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Peatland Fire Danger Rating According to Weeds Characteristic Under Jelutung (Dyera polyphylla) Plantation

ACEP AKBAR[1]

[1]Banjarbaru Forestry Research Insitute, Indonesia

ABSTRACT

Besides to be a competitor plant, weeds could act as the potential fuel under plantation forest in peatland. Characteristic of weeds in relation to peat swamp forest fire danger was studied under jelutung plantation in Central Kalimantan. The research was aimed at exploring the potency of weed to become one of the fire danger rating indicators. By using vegetation analyses method in sampling unit of weeds population, results showed that three plantation area have different dominance weed species. The weeds species that could be the indicator of height fire risk according to water content and percentage of weed mortality during the drought, height potency of greenhouse gas emmision, culm height, and chemical material content that easy burned in this study were *Imperata cylindrica*, *Stenochlaena polustris*, *Cyclosorus aridus*, and *Nephrolepis exaltata*. While, the presence of *Glichenia linearis, Melastoma malabatracum, Ficus grossulariodes, Saurophus androginus, Spatoglathis plicata,Himenocalis littoralis, Leptaspis urcheolata, Cyperus rotundus,* and *Amaranthus spinosa* were not indicated high fire risk.

Key words: Weed, Drought, Fire danger, Peatland

INTRODUCTION

Fire, especially in peat swamp forest is still a serious problem because it occurs almost every year. One of the component of initial cause of the fire is the existence of forest fuels in the form of many species of weeds. When the forest plant is built, almost certain different type of weeds will grow around the plant (Anderson, 1976). Frequently on marginal lands, lots of certain dominant weed species are found very dense so that not only disturb forest plant growth but also increasing fire risk (Temmes, 2010). Structure and disposition of the leaves in many kind of the weeds also affect moisture weeds environment until it can determine the speed of combustion. For example, *Imperata cylindrica* weed is easier to burning rather than a creep type weeds that overlapping leave. Weed growth relationship with forest fire danger shown by the low moisture content of weeds, flammable chemical compounds, weed density, biomass, the length of the culm, the covering pattern of the ground surface by weeds, and the percentage of death weeds at dry season.

Lately, there are many forest plantations of jelutung (*Dyera polyphylla*) in peat swamp forest, which were established through National Program of planting one million trees (OMOT), one billion trees (OBIT), and community forest. Many kind of weed species grow under jelutung plantation may vary depending on the existing of natural seed sources and supported by edafic and the local micro-climate (Ekelene *et al*, 2009; Murphy, 2009; Perry, 2009; Rasmunsen *et al*., 2010). How does the natural weed in peat land in the term of adaptation to the dry season, are there the different fire hazar between the weed when it grow in dry season How does the density of each type of weed under jelutung forest. How many of each weed biomass in the unit of land area until it can reflect the fire intensity and carbon emissions. Are there the plammable chemical comfounds such as ether, benzene, acetone, methanole, esters, carbon disulfide, esetal dehyde, acetic acid,

Correspondence: Acep Akbar, Banjarbaru Forestry Research Insitute Jl. A.Yani KM 28,7 Landasan Ulin Guntung Payung, Banjarbaru 70721, Indonesia.
Mobile. +6281349433709
Email: acep_akbar@yahoo.com

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and ether petrolum be found inside several peatland weeds. The chemical substances mentioned could determine reactivity of fule to the fire (Anonimous, 2012).

Characteristics of weed related to fire hazard not yet known so far and needs to be studied. According to the nature of the life weed can be determined accurately the fire prevention strategies due to weed is a potential fuel when dry weather and low weed moisture content. The more type of weeds that supported combustion, it will be easier to produce bush fire in the forest (Chandler et al, 1983). Several weeds are able to maintain the moisture content. Fuel that has a high moisture content (> 20%) will be difficult combustion (Chandler et al, 1983).

This research aims to find out the species of weeds that become dominant indicator of fire hazard in peat smap forest.

MATERIALS AND METHOD

This research was conducted at the community plantation forest in: Batu Nindan village, Kapuas Regency; Luwuk Kanan village, Katingan Regency; and Tumbang Nusa village, Pulang Pisau Regency. All districts are located in Central Kalimantan Province. Peat in Batu Nindan are generally very thin (< 50 cm) toward Edge Forest Ecosystem. The depth of the peat Tumbang Nusa is 2-4 meter, while in Luwuk Kanan between 1-2 meter. The level of maturity of the peat in three location is fibric and hemyc (WIIP, 2004).Three locations have the altitude relatively the same of 0-5 meters above sea level. Average temperature is 23-36^0 C. Average of rainfall is 2000- 3000 mm/year. Dry month take place from June until September (Statistical Body of Kapuas Distric, 2013). Acidity level of ground in three site is between pH 5 until 6.

