[Research Note]

Heading Performance of Rice Varieties under Double Cropping on Ishigaki Island

Tsukasa NAGAMINE^{a)}, Makoto YAMAMORI^{a)}, Masumi KATSUTA^{b)} and Makoto KAWASE^{c)}

^{a)} Okinawa Sub-tropical Station, Japan International Research Center for Agricultural Sciences (1191-2, Kawarabaru, Maesato, Ishigaki, Okinawa, 907 Japan)

> ^{b, c)}National Institute of Agrobiological Resources (2-1-2, Kannondai, Tsukuba, Ibaraki, 305 Japan)

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Abstract

In order to advance generations of hybrid populations of rice effectively, the heading performance of several varieties in the first and second cropping seasons on Ishigaki island was investigated, and heading dates of the varieties in both Ishigaki and in mainland Japan (Tsukuba city, Ibaraki prefecture) were compared. Number of days to heading in the second cropping season was less than in the first season for all the varieties used. The Japonica group showed a larger variation in heading performance than the Indica group, except for the strongly photoperiod-sensitive varieties, in the first and second seasons. The temperate type Japonica varieties headed earlier than the varieties of the Indica group and the tropical type Japonica. Most varieties of the Indica group and the tropical type Japonica varieties in Ishigaki and Tsukuba. Number of days to heading of many Japonica varieties in Ishigaki became less than in Tsukuba except for the tropical type.

Additional key words: rapid generation advancement, Indica, Japonica

^{a)}Present address: National Institute of agrobiological Resources (2-1-2, Kannondai, Tsukuba, Ibaraki, 305 Japan)

^{c)}Present address: Shikoku National Agricultural Experiment Station (1-3-1, Senyu, Zentsuji, Kagawa, 765 Japan)

Introduction

Rapid generation advancement of the early generations of hybrid populations is essential in crop breeding¹⁾ and many rice varieties released recently have been subjected to the procedure.

Most rice breeding laboratories are advancing early generations of hybrid populations using greenhouses^{5, 8, 11)}, and some are utilizing paddy fields which are located in the southern part of Kyushu island or the subtropical islands of Okinawa prefecture⁴⁾.

Okinawa Subtropical Station of Japan International Research Center for Agricultural Sciences (JIRCAS, former Okinawa Branch of Tropical Agriculture Research Center) has initiated a program for the rapid generation advancement for hybrid populations of rice on Ishigaki island since 1981⁴⁾. Recently, not only Japanese varieties but many foreign varieties have been used as parents. In order to advance generations of hybrid populations effectively, it is important to investigate the heading performance of parental varieties beforehand.

Heading characteristics of distinctive Japanese varieties from Hokkaido to Kyushu and strongly photoperiod-sensitive varieties such as Aman which is one of the agricultural ecotypes cultivated in India, were already clarified on Ishigaki island^{3,9)}.

Double cropping of rice is widely practiced on the island, and day length and temperature conditions in the first and second seasons are different $^{4,9)}$. The heading performance of tropical type Indica varieties such as Boro and Aus in India, the temperate type Indica varieties such as Chinese Hsien and the tropical type Japonica varieties such as those of the Javanica group has not been investigated under cultivation in Ishigaki except for a few varieties $2^{2,3}$. The present paper reports on the heading performance of several rice varieties in the first and second seasons on Ishigaki island and a comparison between the heading performance of the varieties on the island and that at Tsukuba city, Ibaraki prefecture is also presented.

Materials and Methods

A total of 139 rice varieties consisting of 77 indigenous and 62 improved varieties from various countries were used. They were classified into 55 varieties of the Indica and 84 of the Japonica varietal groups based on morphological observations⁷⁾ and esterase isozyme analysis¹⁰⁾. Out of the Indica group, 26 belonged to the tropical type Indica and the remaining 29 to the temperate type Indica. Since the heading performance of the strongly photoperiod-sensitive varieties in the varietal group (for example, Aman in India) had already been clarified in Ishigaki, those were excluded in the present experiments. Out of the Japonica group, 52 belonged to the temperate type Japonica (originating from Japan, Korea and North China, etc.) and the remaining 32 belonged to the tropical type Japonica (from the Philippines, Indonesia and other southeastern Asian countries). Variety name, varietal group and their origin are listed in the Appendix.

Differences in heading date of rice varieties in the first and second seasons were investigated at the Okinawa Subtropical Station of JIRCAS on Ishigaki island, Okinawa prefecture in 1992. Sowing dates for the first and second cropping seasons were February 21 and July 17, respectively. Seedlings were raised in seedling boxes and transplanted on March 12 and August 3 in the first and second seasons, respectively, with a single plant per hill. Number of days for raising seedlings was 19 days in the first season and 16 in the second. The amounts of basal-dressing and top-dressing at tillering stage were 0.3 and 0.2Nkg/a, respectively.

In order to compare the heading performance of rice varieties between Ishigaki and mainland Japan, the same varieties were grown on Ishigaki island (North latitude : 24° 20', East longitude: 124° 10') and at the National Institute of Agrobiological Resources at Tsukuba (North latitude: 36° 1', East longitude: 140° 6') in 1991. Sowing dates were May 23 in Ishigaki and May 9 in Tsukuba and seedlings were raised using seedling boxes. The seedlings were transplanted on June 17 in Ishigaki and June 12 in Tsukuba. Heading date of the varieties was recorded in both locations.

Results and Discussion

Differences in heading performance of several varieties in the first and second seasons

The earliest variety in the first season was the Japanese variety, Hokuto, which headed on April 20, while the latest one, Padi Kenikir Puti headed on June 19 (Appendix). Number of days to heading was 59 and 119 days, respectively (Table 1). In the second season Hokuto headed on September 5, and was again the earliest among the varieties used. The latest variety in the season was Masumikir, which headed on October 27 (Appendix). Number of days to heading of these two varieties in the second season was 50 and 102 days (Table 1).

A highly positive correlation (r=0.919) was observed between the number of days to heading in the first and second seasons (Fig. 1), though the number of days to heading in the second season was less than that in the first season for all the materials. Araki & Ikehashi (1984) reported that there was a high correlation (r=0.851) between the heading dates of nine varieties (one Japonica and eight Indica varieties) in the first and second seasons in Ishigaki, too³⁾.

