DAFTAR ISI

LEMBAR PERSETUJUAN .................................................................................................................. iii
LEMBAR PENGESAHAN ................................................................................................................ iv
LEMBAR PERSEMBAHAN .............................................................................................................. v
KATA PENGANTAR .................................................................................................................... vi
ABSTRAK .......................................................................................................................................... viii
ABSTRACT ........................................................................................................................................ ix
DAFTAR ISI ...................................................................................................................................... x
DAFTAR GAMBAR .......................................................................................................................... xiii
DAFTAR TABEL ............................................................................................................................... xiv
DAFTAR LAMPIRAN ......................................................................................................................... xv

BAB I PENDAHULUAN
1.1 Latar Belakang ............................................................................................................................... 1
1.2 Kerangka dan Ruang Lingkup ...................................................................................................... 2
1.3 Rumusan Masalah ....................................................................................................................... 2
1.4 Tujuan .......................................................................................................................................... 3
1.5 Batasan Masalah .......................................................................................................................... 3
1.6 Metode Pengumpulan Data ....................................................................................................... 3
1.7 Sistematika Penulisan ................................................................................................................. 4

BAB II DASAR TEORI
2.1 Radiasi ......................................................................................................................................... 5
  2.1.1 Radiasi Alpha (α) ................................................................................................................... 5
  2.1.2 Radiasi Beta (β) .................................................................................................................. 6
  2.1.3 Radiasi Gamma (γ) dan Sinar-X ........................................................................................... 7
2.2 Radioaktivitas ............................................................................................................................... 8
  2.2.1 Satuan radiasi ....................................................................................................................... 9
  2.2.2 Batas masukan tahunan ....................................................................................................... 10
2.3 Sumber Radiasi Alam ................................................................................................................. 10
2.4 Deret radionuklida alam ............................................................................................................ 11
2.5 Kalium-40 dan Karbon-14 ....................................................................................................... 13
2.6 Dosis dari radioaktivitas alam................................................................. 13
2.7 Sumber Radiasi Buatan........................................................................ 14
2.8 Deteksi Sinar Gamma ...................................................................... 14
  2.8.1 Interaksi Radiasi Sinar Gamma dengan Bahan............................... 14
    2.8.1.1 Efek Fotolistrik................................................................. 14
    2.8.1.2 Efek Compton................................................................. 15
    2.8.1.3 Produksi Pasangan.......................................................... 16
2.9 Efek Radiasi ...................................................................................... 16
  2.9.1 Efek Radiasi Terhadap Tanaman................................................... 16
  2.9.2 Efek Radiasi Terhadap Manusia.................................................. 17
  2.9.3 Proteksi radiasi ......................................................................... 19
2.10 Spektrometer-γ ............................................................................. 20
  2.10.1 Detektor HPGe ....................................................................... 20
  2.10.2 Penguat Awal (Pre Amplifier) .................................................. 21
  2.10.3 Penguat (Amplifier) ................................................................. 22
  2.10.4 Penganalisis Pulsa dengan PCA-2 ........................................... 22
  2.10.5 Analisis Spektrum ................................................................. 23
2.11 Reaktor TRIGA 2000 ....................................................................... 23
2.12 Pemetaan .......................................................................................... 25
2.13 Tanaman ............................................................................................ 26
  2.13.1 Penyerapan Unsur Oleh tanaman ............................................. 26
  2.13.2 Penyerapan Unsur Melalui Akar .............................................. 27
  2.13.3 Parameter Perpindahan Radionuklida dari Tanah ke Tanaman.... 27
2.14 Jenis-Jenis Tanaman Didalam Lingkungan PSTNT-BATAN Bandung 29

BAB III METODE PENELITIAN

3.1 Lokasi dan Waktu Penelitian .............................................................. 37
3.2 Alat dan Sampel .............................................................................. 37
  3.2.1 Alat ..................................................................................... 37
  3.2.2 Sampel ............................................................................. 38
3.3 Denah Tanaman ............................................................................. 39
3.4 Diagram Alir Penelitian ................................................................. 40
3.5 Prosedur Percobaan
3.5.1 Identifikasi Masalah
3.5.2 Survey Lokasi Sampel dan pengambilan data tanaman
3.5.3 Pengambilan Sample
3.6 Analisis Data Spektrometer Gamma
3.6.1 Proses Analisis Data dengan Y-Spect
3.6.2 Perhitungan Aktivitas Radionuklida Alam
3.6.3 Perhitungan Konsentrasi Radionuklida

