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PROCEEDINGS
of

PALANGKARAYA INTERNATIONAL SYMPOSIUM & WORKSHOP ON TROPICAL PEATLAND

PALANGKARAYA - INDONESIA, JUNE 10th - 11th 2010

"THE PROPER USE OF TROPICAL PEATLAND"

Edited By:
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Darmawan, Suwido Limin, Yanetri Asi Nion

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FOREWORD

Indonesia is a tropical country having about 20 million hectares of tropical peatland or a half of total tropical peatland in the world. Natural peatland in Indonesia is recognized as the most important reservoirs of plants and animals biodiversity and its exhibit a range of important ecological and natural resource functions. Peatland forests are the best habitats for endangered animals such as orang-utan while streams and rivers draining from peatlands are important for fish life. Rapid population growth boosting land conversion, especially from agricultural land to industry, housing, and urban facilities. Recently, conversion of peatland to agricultural land such as forest plantation and oilpalm plantation are become focus discussion among peatland scientists. Recently, conversion of tropical peatland for plantation gives significantly increase on local and national economy. On the other hand, conversion of peatland will give the impact on the degradation of environment. Therefore, discussion on the proper use of tropical peatland based on characterization and land capability is very important.

These proceedings contain papers in many topics of peatland presenting in oral and poster presentation during Symposium and Workshop on 10-11 June 2010 at Palangka Raya, Central Kalimantan, Indonesia. The Symposium and Workshop was organized by Global Center of Excellence (GCOE). The GCOE has established the Integrated Field Environmental Science (IFES) which has main office in Hokkaido University, Japan. IFES-GCOE has liaison offices in Indonesia, Mongolia, and Siberia. The main purpose of IFES-GCOE is to support and evaluation for improvement of the peatland management practices through education and research.

We hope that the proceedings will be very useful for all stakeholders of peatland in order to obtain a better understanding for proper use in agriculture balancing with environmental protection.

Bogor, February 2011

Editors

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IMPROVEMENT OF ACID SOIL PRODUCTIVITY: THE USE OF SHRIMP-TILE PUMP IN RICE CULTIVATION DURING DRY SEASON

Basuki Sumawinata, Suwardi, Darmawan, Gunawan Djajakirana and Dwi Putro Tejo Baskoro

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ABSTRACT

Inappropriateness of applying the method of peatland reclamation has led to peat swamp forests become degraded peat land. Soil has been changed into very acid, which is commonly referred to acid sulfate soil. Most of the land is only remain as unproductive land. Improvement of the acid sulfate soil for cultivation of rice has been carried out by flushing acid and toxic substances, addition of macro and micro nutrients, planting of rice varieties tolerant to aluminum; all together had successfully produced 4-5 tons of unhulled rice. However, this method is only suitable for rice cultivation during the rainy season. In the dry season, generally the land remain uncultivated due to limited supply of water. Experiments using tile-shrimp pump, which was capable of uplifting water with large quantity of discharge, even in a high difference condition, has been done for rice cultivation. The results showed that rice cultivation in dry season has been able to produce rice for 5 tones/ha.

Keywords: *Acid sulfate soil, degraded peatland, shrimp-tile pump, unhulled rice,*

INTRODUCTION

Development of paddy fields on peatlands in Sumatra and Kalimantan had been started expansively by Indonesian government in 1969 mainly to resettle poor and landless people from dense Java and Bali (Suwardi, *et al.*, 2007). These projects have mostly ended up at failure in that only a little expanse of productive rice fields were eventually developed; the lands were drastically changed into worse condition instead. The failure is certainly attributable to inappropriate water management system.

Peat layers of original 2-3 m thickness was after a few years found as thin layers or even are not exist anymore. In some cases, disappearance of peat layers had led former underlain sulphidic material containing sediment to emerge to the surface resulting in development of acid sulfate soils. Cultivation of rice on these acid sulfate soils produced less than 1 ton/ha unhulled rice. Therefore, improvement of management and technology should be carried out to increase the productivity.

Many efforts have been made to survive rice production on the soils, including liming, flushing toxic substances with low acidity water, application of macro- and micro-nutrients, and introduction of low-pH adaptive rice variety. Suwardi *et al.*, (2009) shows that application of three technologies on the cultivation of rice in acid sulfate soil at Rantau Rasau Jambi produced 5 ton/ha unhulled rice (**Figure 1**).

