

---

# Group Work Report

Study of Organic Farming System as an Effort to Sustainable Agriculture as well as Soil Nutrient and Plant Chlorophyll Analysis

Sachnaz Desta Oktarina

Summer-Course Report • Life and Environmental Science • University of Tsukuba

---



---

# Group Work Report

Held in Bogor Agricultural University Field and  
Gunung Geulis Organic Farming, Bogor, West Java, Indonesia

SUMMER COURSE PROGRAM, 15-21 SEPTEMBER 2012

---

## Introduction

The world population now as of today is estimated to number 7.048 billion. and it will be keep increasing year by year. The increase of human population is grow in geometric series whereas food production to suffice all the people only grow in line with arithmetic series. On the other hand, the problem getting worsen by climate change marked by global warming that lead to uncertainty in producing those food supply. People did effort to intense the production yield by Green Revolution in 1960's through abundant used of fertilizer and pesticide. Instead of giving the merits, yet this turn out to other problems followed such as saturated soil, food chance, and pest resistance caused to degradation of environment quality and public healthy.

This huge problem ubiquitously yield a question whether this nature still can feed people as well as further generation in the coming years ahead. Sustainability of agriculture production is the answer. The main issue of the concept of sustainable agriculture, which for scientist and policy makers is a mean to express their vision of better agriculture is a way of raising food that is healthy for consumers and animals, does not harm the environment, humane for workers, respects animals, provides a fair wage to the farmer, supports and also enhances rural communities. Researchers attempted to invent new varieties resisted from pest and drought. Another simpler way out is Organic Farming.

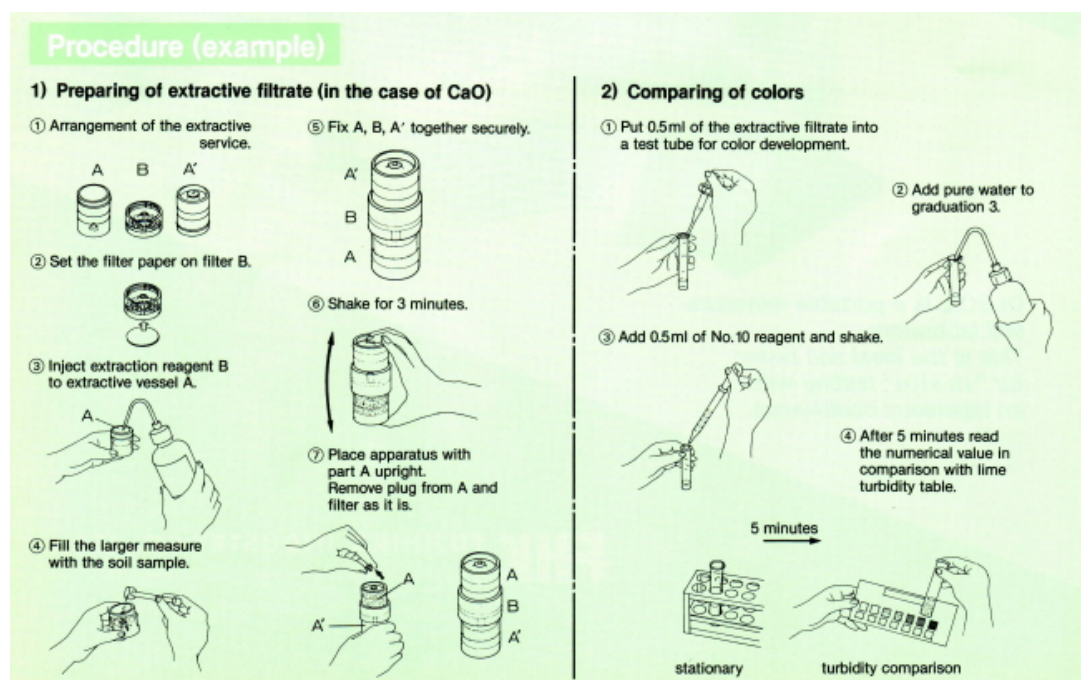
Organic farming is an agricultural system that seeks to provide consumer, with fresh, tasty and authentic food while respecting natural life-cycle systems. designed to minimize the human impact on the environment, while ensuring the agricultural system operates as naturally as possible. Since organic farming processed naturally, It will definitely maintain soil condition as well as leaf condition. Therefore, we made simple test on soil sampling, chlorophyll sampling, also the farm management of organic farming located in Bogor, West Java, Indonesia

