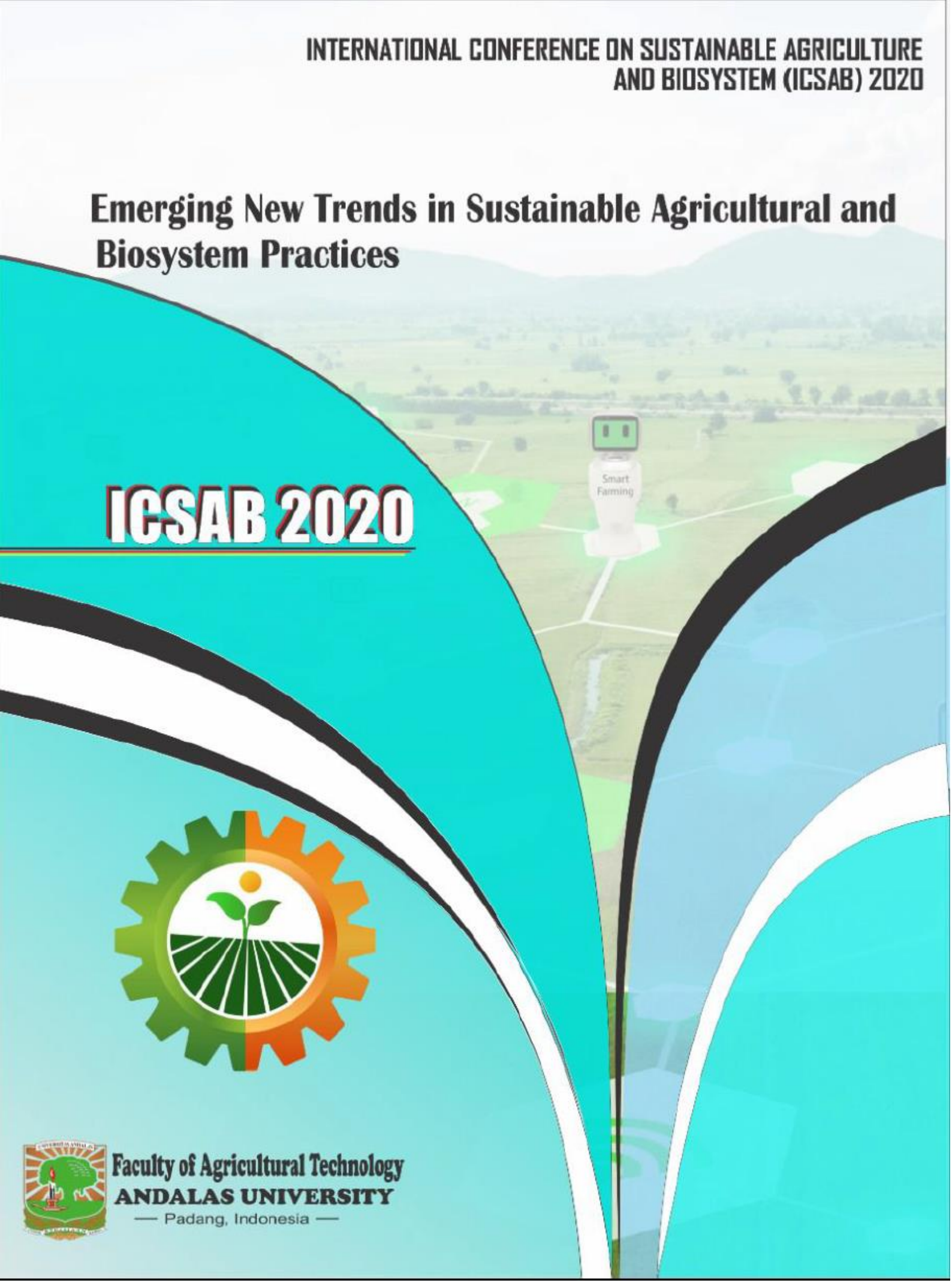
INTERNATIONAL CONFERENCE ON SUSTAINABLE AGRICULTURE AND BIOSYSTEM (ICSAB) 2020

Emerging New Trends in Sustainable Agricultural and Biosystem Practices



ICSAB 2020

Faculty of Agricultural Technology
ANDALAS UNIVERSITY
— Padang, Indonesia —

INTERNATIONAL CONFERENCE ON SUSTAINABLE AGRICULTURE AND BIOSYSTEM (ICSAB) 2020

"EMERGING NEW TRENDS IN SUSTAINABLE AGRICULTURAL AND BIOSYSTEM PRACTICES"

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BOOK OF ABSTRACT

FACULTY OF AGRICULTURAL TECHNOLOGY
ANDALAS UNIVERSITY, PADANG, WEST SUMATERA
INDONESIA

2020

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Paper ID 64

INTERMITTENT IRRIGATION OPERATION MANAGEMENT MODEL IN CIHEA IRRIGATION AREA, CIANJUR REGENCY

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Abstract The availability of water for irrigation is decreasing over time and the need for other sectors is also increasing rapidly. On the other hand, there has been severe environmental damage due to the serious exploitation of natural resources in many places. This situation causes the irrigation system to be should managed efficiently and effectively. In irrigation modernization, the application of intermittent irrigation is the right choice, because it is a water-saving irrigation technology. The intermittent irrigation operation management model that is built is a calculation model to determine the interval of irrigation water provision and the amount of irrigation water, which begins with the planning of the cropping pattern. The irrigation operation management model with intervals of providing irrigation water for 3 days developed in the Cihea Irrigation Area, Cianjur Regency has an influence on irrigation performance. The rice planting season in Cihea, Cianjur Regency with intermittent irrigation operations, was able to achieve irrigation water productivity values> 0.8-1.0 kg / m3 (advanced stage in modern irrigation management).
Keywords: intermittent; water-saving irrigation, irrigation operations, irrigation water productivity

