

Entertainment–education and rice pest management: A radio soap opera in Vietnam

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ARTICLE INFO

Article history:

Received 27 February 2008

Received in revised form

30 May 2008

Accepted 30 May 2008

Keywords:

Rice

Radio

Soap opera, IPMInsect pestsVietnam

ABSTRACT

A radio soap opera created using the entertainment–education (E–E) process contributed towards creating favorable attitudes and change practices in rice farmers' pest management in Vietnam. Between pre- and post-launch farmers' insecticide sprays dropped 31% from 1.9 to 1.3 sprays per season. Corresponding changes in attitudes were also observed. In addition, farmers also reduced their nitrogen and seed use by 7% and 9%, respectively. In the post-test farmers who had listened had higher reductions in insecticide sprays (60%), nitrogen (9%) and seeds (33%) compared to those who had not listened to the soap. There were also similar changes in their belief attitudes favoring judicious use of pesticides, fertilizers and seeds. We also found that the E–E process provided a platform for communication between technical specialists and creative artists, thus enabling technical information to be simplified and incorporated into drama scripts.

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1. Introduction

Entertainment–education (E–E) is the process of designing and implementing a program to both entertain and educate so as to increase audience members' knowledge, create favorable attitudes, shift norms and change behavior (Singhal and Rogers, 2002). E–E is a communication strategy to bring about change and has been successfully used in public health such as HIV/AIDS prevention programs (Vaughan et al., 2000; Singhal and Rogers, 2003), introducing oral dehydration therapy to reduce infant mortality (Abdulla, 2004) and improving maternal health (Singhal and Rogers, 2004) and social behavioral changes, such as reducing domestic violence (Usdin et al., 2000). In agriculture, “The Lawsons” (later called “Blue Hills” in Australia and “The Archers” in the United Kingdom) were the earliest E–E programs developed (Singhal and Rogers, 2004). The Lawsons, started broadcast in 1944 by the Australian Broadcasting Corporation, was designed to promote the diffusion of agricultural innovations and was on air for 27 years for more than 6000 episodes. Similarly, the Archers, which started broadcast by the British Broadcasting Corporation, was also developed to promote agriculture. After 15,000 episodes,

the Archers now with more entertainment content is still on the air in BBC Radio 4 (<http://www.bbc.co.uk/radio4/archers/>). These two radio soap opera series had made early contributions on agricultural development in Australia and the UK. Numerous other uses of E–E have been documented by Dagron (2001), Singhal and Rogers (1999, 2004).

Rice farmers' main pest control tactic is the use of pesticides and often large proportions of their sprays are misused because of poor knowledge and decisions (Heong and Escalada, 1997; Bandong et al., 2002). Most farmers generally focus on highly visible pest damages, like those caused by leaf folders in the early crop stages. However, these damages have little or no yield loss consequences (Graf et al., 1992). These early season insecticide perturbations are instead favorable to some r strategist pest species, like the planthoppers (Schoenly et al., 1994; Heong and Schoenly, 1998) and thus led researchers to advocating farmers to avoid insecticides especially in the first 30–40 days after sowing (Way and Heong, 1994). The mass media campaigns in Vietnam to motivate farmers to stop early season spraying helped reduce farmers loss aversion attitudes towards leaf damages (Escalada et al., 1999; Heong et al. 1998). Integrated Pest Management (IPM) implementation triggered by Indonesia's pesticide subsidy withdrawal and banning the use of 57 insecticides, introduced farmer training in the form of farmer field schools (Conway and Barbier, 1990). The training curricula were aimed at empowering

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farmers with knowledge to enable them to better understand pest damages, appreciate biological control and make better insecticide decisions, thus reducing their insecticide use (Matteson et al., 1994; Matteson, 2000).

