Chapter 16

Sugarcane Cultivation in the Islands of Kagoshima

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1. Introduction

Kagoshima Prefecture consists of about 600 or more islands, including the mainland (the Satsuma and Osumi districts), Tanegashima, Yakushima, Amami Islands, covering over approximately 600 km in the north-south direction. Various climate types exist in these islands, because vast land areas are distributed in both from the tropical and subtropical zones. Additionally, the prefecture has the rich natural surroundings of the world natural heritage in Yakushima Is., food varieties such as Kurobuta (black pigs) and Shochu (distilled spirits), and a unique history and culture.

Kagoshima has the 3rd largest agricultural output in Japan, and it was one of the leading agricultural prefectures in Japan in 2011. The main agricultural products of Kagoshima are livestock and the prefecture is the major producer of beef cattle, pork, and chicken in Japan, addition to sweet potato, sugarcane, podded pea, green tea, and broad bean. In particular, the southwest islands, such as the Tanegashima, Yakushima, and Amami Islands, represent about 27 % of the total area of the Kagoshima Prefecture, and they mainly employ multi-managements schemes, where cultivation of the main crop, sugarcane, is mixed with that of horticultural crops, such as vegetables, flowers, and fruits, as well as beef cattle management (KPAD 2012).

2. Characteristic of sugarcane in Kagoshima

As the crops supporting agriculture and the economy of the islands, sugarcane is the basic crop in the southwest island area. This is because the sugarcane has a high production output, high utilization characteristic to livestock by top silage, dead leaves, and bagasse. Furthermore, because added value of the sugarcane becomes higher by the sugar manufacturing industry. Additionally, compared to other crops, sugarcanes are more resilient to typhoons, which cause the most serious damage to agricultural products in the southwest islands.

Annually, 647,700 t of sugarcane is produced in the Kagoshima Prefecture, which accounts for 44.1 % of the annual sugarcane production in Japan. Moreover, the agricultural output for sugarcane in Kagoshima Prefecture in 2010 was about JPY ¥14,300 million and was ranked third after rice and sweet potato (Table 1). Sugarcane is cultivated in about 10,500 ha, with about 80 % of the farmers being employed in the sugar industry. In the Kagoshima Prefecture, 2,384 farmhouses (61.3 %) are present in the Tanegashima Is. and 6,682 (81.7 %) in the Amami Islands (Table 2). Further, the sugar industry is a major contributor to the regional economy of the islands.

Table 1. The number of sugarcane farmhouses in the Kagoshima Prefecture (2011)

	Number of a farmhouse	Number of sugarcane farmhouse	Ratio of sugarcane farmhouse (%)	Cultivated acreage per 1 farmhouse (are)
Tanegashima Is.	3,891	2,384	61.3	117.8
Amami Islands	8,174	6,682	81.7	112.5
Total	12,065	9,066	75.1	113.9

Source: 2010 Census of Agriculture and Forestry by MAFF

Table 2. Agricultural output of the main crops in the Kagoshima Prefecture (2010)

	Agricultural output (JPY ¥ million)	Production (ton)	Ratio of domestic (%)	Ranking in the domestic
Rice	20,200	117,600	1.4	28
Sweet potato	17,100	347,500	40.2	1
Sugarcane	14,300	647,700	44.1	2

Source: Statistical yearbook of MAFF (2011).

Although sugarcanes are used for manufacturing brown sugar, they are mostly used to obtain centrifugal sugar; hence, factories manufacturing centrifugal sugar in Kagoshima Prefecture are present in Tanegashima Is. of the Kumage County, and in Amami-Oshima Is., Kikaijima Is., Tokunoshima Is., Okinoerabujima Is., and Yoronjima Is. of the Amami Islands.

During the Satsuma Domain, toward the end of the 1600s, sugarcane was introduced into the Amami Islands from Ryukyu, and the sugar industry was subsequently established. The sugar manufacturing technology then spread to other areas under the Satsuma Domain, such as Tanegashima Is. in the 1800s, and sugarcane became the crop that supported the finances of the Satsuma Domain. Further, it is considered that the Satsuma Domain has played an active role in the Meiji Restoration by sugarcane production. Brown sugar production was prosperous until the 1960s, after which centrifugal sugar production increased and is currently the dominant sugar manufacturing process in the country (Humoto 2011).