Heading performance between the varieties in the Indica and Japonica groups was compared. The heading date in the Indica group ranged from May 8 (the earliest variety) to June 14 (the latest) in the first season and that of the Japonica group from April 20 to June 19. The difference between the earliest variety and the latest one was 38 days in the Indica group and 61 days in the Japonica in the first season (Table 1). The Japonica group exhibited a larger variation in heading date than the Indica group. In the second season, heading in the Indica group occurred from September 19 to October 16 while in the Japonica group from September 5 to October 27. The Japonica group showed a larger variation in heading date than the

Indica group in the second season, too. The varieties with a strong photoperiod-sensitivity headed from November to December on Ishigaki island regardless of the sowing dates". Since the strongly photoperiod-sensitive varieties were excluded in the Indica group in the present experiments, this group showed a narrow range of heading date. However, there were very few early maturing varieties in the group. Therefore, most of the hybrid populations derived from crosses using the Indica varieties were expected to head late. At present, in the hybrid populations from the crosses using very early or early maturing parental varieties three generations per year could be efficiently accelerated under field conditions on Ishigaki island, while for the Indica group acceleration of a maximum of two generations per year could be achieved.

Heading performance of the varieties was compared among four varietal groups; the tropical type Indica, the temperate type Indica, the tropical type Japonica and the temperate type Japonica groups.

Heading date of the tropical type Indica varied from May 8 to June 9 in the first season, and from Septembr 19 to October 12 in the second season. The ranges of heading date in the first and second seasons were 33 and 24 days, respectively, showing a small variation in heading characteristics in the four groups.

The heading date in the temperate type Indica varied from May 11 to June 14 in the first season and from September 23 to October 16 in the second season, the former heading earlier than the tropical type Indica group. As the decrease of number of days to heading in this type was less pronounced than that of the temperate type Japonica, this type seems to have a longer basic vegetative growth period.

The tropical type Japonica headed from May 12 to June 19 in the first season and from September 15 to October 27 in the second. Varieties of this type exhibited a wide range of heading characteristics and most of them were late maturing in both cropping seasons because of their

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Table 1. Heading characteristics of several rice varieties under double cropping on Ishigaki island

Numerals indicate the number of varieties.



Fig. 1 Relationship between number of days to heading in the first and second seasons on Ishigaki island.

long basic vegetative growth^{6, 7)}. Therefore, the tropical type Japonica varieties used in the present experiments were characterized by a weak photoperiod-sensitivity and a long basic vegetative growth period. The earliest varieties in both cropping seasons belonged to the temperate type Japonica, and there were many early maturing varieties in the same group. As the number of days to heading was reduced in the second season, this type seems to have a shorter basic vegetative growth period than the varieties of the other types. In this group Kahei and Taichung 65 headed very late, in contrast to other varieties. Judging from their heading characteristics, these two varieties seem to belonged to the tropical type Japonica.

The heading performance of several rice varieties and varietal groups in the first and second cropping seasons in Ishigaki was clarified and the data obtained should provide useful information for efficient rapid generation advancement.

Comparison of heading performance of rice varieties between Ishigaki and Tsukuba

Since the sowing and transplanting dates in the present experiments were slightly different between Ishigaki and Tsukuba, a precise comparison of the date could not be made. However natural day length conditions in Ishigaki and Tsukuba are completely different (Table 2), for example the shortest day length in the summer solstice is 13 hours and 39 minutes in Ishigaki and 14 hours 37 minutes in Tsukuba. Furthermore, since the temperature conditions are also different between the two locations (Table 2), we considered that it is possible to determine the difference in heading characteristics between the varieties based on the present results as a general trend.

As shown in Fig. 2, a significantly positive correlation (r=0.740) was observed between heading dates of the Indica group grown in Ishigaki and those in Tsukuba. As most varieties showed a distribution of heading dates, Y=X, these varieties may not head earlier even in Ishigaki because of the longer basic vegetative growth. For example, IR24 required 97 and 108 days to head in Ishigaki and Tsukuba, respectively.

For the Japonica group a significantly positive correlation (r=0.702) was also observed between the heading dates in Ishigaki and in Tsukuba (Fig. 2). As most varieties showed a distribution below a linear line, Y=X, many Japonica varieties in Ishigaki headed earlier than in Tsukuba. Particularly Shiranui, Nishihomare and Reiho, varieties which were released for Kyushu island, headed earlier than other Japanese varieties because of the shorter basic vegetative growth period¹²⁾.

However, the tropical type Japonica varieties, for examle, Padi Kenikir Puti and Masumikir, did not head earlier due to their longer basic vegetative growth period^{6, 7, 12)}. In most of the Japonica varieties except for the tropical type the growth duration could be shortened in Ishigaki. A higher correlation of r=0.950 was reported between heading dates in the first season in Ishigaki and in Tsukuba, and also r=0.934 between heading dates in the second season in Ishigaki and in Tsukuba, using nine varieties 3 . It was concluded that selection for earliness could be roughly achieved in Ishigaki. Judging from the present results. however, since the correlation coefficient was not very high in the Japonica group (r=0.702), it may be difficult to select plants having a relatively

Location	Temperature	Jan.	Fed.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Ishigaki	Max. (°C) Mean (°C) Min (°C)	21.6 19.2 17.3	20.6 18.3 16.3	24.5 22.1 20.1	26.0 23.5 21.4	28.7 26.3 24.4	31.7 29.3 27.5	32.4 30.0 28.1	32.3 29.5 27.5	30.5 28.1 25.9	27.5 25.0 23.2	24.5 22.2 20.5	23.4 20.6 18.2
Tsukuba	Max (°C) Mean (°C) Min (°C)	9.2 3.2 -2.2	10.1 4.0 -1.8	12.9 7.7 3.0	18.6 13.6 9.3	22.1 17.0 12.2	26.3 22.1 18.6	29.3 24.6 21.2	28.2 23.8 20.7	26.2 22.3 19.4	20.1 16.6 13.3	15.5 10.2 5.5	11.4 6.2 1.1
Location	Day length (hr. min.)	Jan.	Fed.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Ishigaki		10.49	11.22	12.02	12.44	13.19	13.37	13.29	12.58	12.18	11.36	10.58	10.40
Tsukuba		11.13	12.00	12.58	14.07	15.14	15.49	15.31	14.37	13.30	12.24	11.29	11.00

Table 2. Temperature and day length in Ishigaki and Tsukuba



Fig. 2. Relationship between heading date on Ishigaki island and Tsukuba city.

strong photoperiod-sensitivity and a short basic vegetative growth period, particularly for the temperate type Japonica.

