THE DEVELOPMENT OF SEEDLING TRANSPLANTION TECHNOLOGY ON SUGARCANE (*Saccharum officinarum* L.) CULTIVATION ON DRY LAND

ABSTRACT

Sugarcane (*Saccharum officinarum* L.) is an important industrial commodity which cultivated spreads on dry land area to produce sugar. Sugarcane on dry land does not show an optimal yield due to limited soil moisture and low soil fertility; therefore the system of single bud chip seedling transplantation with mycorrhizal inoculation is worth to be studied. The research comprised four stages of experiment which aimed to ascertain (1) the effect of storage media to seeds survival and the further growth of single bud chip seedlingss; 2) the optimal dose of mycorrhizal inoculum for the growth of single cane buds seedling in the nursery, 3) the appropriate time of mycorrhizal inoculation of sugarcane in transplantation on dry land; 4) the effect of interrow spacing on growth, yield of millable cane, sucrose content, and sugar of transplanted sugarcane crop, as well as a sugarcane farming operation on dry land. The one, two, and three experiment stages were carried out in Harjobinangun village of Pakem subdistrict in Sleman Regency whereas stage four was conducted in Dengok, Piyaman, and Bendungan village farmer fields of Gunung Kidul Regency in the Special Region of Yogyakarta. From the first stage, it was found that wood ash was the best storage media in maintaining the viability of single bud chips because of its ability to preserve the sucrose at a higher level for 12 days in order to manage high seed germination, i.e. 66.25 to 82.50%. In the stage two, it was found that the application of 2-3 g mycorrhizal inoculum/seed significantly increases root colonization, relative crop growth rate (RCGR), weight biomass seedling, total root surface area, total root volume, total root length, accelerates the emergence of shoot roots, and improves the responsiveness of mycorrhiza. In the third stage, mycorrhizal inocculation in the nursery significantly affect roots colonization, Pn, Ci, chlorophyll content, leaf area, net assimilation rate (NAR), RCGR, total root lenght, total root surface area, the root dry weight of root: shoot ratio, stem weight, plant height, and the quantity of millable cane per hill. In the four stage, interrow spacing of 60 cm (60 x 100 cm) with a population of about 15.500 seedlings of single bud chips per ha produces millable cane/ha as much as 101,7 tons/ha, which was not significantly different from interrow spacing of 30 cm (30 x 100 cm). The application of 60 cm interrow spacing increase the yield of millable cane, sucrose content, sugar, and profits of a farm operation compare with the system a stem planting with several nodes, respectively by 38.8%, 5.8%, 48,3 %, and 122, 5% with R/C ratio of 1,6. Interrow spacing of 60 cm significantly affects the specific leaf weight (SLW), leaf area, NAR and CGR, light capture, transpiration, leaf area index (LAI), as well as the lowest prolin content of leaves, and increased the number of tillers, the number of stem nodes, stem diameter, plant height, clump angles, and the quantity of millable cane per clump. The physiological determinants of sugarcane productivity in the system of seedling transplantation were Pn at the age of nine months, LAI at the age of four months, SLW at the age of five months, the proline content at the age of nine months, and NAR at the age of six months, whereas in the yield component were stem weight, clump angles, and the number of stem nodes. The physiological determinants of sugar content were Pn at the age of nine months, stem brix, even distribution of brix on the stem nodes, and the level of chlorophyll a, whereas the growth traits were light capture at the age of six, seven, and three months, NAR at the age of five and eight months, SLW at the age of five and ten months, and CGR at the age of nine months.

Keywords: *Saccharum officinarum* L, interrow spacing, arbuscular mycorrhiza, transplantation, single bud chips, dry land

PENGEMBANGAN TEKNOLOGI SISTIM PINDAH TANAM BIBIT PADA BUDIDAYA TEBU (*Saccharum officinarum* L.) LAHAN KERING

Wawan Sulistiono
Minat Agronomi
Program Studi Ilmu Pertanian, Fakultas Pertanian UGM

