



University of Kentucky
UKnowledge

International Grassland Congress Proceedings

21st International Grassland Congress / 8th
International Rangeland Congress

Phosphorus Accumulation in Soil Surface under Japanese Lawngress (*Zoysia japonica* Steud.) Pasture

M. Kaneko

Tokyo University of Agriculture & Technology, Japan

Y. Kurokawa

Tokyo University of Agriculture & Technology, Japan

Qing Hai

Tokyo University of Agriculture & Technology, Japan

H. Tanaka

Tokyo University of Agriculture & Technology, Japan

S. Suzuki

Tokyo University of Agriculture & Technology, Japan

See next page for additional authors

Follow this and additional works at: <https://uknowledge.uky.edu/igc>



Part of the [Plant Sciences Commons](#), and the [Soil Science Commons](#)

Kaneko, M.; Kurokawa, Y.; Hai, Qing; Tanaka, H.; Suzuki, S.; and Kamata, T., "Phosphorus Accumulation in Soil Surface under Japanese Lawngress (*Zoysia japonica* Steud.) Pasture" (2020). *International Grassland Congress Proceedings*. 23.

<https://uknowledge.uky.edu/igc/21/3-2/23>

This Event is brought to you for free and open access by the Plant and Soil Sciences at UKnowledge. It has been accepted for inclusion in International Grassland Congress Proceedings by an authorized administrator of UKnowledge. For more information, please contact UKnowledge@lsv.uky.edu.

The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China in 2008.

Edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

Presenter Information

M. Kaneko, Y. Kurokawa, Qing Hai, H. Tanaka, S. Suzuki, and T. Kamata

Phosphorus accumulation in soil surface under Japanese lawngrass (*Zoysia japonica* Steud.) pasture

M. Kaneko, Y. Kurokawa, Qing Hai, H. Tanaka, S. Suzuki and T. Kamata
Tokyo University of Agriculture & Technology, 3-5-8, Saiwaicho, Fuchu, Tokyo, Japan. E-mail: m2k2@cc.tuat.ac.jp

Key words : P accumulation, Japanese lawngrass, P adsorption, P mineralization

Introduction Much attention is paid to the pasture of Japanese lawngrass in Japan because it is maintained with saved labor and without tillage or fertilizer. To clarify the mechanism of such sustainable production, nutrient flow in the pasture has to be investigated. Kaneko *et al.* (in press) suggested that P might be accumulated from the deeper soil profile into the soil surface in the pasture of Japanese lawngrass. The aim of this study is a comparison of soil P distribution from soil surface to 1 m in depth between the places of Japanese lawngrass and the places of other sward characteristics in the same pasture. This comparison enables us to discuss the P accumulation into soil surface by Japanese lawngrass plant.

Materials and methods This experiment was conducted at a Japanese lawngrass predominant semi-natural rotational grazed pasture for Japanese Black breeding cattle on Silic Andosols with an inclination of 5.6 degrees in Field Museum Tsukui (Kanagawa prefecture) of Tokyo University of Agriculture & Technology. Soils were taken at five points in dominated (JL) and not dominated (N JL) by Japanese lawngrass respectively, on 8th May 2007. At each point, soils were taken from four soil profiles (1st: 0-25 cm, 2nd: 25-50 cm, 3rd: 50-75 cm, 4th: 75-100cm). The soil were sieved through a 2 mm screen and air-dried. Air-dried soil was used to determine total P (TP), modified Bray No. 2 P (BP), Olsen P (OP), water-soluble P (WP), phosphatase activity (PA), total carbon (TC), total nitrogen (TN) and soil pH. All P was determined colorimetrically by the ammonium molybdate method.

Results and discussion Table 1 illustrates the values of measurements in four soil profiles of Japanese lawngrass pasture. Differences between 1st layer and deeper soil profiles in all measurements were significant ($p < 0.05$). TP, BP and OP under JL tended to be higher than under N JL at 1st and 2nd layer, though the differences were not significant. TP and BP under JL tended to be lower than under N JL at 3rd and 4th layer. These suggested that P accumulation, especially inorganic P accumulation, in soil surface might be higher under JL than N JL. BP under JL was lower than under N JL at 3rd layer ($p < 0.01$). At 3rd layer, pH under JL was also lower than under N JL ($p < 0.01$). The difference in the pH may have affected the difference in the BP. The tendency of lower TC under JL than under N JL suggested lower organic matter of soil under JL. PA values suggested the higher ability of the soil P mineralization at 1st layer than deeper soil profiles and the similar ability of the soil P mineralization under JL with N JL.

Table 1 The values of measurements in soil profiles of Japanese lawngrass pasture.

Layer (cm depth)	Total P		BP		OP		Total carbon		PA		pH	
	(g kg ⁻¹)		(mg kg ⁻¹)		(mg kg ⁻¹)		(g kg ⁻¹)		(μmol g ⁻¹ h ⁻¹)			
	JL	N JL	JL	N JL	JL	N JL	JL	N JL	JL	N JL	JL	N JL
1 st (0-25)	2.68	2.37	134.6	102.2	104.5	66.7	37.3	41.2	3.23	3.38	5.96 _a	5.78 _b
2 nd (25-50)	1.52	1.41	37.3	32.6	41.5	26.5	27.7	29.6	1.23	1.27	6.32	6.29
3 rd (50-75)	1.05	1.12	5.1 _a	6.5 _b	5.8	5.2	22.5	26.7	1.06	1.07	6.20 _a	6.38 _b
4 th (75-100)	1.09	1.19	6.2	7.5	6.5	5.5	25.7	30.9	1.48	1.11	6.28	6.34

Each value is mean value of 5 points measurements. JL: Japanese lawngrass dominated. N JL: Non-Japanese lawngrass dominated. BP: modified Bray No. 2 method P. OP: Olsen method P. PA: acid monophosphatase activity. Letters indicate significant differences ($p < 0.05$).

Conclusions The distributions of TP, BP and OP suggested that inorganic P was accumulated into the soil surface under JL more than under N JL. Mineralization of organic P and inorganic P adsorption rate of soil on Andosols might have played important roles on the P accumulation in soil surface under Japanese lawngrass pasture.

Reference

M. Kaneko, Y. Kurokawa, H. Tanaka, S. Suzuki, H. Itabashi (in press). Seasonal changes in herbage production and soil phosphorus contents in Japanese lawngrass (*Zoysia japonica* Steud.) and tall fescue (*Festuca arundinacea* Schreb.) pastures. *Grassland Science*.