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Gahung-Gahung Organic Cassava Farming System: A Climate Change Adaptive and Poverty-Alleviating Farming Strategy

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Farming in hilly-sloping topography faces the twin challenges of evading soil erosion and drought, and they are accentuated by climate change. Long dry spell called El Nino and erratic rainfall lead to the interrelated negative impacts of low crop yields, hunger and more poverty in the severely affected rural areas. On the other hand, chemical agriculture has made most of the farmers poorer in the rural areas.The high production cost pushes them below the poverty threshold and locks them in the vicious cycle of poverty. Being poor, most of these farmers are deprived of their basic necessities.

In view of this sad state of the poor farmers, Governor Antonio Cerilles of Zamboanga del Sur province came up with an innovative farming strategy of organic cassava production program. The program has prescribed the farmers to adopt the *gahung-gahung* (pit) method coupled with organic farming technologies, that is planting cassava on a square-foot pit filled with organic fertilizers. The program also guides farmers on how to plant cassava on a one-hectare farm by dividing it equally to ten plots and utilizing only one plot each month until he completes the whole cycle on the tenth month. The sequence planting is meant to enable farmers to reap a monthly harvest. Almost 2000 farmers are now enrolled in this program; 8000 more intend to take part of it after the long dry spell caused by the El Nino phenomenon.

This study investigates whether the farmers under this program are able to reap substantial harvest monthly and earn sufficient monthly income from their one-hectare cassava farm. It seeks to know whether their income enable them to rise above the poverty threshold and improve their living conditions. This study also assesses how this innovative farming system contributes in mitigating the effects of climate change.

Data shows that, even during the long dry spell, the farmers earned from US$180-US$300 a month, far above the poverty threshold of US$140 a month. The harvest could have been better under the normal climate conditions. Meanwhile, interviews reveal that the farmers already had a substantial income from his intercrops in his organic cassava farm before he started his monthly cassava harvest. Interviews also reveal that the continual use of the same one-hectare farm could be sustained since it is only a matter of refilling the pits with organic matter. Moreover, the initial findings of this study suggests that because of efficient land use in organic cassava farming, there is enough land for everybody. Every hectare counts, as every hectare can liberate a family from poverty. With more than enough lands for agricultural production, we can set aside more lands for vegetation to grow that would help mitigate the effects of climate change.

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Introduction

At present, smallholders provide more than 70% of total food eaten by people, using around 20-30% of arable land (Etc Group, 2013). They represent one-third of the world's 7.3 billion people. Though they may sound like a major player of the global economy, they ironically represent the majority of the poorest and hungriest people in the world (Hugh Locke, 2015). In Zamboanga del Sur, a South-western province of the Philippines, most of these smallholders farm in hilly-sloping topography facing the twin challenges of evading soil erosion and drought. The long dry spell called El Nino and erratic rainfall lead to the interrelated impacts of low crop yields, hunger and more poverty in the severely affected rural areas.

Against this backdrop, a new farming system is emerging that promises a bright future to the smallholders to be free from hunger and poverty and, at the same time, contributes in mitigating the effects of climate change. This new farming strategy mainly aims to liberate the smallholders from hunger and poverty, the threshold of which is pegged by the Philippine government at $140 a month for a family of six. Since this new farming system is only applied on cassava crops at present, it is called the Gahung-gahung Organic Cassava Farming System (GO-CFS). Upon assumption of office in 2010, Zamboanga del Sur Provincial Governor Antonio Cerilles conceptualized and rolled out the GO-CFS as his flagship livelihood project, targeting the smallholders as the main beneficiaries. The GO-CFS appears to be a game changer to the life of the smallholders.

The objective of this research is to determine if the GO-CFS is feasible and viable for adoption by the smallholders and if the GO-CFS is contributory in mitigating the effects of climate change. To answer the research question, the practices of the abovementioned beneficiary smallholders were investigated thru survey and key informant interviews, and the quantitative and qualitative data were carefully studied along with available related literature.

