Profile of Junta YANAI

＋＋＋＋＋

Name: Junta YANAI

Affiliation: Graduate School of Life and Environmental Sciences, Kyoto Prefectural University

Address: Shimogamo Hangi-cho 1-5, Sakyo, Kyoto 606-8522, JAPAN

Tel & Fax: +81-75-703-5649

E-mail: yanai“@”kpu.ac.jp (Use @ for “@”)

URL: https://www.soilkpu.com/

Title: Professor

Degree: PhD (Kyoto University, 1998)

Specialty: Soil Science

＋＋＋＋＋

I. Research Topics

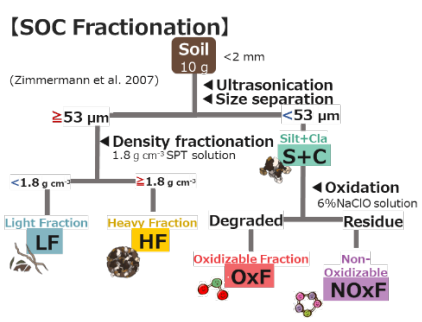
“Analysis of Spatio-temporal Variation of Soil Fertility in Temperate and Tropical Regions and its Application to Sustainable Agriculture”

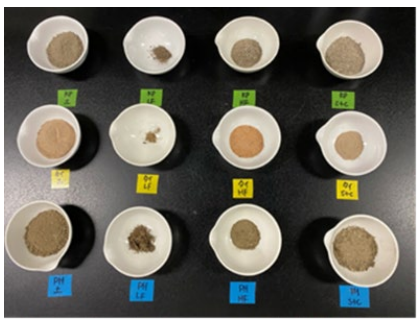
In the era of paradigm shift in agriculture from optimization of food production to compatibility of food production and environmental conservation, I have accomplished extensive research on evaluation and management of soil fertility, which determines plant growth and crop production. Namely, with the aim of obtaining basic information to realize sustainable agriculture, I have investigated the long-term variation of paddy field soil fertility in tropical Asia during the "Green Revolution," fertility evaluation of Japanese agricultural soils and its determinants, analysis of spatial variation of soil properties at the field scale, and spatio-temporal analysis of soil nutrient status at the root zone and rhizosphere scale and the elucidation of nutrient supply mechanisms. Currently, I am engaged in comprehensive analysis of organic matter accumulation mechanisms in Asian paddy soils and development of accumulation optimization methods, comprehensive fertility assessment and sustainable management of Asian paddy soils, and establishment of new evaluation methods for soil fertility. In addition, to pass on the function of soil as a production base to future generations, I am also engaged in conducting research to elucidate the adsorption/desorption behavior of radiocesium in soil and to establish techniques to reduce the transfer of radiocesium to crops. Through these studies, I hope to contribute to sustainable food production based on rational management of soil fertility, conservation of soil resources, and conservation of the global environment.

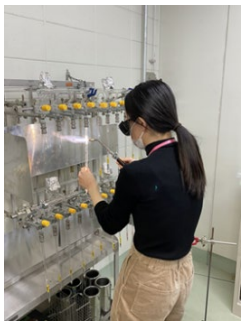
1. Comprehensive analysis of organic matter accumulation mechanisms in Asian paddy soils and development of accumulation optimization methods

We conduct research to comprehensively understand the accumulation mechanism of organic matter

in temperate and tropical paddy soils, which leads to maintenance and improvement of soil fertility and alleviation of global warming, by combining extensive overseas soil surveys with advanced precision physicochemical analyses such as fractionation of soil organic matter, various chemical analyses, and ^{14}C dating. In this study, paddy soils are grouped into four ecological environments, defined by climatic factors (temperate and tropical zones) and geological factors (volcanic influence): 1) soil organic carbon (SOC) is divided into four fractions (easily degradable, aggregated, mineral-bound, and chemically stable) with different degradability according to its stabilization mechanism; and determine the amount and mean residence time of SOC in each fraction 2) the determinants of the accumulation mechanism are determined as a whole and for each ecological environment by analyzing the relationship between the organic matter and climate, soil characteristics, and fertilizer management methods, and 3) accumulation methods of SOC are elucidated that enhance both fertility and carbon sequestration functions. Currently, research is being conducted in seven countries: Japan, Korea, Taiwan, Thailand, the Philippines, Malaysia, and Nepal. We believe that this will provide a new perspective on the evaluation and management of soil organic matter dynamics in the fields of soil science, ecology, and environmental sciences.

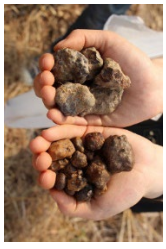






2. Comprehensive fertility assessment and sustainable management of Asian paddy soils

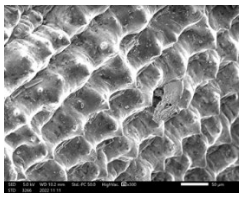
Supporting paddy rice cultivation in Asia, which is estimated to feed more than half of the world's population, is essential for sustainable food production in the world. I have conducted research to extract paddy field soil fertility factors, quantify the factor scores, and classify Asian paddy field soils based on these factors by combining evaluation of soil fertility-related characteristics with multivariate analysis for a large number of paddy soils in major paddy field regions in temperate and tropical Asian countries. Currently, we are elucidating the paddy soil conditions in South Korea, Taiwan, and Nepal, following Japan, Thailand, the Philippines, Malaysia, and Indonesia.



