareness on the technology. However, on knowledge enhancement, these communication methods did not influence respondents' knowledge on rhizobia inoculant in the Northern Region of Ghana. This relationship calls for the promoters of rhizobia inoculant to use combination of all the three communication methods to enhance farmers' knowledge on rhizobia inoculant. The study recommends that local language should be used during radio discussion to ensure effective understanding of message disseminated to farmers on the use of the rhizobia inoculant.

Keywords: Communication Media Usage, Uptake of Rhizobia Inoculant, Farmers.

INTRODUCTION

Communication media according to the Center for Transforming Agriculture, (2003) are seen as technologies which facilitate communication and information dissemination among actors. These media are useful in improving linkages between research and agricultural extension systems (Mishra and Williams, 2006), boost agricultural production and improves rural livelihoods (Arokoyo, 2005) and is seen as essential in the transfer of information and knowledge (Rao, 2004). Communication media facilitate collaboration and knowledge exchange as well as increased efficacy in extension service and market information on product price at all level, (Adetumbi, 2013).

Common communication media used to disseminate agricultural information are the radio, video, internet, computers and mobile phones, (Kajogbola, 2004; Murage, 2011). Rogers, (2003) grouped communication media into two forms, namely; mass media and interpersonal media. It is perceived that, mass media are more effective in creating awareness of an innovation, whereas personal contacts are more effective in forming an individual opinion about an innovation. The use of these communication media among people are influenced by several factors such as age, educational level, cost, availability and accessibility of communication media, (Kajogbola, 2004).

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Different communication media are more suited for different purposes as well as different groups of people thus, the young and old; male and female; educated and non-educated, (Cheboi, 2014). For effective dissemination of agricultural information to farmers, geared towards influencing their decision to adopt a particular innovation, selection of appropriate communication media is very important, (Tadesse, 2008).

In the case of rhizobia inoculant promotion, radio, demonstration and video as well as combination of methods have been extensively used to disseminate information on rhizobia inoculant, (IITA, 2013). These media empower individuals, groups and communities to effectively access, share and use agricultural knowledge in addressing their information needs.

Information on application, accessibility, storage and handling of rhizobia inoculant as well as its benefits aims at influencing human behavior on an innovation and subsequently leading to adoption of rhizobia inoculant. Effective and efficient use of radio, demonstration and video as well as combination of these methods as communication media will increase farmers' awareness of rhizobia inoculant with regard to accessibility as well as enhance their knowledge on the handling, storage and use, which ultimately affects their decision to use rhizobia inoculant. Notwithstanding the massive promotion of rhizobia inoculant technology by promoters, the usage of rhizobia inoculant among farmers is still low (Kannaiyan, 1993; Dogbe, Etwire, Martey, Baba and Siise, 2013).

In attempt to address the low usage of this technology, radio, video, demonstration and several strategies have been used to promote the use of rhizobia inoculant to farmer. Despite the use of these communication media by promoters to disseminate the innovations (information) to farmers, it is perceived that the information needs of farmers on inoculants availability, access and use among end-users, (Dogbe *et al*. 2013; Woomer, Karanja, Mekki, Mwakalombe, Tembo, Nyika, Silver, Nkwine, Ndakidemi, and Msumali. 1997) in the Northern Region of Ghana is largely unmet. Therefore, this study sought to find out the influence of communication media usage on uptake patterns of rhizobia inoculant technology among farmers in the Northern Region.

METHODOLOGY

This study was done in two districts of the Northern Region of Ghana (Tolon and Savelegu). Primary data on how information on rhizobia inoculant from promoters were disseminated to farmers were collected from 210 respondents using questionnaires. Data was analysed using frequency, percentage, cross tabulation, chi-square test and two-way ANOVA. Secondary data was also obtained from SARI, IITA as well as IFDC offices respectively. The survey employed simple random sampling techniques in selecting the sample for the study. Two (2) districts were targeted for the study, and these districts are Tolon and Savelugu respectively. The selection of these communities was premised on the fact that the Savannah Agricultural Research Institute (SARI), collaborating with International Fertilizer Development Center (IFDC) and International Institute of Tropical Agriculture (IITA) were found to be the dominant institutions promoting rhizobia inoculant usage among farmers in these districts. Six communities were randomly selected from Savelugu municipal and Tolon district respectively. The sampled communities from Tolon district were Chirifoyili, Gbulahagu and Nyankpala, and from Savelugu Municipal, Kpung, Dipale and Gushie were selected at random. From the list of legume farmers from each community sampled, the lottery method of random sampling technique were used to sample 35 legume farmers from each of the six communities to form a sample size of 210 in the Northern Region of Ghana.

