ANALYSIS OF DIFUSSION STRATEGIES IN NORTHEEAST BRAZIL FOR NEW CASSAVA VARIETIES WITH NEW IMPROVED NUTRITIONAL QUALITY

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Abstract – In 2006, Embrapa, supported by the HarvestPlus Program and CIAT released four yellow varieties with improved levels of provitamin A: *BRS Dourada*, *BRS Gema de Ovo*, *Amarelo I* and *Amarelo II.* For the diffusion process two strategies were used: 1) a participatory research approach with farmers and 2) public awareness raising activities. To evaluate the results of these two diffusion strategies, a socioeconomic analysis was carried out through two surveys applied in NE Brazil, one with producers involve in the participatory research process (Group 1) and the second with producers who requested stakes (seed) via telephone or mail, following the Launching Event (Group 2). For data analysis, a logit model and a Multiple Correspondence Analysis (MCA) were implemented. A significant finding was the large gap between actual early adoption rates of Group 1 (62.5%) and Group 2 (15.0%) in comparison with the potential adoption rates of the groups (62.1% and 64% respectively). This difference in early adoption rate for Group 2, compared to Groups 1 could be explained, in great part, by the lack of availability of seeds of the new varieties. Results showed that several strategies used for diffusion might be successful, each with its own advantages and disadvantages. Within the first strategy process the factors found to enhance adoption rates were: awareness of the new varieties' advantages; public entities as the main information sources; and involvement in participatory research. Within the second strategy trends were found between adoption rates and producer characteristics including: ownership of land; middle-level income; advance education level; and use of information mediums, namely the Internet. In the case of the second strategy, a lack of seeds was one of the main factors limiting the adoption process
Currently a new study about household perceptions toward some crops (bean, chickpea, sweet potato, cassava and corn) with better nutritional qualities is developing in Sergipe.

Keywords: Cassava, Nutritionally Improved, Diffusion Strategies

Introduction

Vitamin A deficiency (VAD) is a health problem in many developing countries. More than 130 million pre-school children suffer from this deficiency (Meenakshi et al., 2010). To fight against this and other nutritional problems some strategies has been developed, among them biofortification, which increase the micronutrient contents of staple crops through breeding (www.harvestplus.org). Among the crops developed by this program, there are four varieties of cassava (*Manihot Esculenta Cranzt*) with enriched levels of beta-carotene (provitamin A), released in the northeast(NE) of Brazil. In 2006, Embrapa, supported by the HarvestPlus Program and CIAT released these four yellow varieties with improved levels of provitamin A: *BRS Dourada*, *BRS Gema de Ovo*, *Amarelo I* and *Amarelo II.* For the

diffusion process two strategies were used: 1) a participatory research approach with farmers and 2) public awareness raising activities. At the end of some cultivation cycles of these varieties (between 2006 and 2009) researches undertook an evaluation of the producers experience with these two diffusion strategies and the cultivars. The aim of this evaluation was to identify the initial difficulties experienced by farmers and to establish that could be determinants in the success of future farmer adoption processes.

Data and methodology

To evaluate the results of these two diffusion strategies, a socioeconomic analysis was carried out through two surveys applied in NE Brazil, one with producers involve in the participatory research process (Group 1) and the second with producers who requested stakes (seed) via telephone or mail, following the Launching Event (Group 2). A structured interview to collect data from Group 1 was conducted in the second semester of 2009 in the NE of Brazil. Based on a random sampling of Group 1, 359 farmers were surveyed: 108 in the state of Bahia; 69 in Ceará; 52 in Maranhão; and 130 in Pernambuco. Group 2 was similarly surveyed between January and March 2009. Firstly, an inventory was created comprising the 158 farmers who had requested seeds of the new varieties (via telephone, fax or visits to the research station) from Embrapa´s Cassava and Tropical Fruits program. Subsequently a group of 40 producers was randomly selected from the inventory list.