3. Establishment of new evaluation methods for soil fertility related properties

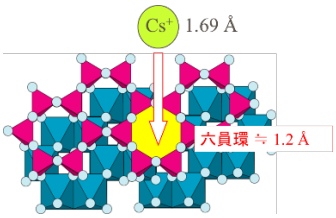
The current transition from intensive agriculture based on the application of large amounts of inorganic fertilizers, mainly nitrogen (N), phosphorus (P) and potassium (K), to regenerative agriculture that also uses organic materials, requires more precise evaluation of soil fertility in response to these changes. Based on this understanding, to evaluate soil K availability in detail, we are conducting research on the stepwise evaluation of soil K availability of non-exchangeable K and the analysis of the relationship between K availability and crop yield under K-deficient conditions. In addition, as a source of silicon (Si), a beneficial element for rice plants such as rice and sugarcane, we are evaluating the crystallinity (amorphousness) and leachability of phytoliths (plant-derived silica) as well as evaluating their importance in Si cycling at the field scale.

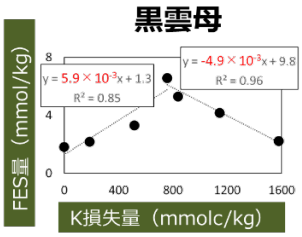


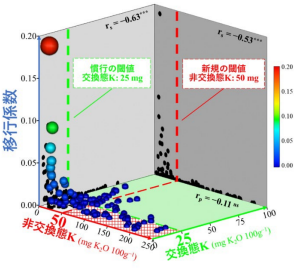



4. Elucidation of adsorption/desorption behavior of radiocesium in soil and establishment of technology to reduce the risk of its transfer to plants

Radiocesium, which has attracted particular attention since the Great East Japan Earthquake, is strongly fixed in "frayed edges," which are caused by terminal expansion of mica (illite-like minerals), a type of clay mineral present in soils. We have investigated the mineralogical factors that determine the mobility of radiocesium by examining the amount and degree of expansion of mica and the effect of Al polymer, which inhibits the adsorption of cesium on the frayed edges, in various types of soils in Japan and around the world. Currently, we are conducting further research on the quantitative relationship between the adsorption/desorption capacity of radiocesium and the risk of its transfer to plants, as well as establishing a rational soil management method for crop production in post-decontamination agricultural soils without increasing the risk of transfer.

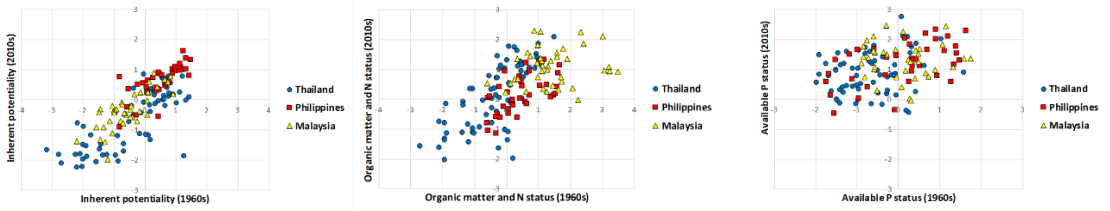




5. Analysis of long-term changes in paddy soil fertility in tropical Asia during the Green Revolution

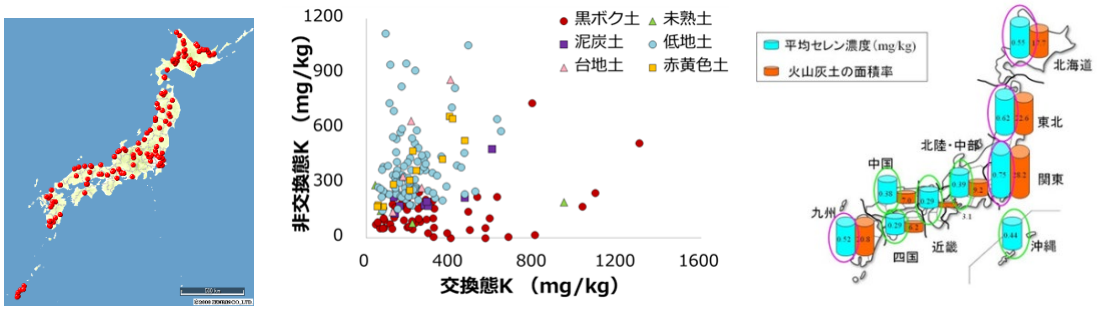
The "Green Revolution" that began in the 1960s increased rice yields in tropical Asia, but the impact of the accompanying increases in fertilizer application and removal of nutrients by harvesting on soil

fertility has not been fully investigated. Therefore, we conducted a re-survey of paddy soils in the 2010s in the same locations as Kawaguchi & Kyuma (1977), who evaluated paddy soil fertility in 10 tropical Asian countries in the 1960s and 1970s and analyzed the changes in soil fertility over the past 50 years by the evaluation of soil fertility-related properties and multivariate analysis of the data. The results showed, over the past 50 years, a significant increase in available P and a slight decrease in organic matter, as well as the maintenance of intrinsic potential, while the release of N and K into the environment was strongly suggested due to largely unchanged soil contents despite the application of large amounts of fertilizer. This study contributed to the development of paddy field soil science in Japan and around the world and provided a new perspective that should be considered in the development of soil fertility management methods for agricultural lands, because it demonstrated the significance of harmonizing appropriate organic matter application with further improvement in plant nutrient use efficiency on a large spatio-temporal scale, which has not been done before.