RESULTS AND DISCUSSION

Table 1: Demographic Profile of Farmers

Characteristics	**Legume Farmers**	
	Frequency	**Percentage**
Gender:		
Male	154	73.3
Female	56	26.7
Age:		
Below 30	50	23.8
30-45	79	37.6
46-60	69	32.9
Above 60	12	5.7
Marital Status:		
Married	164	78.1
Single	11	5.2
Divorced	21	10.0
Widowed	14	6.7
Educational level:		
No education	112	53.3
Primary school	53	25.2
Junior high school	19	9.0
Secondary/vocational institute	26	12.4
Farming Experience:		
Less than 5 years ago	41	19.5
5-10 years ago	59	28.1
More than 10 years ago	110	52.4
Total	**210**	**100.0**

Source: Field Survey Data, 2017

Demographic Profile of Farmers

The survey results (Table 1) show that majority of legume farmers (73.3 %) were males; with 26.7 percent of legume farmers being females. Although females form the least

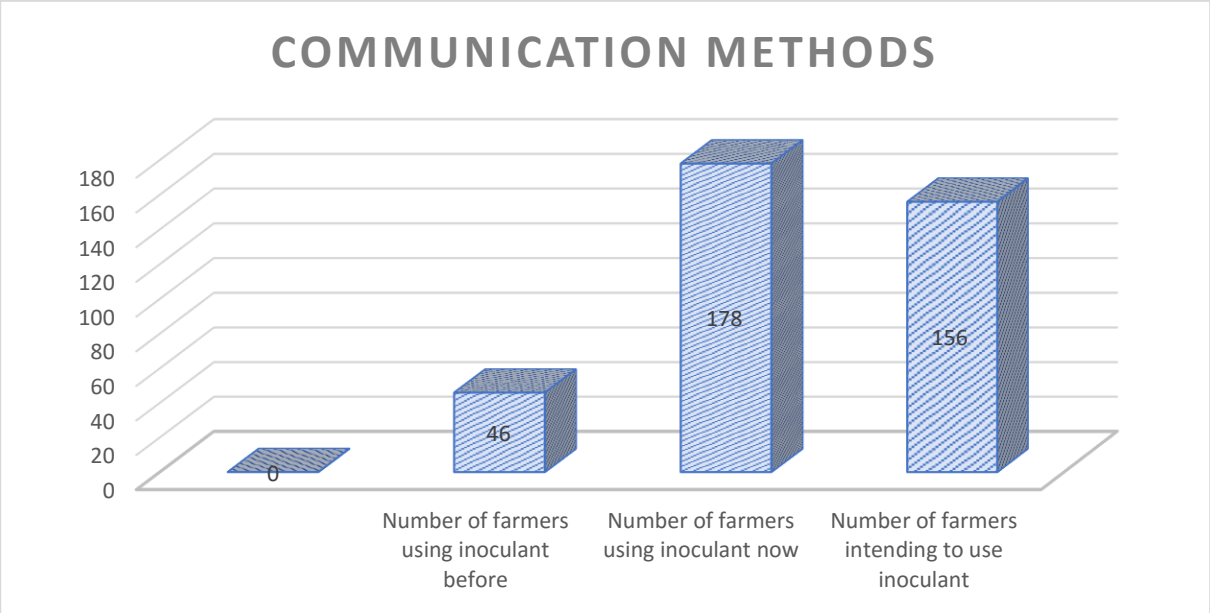

Figure 1: Types of Communication Methods Used by Respondents
Source: Field Survey Data, 2017

