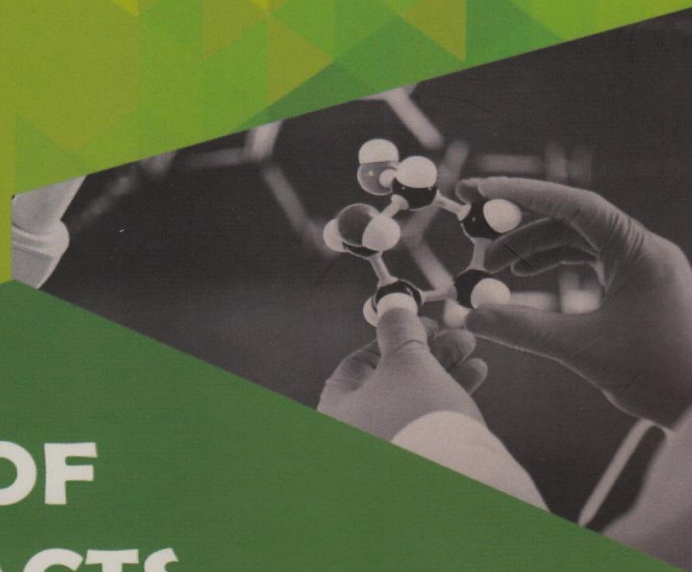




8<sup>th</sup> INTERNATIONAL CONFERENCE  
ON BIOSCIENCE AND BIOTECHNOLOGY



# BOOK OF ABSTRACTS



UDAYANA  
UNIVERSITY



Denpasar, Bali 14 - 16 September 2017, Organized by Faculty of Agriculture

		Forestry, Institut Pertanian INTAN Yogyakarta Jl. Magelang Km 5,6 Yogyakarta. Phone : 0274-589520. Email: niketriwahyu@gmail.com	From Organic Waste As Biofuel		
	Discussion			13.40-13.55	
	Coffee breaks			13.55-14.10	
5	Ida Bagus Komang Mahardika <sup>1*</sup> , I Nyoman Rai <sup>2</sup> , Made Sudiana Mahendra <sup>2</sup> , Rindang Dwiyani <sup>2</sup>	<sup>1</sup> Department of Agrotechnology, Faculty of Agriculture Warmadewa University <sup>2</sup> Department of Agroecotechnology, Faculty of Agriculture Udayana University, Bali 1*)E-mail : gusmahardika62@gmail.com	Genetic Diversity and Fruit Quality of Several Pomelo "Jeruk Bali" ( <i>Citrus grandis</i> L. Osbeck) Cultivars in Bali	14.10-14.20	
→ 6	I Gusti Ngurah Santosa	Faculty of Agriculture, Udayana University E-mail : santosaign@yahoo.com	Enhancement in Utilizing the Rainfall through Managing Planting Time By Using Simulation Model for Cropping Patterns on Dry Land in Eastern Part of North Bali	14.20-14.30	
7	Ketut Srie Marhaeni Julyasih* and Arika Purnawati	Agrotechnology, Faculty of Agriculture University of Pembangunan Nasional "Veteran" Jawa Timur *Email : smjulyasih@gmail.com	Percentage Of Inhibition Of Green Algae <i>Caulerpa</i> Sp. Againsts Aflatoxin Producing <i>aspergillus</i>	14.30-14.40	





*International Conference  
on Biosciences and Biotechnology*  
Biosciences and Biotechnology  
for Sustainable Life



Vice President  
of AOBBC

高橋 さち子

(Prof. Sachiko Takahi, Ph.D.)

Dean of Agriculture Faculty  
Udayana University



*[Signature]*

(Prof. Dr. Ir I Nyoman Rai, MS.)

# CERTIFICATE OF ATTENDANCE AND PARTICIPATION

Awarded to

**I Gusti Ngurah Santosa**

as

ORAL PRESENTER

in the 8<sup>th</sup> International Conference  
on Biosciences and Biotechnology,  
organized by Faculty of Agriculture Udayana University, Bali - Indonesia  
14 - 16 September 2017

Chairman  
of the Committee

*[Signature]*

(Dr. Ir.I Dewa Putu Oka Suardi, M.Si.)