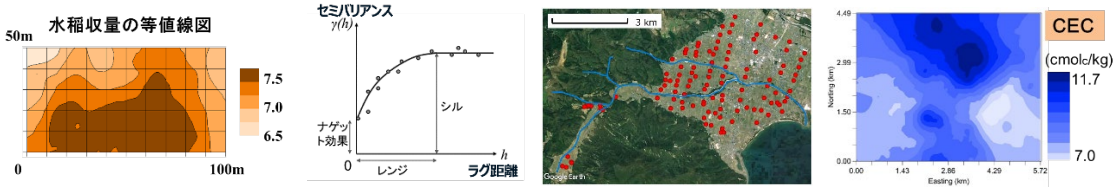
6. Evaluation of soil fertility and analysis of its determinants in Japanese agricultural soils

Comprehensive analysis of soil elemental composition and their various chemical forms is important not only for evaluating soil fertility, but also as basic information on human health via soil-crop-human interaction in that it can determine the amount of essential elements/toxic elements for humans. Therefore, we collected a total of 180 samples of agricultural surface soils (97 from paddy fields and 83 from fields) and quantitatively evaluated total concentrations of N, P, K, Si, iodine (I), selenium (Se) etc., as well as N in different forms, available Si, nonexchangeable K etc. We also analyzed their relationship with other soil properties, soil type and land use to comprehensively determine their determinants. This research will provide basic information for food production and environmental conservation in Japan, and will also be useful in understanding the biogeochemical cycle of elements in the terrestrial environment in Japan by comparing the soil properties with those of rocks and river water. Furthermore, this will lead to the understanding of relative position of Japanese agricultural soils in Asia, by comaring with the results of the broad-scale assessment of agricultural soils in Asia.



7. Analysis of spatial variation of soil properties at the field scale

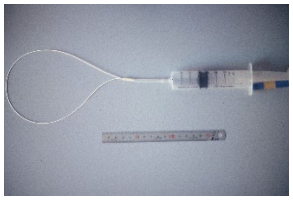
Spatial variability of soil fertility-related property values in rice paddy fields was analyzed using spatial statistics (geostatistics) to elucidate the existence of heterogeneous distribution of various nutrients depending on microtopography and management, even in relatively even paddy fields. Spatial variability analysis of yield combined with multiple regression analysis revealed that 65% of non-random variability in yield can be explained by soil properties and that "precision agriculture" that takes into account spatial variability of soil properties and rice yield can reduce fertilizer application by 13% without changing yield, which can be regarded as the foundation for current smart agriculture. Spatial variation analysis of organic matter dynamics in semi-arid wheat fields in northern Kazakhstan revealed that the dynamics of organic matter is largely determined by topography and demonstrated the effectiveness of "topography-adaptive management" for harmonizing food production and environmental conservation. Spatial variation analysis of soil properties and crop yield and environmental load such as N_2O emission in various agro-ecosystems was conducted. The relationship between soil sampling frequency and data reliability was analyzed to elucidate the rational spatio-temporal sampling frequency for each soil property value according to tolerance and risk factor. Currently, we are conducting research on spatial variability analysis of paddy soils and its application to site-specific fertilizer management in the alluvial plain of Takashima City, Shiga Prefecture, where soils derived from different parent materials are distributed.

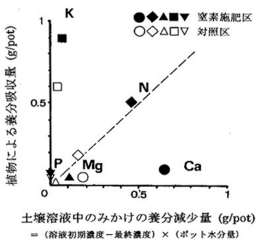


8. Analysis of spatio-temporal variation of soil nutrients in the root zone and rhizosphere and elucidation of nutrient supply mechanisms

A soil solution sampling device using hollow fibers was developed to investigate soil nutrient dynamics by sampling soil solutions in the root zone of individual plants in space and time. By applying this method, we found that the concentration of various nutrients in the soil solution decreases and the nutrient composition, using AR^K (activity ratio of Ca, Mg, and K) as an indicator, also changes dynamically with plant growth, and that nitrate ion, the major anion and the major nitrogen form, controls the dynamics of other nutrients. We have also demonstrated that appropriate fertilizer management that suppresses the concentration of soil solution in the early stages of plant growth can significantly reduce leaching potential without significantly affecting growth rate, nutrient uptake, or the nutrient supply mechanism. In addition, we clarified the effects of various management practices on soil nutrient dynamics in the rhizosphere, the direct interface between soil and plant, and proposed a method for evaluating soluble nutrients based on this understanding. Furthermore, we demonstrated the absorption of non-exchangeable potassium in soil by paddy rice by elucidating the reduction of

non-exchangeable potassium and the associated expansion of mica mineral layers in soils of the potassium-deficient plots of long-term field experiments.



