

ALUMINUM AND IRON ANALYSIS FOR SELECTED SOIL SAMPLES

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INTRODUCTION

ALUMINUM (Al)

- THIRD MOST ABUNDANT ELEMENT IN THE LITHOSPHERE
- NORMALLY IT IS VERY INSOLUABLE AND LOW IN CONCENTRATION IN NATURE IN ITS BIOAVAILABLE FORM.
- IN RECENT TIMES, GETTING MORE IMPORTANCE BECAUSE OF INCREASED RELEASE TO NATURE BY HUMAN ACTIVITIES AND IT'S ADVERSE EFFECTS ON SOILS, PLANTS AND ON HUMANS.

ADVERSE EFFECTS OF ALUMINUM

- REDUCED RENAL FUNCTION AND NEUROTOXICITY IN HUMANS AT ELEVATED LEVELS.
- ONE OF THE MAIN REASONS FOR SOIL ACIDIFICATION
- DISTURBS PLANT GROWTH AND FUNCTIONS.

IRON (Fe)

- FOURTH MOST COMMON ELEMENT IN EARTH CRUST
- HAS A GREAT IMPORTANCE IN INDUSTRIAL WORLD
- AN ESSENTIAL TRACE ELEMENT FOUND IN ALL LIVING CELLS
- ADVERSE EFFECTS IN DEFICIENT AMOUNTS AND AS WELL AS IN ELEVATED AMOUNTS

ADVERSE EFFECTS OF IRON

□ IRON DEFICIENCY

- SIDEROPENIA OR HYPOFFERREMIA IN HUMANS
- CHLOROSIS IN PLANTS



Interveinal Chlorosis in river birch

(www.ipm.iastate.edu)

□ IRON TOXICITY

- IRON POISONING IN HUMANS
- BRONZING OF RICE AND FRECKLE LEAF OF SUGARCANE



Bronzing of Rice

(http://www.ehow.com/about_6679972_iron-toxicity-plants.html)