## Objective

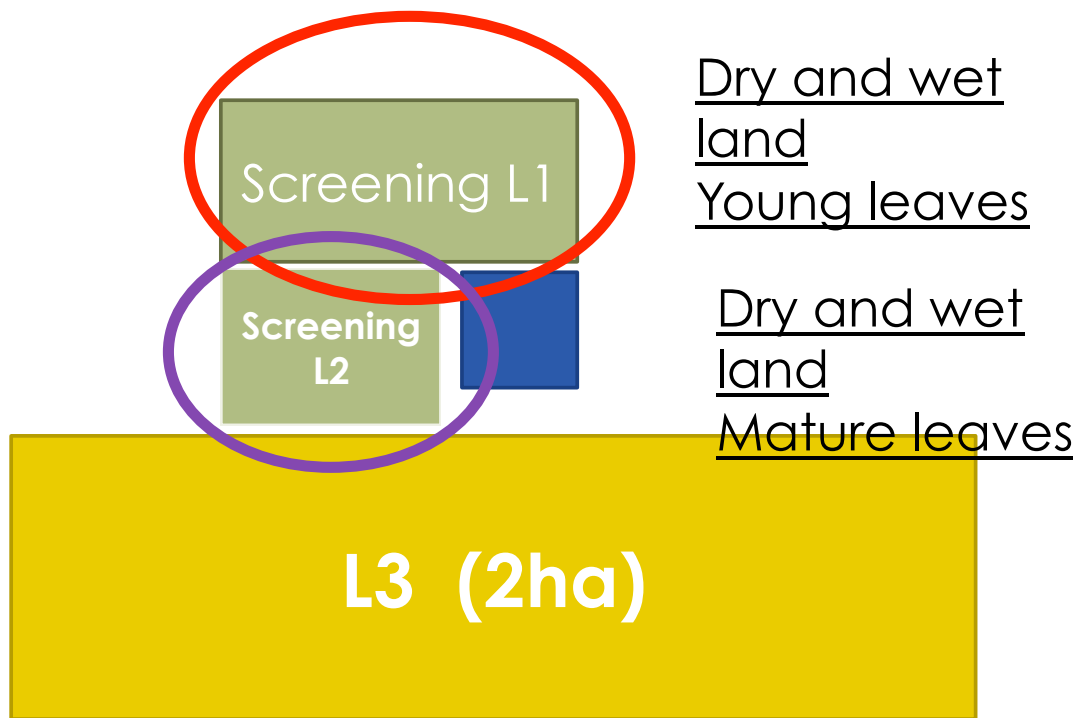
1. To distinguish soil content and chlorophyll content in wet and dry land.
2. To determine whether dry or wet condition effect on soil and chlorophyll content.
3. To benchmark available organic farmings in Bogor area.
4. To define farm management conducted on Organic Farming, the challenge and constrains hide upon in order to enhance Organic Farming development in Indonesia locally and world as globally.

## Methodology

Field work is done in three locations, they are IPB paddy field Babakan Sawah Baru, ICDF Organic Farming and Gunung Geulis Ijo Lestari Organic Farming. Test for soil and chlorophyll content were conducted by in situ analysis through Dr. Soil kit (Dr. Soil: Fujihira Industry) for soil testing and Chlorophyll meter (SPAD 502) to measure leaf chlorophyll content, other equipments such as; shovel, hoe, stationery, and camera. The material used in this study include regent package in Dr. Soil tools, soil and leaf samples of plants that serve as the object of chlorophyll analysis. Here are the procedure of utilizing Dr. Soil kit:



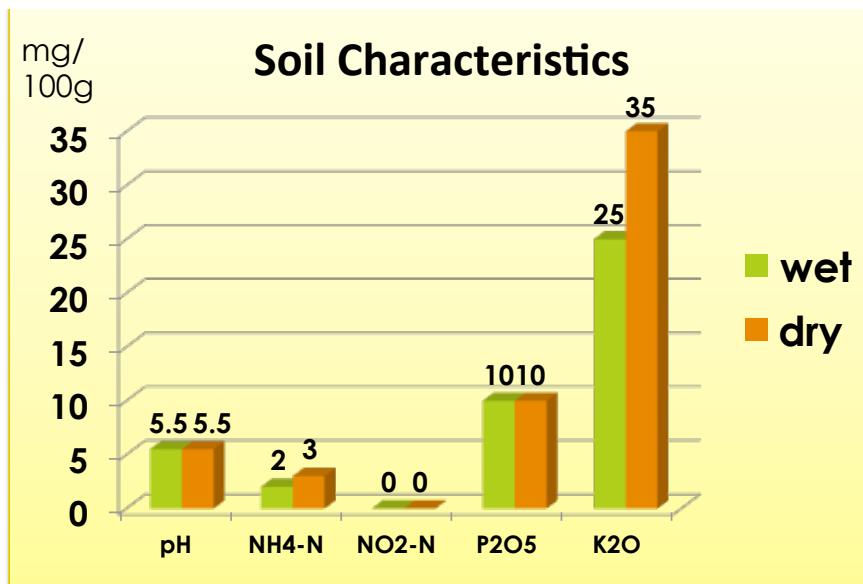
Both soil analysis and chlorophyll analysis were conducted in Babakan Sawah Baru Paddy field which we took the sample from this location below;



the study of Organic Farming management system are compiled by in-depth interview with the officer of both ICDF and Gunung Geulis Farm.

### Result and Discussion

At the beginning we want to test whether there is any significant different of dry and wet soil condition. Based on the chart below, we can see there is no big different among those two condition. pH of both of the soil are same, it is 5.5. Actually, if the pH of soil less than 6.5, the macronutrients contained in the soil, like Phosphate, Sulfur, Potassium, Platinum will decrease. If pH level exceed 7.5, the availability of Fe, Mn, Bo, Cu, and Zn will be decreased. It means acidity affects nutrient content that exist in the soil. Sample soil of wet land shows 2 mg/100 g NH<sub>4</sub>-N content, whereas in dry land; it is higher (3 mg/100g NH<sub>4</sub>-N). The same tendency happened on K<sub>2</sub>O content; dry soil comprises more K<sub>2</sub>O than the wet soil. In general, roughly we can say both wet and dry soil show the same manner. Yet, we obtain other information from the owner of the farm that recently Bogor have been drought for 3-4 months, so all the land in Babakan Sawah Field are basically dry condition. Therefore, the development of variety adaptive to dry is emerging to need.

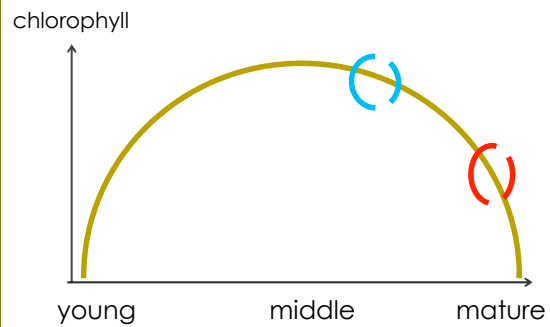
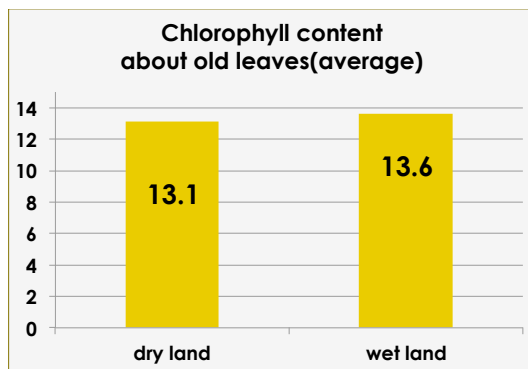


Chlorophyll is a plant pigment that makes plants appear green and is a molecule that harvests light energy to be converted into chemical energy. The harvesting of light energy and the subsequent steps are part of the important process known as photosynthesis. The existence of chlorophyll is fundamental for plant growth. Therefore test for chlorophyll level is also urgently needed.