To promote IPM in the Philippines radio plugs and dramas were developed, broadcast and published by the Philippines–German crop protection program (Pfuhl, 1988). Earlier works have shown that farmers' pest management decisions are influenced more by perceptions (Waibel, 1986; Heong and Escalada, 1997). Mass media have proven to be the most rapid, efficient and effective means to modify beliefs and practices (Rogers, 1995; Escalada et al., 1999); however, these efforts were used in short campaign events. The E–E process provides a platform where IPM specialists and drama script writers can continuously interact and provide and broadcast a drama serial. Farmer training sessions last a few weeks, while a drama serial is able to provide a continuous flow of IPM information over a longer period. To evaluate the effectiveness of using E–E in IPM, we developed and broadcast a radio soap opera serial of 104 episodes and evaluated its effect on farmers' attitudes and practices in managing pests, fertilizers and seeds in Vinh Long province, Vietnam.

2. Methods

2.1. Pilot site

The pilot site was Vinh Long province situated about 150 km south of Ho Chi Minh City (Table 1). Agriculture is the main economic activity with rice as the main crop supplemented by fruits and vegetables.

Table 1
Profile of Vinh Long province (Statistical Publishing House, 2005)

Total land area (ha)	147,500
Total population	1,036,100
Total rice area (ha)/year	207,000
Total rural population	883,000
Annual rice production (tons)	933,200

2.2. Soap opera development

A multi stakeholder participatory process (Fig. 1) was adopted in formative research, designing and developing the soap opera series, launching the program, implementing on-the-ground support and monitoring progress. The stakeholders involved were from research, extension, radio stations, mass media and local government. To facilitate educational content accurately and seamlessly weaved into drama, the collaborating team comprising technical experts and scriptwriters called the “turtles and peacocks” (Bouman, 2002) was established. An audience analysis of 605 randomly selected farmers in two districts in Vinh Long was initially conducted. In addition, a typical farm family was identified to serve as the model for the drama series and a “creative document” with descriptions of the family, home surroundings, common activities and a map was developed. The “turtles and peacocks” paid regular visits to this family, staying overnight at times to learn about activities, behaviors and common local words used to be able to develop the stories. The results of the audience analysis, the creative document and the experiences of the farm visits were used as resource materials in the drama design workshop where stakeholders developed the title of the soap opera, frequency and broadcast times, drama characters and story lines. The soap opera was named “Chuyen Que Minh” or Homeland Story. Two techniques from the Sabido soap opera development methodology (Singhal and Rogers, 1999), the “character map” (Fig. 2) and “values grid” (Fig. 3) were used to develop the characters and educational messages to be incorporated into scriptwriting.

The soap opera was launched in Vinh Long town hall on 7 July 2004 by the Vice Minister for Agriculture and Rural Development. Between July 2004 and July 2005, a total of 104 episodes were broadcast over the Voice of Ho Chi Minh City and Voice of Vinh Long. The soap featured three sets of characters, those who were positive towards IPM practices, those who were negative and a transitional group. Drama conversations were developed between these three sets of characters, discussing the pros and cons of agricultural inputs. The main character was transitional who eventually changed beliefs and practices in the series.

Steps	Purposes
Multi stakeholder meeting	To establish team with stakeholders from research, extension, broadcasting and local government
Audience analysis	To understand target audience for storyline and content development, broadcast scheduling
Baseline survey	To determine current status of audience attitudes and practices towards seed, fertilizer and pesticide use
Script writing workshop	To develop the drama series framework, character map, values grid and drama series title.
Message design workshop	To develop prototype print and broadcast materials to popularize the drama series
Pretesting of materials	To pretest the prototype materials, make adjustments
Materials mass production	To finalize the materials and mass produce
Launching	To select an auspicious day, invite dignitaries and hold a high profile launching ceremony
Materials distributions	To distribute, broadcast promotional materials widely
Monitoring management	Conducted 2 months after launching to determine materials distributions, drama listening so as to make adjustments to increase listener-ship
Post test survey	Conducted 12 months after the launch to determine the effects of the drama on audiences' behaviour and practices.
Review workshop	To review results of the project.

Fig. 1. Steps in the multi-stakeholder process adopted in developing the soap opera.

