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## Perceptions on the Importance, Adoptability, and Extent of Integration of Sustainable Agriculture in Extension Programs In Oriental Negros, Philippines

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The study describes the agricultural technicians' (ATs) views on the importance, practicability, and adoptability of sustainable agriculture (SA), and the extent of its integration into agricultural extension programs in the province of Oriental Negros, Philippines. The study employed a descriptive survey design, using Likert-type scales. Respondents to the study include 126 ATs of the Local Government Units (LGUs) of the province. Research findings show that the responding ATs believe in the importance of extension programs that promote SA. They emphasized that for SA practices to be adoptable, these need to be profitable and economically viable. However, they also expressed apprehensions about SA's workability and practicability in farms, especially in relation to farmers' capability to make informed decisions about its adoption. SA principles and practices have gained inroads into local agricultural extension programs as manifested by the perceived high level of integration of SA topics in agricultural extension activities. Among other SA practices, organic farming, and integrated pest management (IPM) were reported to be highly integrated into agricultural extension programs in the province.<sup>1</sup>

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### INTRODUCTION

**C**ognizant of the critical problem of worldwide degradation and depletion of natural resources and the environment, the World Commission on Environment and Development (WCED) has been promoting the adoption of the sustainable development framework. It defines sustainable development as "meeting the needs of the present without compromising the ability of future generations to meet their own" (PCSD, 1997). Sajise (1999) explained the meaning of sustainable development as "maintaining or prolonging the productive capacity of the natural resource base to meet

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<sup>1</sup> Abbreviations used: SA-sustainable agriculture; ATs- agricultural technicians; LGU- local government units; AFMA – Agriculture and Fisheries Modernization Act; ATI – Agricultural Training Institute; IPM- Integrated Pest Management.

the needs of human society." He elaborates that "the capacity of a country's natural resources and life support system to provide the needed goods and services for its present and future generation is a main determinant of sustainable development." In the Philippine context, the WCED's advocacy for sustainable development provides the philosophical underpinnings for the so-called Philippine Agenda 21 which advocates sustainable development whose essence is the "harmonious integration of a sound and viable economy, responsible governance, social cohesion and harmony and ecological integrity to ensure that development is a life enhancing process." This concept is also the focal point of the Agriculture and Fishery Modernization Act of 1997 (AFMA), R.A. 8435, which incorporates sustainable development as one of its guiding principles.

The threats posed by conventional agriculture, characterized as resource-degrading, industrialized, intensive or high-external input (Pretty, 1995), on the sustainability of agriculture's resource base and on environmental quality, ushered in the emergence and advancement of sustainable agriculture (SA) as an alternative system for agriculture resource management. Pugliese (2001) characterizes SA as belonging to the endogenous development paradigm which highlights the significance of low-input, resource-conserving farming systems (as cited by Bacongus, 2002). Among others, SA has come to be associated with such terms as alternative, regenerative, biodynamic, low external input, organic, eco-agriculture, and permaculture (Pretty, 1995). These farming systems have come to be regarded as sustainable to varying degrees. A definition of SA that has been embraced by more than 300 non-government organizations (NGOs) coming from more than 60 countries during the Earth Summit and Global Forum in June 1992 in Rio de Janeiro describes SA as "any practice, method, technique/technology, philosophy or system of production that makes agriculture ecologically-sound, economically-viable, socially just and equitable, culturally appropriate and grounded on holistic science" (as cited by Zamora, 1999).

For long term viability, there is clearly a need for the agriculture sector to move toward sustainability (Marshall & Herring, 1991). As frontrunners in initiating positive changes in agricultural communities, extension agents, locally referred to as agricultural technicians (ATs), play a pivotal role in helping farmers decide whether to adopt SA practices (Agunga, 1995). Faced with the challenge of advancing agricultural practices that promote agricultural sustainability, ATs are expected to integrate SA in their extension programs and activities. Consequently, this study focuses on ATs' perception of SA and the extent to which they have integrated SA practices into their daily programs and activities. Specifically, this study aims to 1) examine the views of agricultural technicians regarding the importance of SA in extension programs, its practicability or workability in farms, and its adoptability among farmers, and 2) to determine their perceptions on the extent of SA integration in their extension teaching activities.