Methods and materials

This new farming strategy guides each farmer on how to plant cassava on his one-hectare farm by dividing it equally to ten plots and planting on only one plot each month until he completes the whole area in the 10th month. Starting in the 11th month, he can expect a monthly cassava harvest. Before he harvests cassava, this strategy guides each farmer to plant intercrops, either corn or vegetables, in between the rows of cassava so that he can already earn an income while waiting for cassava harvest. After each

cassava harvest, he again plants cassava to continue the monthly cycle of cassava production and sustain his monthly cassava harvest and income.

To ensure the continuing productivity of his cassava farm in spite of its continual use, this strategy guides the farmer to dig a square-foot pit, for each cassava hill, to be filled with organic fertilizers, like compost. This is meant to address the high-absorptive capacity of cassava for nutrients and avoid the degradation of the soil. It is made clear to the farmer that the sustainability of this strategy ultimately lies on the health of the soil.

After having finalized the methodology of GO-CFS, the provincial government through 70 agriculture extension workers called livelihood coordinators mobilized around 1000 smallholders to adopt the GO-CFS in their farms as project beneficiaries starting in December 2013. The provincial government complemented it with a minimal consumption loan thru a microfinance enterprise in order to bridge the beneficiary smallholders while waiting for their first cassava harvest in the 11^{th} month.

This research investigates the performance of the beneficiary smallholders to know the feasibility and viability of GO-CFS. To determine whether the said smallholders complied with the required monthly production of the GO-CFS, a survey was conducted. Quantitative data shows that only 98 farmers complied with the required monthly production and those who complied had relatively higher yield per hill of cassava. A literature review was then conducted to develop the questionnaire to be used for the key informant interviews needed to get the qualitative data. In getting the qualitative data, semi-structured interviews were conducted to the 90% who failed to comply in order to determine the factors that kept them from complying with the requirements. Semi-structured interviews were also conducted to the 10% compliant farmers in order to study their best practices in adopting the GO-CFS.

This research gathered more qualitative data from the compliant farmers because they were the ones who actually tested whether or not the GO-CFS is feasible and viable. The compliant farmers were asked to compare their farming practices before and after they adopted the GO-CFS. They were also asked on the problems they encountered in adopting the GO-CFS and how they were able to surmount them. Their practices serve as basis in assessing how the GO-CFS contributes in mitigating the effects of climate change. Lastly, they were asked how they benefitted from the GO-CFS, in terms of improved living conditions. These compliant smallholders serve as models for the rest of the smallholders the world over.

Results and Conclusions

Fear of the unknown kept many of the beneficiary smallholders from planting cassava on monthly basis. In conventional farming, they are used to plant cassava in seasonal basis, that is only once a year. They are not used to

plant during the dry season. Thus, they were afraid what would happen to their crops when the long dry spell of six months hit the country in late 2014 to early 2015. Usually, a dry spell would only last from three to four months. Most of the beneficiary smallholders then stopped planting for fear that they would have nothing to harvest if they continued the monthly production requirement of the GO-CFS. They were afraid that their efforts during the long dry spell would be in vain.

The compliant farmers pressed on in spite of the long dry spell. They kept in planting cassava on at least one-tenth of a hectare per month that is the size of each plot in the GO-CFS. Since the plot area is not big, the beneficiary smallholders found it easy to water their plants for at least more than a month. They also found out that a two-month old cassava plant could already survive a dry spell even without watering it. Though the growth of cassava crops was conspicuously stunted then, they did not die. The encouragement of the livelihood coordinators also helped a lot the farmers to press on. With a glimmer of hope, the compliant farmers followed the monthly production requirement of the GO-CFS in spite of the challenges they faced during the long dry spell.