SOIL SAMPLES USED FOR THE EXPERIMENT

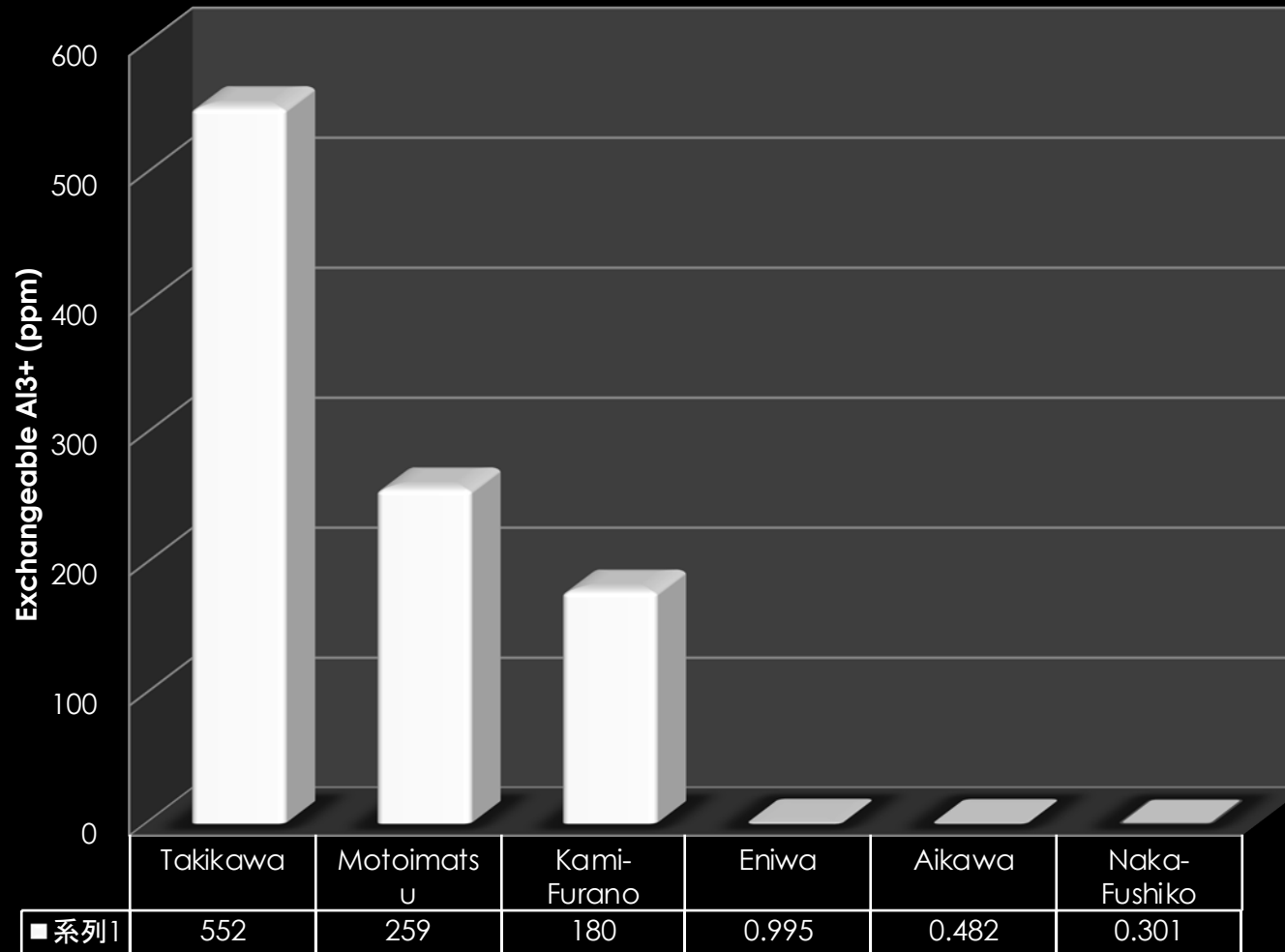
- ✓ TAKIKAWA
- ✓ MOTOIMATSU
- ✓ KAMI-FURANO
- ✓ ENIWA
- ✓ AIKAWA
- ✓ NAKA-FUSHIKO

DETERMINATION OF EXCHANGEABLE Al^{3+} BY ECR METHOD

- ✓ 10 g of air dry soil was extracted by 100 mL of 1 M KCl.
- ✓ 1 ml sample solution in 1M KCl was taken in a cuvette
- ✓ 0.1ml of 1% Ascorbic acid was added to the cuvette and was left for 5 minutes
- ✓ 0.2 ml of 0.0075% ECR solution was added and was left for 5 minutes for complex formation.
- ✓ At last, 1.2 ml of Hexamethylene-buffer was added.
- ✓ Absorbance was measured at 535nm.

RESULTS

Exchangeable Aluminum Content of the Soil Samples.