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ABSTRACT

The availability of water for irrigation has been decreasing and the need for other sectors has been increasing rapidly over the time. Whereas, there are also several environmental damages due to the serious exploitation of natural resources in many places. This situation causes the irrigation system has to be managed efficiently and effectively. In irrigation modernization, the implementation of intermittent irrigation is the right choice, because it is a water-saving irrigation technology. The model operation of intermittent irrigation operation that is built is a calculation model to determine the interval of irrigation water provision and the amount of irrigation water, which begins with the planning of the cropping pattern. The irrigation operation management model with intervals of providing irrigation water for 3 days developed in the Cihea Irrigation Area, Cianjur Regency has an influence on irrigation performance. The paddy planting season in Cihea, Cianjur Regency with intermittent irrigation operation, was able to achieve irrigation water productivity values> 0.8-1.0 kg / m3 (advanced stage in modern irrigation management).
Key words: intermittent; water-saving irrigation, irrigation operations, irrigation water productivity

INTRODUCTION

The irrigation modernization program aims to improve irrigation performance and in general to improve the productivity of agricultural. The target is to produce an average agricultural productivity of 6 tonnes / ha, requiring 6,000 m3 of water or 1 kg / m3 of water productivity, with 200% IP for paddy and 50% for palawija. This can be achieved through reducing water loss and crop water consumption programs [1].

The availability of water for irrigation has been decreasing and the need for other sectors has been increasing rapidly over the time. Whereas, there are also several environmental damages due to the serious exploitation of natural resources in many places. This situation causes the irrigation system has to be managed efficiently and effectively. Intermittent irrigation is a water-saving irrigation becoming a choice for modern irrigation management.

The requirement of water in the field is spatially and temporally changing according to the changes in weather and farmers' agronomic schedules, which require time adjustment. In order to maximize the productivity and cropping intensity in an irrigation area, irrigation management is needed to regulate the amount of water resources with the amount of water for irrigation.

Usually, the implementation of conventional method irrigation operations takes 10-15 days based on the availability (on supply). Meanwhile, the provision of intermittent irrigation water is based on water needs (on demand), the provision of water is not rigid every 10 days or 15 days, the water is flowed according to the availability of water for every time, every day or every 3 days.

Cihea Irrigation Area in Cianjur Regency is one of the paddy centers in West Java, with an area of 5 484 ha of paddy fields. Currently, irrigation management is still using conventional methods. Meanwhile, based on the spatial pattern in the RTRW of Cianjur Regency for 2011-2031, the Cihea Irrigation Area, Cianjur Regency will be prioritized as a strategic industrial area. This will have an impact on land use and the water needs of irrigation.

The implementation of conventional irrigation methods to agricultural areas in Cihea Irrigation area no longer an effective and efficient option to implement, based on the high competition between sectors. The Increasing of the efficiency of irrigation water using in paddy fields can be done by providing the proper water. In general, it can be grouped into three parts (1) continual water provision, (2) scheduled water delivery, (3) controlled water delivery.

Based on the description above, it is needed to develop an intermittent irrigation operation management model using a calculation method based on a cropping pattern scenario. Intermittent irrigation can be applied by regulating the availability of water in the field which includes controlled water delivery so that irrigation intervals are known as the basis for the management of irrigation operations. The purpose of this study was to formulate a management model for intermittent irrigation operations in Cihea Irrigation Area.

RESEARCH METHODS

Location and Time of Research

The research was carried out from January to December 2019 with the scope of the study area, namely the Cihea Irrigation Area, Cianjur Regency. The research was conducted in the computer laboratory of the Bioinformatics Engineering Division, Department of Mechanical and Biosystem Engineering, Faculty of Agricultural Technology, Bogor Agricultural University.

Materials and Tools

The materials used in this study are secondary data in the form of a paddy field map in Cihea Irrigation area, Cianjur Regency, irrigation network schemes, soil types, rainfall, and cropping patterns.

Research procedure

The irrigation operation management model that is built is a calculation model to determine the interval of provision of irrigation water and the amount of irrigation water, which begins with planning the cropping pattern. In the developing of an irrigation operation management model, apart from cropping schedules and patterns, soil processing methods and soil physical properties data are assumed to be the same for the same soil type.

The provision of water is based on changes in the availability of water in the land, when the water availability conditions are under the set point, in this case, it is determined based on the age of plant (Table 1). The flow chart of the calculation of intermittent irrigation water provision is presented in Figure 1.

