



## A success story of the transition to agro-ecology

“A case study of Mr. Yeng Song in the APICI project, Siem Reap, Cambodia”

### “An incredible piece of advice”



Mr. Yeng Song is a 50-year-old man from a farming family, whose main crop is rice. He lives in Kok Russey Cheung village, Dan Run commune, Sotr Nikum district, Siem Reap province. Rice growing is the main source of income in his family. He also owns a small plot for vegetable growing, which is mainly for home consumption; he sells any surplus produce. Even though he owns 8,900 m<sup>2</sup> of rainy-season rice and 1.5 hectares of dry-season rice, his income was insufficient for his large family of eight. In 2007, he accordingly decided to start a vegetable garden on an 875 m<sup>2</sup> plot with a family pond for additional income. **This garden was farmed using conventional practices and essentially chemical inputs, such as**

**chemical fertilizers, pesticides and fungicides.** Moreover, he used to grow a single crop rather than multiple cropping, in the belief that he could get a bigger harvest and so earn more money. He never considered crop diversification. He said, *“I felt that I was playing with a toy if I grew a lot of crops at once. I thought that, with lots of crops at the same time, it would be difficult to sell and I would therefore make little money because it would not all be harvested at the same time”.*

To boost crop yields, he mainly added chemical fertilizers and applied basal fertilization. He did soil preparation at the beginning of each vegetable crop. However, in addition to chemical fertilizers, he also applied about 15 kg of dry cow dung per 20m<sup>2</sup> of bed. At that time, cow dung was applied only on the surface, then incorporated into the soil to a small degree during the growth stage of the vegetables.

To control pests, he used chemical pesticides for any insects and applied fungicide when crops rotted or decayed. He said, *“I applied pesticides 1-2 times on leaf vegetables and at least twice for yard long beans, bitter gourd and cucumber”.* Mr. Yeng Song was able to cultivate only four months a year (November to February) because of the scarcity of water resources.

Mr. Yeng Song started to change his farming practices in 2010 after attending training with GRET and CIRD. Since 2010, he has been attending meetings and trainings with APICI staff. *“I got some knowledge and ideas about improving my garden so that I could use fewer harmful chemical inputs, though I was not really convinced at the time”*, he said. *“Advice from GRET and CIRD agronomists made me want to give it a try”*, he added. He became increasingly



Pic1: previous single-cropping in his farm



Pic2: Irrigating with watering can



Pic3: Furrowing irrigation



involved with the APICI project and, with technical support from the APICI team, developed his garden into a multi-purpose farm. Then he planted fruit trees and other multi-purpose trees around the garden. So, looking around his garden, there are **Mango trees, Neem trees, Sesbania grandiflora, Leucaena leucocephala, Senna siamea, Moringa and Psidium guajava**. These trees provide him with materials or ingredients to make solid compost and bio-pesticides. Furthermore, after working closely with the GRET-CIRD technical team, he is gradually adopting new techniques such as **crop rotation, multiple cropping, inter-cropping, liquid compost and bio-pesticides**. His garden is becoming a wonderful experimental site where he can try out new practices and learn by observing all of the innovative cultivation techniques, testing new crops like sweet pepper and European salads. Since returning from an exchange visit to India in early 2016, he is becoming a more agro-ecological farmer. Once back in his garden, he tested four things that he learnt in India: (1) composting, (2) permanent raised beds, (3) crop diversification and (4) pesticide-free farming. In his composting trial, he succeeded only with solid compost. For the other three ideas, he is still improving the processes.

Irrigating became easier when a solar pump was installed in October 2016. He feels more confident about converting his formerly conventional garden into an agro-ecological garden after putting into practice what he learnt from his exchange visits, especially the visit to India. Since the end of 2016, he has started to adopt more and more agro-ecological practices. He believes solid compost is best for improving



soil fertility and increasing organic matters. He has seen that his soil quality has improved, changing from a sandy texture with a slightly white color to a darker brown color now, with fewer weeds (by comparison with cow dung application). Thanks to these positive results, he is highly motivated to build lots of compost piles

so that he can apply compost not only on the vegetable plots but also in his rice field. To make solid compost, he simply gathers available materials around his garden or house, such as **rice straw, bamboo leaves, banana trunk, cassia leaves, weeds, corn stalks, Chromoleana, tree leaves, animal dung, water hyacinth, rice husk and coconut fiber**. *"It is not necessary to have every material or ingredient I listed, but it should at least be dry and green materials and animal dung"*, he explained. Now he can produce at least four compost piles per year, with approximately 2 tons per pile.

Liquid compost and bio-pesticides are prepared in water jars and containers around the garden. For cultivation techniques, he is now using permanent raised beds; he simply adds more compost and incorporates it thoroughly into the soil in the next crop cycle, without plowing by hand tractor as before. This is completely different to the previous technique, where plowing was necessary for soil preparation in order to break hard soil and reduce weeds. He said, *"Permanent raised beds mean a lot less expenditure and labor for soil preparation. Now I am not so worried about plowing"*.