ANALYSIS OF ACTIVE IRON AND EXCHANGEABLE IRON CONTENT

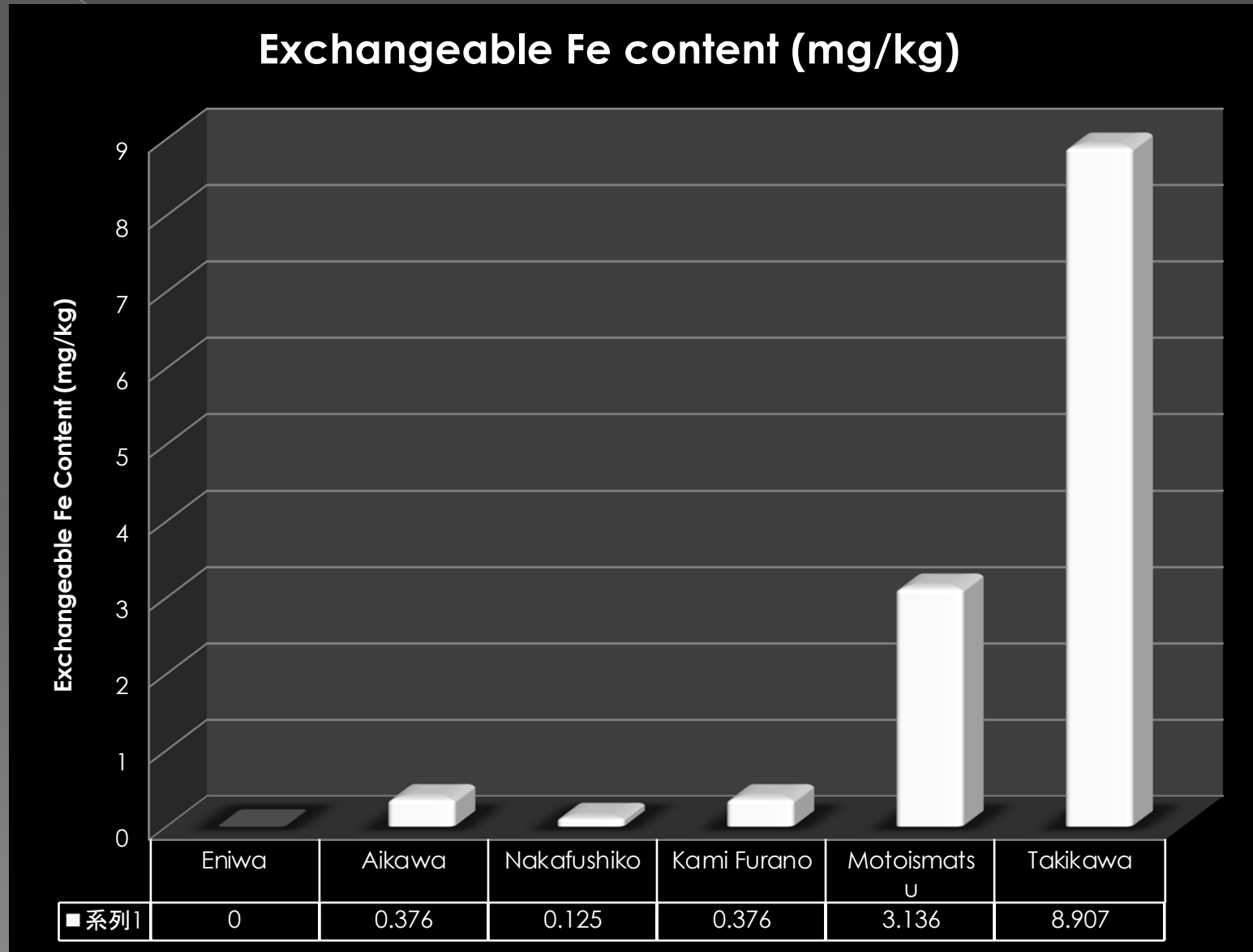
- Exchangeable Iron
- Active Iron



EXCHANGEABLE IRON DETERMINATION

- ✓ 10g of soil was extracted with 50ml 1M KCl solution.
- ✓ 2ml of 5% hydroxylamine-HCl was added to 20ml Extractant
- ✓ 4ml of 0.1% o-phenanthroline was added
- ✓ At last, 3ml of acetate buffer was added and the sample was left for 30minutes.
- ✓ Absorbance was measured at 508nm.