## METHODOLOGY

The study employed a descriptive survey design to achieve the objectives. The population for the study consisted of all ATs that have been devolved to the local government units (LGUs) at the municipal and city levels in the entire province of Oriental Negros, Philippines. A random sample consisting of 30% (n=126) of the total devolved AT population from 20 municipalities and 5 cities of the province provided data for the study. Data gathering started in January up to March 2006.

To collect data, a self-administered questionnaire, which was previously pre-tested with 10 undeveloped ATs, was individually handed out to the devolved ATs. The study adapted parts of the instrument used by Agbaje, et al. in their study on the "Impact of Sustainable Agriculture on Secondary School Agricultural Education Teachers and Programs in the North Central Region of the United States" (Agbaje, et al. 2001). The section dealing with perceptions on SA was adapted by rephrasing four (4) of the original 16 perception statements to suit the study's objectives, and by eliminating one (1) of the statements from the list. The remaining ten (10) original statements were retained. Similarly, the portion of Agbaje's survey instrument which lists the different SA practices was also modified to suit local particularities. One SA practice/ topic was eliminated but was replaced by 2 other SA practices; two were rephrased; while the remaining five were retained. These parts of the instrument made use of a five-point Likert-type scale to determine the range of perceptions of ATs on 15 SA-related statements and the extent to which they have included each of the listed SA practices in their extension programs and activities. Means and standard deviations were calculated in order to describe the data

## RESULTS AND DISCUSSION

### PROFILE OF THE RESPONDENTS

The ATs in this study are affiliated with the LGUs (city and municipal levels) of the entire province of Oriental Negros. The responding ATs consist of equal number of males and females, and are middle-aged, averaging 43.89 years old (Table 1). They have been in the extension service for an average of 14.96 years. These data suggest that they joined the service when they were about 29 years old, and that extension work may not have been their first job. They have varied fields of specialization, mostly agriculture-related, although majority (57%) of them reported having specialized in crop science, reinforcing the notion that extension work in the country is biased towards crops to the neglect of livestock extension (Cardenas, 2004). Majority (69%) of the respondents hold permanent appointments, serving an average number of 9.56 barangays, more than two times higher than the national average of three to four barangays served per extension agent (Cardenas, 2004). The last two years, from

2004 to early part of 2006, the ATs attended an average number of 3.19 trainings on various topics related to agricultural production and agricultural extension.

Table 1. Personal characteristics of respondents.

PARTICULARS	CIRCUMSTANCES	CHARACTERISTICS
Respondents	n=126	All are connected with the LGU Extension under the offices of the municipal and city agriculturists
Place of Assignment	Come from 20 municipalities, and 5 cities in the province of Oriental Negros	Majority are from LGU-municipal level
Sex	Equal number of males and females	50 percent males, 50 percent females
Age	About middle-aged	Average of 43.89 years with a range of 23 to 63 years, standard deviation of 10.10
Length of Service in Extension	Relatively short	Average of 14.96 years with a range of 0.7 -41 years, standard deviation 10.10
Status of appointment	Majority on permanent status	69 percent of ATs are in permanent appointment
Field of specialization	Varied	57 percent are in crop science, 18.5 percent in animal science, and the rest distributed in five other fields
Area of coverage of extension (number of barangays served)	Varied	Average of 9.56 barangays with a range of 1 to 33, standard deviation of 8.48
Number of trainings attended in the last two years (2004-2006)	A number of local trainings in the last two years	Average number of trainings attended 3.19 with a range of 0 to 7, standard deviation of 1.95