Chlorophyll analysis in Babakan Sawah performed on paddy plants are in experimental area of land irrigated and drought land. The results of the analysis are shown in Table below.

Condition	Young Leaves	Old Leaves
Semi Normal (Wet)	17.8	13.6
Drought	19.6	13.1

From the result, we can see the value of chlorophyll leaves almost fair in paddy plants in each treatment. But the value of chlorophyll in younger leaves are higher than older one from each treatment. It shows nutrients in soil just distributed more to young leaves rather than the older. The reason about this matter are shown in the graph below. The density of chlorophyll level in the younger age will keep increasing until certain middle age of leaves, afterwards, the subsequent level will keep decreasing since it got the optimum on the middle age. Naturally chlorophyll content in the leaves will follow this fashion.



Field work of Organic Farming was carried out in the form of in-depth interview in two organic farms in Bogor. Both of the farms face a problem in several factors, such as: water supply, soil fertility, pest and disease management, high quality seeds, and post harvest handling.

From the interview we obtained how the officer manage the farm, and how is the algorithm to make farm management organic farming revolves around. Here are the step in organic farming management system;

1. Location selection
2. Determining planting time
3. Land preparation
4. Seed preparation
5. Planting
6. Irrigation
7. Controlling pest and disease
8. Determining harvesting time
9. Harvesting
10. Distributing

actually, before the harvested crop is about to be distributed and sold in the market, we have to impose post harvesting system into account. The system comprises some systematical processes which conducted after harvesting, they are pre-cooling, sorting & washing, draining, grading, packaging, sorting, and transport to the next entity (retail market or consumer).

So far, organic farming is still one of promising agribusiness sector in Indonesia, we carried out SWOT (Strength, Weakness, Opportunity, and Threat) analysis to check the feasibility of organic farming in the near future.

<b>Strength</b>	<b>Weakness</b>
<ul style="list-style-type: none"> <li>• no “chemical”</li> <li>• Health benefit</li> <li>• nature conservation</li> </ul>	<ul style="list-style-type: none"> <li>• high cost</li> <li>• productivity &lt; conventional farming</li> </ul>
<b>Opportunity</b>	<b>Threat</b>
<ul style="list-style-type: none"> <li>• agricultural trend</li> <li>• food safety issue</li> <li>• farmers income</li> <li>• sustainability</li> </ul>	<ul style="list-style-type: none"> <li>• pest attack</li> <li>• culture</li> <li>• land availability</li> <li>• water</li> <li>• “organic” seed</li> <li>• Climate</li> <li>• certificate</li> </ul>

from the table above, we obtained the possibility for organic farming to keep promising in the next years ahead due to the S+O point is more powerful than we added up weakness and threat. Even-though enormous threats will follow, but the weight of “sustainability” matters a lot in this case.