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No. Variety name group Origin Ishigaki I Ishigaki II Ishigaki II Tshigaki II Aug. 21 Oct. 4 Aug. 21 3 Dakmalo Trop. Indica India May 19 Aug. 11 Sep. 24 Aug. 51 5 Dular Trop. Indica India May 11 Aug. 11 Sep. 25 Aug. 40 Aug. 11 9 Jhona 2 Trop. Indica India May 25 Aug. 21 Oct. 3 Aug. 11 11 Nepal 1 Trop. Indica Nepal May 25 Aug. 14 Oct. 4 Aug. 14 12 Nepal 18 Trop. Indica Nepal May 24 Aug. 24 Oct. 4 Aug. 14 13 N				Varietal		Heading date							
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1 Nilyang 2.5 Trop. Indica Kolea May 2.6 Aug. 19 Sep. 20 Aug. 19 18 Suwcon 258 $\kappa m 258$ Trop. Indica Korea May 2.8 Aug. 14 Sep. 27 Aug. 9 20 Habataki $\gamma \sqrt{5} 9 \pm$ Trop. Indica Japan May 18 Aug. 6 Sep. 27 Aug. 9 21 Sari-kuin $^{+\eta} - 9 i - 2 i$ Trop. Indica Japan May 22 Aug. 18 Sep. 25 Aug. 15 23 IR24 Trop. Indica IRRI Jun. 9 Aug. 20 Oct. 1 Aug. 14 25 IR24 Trop. Indica IRRI May 24 Aug. 20 Oct. 1 Aug. 17 24 IR29 Trop. Indica IRRI May 20 Aug. 20 Sep. 27 Aug. 17 26 IR2061-214-3 Trop. Indica IRRI May 19 Aug. 8 Oct. 2 Aug. 5 27 Xuanchangmi 28 Temp. Indica China May 19 Aug. 8 Oct. 2 Aug. 5 29 Xiligu ###at% Temp. Indica China M	10	Jaguary Milyong 22	家碑22早	Trop. Indica	Brazil	Jun. Mou	1	Aug.	10	Oct.	4	Aug.	10
10 Source of 2.50 Frop. Indica Korea May 2.5 Aug. 2.1 Soc. 1 Y Y Aug. 30 20 Habataki $\gamma \sqrt{5} 9 + Trop. Indica Japan May 18 Aug. 6 Sep. 27 Aug. 9 21 Sari-kuin ^{+}/-^{+}/^{+} Trop. Indica Japan May 22 Aug. 18 Sep. 25 Aug. 21 Aug. 22 Aug. 14 Sep. 25 Aug. 25 23 IR24 Trop. Indica IRRI May 24 Aug. 20 Oct. 1 Aug. 17 Aug. 17 24 IR29 Trop. Indica IRRI May 20 Aug. 18 Sep. 29 Aug. 17 26 IR2061-214-3 Trop. Indica IRRI May 17 Aug. 18 Sep. 29 Aug. 18 27 Xuanchangmi \Xi la \star Temp. Indica China May 17 Aug. 10 Sep. 28 Aug. 17 28 Liuzhobaoyazao m/m d2 \# 1 Temp. Indica China May 20 Aug. 10 Sep. 25 Aug. 17 30 Aijiaonante Egilla m Temp. Indica China May 20 Aug. 10$	18	Suween 258	面陽255 水面258号	Trop. Indica	Korea	May	28	Aug.	19	Sep.	20	Aug.	20
10 10 <th10< th=""> 10 10 <th< td=""><td>10</td><td>Tongil</td><td></td><td>Trop. Indica</td><td>Korea</td><td>May</td><td>29 28</td><td>Aug.</td><td>25 14</td><td>Sen</td><td>20</td><td>Aug.</td><td>21</td></th<></th10<>	10	Tongil		Trop. Indica	Korea	May	29 28	Aug.	25 14	Sen	20	Aug.	21
21 Sari-kuin サリータイ-> Trop. Indica Trop. Indica Japan May 22 Aug. 18 Sep. 25 Aug. 15 22 IR24 Trop. Indica IRRI Jun. 9 Aug. 28 Oct. 12 Aug. 25 23 IR28 Trop. Indica IRRI May 28 Aug. 17 Oct. 1 Aug. 14 24 IR29 Trop. Indica IRRI May 20 Aug. 17 Oct. 1 Aug. 14 25 IR2061-214-3 Trop. Indica IRRI May 18 Aug. 18 Sep. 27 Aug. 17 26 IR2061-214-3 Trop. Indica China May 19 Aug. 8 Oct. 2 Aug. 5 29 Xiligu 細粒数 Temp. Indica China May 20 Aug. 5 Aug. 16 31 Horg	20	Habataki	ハバタキ	Trop. Indica	Japan	May	18	Aug.	6	Sep.	27	Aug.	9
22 IR24 Trop. Indica IRRI Jun. 9 Aug. 28 Oct. 12 Aug. 25 23 IR28 Trop. Indica IRRI May 28 Aug. 17 Oct. 1 Aug. 17 24 IR29 Trop. Indica IRRI May 20 Aug. 20 Sep. 27 Aug. 17 26 IR2061-214-3 Trop. Indica IRRI May 20 Aug. 18 Sep. 25 Aug. 18 27 Xuanchangmi 宣昌米 Trop. Indica China May 19 Aug. 8 Oct. 2 Aug. 5 29 Xiligu 細粒穀 Temp. Indica China May 20 Aug. 5 Sep. 25 Aug. 5 30 Aijiaonante 援脚南特 Temp. Indica China May 30 Aug. 10 Oct. 3 Aug. 17 31 Hongxienuo 紅血糯 Temp. Indica China May 22	21	Sari-kuin	サリークイーン	Trop. Indica	Japan	May	22	Aug.	18	Sep.	25	Aug.	15