**ENHANCEMENT IN UTILIZING THE RAINFALL THROUGH  
MANAGING PLANTING TIME BY USING SIMULATION MODEL  
FOR CROPPING PATTERN ON DRY LAND  
IN EASTERN PART OF NORTH BALI**



**I Gusti Ngurah Santosa**  
**Faculty of Agriculture – Udayana**  
**University**

**September 14, 2017**



# 1. INTRODUCTION

## Background

- ⦿ All area is dry land
- ⦿ Problem Water limited
- ⦿ Initial source of water rainfall, no irrigation
- ⦿ Collaborate Indonesia + Uni Eropa -→ Pump wells for irrigation
- ⦿ Create and operate : Pump well need more cost
- ⦿ Need to grow high marketing value crop and manage planting time and arrange cropping pattern
- ⦿ Need to enhance the rainfall to minimize irrigation

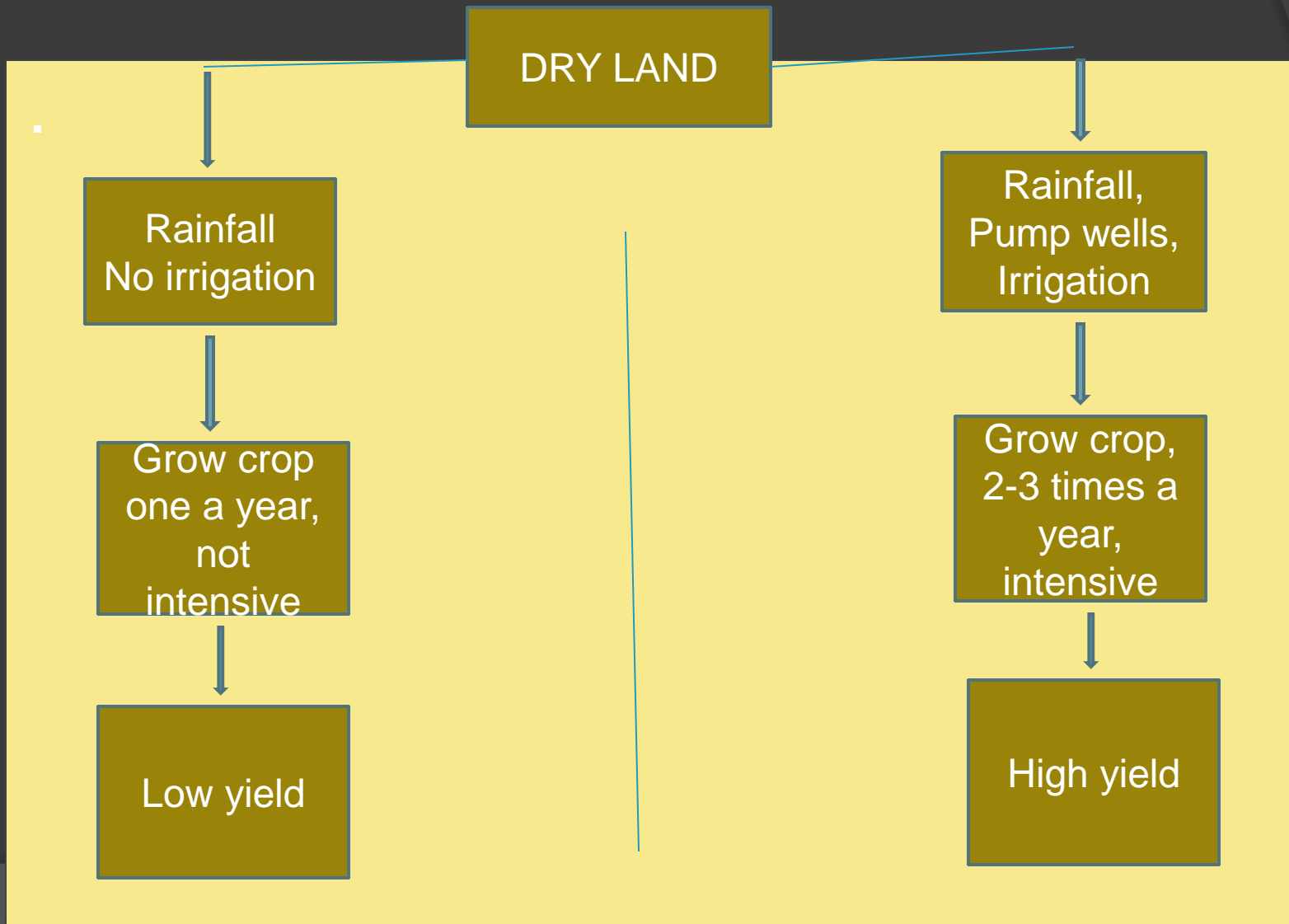


# Aim of the Study

This study aims to :