Table 1 The setting on the water availability of land

Paddy		Palawija	
Age (day)	Water Availability	Age (day)	Water Availability
1-10	Saturated	1-90	Field capacity
11-13	Paddle 2 cm		
14-30	Field capacity		
31-33	Paddle 2 cm		
34-90	Field capacity		
91-105	Permanent wilting point		

$$AT_n = AT_{n-1} + I_{n-1} + HE_{n-1} - ET_{n-1} - P_{n-1} \quad (1)$$

$$AT_n = AT_{n-1} - D_{n-1} + HE_{n-1} - ET_{n-1} - P_{n-1} \quad (2)$$

$ATn > ATMAKn$: then Dn

$ATn < ATMAKn$: then In

$$In = ATMAKn - ATn \quad (3)$$

where: AT_n = water available at the time of observation on day n

AT_{n-1} = water available at the end of the previous day, day n-1

D_{n-1} = drainage on day n-1

I_{n-1} = irrigation day n-1

HE_{n-1} = effective rain on day n-1

ET_{n-1} = evapotranspiration on day n-1

P_{n-1} = percolation of day n-1

$ATMAK_n$ = available water according to the nth day setting (Table 1)

D_n = drainage day n

I_n = irrigation day n

n = 1, 2, 3,… .., n

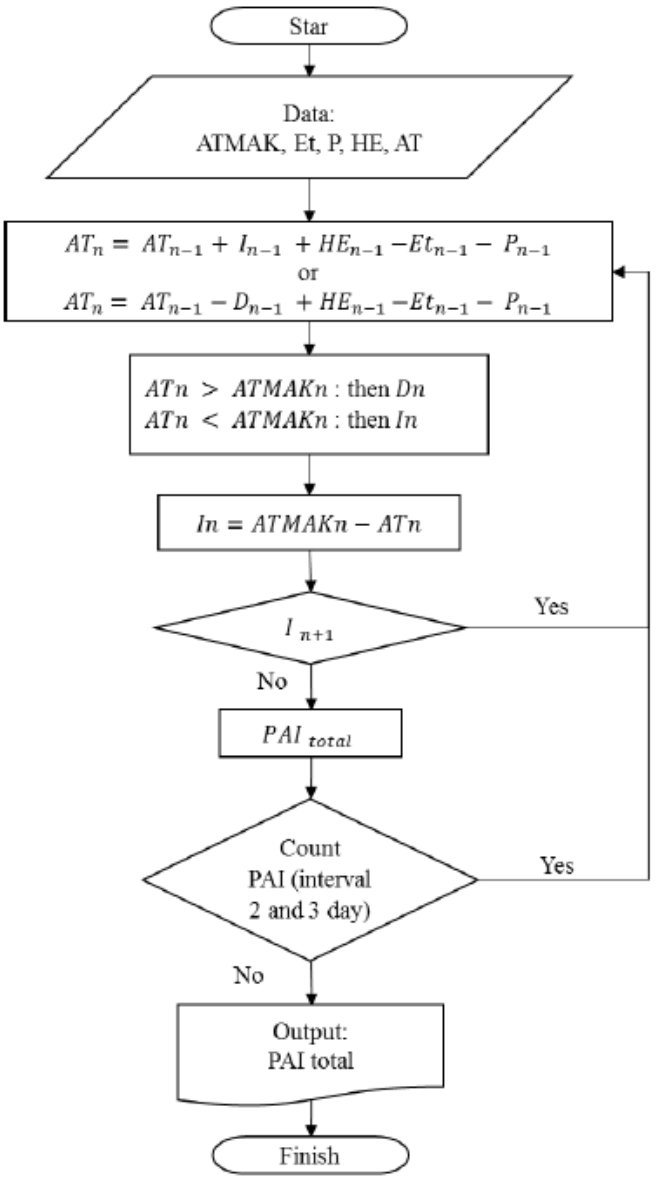

Figure 1 Flow diagram of the calculation of intermittent irrigation water

Data Analysis

The data analysis carried out included:

1. Analysis of climatic conditions, determination of climate classification using the Oldeman system in order to obtain the agro-climatic zone of the study area.
2. Calculation of irrigation water needs is carried out by the steps:
   a) Determine the value of water content and the percolation of location of the study
   The value of water content and percolation is based on soil tests in Table 2. In calculation of the need for irrigation water, the percolation value for a certain period during paddy cultivation is assumed to be the same.

Table 2 Water content and percolation based on soil texture

Parameter	Texture		
Water content (% vol) *	Clay	Loam	Sand
pF 4,2 (Permanent wilting point)	29	9	4
pF 2,54 (Field capacity)	49	38	10
pF 0 (Saturated)	54	50	39
Percolation (mm/day) **	1-2	2-3	3-6

Ket: * [2]; **[3]

   b) Calculating potential evapotranspiration (ETo)
   The calculation of potential evapotranspiration (ETo) according to Blaney-Criddle [4] is as follows:

$$ET_o = p\,(0.46\,T + 8.13) \quad (4)$$

   where p is the percentage of the average daylight hours, the magnitude of which depends on the latitude and T is the air temperature. Analysis of irrigation water needs.
   c) The need for irrigation water is calculated according to equation (5)[6], by regulating the availability of water in the land at field capacity conditions.