23 IR28 Trop. Indica IRRI May 28 Aug. 17 Oct. 1 Aug. 17 24 IR29 Trop. Indica IRRI May 24 Aug. 20 Oct. 1 Aug. 14 25 IR30 Trop. Indica IRRI May 20 Aug. 20 Sep. 27 Aug. 14 26 IR2061-214-3 Trop. Indica IRRI May 18 Aug. 18 Sep. 25 Aug. 28 27 Xuanchangmi ÎEA* Temp. Indica China May 19 Aug. 8 Oct. 2 Aug. 5 30 Aijiaonante 矮脚南特 Temp. Indica China May 30 Aug. 10 Oct. 3 Aug. 17 31 Hongni 紅米 Temp. Indica China May 30 Aug. 10 Oct. 3 Aug. 17 34 Hongxienuo 紅血糯 Temp. Indica China May 30 Aug. 10 Oct. 3 Aug. 17 35 Deogewoogen 低脚南和 Temp. Indica China Jun. 5 Aug. 23 Oct. 10 Aug. 23 36 Daorenqiao 道人橋 Temp. Indica <t< td=""><td>22</td><td>IR24</td><td></td><td>Trop. Indica</td><td>IRRI</td><td>Jun.</td><td>9</td><td>Aug.</td><td>28</td><td>Oct.</td><td>12</td><td>Aug.</td><td>25</td></t<>	22	IR24		Trop. Indica	IRRI	Jun.	9	Aug.	28	Oct.	12	Aug.	25
24 IR29 Trop. Indica IRRI May 24 Aug. 20 Oct. 1 Aug. 14 25 IR30 Trop. Indica IRRI May 20 Aug. 20 Sep. 27 Aug. 17 26 IR2061-214-3 Trop. Indica IRRI May 18 Aug. 18 Sep. 25 Aug. 28 27 Xuanchangmi 宣昌米 Temp. Indica China May 19 Aug. 8 Oct. 2 Aug. 5 29 Xiligu 細粒穀 Temp. Indica China May 20 Aug. 5 Sep. 25 Aug. 5 30 Aijiaonante 矮脚南特 Temp. Indica China May 20 Aug. 10 Sep. 25 Aug. 16 31 Hongmi 紅米 Temp. Indica China May 20 Aug. 11 Sep. 25 Aug. 16 33 Hongxienuo 紅血橋 Temp. Indica China May 22 Aug. 11 Sep. 25 Aug. 17 35 Deegeowoogen 低脚烏尖 Temp. Indica China May 22 Aug. 17 Oct. 1 Aug. 21 36 Daorenqiao 道人橋 Temp. Indica	23	IR28		Trop. Indica	IRRI	May	28	Aug.	17	Oct.	1	Aug.	17
25 IR30 Trop. Indica IRRI May 20 Aug. 20 Sep. 27 Aug. 17 26 IR2061-214-3 Trop. Indica IRRI May 18 Aug. 18 Sep. 25 Aug. 28 27 Xuanchangmi 宣昌米 Temp. Indica China May 19 Aug. 10 Sep. 29 Aug. 5 29 Xiligu 細粒穀 Temp. Indica China May 20 Aug. 5 Sep. 25 Aug. 5 30 Aijiaonante 援脚南特 Temp. Indica China May 20 Aug. 10 Sep. 28 Aug. 16 31 Hongmi 紅米 Temp. Indica China May 20 Aug. 10 Oct. 3 Aug. 10 34 Hongxienuo 紅血糯 Temp. Indica China May 22 Aug. 17 Oct. 1 Aug. 11 35 Decgeowoogen 低脚鳥尖 Temp. Indica China May 22 Aug. 17 Oct. 1 Aug. 21 Nug. 13 36 Daorenqiao 道人橋 Temp. Indica China Jun. 5 Aug. 22 Oct. 10 Aug. 23 37 Duanguanhualuo <t< td=""><td>24</td><td>IR29</td><td></td><td>Trop. Indica</td><td>IRRI</td><td>May</td><td>24</td><td>Aug.</td><td>20</td><td>Oct.</td><td>1</td><td>Aug.</td><td>14</td></t<>	24	IR29		Trop. Indica	IRRI	May	24	Aug.	20	Oct.	1	Aug.	14
26IR2061-214-3Trop. IndicaIRRIMay18Aug.18Sep.25Aug.2827Xuanchangmi $\hat{\Xi}$ Temp. IndicaChinaMay17Aug.10Sep.29Aug.828Lizzhoubaoyazao $\bar{m}ml (2 \pi P)$ Immp. IndicaChinaMay19Aug.8Oct.2Aug.529Xiligu $mm t 2 \pi P$ Temp. IndicaChinaMay20Aug.5Sep.25Aug.1630Aijiaonante $f m P$ IndicaChinaMay20Aug.10Sep.28Aug.1631Hongmi $f m R$ Temp. IndicaChinaMay15Aug.11Sep.25Aug.1032Chixiandao $g m m R$ Temp. IndicaChinaMay22Aug.17Oct.1Aug.1134Hunanxian $m m R$ Temp. IndicaChinaMay22Aug.17Oct.1Aug.1135Deegeowoogen $f m P$ IndicaChinaJun.3Aug.19Oct.10Aug.2336Daorencjao $\tilde{a} L m$ Temp. IndicaChinaJun.5Aug.23Oct.16Aug.2038Zhamianni $L m R$ Temp. IndicaChinaJun.7Aug.25Oct.16Aug.2039	25	IR30		Trop. Indica	IRRI	May	20	Aug.	20	Sep.	27	Aug.	17
27Xuanchangmi直晶木Temp. IndicaChinaMay17Aug.10Sep.29Aug.828Liuzhoubaoyazao柳州包芽早Temp. IndicaChinaMay19Aug.8Oct.2Aug.529Xiligu細粒袋Temp. IndicaChinaMay20Aug.5Sep.25Aug.1630Aijiaonante矮脚南特Temp. IndicaChinaMay30Aug.10Oct.3Aug.1631Hongxienuo紅血糯Temp. IndicaChinaMay15Aug.11Sep.25Aug.1033Hongxienuo紅血糯Temp. IndicaChinaMay15Aug.17Oct.1Aug.1134Hunaxian湖南和Temp. IndicaChinaJun.3Aug.17Oct.1Aug.1335Deegeowoogen低脚烏尖Temp. IndicaChinaJun.7Aug.22Oct.10Aug.2336Daorenqiao道人橋Temp. IndicaChinaJun.5Aug.23Oct.16Aug.2038Zhamianini扎緬尼Temp. IndicaChinaJun.7Aug.25Oct.16Aug.2037Duaguanhualuo短広花螺Temp. IndicaChinaJun.7Aug.25Oct.16Aug.2038Zhamiani北氟化 <td>26</td> <td>IR2061-214-3</td> <td>白日 火</td> <td>Trop. Indica</td> <td>IRRI</td> <td>May</td> <td>18</td> <td>Aug.</td> <td>18</td> <td>Sep.</td> <td>25</td> <td>Aug.</td> <td>28</td>	26	IR2061-214-3	白 日 火	Trop. Indica	IRRI	May	18	Aug.	18	Sep.	25	Aug.	28
