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Achieving best management practices in an oil palm plantation at tropical peatland: A gap analysis

A.R. Adesiji[1,A], A.M.Thamer[1,a], D. Nik Norsyahariati[1], M. Sa'ari[2], A. Sayok[3], R. Padfield[4], and S. Evers[5].

[1]Department of Civil Engineering, Universiti Putra, Malaysia, (UPM) Malaysia; [2]Department of Environmental and Chemical Engineering, Universiti Putra, Malaysia; [3]Institute of Biodiversity and Environmental Conservation, Universiti Malaysia, Sarawak, Malaysia; [4]Malaysian-Japan International Institute of Technology, University Technology Malaysia (UTM)Malaysia; [5]School of Biosciences, The University of Nottingham, Malaysia Campus; [6]Department of Civil Engineering, Federal University of Technology, Minna, Nigeria.

Abstract

Despite the economic gains recorded in the oil palm industry, the industry has faced serious challenges in terms of sustainability. Non-adherence to the best management practices has been blamed for such challenges and mitigating the resultant negative results is inevitable. In this work, a framework consisting of site management and best management practices which analyzes the gaps between the two practices was developed and conclusions on possible divergence drawn. Literature review and interviews to gather opinions from the experts and practitioners in the industry were used. In conclusion, there is no proper adherence to the recommended best management practices.

Keywords: best management practices, gap analysis, oil palm industry, site management practices, sustainability

INTRODUCTION

Since it has become high economic importance for oil palms business to be practiced in Southeastern countries like Malaysia and Indonesia due to the boom experienced in the industry across the region, there is therefore an urgent need for proper appraisal of the site management practices in the industry and its adherence to the best management practices BMPs. This has become necessary so as to check the existing gaps between the two practices and analyze the existing gaps in order to mitigate the negative outcomes of oil palm cultivations on peats. In the last two decades, the practice of oil palm cultivation has received a reasonable boost and has expanded rapidly, particularly in the Southeast Asia. Currently, oil palm cultivation covers well above 12.5 million ha in the region and it is still expanding (RSPO, (2010).

This study therefore focuses on appraising the site management practices and best management practices in order to analyze the gaps between the two practices and to find ways of bridging the observed gaps so as to enhance oil palm productivity while protecting the environment. This will be done by developing a framework highlighting the best management policies as developed by various policy makers and comparing them with site practices which were obtained through literature reviews, in-depth interviews, site visits and site observation over periods of 2 years.

MATERIALS AND METHODS

For proper appraisal of the roles played by the policy makers and managers in the oil palm industry, this review was complemented with the interviews conducted during the visit

[a] E-mail: thamer@upm.edu.my

to the oil palm plantation among the managers in the industry with the aid of a questionnaire. Salient points ranging from peatland water management, site clearance, pest management, and fertilizers application were raised in the questionnaire to cover all the policies in BMPs. This is also coupled with on-site interviews conducted among the site workers and their supervisor on various practices covering those points raised in the questionnaire. Observations during bi-monthly site visits were also of great importance in the study.

For the purpose of gap analysis, this work will highlight those subject matters raised in the interviews which are the site management practices alongside with the best management practices and observe the existing gaps before coming up with recommendations

Peatland best management practices for oil palms in tropical peatland

For the optimum oil palm production, certain policies must be followed in order to produce the desired results that would favour both the industry in terms of yields and output and the environment in general. These policies are better referred to as best management practices BMPs and are as summarized below

1. Peatland water management

Many NGOs and government agencies stipulated that for proper water management on peatland, depth to water table should be maintained between 50 to 70 cm from ground surface (Moore and Knowles, 1989; RSPO, 2012). This was further supported by past studies (Regina et al., 1996; Dolmat, 2005; Worrall et al., 2005; Parish et al., 2008; Turetsky et al., 2008; Wosten et al., 2008; MPOB, 2012) though with some giving the range of 40 to 100 cm as the recommended levels while the rest just stipulated nearness of the groundwater table to the ground surface as the needed requirement. In order to achieve the main goal of this water management, an efficient and adequate drainage network system should be put in place. According to MPOB (2012), with strong adherence to the stipulated requirements of proper drainage network system, optimum water table for efficient palm growth would be realized. And in addition to this, RSPO (2012) recommended the installations of weirs and water control structures with overflows which are needed at strategic locations along both the field and side drains to monitor and maintain the acceptable peat water level around the plantation.