When the rainy season came in the 2nd quarter of 2015, the cassava crops whose growth was stunted recovered fast. In a few weeks, the conditions of the crops were already normal. The beneficiary smallholders were then assured that they could sustain the monthly production requirement since their crops would no longer die for lack of water.

With regards the yield during the long dry spell, it appeared that mature cassava crops, at least five months old, were only slightly affected because they still produced sufficient yield that allowed them to earn a decent monthly income. The yield varied depending on the variety of cassava that they planted and on how they managed their farm. Though the yield varied, it was at least sufficient since it enabled the beneficiary smallholders to earn a monthly income from around $180 to $470 per plot.

With such a monthly income, the compliant smallholders have somehow liberated themselves from the bondage of poverty. They can no longer be called poor technically, being above the poverty threshold pegged at around $140. Their purchasing power increases. They can already afford to buy sufficient food and other basic necessities. They are now in better position to send their children to school even up to higher education. With their basic needs being met, they get more happiness and less stress in life. Indeed, they have improved their living conditions. With better living conditions, they serve as models for those who want to liberate from poverty.

Ironically, as they find their income getting better, they also find their work in the farm getting easier. They only have to take care of a few garden-size plots. Mature cassava planted earlier in other plots can survive by themselves. Thus, the farmers become more flexible on their time to

work in the farm. They have the option to avoid the scorching heat of the sun and still have enough time to finish their farm work on cassava. They do not need to hire labor anymore, as their own family can already do the farm work with ease. Farming becomes less stressful. The work is lesser, yet they are assured of a decent monthly income.

Moreover, the compliant farmers find this new farming system as a low-cost and environmentally-friendly activity. They only need to do composting to sustain the health of their soil and pest management to protect their crops from diseases. Instead of buying harmful chemicals, they make their own organic fertilizers gathered from their surroundings. They are able to save the cost of chemical inputs and avoid soil degradation. Any smallholder can do such a low-cost activity and can contribute something good for the environment just by doing it.

However, the biggest positive contribution of this new farming system to the environment lies in its minimalist character. Because of this minimalist innovation, farmers do not need to till several hectares of farm anymore, effectively reducing the emission of GHG gases that come out profusely with over tillage of farm lands. In a study commissioned by the International Federation Organic Agriculture Movements (IFOAM), it is affirmed that agriculture is a major contributor to emissions of methane (CH_4), nitrous oxide (N_2O), and carbon dioxide (CO_2). On a global scale, agricultural land use in the 1990s has been responsible for approximately 15% of all GHG emissions. One third of all carbon dioxide emissions come from changes in land use (forest clearing, shifting cultivation and intensification of agriculture). Approximately two thirds of methane and most of nitrous oxide emissions originate from agriculture (Kotschi J & Müller-Sämann K, 2004). With less tillage and use of organic agriculture technologies, this innovation significantly reduces the negative contribution of agriculture to climate change.

By minimum tillage and organic agriculture, this innovation mitigates the effects of climate change. With minimal disturbance to the soil, this innovation improves the soil quality. It reduces soil erosion brought about by wind and water and improves its capacity for carbon sequestration. The United Nations Environment Programme restates the claim that minimum tillage causes an accumulation of organic carbon in soil, thus mitigating climate change through carbon sequestration (UNEP, 2013). With organic farming, moreover, this innovation offers a permanent cropping system that ensures productivity and sustainability. Soil fertility is maintained through farm internal and organic inputs, as it rejects the use of chemical fertilizers and pesticides whose production spawns lots of GHG emissions. On the whole, minimum tillage and organic agriculture keeps the farms in perfect balance, as well as in better position to mitigate the effects of climate change.

