Summary

Maintain Problems and Regional Management of Agricultural Infrastructure —New Weeding Work System in Hilly and Mountainous Area—

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Levee management in paddy field is an important point of continuing rice farming, but it has been disregarded in research and extension work, because it doesn't affect the productivity of rice directly. With discussing the necessity of the levee weeding work which has not been recognized as the key of rice farming, this paper clarifies the economical and working burden of it, and proposes the new regional management system.

In introduction, from the viewpoint of farm management, it is indicated that agricultural infrastructures around paddy fields, e.g. levee, channel of irrigation, drainage canal, are not maintained appropriately recently, and this causes the increasing of abandoned lands. This is serious problem of agriculture in Japan. In addition, from the viewpoint of productivity, the ratio of the management working hours, e.g. levee weeding, adjust of water level, has been increasing relatively in rice farming according to the statistics. In fields, mechanization and land consolidation have been progressed, but levee weeding work remains to be progressed. Thus, it is clarified that the remarkable gap of technology progress has occurred during the field work and the levee weeding work.

Especially, in the hilly and mountainous area which contains cultivated

lands over 40% of our country, there are long and large slope accompanied levees. The slope is so long and large that farmers cannot manage it. Moreover, in this area, the most farmers have been aged in advance of the city and the plain area, and there are few core farmers. Thus, the problem of levee weeding work is much more serious in the hilly and mountainous area. Though, it came to be indicated that the levee weeding work is obstacle to continue and develop the farm management for such problems by agricultural economists and farm management researchers in recent years, the actual conditions have not been studied and the working efficiency and the economical burden has not been analyzed. The burden of levee weeding work is not understood in statistics, too, because it is not recorded in production cost surveys. It is important to clarify the actual conditions.

The method of this study is as follows; investigation of the actual conditions of levee weeding work, analyze the work efficiency and economical load, while comparing family farm and large seize lease farm, plain area and the hilly and mountainous area, and propose a new regional management system, based on the state of past studies and statistics.

In chapter 1, to clarify the burden of the levee weeding work in the hilly and mountainous area, regional customs, weeding work method, working hours and cost were investigated by hearing and case study of three farmers in Yamatsuna-cho, Okazaki-city precisely, and analyzed comparing with the plain and slope.

As the result, in this area, it is understood that farmers generally weed the levee by using the portable weed cutter, carrying to their shoulder by walking movement. The working hours and the cost for each 10a paddy field in slope area are 8.0 hours and 17,173yen, which is 4.5 times and twice as much as in plain area. As this factor, in the hilly and mountainous area, the working hours becomes long, because the weeding working area is larger and the work

efficiency is lower than in plain area, and it is considered that the economical burden, which contains the labor cost, of weeding work is weighted heavy. In addition, from the viewpoint of farm management, net farm income, which has been decreasing by fail of rice price after 2007, is short for levee management cost in the hilly and mountainous area. In case of evaluating the burden of levee weeding work, break-even point analysis shows that it is impossible to continue the rice farm.

In conclusion, the physical and economical burden of levee weeding work using the portable weed cutter is too much to continue rice farm management in the hilly and mountainous area.

In chapter 2, to clarify the strategy of a large farm contractor for levee weeding, the case of farm A in Mutsumi-area, Okazaki-city was investigated.

First of all, in recent years, the family farmers who cannot continue the management become to lease farm lands to the large farm contractors who intend to expand scale increasingly. This means that the burden of levee weeding work is transferred to large farm contractors at the same time. To clarify the actual conditions of farm A's strategy, machine equipments, the work method, the working hours and the cost were investigated.

As the result, it is disclosed that farm A makes the weeding work rationalized by investment in equipments and outsourcing. And it is indicated that by using only portable weed cutters the weeding work hours become to be so long that the work competition occurs, and this is a big problem of the scale expansion for the large farm contract. By rationalize of weeding work, farm A is able to be shorten the working hours to about 40% and put the surplus labor into the premeditated work and expansion scale. It is expected that the machine cost will decrease by improving the utilization rates of machinery with the scale expansion.

From this result, it is validated that the technology and management

strategy such as machinery and outsourcing is advantageous for the levee weeding work which is obstacle for development in the large farm contractor.

In capter3, the actual conditions of farm B which has been developing large scale management from the plain area to the hilly and mountainous area in east Okazaki area was investigated to consider the new levee management system.

First of all, it is indicated that the burden of levee weeding work is weighted heavy, and the large farm contractors hesitate to lease the paddy fields with long and large slope. The cultivated land like this might become abandoned land. And the hypothesis is described that the large farm contractors in the hilly and mountainous area are urged to take measures for the rationalizing the weeding work and securing income. Therefore, the investigation of the farm B is important for new levee management system.

As a result of the investigation of the actual conditions, it is verified to advance the scale expansion and the farmland accumulation intentionally in farm B, to decrease the machine cost by the scale advantage, to improve the utilization rates of the machine, to improve the efficiency of work, and to have rationalized the levee management work. The working hours and cost of weeding work per 10a paddy field are 6.1hours and 12,017yen from the investigation of the actual conditions. They are lower than the family farmers' data understood in chapter1. Moreover, it is considered that accumulating 'levee' make the management efficiency higher. Farm B's strategy such as the scale expansions in the plain area to cover the profitability in the mountainous area, securing the low-wage labor and work management was understood.

In conclusion, the large farm contractor with the large machinery and manpower can do the levee weeding work in the hilly and mountainous area rationally.

In the closing chapter, a new levee management system in the hilly and mountainous area is proposed based on the above–mentioned study result. This system is adopted the method to consign the weeding work to one large farm contractor equipped the large machinery in a lump. In this system, the continuous levee is seen as 'greenbelt'. It is new system that is based on a new conception of separating the levee with field, and adjusts the land use and cosigning work.

This is not only the proposal of work method but also the management system. Because this method needs the consensus building in rural community, for example the production plans. This Greenbelt Management System (GMS) is the regional management system for rational levee weeding by the large farm contractor.

It is expected that the GMS makes the work efficiency high and the time loss, e.g. turnabout, the rise and descent of the mower, minimized, by keeping the continuousness of the large machine work and expanding the area of the large machinery work, it reduces the human power. From the trial calculation, GMS is able to reduce the economical and physical burden of levee weeding work greatly. This means that the GMS is the economical advantageous system.

In conclusion, by introducing this system, the levee weeding work is able to be done efficiently low-cost by "the levee is accumulated", and the possibility of reducing the burden of the farm management in the hilly and mountainous area is suggested.