28Luzhoubaoyazao (如) 四边牙中 (如) 四边牙中 (如) 四边牙中 (如) 四边子中 (如) 四方 (如) 四方 (如) 四方公式 (如) 四方公式 (四) 四方公式 (四) 四方公式 (四) 四方公式 	27	Xuanchangmi	直昌木	Temp. Indica	China	May	17	Aug.	10	Sep.	29	Aug.	8
29Angu Augamatax (長脚南特)Temp. IndicaChina (ChinaMay 20Aug. 3Sep. 25Aug. 1630Aijiaonante矮脚南特Temp. IndicaChinaMay 26Aug. 10Sep. 28Aug. 1631Hongmi 32紅米Temp. IndicaChinaMay 30Aug. 10Oct. 3Aug. 1732Chixiandao遅和稲Temp. IndicaChinaMay 22Aug. 11Sep. 25Aug. 1033Hongxienuo紅血糯Temp. IndicaChinaMay 22Aug. 17Oct. 1Aug. 1134Hunanxian湖南和 湖南和Temp. IndicaChinaJun. 3Aug. 19Oct. 10Aug. 1735Deegeowoogen低脚烏尖Temp. IndicaChinaJun. 5Aug. 22Oct. 10Aug. 2336Daorenqiao道人橋Temp. IndicaChinaJun. 5Aug. 22Oct. 16Aug. 2037Duanguanhualuo短広花螺Temp. IndicaChinaJun. 7Aug. 25Oct. 16Aug. 2038Zhamianni扎緬尼Temp. IndicaChinaJun. 7Aug. 25Oct. 16Aug. 2039HongcjeuhzhaiTemp. IndicaChinaMay 30Aug. 19Oct. 9Aug. 1641Wuguhualuo鳥毅花螺Temp. IndicaChinaMay 31Aug. 16Oct. 11Aug. 1742Deejiaohualuo崎毅花螺Temp. IndicaChinaMay 30Aug. 15Oct. 8Aug. 1243Dengpaozhai等抛斉Temp. Indica<	28	Liuznoubaoyazao	柳川己牙半	Temp. Indica	China	May	19	Aug.	8	Oct.	2	Aug.	5
31 Hongmi 紅米 Temp. Indica China May 30 Aug. 10 Oct. 3 Aug. 17 32 Chixiandao 遅和稲 Temp. Indica China May 15 Aug. 11 Sep. 25 Aug. 10 33 Hongxienuo 紅血糯 Temp. Indica China Jun. 3 Aug. 17 Oct. 1 Aug. 11 34 Hunanxian 湖南和 Temp. Indica China Jun. 3 Aug. 19 Oct. 10 Aug. 17 35 Deegeowoogen 低脚鳥尖 Temp. Indica China Jun. 7 Aug. 22 Oct. 10 Aug. 23 36 Daorenqiao 道人橋 Temp. Indica China Jun. 7 Aug. 23 Oct. 16 Aug. 20 38 Zhamianni 扎緬尼 Temp. Indica China May 31 Aug.	29 30	Aijiaonante	和包叙 矮脚南特	Temp. Indica Temp. Indica	China	May	20 26	Aug. Aug.	5 10	Sep. Sep.	25 28	Aug. Aug.	5 16
32Chixiandao遅和稲Temp. IndicaChinaMay15Aug.11Sep.25Aug.1033Hongxienuo紅血糯Temp. IndicaChinaMay22Aug.17Oct.1Aug.1134Hunanxian湖南和Temp. IndicaChinaJun.3Aug.19Oct.10Aug.1735Deegeowoogen低脚烏尖Temp. IndicaChinaJun.7Aug.22Oct.10Aug.2336Daorenqiao道人橋Temp. IndicaChinaJun.5Aug.22Oct.4Aug.2337Duanguanhualuo短広花螺Temp. IndicaChinaJun.8Aug.23Oct.16Aug.2038Zhamianni扎緬尼Temp. IndicaChinaJun.7Aug.25Oct.16Aug.2039HongcjeuhzhaiTemp. IndicaChinaMay31Aug.19Oct.9Aug.1641Wuguhualuo鳥穀花螺Temp. IndicaChinaMay31Aug.16Oct.11Aug.1742Deejiaohualuo低脚花螺Temp. IndicaChinaMay30Aug.15Oct.8Aug.1243Dengpaozhai等拋斉Temp. IndicaChinaJun.6Aug.20Sep.27Aug.2244Toboshi唐干	31	Hongmi	紅米	Temp. Indica	China	May	30	Aug.	10	Oct.	3	Aug.	17
33Hongxienuo紅血糯 湖南和 湖南和 Temp. IndicaChina ChinaMay Jun.22 Aug.Aug.17 Oct.Oct.1 Aug.Aug.1134Hunanxian 湖南和 Jun.湖南和 河和Temp. Indica Temp. IndicaChina ChinaJun.3 Aug.Aug.19 Oct.Oct.10 Aug.Aug.17 Aug.22 Oct.Oct.10 Aug.Aug.17 Aug.35Deegeowoogen Deegeowoogen低脚烏尖 酒人橋 短広花螺Temp. Indica Temp. IndicaChina China Jun.Jun.5 Aug.Aug.22 Oct.Oct.10 Aug.Aug.23 Oct.Aug.23 Oct.Oct.16 Aug.Aug.23 Oct.Aug.23 Oct.16 Aug.Aug.20 Oct.16 Aug.20 Oct.16 Aug.20 Oct.16 	32	Chixiandao	遅秈稲	Temp. Indica	China	May	15	Aug.	11	Sep.	25	Aug.	10
34 Hunanxian 湖南私 Temp. Indica China Jun. 3 Aug. 19 Oct. 10 Aug. 17 35 Deegeowoogen 低脚烏尖 Temp. Indica China Jun. 7 Aug. 22 Oct. 10 Aug. 23 36 Daorenqiao 道人橋 Temp. Indica China Jun. 5 Aug. 22 Oct. 4 Aug. 23 37 Duanguanhualuo 短広花螺 Temp. Indica China Jun. 7 Aug. 23 Oct. 16 Aug. 20 38 Zhamianni 扎緬尼 Temp. Indica China Jun. 7 Aug. 25 Oct. 16 Aug. 20 39 Hongcjeuhzhai Temp. Indica China May 31 Aug. 19 Oct. 9 Aug. 16 40 Qingyu 清油 Temp. Indica China May 30 Aug. 15	33	Hongxienuo	紅血糯	Temp. Indica	China	May	22	Aug.	17	Oct.	1	Aug.	11
35Deegeowoogen低脚烏尖 道人橋Temp. IndicaChinaJun.7Aug.22Oct.10Aug.2336Daorenqiao道人橋Temp. IndicaChinaJun.5Aug.22Oct.4Aug.2337Duanguanhualuo短広花螺Temp. IndicaChinaJun.8Aug.23Oct.16Aug.2038Zhamianni扎緬尼Temp. IndicaChinaJun.7Aug.25Oct.16Aug.2039HongcjeuhzhaiTemp. IndicaChinaMay26Aug.8Sep.30Aug.440Qingyu清油Temp. IndicaChinaMay31Aug.19Oct.9Aug.1641Wuguhualuo鳥穀花螺Temp. IndicaChinaMay30Aug.15Oct.8Aug.1243Dengpaozhai等拋斉Temp. IndicaChinaMay19Aug.14Sep.23Aug.2144Toboshi唐干Temp. IndicaChinaJapanMay19Aug.14Sep.23Aug.2145TadukanTemp. IndicaChinaMay11Aug.8Sep.29Jul.2446Guangluai 4広陸矮4号Temp. IndicaChinaMay19Aug.6Sep.29Aug.1248Juanyebai卷葉白Tem	34	Hunanxian	湖南私	Temp. Indica	China	Jun.	3	Aug.	19	Oct.	10	Aug.	17