2. Peatland fertilizer management

Insufficient fertilization of oil palms results in its poor productivity (Holden et al., 2004). This was buttressed by Melling et al. (2005) which stated that inadequate application of fertilizers resulted to slow recovery of oil palm productivity, and loss of oil palm yields. In order to balance this, enhanced fertilizer management in oil palm plantations becomes very necessary for greater oil palm productivity and to mitigate the negative effects of its abuse.

Identified among the best management practices in the area of fertilizer application is the timing of applying the fertilizers. Many policy makers have recommended acceptable practices in order to control the use of fertilizers for oil palms for optimum productivity. According to Holden et al. 2004, due to high porosity and infiltration rates of peat soil on which most of the oil palms are cultivated, strict timing of fertilizers should be ensured in order to prevent leaching of easily-leachable fertilizers into the groundwater body and for cost efficiency. This was buttressed by majority of the policy makers like Malaysian National Action Plan, MNAP, Global Environment Centre, GEC, Food and Agricultural Organization of United Nation, FAO, and Malaysian Palm Oil Board, MPOB. Fertilizer trials which help in determining fertilizers requirements of specific site fertilizers' need should be practiced (RSPO, 2012).

3. Pest and Disease Management

Oil palms cultivated on organic soils experience frequent outbreaks and pest invasion at the early stage when compared to the minerals soils (Holden et al., 2004). This is why on organic soil, regular monitoring is recommended in order to arrest the outbreak at the early

stage of oil palm growth. The practice of Integrated Peat Management, IPM, should be encouraged which involves good understanding of pest biology and ecology. This will help in making the correct choice of physical, cultural, chemical and biological control methods. It is important to look for weaknesses in pest life cycles for targeting control. The spread and development of the oil palm disease is affected by physical, chemical and microbiological properties of the soil (Singh et al., 1991).

4. Site Clearing Management

Several numbers of policy makers and governmental agencies in the industry have recommended some BMPs tailored to correct some measures being practiced in the plantation that are threatening the sustainability and efficiency of the oil palm industry. Among the recommended practice in the area of site clearing is zero burning policy. All the NGOs such as RSPO, GEC, NAP, and national and international agency like, MPOB, and Wetland international recommended the principle of zero burning as the major method of land clearing prior to oil palm cultivation. In other words, for oil palm sustainability on peatland, zero burning method for site clearing is encouraged. This is to avoid peat swamp degradation which affects their hydrological and ecological usefulness while improving on soil fertility.

Site management practices: A detailed case study

For the proper understanding of site management practices, comprehensive in-depth interviews were conducted among the stakeholders, oil palm managers and oil palm site workers coupled with on-site observation in the area of pre and post-oil palm cultivation for the period of two years of this study. Highlighted below are the various practices identified as the major management practices which form the basis of comparison with best management practices in this study

1. Peatland water management

Globally, 50 - 70 cm has been accepted as the required depth to groundwater from peat surface. The installation of weirs on the site at strategic locations has always helped in maintaining this water level and removing the excess water from the plantation in case of site flooding. From the results of the interviews conducted, managers in the oil palm industry have these management policies well adhered to but not without some limitations.

As shown in Figure 1, many of the plantations visited had the weirs installed at different strategic locations which helped in dewatering the plantation in the event of flooding. During the dry period, the weir is closed which enables the groundwater level to rise so as to prevent peat fires. But despite this closure, the average groundwater depth in the study area still falls far below the recommended depth to groundwater as shown in Figure 2. From Figure 2, the bi-monthly depth to groundwater within the study area and the recommended depths are shown, and it would be observed from this that the recommended depth to groundwater was only attainable during the period of high storm.