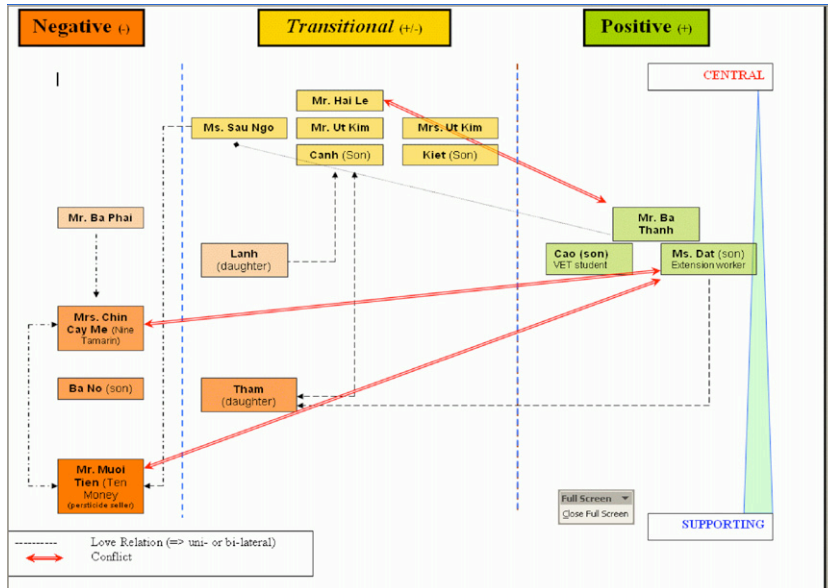


Fig. 2. Character map of the soap opera.

Educational issues	Positive values: It is good that -	Negative values: It is bad that -
Most of farmers are unable to recognize natural enemies in the field. These are important agents for natural control.	Farmers know that there are many organisms in rice fields feeding on pests that can keep the pest number from increasing. Examples of these are spiders, beetles, crickets and many tiny ones that lay eggs into the pest and growth in them, like parasites. The pests also die from diseases.	Farmers do not know that there are important organisms in the rice fields that eat pests. They think that all insects in rice crops are bad and harmful.
In the early crop season, many natural enemies arrive into the rice crop	Many of these good organisms come to the rice field early in the crop season and as the crop grows, they increase in numbers.	Farmers do not know that the good organisms arrive early in the crop season and increase in numbers as the crop grows.
Many early season pests, like the leaf folder, are attacked by parasites.	There are many types of good organisms, like the parasites of the leaf folder that lay eggs by injecting their stings into the leaf folder worm. These eggs hatch and feed inside the worm thus killing it.	Farmers do not know nor recognize parasites and the roles they play
The mirid bug <i>Cyrtorhinus</i> is an important egg predator of brown plant hopper eggs.	The brown plant hopper lays eggs by injecting them into the rice stem, but the green bug has a long proboscis that can suck the egg content and kill the egg, like using a straw to drink from a soda bottle.	Farmers think that the green bug is a pest because it uses its proboscis to probe into the rice crop.
The virus diseases are transmitted by planthoppers that feed on diseased plants.	Farmers should rouge out diseased plants as they can be the source of virus that will spread to other areas	Farmers leave diseased plants in the field thus allowing hoppers to acquire viruses for further transmission.

Fig. 3. An example of the values grid framework used in developing a radio soap opera to communicate educational issues to rice farmers in Vietnam. All the IPM messages in the soap opera serial were developed using this grid.

2.3. On-the-ground support

A message design workshop was held to develop a strategy, materials and activities to promote the new drama series.

A poster, a leaflet, advertising plugs for TV and radio, and a launching ceremony were also developed. All the support materials were pre-tested before they were finalized and mass produced. In parallel with the drama broadcasts, three additional

Table 2
Details of the surveys conducted

Surveys	Dates conducted	Sample sizes
Audience analysis	January 2004	605
Pre-test survey	May 2004	600
Post-test survey	July 2005	609

on-the-ground activities were organized. Radio clubs, where farmers gather together once a month to listen to previous episodes and discuss the stories and educational issues, were organized. Quiz competitions were organized weekly and a “meet the actors” day was held in the Vinh Long town hall.