Material and Equipment

Material and equipments which used in this research were: seven year old plantation forest of jelutung (*Dyera polyphylla*) in spacing 5×4 meter, weed growing under forest stand, high measuring tool, rectangular box for vegetation analysis and small plastic bags, 50 meter distance measuring instrument is used to measure plot, weighing instrument used to weigh the fresh weight of weeds. Other equipments were a counter, compass, GPS, and laboratory equipment.

Work Procedure

This research was done in several step. The first is to conduct a survey of the jelutung plantations in Central Kalimantan. The second stage is to make the plot inside the stand. Most of the plots are used to analyze vegetation. Partly used to take speciment of weed to be measured in the laboratory. Systematically, the working procedure is describe from the type and design of the study, data collection to data analysis.

Research Design

This research was conducted through a descriptive survey method and analysis vegetation of weeds in jelutung forest plantation. In each jelutung plantation, sampling was made in the form of quadrat with sistematically sampling pattern.The sampling intensity is 5-10% of the total population. Level of sampling size is established by considering the results of the species area curve which determined based on distribution and the number of species in the research area. Against the dominant weed species, further measurements were carried out on the water content, density, mortality in the dry season and biomass of the weeds. Water content of the weeds were measured when the dry season between June to October. Weed density was measured simultaneusly with the analysis of vegetation. The percentage of deaths weeds measured by counting individual die weed within one square meters. Dead weeds marked if the entire culm dries. Condition of jelutung plantation described by high performance and an average diameter of field measurement results.

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Peat as a growing medium was decribed by the general condition of the physical, chemical, and biological of the soil. The physical properties identified by the level of maturity and depth of the peat. Chemical properties were determined by the content of NPK and pH (acidity) of the soil, where as the biologycal properties of the soil was presented by the population of weed vegetation that grow on the site.

Data collection

Catagory of the data used in this research are primary and secondary data. Primary data were consisted of water content of weed, density, frequency, dominance weeds, weed mortality in dry season, biomass, the average height of the weed, and chemical content of the weeds. Primary data was obtained from directly measurement in the field, while chemical analysis was done in the laboratory integrated forest product of The Center of Forestry Engineering and Processing Research of Forest Product in Bogor. Secondary data were consisted of weather data obtained from the Agency For Meteorology, Climatology, and Geophysics of Central Kalimantan namely monthly temperature during observation, monthly humidity during the month of observation, and the monthly light intensity during the study. Data collected through the measurement object on the samples that had been determined. Water content measured at every mid-month. Each speciment weeds as a measurement object of water content and flammable chemical compounds obtain from 4 samples were organized randomly.

Special speciment for chemical analysis, the material taken from the leaves of the upper, midle, and bottom of the plant organism body (Hendra, 2012, the person.com). Every manufacture and sampling of speciments is always followed by labeling before being sent to the laboratory. Weeds height was determined by measuring the length of a culm from base to the tip of the leaf. Individual weeds is determined by the stem weeds that grow in the ground. Weed specimens for water content was taken from the culm part or leave of the weeds. Vegetation data obtained from 1 m^2 field plots that placed systematically sampling until it reaches 10% intensity of the population. Appearance of plantation was shown from 5% of the total population, while the soil data derived from relevant agencies in Central Kalimantan.

Data analysis

Most of the data were analized using descriptive statistical method (Suryabrata, 2009). The analysis is intended to obtain an average value and the percentage of all measured parameters. Some data were analyzed by inferencial statistic using different test of "t" (t test). Percentage of death of weed measured by calculating individual of dead weeds 1 m^2 using the following formula :

$$\text{Mortality} = \frac{TI-LI}{TI} \times 100\% \quad \text{which :}$$

TI = Total individual weeds (individual)
LI = The number of Individual die (individual)
Weed water content was calculated by the following formula:

$$\text{Water content} = \frac{FW-DW}{DW} \times 100\% \quad \text{which :}$$

FW = fresh weight (gram)
DW = dry weight (gram)

Density of weeds is amount of individual weeds which grow in 1 m^2 land able to convert into hectare. Biomass was counted in the form of dry weight by converting water content and fresh weight value, using the following formula (Haygreen and Bowyer, 1982) :

$$\text{Oven Dry Weight (ODW)} = \frac{WE}{\frac{1}{100}WC+1} \quad \text{which :}$$

WE = Weight early (gram)
WC = Water content (%)

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Chemical content of weed was analized using GC-MS Pirolisis method (Chemical analyser of Forest Product digitally). Vegetation analysis was conducted to find out important value after measuring relative density and frequency of all weeds found (Kusmana, 1997). Sampling was made in the form transects were divided into squares measuring 1x1 m^2 form as suggested Oosting (1956) inside Kusmana (1997). The vegetation ecological parameter calculated by the following formulas :

$$\text{Absolute Density (D)} = \frac{\text{Number individual of species}}{\text{The magnitude of sampling}}$$

$$\text{Relative density (RD)} = \frac{\text{Density of one species}}{\text{Density of all species}} \times 100\%$$

$$\text{Absolute frequency (AF)} = \frac{\text{The number of subplot discovered species}}{\text{The total number of subplot}}$$

$$\text{Relative frequency (RF)} = \frac{\text{Frequency of species}}{\text{Frequensy of all species}} \times 100\%$$

Importance value (IV) $= \text{RD} + \text{RF}$. Importance value was calculated to show dominant species respectivelly (Kusmana, 1997)

RESULTS AND DISCUSSION

Result and interpretation of this research were divided into the dominance of weeds, weed moisture content, percent of mortality, weed biomass, the average length of weed culm, and flammable chemical substances. The results of integration from all collected data, then used as a basis for determining the classification of weed as an indicator of fire danger rating to forest and land fire in peat swamp forest.