II. BOOKS

1. Funakawa, S., Yanai, J., Takata, Y., Karbozova-Saaljnikov, E., Akshalov, K. and Kosaki, T. 2007: Dynamics of water and soil organic matter under grain farming in Northern Kazakhstan – Toward sustainable land use both from the agronomic and environmental viewpoints. *In* "Climate Change and Terrestrial Carbon Sequestration in Central Asia". Eds. R. Lal, M. Suleimenov, B.A. Stewart, D.O. Hanson, and P. Doraiswamy. pp279-331. Taylor & Francis, Leiden, Netherlands.
2. Yanai, J. and Toma, M. 2021: Kinki, Chugoku and Shikoku regions. *In* "The Soils of Japan", Hatano, R. Shinjo, H. and Takata, Y. (ed), Springer, pp 299-326.
3. Murashita, N. Nakao, A., Nagashima, K. and Yanai, J. 2021: Effect of deer browsing and clear-cutting of trees on soil erosion in a forest ecosystem in Japan. *In* "Advances in Understanding Soil Degradation" (Elmira Saljnikov et al. (ed)), 271-285. Springer.
4. Yanai, J., Tanaka, S., Nakao, A. and Abe, S. 2022: Changes in Paddy Soil Fertility in Tropical Asia under the Green Revolution. From the 1960s to the 2010s. Springer, pp246. https://link.springer.com/book/10.1007/978-981-16-5425-1
5. Nakao, A., Uno, S., Tanaka, R. and Yanai, J. 2022: Mineralogical factors controlling the ability to retain ^{137}Cs in Andosols in Japan. *In* Behavior of radionuclides in the Environment. Volume III – Fukushima. Nanba, K., Konoplev, A. and Wada, T. (ed), 365-375, Springer.

III. PUBLICATIONS (REFEREED PAPERS)

1. Yanai, J., Araki, S. and Kyuma, K. 1993: Use of a looped hollow fiber sampler as a device for nondestructive soil solution sampling from the heterogeneous root zone. *Soil Science and Plant Nutrition*, **39**, 737-743.
2. Yanai, J., Araki, S. and Kyuma, K. 1995: Effects of plant growth on the dynamics of the soil solution composition in the root zone of maize in four Japanese soils. *Soil Science and Plant Nutrition*, **41**, 195-206.
3. Yanai, J., Linehan, D.J., Robinson, D., Young, I.M., Hackett, C.A., Kyuma, K. and Kosaki, T. 1996: Effects of inorganic nitrogen application on the dynamics of the soil solution composition in the root zone of maize. *Plant and Soil*, **180**, 1-9.
4. Yanai, J., Nakano, A., Kyuma, K. and Kosaki, T. 1997: Application effects of controlled-availability fertilizer on dynamics of soil solution composition. *Soil Science Society of America Journal*, **61**, 1781-1786.
5. Tsunekawa, A., Kar, A., Yanai, J., Tanaka, U. and Miyazaki, T. 1997: Influence of continuous cultivation on the soil properties affecting crop productivity in the Thar Desert, India. *Journal of Arid Environment*, **36**, 367-384.
6. Yanai, J., Robinson, D., Young, I.M., Kyuma, K. and Kosaki, T. 1998: Effects of the chemical form of inorganic nitrogen fertilizers on the dynamics of soil solution composition and on nutrient uptake by wheat. *Plant and Soil*, **202**, 263-270.
7. Yanai, J., Yabutani, M., Kang, Y., Huang, B., Luo, G. and Kosaki, T. 1998: Heavy metal pollution of agricultural soils and sediments in Liaoning Province, China. *Soil Science and Plant Nutrition*, **44**, 367-375.
8. Moritsuka, N., Yanai, J., and Kosaki, T. 2000: Effect of plant growth on the distribution and forms of soil nutrients in the rhizosphere. *Soil Science and Plant Nutrition*, **46**, 439-447.
9. Yanai, J., Lee, C.K., Umeda, M. and Kosaki, T. 2000: Spatial variability of soil chemical properties in a paddy field. *Soil Science and Plant Nutrition*, **46**, 473-482.
10. Moritsuka, N., Yanai, J., and Kosaki, T. 2000: Non-destructive method for determining temporal and spatial changes of the soil solution chemistry in the rhizosphere. *Soil Science and Plant Nutrition*, **46**, 713-719.
11. Moritsuka, N., Yanai, J., and Kosaki, T. 2001: Effect of application of inorganic and organic fertilizers on the dynamics of soil nutrients in the rhizosphere. *Soil Science and Plant Nutrition*, **47**, 139-148.
12. Yanai, J., Lee, C.K., Kaho, T., Iida, M., Matsui, T., Umeda, M. and Kosaki, T. 2001: Geostatistical analysis of soil chemical properties and rice yield in a paddy field and application to the analysis of yield-determining factors. *Soil Science and Plant Nutrition*, **47**, 291-301.