group in the survey, they play several roles in the cultivation of legumes including planting, harvesting and shelling of legumes. However, much of what the women do on the farm is mostly considered as family labour and this accounts for the small number of female farmers (26.7%) solely engaged in legume (soy bean) cultivation in the study area. On age of respondents, the results revealed that, 23.8 percent of the farmers were below the age 30, with 5.7 percent being above 60 years. However, 37.6 percent of farmers were between 30 and 45 years, whiles 32.9% of the respondents were between the age 46 and 60 (table 1.0) as seen the table below. The analysis on marital status of respondents indicates that, majority of farmers (78.1%) interviewed were married, while very few (5.2%) are single (never married) and 10 percent and 6.7 percent divorcees and windows respectively. With educational status of respondents, few farmers had Junior High school education (9.0%), primary education were 25.2 percent and 12.4 percent had secondary education. However, 53.3 percent had no-formal education, and none of the respondents having tertiary education. These results indicate that majority of the farmers had no formal education. From literature however, higher education status of farmers is seen as essential in increasing their ability to process and use information disseminated to them on agricultural innovation (Lavison, 2013). In line with the findings, it might be difficult for illiterate farmers to properly understand information disseminated to them by promoters of rhizobia inoculant. With regard to farming experience, the results show that, majority (52.4%) of the respondents had more than 10 years' experience of legume production. Thus, this implies that since most legume farmers had a much farming experience in legume production, adoption of rhizobia inoculant is likely to occur after these projects are over in the study area.

Types of Communication Methods Used by Respondents

Figure 1 reveals that majority, 54.8% of the respondents had used radio as a means communication method to access information on rhizobia inoculant. Respondents who had used video to access information were 19.5%. Though field demonstration is noticed to provide practical and hands on knowledge to farmers, only 25.7% of the respondents' used this medium. However, there is significant difference between the use of radio against the rest of the methods. This implies that radio programs could be a surest way of disseminating information's to farmers since, most of them used radio to access information on rhizobia inoculant.

Combination of Communication Methods Used by Respondents

Table 2: Combination of Communication Methods Used by Respondents

Use of Communication	Frequency	Percentage
Only one method	45	21.4
Combination of two method	33	15.7
Combination of three methods	132	62.9
Total	**210**	**100.0**

Source: Field Survey Data, 2017

The results of the survey in the table 2 above show that majority 132 (62.9%) of the respondents had used a combination of all the three communication methods to access information on rhizobia inoculants with, 45% of respondents having used only one method and 33 (15.7%), a combination of two methods. The finding implies that majority of farmers used combination of all the

Table 3: Relationship between Communication methods and Level of Knowledge Enhancement

Communication Methods Used	Level of Knowledge		Total
	Lower knowledge on rhizobia inoculant	Higher knowledge on rhizobia inoculant	
Radio discussion Frequency	23	92	115
% within Column	67.6%	27.6%	54.8%
Video show Frequency	5	36	41
% within Column	14.7%	20.5%	19.5%
Demonstration Frequency	6	48	54
% within Column	17.6%	27.3%	25.7%
Total	100%	100%	100%

Source: Field Survey Data, 2017
(X^2 =2.739 p=0.254) Not Significant

three communication methods to access information on rhizobia inoculant and give a firm indication that combination of all the three methods is preferred medium of information among farmers in the Northern Region. Thus, this suggests that, targeting farmers through combination of the three methods would be a surest way of reaching out to them. Moreover, farmers would have better understanding of the information being disseminated to them by promoters of rhizobia inoculant, since they get to see, hear and feel the package being disseminated to them.

Type of Message Communicated to Farmers by Promoters on Rhizobia Inoculant

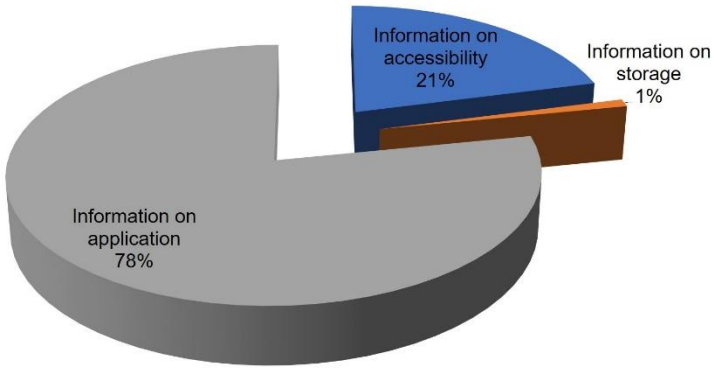

Figure 2: Type of Information Communicated to Farmers by Promoters of Rhizobia Inoculant
Source: Field Survey Data, 2017