$$\frac{\Delta\theta}{\Delta t} = \frac{R+Q-K_c.ET_o-P}{\Delta Z} \quad (5)$$

   where $\Delta\theta$ is the change in soil moisture (m^3 / m^3), Δt is the change in time (days), R is the rain (mm / day), Q is the irrigation (mm / day), Kc is the plant coefficient, ETo is the potential evapotranspiration (mm / day), P is percolation (mm / day), and Δz is the depth of the root zone (mm).
3. Analysis of the effect of intermittent irrigation on water productivity, irrigation services and the efficiency of irrigation
   a) Calculation of Water Productivity
   Water productivity is the ratio between the yield obtained and the amount of irrigation water supplied with units of kgm^{-3} of water. The higher the water productivity, the more optimal the use of that water will be.
   b) Irrigation Service Measurement
   Measurement of irrigation services is carried out by observing the parameter of water supply (reliability). Reliability can be measured in units of time (equation 6).

$$R_t = {}^{n}/_{N} \times 100\ \% \quad (6)$$

   where n is the number of times water needs and N is the total number of times.
   c) Reliable debit analysis, using the discharge duration curve method with the following Weibul probability calculation formula (7):

$$P\,(X \geq x) = \frac{m}{n+1}\ x\ 100\ \% \quad (7)$$

   where P ($X \geq x$) is the probability of occurrence of variable X (discharge) which is equal to or greater than x, m is the data rank, n is the amount of data, X is the data

debit series, x is the reliable debit if the probability is in accordance with the designation, for example P (X≥Q80%) = 0.8

d) Irrigation Efficiency Measurement

Efficiency in the tertiary plot is the ratio between the amount of water needed by the plant and the amount of water given to the farm land, expressed by equation (8) as follows:

$$Ea = Vm / Vf \quad (8)$$

where E_a is the efficiency of water use in the tertiary plots of paddy fields (%), V_m is the volume of irrigation water required by plants (mm/day), V_f is the volume of water supplied to the paddy fields (mm/day).

RESULTS AND DISCUSSION

Rainfall Analysis in Cihea

In Cihea there are three rain posts: Ciranjang, Cibarengkok, and Cipeuyeum. In this study, rainfall data for 2018-2019 were used, the average rainfall data for the study area was presented in Figure 2. Based on the Oldeman system classification, Cihea Irrigation area is included in the D3 agro-climatic zone which is climate type D with wet months (rainfall> 200mm / month) 4 times in a row and subtype 3 with dry months (rainfall <100mm / month) 4-6 times.

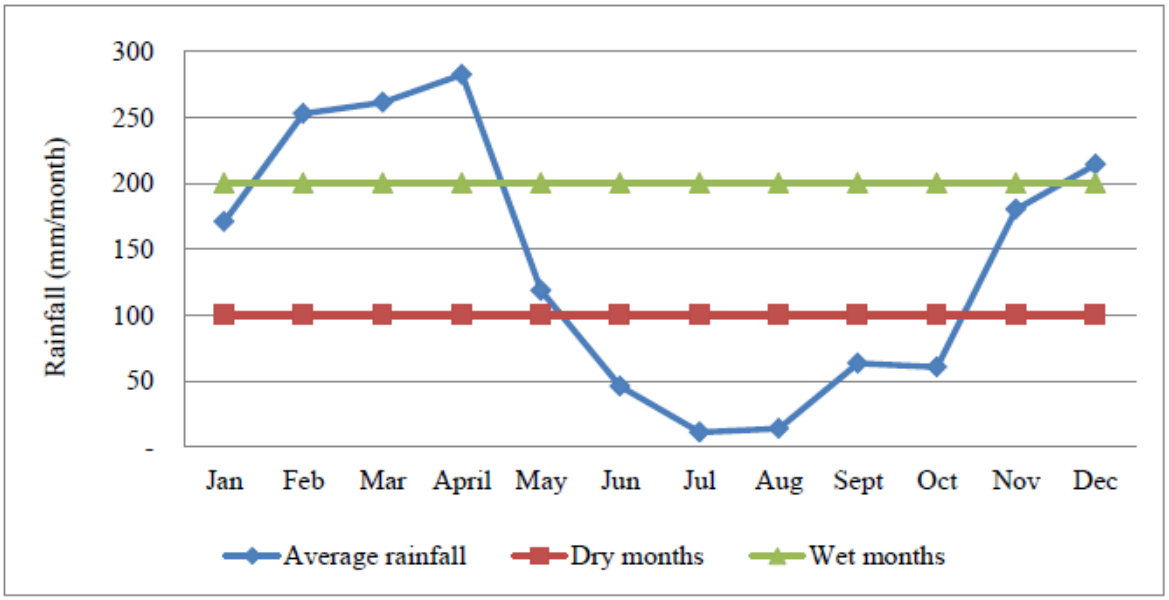

Figure 2 Average rainfall of Cihea irrigation area, Cianjur regency

Wet months occur in December, February, March, and April, while dry months occur in June, July, August, September and October. The highest rainfall is in April, which is 282.45 mm and the lowest is in July, which is 11 mm. The Cihea Irrigation Area with the D3 agro-climate zone, allows for single cropping of crops, depending on the stability of the irrigation.