## ATs' PERCEPTIONS ON SUSTAINABLE AGRICULTURE

Table 2 shows the means and standard deviations of the 15 perception statements ranked in descending order based on mean scores. Statements ranked 1, 2, 3, 14, 15 are related to the perceived importance of SA in extension programs, while statements ranked 8, 9, 12 and 13 pertain to SA's workability or practicality. On the other hand, those ranked 4, 5, 6, 7, 10 and 11 deal with SA's perceived adoptability by farmers. Adapting the methodology of Agbaje, et al., (2001), the five point rating scale was interpreted as follows: 4.50 - 5.00= strongly agree; 3.50 - 4.49= agree; 2.50 - 3.49= neither agree nor disagree (neutral); 1.50 - 2.49 = disagree; and 1.00 - 1.49 = strongly disagree.

As the mean scores indicate, the respondents neither strongly agreed nor strongly disagreed with any of the 15 statements related to sustainable agriculture (SA). However, they "agreed" with seven (7) statements, showed neutrality by neither agreeing nor disagreeing with six (6) others, and manifested disagreement with only (2) two statements.

In particular, the statements garnering the top three highest "agree" mean ratings were those alluding to the importance of making SA an integral part of government agricultural extension programs. Specifically, the responding ATs indicated that they would support extension programs that encourage the use of SA practices. They perceived SA practices to be an important part of their extension teaching activities, and stressed the need for extension programs to promote agricultural practices that are both ecologically sound and economically viable. These views may be attributed to what is now increasingly regarded as an emerging role of extension—promoting natural resource management and environmental protection (Battad, 2003; SDC, 1997), which is considered key underpinning principle of SA. To some extent, the respondents' views are indicative of the inroads SA practices have made into government agricultural extension programs as manifested in the articulation of SA principles and practices in extension programs and activities, and into the thinking and activities of ATs involved in this study. This is operationalized in, among others, the widespread involvement of ATs in the nationwide implementation of the FAO-Integrated Pest Management (IPM) - KASAKALIKASAN Program. IPM has been widely acknowledged as a sustainable agricultural practice (Pretty, 1995).

The respondents also agreed with statements indicating the importance of agricultural practices used on farms to be economically viable, and specifically, for SA practices to be profitable to be adoptable (statements ranked 5 & 6). It appears that the perceived adoptability of SA practices hinges not only on its capacity to ensure ecological stability, but also on the attainment of economic viability and profitability, among other considerations. The ATs' lack of certainty on statements ranked 10 and 11, which broadly pertain to the adoptability of SA without specifying its ecological or economic implications, reinforces this notion. Moreover, the ATs are cognizant of the need for changes in farm management practices as a pre-requisite for farmers who plan to adopt

SA. Agbaje, et al. (2001) explained that managemental changes are indispensable as farmers consider environmental and social factors along with the economic dimension in their farming operations. It appears that for SA practices to be adoptable, all SA dimensions must be given equal emphasis. This was to be expected because for agriculture to be sustainable, according to the NGO Sustainable Agriculture Treaty, "it has to be ecologically sound, economically viable, socially just, culturally appropriate and based on a holistic scientific approach."

Table 2. Means and standard deviations for the perceptions of agricultural technicians (ATs) regarding sustainable agriculture\*