13. Moritsuka, N., Yanai, J., and Kosaki, T. 2001: Effect of soil heating on the dynamics of soil available nutrients in the rhizosphere. *Soil Science and Plant Nutrition*, **47**, 323-331.
14. Moritsuka, N., Yanai, J., and Kosaki, T. 2002: A sensitive method for detecting the depletion of nonexchangeable potassium in the rhizosphere using a sequential extraction with 0.01 molar hydrochloric acid. *Soil Science and Plant Nutrition*, **48**, 577-583.
15. Yamamuro, S., Ueno, H., Yamada, H., Takahashi, Y., Shiga, Y., Miyahara, S., Shimonihara, T., Murase, J., Yanai, J. and Nishida, M. 2002: Uptake of carbon and nitrogen through roots of rice and corn plants, grown in soils treated with ^{13}C and ^{15}N dual-labeled cattle manure compost. *Soil Science and Plant Nutrition*, **48**, 787-795.
16. Moritsuka, N., Yanai, J., Sano, S., Fujii, A. and Kosaki, T. 2003: Evaluation of readily available nonexchangeable potassium in soil by sequential extractions with 0.01 molar hydrochloric acid. *Soil Science and Plant Nutrition*, **49**, 631-639.
17. Yanai, J., Sawamoto, T., Oe, T., Kusa, K., Yamakawa, K., Sakamoto, K., Naganawa, T., Inubushi, K., Hatano, R. and Kosaki, T. 2003: Spatial variability of nitrous oxide emissions and their soil-related determining factors in an agricultural field. *Journal of Environmental Quality*, **32**, 1965-1977.
18. Moritsuka, N., Yanai, J. and Kosaki, T. 2004: Possible processes releasing nonexchangeable potassium from the rhizosphere of maize. *Plant and Soil*, **258**, 261-268.
19. Moritsuka, N., Yanai, J. Mori, K. and Kosaki, T. 2004: Biotic and abiotic processes of nitrogen immobilization in the soil-residue interface. *Soil Biology and Biochemistry*, **36**, 1141-1148.
20. Yanai, J., Mabuchi, N., Moritsuka, N., and Kosaki, T. 2004: Distribution and forms of cadmium in the rhizosphere of *Brassica juncea* in Cd contaminated soils and implications for phytoremediation. *Soil Science and Plant Nutrition*, **50**, 423-430.
21. Sano, S., Yanai, J. and Kosaki, T. 2004: Evaluation of soil nitrogen status in Japanese agricultural lands with reference to land use and soil types. *Soil Science and Plant Nutrition*, **50**, 501-510.
22. Moritsuka, N., Yanai, J., Umeda, M. and Kosaki, T. 2004: Spatial relationships among different forms of soil nutrients in a paddy field. *Soil Science and Plant Nutrition*, **50**, 565-573.
23. Yanai, J., Mishima, A., Funakawa, S., Akshalov, K. and Kosaki, T. 2005: Spatial variability of organic matter dynamics in the semi-arid croplands of northern Kazakhstan. *Soil Science and Plant Nutrition*, **51**, 261-269. **（SSPN Award）**
24. Nishiyama, Y., Yanai, J. and Kosaki, T. 2005: Potential of *Thlaspi caerulescens* for cadmium phytoremediation: comparison of two representative soil types in Japan under different planting frequencies. *Soil Science and Plant Nutrition*, **51**, 827-834.

25. Yanai, J., Zhao, F.J., McGrath, S. and Kosaki, T. 2006: Effect of soil characteristics on Cd uptake by the hyperaccumulator *Thlaspi caerulescens*. *Environmental Pollution*, **139**, 167-175.
26. Itami, K. and Yanai, J. 2006: Sorption and desorption properties of cadmium and copper on soil clays in relation to charge characteristics. *Soil Science and Plant Nutrition*, **52**, 5-12.
27. Sano, S., Yanai, J. and Kosaki, T. 2006: Relationship between labile organic matters and nitrogen mineralization in Japanese agricultural soils with reference to land use and soil type. *Soil Science and Plant Nutrition*, **52**, 49-60.
28. Imamura, A., Yumoto, T. and Yanai, J. 2006: Urease activity in soil as a factor affecting the succession of ammonia fungi. *Journal of Forest Research*, **11**, 131-135.
29. Funakawa, S., Yanai, J., Hayashi, Y., Hayashi, T., Watanabe, T., Noichana, T., Panitkasate, T., Katawatin, R., Kosaki, T. and Nawata, E. 2006: Soil organic matter dynamics in a sloped sandy cropland of northeast Thailand with special reference to the spatial distribution of soil properties. *Japanese Journal of Tropical Agriculture*, **50**, 199-207.
30. Yanai, J., Nakata, S., Funakawa, S., Nawata, E., Katawatin, R., Tulaphitak, T. and Kosaki, T. 2007: Evaluation of nutrient availability of sandy soil in northeast Thailand with reference to growth, yield and nutrient uptake by maize. *Japanese Journal of Tropical Agriculture*, **51**, 169-176.
31. Takata, Y., Funakawa, S., Yanai, J., Mishima, A., Akshalov, K., Ishida, N., and Kosaki, T. 2008: Influence of crop rotation system on the spatial and temporal variation of the soil organic carbon budget in northern Kazakhstan. *Soil Science and Plant Nutrition*, **54**, 159-171.
32. Liu, M.Q., Yanai, J., Jiang, R.F., Zhang, F. McGrath, S.P. and Zhao, F.J. 2008: Does cadmium play a physiological role in the hyperaccumulator *Thlaspi caerulescens*? *Chemosphere*, **71**, 1276-1283.
33. Matsui, N., Suekuni, J., Havanod, S., Nishimiya, A., Yanai, J. and Kosaki. T. 2008: Determination of soil-related factors controlling initial mangrove (*Rhizophora apiculata* BL.) growth in an abandoned shrimp pond. *Soil Science and Plant Nutrition*, **54**, 301-309.
34. Yanai, J., Noguchi, J., Yamada, H., Sugihara, S., Kilasara, M. and Kosaki, T. 2009: Function of geophagy as supplementation of micronutrients in Tanzania. *Soil Science and Plant Nutrition*, **55**, 215-223.
35. Meharg, A.A., Williams, P.N., Adamako, E., Lawgali, Y.Y., Deacon, C., Villada, A., Cambell, R.C.J., Sun, G., Zhu, Y.G., Feldmann, J., Raab, A., Zhao, F.J., Islam, R., Hossain, S. and Yanai, J. 2009: Geographical variation in total and inorganic arsenic content of polished (white) rice. *Environmental Science and Technology*, **43**, 1612-1617.
36. Yamada, H., Kamada, A., Usuki, and Yanai, J. 2009: Total selenium content of agricultural soils in Japan. *Soil Science and Plant Nutrition*, **55**, 616-622.