Cihea Irrigation Area Planting Pattern

In general, there are 3 planting seasons in Cihea Irrigation area in one calendar year, which are paddy-paddy-palawija or mixed (Figure 2). Cihea irrigation area is divided into three groups, the first one is group I covering an area of 1 634 ha, then is group II covering an area of 1 751 ha and group III covering an area of 1 749 ha. The difference of the planting

season between groups is 15 days. One period of paddy planting season is 135 days, which is 30 days for soil cultivation and 105 days for paddy cultivation (starting from planting paddy to harvest). The growing season for crops is 90 days, which is generally soybean cultivation.

Based on the data on the realization of the Cihea Irrigation area cropping pattern (2008-2018), in the third planting season, not only palawija cultivation but also paddy cultivation, known as mixed planting season. In Cihea Irrigation area's global cropping plan there is no mixed crop. One of the factors that causes mixed crops is the desire of the farmers themselves to keep planting paddy during the period of planting crops, because it is driven by economic demands and the availability of water. So that in the scenario of developing an intermittent irrigation operation management model in the Cihea Irrigation Area, it is necessary to consider the mixed planting season. There are two cropping pattern scenarios being tested; paddy-paddy-palawija and mixed (paddy-palawija). The schematic cropping scenario in model development is presented in Figure 3.

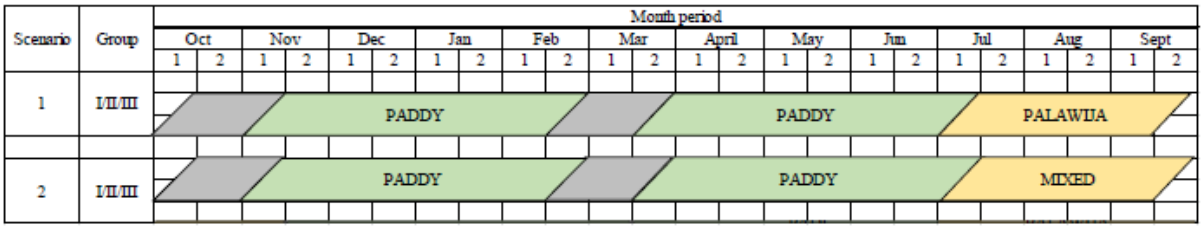

Figure 3 The scheme of cropping pattern scenario of Cihea irrigation area Cianjur regency

The planting area for paddy or palawija is in accordance with the paddy field in Cihea irrigation area, but the mixed planting area is based on historical data and the results of MODIS analysis. On average, 27.21% of the planted area in the third planting season is planted with paddy, so in the cropping pattern scenario in the third planting season, 10% of the total area is planted with paddy. The paddy fields that cultivate paddy during the palawija planting season are paddy fields that are near irrigation water sources.

Needs of Irrigation Water In Cihea Irrigation Area

The intermittent irrigation water level control mechanism is the depth of the trench based on the criteria of soil characteristics. For the development of an intermittent irrigation operation management model in Cihea irrigation system, the condition of the availability of water is a condition of field capacity with the setting of the availability of water based on Table 1, meaning that irrigation water can be provided every day.

In calculating the need for irrigation water, soil type is one of the important parameters that is taken into account because it is related to soil texture which affects the value of water content and percolation. Soil types in the study location were latosol (clay textured) and grumasol (clay textured). The value of water content and percolation based on soil texture (Table 2) at the study location is assumed to be the same. The results of calculating irrigation water requirements based on the cropping pattern scenario and the realization of the 2017-2018 planting calendar are presented in Table 3.

Table 3 Irrigation water requirements based on cropping scenarios and realization patterns

Realization 2017-2018		Scenario I		Scenario II	
PS	Water irrigation needs (m^3/ha)	PS	Water irrigation needs (m^3/ha)	PS	Water irrigation needs (m^3/ha)
Paddy	7 187.56	Paddy	4 693.99	Paddy	4 693.99
Paddy	7 225.09	Paddy	5 113.36	Paddy	5 113.36
Mixed	5 660.49	Palawija	3 856.83	Mixed	4 078.43

It can be seen that the need for irrigation water at the same planting season (PS) is not constant. The realization of irrigation water demand at PS 1 and PS 2 (paddy-paddy) is greater than the water requirement based on the cropping scenario. This is because the realized paddy cultivation system is conventional (inundation), while the scenario paddy cultivation system is the regulation of water availability in field capacity conditions. Meanwhile in PS 3 (mixed), the need for irrigation water for the cropping pattern in scenario 2 is also smaller than the realization.

Irrigation Water Productivity

The actual productivity of paddy with water availability at field capacity conditions for paddy plants is 7 tonnes / ha (research results) and for palawija (soybean) is 1.6 tonnes / ha (average productivity of soybean in West Java). Meanwhile, the realized land productivity for 2017-2018 (conventional method) is PS 1 (paddy) 6.5 tons / ha, PS 2 (paddy) 5.6 tons / ha, and PS 2 (paddy) 4.8 tons / ha and (crops) 1.3 tons / ha . Land productivity is directly proportional to the productivity value of irrigation water.

The value of water productivity in Indonesia at the minimum service level for modern irrigation is 0.6-0.7 kg GKP / m^3 of water. The productivity value of irrigation water based on the developed intermittent irrigation operation management model is already above the productivity value of the minimum service level of modern irrigation. The value of irrigation water productivity (IWP) based on scenarios of cropping patterns and realization of 2017-2018 are presented in Table 4.