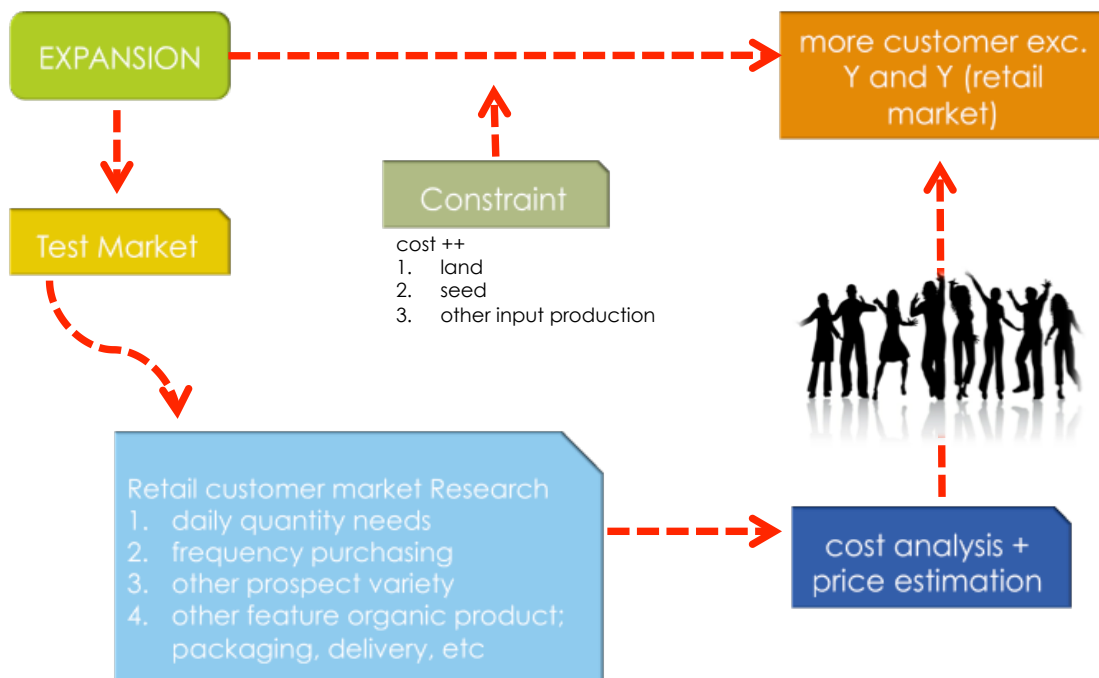
Here we also performed benchmarking analysis to distinguish the ICDF (International Cooperation Development Fund) organic farming and Gunung Geulis Ijo Lestari Organic Farming.

Parameter	ICDF	Gunung Geulis
Owner	Company collaborate with university	Private
Market	Public	Fulfill demand
Scale	10 ha	1,3 ha
Process	Packaging	Simple packaging (box)
Activity	Farming , Training and Research	Farming
Organic Certification	Yes	No



It is needed also to see financial impact of organic farming through economic analysis. Once we also performed Analysis of probability based on the latest balance sheet of the Gunung geulis organic farming.

Crops	Amount (Rp)
fruit vegie	1162250
leaf vegie	1715350
flower	423800
leaf	3417300
fruits	349700
tubers	1497750
egg	52000
Q	8618150
C	10000000
$\pi$	-1381850
loss about 16%	



the latest financial report depicted about gain/loss condition of the farm, and it is showed for the pertinent month, the income of the farm less than how much they spend all cost, therefore they loss about 16%. The officer mentioned also about historical finance background that during past 4 years ago, profit distribution still not stable and according to their financial analysis, they predict they will get Break Even Point in the 5th years since the origin of time of farm start to work. From the owner of the farm itself, it is noted that they are going to expand the business to penetrate retail market (so far they just feed domestic demand of Y & Y Restaurants). But prior to establishing the expansion, it is recommended to attempt agricultural marketing research to get market insight of their consumers profile, behavior, expected price, expected utility, etc to be then inputed to cost analysis and price estimation,



so that hopefully farmers can design and allocate optimum input or any production factors that fitted to their best profitability.

## **Conclusion**

Sustainability in agriculture product is urgently needed to fulfill long term food necessity. Sustainable agriculture is agriculture production without depleting resources of nature the follows the principles of nature to develop system for raising crops and livestock that are, like nature, self sustaining.

Sustainable agriculture can be manifested by means of organic farming where utilization of pesticide and fertilizers are avertable. Soil analysis and chlorophyl content analysis are conducted in order to maintain the quality of production. in the other hand, developing new varieties adapted to extreme condition and pest is also copped the problem in sustainability.