学 位 論 文 要 旨

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題　目	Studies on sugarcane production at the Higashi-Mikawa, Tokai region in Japan （東海地方・東三河におけるサトウキビ生産に関する研究）

A literature review was performed regarding the history of sugarcane cultivation and sugar production, and a series of cultivation tests were undertaken in a test field at Higashi-Mikawa in the Tokai region of Japan. Firstly, the database of the history of past sugar production in the area was created through surveys and this data was analyzed. Secondly, a series of sugarcane cultivation tests were performed to analyze the growth characteristics since 2001 using the test field (34°48′11″ N, 137°21′51″ E） in the Toyokawa City.

Literature survey

The oldest record of sugar production is from the sixth Tempo i.e. 1835 in the Tahara Domain of Higashi-Mikawa, when black sugar was cultivated and produced in several villages. Production of sugar subsequently decreased between Taisho to the beginning of Showa, but began to increase again from 1931. By the end of World War II it had become the area with the largest production in the Aichi Prefecture. The yield of spring plant cane was 20–30 t/ha, which was lower than the nationwide mean yield. The cultivation technology conformed to "Kansho Taisei" by Nagatsune Okura, with minor yet recognized influences from Enshu and Sanuki. Some apparatus such as juicing machine, statistical data, and photographs were revealed through the field survey.

Cultivation testing

Sugarcane cultivar NiF8 was grown by organic cultivation in test fields. The optimum planting season was from mid-April to early May. The yields of first and second ratoon cane (50–70 t/ha) were always higher than that of spring plant cane (40–60 t/ha), and these figures were analogous to yields of the Nansei Arcs. Throughout August and September the growth rate of the rainfall cultivation decreased from the maximum of 30–35 mm/d. Sugar content by the Pol in cane, denoted as PIC, reached 13%–15% by November or December, and black sugar production was possible. The growth of sugarcane was modelled by the logistic curve with high accuracy, which was effective to the yield prediction and others.

The PIC increased until December as well as Okinawa, after which it started decreasing due to the effects of frost and low temperature, with marked decrease at temperatures below –2ºC and long durations at 0ºC; however, there was no hindrance to reaching the next ratoon stage if the lowest temperature was higher than –2ºC. Sugarcane growth rate was modelled by the logistic curve with high accuracy, and thus it effectively predicted yield. The variety NiF8 performed similarly to other sugarcane cultivars, although the yields of NiTn18, Ni27, and Ni17 were high among these cultivars, while Kurokaido, Ni15, and Ni22 had high sugar contents.

From the results, we concluded that sugarcane cultivation is viable in the temperate region, and may be used to generate employment in the area. In addition, sugarcane may be effective as a highly adaptable crop suited to rapidly changing conditions due to global warming.