Dominant Species

The sequence of dominance weeds under the plants stand at three location jelutung plantation from the highest to the lowest in Batu Nindan (Table 1) occupied species were *Stenoclaena polustris* (IV = 94.31), *Imperata cylindrica* (IV= 44.22), and *Cyperus rotundus* (IV = 40.16), while the codominant grouf were *Amaranthus spinosus* (IV= 10.47), *Melastoma malabatracum* (IV = 5.03), and *Glichenia linearis* (IV= 3.99). Barus (2009) stated that some species of weeds in peat swamp forest that can grow dominantly are include kelakai (*Stenochlaena polustris*), wide leaf fern (*Nephrolepis exaltata*), short leaf fern (*Osmoda cinnamomea*), pakis kawat (*Ciclosorus aridus*), paku rane (*Glichenia linearis*) etc.

The sequence of dominance weeds at jelutung plantation in Tumbang Nusa were *Nephrolevis exaltata* (IV= 63.83), *Stenochlaena polustris* (IV= 45.27), *Melastoma malabatracum* (IV= 37.51), and *Ficus grassulariodes* (IV= 35.32), while the co-dominant weeds were *Leptaspis urcheolata* (IV=10.10), *Hymenocalis littoralis* (IV= 2.98), *Imperata cylindrica* (IV= 2.71), and *Spatoglathis plicata* (IV= 2.27).

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Table 1. Dominant weeds under jelutung plantation in three peatland site

Batu Nindan site	RD	RF	IV	Tumbang Nusa site	RD	RF	IV	Luwuk Kanan site	RD	RF	IV
Species											
Cyperus rotundus	17.62	22.54	40,16								
Melastoma malabatracum	0.99	4.05	5.03		11.01	26.50	37.51		2.75	5.95	8.70.
Glichenia linearis	2.26	1.73	3.99								
Imperata cylindrica	40.17	4.05	44.22		0.71	1.99	2.71				
Amaranthus spinosus	1.97	8.09	10.07						0.19	1.98	2.07
Stenochlaena polustris	36.50	57.80	94.31		23.05	22.22	45.27		17.34	17.28	34.62
Nephrolepis exaltata					37.62	26.21	63.83		2.30	26.35	28.65
Leptaspis urcheolata					4.12	5.98	10.10		2.05	1.98	4.03
Spatoglathis plicata					0.28	1.99	2.27				
Ficus grosulariodes					22.22	13.11	35.32		4.99	11.05	16.04
Hymenocalis littoralis					0.99	1.99	2.98				
Cyclosorus aridus									66.73	28.33	95.06
Saurophus androginus									0.19	1.98	2.70

Remark: RD=*relative dominance*; RF=*relative frequention*; IV=*important value*
Order dominance weeds under jelutung plantation in Luwuk Kanan was composed of *Cyclosorus aridus* (IV= 95.06), *Stenochlaena polustris* (IV=34.62), *Nephrolepis exaltata* (28.65), *Ficus grassulariodes* (IV=16.04), and *Saurophus androginus* (IV= 10.73), while co-dominance species consist of *Melatoma malabatracum* (IV= 8.70), *Leptaspis urcheolata* (IV= 4.03), and *Amaranthus spinosus* (IV= 2.17).

Water Content of Weeds

The order of average water content of weeds under jelutung plantation when dry season from lowest to the highest in Batu Nindan were *Imperata cylindrica* (IV= 39.80%), *Glichenia linearis* (IV= 54.87%), *Cyperus rotundus* (67.96%), *Stenochlaena polustris* (57.97%), and *Melastoma malabatracum* (70.44%). Sequence water content of weeds from lowest to highest in Tumbang Nusa were *Leptaspis urcheolata* (27.89%), *Stenochlaena polustris* (57.97%), *Nephrolepis biserrata* (59.04%), *Melastoma malabatracum* (64.77%), and *Ficus grassulariodes* (56.87%).Sequence of weeds

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water content in Luwuk Kanan site were*Cyclosorus aridus* (42.28%), *Ficus grassulariodes* (56.87%), *Stenochlaena polustris* (63.66%), *Melastoma malabatracum* (66.09%), *Saurophus androginus* (70.79%), and *Nephrolepis exaltata* (71.16 %).

Fluctuations of weeds water content at all locations of jelutung plantation tend to follow the prevailing weather fluctuations in Central Kalimantan, especially in rainfall, humidity, and temperature. The lowest water content occured in August 2013 (Figure 1).