2.4. Data collection

Three surveys were conducted to prepare the drama, monitor its progress and evaluate its effects; the audience analysis, the baseline or pre-test survey and the post-test survey. Details of the surveys are shown in Table 2. The pre-test–post-test experimental design was used to assess the effects of the drama as the broadcasts were far reaching and we were unable to maintain a control where the radio broadcasts had not reached. Prior to developing the questionnaire for each of these surveys, the authors conducted focus group discussions to gather materials to structure and frame the questionnaires. The questionnaires were prepared in English, translated into Vietnamese and pre-tested before they were finalized. Each survey was conducted under direct supervision of two of the authors (NHH, HVC). A group of final-year agricultural science students from the local college was trained to use the questionnaire to collect the data. The completed questionnaires were then coded using the spreadsheet program, EXCEL and the data analyzed using SPSS version 11.5 (SPSS 2002).

3. Results

3.1. Audience analysis

The average age of the respondents was 47 years old with 6–7 years of education. A large proportion (93%) owned television, while about half had radios as well. Listening to news was the favorite program of respondents (44%), followed by agricultural programs (32%), music (12%) and drama (12%). Respondents generally spent about 3 h a day listening to the radio, and their preferred times of listening were evening (6–10 pm) (37%), early mornings (4–7 am) (25%) and noon (12–1 pm) (22%).

3.2. Pre- and post-test surveys

Table 3 shows the profiles of the two samples of respondents in the pre- and post-test surveys. Between the samples there were small but significant differences in age, education, farming experience and farm sizes reported.

3.3. Changes in seed, fertilizer and pest management practices

Table 4 shows changes in inputs reported by the pre- and post-test samples. Farmers reported about 31% reduction in insecticide sprays in the wet season from a mean of 1.89 to 1.30 sprays per season. Farmers also reported about 9% reduction in seed rates used, from a mean of 210.3 to 191.8 kg/ha, and about 7% reduction in nitrogen used, from 95.6 to 88.6 kg/ha. There were also slight

Table 3
Farmer respondents' profiles in pre- and post-test surveys

	Pre-test	Post-test	F
Sample size	600	609	
Age in years	49.4	47.4	9.24**
Education in years	6.2	7.1	29.4**
Farm size cultivated in ha	0.77	0.85	5.1*
Farming experience in years	25.3	24.3	7.2**

*Significant at $p = 0.05$ and **significant at $p = 0.01$.

Table 4
Changes in farmers' input practices and yields between pre- and post-test surveys

Farmers' input practices	Pre-test	Post-test	F
Seed rates (kg/ha)	210.3	191.8	32.2**
Fertilizer (kg/ha)			
Nitrogen	95.6	88.6	16.0**
Phosphorus	49.5	49.0	0.1 ns
Potassium	32.6	31.0	1.5 ns
Insecticide sprays (number in wet season)	1.89	1.30	5.7**
Rice yields (t/ha)	4.75	5.12	42.5**
% Farmers who did not spray insecticides	17.5	30.3	

*Significant at $p = 0.05$ and ** significant at $p = 0.01$.

Table 5
Comparison of input practices—farmers who had listened to the radio soap opera and those who had not in the post-test survey

Farmers' input practices and yields	Listened	Did not listen	F
Seed rates (kg/ha)	152.7	227.3	163**
Fertilizer (kg/ha)			
Nitrogen	83.6	91.5	10.5**
Phosphorus	47.9	48.9	0.3 ns
Potassium	32.9	29.6	3.5 ns
Insecticide sprays (number in wet season)	0.70	1.74	5.7**
% Farmers who did not spray insecticides	53.6	14.9	
Yields (t/ha)	5.01	5.25	9.5**

** Significant at $p = 0.01$.

reductions in the use of potassium and phosphorus but were not significant. Yields reported were significantly different, mean of 4.75–5.12 t/ha in the pre- and post-test, respectively. More farmers in the post-test (30.3%) reported not using any insecticides at all than in the pre-test (17.5%).