37. Moritsuka, N., Matsuoka, K., Matsumoto, S., Masunaga, T. and Yanai, J. 2010: Significance of plant-induced solubilization of soil nitrogen: A case of komatsuna plants grown in fertilized soils. *Plant Production Science*, **13**, 307-313.
38. Yanai, J., Nakata, S., Funakawa, S., Nawata, E., Katawatin, R. and Kosaki, T. 2010: Effect of NPK application on the growth, yield and nutrient uptake by sugarcane on a sandy soil in northeast Thailand. *Tropical Agriculture and Development*, **54**, 113-118.
39. Yanai, J., Yamada, K. Yamada, H., Nagano, Y. and Kosaki, T. 2011: Risk assessment of heavy metal-contaminated soils with reference to the aging effect. *Pedologist*, **54**, 278-284.
40. Yanai, J., Okada, T., and Yamada, H. 2012: Elemental composition of agricultural soils in Japan in relation to soil type, land use and region. *Soil Science and Plant Nutrition*, **58**, 1-10.
41. Ogasawara, S., Nakao, A. and Yanai, J. 2013: Radiocesium interception potential (RIP) of smectite and kaolin reference minerals containing illite (micaceous mineral) as impurity. *Soil Science and Plant Nutrition*, **59**, 852-857.
42. Nakao, A., Ogasawara, S., Sano, O., Ito, T. and Yanai, J. 2014: Radiocesium sorption in relation to clay mineralogy of paddy soils in Fukushima, Japan. *Science of the Total Environment*, **468-469**, 523-529.
43. Yanai, J., Ohmoto, T., Nakao, A., Koyama, K., Hartono, A. and Anwar, S. 2014: Evaluation of nitrogen status of agricultural soils in Java, Indonesia. *Soil Science and Plant Nutrition*, **60**, 188-195.
44. Moritsuka, N. Matsuoka, K. Katsura, K. Sano, S. and Yanai, J. 2014: Soil color analysis for statistically estimating total carbon, total nitrogen and active iron contents in Japanese agricultural soils. *Soil Science and Plant Nutrition*, **60**, 475-485.
45. Yanai, J., Mizuhara, S. and Yamada, H. 2015: Soluble selenium content of agricultural soils in Japan and its determining factors with reference to soil type, land use and region. *Soil Science and Plant Nutrition*, **61**, 312-318.
46. Nakao, A., Takeda, A., Ogasawara, S., Yanai, J., Sano, O. and Ito, T. 2015: Relationships between paddy soil radiocesium interception potentials and physicochemical properties in Fukushima, Japan. *Journal of Environmental Quality*, **44**, 780-788.
47. Moritsuka, N., Katsura, K., Matsuoka, K. and Yanai, J. 2015: Decadal sustainability of spatial distributions of soil properties in a paddy field as a fingerprint reflecting soil forming factors and field managements. *Soil Science and Plant Nutrition*, **61**, 516-527.
48. Hartono, A., Anwar, S., Satwoko, A., Koyama, K., Omoto, T., Nakao, A. and Yanai, J. 2015: Phosphorus fractions of paddy soils in Java, Indonesia. *Journal of International Society for Southeast Asian Agricultural Sciences*, **21-2**, 20-30.
49. Nakao, A., Nakao, A., Tanaka, R., Ogasawara, S. and Yanai, J. 2015: Aeolian-dust-derived micaceous minerals control radiocesium retention in Andosols in Japan. *Soil Science Society of America Journal*, **79**, 1590-1600.