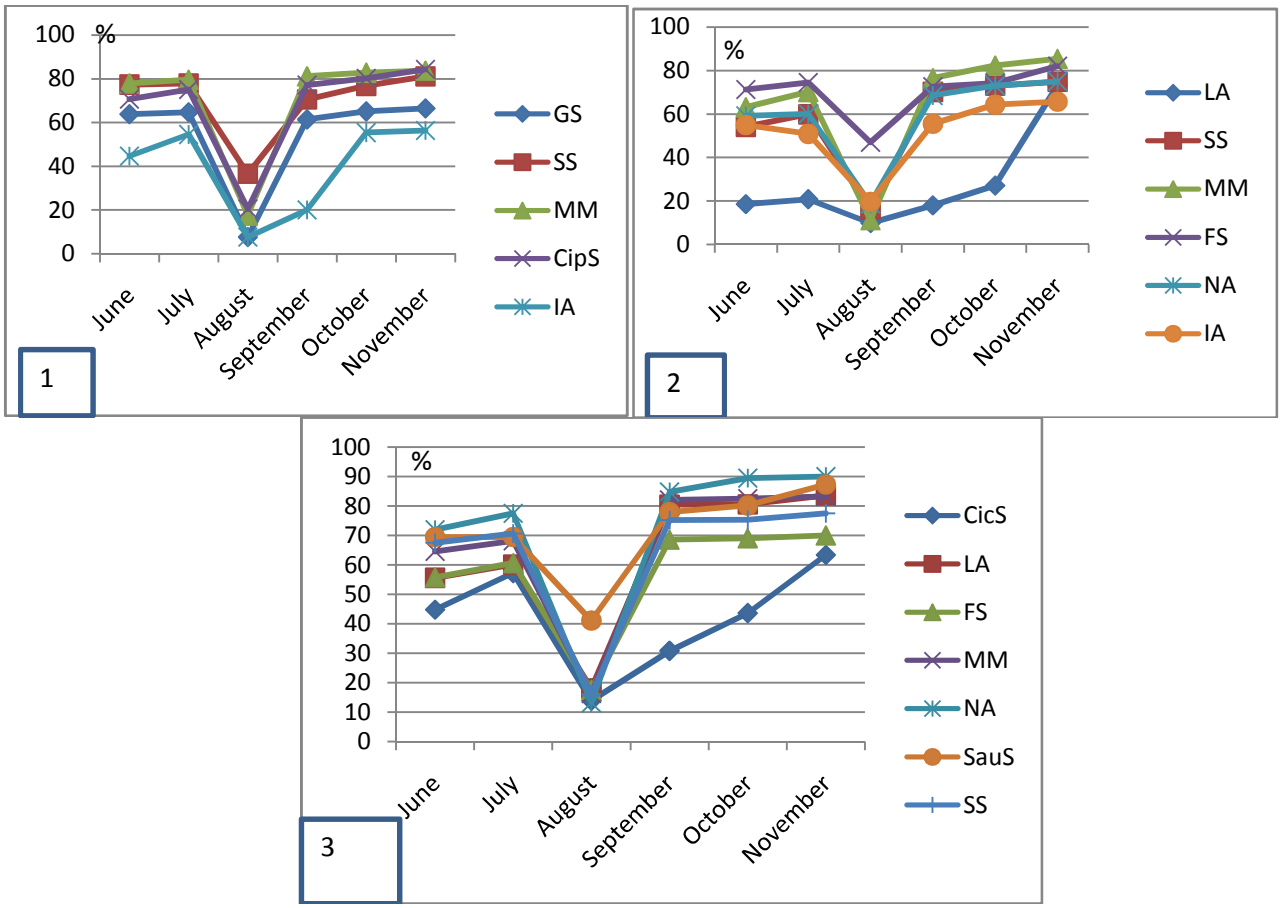

Figure 1. Weeds water content fluctuation of jelutung plantation during the dry season.

1. Batu Nindan site, 2. Tumbang Nusa site, 3. Luwuk Kanan site
Remark : GS=*Glichenia linearis*,SS=*Stenochlaena polustris*, MM=*Melastoma Malabatracum*,CipS=*Cyperus rotundus*,IA=*Imperata cylindrica*, LA=*Leptaspis urcheolata*, FS=*Ficus grossulariodes*, NA=*Nephrolepis exaltata*, CicS=*Cyclosorus aridus*, SauS=*Saurophus androginus*.

Mortality

The mortality rate of the weeds from highest to the lowest inside jelutung plants in Batu Nindan during dry season were *Imperata cylindrica* (55.1%), while other weeds were not drying (0.0 %), Sequence death weeds in Tumbang Nusa site was *Nephrolepis exaltata* (59.9 %), *Leptaspis urcheolata* (57.8%), and *Stenochlaena polustris* (54.4%), whereas the other tree species namely *Ficus grassulariodes*, *Melastoma malabatracum*, and *Spatoglathis plicata*did not suffering death (Figure 2).