Figure 2 reveals that most of the respondents 164 (78.2%) received information regarding how to apply inoculant. Moreover, only 2 (1.0%) of the respondents had received information on how to store the rhizobia inoculant. 44(21.0%) of the respondents had received information on where to access the inoculant for their farming operation as shown in the figure 2.0 above. These findings suggest that promoters of rhizobia inoculant have not dealt well with farmers, since the major concern has to do with handling and storage of rhizobia inoculant. Rather, promoters of rhizobia inoculant have succeeded in enhancing farmers' knowledge on application of the technology, with only few farmers knowing how to handle and store the rhizobia inoculant, as poor handling and storage of rhizobia inoculant leads to loss of viability of the technology.

Relationship between Communication methods and Level of Knowledge Enhancement

Table 3 shows the relationship between communication methods used and level of knowledge enhancement. From the results, majority of respondents (92) indicated that radio discussion had higher knowledge enhancement on rhizobia inoculant as compared to only (23) respondents who indicated that radio discussion had lower knowledge enhancement on rhizobia inoculant. Additionally, 48 respondents indicated that demonstration had higher knowledge enhancement on rhizobia inoculant as compared to only (6) respondents who indicated that demonstration had lower knowledge enhancement on rhizobia inoculant. In general, radio discussion had the highest impact on farmers' knowledge enhancement on rhizobia inoculant.

When subjected to the chi square test, the chi square statistics (X^2 =2.739 p=0.254) at 5% confidence level shows that the relationship between communication methods used and level of knowledge enhancement is not significant. It therefore means that, respondents' level of knowledge enhancement is not dependent on the type of methods used.

Relationship between Communication methods and Level of Awareness Creation

Table 4 shows the relationship between communication methods used and level of awareness creation. From the results, majority of respondents (108) indicated that radio discussion had higher awareness creation on rhizobia inoculant as compared to only (7) respondents who indicated that radio discussion had lower awareness creation on rhizobia inoculant. Additionally, 48 respondents indicated that demonstration had higher awareness creation on rhizobia inoculant as compared to only 6 respondents who indicated that demonstration had lower awareness creation on rhizobia inoculant. When subjected to the chi square test, the chi square statistics (X^2 =13.132 p=0. .001) at 5% confidence level, the relationship between communication methods used and level of awareness creation is not significant. It therefore means that, respondents' level of awareness creation is not dependent on the type of methods used.

Table 4: Relationship between Communication methods and Level of Awareness Creation

Communication Methods Used	Level of Awareness		Total
	Low awareness on rhizobia inoculant	Higher awareness on rhizobia inoculant	
Radio discussion Frequency	7	108	115
% within Column	25.0%	59.3%	54.8%
Video show Frequency	7	34	41
% within Column	25.0%	18.7%	19.5%
Demonstration Frequency	6	48	54
% within Column	50.0%	22.0%	25.7%
Total	100%	100%	100%

Source: Field Survey Data, 2017 (X^2 =13.132 p=0.001) Significant

Table 5: Tests of Between-Subjects Effects
Dependent Variable: Uptake of Rhizobia Inoculant

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11.268	3	3.756	2.699	.047	.038
Intercept	336.344	1	336.344	241.659	.000	.540
Knowledge Enhancement	1.233	1	1.233	.886	.348	.004
Awareness Creation	.291	1	.291	.209	.648	.001
Knowledge * Awareness	3.719	1	3.719	2.672	.104	.013
Error	286.713	206	1.392			
Total	1856.000	210				
Corrected Total	297.981	209				

a. R Squared = .038 (Adjusted R Squared = .024)
Source: Field Survey Data, 2017

Table 6: Frequency of Uptake of Rhizobia Inoculant among Farmers

Uptake of Rhizobia Inoculant	Frequency		Percentage	
	Yes	No	Yes	No
Number of farmers using inoculant before	46	164	21.9	78.1
Number of farmers using inoculant now	178	32	84.8	15.2
Number of farmers intending to use inoculant	156	54	74.3	25.7

