Optimum Ground Water Level on Sustainable Sago Palm Cultivation in Tropical Peat Soil

Yuka Sasaki [1*], Kyuichi Hashimoto [1], Ken-ichi Kakuda [1], Akira Watanabe [2], Foh Shoon Jong [3], and Ho Ando [1]

[1] Faculty of Agriculture, Yamagata University, Tsuruoka, Yamagata, Japan
[2] Graduate School of Bioagricultural Science, Nagoya University, Nagoya, Aichi, Japan
[3] P.T. National Timber and Forest Products, Selatpanjang, Indonesia
* Corresponding author, e-mail: yukas@tds1.tr.yamagata-u.ac.jp

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Introduction:

Although sago palm has been recognized to survive in tropical peat soil with waterlogged condition, sago growth might be affected by ground water level. Therefore, the commercial cultivation in the plantations conducts drainage to keep suitable ground water level and fertilizer application to improve the production efficiency. However, no information about relationship between sago growth and ground water level is available. In addition, drainage will promote aerobic decomposition of tropical peat soil. It will lead to fewer amounts of nutrient supply, increase of carbon dioxide emission and the ground subsidence. It is important to estimate the optimum ground water level for productive and environmental sustainability of sago palm cultivation.

Objectives:

To clarify (1) the change of ground water level over a year, (2) the effect of ground water level on the nitrogen availability in tropical peat soil and (3) the sago palm growth under the different ground water level in the plantation fields.

Materials and Methods:

Location: sago palm plantation of P.T. National Timber and Forest Products, Selatpanjang, Indonesia. Field measurements: ground water level, and growth parameters of sago palm such as leaf number, palm height, trunk height, and trunk diameter at chest height. Measurements of ground water level and growth parameters: once a month from 2005 June to 2006 July. Three fields of 0.5 km^2 were used. Soil measurements: amount of available nitrogen in soil collected in 2005 May, which estimated by incubation method under submerged condition for 4 weeks (30^oC). The ammonium nitrogen in soil was extracted by 1M KCl and measured by the steam-distillation method.

Results:

1. Averaged ground water level was -48 to -81 cm, depending on the place in the sago palm fields.
2. There were no significant spatial differences on the amount of available nitrogen in soil.
3. Under the field conditions in this study regarding to the ground water level of -48 to -81 cm, higher ground water level increased the leaf number, trunk diameter of sago palm.