For data analysis in Group 1, a logit model was implemented using a dichotomous dependent variable of the potential adoption rate (whether or not producers would continue planting the new cassava varieties based on their experiences). This variable provided an indication of the success of the transfer process. Due that the survey structure and number of observation varied from Group 1 to Group 2, an alternate methodology—Multiple Correspondence Analysis (MCA)—was used in the analysis. MCA reduces the number of variables and detects the relationships among levels of the variables (Lebart *et al*., 1984).

Results

For both Groups, cassava was found to be the main crop farmed, followed by beans, fruits, maize, rice and squash. Cassava consumption was also recorded as high: some 54% of cassava produced was for self-consumption while only 14-15% was intended for the market.

For estimating the probability of a farmer in Group 1 to adopt these new varieties, a 20 independent variables model was implemented. According to this model results A farmer had a 66% probability of adopting the new varieties if he/she had the following characteristics: a sum family income lower than one minimum monthly wage; a household including children below the age of 5; a preference for white pulp cassava; involvement in participatory research; access to information from a public source (i.e. an extension agency or Embrapa); no established perception of the productive qualities of the new varieties (i.e. their management, productivity, shelf life, taste, cooking time, ease of peeling, and nutritional advantages); and without information about of nutritional advantages of the new varieties. While a farmer with the same set of characteristics and awareness of the nutritional advantages of improved yellow varieties had a 79% probability of adopting the new varieties. This suggested that there were three factors key to increasing adoption probability rate: receiving information mainly from public entities (extension agencies or Embrapa); involvement in participatory research endeavors; and awareness of the nutritional advantages of the new varieties. The probability of any farmer adopting without positive answers to these three variables is less than 18%

To the question of whether they intended to plant the new varieties, 223 farmers responded affirmatively, indicating a potential adoption rate of 62% of the sample group. The main reasons for adopting the new varieties were: nutritional content (90%); family preference for their flavor (7%); and acceptance in the market (3%). The reasons given for not adopting the new varieties by Group 1 were: not knowing how to obtain the seed (43%); dislike of the taste (27%); lack of tradition in the region for planting yellow cassava varieties (21%); low productivity compared to traditional varieties in combination with low resistance to diseases (10%). For Group 2, 75% of producers remembered having received seed of the two varieties from Embrapa and 62.5% planted the seeds in 2007. The reasons for not planting were related to a lack of seed availability and adaptability of the new varieties to the region. Additionally some producers (37%) gave away their new variety stakes to neighbors and friends. A small number of producers (17.5%) used the new cassava varieties for purposes other than direct consumption, such as cassava flour (farinha) and starch production.

About farmers' perceptions respect to improved yellow varieties in contrast with conventional varieties, around 35% of producers noted that improved yellow varieties were respectively: easier to harvest and easier to peel. 6% of farmers in Group 1 and 32% in Group 2 stated that the productivity of improved yellow varieties was lower than that of conventional varieties. By states, Ceara and Bahia are the states with the highest proportion of potential adopters while Maranhao and Pernambuco are those with the lowest proportion. This could be explained because the latter states had greater problems with the seed distribution, and additionally due to climatic difficulties in Maranhao. In the other hand, Large-scale producers are typically non-adopters, possibly because they are less concerned about nutritional issues; their priorities relate to higher yields. Groups do not differ significantly in relation to characteristics such as: age; levels of education; and numbers of children and pregnant women.

For Group 2, as is shown in Figure 1, there are 40 points representing all the possible outcomes of 10 descriptive variables with high discriminatory power. These were (in order of the most to least significant): (a) whether the participant had a perception of the productivity of new cassava varieties vis-à-vis that of the conventional varieties; (b) whether the participant was a seed donor; (c) whether the participant had a perception of the quality characteristics (i.e. ease of harvesting and ease of peeling); (d) whether the participant had a perception of the „quality characteristics 2" (cooking time, perishability and culinary quality); (e) participant disposition toward replanting the new cassava varieties; (f) whether the participant had perceptions of differences in crop management; (g) whether the participant planted the new improved yellow varieties in 2007; and finally (h) whether the participant had received the seed of improved yellow varieties.