RANK	PERCEPTION STATEMENT	N	MEAN*	S.D.
1	I would support government extension programs that encourage the use of sustainable agricultural practices	126	4.43	.77
2	Teaching about sustainable agriculture practices is an important part of extension activities	126	4.36	.77
3	Extension programs must promote agricultural practices that are not only ecologically sound but economically viable as well	126	4.31	.66
4	Adoption of sustainable agricultural practices will be easier for farmers who have both crop and livestock enterprises	126	4.25	.84
5	Most farmers will adopt sustainable agricultural practices if these practices do not reduce profits	126	4.12	.83
6	If sustainable agriculture practices reduced the profitability of farmland, farmers would not adopt them	126	3.69	1.95
7	Use of sustainable agricultural practices requires that farmers change farm management practices	126	3.69	.99
8	The purpose of farmland is to use it to derive maximum financial gain	126	3.47	1.09
9	Sustainable agricultural practices would work well on any farm	126	3.39	.96
10	All farmers can adopt sustainable agricultural practices	126	3.37	1.23
11	Sustainable agriculture practices are not adoptable in some farms	126	3.23	1.07
12	The farmer has enough information to make decisions about using sustainable agricultural practices	126	3.17	1.25
13	Most sustainable agricultural practices are not practical for the average farmer	126	2.67	1.13
14	Advocates of sustainable agriculture have an anti-farmer attitude	126	2.49	1.12
15	Government has no business telling farmers how to use their land	126	2.13	1.04

\* Rating Scale :: 4.50 - 5.00 = strongly agree; 3.50 - 4.49 = agree; 2.50 - 3.49 = neither agree nor disagree (neutral); 1.50 - 2.49 = disagree; and 1.00 - 1.49 = strongly disagree.

On the other hand, the respondents were neutral on statements related to the purpose of farms (no. 8) and the workability or practicability of SA (nos. 9 & 13). They manifested a wide range of opinions on these issues as shown in the high standard deviation values (greater than 1.0) for all but one of the statements rated neutral. Specifically, the ATs were unsure of their stand with respect to the statement "the purpose of farmland is to use it to derive maximum gain."

This ambivalent stance may be explained in part by what SA advocates contend as the need to look beyond financial profitability of farms as the only consideration in farming operations, and to strike an acceptable balance between increased production efficiency on one hand, and ecological well being, on the other. SA advocates argue that "ecological sustainability is a necessary condition for the achievement of long term economic and agronomic sustainability" (Lowrance, et al. 1986).

The respondents expressed similar views on the issue of whether farmers possess sufficient information to make informed decisions about adopting SA practices, whether these practices would work well in farms, or are practical for farmers to follow. The ambiguous position of ATs on these issues may have stemmed from their insufficient exposure to SA farms and lack of interactions with SA practitioners due to the scarcity of farms employing SA practices in the country in general, and in the province in particular, as opposed to the preponderance of conventional farms (Viado, 1997).

On a different note, the respondents disagreed with the statement that SA advocates have an "anti-farmer" attitude, conversely suggesting that they viewed SA practices to be pro-farmer. This supports the contention of SA advocates that SA practices are important and beneficial to farmers and the community at large, and for both the present and future generations, because SA aims to ensure the long term viability of the resource base of agriculture. In more concrete terms, SA advocates argue that by emphasizing the use of locally available renewable resources, appropriate and affordable technologies, and minimal dependence on external and purchasable inputs, SA promotes increased local independence and self-sufficiency, thereby ensuring a source of stable income for peasants and small farmers (NGO Sustainable Agriculture Treaty, Global Forum, 1992).

By disagreeing with the statement that government has no business telling farmers how to use or what to do with their farms, the ATs were, in effect, saying that government must play a role in ensuring that agricultural resources are well-utilized in a manner that is consistent with national goals as exemplified by the Agriculture and Fisheries Modernization Act of 1997. Clearly, this stance is consistent with their views on SA as an important part of government agricultural extension programs (See statements 1 and 2 in Table 2).

## EXTENT OF SA INTEGRATION IN EXTENSION ACTIVITIES

Table 3 presents the means and standard deviations on the perceived extent of SA integration in the extension activities of ATs. Following Agbaje's, et al. (2001) mode of interpretation, the five point rating scale was interpreted as follows: 4.50 - 5.00= very high level; 3.50 - 4.49= high; 2.50 - 3.49= moderate; 1.50 - 2.49 = low; and 1.00 - 1.49 = none. A total of 98 ATs provided responses to these questions. Since most of the SA practices listed are crops-related, ATs who were involved in non-crop related extension activities refrained from responding to the questions.

