

学 位 論 文 要 旨

氏 名

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題 目

Development of mechanization technologies for stably high production of sugarcane
(サトウキビの安定的増収に向けた機械化技術の開発)

In Okinawa Prefecture, the mechanization of sugarcane cultivation has advanced with aging and the decreasing number of farmers. In particular, the use of harvesters for reducing labor and time has increased. However, sugarcane yields have been decreasing on the farms, wherein heavy machinery has been used for a long time because of the formation of hard pans, degradation of soil properties, inadequate cultivation, and other factors. Further, farmers of small farms who are forced to use heavy machinery face problems in improving the efficiency of ratoon cultivation and cost reduction.

The purpose of this study is to establish mechanization technologies capable of a stable, high production of sugarcane. The results are summarized as follows:

1. The problems in the mechanization of sugarcane cultivation were established by the analyses of the trends and current status in Okinawa.

2. A traction-type cane planter was improved to adapt the 130-cm row spacing for small harvesters from the 140-cm row spacing for large harvesters.

3. The performance of a small harvester in Okinawa and Miyako Islands revealed that operating a small harvester was more advantageous than a large harvester.

4. Subsoiling and tillage using a wide chisel subsoiler called the “Pla-soiler” were effective as a simple measure for the improvement of drainage in fields mechanically harvested with a small harvester. Thus, a simple method was developed for farmers to improve subsurface drainage.

5. An effective method was developed for raising sugarcane seedlings using one-node seedlings, and the cost efficiency of replanting for filling the gaps after harvesting was evaluated.

6. A commercial stubble shaver was developed for adapting to the small tractors of 15 kW, which allowed stubble shaving, fertilization, and agrochemical applications in one operation for an effective management of ratooning.

7. A compost application drill was developed as a tractor attachment for not only using the new plant cane but also the ratoon cane. A hose-winding distributor and a flat hose sprayer were developed to effectively apply piggery sewage, saving electricity and labor.

A plan was finally proposed for the introduction of machines into a mechanized system using the abovementioned results and comparisons of fuel consumption and other characteristics. This plan will be useful for large agricultural production corporations.