Pic4: Hose pipe, Mulching, Crop diversification



Pic5: Preparing Liquid compost & bio-pesticide



Pic6: Solid compost



Pic7: Healthy sweet pepper under AE techniques



Pic8: More crop diversification in garden



Moreover, his garden is becoming more diversified, with many crops cultivated at the same time. **Crop rotation, inter-cropping, multiple cropping, mulching, composting, bio-pesticides and micro-irrigation** are all applied in Yeng Song's garden. Now he grows at least 5 crops at a time, such as **Salad, Cabbage, Amaranth, Batching onion, Thai basil, Herbs, Okra, Bitter gourd, Cucumber and Sponge gourd**. To make more efficient use of the limited land area available for cropping, he grows sponge gourd as a canopy and leaf vegetables underneath. Besides getting larger harvests on the same plot, this creative idea could also be worthwhile to reduce his outlay on purchasing shade cloth to protect plants from strong sunlight in the dry season. The practices and trials he has carried out on his farm have shown this farmer that multiple cropping is a good way to cope with unstable market prices. In local markets, not all crops will sell for a good price. Bringing many kinds of vegetables to market is better: when the price for one is low, other kinds may sell for a higher price. In addition, he recognizes that problems of insects, diseases and weeds have been gradually reduced through crop diversification, rotating different crop families, and various agro-ecological techniques. With all of these agro-ecological practices combined, it is possible to **reduce chemical fertilizers by about 50% to 60% and pesticides by approximately 40% to 70%**. Sometimes there is no application of pesticide.

Thanks to the Louis Dreyfus Foundation program, which brought him better irrigation techniques and water access, **"Now I spend less time irrigating my vegetables and have more time to do other work inside the garden and extend the cultivated area"**.

Before he had a solar pump system, irrigation was done in the traditional way, using a watering can for leaf vegetables and furrowing by using a gasoline-powered pump for fruit vegetables. **Water flowed directly to fill a small channel** (shown in picture 3) dug between each bed of yard long bean, cucumber, bitter gourd and eggplant. This way, he irrigates only every 3-4 days, not every day.

The solar pump system came with a 1500-liter water tank. The pump runs automatically when there is sunlight (a non-battery system) and less water in the water tank. It takes **approximately 2 hours to fill the 1500-liter tank. The 1500-liter tank can be filled a maximum of 3 to 4 times per day**. To irrigate leaf vegetables, he connects a hose pipe to the water tank (as shown in picture 4). Instead of pumping water into the vegetable beds to irrigate fruit vegetables, he now **connects a drip line to the water tank** (see a comparison between the two irrigation methods in the table below).



Pic9: Sharing session on Liquid compost



Pic10: Sharing session on Solid compost



Pic11: Sharing session on crop diversification and intercrop

	Conventional irrigation systems (875m <sup>2</sup> )		Innovative irrigation systems (875m <sup>2</sup> )	
	Watering can	Furrowing by gasoline pump	Solar pump & Hose pipe	Solar pump & Drip
	Leaf vegetables	Fruit vegetables	Leaf vegetables	Fruit vegetables
Labor force	1-2 person	1 person	1 person	1 person
Irrigating frequency	2 times/day	Every 3-4 day	2 times/day	1-2 time/day
Time spent	2-3 hrs/time	30 min/time	1 hr/time	15-20 min/time
Water use	Medium	Too much	Medium	Economical

Table1: Comparison between conventional irrigation and innovative irrigation



Pic12: Hose pipe connects Solar pump system



Pic13: Drip connects Solar pump system

*“It saves a lot of water, time and labor”*. With the improved equipment and techniques, in 2016 **he was able to expand his farm to 1,677 m<sup>2</sup>**. Now **he is working on a 2,552 m<sup>2</sup> plot** to grow vegetables.

Besides improving his garden, the other major advantage is that he hosts and shares his experiences with many other farmers through individual farm visits, farmer exchange visits and

exchange visits with other stakeholders (local authorities, NGOs, shops and restaurants).

Currently, his garden provides him with a monthly income because it is possible to cultivate year-round. Previously, on a 875 m<sup>2</sup> plot, he could earn about **\$80 to \$120 per month**, which covered about **\$50 per month in expenses**. Now his income from the same plot is **approximately \$150 - \$250 per month** with 2 laborers, and sometimes up to \$300, while his expenditures are **less than \$50 per month** (excluding labor and long-term assets). This shows why he spends most of his working time in his garden and has enlarged his garden twice.

Finally, he strongly encourages farmers to use more compost rather than manure from cows or other animals, because compost is a good way to improve soil quality, lower production costs, and make more efficient use of available local materials. At the same time, he recommends trying to minimize chemical fertilizers and chemical pesticides by gradually introducing crop rotation, inter-cropping, mulching, liquid compost and bio-pesticide. More importantly, this agro-ecological garden cannot work well with a single agro-ecological technique: it works best with a wide variety of agro-ecological practices. *“I was a conventional practitioner, just like my neighboring farmers. My wife and I did not believe agronomists when they said that agro-ecological techniques would work for vegetable cultivation, until we tested the techniques and saw the results with our own eyes”*, Song says. Now the results of his agro-ecological practices are obvious, but the challenge he faced earlier was that the initial results of the transition were not really convincing for him, and his wife strongly disagreed with what he was doing. However, based on what he saw in agro-ecology farms in India, he is still motivated, and being encouraged by APICI technicians to continue the transition to agro-ecology. Now he is a pilot agro-ecological farmer who can share his experience and knowledge of agro-ecology with many other farmers. He and his wife are happy to work together on this environmentally-friendly garden and are planning to convert a 2,000 m<sup>2</sup> rice field into a vegetable plot in the years ahead.



Pic14: New expanded plot



Pic15: Drip system for Yard long bean



Pic16: His wife harvests Sponge gourds

**Development of Sustainable Agriculture for Small Holders in  
Siem Reap Province**

**Agriculture Paysanne Intensive peu Consommatrice d'Intrant  
(APICI Project)**

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