飯舘村放射能エコロジー研究会（IISORA）福島シンポジウム　2013 年秋

原発災害と生物・人・地域社会への影響と克復の途を探る

共同世話人　　今中哲二、糸長浩司、小澤祥司

日　時：2013 年 11 月 17 日（日）10：00 ～ 17：30

場　所：福島県青少年会館大研修室（収容人数 200 名程度）

参加者：一般市民、研究者

参加費：無料

3.11 以前の飯舘村

村の情景

牛の放牧

稲干し

3.11 以降

ベラルーシから小学校の先生とお医者さまを迎えての勉強会

対話による美術鑑賞の創始者アメリア・アナレスさんを迎えてのワークショップ

放射能公害による避難生活と復興に関する対策検討ワークショップ（RING!RING! プロジェクト助成）

主　　催：飯舘村放射能エコロジー研究会

共　　催：NPO 法人エコロジー・アーキスケープ

協力団体（50 音順）：飯舘村後方支援チーム、京都大学原子炉実験所原子力安全研究グループ、原子力資料情報室、原発事故被災者相双の会、国際環境 NGO FoE ジャパン、世界自然保護基金 (WWF) ジャパン（予定）、市民エネルギー研究所、東京大学大学院新領域創成科学研究科鬼頭研究室、日本大学生物資源科学部糸長研究室、農村計画学会（予定）、BIOCITY、ふぇみん、北海道大学スラブ研究センター家田研究室

お問い合わせ／ IISORA 福島シンポジウム事務局　email : sympo@iitate-sora.net

プログラム

＜開会あいさつ＞　10：00-10：10

＜第1部＞　10:00-12:30　　放射能の生物影響と初期被曝評価

座長：　小澤祥司／NPO法人エコロジーアーキスケープ

◆稲への影響／飯舘村での実験を通して
　　　　ランディープ・ラクワール／筑波大学

◆飯舘村民らによる山菜・食品等の放射能汚染調査
　　　　伊藤延由／いいたてふぁーむ

◆家畜、野生動物への影響
　　　　漆原佑介／東北大学

◆飯舘村民を対象とした初期被曝量評価の試み
　　　　今中哲二／京都大学

質疑応答

＜昼食休憩＞　12：30-13：30

＜第2部前半＞　13：30-16：00
　　生活・コミュニティ再建と複合まちづくり

座長：菅井益郎／國學院大學

◆「原子力市民委員会」中間報告【11/11追加】
　　　　　細川弘明／京都精華大学

◆飯舘の住宅内の放射能汚染の実態
　　　　　糸長浩司／日本大学

◆飯舘村民の生活再建・復興への思い
　　村民ＷＳの中間発表
　　　　浦上健司／NPO法人エコロジーアーキスケープ
　　村民からの報告
　　　　渡辺富士男（「負けねど飯舘！」）

◆二本松市での複合まちづくりの試み
　　　　佐藤滋／早稲田大学

＜休憩＞　16：00-16：20

＜第2部後半＞　16：20-17：30
　　生活・コミュニティ再建と複合まちづくりの総合討論
　モデレーター：糸長浩司
　登壇者：ランディープ、伊藤、漆原、今中、細川、浦上、渡辺
　　　　　菅野栄子、佐藤、小澤

Observation of Rice Gene/Protein Expression and Rice Growth and Development by Low-level Gamma Ray Exposure in Iitate Village

Randeep Rakwal (University of Tsukuba)

Email: plantproteomics@gmail.com

Abstract

In the summer of 2012, one year after the 3.11 nuclear accident at Fukushima Daiichi plant following the Great Tohoku Earthquake, a project was initiated to examine the effects of low-level gamma radiation on rice plants. The site of the experiment was the highly contaminated Iitate village in Fukushima prefecture of Japan. The experiment was set up at the Iitate Farm (ITF), which is located 31 kms from the nuclear power plant, having a background radiation level over 100 times (about 5 μSv/h) than normal. The basic experimental strategy was to expose healthy rice seedlings to continuous low-dose gamma radiation and investigate the changes in the physiology and at the molecular level – gene (transcriptomics), protein (proteomics), and metabolite.

The experiment was started by growing healthy rice seedlings. For this present study, *Japonica*-type rice (*Oryza sativa* L.) cv. Nipponbare was used as the test material. Healthy rice seedlings were transported to ITF, and placed in a designated area that was defined as a low-level gamma field. There was no direct contact between the rice seedlings and the contaminated soil, thus helping us observe primarily the effects of gamma radiation alone. Exposure times were set at 6, 12, 24, 48, and 72 h after arrival at ITF, and the rice leaves at the 3rd position (from the base) from 6 to 10 seedlings were sampled.