3. Sugarcane cultivars in the island of Kagoshima

The sugarcane variety, POJ2725, became popular in 1929 in the Kagoshima Prefecture and currently occupies more than 90 % of the planted area in the Amami Islands, after the Yomitanyama variety, which was introduced from Okinawa in 1892 (Yasuniwa 2010). The NCo310 variety was a recommended cultivar of the southwest islands and was grown about 30 years, from 1959 to early 1960. In 1990, the NiF8 cultivar was prominently used to recommended cultivar in the Kagoshima Prefecture, and it has remained so until now, because this cultivar is early high sugar variety, and resistant to smut and other diseases. Thus, improvements in the productivity and quality of sugarcane in the islands were achieved by popularization of the NiF8 cultivar (Wakamatsu and Hurue 2010, Yasuniwa 2010). Furthermore, the use of mulching in Tanegashima Is. led to stable ratoon sprouting and high yields, after which the cultivated area was expanded to 90 % within a 15 year period (1994-2010). Other recommended cultivars include Ni17, N177, Ni22, and Ni23. In 2011, NiF8 was cultivated in the highest area at 52 %, followed by Ni17, Ni22, Ni23, N177, and other cultivars (Fig. 1). However, NiF8 covers 84 % of the area in Tanegashima Is., 2 % in Amami-Oshima Is., 62 % in Kikaijima Is., 43 % in Tokunoshima Is., 41 % in Okinoerabujima Is., and 13 % in Yoronjima Is. Thus NiF8 is the main cultivar in Tanegashima Is., Kikaijima Is., and Tokunoshima Is. Further, Ni22 is the main cultivar in Amami-Oshima Is. (37 %) and Okinoerabujima Is. (44 %), and Ni23 is the main cultivar in Yoronjima Is. (69 %). In general, cultivars are selected based on their resistance to environmental factors, such as typhoon or drought, cultivation skill or type, and production base or sugar manufacturing system (Komaki 2011).

4. Sugarcane production and cultivation trend in Kagoshima

In 2010, the production output of sugarcane accounted for JPY ¥4,300 million (23 %) in Tanegashima Is., and ¥9,400 million (32 %) in the Amami Islands. In both islands region, the production output of sugarcane was ranked the first place in all crops. Therefore, sugarcane plays a major

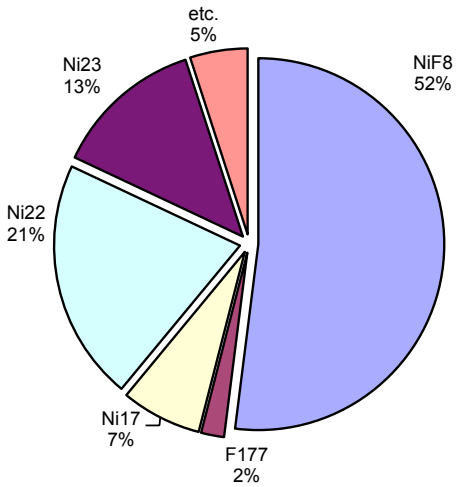

Fig. 1. Proportions of cultivated areas for the different sugarcane cultivars in the Kagoshima Prefecture (2011). Source: Based on the reference of the Sugarcane examination & research committee in the Kagoshima Prefecture.

economical role in southwest islands of the Kagoshima Prefecture.

About 648,000 t of sugarcane was produced in the Kagoshima Prefecture in 2010 (450,000 t in the Amami Islands and 198,000 t in Tanegashima Is.), which was about 80 % of the total annual production by the Okinawa Prefecture (820,000 t) (Table 3). The annual sugarcane production in 1985 was about 900,000 t from 12,595 ha. However, the production decreased to about 530,000 tons in 2005 from 8,800 ha, because of aging farmers (Fig. 2). Therefore, the Ministry of Agriculture, Forestry and Fisheries and Kagoshima Prefecture launched the "Increasing Production of the Sugarcane Project," and as a result, has been recovered production and cultivation area in the islands. The order of cultivation areas are as follows: Tokunoshima Is. > Tanegashima Is. > Okinoerabujima Is. > Kikaijima Is. > Amami-Oshima Is. > Yoronjima Is (Figs 3-4).

In regard to the cultivation type in Kagoshima Prefecture, ratooning cultivation accounted for 46 %, the spring cultivation (planting in February-March) accounted for 23 %, and the summer cultivation (planting in August-September) accounted for 13 % (Fig. 5). Although the percentage of the cultivation type in the various islands differs depending on the infrastructure development, namely, irrigation facilities and windbreak forests or influence of the growing environment, ratooning cultivation forms 50-70 % of the cultivation type in all the islands and has been increasing over the past 10 years. In addition, the trend of summer cultivation is decreasing.

