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Acceptance of golden rice in the Philippine 'rice bowl'

Few science issues in recent years have elicited such polarized public reactions as modern biotechnology and its agricultural applications. Although a new study conducted by the University of Illinois at Urbana-Champaign and the International Service for the Acquisition of Agri-biotech Applications (Ithaca, NY, USA) indicates that Southeast Asian stakeholders generally hold positive views about agricultural biotechnology (http://www.isaaa.org/kc/CBTNews/2003_Issues/May/CBT_May_20.htm), other studies focusing more specifically on public acceptance of transgenic (*Oryza sativa* ssp. *indica*) rice—*Bt* rice in the Philippines¹ and vitamin A-enriched (Golden) rice in Thailand²—reveal a more polarized situation. Given the potentially significant impact of Golden rice in addressing malnutrition and the strong opposition to it by particular stakeholders in Southeast Asia, I conducted an exploratory study in May 2003 to assess risk perceptions of Golden rice among rice farmer leaders in Nueva Ecija province—widely regarded as the 'rice bowl' of the Philippines.

The Philippines is the focal point of an international effort to genetically engineer provitamin A (or carotenoids) into *indica* rice. Vitamin A deficiency is a serious problem in parts of the developing world where rice is the major staple food. In Asia alone, over 180 million children and women suffer from vitamin A deficiency³. Worldwide, 500,000 children are permanently blinded by the disease each year⁴. Thus, Golden rice seems to represent "a pioneering step in the use of agri-biotech to produce a significant impact at the consumer level, more specifically in developing countries"⁴. The International Rice Research Institute (IRRI) in Los Baños, the Philippines, is now conducting tests on Golden rice and expects to complete field and food safety trials by mid-2003 and 2006, respectively⁵. Nonetheless, Golden Rice is not the first transgenic rice to be developed in the Philippines: in 2000, the Philippine Rice Research Institute (Muñoz, the Philippines) conducted field trials of a rice engineered to carry the *Xa21* gene, which conveys resistance to the common rice disease bacterial blight (*Xanthomonas oryzae*).

The Nueva Ecija region accounts for 7.2% of the Philippine's total rice output and is the leading rice-growing area by far. Not surprisingly, rice production is the single

most important economic activity in the province⁶. Understanding risk perceptions of rice farmers is important for two reasons: first, risk perceptions influence public acceptance of new technologies, ranging from nuclear power to transgenic crops⁷; and second, although most studies to date have focused on more easily accessible stakeholders, such as policy makers and urban consumers, little is known about the risk perceptions of local farmers.

Even though Nueva Ecija rice farmers have had no direct experience with Golden rice or any other transgenic crop, research has shown that technologies may be stigmatized by communication—especially by the news media—about potential risks associated with those particular technologies. Indeed, people, products and places may be stigmatized in advance of, or even in the absence of, any demonstrated physical effects⁸. But, more significantly, stigmatized residents, places, products and other targets are often blacklisted by external observers who exhibit 'anticipatory fears' of undesirable future outcomes⁹.

Nueva Ecija consists of 28 municipalities and 4 cities; each municipality and city in turn comprises a number of *barangays* or barrios (villages). Using a stratified random sample, I conducted interviews, using a semistructured questionnaire, with one barrio leader from each of the 32 zones in the province. As opinion leaders play a pivotal role in the adoption and diffusion of new technologies in their communities, the risk perceptions of barrio leaders have potentially significant implications for the acceptance of transgenic crops such as Golden rice¹⁰.

The results of this study show that both awareness and knowledge of Golden rice among the barrio leaders is almost nonexistent. Moreover, only one barrio leader had any knowledge of what a transgenic crop is (even though the Philippine Rice Research Institute in Nueva Ecija tested its transgenic bacterial blight rice in 2000, only one of the respondents was aware of the crop). This finding is in line with research results from other parts of the world: even in the United States and Europe, most people are not able to give correct answers to basic questions about gene technology¹¹.

Although evidence suggests (M. Chong, J. Shanahan, D. Brossard, N. Ngo & K. Dalrymple, unpublished data) that elite

Philippine newspapers (such as the *Philippine Daily Inquirer*) frequently cover agricultural biotechnology in a controversial manner, the barrio leaders' low awareness and knowledge levels suggest that the biotechnology debate is still predominantly an urban, elite discourse that is not closely attended to by rice farmers in the rural areas. And as opinion leaders generally have better access to the news media than do others in their communities¹², the average farmer is even less likely to be aware of or knowledgeable about transgenic rice strains such as Golden rice. From a communication standpoint, it is pertinent that the three barrio leaders who are aware of Golden rice first heard about it from personal contacts at the Philippine Rice Research Institute and the agricultural biotechnology company Syngenta (Basel, Switzerland) as well as from other farmers. This suggests that interpersonal channels of communication may be more effective in reaching rice farmers than the news media.

By far, the barrio leaders cited higher yield as the most important criterion when making a decision on whether to adopt a new rice variety—transgenic or otherwise. Thus, pragmatic, material concerns seem to take center stage: farmer leaders are first and foremost concerned about bread-and-butter issues, such as producing enough rice to meet immediate material needs, whereas less tangible considerations (such as longer-term environmental risks) are of secondary concern. This makes sense when seen against the backdrop of stagnant rice yields in the country over the past decade¹³.

The implications for Golden rice are obvious: it must demonstrate yields or cost savings equivalent to (or higher than) those of the best currently grown nontransgenic varieties if it is to be successfully introduced and adopted by rice farmers in Nueva Ecija. Water efficiency might also be added as a critical trait, as lack of irrigation and water shortage was most frequently cited as the biggest problem facing rice farmers in the area.

The barrio leaders consider the Department of Agriculture (Quezon City, the Philippines; 19 mentions from questionnaire) and The Philippine Rice Institute (7 mentions) to be the most trusted sources of information on agriculture. The credibility enjoyed by these two institutions bodes well for the future promotion and adoption of transgenic rice varieties in the

Philippine rice bowl: empirical studies show that people who have social trust in the institutional actors involved in deploying, managing or regulating risky technologies perceive more benefits and fewer risks than people not having social trust in those actors¹⁴.

It is significant that not a single barrio leader mentioned anti-biotech nongovernment organizations, such as Masipag, as a trusted information source, even though Masipag operates an office and programs in Nueva Ecija. This casts some doubts on the legitimacy of claims put forth by Masipag and similar groups that they represent the broad interests and concerns of Philippine farmers (an English-language manuscript on Golden rice coauthored by Masipag is evidently tailored to an elite, urban audience).

Finally, the barrio leaders were asked if they would grow a new 'yellow rice' that is fortified with vitamin A and that will be given free by the IRRI to farmers who earn less than US\$10,000 (~500,000 pesos) annually. Thirty expressed a willingness to plant it, especially if it is high yielding, is proven safe for human consumption and

has sufficient market demand. Even the two leaders who were not keen on adopting Golden rice based their response on their perceived inability to market such a novel product. Thus, in addition to paying attention to the nutritional content, safety and agronomic performance of Golden rice, the IRRI would probably do well to provide marketing know-how and support to rice farmers, who put economic gains above other criteria. But clearly, the lack of previous knowledge does not stand in the way of farmer acceptance of Golden rice; indeed, technology adoption may precede knowledge acquisition and attitude development¹⁵. Although more research is needed to confirm the results of this exploratory study, Golden rice appears to have a promising future in the Philippine rice bowl.

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