Figure 1. Installed Weir within the Peatland to Control Water Level

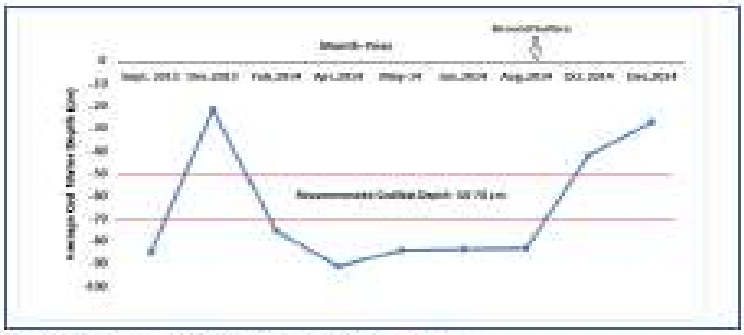

Figure 2. Bi-Monthly Average Site Groundwater Depth.

2. Peatland fertilizer management

Fertilizer application is assumed to be a very important aspect of management practices in the oil palm industry and special attention has been given in this regard. To achieve this, timing in application of fertilizers which is considered one of the most important strategies has been strictly adhered to. From the interview conducted, it was observed that there are two periods of application of fertilizers in a year ranging from March to April and August to October. This implies that there is a fixed schedule in the fertilizer application which is strictly adhered to and supports. Apart from fixed schedule in applying the fertilizers, another practice in the industry is the foliage testing or leaf analysis of oil palms in order to know their levels of nutrient deficiency. This practice is achieved in such a way that foliage analysis is done on the palms at different ages so as to know the required fertilizers suitable for such age of oil palms. Timing of fertilizer application is also given serious consideration as fertilizers are being applied with rainfall pattern in mind.

3. Site Clearing Management

Various methods of clearing are adopted as explained in the previous section range from cutting down the bunches to smaller portion and exposing them to sunlight and allowing them to decompose or burning of bunches after being cut down are being adopted as means of clearing the plantations for cultivation. This method is commonly referred to as zero burning policy and has been globally encouraged as it poses no threat to both the soil and the environment as against the latter which contributes negatively to peat soil degradation and global warming.

The zero policy method has also helped in allowing the complete return of organic matter back to the soil in form of carbon sequestration and it is therefore practical and environmental friendly.

RESULTS

A Gap analysis between the site practices and BMPs

Having highlighted both the site management practices and BMPs in terms of peatland water management, fertilizer management, disease and pest control, and site clearing management, the analysis of gaps existing between the two practices are as presented here; The analysis clearly shows that much still needs to be done in the area of peatland water management, fertilization management, and disease and pest control management. While proper adherence has been observed in the area of site clearing, these other areas require serious attention if the oil palm productivity is to be enhanced. Lack of proper adherence to pest management as proscribed in the BMPs has greatly influenced the frequent disease outbreak which has resulted in low oil palm yields. Lack of groundwater level monitoring devices like observation wells in strategic locations in the peatland has also been observed to be responsible for peat fires during the dry period despite the water control structures

installed at different locations. The existing gaps in the area of fertilization have resulted into economic loss.

CONCLUSIONS

The following conclusions can be drawn from the study:

- If the oil palm industry is to continue to serve as a leading source of economic reliance among the oil palm-producing countries with guaranteed environmental friendliness, there is urgent need to adhere to the best management practices, BMPs as outlined by the policy makers presented in the framework presented in this study.
- Among all other necessary practices that must be put in place if the BMPs are to meet are;

1. Observation wells that will monitor the groundwater levels during both the wet and dry periods should be installed and the depth to groundwater table from peat surface maintained at 50-70 cm.
2. Closure of weirs when the depth to water table is getting above 60 cm should be noted, especially during the dry period.
3. Strict timing of fertilizers should be ensured to avoid fertilizers leaching to the groundwater body since peat soils are porous. In other words, fertilizers should be applied only after the rainfall events.
4. Fertilizer trials in determining site-specific fertilizer requirements for the peat types and environmental conditions must be carried out.
5. Foliage testing and a prescriptive range of fertilizer recommendations should be encouraged.
6. Practices of fertilizer that optimizes Nitrogen-ferilizers and maximize organic fertilizer use will aid in reducing GHG emissions and should therefore be encouraged.

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