This technique is however workable only in rainy season when fresh water is available in the respected canals. Therefore, there is a need of developing irrigation technique to be applied during the dry season.

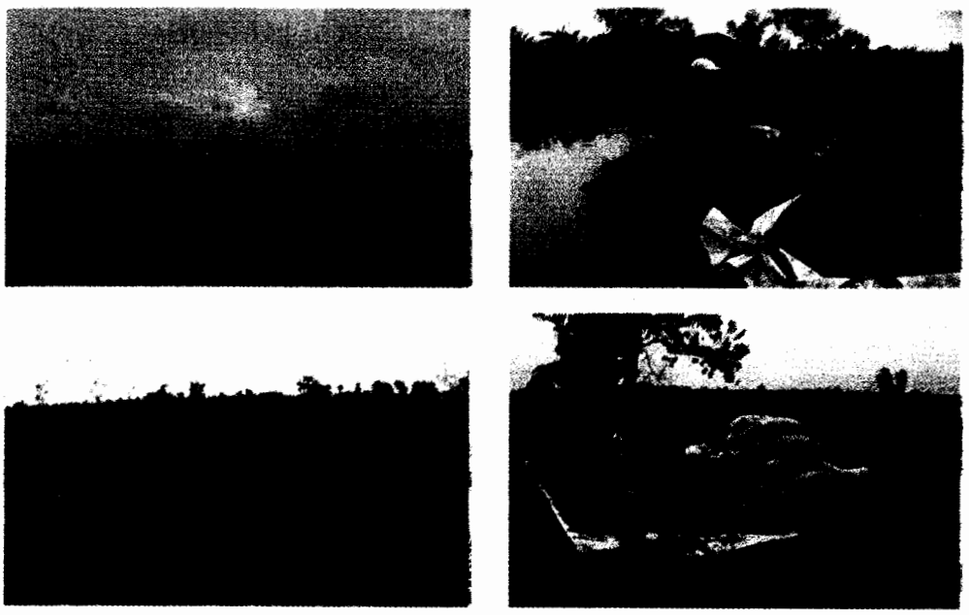

Figure 1. Application of technologies at rice cultivation in acid sulfate soil at Rantau Rasau Jambi, 2006 producing 5 ton/ha unhulled rice

SOME PROBLEMS OF PUMP APPLICATION

Irrigation using pump have been initiated by Indonesian government through pump assistance projects. However, these programs were fail due to very low debit and the pump only capable to pump water up at only every tide. Each tide has a quite short period and it does not come at a fix time (**Figure 2**). It may come even at late night. Therefore, irrigation using conventional pump is always fail.

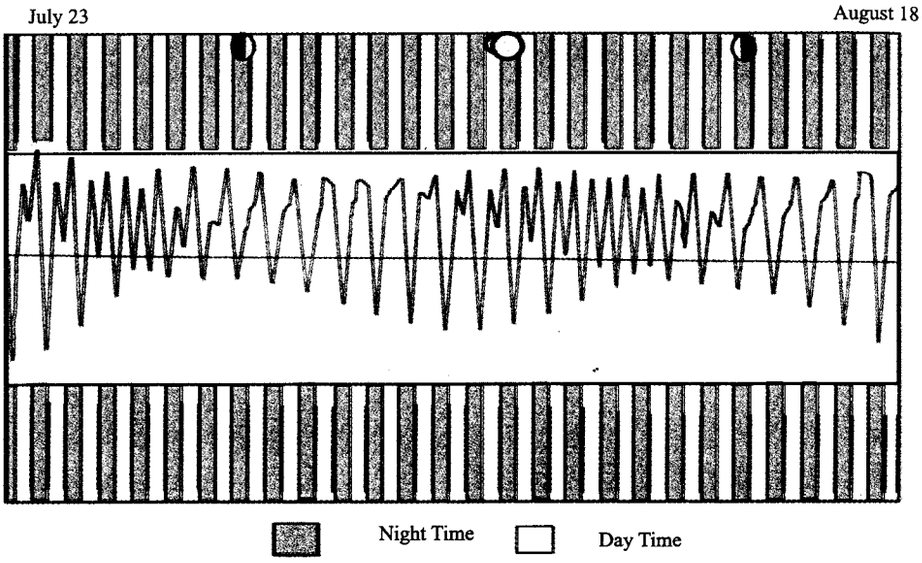

Figure 2. Fluctuation of water level around Dendang, Batanghari, Jambi (Calculated from July-August 2009)

Submersible centrifugal pumps having big enough debit are available in the market. However, those types of pumps are very expensive. We have modified the pump that cheap enough for farmers and could produce a big debit. The pump is called "shrimp-tile pump". It consists of two basic parts namely rotary element or impeller and machine where during operation the impeller is entered to the water and the machine still in the air (**Figure 3**).