BAB VI HASIL DAN PEMBAHSAN
4.1 Kondisi Penelitian
4.2 Identifikasi Radionuklida Alam
4.3 Aktivitas dan Konsentrasi Radionuklida Alam
4.4 Pengaruh lokasi PSTNT-BATAN Bandung terhadap Kandungan Radionuklida Pada Sampel Daun

BAB V KESIMPULAN DAN SARAN
5.1 Kesimpulan
5.2 Saran
DAFTAR PUSTAKA
LAMPIRAN A
LAMPIRAN B
RIWAYAT HIDUP
DAFTAR GAMBAR

Gambar 1 1 Skema Penelitian Secara Umum ................................................................. 2
Gambar 2 1 Daya tembus alpha, beta, dan gamma pada material .............................. 5
Gambar 2 2 Poses peluruhan alpha .............................................................................. 6
Gambar 2 3 Proses peluruhan beta ................................................................................ 7
Gambar 2 4 Proses peluruhan gamma ............................................................................ 8
Gambar 2 5 Deret peluruhan $^{238}\text{U}$, $^{232}\text{Th}$, dan $^{235}\text{U}$ ..................................... 12
Gambar 2 6 Efek Foto Listrik (Bushong, 2001) ............................................................ 15
Gambar 2 7 Efek Compton (Bushong, 2001) ................................................................. 16
Gambar 2 8 Produksi Pasangan (Sumber: Bushong, 2001) ......................................... 16
Gambar 2 9 Efek radiasi (Corner, 2009) ......................................................................... 17
Gambar 2 10 Blok diagram spektrometer gamma ......................................................... 20
Gambar 2 11 Model kompartemen perpindahan radionuklida dari tanah ke tanaman. (Sumber: H. Yasuda, 1995) ................................................................. 28
Gambar 3 1 Denah tanaman di lingkungan Batan Bandung ......................................... 39
Gambar 3 2 Diagram alir proses penelitian ................................................................. 40
Gambar 3 3 Spektrum data dianalisis dengan Y-Spect .................................................... 48
Gambar 3 4 Spektrum data dianalisis dengan Y-Spect .................................................... 49
Gambar 4 1 Analisis radionuklida $^{226}\text{Ra}$ dan $^{40}\text{K}$ menggunakan software Y-spect ........................................................................................................ 53
Gambar 4 2 Analisis radionuklida $^{210}\text{Pb}$ dan $^{226}\text{Ra}$ menggunakan software Y-spect ........................................................................................................ 53
DAFTAR TABEL

Tabel 2.1 Batas masukan dosis yang diterima per tahun (BATAN, 1989) ....... 10
Tabel 2.2 Dosis tahunan rata-rata dari radioaktivitas alam (BATAN, 1989) ....... 13
Tabel 2.3 Jenis-jenis tanaman didalam lingkungan PSTNT-BATAN Bandung ... 29
Tabel 3.1 Pengambilan Sampel Daun .......................................................... 42
Tabel 3.2 Konsentrasi U, Th, dan K di metarial standar IAEA RGTh-1, RGU-1, 
    dan RGK-1 .................................................................................................. 47
Tabel 4.1 Hasil pencacahan background alat MCA ........................................ 52
Tabel 4.2 Hasil cacahan sampel daun .............................................................. 54
Tabel 4.3 Fokus penelitian pada deret $^{210}\text{Pb}$, $^{226}\text{Ra}$, dan $^{40}\text{K}$ ......................... 57
Tabel 4.4 Aktivitas dan Konsentrasi radionuklida dalam 36 sampel daun ....... 58
DAFTAR LAMPIRAN

Lampiran A 1 Tabel Data Cacah Sampel................................................................. 72
Lampiran A 2 Tabel perhitungan radionuklida alam ........................................ 74
Lampiran B 1 Survey lokasi dan pengambilan data nama tanaman.................... 81
Lampiran B 2 Pengambilan daun ........................................................................ 81
Lampiran B 3 Pengeringan daun dengan dijemur ............................................ 81
Lampiran B 4 Penguningan daun ...................................................................... 81
Lampiran B 5 Pengovenan daun ....................................................................... 81
Lampiran B 6 Penghalusan daun ...................................................................... 81
Lampiran B 7 Penyaringan hasil penghalusan daun ......................................... 81
Lampiran B 8 Pengepakkan serbuk daun ke dalam botol 200ml..................... 81