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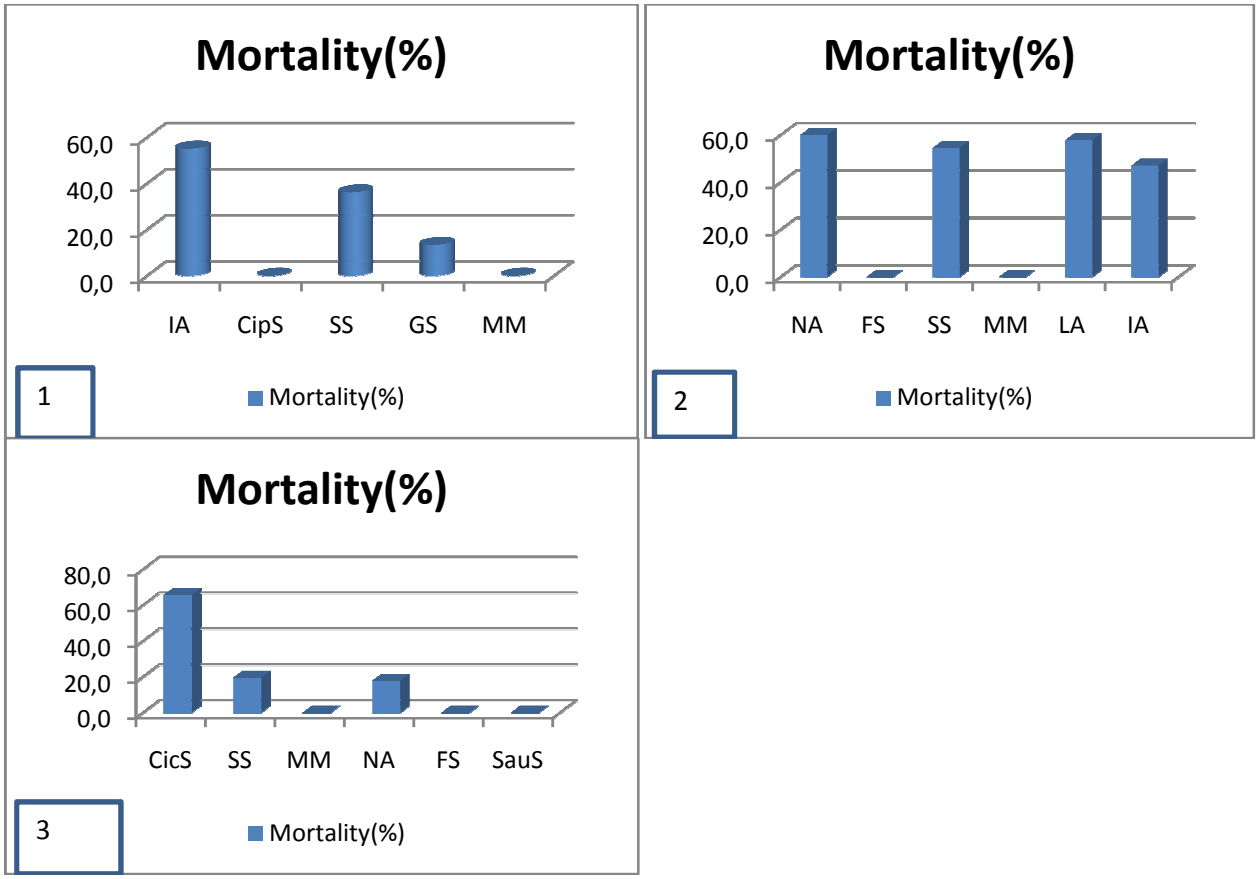

Figure 2. Mortality of weeds under jelutung plantation during dry season.

1. Batu Nindan Site, 2. Tumbang Nusa site, 3. Luwuk Kanan site
Remark: GS=*Glichenia linearis*, SS=*Stenochlaena polustris*, MM=*Melastoma Malabatracum*, CipS=*Cyperus rotundus*, IA=*Imperata cylindrica*, LA=*Leptaspis urcheolata*, FS=*Ficus grossulariodes*, NA=*Nephrolepisexaltata*, CicS=*Cyclosorus aridus*, SauS=*Saurophus androginus.*

Weeds Height (Culm Height)

The weeds height from the highest to the lowest during dry season in Batu Nindan were *Melastoma malabatracum* (84.5 cm), *Imperata cylindrica* (76.0 cm), *Cyperus rotundus* (72.8 cm), *Glichenia linearis* (68.5 cm), *Amaranthus spinosus* (66.2 cm), and *Stenochlaena polustris* (65.7 cm), Culm (weed stem) height from the highest to the lowest under jelutung plantation during dry season in Tumbang Nusa were *Nephrolepis exaltata* (80.81cm), *Melastoma malabatracum* (71.0 cm), *Imperata cylindrica* (68.7 cm), *Stenochlaena polustris* (48.7 cm), *Spatoglathis plicata* (64.0 cm), *Ficus grassulariodes* (44.8 cm), and *Leptaspis urcheolata* (6.8 cm). Weeds length from the highest to the lowest below jelutung plantation during drought in Luwuk Kanan were *Cyclosorus aridus* (105.7 cm), *Saurophus androginus* (91.6 cm), *Stenochlaena polustris* (61.5 cm), *Melastoma malabatracum* (51.0 cm), *Nephrolepis exaltata* (43.5 cm), *Ficus grassulariodes* (35.45 cm), and *Leptaspis urcheolata* (13.0 cm). Generally, weeds in peat swamp forest could reach more than 1 meter (CSAR, 2010).