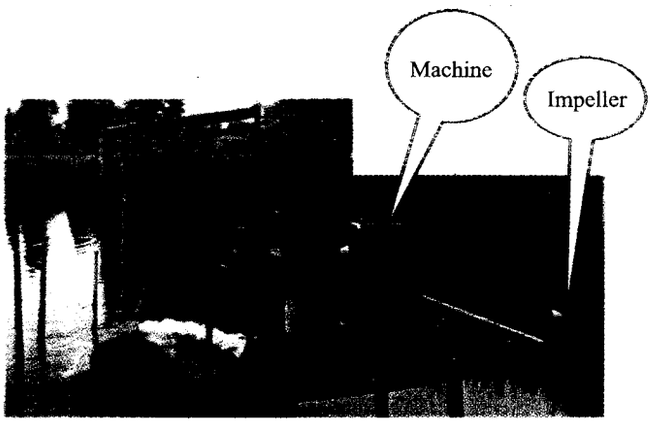

Figure 3. Shrimp-tile pump

Application of shrimp-tile pump having much bigger water debit (100-120 liter/sec) possible to irrigate rice field in the dry season. Using this pump, we obtained a quite high yield of 2.25 ton/ha unhulled rice (**Figure 4**).

Our experience, however, suggest that the best pumping time was the time when the tide reach the pumping locations, which is according to the **Figure 2** has no fix time even maybe comes at late night. As the consequence the operation time can not be scheduled but the farmer should adjust by monitoring the water level of the canal. It will be better if a sensor of water level be attached so the pump will operate automatically when the water level meet the sensor.

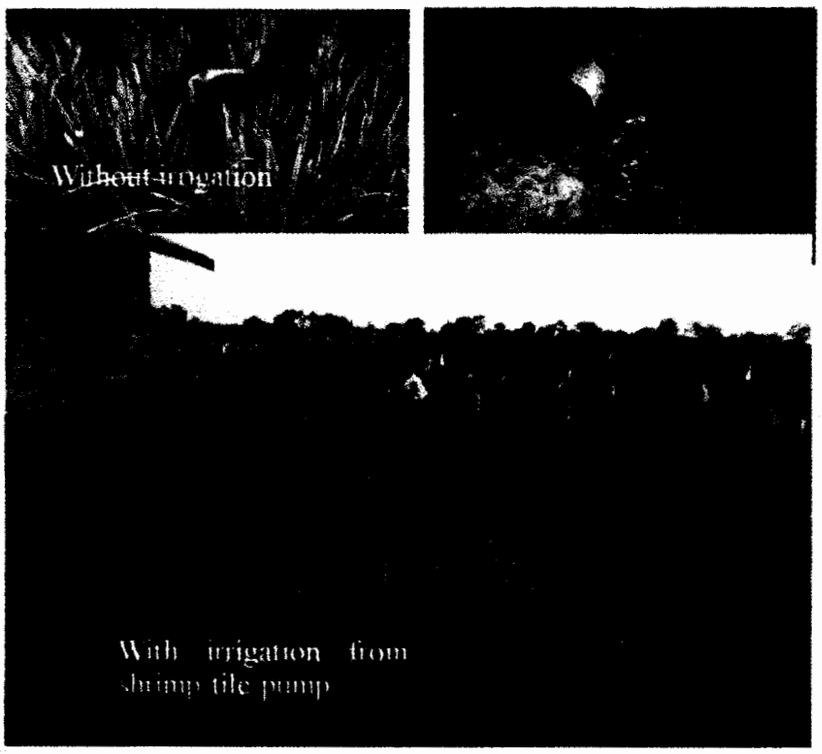

Figure 4. The production of rice increased with using shrimp tile pump irrigation

CONCLUSIONS

Shrimp-tile pump is possible to be used for irrigation and flushing toxic substances at acid sulfate soil areas during the dry season when tide water is available. The use of this pump during dry season gives farmers a possibility to produce good rice yield. This pump can be installed stationary between rice field and canal or installed in moving small boat. Automatic starting mechanism of the pump is recommended regarding the short and uncertain of tide time.

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