Table 4 Irrigation water productivity based on scenarios and realization of planting patterns

Realization 2017-2018		Scenario I		Scenario II	
PS	IWP (kg/m^3)	PS	IWP (kg/m^3)	PS	IWP (kg/m^3)
Paddy	0.90	Paddy	1.49	Paddy	1.49
Paddy	0.78	Paddy	1.37	Paddy	1.37
Mixed	0.50	Palawija	0.41	Mixed	0.52

The increase in the productivity value of irrigation water in the cropping scenario shows that using more water does not necessarily provide greater yields. In accordance with climatic conditions in Cihea Irrigation area, the right cropping pattern is 2 crops of paddy and 1 crop of crops or mixed crops. The cropping pattern with regulating water availability in the land at field capacity conditions that will be developed in the intermittent irrigation model needs to be studied further for its effect on irrigation performance. The lower limit of water availability in the land will determine the interval of provision and the amount of irrigation water, so as to increase water use efficiency and maximize production

Effect of Intermittent Irrigation on Cihea Irrigation Area

Provision of irrigation water by regulating water availability in field capacity conditions is given according to need (on demand). The lower limit of water availability in the land will determine the interval of provision and the amount of irrigation water, thereby increasing the efficiency of water use and maximizing production. This means that the interval of providing irrigation water has an effect on irrigation performance.

1. Irrigation Water Productivity Value

Irrigation water productivity is one indicator of irrigation modernization in Indonesia. The productivity value of intermittent irrigation water in Cihea based on the interval of irrigation water is presented in Table 5.

Table 5 Productivity of intermittent irrigation water in Cihea

Scenario I				Scenario II			
PS	IWP (kg/m^3)			PS	IWP (kg/m^3)		
	1 day	2 day	3 day		1 day	2 day	3 day
Paddy	1.49	1.51	1.55	Paddy	1.49	1.51	1.55
Paddy	1.37	1.40	1.46	Paddy	1.37	1.40	1.46
Palawija	0.41	0.42	0.42	Mixed	0.52	0.53	0.54

Compared with the irrigation water productivity value of the SRI method [6] which is 1.12 kg / m^3, the productivity value of intermittent irrigation water with rainfall as an input obtained is higher, namely 1.55 kg / m^3 (PS 1) and 1.46 kg / m^3 (PS 2). The results of the research by [7] obtained that the highest irrigation water productivity value for paddy plants from several water treatments, namely 1.07 kg / m^3 (a pattern of water distribution is usually done by farmers who apply SRI in West Java. greater than hair cracks (groundwater depth of about -20 cm) In the third planting season, mixed crops had a higher irrigation water productivity value than palawija.

2. Irrigation Services

The level of irrigation service can be measured from the reliability of irrigation water supply with the tertiary irrigation reliability requirement of 80%. To find out that water needs are met, it is necessary to carry out a reliable discharge analysis as a source of water supply. Mainstay discharge is a certain amount of debit whose events are associated with a certain probability or return period. The mainstay debit in Cihea is calculated based on monthly debit data with a probability of 80% (Q80) using 2009-2018 data. The reliability of water supply by intermittent irrigation is presented in Table 6.

Table 6 Reliability of water supply with intermittent irrigation in Cihea

Interval	Irrigation Reliability (%)	
	Planting Pattern Scenario 1	Planting Pattern Scenario 2
1 day	58.3	58.3
2 day	75	75
3 day	75	75

Based on Table 6, the reliability of water supply in Cihea Irrigation area with the application of intermittent irrigation with intervals of 3 (three) days is 75%. The reliability of irrigation water supply does not meet the reliability requirements of irrigation if irrigation water is provided simultaneously for an area of 5 134 ha. To increase the reliability of irrigation water supply, the operation of irrigation. provision of irrigation water is carried out in turns between groups.

3. Irrigation Efficiency

One of the final goals of irrigation modernization is to increase water efficiency. Irrigation efficiency in the tertiary plot based on the interval is presented in Table 7 below.

Table 7 The efficiency of intermittent irrigation in Cihea

Scenario I				Scenario II			
PS	Irrigation efficiency (%)			PS	Irrigation efficiency (%)		
	1 day	2 day	3 day		1 day	2 day	3 day
Paddy	85.54	85.54	85.54	Paddy	85.54	85.54	85.54
Paddy	85.67	85.67	85.67	Paddy	85.67	85.67	85.67
Palawija	81.00	81.00	76.00	Mixed	77.03	76.97	80.49

The Management of Intermittent Irrigation Operations in Cihea Irrigation area, Cianjur Regency

Irrigation network operation is an effort to regulate irrigation water and its disposal so that irrigation water can be utilized effectively, efficiently and evenly through activities of opening and closing the doors of irrigation buildings, composing cropping plans, composing group systems, composing water distribution plans, carrying out door / building calibration , collect data, monitor, and evaluate.

Three things are the basis for the development of an intermittent irrigation operation management model, namely soil cultivation, water availability in the land during paddy or palawija cultivation, and cropping patterns. In Cihea is included in the D3 agro-climatic zone, with a cropping pattern of twice paddy and one crop. Based on the results of the analysis of the effect of intermittent irrigation application on irrigation performance in Cihea, the three mixed planting season (paddy-palawija) can be applied to DI Cihea because it can increasing irrigation performance. However, in terms of irrigation management, proper planning is needed, namely determining 30% of the total area of paddy fields to be planted with paddy and rotating paddy planting locations during the palawija season, so as not to trigger conflicts between farmers.