50. Yanai, J., Taniguchi, H. and Nakao, A. 2016：Evaluation of available silicon content and its determining factors of agricultural soils in Japan. *Soil Science and Plant Nutrition*, **62**, 511-518. **（SSPN Award）**
51. Ogasawara, S., Nakao, A. and Yanai, J. 2017: A stepwise change of frayed edge site content in biotite in response to the gradual release of potassium from the interlayers. *Soil Science and Plant Nutrition*, **63**, 529-535.
52. Kitagawa, Y., Yanai, J. and Nakao, A. 2018: Evaluation of nonexchangeable potassium content of agricultural soils in Japan by the hot HNO_3 extraction method. *Soil Science and Plant Nutrition*, **64**, 116-122.
53. Tashiro, Y., Nakao, A., Wagai, R., Yanai, J. and Kosaki, T. 2018: Inhibition of radiocesium adsorption on 2:1 clay minerals under acidic soil environment: effect of organic matter vs. hydroxy aluminum polymer. *Geoderma*, **319**, 52-60.
54. Ogasawara, S., Eguchi, T., Nakao, A., Fujimura, S., Takahashi, Y., Matsunami, H., Tsukada, H., Yanai, J. and Shinano, T. 2019. Phytoavailability of ^{137}Cs and stable Cs in soils from different parent materials in Fukushima, Japan. *Journal of Environmental Radioactivity*, **198**, 117-125.
55. Moritsuka, N., Matsuoka, K., Katsura, K. and Yanai, J. 2019: Farm-scale variations in soil color as influenced by organic matter and iron oxides in Japanese paddy fields. *Soil Science and Plant Nutrition*, **65**, 166-175.
56. Nakao, A., Tomita, M., Nakao, A., Wagai, R., Tanaka, R., Yanai, J. and Kosaki, T. 2019: Asian dust increases radiocesium retention ability of serpentine soils in Japan. *Journal of Environmental Radioactivity*, **204**, 86-94.
57. Kurokawa, K., Nakao, A., Tsukada, H., Manpuku, Y. and Yanai, J. 2019: Exchangeability of ^{137}Cs and K in soils of agricultural fields after decontamination in the eastern coastal area of Fukushima. *Soil Science and Plant Nutrition*, **65**, 401-408.
58. Kitayama, R., Yanai, J. and Nakao, A. 2020: Ability of micaceous minerals to adsorb and desorb cesium ions: Effects of mineral type and degree of weathering. *European Journal of Soil Science*, **71**, 641-653.
59. Ogasawara; S., Nakao; A., Eguchi; T., Ota, T., Matsunami; H., Yanai; J. and Shinano, T. 2020: The extractability of potassium and radiocaesium in soils developed from granite and sedimentary rock in Fukushima, Japan. *Journal of Radioanalytical and Nuclear Chemistry*, **323**, 633-640.
60. Kurokawa, K., Nakao, A., Wakabayashi, S., Fujimura, S., Eguchi, T., Matsunami, H. and Yanai, J. 2020: Advanced approach for screening soil with a low radiocesium transfer to brown rice in Fukushima based on exchangeable and nonexchangeable potassium. *Science of the Total Environment*, **743**, 140458.

61. Yanai, J., Hirose, M., Tanaka, S., Sakamoto, K., Nakao, A., Dejbhimon, K., Sriprachote, A., Kanyawongha, P., Lattirasuvan, T. and Abe, S. 2020: Changes in paddy soil fertility in Thailand due to the Green Revolution during the last 50 years. *Soil Science and Plant Nutrition*, **66**, 889-899.
62. Tanaka, S., Saito, H., Kajiwara, N., Paing, T.N., Yusoff, K.H.M., Abe, S., Nakao, A. and Yanai, J. 2021: Long-term changes in paddy soil fertility in Peninsular Malaysia during 50 years after the Green Revolution with special reference to their physiographic environments. *Soil Science and Plant Nutrition*, **67**, 80-88.
63. Nakao, A., Uno, S., Yanai, J., Kubotera, H., Tanaka, R. and Kosaki, T. 2021: Distance-dependence from volcano for Asian dust inclusions in Andosols: a key to control soil ability to retain radiocesium. *Geoderma*, **385**, 114889.
64. Hasukawa, H., Inoda, Y., Toritsuka, S., Takahashi, Y., Sudo, S., Oura N., Sano, T., Shirato, Y. and Yanai, J. 2021: Effect of paddy-upland rotation system on the net greenhouse gas balance as the sum of methane and nitrous oxide emissions and soil carbon storage: a case in western Japan. *Agriculture*, **11**, 52.
65. Moritsuka, N., Matsuoka, K., Katsura, K., Sano, S. and Yanai, J. 2021: Laboratory and field measurement of magnetic susceptibility of Japanese agricultural soils for rapid soil assessment. *Geoderma*, **393**, 115013.
66. Rattan Lal, Johan Bouma, Eric Brevik, Lorna Dawson, Damien J. Field, Bruno Glaser, Ryusuke Hatano, Alfred Hartemink, Takashi Kosaki, Bruce Lascelles, Curtis Monger, Cristine Muggler, Georges Martial Ndzana, Stefan Norra, Xicai Pan, Remigio Paradelo, Laura Bertha Reyes-Sánchez, Taru Sandén, Bal Ram Singh, Heide Spiegel, Junta Yanai, Jiabao Zhang 2021: Soils and Sustainable Development Goals of the United Nations: An IUSS Perspective. *Geoderma Regional*, **25**, e00398.
67. Nakao, A., Masai, F., Timbas, N., Medina, S., Abe, S., Tanaka, S. and Yanai, J. 2021: Changes in lowland paddy soil fertility in the Philippines after 50 years of the Green Revolution. *Soil Science and Plant Nutrition*, **67**, 446-459.
68. Yanai, J., Tanaka, S., Nakao, A., Abe, S., Hirose, M., Sakamoto, K., Masai, F., Saito, H., Kajiwara, N., Dejbhimon, K., Sriprachote, A., Kanyawongha, P., Lattirasuvan, Timbas, N.T., Medina, S., Tan, K., Hafiz, K. and Kyuma, K. 2022: Long-term changes in paddy soil fertility in tropical Asia after 50 years of the Green Revolution. *European Journal of Soil Science*, **73**, e13193.
69. Hirose, M., Yanai, J., Tanaka, S., Sakamoto, K., Nakao, A., Dejbhimon, K., Sriprachote, A., Kanyawongha, P., Lattirasuvan, T., Abe, S. and Nawata, E. 2022: Changes in paddy soil fertility in Thailand in relation to total content of elements and micronutrient status under the Green Revolution from the 1960s to the 2010s. *Tropical Agriculture and Development*, **66**, 33-43 **(Best Paper Award)**.