Source: Field Survey Data, 2017

Relationship between Uptake of Rhizobia Inoculant and Farmers Awareness and Knowledge Level

A two-way between-groups analysis of variance was conducted to explore the effect of knowledge enhancement and awareness creation on uptake of rhizobia inoculant respondents were divided into two groups according to their knowledge and awareness level (Lower and higher levels). The interaction effect between knowledge enhancement and awareness creation was not statistically significant, F (1, 206) = 2.672, p = .104. This corresponds to small effect size of η2 = .013, which means that about 1.3% of the variance in the knowledge enhancement and awareness creation scores was predictable from an uptake of rhizobia inoculant when all of the other variables are held constant.

There was not a statistically significant effect for knowledge enhancement, F (1, 206) = .886, p = .348; however, the effect size was small (partial eta squared = .004). The main effect for awareness creation, F (1, 206) = .209, p = .648, did not reach statistical significance.

Frequency of Uptake of Rhizobia Inoculant among Farmers

Prior to the promotion of rhizobia inoculant technology, some farmers were already aware of the technology through input dealers and were using rhizobia inoculant to enhance soil fertility as well as boost production of their crop. The results in table 6.0 revealed that, few farmers 46 (21.9%) out of the total sample size were already using rhizobia inoculant as an alternative to inorganic fertilizer on their farms before these institutions started promoting the technology. However, since these institutions begun promoting the technology to farmers, majority 178 (84.8%) of respondents out of the total sample size currently use rhizobia inoculant on their farms. It is expected that farmers would continue to rhizobia inoculant after these projects are over in the catchment areas. However, the study results revealed that a great number of respondents-156 are willing to use the technology in the near future after these projects are over. This finding gives a firm indication that majority of the respondents are currently using and hope to continue use rhizobia inoculant in the future for their farming operation.

Table 7a: Paired Samples Statistics of the Usage of Rhizobia Inoculant before and Now

Trend of Usage	Mean	Std. Deviation
Farmers using of rhizobia inoculant before	1.78	.415
Farmers currently using of rhizobia inoculant	1.15	.360

Source: Field Survey Data, 2017

Table 7b: Test of Usage of Rhizobia Inoculant before and Now

	Paired Differences					T	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Farmers using of rhizobia inoculant before Farmers currently using rhizobia inoculant	.629	.566	.039	.552	.706	16.084	209	.000

Source: Field Survey Data, 2017

Usage of Rhizobia Inoculant before and Now among Respondents

Based on Table 7 a, and b above, the following are evident

i. There is a significant difference between the scores before and during the promotion rhizobia inoculant. Thus, this shows an overall significant difference in the number of farmers now using rhizobia inoculant for their farming activities. The probability value in table (7.0b) is .000, which is less than .0005. This value is substantially lower than the specified alpha value of .05 and indicates a significant difference in the number of farmers now using rhizobia inoculant for their farming activities.
ii. The next statistic reveals, in terms of the scores, which score is lower than the other before and during the promotion rhizobia inoculant. The mean scores, before the promotion rhizobia inoculant was 1.78; and the score during the promotion rhizobia inoculant was 1.15. This points to a significant difference in the number of farmers now using rhizobia inoculant for their farming activities.
iii. The results presented show that the difference obtained in the two sets of scores was unlikely to occur by chance; and does reveal the magnitude of the information dissemination effect. Using the eta squared statistic, an effect size of 0.55 was obtained. Based on the guidelines provided by Cohen (1998), where an effect size of 0.5 and above is interpreted as a large effect; this impact represents a large effect of the information dissemination to farmers on uptake of rhizobia inoculant.

A paired sample T-test was conducted to evaluate the effect of the information dissemination to farmers on uptake of rhizobia inoculant. There was a statistically significant difference in the number of farmers now using rhizobia inoculant for their farming activities (M=1.78, SD=.415) to after [M=1.15, SD=.360, t (210) = 16.084, p<.0000]. The eta squared statistic (0.55) indicated a large effect size.