- ⦿ Increase rainfall utilization by arranging planting time
- ⦿ Determining the right planting time
- ⦿ Choose the best cropping pattern

## 2. STUDY CONCEPT DIAGRAM

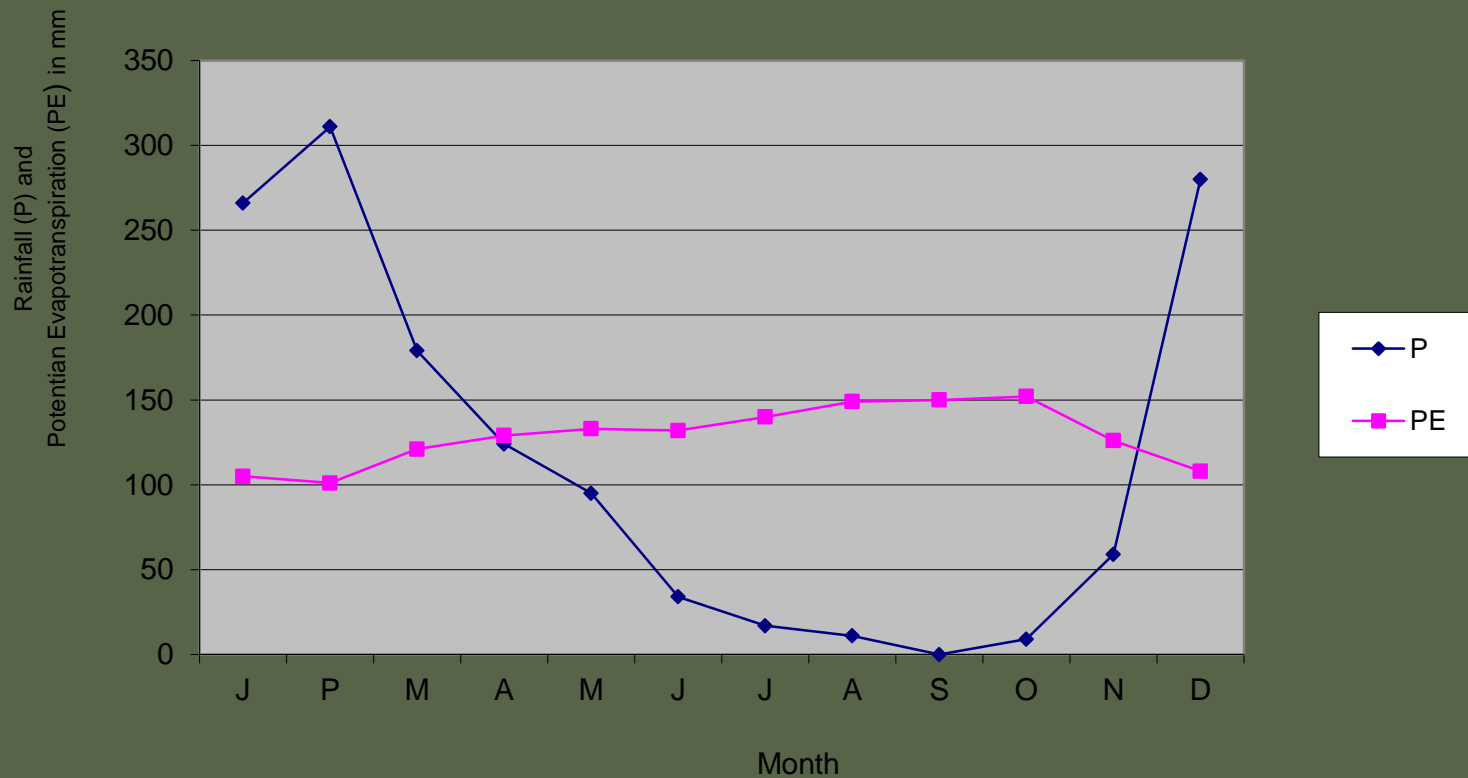


### 3. LAND CHARACTERISTIC OF STUDY AREA

- ⦿ Potential area to be irrigated 5300 ha
- ⦿ Irrigated area from farm well about 500 ha
- ⦿ Near the beach, altitude 0 – 50 m, slope 0 – 2%, soil type andisol
- ⦿ Vegetation : grass, shrubs, little vegetation, annual crop, perennial crop, vegetation in rainy season is greener than dry season.
- ⦿ Average temperature 27.4°C, humidity 74 %, radiation 7.4 hours, wind speed 70.8 km.day<sup>-1</sup> and radiation 19.9 MJ.m<sup>-2</sup>day<sup>-1</sup>



