

THE IMPORTANCE OF FERTILIZATION FOR INCREASING RICE PRODUCTION

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I have the honor to express here my opinion on the importance of fertilization for increasing rice production. I will give only an outline of the problems so that we may have much time for full discussion on the main subjects scheduled in this symposium.

Our country covers an area of 370,000 km² in total. However, it is rather low in the rate of cultivated field, because it has complicated configuration of the ground in addition to many mountains. And 5,400,000 families of farmers work in 3,200,000 ha of paddy field and 3,000,000 ha of upland farm. Their managements, therefore, are small in scale. Most of the upland farm is of less fertile allophanic soil, and acidic as the result of much rainfall and severe erosion, being generally low in fertility. The reproduction of fertility within the management is low, since the crop rotation system as seen in Europe and America has not been adopted for the cultivation in both paddy field and upland farm, and the combination of cultivation with livestock raising is weak. As everyone knows the productive efficiency of fertilizers is higher in less fertile soil, and the farming in our country is carried on intensively by heavy application of fertilizers.

The rice production which was 5,000,000 tons, 2 tons per ha, in 1885 has recently reached 13,000,000 tons, 4.5 tons per ha, 80 years after that. These figures show that the production per ha has increased to 2.3 times during the period. Our country is completely self-supporting the rice which is the most important staple food for the people.

As to the causes which made Japan the highest producer per ha among the main rice producing countries in the world, we can enumerate many factors such as breeding of superior varieties, improvement of fertilization method, improvement of land and soil, progress in prevention technique against diseases and insect pests, and development of new techniques for growing seedlings, etc. Among them the ones which made the greatest contribution to the increased production of rice are the breeding of superior varieties and the improvement of fertilization method.

The application of chemical fertilizers has increased in amount to 2.5 times for these 30 years, and tends to increase still more, resulting in increased gains of farmers through increased rice production. However, the effect of the improvement of fertilization method is not so large, when the other factors remain unchanged. For instance, the transition from long-stemmed varieties to short-stemmed ones increased the efficiency of fertilizers through the prevention of lodging of rice plants. The advance of the transplantation time of seedlings achieved by improvement of the mode of nursing has resulted in reduced cold-weather damage of rice plants, and made application of a sufficient amount of top-dressing possible in the north eastern district of Japan. Improvement of drainage and progress in water control made planned fertilization possible in the paddy field through the regulation of the mineralization of soil organic nitrogen. Improvement of the soil, especially application of silicic materials increased the disease-resistance of rice plants, and admixture of ferrous and manganic materials decreased the occurrence of the root rot, making heavy application

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of fertilizers and a high yield of rice possible. The progress in the technique of preventing diseases and exterminating insect pests made also a great contribution to increase the effect of the heavy application of fertilizers. From these facts it can be said that various techniques for increasing the rice production are making progress toward a direction increasing the effect of heavy application of fertilizers. The application of fertilizers to rice plants must be changed in amount and method according to the level of production. The first step of fertilization work is estimation of the amount of nutrients necessary for the growth of rice plants to produce an aimed amount of rice, and the next is a device to supply the rice plants with the necessary amount of nutrients from the soil and fertilizers. Fertilization methods, therefore, differ with characteristics of soil, climatic conditions, varieties of rice plants and methods of cultivation, not to mention levels of rice production. And a rational method can only be founded on the accumulation of data obtained by experiments carried out with different soils in various districts.

A particular type of degraded paddy field was distributed in Japan in the 1940's. In those paddy fields fertilizers were less effective and rice production was small in amount owing to an excessive loss of iron by leaching. And improvement of the soil by admixture of ferrous materials heightened the efficiency of fertilizers, sharply increasing the yield. This is only an example of soil improvement. It seems that poor soils have a wide distribution in Southeast Asia, and investigations and improvement of them will be important problems to increase the efficiency of fertilizers there in future.

Rice varieties of high fertilizer response are usually higher in productivity. The characteristics of those varieties such as plant type, photosynthetic activity, activity of roots as well as the proper method of fertilization are the subjects which must be studied more deeply, though we have a schedule to discuss them later.

I have expressed my opinion on the importance of fertilization. I sincerely hope this symposium of three days session will be a success with your cooperation.