Combustible Chemical

The content of combustible chemical inside the weeds under jelutung plantation in three research site presented in Figure 3. The compounds of the major organic chemical contained in the weeds that were detected by

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means of GC-MS Pyrolisis, consist of : acetic acid, methane, benzene, phenol, etanon, and alcohol compound and their derivatives. Acetic acid was found inside species of *Stenochlaena polustris* (9.25%), *Cyclosorus aridus* (10.04 %), *Neprolepis exaltata*(12.38 %), *Cyperus rotundus* (17.96%), *Melastoma malabatracum* (6.74%), *Picus glassurariodes* (7.72%), *Imperata cylindrica* (4.00%), *Leptaspis urcheolata* (4.73%), *Saurophus androginus* (1.48%), *Hymenocalis littoralis* (10.58%), while *Glichenia linearis* does not contain *acetic acid*. Methane substances contained by weeds species of *Stenochlaena polustris* (5,54%), *Melastoma malabatracum* (6,83%), *Ficus grassulariodes* (13.87%), *Imperata cylindrica* (0.5%), *Saurophus androginus* (29.87%), *Glichenia linearis* (5.03%), and*Nephrolepis exaltata* (8,36%), whereas *Cyclosirus aridus*, *Leptaspis urcheolata*and *Hymenocalis littoralis*, whereas*Cyperus rotundus* does not contain methane. Benzene substances was contained by species of *Melastoma malabatracum* (5.52%), *Hymenocalis littoralis* (4.78%), *Cyperus rotundus* (2.30%), *Glichenia linearis* (2.28%), *Ficus grassulariodes* (2.09%), *Nephrolepis exaltata* (2.07%), *Stenochlaena polustris* (1.92%), *Saurophus androginus* (0.96%). While the species of *Cyclosorus aridus*, *Imperata cylindrica*, and *Leptaspis urcheolata* does not contain benzene. Kind of other compounds such as phenol, etanon, and alcohol is a compound that has burning point lower than acetic acid, benzene, and methan (Anonimous, 2012). However, all these compounds also play a role in determining the reactivity against the initial ignition.

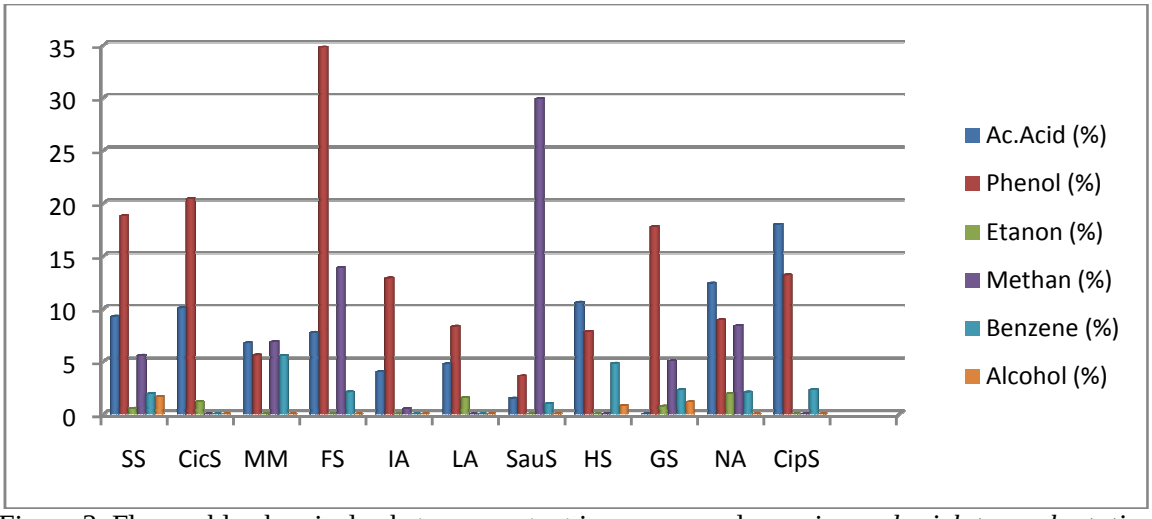

Figure 3. Flammable chemical substance content in many weeds species *under jelutung plantation*