In the development of intermittent irrigation at Cihea Irrigation Area, Cianjur Regency, the cropping patterns that were further analyzed were cropping patterns that were in accordance with the climate zone and the global cropping plan in Cihea, that is paddy-paddy-palawija with irrigation water intervals of 3 days. In the operation of irrigation, a group system is applied in the order of group 2, group 3, and group 1.

Provision of irrigation water that is calculated according to irrigation water needs during plant growth. The results of the calculation of irrigation water during paddy plant growth are presented in Figure 4-6. If the value of irrigation water on the graph reads 0 (zero), it means that on that day there is no provision of irrigation water or drainage.

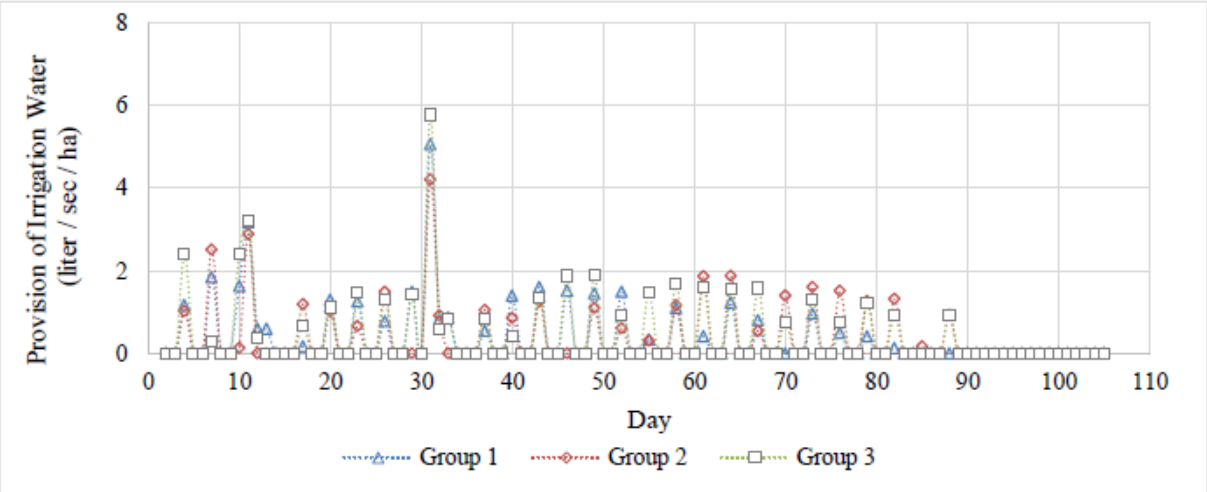

Figure 4 Calculation of the provision of irrigation water at intervals of 3 (three) days in planting season 1 (paddy)

Figure 4 shows the output of the calculation of intermittent water supply with one 3 (three) day interval of water distribution in the first planting season (paddy). Provision of irrigation water according to needs, group 3 is 1.19 liter / second / ha, group 2 is 1.29 liter / second / ha, and group 1 is 1.43 liter / second / ha. The provision of irrigation water based on groups consecutively is group 1 29 times, group 2 27 times, and group 3 30 times.

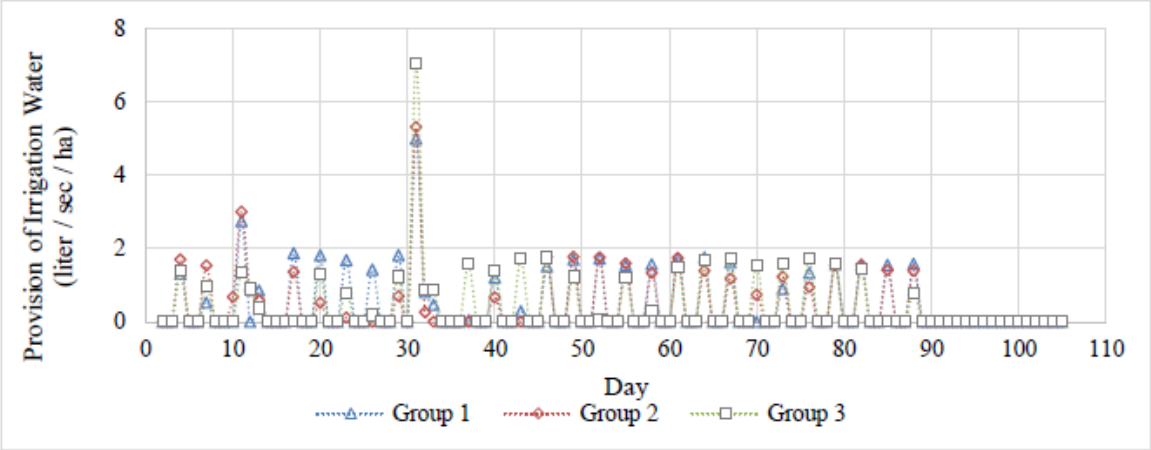

Figure 5 Calculation of the provision of irrigation water at intervals of 3 (three) days in planting season 2 (paddy)

In Figure 5 it can be seen that the irrigation water needs of the most consecutively are group 1, group 2, and group 3. The average provision of irrigation water in group 1 is 1.50 liters / second / ha, group 2 is 1.38 liters / sec / ha, and group 3 is 1.38 liter / second / ha. The provision of irrigation water based on groups in sequence is group 1 29 times, group 2 28 times, and group 3 29 times. The highest number of irrigation water is group 1, group 3, and group 2.