Three groups were identified based on these results (see Figure 1). Group A (N=6), located in the right section of Figure 1 was composed mostly of producers who did not answer the questions, did not receive the seeds from Embrapa or did not plant the improved fortified yellow cassava varieties. Most of those within this group perceived the characteristics of these two new varieties to be better than those of conventional ones.Group B (N=19), located in the upper-left of Figure 1 was made up of producers who received, planted, intend to plant again, and furthermore redistributed the seed of the improved yellow cassava varieties. For farmers in this group, improved yellow varieties were seen to be more productive than conventional varieties. Group C (N=15), located in the bottom left of Figure 1, comprise by producers who were unlikely to plant the improved yellow varieties again; who considered that the qualities of the new and conventional varieties of cassava to be the same; or who were unable to distinguish which of the new and conventional was the more productive cassava variety.

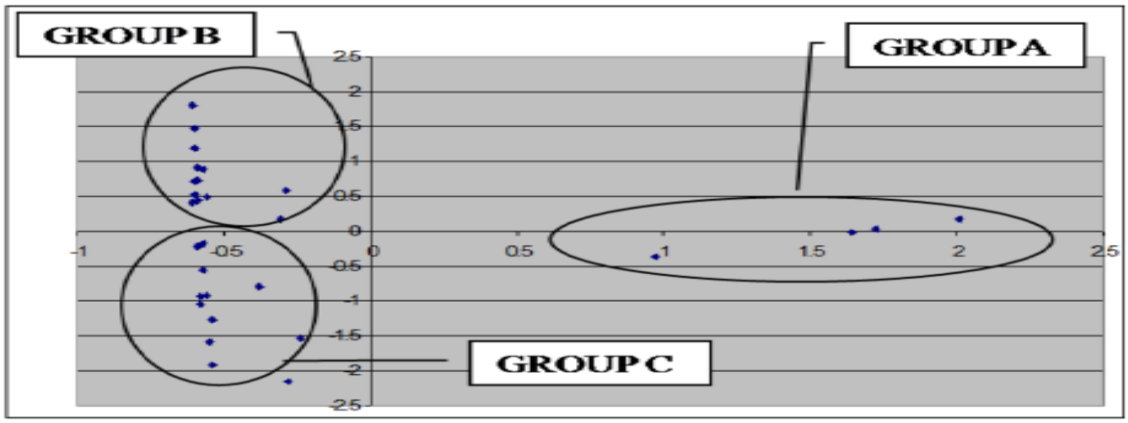

Figure 1. Groups of cassava producers.

Discussion

The main finding was the large gap between actual early adoption rates of Group 1 (62.5%) and Group 2 (15.0%) in comparison with the potential adoption rates of the groups (62.1% and 64% respectively). This difference in early adoption rate for Group 2, compared to Groups 1 could be explained by the lack of availability of seeds of the new varieties. Amongst producers involved in the participatory research process, factors with the greatest positive influence on adoption probability were: being aware of the advantages of the new varieties; having the public entities (extension agencies and Embrapa) as their main information sources; and involvement in participatory research

According to the results, participatory research was seen to reach the target population (i.e. vulnerable households with high level of poverty and malnutrition). Studies have demonstrated the success of this approach for transferring scientific findings into application by farmers. To achieve this transference, it is necessary to firstly facilitate community (i.e. the producers) consensus on the project's legitimacy, hence generating a sense of ownerships and commitment to application (Bruges and Smith, 2008). A limiting factor for using the participatory research approach is its high costs relative to other strategies, in addition to its typically slow process. In contrast, diffusion of information via launch events, TV and Internet are cheaper approaches, however they typically result in information principally reaching farmers with higher levels of income and education (and hence access to these information sources).

References

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