

7. ROOT DEVELOPMENT AND ROOT ACTIVITIE IN CERRADO SOILS

TAKEHIKO YOSHIDA 1 (solos)

7. ROOT DEVELOPMENT AND ROOT ACTIVITIES IN CERRADO SOILS

TAKEHIKO YOSHIDA¹ (Solos)

Based on the agreement between Brazilian and Japanese Governments for the Cooperation in Research in Cerrado Agriculture, I stayed and worked for about three months at CPAC.

I am greatly appreciated to EMBRAPA and JICA together with CPAC and NIAS (National Institute of Agricultural Sciences — NIAS) to have an opportunity of studying in Brazil, though my stay was not so long. I got intimate and warm friendship with a number of Brazilian colleagues, particularly with Dr. José Eurípedes da Silva who worked together during my three-months stay at CPAC. Dr. Elmar Wagner, Dr. Wenceslau Goedert and Dr. Edson Lobato kindly gave us excellent orientation and guidance. I would like to express my hearty gratitude to all of them.

1. **Period of stay:** 23 February 1979 — 14 May 1979
2. **Aspect of Research:** Root Development in Cerrado Soils
3. **Record of Work:**
 - 23 Feb. — Arrived in Brasília
 - 1 Mar. — Orientation at CPAC
 - 5-7 Mar. — Field inspection in Araxá, with Dr. Dedecek, Dr. Iwata and Dr. Kawasaki
 - 8 Mar. — Visit of CNPARroz e Feijão, Goiânia, with Dr. Iwata and Dr. Kawasaki
 - 12 Mar. — Discussion about experiment with Dr. W. Goedert, Dr. E. Lobato, Dr. J. E. da Silva and Dr. W. Espinoza

- 13-16 Mar. — Preliminary test for root activity measurement
- 20-21 Mar. — Preparation of experimental field and seeding
- 29-30 Mar. — Investigation on bean root distribution in field by the monolith method
- 2 April — Started a root-chamber experiment
- 3-8 Apr. — Visit to Rio da Ribeira Project São Paulo State, with Dr. Yamamoto and Mr. Kobayashi
- 10-11 Apr. — First determination of root activity in corn, soybean and bean
- 16-19 Apr. — Visit of CNPSoja and IAPAR, Londrina, Paraná State, for the inspection of soybean root development, with Dr. Iwata and Dr. Kawasaki
- 23-25 Apr. — Second determination of root activity in corn, soybean and bean
- 27 April — Harvest of root-chamber experiment
- 1-5 May — Visit to CPATU, Belém, Pará State, and UEPAE, Manaus, Amazonas State
- 7-9 May — Third determination of root activities in corn, soybean and bean
- 10 May — Seminary on "Phosphate absorption by crops in response to environmental changes", by T. Yoshida and "Measurements of root acti-

vity and root distribution of crops" by José Eurípedes da Silva.

11 May — Sampling of soils

4. Outline of the experiments

(a) Field inquiry on bean root distribution

Roots of bean plant at flowering stage were taken by monolith method, then washed and prepared a sample showing bean root distribution in soil. Although the soil has been improved by incorporating 4 t/ha of lime and 1.6 t/ha of phosphorus, bean root distribution was restricted in shallow horizon above 15 cm. Extension of roots in deeper layer was quite few. Monolith method will be a powerful means to find out the methods to improve root development under Cerrado conditions, though much labor is needed.

As for the method, see "Improved monolith method" by M. AMMA and K. ODA, translated by T. YOSHIDA.

(b) Measurement of root activity in corn, soybean and bean grown in experimental field.

Corn, soybean and bean were sown in four plots, high lime-high phosphate, high lime-low phosphate, low lime-high phosphate and low lime-low phosphate on 21 March.

After germination, root samples were taken at every 2 weeks, and determined root activity by TTC and —naphthylamine method. In parallel to the measurement of root activity, growth analysis of crops was

performed by measuring leaf area and dry weight of tops.

This experiment is still continuing by Dr. José Eurípedes da Silva, and the detailed results will be reported by him when the experiment is completed.

As for the method: See "Method of measuring root activity" by T. YOSHIDA, translated by T. YOSHIDA.

(c) Root-chamber experiment

In parallel to the field experiment mentioned above, we made an attempt to observe the root development of corn, soybean and bean using root-chamber method. Experimental design was the same as (b). Three kinds of crops were sown in root chambers on 2 April. In contrary to our expect, however, serious symptom of iron deficiency appeared in heavily limed plots, though the plants in field showed no symptom at all. The reason for this is possibly attributed to so complete mixing of lime with soil that resulted in a rise of soil pH in root chamber. In a sense, this experiment failed, but raised an important problem about the incorporating method of lime into soil.

(d) Detection of aluminum in root tissues

Because of the limitation of time, actual testes were not made.

I expect that the validity of the method will be tested in future.

As for the method: See a note "Histochemical detection of aluminum in root tissues by aluminum reagent", by T. YOSHIDA.