In the post-test survey 41.4% of the respondents reported listening to the soap opera. Table 5 shows the comparison of practices between those who had listened to the soap opera and those who had not. Farmers exposed to the soap opera had 33% reduction in their seed rates, 9% reduction in their nitrogen rates and about 60% reduction in the number of insecticide sprays. In addition, there were significantly more farmers exposed to the soap opera who did not use any insecticides at all, 54% compared with 15%.

3.4. Changes in attitudes

Table 6 shows the changes in farmers' beliefs between pre- and post-test surveys favoring their observed practices of reducing insecticides and nitrogen. Fewer farmers (63.5%) believed that “all insects are bad” in the post-test than in the pre-test (79.1%). There were also significant reductions in farmers believing that insecticide sprays had to be applied in the first 40 days after sowing (from 79.8% to 47.6%) and that leaf damages would mean

Table 6
Changes in farmers' beliefs between pre- and post-test surveys (% farmers who believed in the statements)

Belief statements	Pre-test	Post-test	z
All insects in rice fields are bad	79.1	63.5	4.2**
Farmers should spray in the first 40 days after sowing	79.8	47.6	11.9**
Leaf damage means yield loss	59.2	38.3	9.1**
Pesticides can affect human health	61.6	86.1	13.6**
Yields from fields using 80–100 and 150–200 kg/ha are the same	44.2	50.2	3.8**
More nitrogen inputs will produce healthier plants	88.2	81.0	4.5**

*Significant at $p = 0.05$ and **significant at $p = 0.01$.

Table 7
Comparison of farmers' beliefs between those who had listened to the soap opera and those who had not in the post-test survey (% farmers who believed in the statements)

Belief statements	Had listened	Had not listened	z
All insects in rice fields are bad	54.2	76.0	2.6**
Farmers should spray in the first 40 days after sowing	17.7	69.3	6.8**
Pesticides can affect human health	94.1	82.3	1.9**
Too much insecticide use can cause insecticide resistance	86.0	58.9	3.2**

** Significant at $p = 0.01$.

Table 8
Stepwise regression of farmers' insecticide sprays on predictor variables

Step	Predictor variable	Regression coefficients	Standardized coefficients	R^2	R^2 change	F
1	(Constant)	0.122		0.132		185
	Farmers should spray in the first 40 days after sowing	0.452	0.365			
2	(Constant)	1.092		0.145	0.013	103
	Farmers should spray in the first 40 days after sowing	0.419	0.338			
	Pesticides can affect human health	0.210	0.118			
3	(Constant)	1.427		0.150	0.005	72
	Farmers should spray in the first 40 days after sowing	0.411	0.332			
	Pesticides can affect human health	0.212	0.119			
	Leaf damages means yield loss	0.099	0.074			

loss in yields (from 59.2% to 38.3%). On the other hand, more farmers believed that pesticides can affect their health, from 61.6% to 86.1%. More farmers in the post-test believed that reducing seed rates from 150–200 to 80–100 kg/ha would result in the same yields and farmers also modified their beliefs that nitrogen would produce healthier crops.

Table 7 compares the attitudes of farmers exposed to the soap opera with those who were not. Soap opera-exposed farmers had significantly modified some of their beliefs that favored reduced inputs.

We explored which variables had more influence on farmers' insecticide use by using the stepwise multiple regression analysis (Table 8). This method allows the entry of independent variables in blocks at each step and the variables with little effects are excluded in a stepwise manner. The final model of three variables was statistically significant ($F = 72$ $p < 0.001$) but accounted for only 15% ($R^2 = 0.15$) of the total variation. Of the three variables, farmers' beliefs that spraying in the first 40 days after sowing was not necessary and that pesticides would affect human health, accounted for ~45% of farmers' sprays (beta coefficients were 0.332 and 0.119, respectively). This implies that the drama episodes that focused on these two messages might have contributed more towards farmers' insecticide use changes.

4. Discussion

Our data showed that the entertainment–education (E–E) soap opera, *Chuyen Que Minh*, contributed positively to changes in farmers' beliefs and practices. It is evident from the statistically significant changes in farmers' beliefs and input practices in seed, nitrogenous fertilizer and insecticides between pre- and post-test surveys. Comparison of farmers who had listened to the soap opera and those who had not in the post-test survey provided further evidence that the soap opera had contributed to the observed changes.