The labor expense represents 49.9 % (2011) of the sugarcane production costs. Further, labor time

Table 3. Sugarcane production in each island in the Kagoshima Prefecture (2010, 2011)

(10,000 t)

	Production (2010)		Production (2011)	
Tanegashima Is.	19.8	(31%)	17.1	(37%)
Amami-Oshima Is.	3.3	(5%)	1.8	(4%)
Kikaijima Is.	8.8	(14%)	5.8	(3%)
Tokunoshima Is.	22.0	(34%)	14.3	(31%)
Okinoerabujima Is.	8.0	(12%)	5.0	(11%)
Yoronjima is.	2.9	(4%)	1.8	(4%)
Total	64.8	(100%)	45.9	(100%)

( ): Ratio of production

Source: Based on the reference of the Sugarcane examination & research committee in the Kagoshima Prefecture

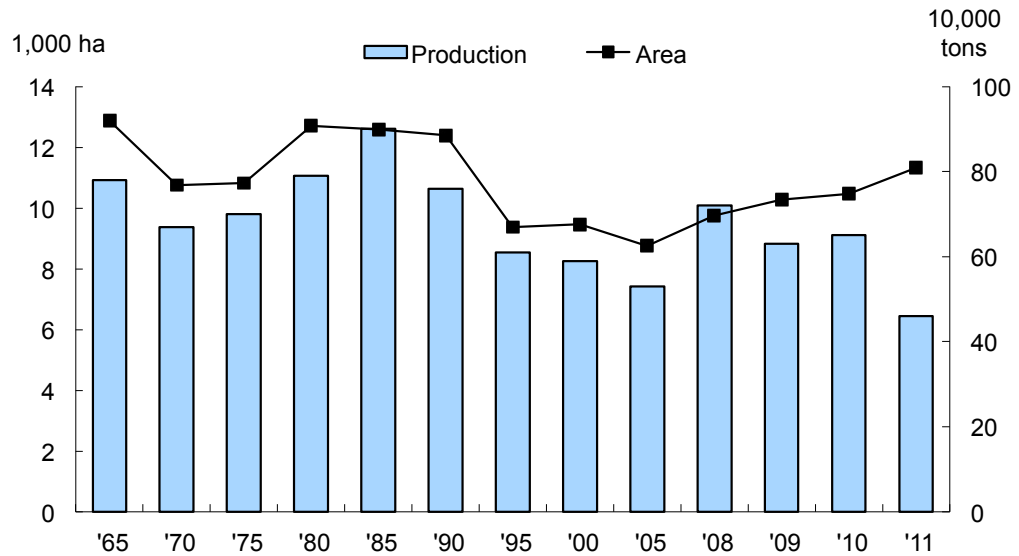

Fig. 2. Change in sugarcane production and cultivated area in the Kagoshima Prefecture (1965-2011). Source; Sugarcane and sugar production results by Kagoshima Prefectural Agriculture Department (1965-2011).

is the highest during harvest; hence, harvester machines are currently used in 80 % of the crop areas as a laborsaving technique. Since the introduction of harvester machines in 1994, about 400 harvester machines have been operational in the Kagoshima Prefecture by 2010. In 2010, the rates of mechanical harvesting in the islands were as follows: Tanegashima Is., 75.3 %; Amami-Oshima Is., 81.1 %; Kikaijima Is., 80.5 %; Tokunoshima Is., 91.0 %; Okinoerabujima Is., 88.6 %; and Yoronjima Is., 44.3 %. The effectiveness of work and scale of expansion of the sugarcane cultivation in the southwest islands have progressed, while maintenance of the harvested areas has been achieved by the spread of the harvesters or planters (Hidaka 2011).

Currently, under the system that put one sugar company per one island, 7 factories belonging to 6 sugar companies are present in the 6 islands in the Kagoshima Prefecture. Over 90 % of the sugarcane currently produced in the island is transported to the sugar factory and is processed into centrifugal sugar (SIS 2007). Although the sugar factory in Tanegashima Is. begins operations from the end of November, other sugar factories begin their operations from December to January. The brown sugar factory in the Kagoshima Islands has 57 factories, with brown sugar production quantity of only 809 t compared to the 8,036 t produced in the Okinawa Prefecture (CAA 2010).

