

Environmental and agricultural education

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Back ground

Agricultural green revolution technology is often referred to conventional farming, modern agriculture, industrial agriculture or energy-intensive agriculture, because the technology is very commonly used around the world. Conventional farming improved varieties, chemical fertilizers and pesticides as the result. Conventional agriculture is also known as industrial agriculture because agricultural production is considered as an activity that processes the factory of production inputs such as seeds, fertilizers, and others to be output in the form of food and other agricultural products and farm profits (Lucky , 2011). Gliessmann (2007) stated that the approach and conventional farming practices primarily to an increase in food production has been followed by many countries both developed and developing countries. According to Gliessmann, the conventional agricultural technology based on cultivation techniques as follows:

- 1) Land Intensive Processing,
- 2) Raising Monoculture,
- 3) Various Applications of Synthetic Fertilizer,
- 4) The expansion and intensification of irrigation networks,
- 5) Control of pests , diseases , weeds with chemical pesticides,
- 6) Plant and Animal Genome manipulations that produce superior crop varieties through plant breeding technologies and genetic engineering.

However, it is become clear that conventional farming is not sustainable system. The application of conventional farming does not bring better circumstances but it raises new problems. The application of conventional agricultural technologies are widely and uniformly result in negative impacts on the environment, socio-economic conditions and public health. According Gliessmann (2007) side effects of conventional agriculture include:

1. Degradation and decline in soil fertility.
2. And excessive use of Damage System Water Hydrology.

3. Pollution in the form of harmful ingredients in the environment and food.
4. Farmers' dependence on external inputs.
5. Loss of Genetic Diversity as various types of crops and crop varieties of local/traditional.
6. Global increase in the gap between industrialized countries and developing countries.
7. Losing Control of Local Communities on Agricultural Production.

The number of people in Indonesia from year to year continues to increase. This of course will lead to an imbalance between the numbers of people with the amount of food available. But handling agricultural sector led to less professional desires of young generation in the agricultural sector is very low. They prefer to venture out of the city and even abroad, working in factories, in medicine, a Civil Servant, and other prestigious jobs. During this time the average worker who works in the agricultural sector is the population older than 50 years. Low interest of young generation in the agricultural sector is causing the lack of income. There are two reasons;

First, better cultivating the fields that we have in the village rather than going to venture out of town or out of the country that we do not know anything about the condition and fate of the future when we've reached the destination.

Second, the government set a minimum purchase price of the agricultural products .

This is what triggers the low interest young people in agriculture. In addition to the constraints faced by the agricultural sector is the limited quantity and quality of human resources in agriculture. The low level of education of farmers led to the ability to absorb information and adopt technology is relatively very limited so as to produce a low quality product.

Low levels of knowledge and skills of farmers resulted in low capacity of farmers to manage their business. Lack of soft skills (the ability of farmers to work together and the lack of motivation to improve the quality / value added products derived from it) encourages agricultural development for poor performance overall.

Purpose/objective

With increasing public knowledge about the negative effects of the use of chemicals for agriculture, and we should create a new sustainable agricultural system which is compatible with economy. For that, the education of the importance of organic farming should be done earlier.

Methodology

1. Field observation and sample collection

We visited 3 Balinese farms in 17th September 2013. We observed type of farms (species / organic or agricultural chemicals) and collected over 100 g soil / 1 farm with scoop and plastic bug. Location of this observation is as following.

- 1) Subak Ayunan, Badung Regency – Mengwi
- 2) Br. Bangli, Titigalar Vilage, Baturiti – Tabanan (in this farm, we collected soil from 2 fields)
- 3) Jatiluwih, Penebel Vilage – TabananInterviews

2. Interviews

We asked farmers of 3 locations about their way of farming in 17th September 2013. Farmer's information is as follows.

- 1) Ayunan: I Ketut, The chairperson of subak ayunan
- 2) Baturiti: I Wayan Runca, Owner of organic farming
- 3) Jatiluwih: I Nyoman Sutama, The chairperson of subak Jatiluwih

3. Laboratory work The quantitative analysis of soil components

Soil components are extracted and determined. In addition, we also measured pH of soil. All processes are done by a soil-analysis kit, Dr. Soil tool kit (Japan Bio Farm). NH₄-N, NO₃-N, P₂O₅, K₂O, and Fe

4. Literature review

We gathered information of agriculture in Bali and Japan with books, papers and web pages.

Results and discussion

Parameters	Sample			
	Subak Ayunan	Organic Crop Titigalar	Conventional Crop Titigalar	Jatiluwih
NH ₄ -N (mg/100 g soil)	1	<1	<1	1
NO ₃ -N (mg/100 g soil)	1	1	5	1
P ₂ O ₅	25	10	50	5
K ₂ O (Kg/10 a)	100	70	35	70
Fe (kg/ 10 a)	7.5	0.5	0.5	10
pH	7	6.5	6.5	4.5

1) Condition of the land

As the result shows, NO_3 is at highest level in Conventional crop Titigalar, and at low level in other place. And, the soil of Conventional crop Titigalar has much amount of P_2O_5 . Nitrogen and phosphate are important components for growth of crops, but too much NO_3 and P_2O_5 are carried out to river, and they can cause water pollution. It can be said chemical farming is bad for environment and our health. In contrast, K_2O of Conventional crop Tirigalar is at lowest level of 4 samples. Potassium is easily soluble, and then we suggest that most of K_2O is lost by rain fall. It is not efficiency and sustainable.

In addition, pH of Jatiluwih is very low. We think it says that there is far more water in Jatilueih compared with other place, so concentration of hydrogen ion is high.

We reason out condition of a land shows chemical farming is un-ecological and unsustainable. Because of that, we think to promote organic farming system is necessary for future agriculture in Bali.

And there is a gap of irrigation system among the subak. We should reconsider the irrigation system of other place to produce more products.

2) With education we also could change the mindset and create new market

As the result of our interview, there is lack of an understanding of relationship between farming system and ecosystem. Because of that market price of crops is low compare with cost of organic farming, benefits of organic farmer are not enough.

Thus, education about relation between farming system and ecosystem is important for children and other Balinese people to realize organic farming. If we can change the mindset of consumers in Bali or Indonesia, we can create new markets as well understanding about organic farming. But, many farmers like conventional farming because it is most simple way for mass production. To change farming system, we must have a strong policy and many support for farmers.

3) Practical solution

We suggest practical solutions, zero waste management and SRI method which is needed for Balinese.

Zero waste management

The problem of waste is very important. Chemical waste can be toxic and make damage to the environment. Zero waste management is a kind of a recycle system to prevent environmental pollution by reducing wastes.

SRI (System of Rice Intensification)

SRI is the organic cultivation method of rice. On SRI, non-cyclic irrigation is applied to improve microbe activity which helps growth of rice. To use SRI, we can reduce irrigation water, pesticide, and chemical fertilizer. SRI is safety method for our health and environment, and very sustainable.

Conclusion

We suggest two important factors as our conclusion.

One is Environmental education. We would propose the Zero waste management. For example, if, people are educated to separate the waste to organic or non-organic do not throw their waste on a street or river, farmers can use their waste to organic farming as compost and they could cut their cost. And the other is agricultural education, SRI method is good for to let farmers to the organic farming. It may have some problems to solve, but we think it has a potential to try.

References

- Gliessman, S.R. 2007. *Agroecology: The Ecology of Sustainable Food System*. Second Edition. CRC Press. New York.
- Untung, K. 2011. *Sains Petani Sebagai Kontribusi Slpht untuk Pemberdayaan Petani*. Available from <http://agrikulture.blogspot.com/>