# Rainfall and Evapotranspiration



# **SIMULATION MODEL**

## **Simulation Model :**

**To imitate the state of real system to speed up data processing to get immediate results.**

**Simulation are widely used in many disciplines including in agriculture**

**In principle in the simulation model there are three things to note : Input data, Simulation process and output results.**

# CropWat for Windows Program

## **Require Data:**

**Climate Data : temperature, humidity, radiation, wind speed and rainfall**

**Cropping pattern : date of planting, crop coefficient, growth stage, depth of root, depletion fraction and planting area**

**Soil type : total water available, maximum rooting, depletion fraction, and initial soil moisture percentage of total soil moisture.**

# Running in the Computer



## Out put :

**Daily ground water deficit (mm), irrigation interval (day), and application depth (mm), irrigation loss (mm), and estimated yield decrease.**

## Indicator :

**The less soil water deficit means the greater the rainfall that can be utilized or the less irrigation that needs to be given.**



# PLANTING TIME, CROPS AND CROPPING PATTERN

- Planting time in rainy season mid-November to mid December
- Cultivated crop (before irrigation) : maize, groundnut, cassava, sweet potatoes (no market oriented – self consumption)
- Cropping pattern one a year after that fallow
- Cultivated crop (after irrigation) which suitable to be cultivated : melon, onion, long bean and chili
- Cropping pattern three times a year

# POSSIBLE CROPPING PATTERN

- Cropping Pattern 1 : Groundnut – Onion – Maize
- Cropping Pattern 2 : Maize and Groundnut – Long bean – Groundnut
- Cropping Pattern 3 : Maize – Melon – Groundnut
- Cropping Pattern 4 : Sweet potato – Onion- maize
- Cropping Pattern 5 : Maize and Groundnut - Chili

# Discussion



## The main issues of discussion :

## Dry land and Water Shortage

- Dry land
- Water shortage
- Irrigation
- Planting time
  
- Cropping pattern
- Simulation
- Irrigation efficiency

- Water shortage on dry land partially has been anticipated by pump wells
  
- Irrigation from pump well has fulfilled water necessity for the second crop and partially for the third of period of planting time.

# Rainfall and Irrigation

- More irrigation means more cost
  - Anticipation : by maximizing the utilization of rainfall by arranging planting time
  - The more rainfall that can be utilized, drive the less water use from the pump wells
- This means increasing the efficiency of irrigation and reducing the operating cost from pump wells.
  - The use of more irrigation water in the third season must be well considered



# Planting time : Advance or Postpone

- Period of planting time one month  
November 7 – December 7
- Normal planting time November 21
- Advance one or two weeks; or postpone one or two weeks
- In this postpone not to do because of dry season
- The chosen planting time is planting time which utilizing more rainfall

# The use of Simulation Model

- ⦿ The selection of appropriate planting is obtained from the simulation results.
- ⦿ Can it be used as a reference or not
- ⦿ If the reference base on real research in the field, it will be more accurate than simulation,
- ⦿ This real research need long time and high cost
- ⦿ In such situation simulation model is useful for decision making.
- ⦿ The important one is as long as input data take from field research, the simulation result will be more credible.



# Conclusion

- ① Utilization of rainfall can be increased by advancing the planting time
- ① Advancing the planting time two weeks from normal planting is better compared to advancing planting time one week
- ① The best cropping pattern is : Maize – Melon - Groundnut

# Suggestion

- ⦿ **Advance the planting time two weeks, can be fully utilized rainfall**
- ⦿ **Cropping Pattern : Maize – Melon – Groundnut, with two weeks advanced planting time, should be tested directly in the field**
- ⦿ **In improving the irrigation efficiency, it needs to be supported simultaneously by :**
  - **Planting high yielding varieties of dry crops**
  - **Short life varieties**
  - **High economic value varieties**
  - **Mulch usage**
  - **Accommodating the rain water during rainy season**



Thank You