All the SA related topics presented were included by the responding ATs in their extension teaching activities though none of them were done at a "very high" level. With the exception of "soil testing" which was included at a "moderate" level, all the other eight (8) topics were tackled by the AT's at a "high" level. The SA topics receiving the top two highest mean scores were organic farming and integrated pest management (IPM), respectively. The emergence of organic farming as the top pick of ATs is not surprising because according to Viado (1997), organic farming, together with low external input (LEI), and biodynamic farming are the most common approaches to sustainable agriculture being employed in the Philippines, although they may not be practiced in their pure forms (as cited by Baconguis, 2002). The USDA Study Team on Organic Farming defines organic farming as "a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible, organic farming systems rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds, and other pests" (as cited by Gold, 1999).

Clearly, the definition shows that organic farming encompasses the other topics also identified by ATs as part of their extension teaching activities such as crop rotation, reduced use of pesticides and synthetic fertilizers, and others, although they were not rated as highly as organic farming. The high ratings for IPM and INM (Integrated Nutrient Management) were not unexpected because these two systems-oriented sustainable agricultural practices are part of the major programs of the Department of Agriculture (DA) in relation to its grain productivity enhancement programs. Although devolved, many of the extension activities of the LGUs are done in support of the program thrusts of DA.



Table 3. Means and standard deviations for the perceived extent of integration of SA topics in agricultural extension teaching activities.

RANK	SA TOPICS	N	MEAN	S.D.	EXTENT OF INTEGRATION
1	Organic Farming	98	4.32	.89	High
2	Integrated Pest Management	98	4.00	.91	High
3	Reduced Use of Chemicals (Pesticides)	98	3.87	1.04	High
4	Crop Rotation	98	3.86	.89	High
5	Integrated Nutrient Management	98	3.85	.91	High
6	Soil Conservation	98	3.70	.89	High
7	Insect-resistant Crops	98	3.62	.97	High
8	Reduced Use of Synthetic Fertilizers	98	3.52	1.06	High
9	Soil Testing	98	3.47	1.00	Moderate

### CONCLUSIONS

Based on the findings of this study, the following conclusions can be drawn:

Results of this study show that participating ATs believe in the importance of making SA an integral part of extension programs, as indicated by their support for extension programs that promote SA principles and practices and by their appreciation of the importance of making it a part of their extension teaching activities.

Though generally supportive of SA, the responding ATs have varied perceptions on certain dimensions of SA. While voicing certainty that SA practices must be profitable and economically viable in order to be adoptable, they also expressed reservations on the practicality and workability of these practices on farms. In particular, ATs expressed concern whether farmers have access to sufficient information that will guide them when deciding to adopt SA practices on their farms.

To some extent, sustainable agricultural practices have gained inroads into local agricultural extension programs in the province as they have become part of the extension teaching activities of the ATs involved in this study. Organic farming and IPM appear to be the most highly integrated sustainable agricultural practices in agricultural extension programs in the province.

### RECOMMENDATIONS

The ATs need to be provided with more opportunities to learn about SA through

trainings, seminars, field exposures, and others in orders to address their perceived ambivalence on the workability and practicability of SA in farms, and to sustain and enrich current initiatives which promote SA practices through their extension teaching activities. In cognizance of the very limited availability of training programs for ATs at the LGU-municipal level, it is suggested that national programs being implemented by the Department of Agriculture, in partnership with the LGU extension, should encompass or reinforce the teaching of SA practices to upgrade the competencies and confidence of 'ATs on SA. The LGU extension offices need to link up with the Agricultural Training Institute and recommend the inclusion or strengthening of emphasis on SA in their capability building programs for ATs.

Due to the limitations of studies that primarily rely on perceptions, this paper recommends another study that will determine the true extent of SA integration in local agricultural extension programs using more objective measures such as an actual examination of extension program documents, and actual observations and assessment of extension programs in action.

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