RINGKASAN

Tanaman kelapa sawit merupakan salah satu jenis tanaman palma yang memiliki kandungan polisakarida dan polifenol yang tinggi. Kontaminasi polisakarida dan polifenol pada sampel tanaman dapat menyebabkan sulitnya proses isolasi RNA dengan kualitas tinggi dari jaringan tanaman kelapa sawit. Selain karena kontaminasi polisakarida dan polifenol, isolasi RNA juga sulit dilakukan karena adanya RNase pada jaringan tanaman yang menyebabkan RNA terdegradasi secara enzimatik. Penelitian ini dilakukan untuk mengoptimasi beberapa protokol isolasi RNA tanaman kelapa sawit yang efektif dan efisien, serta menghasilkan RNA yang berkualitas tinggi dari segi kualitas maupun kuantitas.

Penelitian dilaksanakan selama tiga bulan, pada bulan Oktober-Desember 2018 di Laboratorium Biokimia dan Biologi Molekuler, Pusat Penelitian Bioteknologi dan Bioindustri Indonesia (PPBBI). Teknik isolasi RNA menggunakan tiga protokol, yaitu protokol modifikasi *Cetyl Trimethyl Ammonium Bromide* (CTAB), kit isolasi RNA *RNeasy Plant Mini Kit* (Qiagen) dan kit isolasi *NucleoSpin RNAPlant* (Macherey-Nagel). Sampel yang digunakan untuk isolasi RNA adalah daun dan akar tanaman kelapa sawit yang berumur kurang dari tiga bulan. Sampel daun dan akar kelapa sawit memiliki bobot sampel 0,1 g dan 2,5 g yang disesuaikan untuk tiap protokol. Variabel yang diamati adalah konsentrasi RNA (ng/µl), kemurnian RNA (rasio A_{260}/A_{280} dan A_{260}/A_{230}) dan pita RNA pada elektroforesis gel agarosa.

Hasil penelitian menunjukkan bahwa, RNA total hasil isolasi protokol *NucleoSpin RNAPlant* (Macherey-Nagel) memiliki kuantitas dan kualitas yang paling tinggi dibandingkan RNA total hasil isolasi protokol CTAB modifikasi 1 dan 2 serta *RNeasy Plant Mini Kit* (Qiagen). Konsentrasi RNA total daun dan akar kelapa sawit yang didapatkan melalui protokol *NucleoSpin RNAPlant* (Macherey-Nagel) sebesar 338 ng/µl dan 184,4 ng/µl dengan rasio A_{260}/A_{280} RNA total daun dan akar kelapa sawit sebesar 2,13 dan 2,18 serta rasio A_{260}/A_{230} sebesar 2,09 dan 2,20. Hasil elektroforesis gel agarosa menunjukkan integritas yang bagus dari RNA total daun dan akar kelapa sawit protokol *RNeasy Plant Mini Kit* dan *NucleoSpin RNAPlant* (Macherey-Nagel), namun terdapat kontaminasi dan *smear* pada RNA total daun dan akar kelapa sawit protokol CTAB modifikasi 1 dan 2.

SUMMARY

Oil palm is one of the palm crops which contains high levels of polysaccharides and polyphenols. The isolation process of high quality RNA from oil palm tissues is challenging due to the polysaccharides and polyphenols contamination. Beside of polysaccharides and polyphenols contamination, the RNA isolation also become difficult due to enzymatic degradation of RNA by RNase that present in the oil palm tissues. The aim of this study was to optimize the effective and efficient RNA isolation protocols from oil palm tissues that produce high-integrity RNA.

The research was conducted during three months, October-December 2018 in Biochemistry and Biology Molecular Laboratory, Indonesian Research Institute for Biotechnology and Bioindustry (IRIBB). The isolation process used three protocols such as the modification of Cetyl Trimethyl Ammonium Bromide (CTAB), *RNeasy Plant Mini Kit* (*Qiagen*) *and NucleoSpin RNAPlant (Macherey-Nagel). Leaves and roots of oil palm which are less than three months old were used as samples with weights of 0,1 g and 2,5 g which was adjusted for each protocol. The RNA integrity including RNA concentration (ng/µl), RNA purity (A_{260}/A_{280} and A_{260}/A_{230} ratio) and RNA quality by the electrophoresis gel agarose were observed.*

The result showed that total RNA yield from the NucleoSpin RNAPlant (Macherey-Nagel) protocol have the highest quantity and quality compared the yield of total RNA from RNeasy Plant Mini Kit (Qiagen), CTAB modification 1 and 2 protocols. Concentration of leaves and roots of oil palm total RNA were obtained from NucleoSpin RNAPlant (Macherey-Nagel) protocol was 338 ng/µl and 184,4 ng/µl with A_{260}/A_{280} ratio of leaves and roots of oil palm total RNA was 2,13 and 2,1 also A_{260}/A_{230} ratio was 2,09 and 2,20. The result of agarose electrophoresis indicated good integrity of leaves and roots of oil palm total RNA from RNeasy Plant Mini Kit (*Qiagen*) *and NucleoSpin RNAPlant (Macherey-Nagel) protocol, however the agarose electrophoresis also indacated contamination and smear of the leaves and roots of oil palm total RNA from CTAB modification 1 and 2 protocols.*