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Organic Crops or Energy Crops?

Options for Rural Development in Cambodia and the Lao People's Democratic Republic

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1. Introduction

The agricultural sectors of developing Asian countries are experiencing two important new developments: the growth of organic agriculture (OA) and the increasing use of land to grow energy crops (biofuels). This policy brief summarizes the pros and cons of OA and biofuel and makes policy recommendations based on a detailed investigation for Cambodia and the Lao People's Democratic Republic.

Organic Agriculture: Pros and Cons

A substantial body of literature indicates that organic methods are often beneficial to small, resource-poor farmers. Conversion to market-oriented and certified organic agriculture often leads to improved income due to an organic price premium as well as to yield improvement, especially in marginal areas.

Other advantages widely reported from organic practices include improved soil fertility, enhancement or preservation of biodiversity, and improved health from absence of chemical pesticides. OA also leads to improved sanitation, purifies water, and may contribute to the prevention of health problems. In addition to mitigating greenhouse gases and sequestering carbon in the soil, OA has been shown to produce crops that are more resilient than their conventionally farmed counterparts to floods and droughts. OA is also a highly effective market-based development strategy that contributes significantly to the income and non-income poverty reduction targets of the Millennium Development Goals.

Critics argue that a significant shift toward OA would result in the world not being able to feed itself, since yields from OA are sometimes lower than those from conventional agriculture (CA). However, this is a misplaced concern; yields may decline in the case of conversion to OA from input-intensive systems mainly in developed countries. In developing countries, where input-intensive systems are not as widespread, introduction of OA will lead to more sustainable yield improvement without dependency on chemical inputs from faraway places. A study by Badgley et al. (2006) showed that OA could produce enough food to sustain the current human population and potentially more without an increase in the agricultural land base.

Another common concern is whether enough organic fertilizer that meets phytosanitary standards is available for such a massive shift in production. Again, the same study by Badgley et al. showed that leguminous cover crops could fix enough nitrogen to replace the synthetic fertilizer currently in use. These results need confirmation, but they offer encouraging evidence that OA on a global scale is not impossible.

Developing countries can also gain other secondary benefits from OA. The diversification of smallholder farms into growing a variety of crops and multipurpose trees combined with livestock enterprises and/or fish culture has been shown to enhance the overall yield stability (so-called resilience) (Economic and Social Commission for Asia and the Pacific 2002) and therefore the food security of organic farmers. Thus, there are reasons to believe that smallholders and resource-poor farmers may improve their

asset building and livelihoods through participation in certified organic production schemes.

Biofuels: Pros and Cons

On economic grounds, the arguments for more biofuel use are based on its potential to (i) substitute for gasoline and diesel, (ii) generate employment and economic growth by replacing imports with domestic production, and (iii) provide energy security by reducing dependence on imported fuels.

Biofuels' competitiveness depends critically on the world price of oil and on the taxation regimes for oil products relative to biofuels. Even at the price of US$90 per barrel, **some subsidy is needed to allow the market to adopt biofuel**. As far as developing countries are concerned, the potential for exporting biofuels to the more industrialized countries will depend on the amount of subsidy those industrialized countries provide to domestic producers and on the market access afforded to the developing country producers.

While the potential for biofuels in most developing countries depends heavily on the openness of the developed markets, there are also important local opportunities for biofuels. These opportunities are based on replacing imported oil and using locally produced biofuels for rural purposes, such as pumping and operating agricultural machinery. Policies that encourage local farmers to produce oil seeds such as jatropha can yield local economic and social benefits. For example, India is developing a program to cultivate 8,000 hectares of unused land that will produce 9 million liters of biodiesel a year.

The major economic concerns about the expansion of biofuels are at the global level. Increasing land areas for biofuel will reduce the amount of land for food production. In addition, it may lead to clearance of rainforest or peat land, which can be environmentally detrimental.

Whatever view one takes on the potential for biofuels, the studies to date suggest a need to be much more careful about how future energy demands are to be met from this energy source, and at what pace and to what extent such fuels can meet our energy demands. For example, meeting biofuel targets by producing one crop inside a major fuel consuming area is undesirable and other, more efficient sources must be exploited as international trade in fuels expands. Governments must allow for and expect increases in efficiency in crop production as well as in the technologies that will allow a wider range of crops for biofuel production (especially second-generation cellulosic ethanol). The extent to which these new sources of biofuel can change the potential for biofuels and the comparative advantage of different countries in producing them is not known. It is therefore desirable to be cautious in setting medium- to long-term goals for biofuels.

Another major argument against biofuels is based on their social consequences, arising from the fact that the growth in demand for feedstocks is fueling increases in food prices, which has a negative impact on the welfare of consumers, especially those in developing countries. Estimates by the International Food Policy Research Institute (von Braun and Pachauri 2006) indicate that the rapid increase in biofuel production will push global maize prices up by 20% by 2010 and 41% by 2020. In sub-Saharan

Africa, Asia, and Latin America, where cassava is a staple, its price is expected to increase by 33% by 2010 and 135% by 2020.[1] The World Bank (as cited in von Braun and Pachauri 2006) has estimated that the increased use of food crops for production of biofuels is an important factor that led to large increases in the prices of vegetable oils and grains in 2007, which in turn contributed to an overall 15% increase in the index of agricultural prices and a 20% rise in food prices.