Remark : SS= *Stenochlaena polustris*, CicS=*Cyclosorus aridus*
MM=*Melastoma malabatracum*,FS=*Ficus grossulariodes*, HS=*Hymenocalis littoralis*, *SauS=Saurophus androginus*, GS=*Glichenia linearis*,
NA=*Nephrolepis exaltata*, CipS= *Cyperus rotundus*, IA=*Imperata cylindrica*, LA=*Leptaspis urcheolata*

In calculation, biomass of weeds directly transfered into organic compounds in order to describe material of carbon emission into the atmosphere when they were burned. Potential emission of carbon stocks as material on each weed jelutung plantation in three locations are presented in Table 2. The highest carbon stock are owned by species of *Stenochlaena polustris* (1818.1 kg ha^{-1}) in Batu Nindan site, while the lowest carbon stocks owned by species of *Imperata cylindrica* (14.1 kg ha^{-1}) in Tumbang Nusa site.

To illustrate the impact indicators of vulnerability due to a fire, carbon content data

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were averaged from three locations that reflected the overall carbon potential. Organic carbon storage in various type of weeds replects delayed emission material so that greenhouse gas emission mainly CO_2 not emitted into the atmosphere (DOA, 2010), the presence of weeds in the unburned condition is very expected.*Stenochlaena polustris* has a very high risk of fire due to is having the highest carbon store (1818.1 kg ha^{-1}) among species to another. Instead, species of *Glichenia linearis*, *Amaranthus spinosus*, *Leptaspis urcheolata*, do not have a high risk of fire occurrence.

Table 2. The value grade of weeds under jelutung plantation for indicator in fire danger rating of peat swamp forest

No	Species	IV Important value	Water content (%)	Mortality (%)	Carbon stock (kg/ha)	High (cm)	Chemical content (%)		
							Aceticacid	Ben Zene	Methane
1.	*Stenochlaena polustris*	174.20	63.91	36.6	1015.78	58.64	9.25	1.92	8.19
2	*Cyclosorus aridus*	95.06	42.28	13.4	2408.03	105.66	10.04	0.00	0.00
3	*Nephrolepis exaltata*	92.48	65.10	32.9	799.46	140.4	12.38	2.07	8.36
4	*Ficus grossulariodes*	51.36	63.56	0.00	642.61	90.1	7.72	2.09	13.87
5	*Melastoma malabatracum*	51.24	67.37	0.00	563.61	91.12	6.74	0.00	0.00
6	*Imperata cylindrica*	46.93	45.79	51.1	888.22	72.37	4.00	0.00	0.52
7	*Cyperus rotundus*	40.16	67.96	0.00	87.77	51.41	17.96	2.30	0.00
8	*Leptaspis urcheolata*	14.13	45.47	17,9	42.96	9.16	4.73	0.00	0.00
9	*Amarathus spinosa*	12.14	-	-	76.98	66.25	-	-	-
10	*Glichenia linearis*	3.99	54.87	4.3	305.12	68.50	0.00	2.28	5.03
11	*Hymenocalis littoralis*	2.98	-	-	1045.00	-	10.58	-	-
12	*Saurophus androginus*	2.70	70.89	0.00	233.47	79.12	1.48	0.96	29.87
13	*Spatoglathis plicata*	2.27	-	-	1761.60	64.00	-	-	-

Remark : IV=*important value*

A combination of various parameter as the measurement variable of risk rate in forest fire have produce cumulative data presented in Table 2.

Cumulative data of important value index, water content, mortality, carbon stock, vegetation height, and the content of flammable chemical have shown fire danger indicator from each species. *Stenochlaena polustris* has the highest level of dominance with important value (IV) of 174.20, has an average water content decreases when dry season (63.91%), suffered the death of 36.6% during dry season, a very high carbon stock (1015.78 kg ha^{-1}), 56.64 cm high vegetation, and flammable chemical which containing acetic acid (9.25%), benzene (1.92%), and methane (8.19%) so that it can be determined as an indicator of vulnerability to fire in the peat swamp forest. The next is *Cyclosorus*

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aridus which has a second level of dominance (95.06%), has a decrease in water content during dry season (42.28%), suffered the death of 13.4%, has a high carbon stock (2408 kg ha^{-1}), vegetation height reaches 105.7 cm, and has a high acetic acid content of 10.04%. This species can be a second indicator of fire danger. *Nephrolepis exaltata* is also the dominant species (92.48), the water content decrease during the dry season (65.10%), death in dry season of 32.9%, it has high carbon stock that is 799 kg ha^{-1}, has the high vegetation (140.4 cm), and contains three highly flammable chemical compound were acetic acid, benzene, and methane. Likewise, *Imperata cylindrica*, which still includs the dominant grouf (46.93%), water content decrease during drought, and suffering death 51.1%. Carbon stock is quite high, culm tall is 72.37 cm, and contains two flammable chemical compound that can be an indicator of vurnerability of peat swamp forest fires. *Melastoma malabatracum*, *Ficus grassulariodes*, *Cyperus rotundus*, and *Saurophus androginus* were species that do not suffer death in the dry season, so that despite a decline in water content, they were still alive and moisture content will stabilize at above 20%. On the condition of the fuel has a moisture content more than 20%, the weeds will be difficult to burn (Chandler, 1983). These species can be classified as second class vulnerability indicators because they have a flammable chemical substances between 2-3 types of chemicals. The presence of other species such as *Glichenia linearis*, *Melastoma malabatracum*, *Saurophus androginus*, *Spatoglathis plicata*, and *Hymonocalis littoralis* can not be used as an indicator of fire danger rating as a result of its presence are co-dominant in the forest weed community. Fire occurrences in peatland always related to a lot of fuel and drying of fuel (Anderson, 1976; PFS, 2011).