70. Hasukawa, H., Inoda, Y., Takayama, T., Takehisa, K., Sudo, S., Akiyama, H. and Yanai, J. 2022: Effects of controlled release N fertilizers and reduced application rate on nitrous oxide emissions from soybean fields converted from rice paddies. *Soil Science and Plant Nutrition*, **67**, 716-726.
71. Wakabayashi, S., Eguchi, T., Nakao, A., Azuma, K., Fujimura, S., Kubo, K., Saito, M., Matsunami, H. and Yanai, J. 2022: Effectiveness of non-exchangeable potassium quantified by mild tetraphenyl-boron extraction in estimating radiocesium transfer to soybean in Fukushima. *Science of the Total Environment*, **820**, 153119.
72. Asano, I., Harada, N., Nakao, A., Evrard, O. and Yanai, J. 2022: Impact of radiocesium contamination in flooded sediment deposited after the 2019 typhoon on decontaminated fields of Fukushima Prefecture, Japan. *Comptes Rendus Geosciences*, **134**, 131-140.
73. Arakawa, K., Yanai, J. and Watanabe, K. 2022: Study of the Ca^{2+}-dependent gene expression of EuPrt, an extracellular metalloprotease produced by the psychro-tolerant bacterium *Exiguobacterium undae* Su-1. *Bioscience, Biotechnology, and Biochemistry*, **86**, 1308-1317.
74. Yanai, J., Inoue, N., Nakao, A., Kasuya, M., Ando, K., Oga, T., Takayama, T., Hasukawa, H., Takehisa, K., Takamoto, S., Togami, K. and Takahashi, T. 2022: Use of soil nonexchangeable potassium by paddy rice with clay structural changes under long-term fertilizer management. *Soil Use and Management*, **39**, 785–793.
75. Ito, R., Yanai, J. and Nakao, A. 2022: Interactive effect of parent material and topography on the spatial variability of soil material characteristics of paddy soils in the alluvial plain. *Soil Science and Plant Nutrition*, **69**, 99-108.
76. Morita, S. Tamba, N., Shibasaka, M., Sasano, S., Kadoike, T., Urase, Y, Maruyama, M., Fukuoka, A., Yanai, J., Masumura, T., Ogihara, Y., Satoh, S., Tanaka, K., Katsuhara, M., Nakayama, H. 2023: *In planta* evidence that the HAK transporter OsHAK2 is involved in Na^+ transport in rice. *Bioscience, Biotechnology, and Biochemistry* (in press).

IV. PROFESSIONAL AFFILIATIONS AND SERVICES

+ Japanese Society of Soil Science and Plant Nutrition (Editor-in-Chief of *Soil Science and Plant Nutrition*)
+ Japanese Society of Pedology (Council member)
+ Soil Science Society of America
+ British Society of Soil Science
+ International Union of Soil Sciences (IUSS)

V. AWARD RECEIVED

Apr-2006 : Encouragement Award of Japanese Society of Soil Science and Plant Nutrition.
Apr-2006: Best Paper Award of Soil Science and Plant Nutrition.

April-2018: Best Paper Award of Soil Science and Plant Nutrition.

April-2021: Best Paper Award of Japanese Journal of Soil Science and Plant Nutrition.

March-2023: Best Paper Award of Tropical Agriculture and Development.

VI. UNIVERSITY EDUCATION

Apr-1986 – Mar-1990: Department of Agricultural Chemistry, Faculty of Agriculture, Kyoto University, Kyoto Japan, Bachelor Degree Candidate.

Apr-1990 – Mar-1992: Department of Agricultural Chemistry, Graduate School of Agriculture, Kyoto University, Kyoto Japan, Master Degree Candidate.

Apr-1992 – Jul-1995: Department of Agricultural Chemistry, Graduate School of Agriculture, Kyoto University, Kyoto Japan, Dr. Degree Candidate.

Apr-1993 – Jan-1994: Scottish Crop Research Institute, UK, to make collaborative research as a visiting Doctor course student under the supervision of Drs. Iain Young, Denis Linehan and David Robinson.

Mar-1998: Doctor Degree of Agricultural Science, Kyoto University, Kyoto Japan.

VII. PROFESSIONAL EXPERIENCE

Jul-1995 – Mar-1997: Assistant Professor, Faculty of Agriculture, Kyoto University

Apr-1997 – Mar-2002: Assistant Professor, Graduate School of Agriculture, Kyoto University

Apr-2002 – Mar-2005: Assistant Professor, Graduate School of Global Environmental Sciences, Kyoto University

Aug-2002 – Aug-2003: Visiting Researcher, Rothamsted Research, UK (by JSPS Program, in collaboration with Prof. Steve McGrath and Dr. Fangjie Zhao)

Apr-2005 – Mar-2007: Associate Professor, Graduate School of Agriculture, Kyoto Prefectural University

April-2007 – March-2011: Associate Professor, Graduate School of Life and Environmental Sciences, Kyoto Prefectural University

April-2011 – Present: Professor, Graduate School of Life and Environmental Sciences, Kyoto Prefectural University

＋＋＋＋＋

（August 31, 2023）