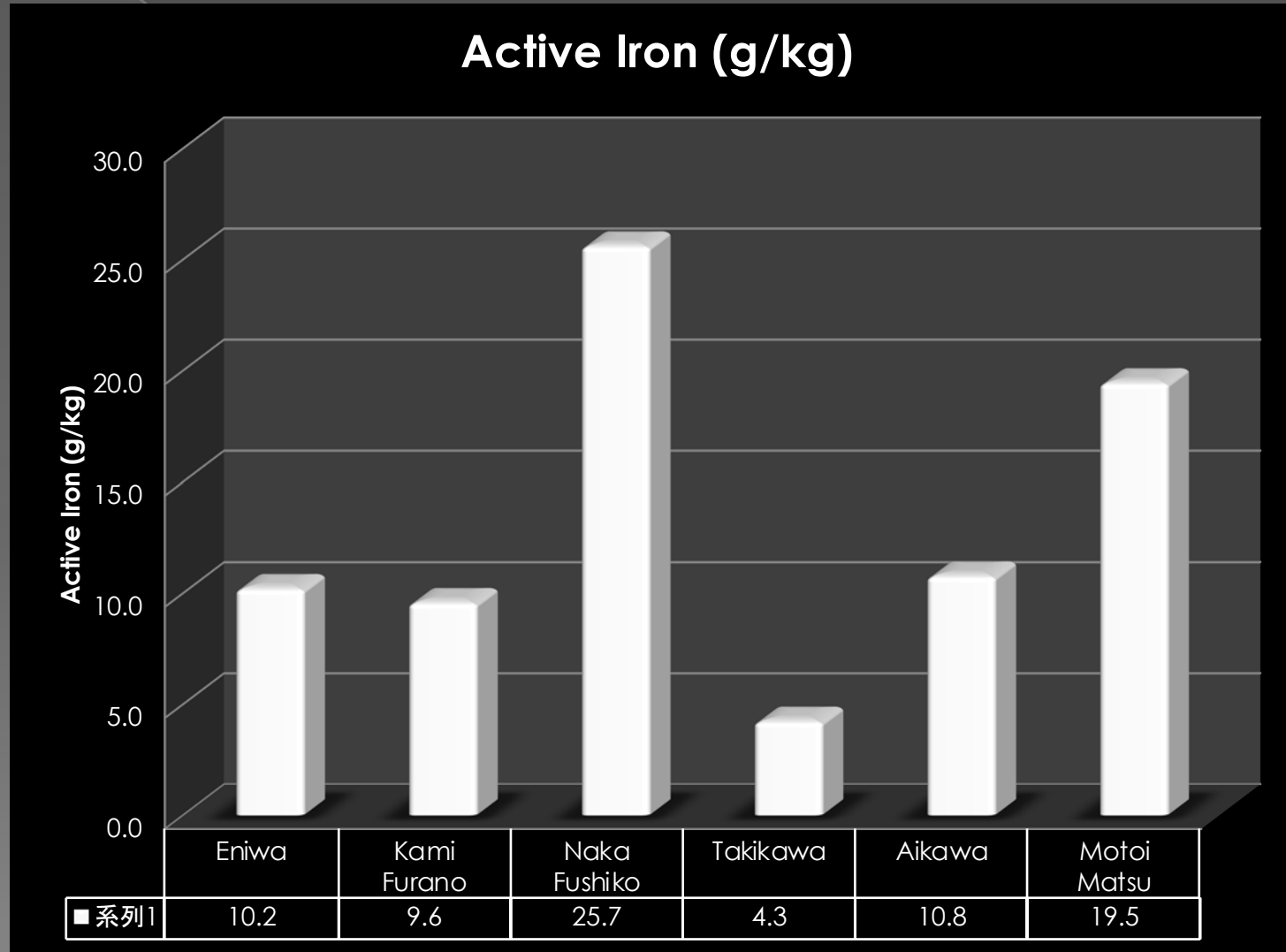
Exchangeable Fe - Results



Active Fe Determination

- ✓ 1g air dried soil and 3 g $\text{Na}_2\text{S}_2\text{O}_4$ were taken together.
- ✓ 100ml 0.02M EDTA solution was added and the sample was kept in a 70°C water bath for 15 minutes.
- ✓ Solution was then filtered and soil residue further washed with 1% NaCl 3 times.
- ✓ 1ml filtrate was taken and the colorimetric procedures were similar to the exchangeable Iron determination

Active Iron - Results



SUMMARY

SAMPLE NAME	EXCH. Al (ppm)	EXCH. Fe (mg/kg)	ACTIVE Fe (g/kg)
Eniwa	0.995	0.00	10.2
Kami-furano	180	0.38	9.6
Naka-fushiko	0.301	0.13	25.7
Takikawa	552	8.91	4.3
Aikawa	0.482	0.38	10.8
Motoi matsu	259	3.14	19.5