CONCLUSIONS

Generally, the study results revealed that communication methods used by promoters of rhizobia inoculant in the dissemination of information on rhizobia inoculant are radio, demonstration and video as well as combination of these methods. However, the type of communication method frequently used in accessing information on agricultural innovation is radio, followed by demonstration and video being the least used method among farmers. Also, the study revealed that majority (132) of the respondents used a combination of all the three communication methods in accessing information on rhizobia inoculant. Notwithstanding, the efforts made by promoters of rhizobia inoculant technology, the study further revealed that, the type communication method used to disseminate information farmers did not enhance farmers knowledge on rhizobia inoculant, especially when it comes to handling and storage of the technology. However, the study revealed that, the type communication method used to disseminate information farmers were able enhanced farmers' awareness on rhizobia inoculant. Finally, the study revealed that, more farmers are willing to use rhizobia inoculant on their farmer in the near future for their farming operations.

RECOMMENDATIONS

In view of the fact that radio plays an important role in information dissemination to farmers, promoting institutions of rhizobia inoculant should identify and train volunteers on radio broadcasting to assist in information dissemination using the local language. Also, institutions that promote rhizobia inoculant should focus on using a combination of radio, video and demonstration when disseminating information to farmers in a holistic approach. Much emphasis should be placed on educating farmers on the handling and storage of rhizobia inoculant technology.

REFERENCES

Adetumbi, S. I., Olaniyi, O. A., and Adewale, J. G. (2013). Assessment of use of selected Information Communication Technologies (ICTs) for extension service delivery: implication for agricultural development in Nigeria. *International Journal of Agricultural Management and Development*, *3*(2), 131-139.

Arokoyo, T. (2005). ICTs application in agricultural extension service delivery. *Agricultural Extension in Nigeria. Ilorin: Agricultural Extension Society of Nigeria*, 245-251.

Cheboi, S., and Mberia, H. (2014). Efficacy of Interpersonal Communication Channels in the Diffusion and Adoption of Zero Grazing Technology. *International Journal of Academic Research in Business and Social Sciences*, *4*(9), 352.

CTA (2003). ICTs – Center for Transforming Agricultural Extension an e-discussion, 20th August – 29th September 2003.17. FAO (1993).pp. 4-5.

Dogbe, W., Etwire, P. M., Martey, E., Etwire, J. C., Baba, I. I., and Siise, A. (2013). Economics of Soybean Production: Evidence from Saboba and Chereponi Districts of Northern Region of Ghana. *Journal of Agricultural Science*, *5*(12), 38.

Fiedler F.E. (2007). Theory of leadership effectiveness. 13: 15-26.

IITA, (2009). Soybean overview. Summary. 5pp. Information Age.

Kajogbola, D. A. (2004): The Impact of Information Technology on the Nigerian Economy: A Study of Manufacturing and Services Sectors in the South Western and South Eastern Zones of Nigeria.

Kannaiyan, S. (1993). Nitrogen contribution by Azolla to rice crop. *Energy*, *400*(5.87), 1-67.

Lavison, R. K. (2013). *Factors influencing the adoption of organic fertilizers in vegetable production in Accra* (Doctoral dissertation, University of Ghana).

McCall M.W. (2004). Leadership development through experience. *Academy of Management Executive,18, 127-130.*

Mishra, A. K., and Williams, R. P. (2006). Internet access and use by farm households. In *2006 Annual meeting, July 23-26, Long Beach, CA* (No. 21106). American Agricultural Economics Association (New Name 2008: Agricultural and Applied Economics Association).

MoFA (2012). Annual Progress Report Vol.5.MEC/PPMED/MoFA, Draft Report

Murage, A. W., Amudavi, D. M., Obare, G., Chianu, J., Midega, C. A. O., Pickett, J. A., and Khan, Z. R. (2011). Determining smallholder farmers' preferences for technology dissemination pathways: the case of 'push–pull' technology in the control of stemborer and Striga weeds in Kenya. *International journal of pest management*, *57*(2), 133-145.

Rao, T. R. (2004). ICT and e-Governance for Rural Development. *Center for Electronic Governance, Indian Institute of Management, Ahmedabad*. 28: 312-315

Rogers, E. M. (2003). Diffusion of innovations(5thed.). New York: Free Press, P 206 – 2

Tadesse, D. (2008). *Access and utilization of agricultural information by resettler farming households: The case of Metema Woreda, North Gondar, Ethiopia.* (Master's thesis). Retrieved on 10 September, 2016

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