Finally, there are the environmental impacts of a shift to biofuels. Careful calculations show that the savings in greenhouse gases produced from a switch to biofuels will depend on the source of the biofuel crop, where it is cultivated (e.g., whether land has been cleared to plant it), and the processes used to produce the final biodiesel or ethanol. The opening up of protected land or forestland for biofuel leads, moreover, to further loss of land and of biodiversity—not to mention the social consequences of such land use. The relative amount of local air pollution produced by the use of biofuels can also be greater or less than that produced by the use of conventional fossil fuels. It is also important to take note of the high cost per ton of greenhouse gases reduced from switching to biofuels. Cheaper means for reducing greenhouse gases include demand-side management; improved efficiency in fossil fuel generation; more efficient lighting, electric appliances,

[1] These sharp increases in prices will be mitigated if crop yields increase substantially or if biofuel production comes to be based on other raw materials, such as trees and grasses. While there is little indication that the latter is imminent, the improvements in yields are noticeable. The average yield of maize in the United States has increased about 2% per year over the last 15 years and the USDA projects a further improvement of 10% for maize and 5% for soybeans over the next 10 years. In the region of Brazil's Sao Paulo, sugarcane yields increased by 33% between 1975 and 2000. At the same time, the efficiency of conversion from food crops to biofuel crops has also been increasing—at about 1% per year for ethanol and about 0.3% per year for biodiesel.

and heating and cooling devices in buildings; and more fuel-efficient vehicles.

The social and environmental record of biofuels suggests that a labeling system is needed for biofuel products to inform consumers of their environmental impacts.

2. Organic Agriculture and Biofuels in Cambodia and the Lao People's Democratic Republic (Lao PDR)

This policy brief has the following findings for both countries:

- Assistance should be provided to build certification capacity in both OA and biofuels.
- In addition to a third-party certification system, alternative certification systems based on existing social capital should be developed and utilized, particularly for the domestic market.
- Even as more farmers go organic, concerns about undersupply of organic fertilizer appear to be unwarranted.
- Assessment of biofuels' local environmental impacts also requires careful analysis.
- Intergovernmental organizations should support these countries in identifying carbon credits of biofuels and OA and in promoting the technologies and processes that generate measurable and worthwhile benefits.

In the case of Cambodia, the following results are noted:

- OA through the System of Rice Intensification (SRI) should be promoted. Converting cultivated land by 20% of wet season rice farmers to SRI increases the farmers' incomes by 40% to 70%. About 21,300 households could escape poverty. Export sales could reach US$180 million.
- Two biofuel crops may be attractive options: jatropha and cassava.

– Under the jatropha program, 10,000 hectares are to be cultivated in 2008, increasing to 40,000 hectares by 2010. Fifty-six percent of the land is to be given to smallholders and the remaining 44% to commercial growers and biodiesel processors.

  The smallholder program would benefit farmers more than the concessionaire program. The former could take between 6,500 and 7,900 households out of poverty, vis-à-vis 1,400 to 1,500 for the latter. The smallholder program would produce 27% less biodiesel and would be financially unviable if the amount produced fell in the lower end of the yield range unless some subsidy was provided. Issues to be addressed are: (i) identification and processing of the carbon credits, (ii) reduction of the risks of failure (in case the price of oil falls) through a price guarantee program, and (iii) a capacity building support program.
– In the case of cassava, private sector interest is already present. A program should be developed to increase yields from the current 17.8 tons/hectare to a possible 22.8 tons/hectare by 2012.
– Similarly, the program would have a smallholder part and a concessionaire part. The former would target 20,000 households initially, going up to 30,000 by 2011. It would take about 7,000 households out of poverty and could increase farmers' net incomes to US$14.5 million by 2011. Again, the concessionaire component would have higher yields, creating about 2,000 jobs, but has fewer social benefits. Cassava roots could be used partly for ethanol

production for export, which could earn US$65 million by 2011. However, the project needs to be evaluated in terms of the cost of the support program and analyzed with respect to the possible carbon credits.

- Given limited funds, OA rice using the SRI method should be given the highest priority as it generates the greatest increases for the smallest inputs, followed by the jatropha project and finally the cassava project.

In the case of the Lao PDR, the following results are noted:

As data for the Lao PDR are less comprehensive, the analysis that follows is less rigorous and the recommendations more generic.

- The study focusing only on rice crops in the Lao PDR yielded the following findings:
  - With experts' advice, Good Agriculture Practice and OA can be combined in a program following the regional demarcations laid out by the government.
  - If yields could be maintained and if marketing and communication could be improved, farmers' income could increase by 15%.
  - With a program covering around 100,000 households, of which half are upland and the other half lowland, an increase in incomes of about US$5.6 million is feasible, taking about 33,000 households out of poverty. The program would cost about US$52 million.
- Regarding biofuels, similarly to the case of Cambodia, cassava and jatropha crops are attractive options but further investigation and development are needed before they can be implemented, as current targets are unrealistic.

- The program's economic benefits should be similar to those in Cambodia (i.e., a smallholder program benefits more poor farmers than a concession program).
- The program's viability will depend on the price of biodiesel. At US¢40/liter, only the concession program would be viable. As in the case of Cambodia, some subsidy or support for smallholders may be needed.
- For the cassava program, yields should be increased from 6.8 tons/hectare (one of the lowest levels in Asia) to around 17.8 tons/hectare to be on par with Cambodia. To avoid conflicts and even hardships within local communities, the government needs to improve the framework for concessions of land to private investors.

• As with Cambodia, the Good Agriculture Practice rice development program should be prioritized, with certified OA programs being developed where market niches can be identified.

3. Conclusion

The extent of the benefits of organic agriculture (OA) and biofuel crops will depend on market access and the costs of certification. Poverty alleviation appears to be greater for OA than for biofuels, but since the growing areas for OA and biofuel crops under this study do not generally overlap, both could be promoted. As both countries have de facto organic practices with a low level of chemical inputs, production of safe food for a high-value market may be a better strategy than intensification of agriculture through conventional methods. Assistance from external organizations in overcoming the challenges described in this policy brief will be critical for the success of any programs to promote OA or biofuels.

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About this Research Policy Brief

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