CONCLUSSIONS

1. The species of weeds dominant under jelutung plantation in peatland seven years after planting are consisted of *Stenochlaena polustris*, *Cyclosorus aridus*, *Nephrolepis exaltata*, *Ficus grassulariodes*, *Melastoma malabatracum*, *Imperata cylindrica*, *and Cyperus rotundus*, whereas the co-dominance are *Leptaspis urcheolata*, *Amaranthus spinosa*, *Glichenia linearis*, *Hymenocalis littoralis*, *Saurophus androginus*, and *Spatoglathis plicata*.
2. The species of high fire danger rating indicator according to the level water content in dry season, the magnitude of the potential emission materials, high of vegetation, and flammable compounds are *Imperata cylindrica*, *Stenochlaena polustris*, *Ciclosorus aridus*, and *Nephrolepis exaltata*, while the weeds whose presence indicates not danger to fire are *Glichenia linearis*, *Melastoma malabatracum*, *Ficus grasullariodes*, *Saurophus androginus*, *Spatoglathis plicata*, *Hymenocalis littoralis*, *leptaspis urcheolata*, *Cyperus rotundus*, and *Amaranthus spinosa*.
3. Eradication of weed at jelutung plantation in peat swamp forest in the dry season should consider the properties of weed in term of encreasing fire hazard. Weeding activity in dry season should be addressed to reduce the risk of forest and land fire.
4. Characteristics of weeds which discussed in this research is the nature of life weeds related to flammability and fire risk as a result of the level of dominance covered, the water content of weeds in dry season, the mortality rate in dry season, carbon content that can be amitted to the air, the tall of culm, and the content of flammable chemical substances.

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REFERENCES

Anderson, J.A.R. (1976). Observation on The Ecology of Five Peat Swamp in Sumatra and Kalimantan. Soil Res. Inst.Bogor Bull 3:45-55.

Anonimous. (2012). Combustible Chemical substance. Download from Website :http://jukrihimaki.blayspot.com/2011/04/bahan-kimia-mudah-terbakar.html.December 19th 2012.

Barus, E. (2009). Weed Management in estate crop. Effectivenes and efficiency in application of Herbicide, Kanisius. Yogyakarta. 103 Page.

Center for Soil and Agroclimate Research (CSAR). (2010). Second Land Resource Evaluation and Planning Project.Republic of Indonesia, Bogor.

Chandler, G. P.. Cheney, P. Thomas, L. Trabaud, dan D. Williams. (1983). Fire in Forestry. Forest Fire Management and Organisation. A Wiley-Intersciense Publicatgion. John Wiley & Sons. New York.

Departement of Agriculture (DOA). (2010). Manual for identification various of important weeds species at estate plants. Directorate General of Estate Crop. Jakarta.

Ekeleme, F. D.Chikaye; dan I.O. Akobundu. (2009). Weed seed bank response to Planted Fallow and tillage in Southwest Nigeria. Agroforestry Forum. 63: 299-306.

Haygreen JG and Bowyer JL. (2010). Forest Products and Wood science, an Introductions.Lowa State University Press.Ames. Lowa.

Kusmana, C. (1997). Vegetation survey Method. Bogor University of Agriculture. Bogor.

Murphy, C.E. dan D.Lemerla. (2009). Continuous Cropping Systems and Weed Selection. Euphytica. 148: 61-73

Perry, L.G. dan Susan M.G. (2009). Light Competition for Invasive Species Control: A Model of Cover Crop-weed Competition and Inplications for Phalaria arundinaceae Control in Sedge Meadow Wetland. Euphytica. 148: 121-134.

Provincial Forest Service (PFS). (2011). Annual Report of Provincial Forest Service, Central Kalimantan, Palangka Raya.

Rasmunsen, I.A.; M.Askegaard; J.E.Olesen; K.Kristensen. (2010). Effects on Weeds of Management in Newly Converted Organic Crop Rotation.in Denmark. Elsevier.

Sutherland, S.(2009). What makes a weed a weed : Life history traits of native and exotic plants in the USA. Population Ecology. Ecologi 141 : 24-39

Suryabrata, S. (2009). Research Methodology. Raja GrafindoPersada. Jakarta.

Temmes M. (2010). Reforestation Operation Manual For Alang-alang Grassland. FINIDA, Finlandia-Indonesia