UNIVERSITI PUTRA MALAYSIA

COMPARATIVE STUDY OF DIFFERENT YIELD STIMULATION SYSTEMS ON YOUNG TREES OF HEVEA CLONE RRIM 901 PANEL BO-1

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By

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Faculty : Agriculture

The emphasis of the study is to evaluate the response of young *Hevea* trees to a new method of stimulation, REACTORRIM technique, developed by the Rubber Research Institute of Malaysia (RRIM) in 1990. The main objective of the development of REACTORRIM method of stimulation is to address the problem of shortage of skilled tappers to tap trees according to the conventional tapping system. REACTORRIM technique, which employs a concept of direct supply of ethylene into the laticiferous tissue at a slow but continuous rate, is effective for increasing the yield response of premium and old rubber trees.

Young *Hevea* trees clone RRIM 901, panel BO-1 responded negatively to the method of stimulation irrespective of methods of latex extraction, age of tree and history of tapping. The results showed that the negative effects were seen earlier on the cut systems than on the puncture tapping system. The bole growth quantified during the

study period was shown not to be solely the manifestation of cambial activity but also the continuous formation of layers of unproductive dry tissue.

Despite severe bark reaction, the puncture tapping system responded more favorably to the REACTORRIM technique. All the experiments showed a consistent trend, where a higher dosage of ethylene was required for the puncture tapping system. The results confirmed the inverse relationship between dosage of ethylene and number of latex vessels severed during tapping.

The effect of methods of stimulation on the status of elements and selected physiological parameters was markedly observed. Removal of nutrients was higher in the REACTORRIM stimulated trees. The high removal of nutrients and low content of sucrose can be associated with the downward trend of yield of the *Hevea* trees used. There was no significant difference between the status of nutrients during the moderate and high yielding periods of the year.

Sucrose appeared as the most suitable parameter to be used as stress indicator for young *Hevea* trees, clone RRIM 901, panel BO-1 used in this study. The content of sucrose was influenced by the interaction effect between the methods of stimulation and latex extraction. The content of sucrose of the REACTORRIM stimulated treatments was consistently lower than the non-REACTORRIM stimulated treatments, except for the puncture tapping system.

Young *Hevea* trees clone RRIM 901, panel BO-1 used in the study responded negatively to REACTORRIM method of stimulation with drastic reduction in latex production, low content of sugar, high incidence of tapping panel dryness and considerably high loss of nutrient from latex and after-shaved bark. The yield profile obtained from the study showed that there was no sign of yield recovery indicating collapse of lactiferous system and impaired biosynthetic processes. Findings established from the study confirmed that REACTORRIM technique is not suitable as yet, for commercial uptake on young *Hevea* trees. For young *Hevea* trees, the most suitable exploitation system is the conventional 1/2S d/3 system with or without mild ethephon stimulation.

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KAJIAN PERBANDINGAN PELBAGAI SISTEM PERANGSANGAN HASIL KE ATAS POKOK *HEVEA* MUDA KLON RRIM 901 PANEL BO-1

Oleh

MOHD AKBAR B MD SAID

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Penumpuan kajian ialah untuk menilai respon pokok-pokok *Hevea* muda kepada kaedah perangsangan teknik REACTORRIM yang dicipta oleh Institut Penyelidikan Getah Malaysia (RRIM) pada tahun 1990. Tujuan utama menghasilkan teknik perangsangan REACTORRIM ialah untuk menangani masalah kekurangan penoreh mahir untuk menoreh sistem torehan konvensional. Teknik perangsangan REACTORRIM menggunakan konsep membekal gas etilina secara berterusan ke tisu `laticiferous' dengan kadar pelepasan yang perlahan adalah berkesan untuk meningkatkan respon hasil pokok-pokok getah premium dan pokok getah tua. Sungguhpun demikian, kaedah perangsangan REACTORRIM belum lagi disyorkan kepada pokok-pokok *Hevea* muda.

Teknik perangsangan REACTORRIM tidak sesuai untuk pokok *Hevea* muda, klon RRIM 901, panel BO-1, yang menunjukkan respon hegatif ke atasnya tidak mengira

kaedah pengeluaran lateks, umur pokok dan sejarah penorehan. Pertumbuhan batang pokok yang dirangsang dengan teknik REACTORRIM yang direkodkan disepanjang kajian ini bukan merupakan manifestasi aktiviti kambium tetapi juga disebabkan oleh kesan pembentukan lapisan kulit kering yang tidak produktif secara berterusan.

Walaupun reaksi kulit keterlaluan, sistem torehan cucuk menunjukkan respon yang lebih menggalakkan kepada keadah perangsangan REACTORRIM. Kesemua percubaan menunjukkan corak yang seragam di mana dos etelina yang tinggi diperlukan untuk sistem torehan cucuk Keputusan ini adalah selaras dengan perhubungan yang bertentangan di antara dos etilina dengan bilangan saluran lateks yang tercedera apabila ditoreh.

Kesan kaedah perangsangan ke ats status unsur pemakanan mineral dan bukan mineral dan ke atas status parameter fisiologi lateks terpilih adalah sangat ketara. Pengaliran keluar unsur pemakanan terutamanya unsur pemakanan makro dari kulit yang ditoreh dan dari lateks adalah tinggi pada pokok-pokok yang dirangsang dengan teknik REACTORRIM. Pengaliran unsur pemakanan yang tinggi adalah berkait rapat dengan corak penurunan hasil torehan pokok *Hevea* muda yang digunakan dalam kajian ini. Keputusan yang didapati menunjukkan tiada perbezaan ketara di antara status unsur pemakanan ketika musim berpenghasilan sederhana dan tinggi dalam tahun yang sama.

Sukrosa merupakan parameter yang paling sesuai untuk digunakan sebagai petanda `stress' bagi pokok *Hevea* muda, klon RRIM 901, panel BO-1, yang digunakan

di dalam kajian ini. Kandungan sukrosa dipengaruhi oleh kesan interaksi di antara kaedah perangsangan dengan kaedah pengeluaran lateks.

Kandungan sukrosa rawatan yang dirangsang dengan teknik REACTORRIM adalah sentiasa rendah dari kandungan gula rawatan yang tidak dirangsang dengan teknik REACTORRIM, kecuali sistem torehan cucuk. Pokok getah muda klon RRIM 901, panel BO-1 yang digunakan dalam kajian ini menunjukkan respon negatif kepada teknik REACTORRIM dengan kejatuhan pengeluaran lateks yang amat ketara, kejadian kekeringan kulit dan kehilangan kandungan unsur pemakanan yang agak tinggi dari lateks dan kulit yang ditoreh berbanding torehan konvensional.

Profil hasil yang ditunjukkan dari percubaan ini menunjukkan tiada tanda-tanda pemulihan ke atas pengeluaran hasil.di masa hadapan dan ini berkemungkinan tinggi disebabkan oleh sistem `laticiferous' pokok-pokok yang terlibat tidak berfungsi serta gangguan ke atas sistem biosintisis. Keputusan kajian menjurus kepada kesimpulan iaitu teknik REACTORRIM masih belum sesuai untuk diamalkan secara komersil tidak mengira kaedah pengeluaran hasil, umur pokok dan sejarah penorehan. Untuk pokok *Hevea* muda, sistem eksploitasi yang paling sesuai ialah sistem torehan konvensional 1/2S d/3 dengan atau tanpa penggunaan etefon dengan kekuatan yang rendah.

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