36Daorenqiao道人橋Temp. IndicaChinaJun.5Aug.22Oct.4Aug.2337Duanguanhualuo短広花螺Temp. IndicaChinaJun.8Aug.23Oct.16Aug.2038Zhamianni扎緬尼Temp. IndicaChinaJun.7Aug.25Oct.16Aug.2039HongcjeuhzhaiTemp. IndicaChinaMay26Aug.8Sep.30Aug.440Qingyu清油Temp. IndicaChinaMay31Aug.19Oct.9Aug.1641Wuguhualuo鳥穀花螺Temp. IndicaChinaMay31Aug.16Oct.11Aug.1742Deejiaohualuo低脚花螺Temp. IndicaChinaMay30Aug.15Oct.8Aug.1243Dengpaozhai等抛齐Temp. IndicaChinaJun.6Aug.20Sep.27Aug.2244Toboshi唐干Temp. IndicaJapanMay19Aug.14Sep.23Aug.2145TadukanTemp. IndicaChinaMay11Aug.8Sep.29Jul.2447Nanjing 11南京11号Temp. IndicaChinaMay19Aug.6Sep.25Aug.1248Juanyebai巻葉白Temp. IndicaChin	35	Deegeowoogen	低脚烏尖	Temp. Indica	China	Jun.	7	Aug.	22	Oct.	10	Aug.	23
37Duanguanhualuo短広花螺 扎緬尼Temp. Indica Temp. IndicaChinaJun.8Aug.23Oct.16Aug.2038Zhamianni扎緬尼Temp. Indica Temp. IndicaChinaJun.7Aug.25Oct.16Aug.2039Hongcjeuhzhai 40Qingyu清油Temp. Indica Temp. IndicaChinaMay26Aug.8Sep.30Aug.440Qingyu清油Temp. Indica Temp. IndicaChinaMay31Aug.19Oct.9Aug.1641Wuguhualuo烏穀花螺 甘露菜花螺Temp. Indica Temp. IndicaChinaMay30Aug.15Oct.8Aug.1243Dengpaozhai等抛済 皆東Temp. Indica Temp. IndicaChinaJun.6Aug.20Sep.27Aug.2244Toboshi唐干Temp. Indica Temp. IndicaJapanMay19Aug.14Sep.23Aug.2145TadukanTemp. Indica remp. IndicaChinaMay11Aug.8Sep.29Jul.2447Nanjing 11南京11号 青京11号Temp. Indica Temp. IndicaChinaMay16Aug.8Sep.25Aug.1248Juanyebai巻葉白 子Temp. Indica Temp. IndicaChinaMay16Aug.8Sep.25Aug.1249<	36	Daorenqiao	道人橋	Temp. Indica	China	Jun.	5	Aug.	22	Oct.	4	Aug.	23
38Zhamianni扎釉尼Temp. IndicaChinaJun.7Aug.25Oct.16Aug.2039HongcjeuhzhaiTemp. IndicaTemp. IndicaChinaMay26Aug.8Sep.30Aug.440Qingyu清油Temp. IndicaChinaMay31Aug.19Oct.9Aug.1641Wuguhualuo烏穀花螺Temp. IndicaChinaMay31Aug.16Oct.11Aug.1642Deejiaohualuo低脚花螺Temp. IndicaChinaMay30Aug.15Oct.8Aug.1243Dengpaozhai等拋斉Temp. IndicaChinaJun.6Aug.20Sep.27Aug.2244Toboshi唐干Temp. IndicaDhilippinesJun.14Aug.20Oct.5Aug.2145TadukanTemp. IndicaChinaMay11Aug.8Sep.29Jul.2447Nanjing 11南京11号Temp. IndicaChinaMay16Aug.8Sep.25Aug.1248Juanyebai卷葉白Temp. IndicaChinaMay19Aug.6Sep.29Aug.1249China 830Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250Zhaiyeqing 8窄葉青8号Temp. Indica	37	Duanguanhualuo	短広花螺	Temp. Indica	China	Jun.	8	Aug.	23	Oct.	16	Aug.	20
39HongcjeuhzhaiTemp. IndicaChinaMay26Aug.8Sep.30Aug.440Qingyu清油Temp. IndicaChinaMay31Aug.19Oct.9Aug.1641Wuguhualuo烏穀花螺Temp. IndicaChinaMay31Aug.16Oct.11Aug.1642Deejiaohualuo低脚花螺Temp. IndicaChinaMay30Aug.15Oct.8Aug.1243Dengpaozhai等拋斉Temp. IndicaChinaJun.6Aug.20Sep.27Aug.2244Toboshi唐干Temp. IndicaJapanMay19Aug.14Sep.23Aug.2145TadukanTemp. IndicaPhilippinesJun.14Aug.20Oct.5Aug.3046Guangluai 4広陸矮4号Temp. IndicaChinaMay11Aug.8Sep.29Jul.2447Nanjing 11南京11号Temp. IndicaChinaMay16Aug.8Sep.25Aug.1248Juanyebai巻葉白Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250Zhaiyeqing 8窄葉青8号Temp. IndicaChinaMay19Aug.16Oct.4Aug.11	38	Zhamianni	扎緬庀	Temp. Indica	China	Jun.	7	Aug.	25	Oct.	16	Aug.	20
41Wuguhualuo烏穀花螺 低脚花螺Temp. Indica Temp. IndicaChina ChinaMay31Aug.16Oct.11Aug.1742Deejiaohualuo低脚花螺Temp. IndicaChinaMay30Aug.15Oct.8Aug.1243Dengpaozhai等拋斉Temp. IndicaChinaJun.6Aug.20Sep.27Aug.2244Toboshi唐干Temp. IndicaJapanMay19Aug.14Sep.23Aug.2145TadukanTemp. IndicaPhilippinesJun.14Aug.20Oct.5Aug.3046Guangluai 4広陸矮4号Temp. IndicaChinaMay11Aug.8Sep.29Jul.2447Nanjing 11南京11号Temp. IndicaChinaMay19Aug.6Sep.29Aug.1248Juanyebai巻葉白Temp. IndicaChinaMay16Aug.8Sep.25Aug.149China 830Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250Zhaiyeqing 8窄葉青8号Temp. IndicaChinaMay19Aug.16Oct.4Aug.11	39 40	Hongcjeuhzhai Oingvu	清油	Temp. Indica Temp. Indica	China China	May Mav	26 31	Aug. Aug.	8 19	Sep. Oct.	30 9	Aug. Aug.	4 16