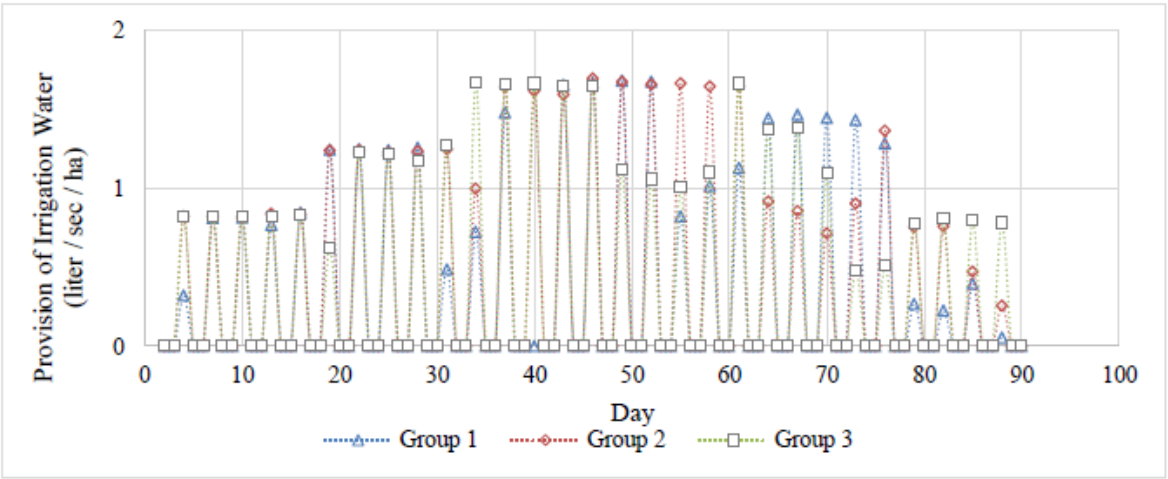

Figure 6 Calculation of the provision of irrigation water at intervals of 3 (three) days in planting season 3 (palawija)

In Figure 6 it can be seen, the average provision of irrigation water in group 1 is 1.03 liters / second / ha, group 2 is 1.14 liters / second / ha, and group 3 is 1.10 liters / sec / ha. The third planting season is palawija, with an interval of 3 days of water supply at the limit of water availability in the field capacity. The plant life of the palawija (soybean) is 90 days, so it will be 30 times of giving water. Figure 6 shows that the provision of irrigation water in group 1 is done 28 times, group 2 is 29 times, and group 3 is 29 times.

The age of planting of paddy is 105 days, with an interval of irrigation water for 3 days, then it should be 35 times should be given. However, with the control of the availability of water in land based on plant age, there are times when drainage is carried out due to the influence of rainfall. Based on the calculation results, it can be seen that the provision of irrigation water is less than 35 times. The average intermittent irrigation water provision is presented in Table 8.

Table 8 Average intermittent irrigation water distribution in Cihea

PS	Provision of Irrigation Water (liter/sec/ha) per day		
	Group 1	Group 2	Group 3
1 (paddy)	0.40	0.43	0.48
2 (paddy)	0.50	0.46	0.46
3 (palawija)	0.34	0.38	0.37

In Table 8 it can be seen that in the same season, there are differences in the provision of irrigation water between groups. This is due to the differences in the beginning of the planting season between groups and differences in soil characteristics that affect the lower limit set point value of water availability on land. The need for intermittent irrigation water is less when compared to conventional methods, which 1 liter / second / ha.

CONCLUSION

The intermittent irrigation operation management model in the Cihea Irrigation Area, Cianjur Regency, is the paddy-paddy-palawija cropping pattern, the arrangement of irrigation water with a group system with the initial sequence of the planting season for group 2 (November 1), group 3 (November 2), and group 1 (December 1). The interval of giving irrigation water is 3 days, with the average irrigation water distribution at planting season (PS) 1, namely 1.19 liter / second / ha (group 1), 1.29 liter / second / ha (group 2), and 1.43 liter / second / ha group 3). At planting season (PS) 2, it is 1.50 liter / second / ha (group 1), 1.38 liter / second / ha (group 2), and 1.38 liter / second / ha (group 3). At planting season (PS) 3, namely 1.03 liters / second / ha (group 1), 1.14 liters / sec / ha (group 2), and 1.10 liters / sec / ha (group 3). The intermittent irrigation operation management model developed in the Cihea Irrigation Area, Cianjur Regency has an influence on irrigation performance. The paddy planting season in Cihea, Cianjur Regency with intermittent irrigation operations, was able to achieve irrigation water productivity values> 0.8-1.0 kg / m3 (advanced stage in modern irrigation management).

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