INTISARI

Tebu (*Saccharum officinarum* L.) merupakan komoditas industri penting penghasil gula yang sebagian besar dibudidayakan pada lahan kering. Tebu lahan kering menghadapi keterbatasan lengas tanah dan kesuburan rendah sehingga hasil tidak maksimal oleh karena itu sistim pindah tanam bibit yang dihasilkan dari mata tunas tunggal dengan inokulasi mikoriza layak dikaji. Penelitian terbagi dalam 4 tahap percobaan yang memiliki tujuan (1) mengetahui pengaruh media penyimpanan terhadap lama simpan dan daya tumbuh bibit mata tunas tunggal tebu, (2) mengetahui dosis inokulum mikoriza optimal untuk pertumbuhan bibit tebu mata tunas tunggal di persemaian, (3) mengetahui waktu inokulasi mikoriza yang tepat terhadap pertumbuhan tebu sistim pindah tanam, dan (4) mengetahui pengaruh jarak tanam terhadap pertumbuhan, hasil tebu giling, rendemen, kristal gula, serta usahatani tebu di lahan kering. Penelitian dilakukan dalam 4 tahap percobaan dengan percobaan tahap satu, dua, dan tiga dilakukan di desa Harjoningan, Pakem, Sleman sedangkan tahap keempat dilakukan di lahan tebu di desa Piyaman, Dengok, dan Bendungan, kabupaten Gunung Kidul, Daerah Istimewa Yogyakarta. Dari percobaan tahap satu dapat disampaikan bahwa media simpan serbuk arang kayu lebih baik dalam menjaga viabilitas bibit mata tunas tunggal tebu karena mampu menjaga kadar sukrosa bibit lebih tinggi dengan lama simpan 12 hari yang menjaga daya tumbuh tetap tinggi yaitu 66,25 - 82,50 %. Pada percobaan ke dua dapat disampaikan bahwa pemberian inokulasi mikoriza sebanyak 2-3g/bibit nyata memperbaiki kolonisasi akar, LPTR dan biomasa bibit, luas permukaan akar total, volume akar total, panjang akar total, mempercepat muncul akar sekunder, dan meningkatkan ketanggapan mikoriza. Pada percobaan ke tiga disampaikan bahwa inokulasi mikoriza di persemaian berpengaruh nyata terhadap kolonisasi akar, Pn, Ci, kandungan klorofil, luas daun, LAB, LPTR, panjang akar total, luas permukaan akar, rasio berat kering akar:pucuk, berat batang, tinggi tanaman, dan jumlah tebu giling per rumpun. Pada percobaan ke empat, jarak tanam dalam baris 60 cm (60 x 100 cm) berpengaruh nyata menghasilkan tebu giling yang tinggi sebesar 101, 7 ton/ha tidak berbeda nyata dengan jarak tanam dalam baris rapat 30 cm. Penerapan jarak tanam dalam baris 60 cm tersebut meningkatkan hasil tebu giling, rendemen, kristal gula, serta keuntungan usahatani dibanding dengan sistim tanam bagal masing-masing sebesar 38,8 %, 5,8 %, 48,3%, dan 122, 5 % dengan R/C rasio sebesar 1,6. Jarak tanam dalam baris 60 cm berpengaruh nyata terhadap BDK, luas daun, LAB dan LPT, sekapan cahaya, transpirasi, ILD, serta kadar prolin daun terendah, meningkatkan jumlah anakan, jumlah ruas, diameter batang, tinggi tanaman, sudut rumpun, dan jumlah tebu giling per rumpun. Penentu produktivitas tebu sistim pindah tanam bibit pada sifat fisiologi adalah Pn umur 9 bulan, ILD umur 4 bulan, BDK umur 5 bulan, kadar prolin, LAB 6 bulan, sedangkan pada komponen hasil yaitu berat batang, sudut rumpun, dan jumlah ruas. Sementara itu penentu rendemen pada sifat fisiologi adalah Pn umur 9 bulan, brix batang, kerataan brix batang, dan kadar klorofil a, sedangkan sifat pertumbuhan yaitu sekapan cahaya umur 6, 7, dan 3 bulan, LAB umur 5 dan 8 bulan, BDK umur 5 dan 10 bulan, dan LPT umur 9 bulan.

Kata kunci: *Saccharum officinarum* L, jarak tanam, mikoriza arbuskula, pindah tanam bibit, mata tunas tunggal, lahan kering