41Wuguhualuo病報花螺Temp. IndicaChinaMay31Aug.16Oct.11Aug.1742Deejiaohualuo低脚花螺Temp. IndicaChinaMay30Aug.15Oct.8Aug.1243Dengpaozhai等拋斉Temp. IndicaChinaJun.6Aug.20Sep.27Aug.2244Toboshi唐干Temp. IndicaJapanMay19Aug.14Sep.23Aug.2145TadukanTemp. IndicaPhilippinesJun.14Aug.20Oct.5Aug.3046Guangluai 4広陸矮4号Temp. IndicaChinaMay11Aug.8Sep.29Jul.2447Nanjing 11南京11号Temp. IndicaChinaMay16Aug.6Sep.25Aug.148Juanyebai巻葉白Temp. IndicaChinaMay16Aug.8Sep.25Aug.149China 830Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250Zhaiyeqing 8窄葉青8号Temp. IndicaChinaMay19Aug.16Oct.4Aug.11				man Indian	Chier								
42DecisionandoExperitorsTemp. IndicaChinaMay50Aug.15Oct.8Aug.1243Dengpaozhai等拋斉Temp. IndicaChinaJun.6Aug.20Sep.27Aug.2244Toboshi唐干Temp. IndicaJapanMay19Aug.14Sep.23Aug.2145TadukanTemp. IndicaPhilippinesJun.14Aug.20Oct.5Aug.3046Guangluai 4広陸矮4号Temp. IndicaChinaMay11Aug.8Sep.29Jul.2447Nanjing 11南京11号Temp. IndicaChinaMay19Aug.6Sep.29Aug.1248Juanyebai巻葉白Temp. IndicaChinaMay16Aug.8Sep.25Aug.149China 830Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250Zhaiyeqing 8窄葉青8号Temp. IndicaChinaMay19Aug.16Oct.4Aug.11	41 10	wugunualuo Deejjachushuo	雨秋化 縣 任期古姆	Temp. Indica	China	May	30	Aug.	10 15	Oct.	11 0	Aug.	17
44Toboshi唐干Temp. IndicaJapanMay19Aug.20Sep.27Aug.2244Toboshi唐干Temp. IndicaJapanMay19Aug.14Sep.23Aug.2145TadukanTemp. IndicaPhilippinesJun.14Aug.20Oct.5Aug.3046Guangluai 4広陸矮4号Temp. IndicaChinaMay11Aug.8Sep.29Jul.2447Nanjing 11南京11号Temp. IndicaChinaMay19Aug.6Sep.29Aug.1248Juanyebai卷葉白Temp. IndicaChinaMay16Aug.8Sep.25Aug.149China 830Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250Zhaiyeqing 8窄葉青8号Temp. IndicaChinaMay19Aug.16Oct.4Aug.11	42 13	Dengnaozhai	些m15环 等抽客	Temp. Indica	China	Inay	50	Aug.	20	Sen	0 77	Aug.	12 22
45TadukanTemp. IndicaPhilippinesJun.14Aug.14Sep.25Aug.2145TadukanTemp. IndicaPhilippinesJun.14Aug.20Oct.5Aug.3046Guangluai 4広陸矮4号Temp. IndicaChinaMay11Aug.8Sep.29Jul.2447Nanjing 11南京11号Temp. IndicaChinaMay19Aug.6Sep.29Aug.1248Juanyebai巻葉白Temp. IndicaChinaMay16Aug.8Sep.25Aug.149China 830Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250Zhaiyeqing 8窄葉青8号Temp. IndicaChinaMay19Aug.16Oct.4Aug.11	44	Toboshi	唐干	Temp. Indica	Japan	Mav	19	Ano	14	Sep.	23	Aug.	22
46Guangluai 4広陸矮4号Temp. IndicaChinaMay11Aug.26Sect.9Jul.2447Nanjing 11南京11号Temp. IndicaChinaMay19Aug.6Sep.29Jul.2448Juanyebai巻葉白Temp. IndicaChinaMay19Aug.6Sep.29Aug.1249China830Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250Zhaiyeqing 8窄葉青8号Temp. IndicaChinaMay19Aug.16Oct.4Aug.11	45	Tadukan	· ⊢1 I	Temp. Indica	Philippines	Jun.	14	Ano	20	Oct.	5	Ang	30
47Nanjing 11南京11号Temp. IndicaChinaMay19Aug.6Sep.29Aug.1248Juanyebai巻葉白Temp. IndicaChinaMay16Aug.8Sep.25Aug.1249China 830Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250Zhaiyeqing 8窄葉青8号Temp. IndicaChinaMay19Aug.16Oct.4Aug.11	46	Guangluai 4	広陸矮4号	Temp. Indica	China	Mav	11	Aug	8	Sen.	29	Jul.	24
48 Juanyebai巻葉白Temp. IndicaChinaMay16Aug.8Sep.25Aug.149 China 830Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250 Zhaiyeqing 8窄葉青8号Temp. IndicaChinaMay19Aug.16Oct.4Aug.11	47	Nanjing 11	南京11号	Temp. Indica	China	May	19	Aug.	6	Sep.	29	Aug.	12
49 China 830Temp. IndicaChinaMay15Aug.14Sep.28Aug.1250 Zhaiyeqing 8窄葉青8号Temp. IndicaChinaMay19Aug.16Oct.4Aug.11	48	Juanyebai	卷葉白	Temp. Indica	China	May	16	Aug.	8	Sep.	25	Aug.	1
50 Zhaiyeqing 8 窄葉青8号 Temp. Indica China May 19 Aug. 16 Oct. 4 Aug. 11	49	China 830		Temp. Indica	China	May	15	Aug.	14	Sep.	28	Aug.	12
	50	Zhaiyeqing 8	窄葉青8号	Temp. Indica	China	May	19	Aug.	16	Oct.	4	Aug.	11

