

A Mechanized Tea Cultivation System in Kagoshima, Japan

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1. Characteristics of the tea industry in Kagoshima

Kagoshima's tea field area was 8,690 ha in 2009. While the tea field areas of other main production regions are decreasing every year, Kagoshima's tea field area is continually increasing. This is due to the efficient management of the tea fields, which is made possible by the mechanization of the tea cultivation system. In Kagoshima today, tea farmers manage the tea field using three kinds of riding-type machinery, namely the riding-type tea plucking machine, the riding-type sprayer and the riding-type tea field management machine.

2. Reason for the successful mechanization of the tea cultivation system in Kagoshima

In Kagoshima, riding-type tea plucking machine has already been introduced to 87 % of the tea fields. This is possible because tea is cultivated on flat land in Kagoshima. Since the past, the tea fields in Kagoshima have been developed with the intention of utilizing the riding-type machine. Even when the tea farmer plans to develop tea fields on mountainous areas, we recommended that he uses the "terracing" or "land reclamation at original slope" methods to develop the tea fields in order to lower the land gradient. As a result, 99.7 % of the tea fields have less than 5 degrees land gradient, and the riding-type machine could be utilized in most of the tea fields. Furthermore, when developing the tea fields, we recommended the length of the tea hedges to be more than 50 m in order to maximize the efficiency of the riding-type machine. In the case where the tea had already been planted and the hedges are short, we changed the direction of the hedge so as to lengthen it. As a result of such efforts, the effective and efficient management of the tea fields was made possible, and the fresh leaf yield increased while working hours decreased.

3. Development process of the riding-type machine

The development of the riding-type machine began in 1961. This was to support the then national initiative to develop large scale fields. In the beginning, the tractor-style riding-type machine was developed in 1962. However, this machine had the problem of soil treading stress. The crawler-style was hence developed from 1968 through to 1969, and this became the prototype of the current machine. The following is the characteristics of the latest model.

[Riding-type tea plucking machine]

The processing capacity is 0.2 ha per hour. The fresh leaves are deposited in the container-type storage compartment. This machine can pluck and store 300 kg of fresh leaves at one go, and by using trucks that can be fitted with the container storage, transportation of the fresh leaves to the tea manufacturing factory was made easier and quicker (Photo 1).

[Riding-type sprayer]

The processing capacity is 0.7 ha per hour. This machine is able to spray agricultural chemical on three hedges at same time. In recent years, an attachment nozzle that can spray agricultural chemical directly onto pest infested areas of the plant is being developed (Photo 2).

[Riding-type tea field management machine]

Attachments such as the medium pruning machine, fertilizer distributor and the deep plowing machine can be attached to this machine. As for the processing capacity, the medium pruning machine can process 0.1 ha per hour, the fertilizer distributor, 0.3 ha per hour, and the deep plowing machine, 0.4 ha per hour. In addition, there are currently 16 other types of attachments available (Photo 3).



Photo 1. Riding-type tea plucking machine



Photo 2. Riding-type sprayer



Photo 3. Riding-type tea field management machine (Medium pruning, Fertilization, Deep plowing)
The provision of these photos is Matsumoto-kiko Co., Ltd. (<http://matsumotokiko.co.jp/index.html>)

4. A success story on the effective use of the riding-type machinery

The Kikunaga Tea Productive Cooperation is located in Minamikyushu city, Kagoshima prefecture. The cooperation manages 151 ha of tea field and 3 tea manufacturing factories. The cooperation has 13 riding-type tea plucking machines and 3 riding-type tea field management machines. In order to utilize the machines effectively, the cooperation created a section put in charged of planning the use of the machines, and meticulously deciding details of the tea field conditions such as the area of each tea field and the distance from each of the tea fields to the tea manufacturing factory. Moreover, the cooperation had also standardized the cultivation methods throughout all its tea fields. As a result of these efforts, the management of this cooperation is stable, and the tea field areas increased yearly.

5. A recent research themes in Kagoshima

The current tea market is sluggish due to changes in the consumer's lifestyle. In Kagoshima prefecture, we are researching new products to create new market demands and techniques to stabilize production.

[Recent themes]

- The development of new parching machine which uses new heat sources such as superheated vapor.
- Fresh leaf storage time and varietal variation to strengthen the withering flavour.
- Deep plowing timing in the medium pruning tea field using the riding-type deep plowing machine.
- The development of a nozzle having superior control effect in mulberry scare.

6. Future promotion of the Kagoshima-cha

Kagoshima-cha aims to become the best in quality and production quantity in Japan. To achieve that, we recommend strengthening the marketing strategy, grooming leaders, strengthening management foundations, and making tea trusted by consumers. By 2018, we aim to expand our tea field area to 10,000 ha, reduce production costs by 20 %, and raise production quantity of crude tea to 30,000 tons.