5. Restarting for the future

There are many threats to the agricultural output of sugarcane in the southwest islands, including typhoon and drought. In addition, difficulty of the machine introduction, high sediment discharge, lack of soil nutrients and cultivated land becoming narrow and sloped. Moreover, damages to sugarcane crops are caused by low temperature, limited sunlight, drought, typhoons, and cane borer pest, which have led to record low-income production levels in 2011. Although sugarcane has been a major crop for the regional economy growth in the southwest islands for a long period, various problems are currently limiting production, such as changes in the climatic conditions, stagnation of profits, and difficulties in execution of the agricultural work caused by mechanization or aging of the farmers. However, Sugarcane farmers and their agencies have a various efforts to the enhancing early production recovery in the southwest island, such as preservation of the cultivated areas, practicing the basic cultivation techniques, training and spread of superior cultivars, insect pest control, maintenance and functional enhancement of sugar manufacturing facilities, and improvement in the regional farming system.

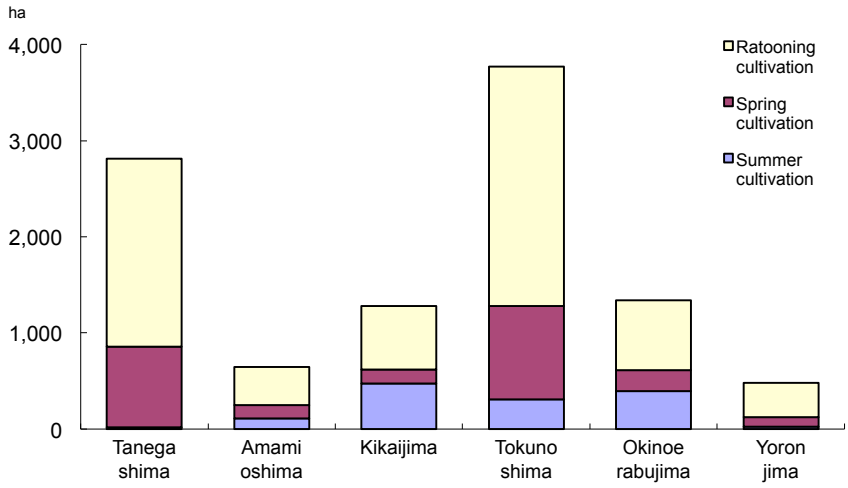

Fig. 3. Sugarcane cultivation type in each island in the Kagoshima Prefecture (2011). Source: Based on the reference of the Sugarcane examination & research committee in the Kagoshima Prefecture.

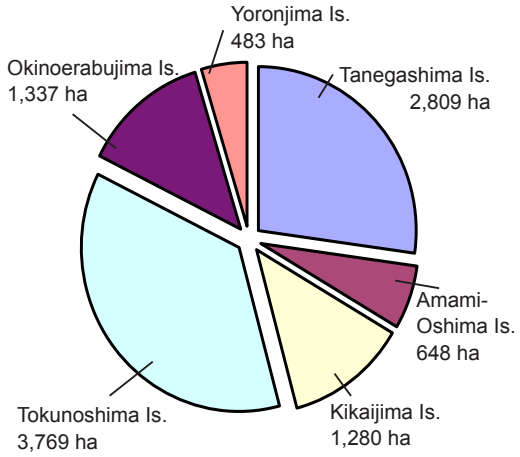

Fig. 4. Sugarcane cultivated area in each island in the Kagoshima Prefecture (2011). Source: Based on the reference of the Sugarcane examination and research committee in the Kagoshima Prefecture.

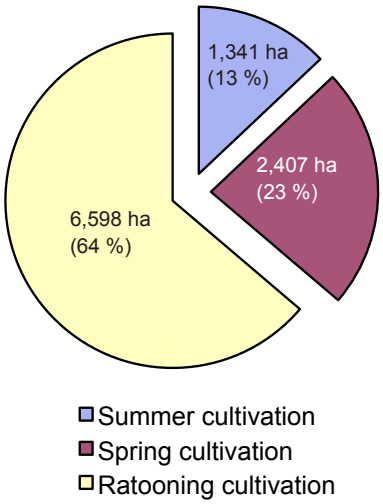

Fig. 5. Sugarcane cultivation type in the Kagoshima Prefecture (2011). Source: Based on the reference of the Sugarcane examination & research committee in the Kagoshima Prefecture.

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