Farmers reduced their insecticide sprays by 31% and this change is supported by the changes in corresponding attitude beliefs. Farmers believing that “all insects are bad” changed from 79% to 64%, that “sprays are needed in the first 40 days after sowing” changed from 80% to 48% and that “leaf damages means yield loss” changed from 59% to 38%. Farmers' belief that pesticides will affect their health increased from 62% to 86%, indicating a positive change in attitudes towards good health. There were marginal changes in farmers' nitrogen and seed rates, 7% and 9%, respectively, indicating farmers' responses to the drama's episodes on nitrogen and seed reduction. As the high seed and nitrogen rates tend to favor pest populations, these practices might have contributed to farmers' insecticide use reduction as well. In comparing farmers who had listened to the soap opera

and those who had not, it was also evident that the soap opera had significant effects on their belief attitudes and practices.

In addition to evaluating direct effects of the soap opera on farmers' beliefs and practices, we found that the soap opera development process and played a role in facilitating communication of technical information. A wide gap exists between what scientists and farmers know in pest management as there are weaknesses in farmers' technical knowledge and these weaknesses are making farmers' victims of pesticide abuse (Bentley, 1989). The participatory process used in developing the soap opera serial involving technical experts and script writers served as a facilitating platform in the distillation of scientific information that was seamlessly built into drama conversations to educate, entertain and motivate listeners. This partnership, coined the "turtles and peacocks" (Bouman, 2002), had been critical to the drama production providing a mechanism to transform technical information to motivate change. Another important key component of our process was the series of on-the-ground support activities. The radio clubs established in the villages became primary sources to provide technical support, advice and discussions. The launching day, drama advertising, radio quizzes and "meet-the-actors" day were also important in popularizing the drama. The process can easily be adapted to communicate other content for social change, such as environmental protection, crop management, gender equity, health and disease prevention.

In most developing countries radio will remain the principal medium for communication in the rural areas. These are readily available, inexpensive, portable and can have wide reach, even in very remote areas. It has high potential to be the vehicle for new agriculture ideas and technologies, especially when the content is developed with high appeal. We showed that IPM contents in E–E soap operas can contribute to changes in beliefs and practices, when systematically developed. Similarly other resource management practices can also be built in, such as practices in land preparation, weed management, nutrient management, water management and environmental management.

In 2006 and 2007 rice production was seriously infected with new virus diseases transmitted by planthoppers. Agricultural authorities needed a rapid way to communicate to farmers in the Mekong. The drama team rapidly modified 20 episodes to include information on the threat of the virus infections as a contribution to a multi-media campaign launched by the government. A following scoping study¹ showed that most farmers learnt about the new virus diseases from media. A serial soap opera with constant IPM messages can thus be a useful mechanism to reinforce and complement IPM training programs.

The process and ideas piloted in the project led to the development of the "Environmental Soap Opera for Rural Vietnam", which won the 2005 World Bank development marketplace award and the new drama series called "Que Minh Xanh Mai" (Forever green homeland) was launched on World Environment Day June 5, 2006 and is on air till July 2007 (<http://www.voh.com.vn/news-sound/newssound.cfm?catid=75>). In December 2007 this soap opera series was awarded the 2007 COM plus Award by the Alliance of Communication for Sustainable Development (<http://devcompage.com/2007/12/08/environmental-radio-soap-opera-wins-award-for-communicating-science-to-people/>).

Acknowledgments

The authors are grateful to Professor Arvind Singhal of the University of Texas El Paso and Professor Kimani Njogu of

Kenyatta University, Kenya, for introducing entertainment education to us and providing training and advice. The Rockefeller Foundation for providing the funds and special thanks to Dr John O'Toole, who provided support in developing the project as well as Professor Sir Gordon Conway the former president of Rockefeller Foundation for the initial discussions. Vice minister Dr Bui Ba Bong's support helped mobilize the Ministry of Agriculture and Rural Development staff and resources that helped in launching, implementation and data gathering.

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¹ <http://www.aciar.gov.au/project/CP/2007/211>.