J. Agron. Indonesia 37 (3) : 226 – 232 (2009)

Production of Soybean Varieties under Saturated Soil Culture on Tidal Swamps

Munif Ghulamahdi[1*], Maya Melati[1] and Danner Sagala[2]

[1] Department of Agronomy and Horticulture, Faculty of Agriculture, Bogor Agricultural University
Jl. Meranti Campus Darmaga, Bogor 16680, Indonesia
[2] Department of Agronomy, Faculty of Agriculture, The University of Prof. Dr. Hazairin, S.H.
Bengkulu, Indonesia

Diterima 6 Agustus 2009/Disetujui 10 November 2009

ABSTRACT

Saturated soil culture (SSC) is a cultivation technology that gives continuous irrigation and maintains water depth constantly and makes soil layer in saturated condition. By keeping the water-table constantly, soybean will be avoided from negative effect of inundation on soybean growth because soybean will acclimatize and improve its growth. The objective of the research was to study the response of soybean varieties under saturated soil culture on tidal swamps. The research was conducted at Banyu Urip of Tanjung Lago Sub District, Banyuasin District, South Sumatera Province, Indonesia from April to August 2009. The experiment was arranged in a split plot design with three replications. The main plot was water depth in the furrow consisted of without watering, 10, 20, 30, 40 cm under soil surface (uss). The subplot was soybean variety consisted of Tanggamus, Slamet, Willis, and Anjasmoro. The result showed that the interaction between varieties and water depth significantly affected growth and seed production, except pod numbers/plant. The values of all variables were higher under SSC compared to those cultivated without watering (control), but varieties responded to SSC differently. The highest seed production was obtained from Tanggamus with 40 cm uss, i.e. 4.83 ton/ha but it was not significantly different from those at water depth 20 (4.63 ton/ha) and 30 cm uss (4.71 ton/ha). However, technically and economically, 20 cm uss was the most appropriate water depth for soybean production on tidal swamps.

Key words: *Glycine max* L. (Merr.), water management, water table

INTRODUCTION

National production of soybean in Indonesia is low and can only fullfill about 35–40% of the national demand, therefore the government imports soybean about 1.3 million ton/year (Balitbangtan, 2005). Increasing soybean planting area in order to increase soybean production is hampered by land use change. One of the alternatives is to optimize the use of marginal land, and tidal swamp is one of the potential ecosystems for future soybean production. There is about 20 million ha tidal swamps in Indonesia (Suryana, 2006), and about 9 million ha is appropriate for agriculture (Nugroho *et al*., 1992 *in* Noor and Sabur, 2007).

The major constrain of producing soybean in tidal swamp is high pyrite content. When pyrite is oxidized, soil pH decreases. Djayusman *et al*. (2001) reported that high pyrite content suppressed the productivity of soybean on tidal swamps to only about 800 kg/ha.

SSC is a technology in cultivation that gives water permanently, maintains and keeps its depth constantly (± 5 cm under soil surface/uss). This makes soil layer in saturated condition. In saturated soil culture, watering is started from the beginning of plant growth to maturity stage (Hunter *et al.,* 1980). By keeping the water-table constantly, soybean will be avoided from negative effect of inundation on soybean growth, because soybean will acclimatize and improve its growth (Troedson *et al*., 1983).

Soil water management can be applied to reduce pyrite content where the soil is in reductive condition and able to support soybean growth. SSC technology is one of soil water managements that has been studied in highland and succeeds to increase soybean production (Ghulamahdi *et al*., 1991; Indradewa *et al*., 2004; Ghulamahdi and Nirmala, 2008). This offers the chance to reduce the pyrite hence increase soybean production on tidal swamps.

Response of soybean to saturated condition varied between varieties and the later-maturing soybean was better than the earlier one (CSIRO, 1983; Ghulamahdi *et al*., 1991; Ghulamahdi, 2008; Ghulamahdi and Nirmala, 2008). Many varieties of soybean have been studied in their response on acid soil, e.g. Alihamsyah and Ar-Riza (2006) found that Tanggamus, Wilis, and Slamet were varieties that could adapt well on inland.

[1]*Author for correspondence. E-mail:mghulamahdi@yahoo.com