Prior to analysis of gene expression, the rice leaf samples powders were prepared. For the first part of the analyses, total RNA was extracted from the leaves, and whose quality and quantity were determined to be excellent for downstream analysis. Selected gene expression profiles of internal control, DNA repair/damage, oxidative stress, photosynthesis, and defense/stress functions were examined by semi-quantitative RT-PCR. Results revealed that low-level gamma radiation affects the expression of numerous genes, in particular showing the early (6 h) induction in DNA repair/damage-related genes and the late (72 h) induction of a previously described marker gene for defense/stress responses. Based on these results, which confirmed our data from preliminary experiments using detached rice leaves for radiation exposure, we proceeded for DNA microarray analysis.

Using the established dye-swap approach, we analyzed the differentially expressed genes at 6 and 72 h time points using a whole rice genome 4 x 44 K custom chip. A rice 4 x 44K custom (eARRAY, AMAdid-017845) oligo DNA microarray chip (G2514F: Agilent Technologies, Palo Alto, CA, USA) was used; 0 h controls were also analyzed. Obtained results showed that exposure to low-level gamma radiation differentially regulated 4481 (induced) and 3740 (suppressed) and 2291 (induced) and 1474 (suppressed) rice leaf genes at 6 and 72 h post-exposure, respectively, by at least two-fold changes. Proteomics approach involved extraction of proteins from the 0 h healthy control and 72 h gamma irradiated leaves in a lysis buffer followed by analysis using the 2-D-DIGE technique and DeCyder analysis and identification of the proteins by mass spectrometry. A total of 91 differentially expressed protein spots were identified.

I thank the people of Iitate village (Fukushima) and all other people involved in this study at various parts of the experiment for their support and encouragement, without which this work could not have seen light.

稲への影響/飯舘村での実験を通して

Randeep Rakwal

Email: plantproteomics@gmail.com

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(RNA)

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6 10 3

ITF 72

RNA RNA

RT-PCR

DNA

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2. Yamashiro H, Abe Y, Fukuda T, Kino Y, Kawaguchi I, Kuwahara Y, Fukumoto M, Takahashi S, Suzuki M, Kobayashi J, Uematsu E, Tong B, Yamada T, Yoshida S, Sato E, Shinoda H, Sekine T, Isogai E, Fukumoto M: Effects of radioactive caesium on bull testes after the Fukushima nnuclear plkant accident. *SCIENTIFIC REPORTS* 3:2850. doi:10.1038/srep02850.

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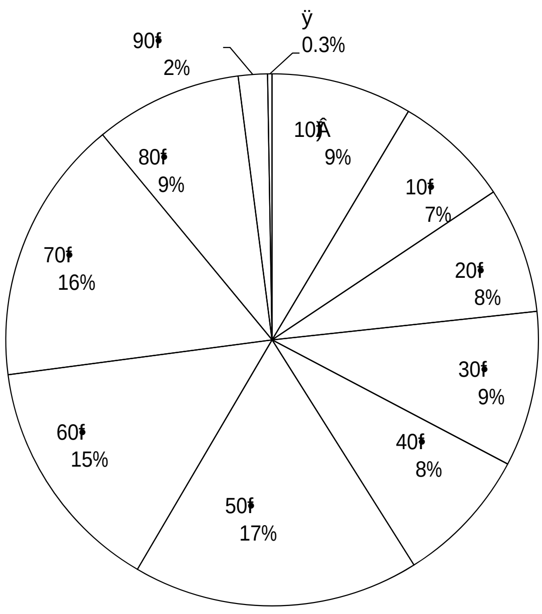

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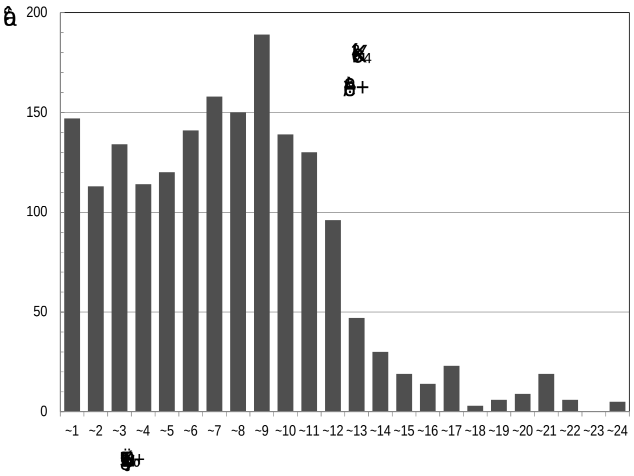

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