A peer-reviewed scientific study of the Rodale Farming Systems Trial, (in the USA) a long-term comparison trial of conventional and organic systems, found that the organic systems use less fossil fuels and emit 30% less greenhouse gases. (Pimentel et al. 2005)

The kind of minimum tillage in this innovation, moreover, leaves more areas for vegetation. In effect, it encourages the people to reforest especially the denuded uplands. Cerilles looks at this as an agro-forestry concept meant to preserve, if not recover, the watersheds that are critical to prevent flooding, to store and provide water for the plants and the people, and to conserve biodiversity. Such kind of biodiversity is what the world needs most today, and this is what the smallholders can provide by adopting the GO-CFS.

In view of the abovementioned performance of compliant farmers, this study concludes that the GO-CFS is feasible and viable for adoption by the smallholders, as well as contributory in mitigating the effects of climate change. It is feasible because it is very practicable for them. It only needs a hectare to do it. It is a very low cost activity, which does not need chemical inputs and hired labor. It is also viable because it provides farmers sufficient harvest and decent monthly income that results to the well-being of their families. The smallholders will surely sustain something that ushers well-being to their families. Being environment-friendly contributes to the viability of the GO-CFS. By sustaining soil health and mitigating the effects of climate change, it surely can last in spite of the continual use of land resources and can contribute in reversing the bleak future that climate change spawns. Indeed, the compliant farmers have blazed a trail showing to the rest of the smallholders that the GO-CFS is feasible and viable.

Discussions:

If only the GO-CFS would be replicated in other parts of the world following its strategy-- producing enough food and income per hectare of farm and prioritizing and empowering the target beneficiaries, the problem of world hunger can be addressed effectively.

In GO-CFS, the smallholder can produce sufficient food for his family in every hectare. With this farming system, one hectare is enough to feed his family and let them live decently. Every hectare can produce sufficient harvest of tubers that a farmer can set aside as staple food or sell to cassava chips consolidator. His income out of this sale is at least double the poverty threshold, and he can raise it further if he works harder. With the new farming system, the farmer is assured of staple food and sufficient income that can buy more food, plus the basic necessities, for his family.

To address hunger, target beneficiaries have to be prioritized and empowered, just like what the GO-CFS project has done (Julius Breva, 2015). It is important to note that food cannot be distributed equally in every

part of the world because hunger happens in varying degrees in every region, country, province and municipality (FAO, 1996). Smallholders who live below the poverty threshold and suffer hunger should be targetted. They who really need or who experience hunger should be prioritized in any development assistance to address hunger. By empowering the smallholders, who comprise one-third of the world population, to produce sufficient food in a sustainable way, world hunger will be addressed effectively (FAO, IFAD & WFP, 2012).

References

Etc Group.2013. With Climate Change…Who Will Feed Us? *Food Poster.* http://www.etcgroup.org/sites/www.etcgroup.org/files/Food%20Poster_Design-Sept042013.pdf

Hugh Locke.2015. Smallholder farmers are the new global food frontier. http://www.theguardian.com/the-b-team-partner-zone/2015/may/12/smallholder-farmers-producers-agriculture-food-women

Kotschi J & Müller-Sämann K (2004): The Role of Organic Agriculture in Mitigating Climate Change. IFOAM. Bonn. http:// www.ifoam.org/Neil: PATH

UNEP, 2013. The Emissions Gap Report 2013.Nairobi. http://www.unep.org/pdf/UNEPEmissionsGapReport2013.pdf

Pimentel, D., Hepperly, P., Hanson, J., Douds, D. & Seidel, R. 2005. Environmental, energetic and economic comparisons of organic and conventional farming systems, Bioscience 55(7): 557-582.

Julius Breva.2015.Addressing World Hunger. *Kosmos: Journal for Global Transformation.* http://www.kosmosjournal.org/reader-essay/addressing-world-hunger

FAO.1996. Food Security and Food Assistance. *World Food Summit Technical Background Doc.* Rome

FAO, IFAD & WFP. 2012. Imagining a world free from hunger: Ending hunger and malnutrition and ensuring food and nutrition security. http://www.un.org/millenniumgoals/pdf/Think%20Pieces/6_food_nutrition.pdf