Appendix Heading date of rice varieties in Ishigaki and Tsukuba

(com.)

			Varietal]	Headir	ig date			
No.	Variety name		group	Origin	Ishig	aki I	Ishiga	aki II	Ishig	aki III	Tsuk	uba
51 52 53	Guizhao 2 Dianyu 1 Taichungxian 3	桂朝2号 滇楡1号 台中仙1号	Temp. Indica Temp. Indica Temp. Indica	China China Taiwan	Jun. May Jun.	2 25 7	Aug. Aug. Aug.	23 21 25	Oct. Oct. Oct.	5 5 9	Aug. Aug. Aug.	21 12 23
54	Taichungyu 204	台中育204号	Temp. Indica	Taiwan	May	30	Aug.	19	Oct.	3	Aug.	21
55	Taichungzailai 1	台中在来1号	Temp. Indica	Taiwan	Jun.	1	Aug.	20	Oct.	3	Aug.	22
56	Nanjingxiangdao	南京香稲	Trop. Japonica	China	May	19	Aug.	14	Sep.	28	Aug.	19
57	Naxi	納西	Trop. Japonica	China	May	14	Aug.	11	Sep.	19	Aug.	23
58	Bayuenuo	八月糯	Trop. Japonica	China	May	18	Aug.	5	Sep.	22	Aug.	26
59	In Sitt		Trop. Japonica	Burma	May	31	Aug.	14	Sep.	29	Aug.	21
	Khauk Yoe		Trop. Japonica	Burma	Jun.	3	Aug.	15	Oct.	/	Aug.	
61 62	Mack Kheua		Trop. Japonica	Laos	May May	31 31	Aug.	21	Oct.	4	Sep.	3
63	Deng Mack Tek		Trop. Japonica	Laos	Lun	1	Aug.	18	Oct.	4	Sen	4
64	Dam Ngo		Trop. Japonica	Laos	Jun.	1	Aug.	20	Oct.	4	Sep.	4
65	Lep Xang		Trop. Japonica	Laos	May	24	Aug.	21	Sep.	27	Sep.	16
66	Daw Dam		Trop. Japonica	Laos	May	22	Aug.	15	Oct.	1	Sep.	4
67	Canabongbong		Trop. Japonica	Philippines	Jun.	3	Aug.	19	Oct.	11	Aug.	21
68	Simedel		Trop. Japonica	Indonesia	May	31	Aug.	17	Oct.	7	Aug.	21
69	Siampang		Trop. Japonica	Indonesia	Jun.	5	Aug.	26	Oct.	15	Aug.	26
70	Ladang		Trop. Japonica	Indonesia	Jun.	12	Sep.	4	Oct.	22	Sep.	2
71	Simanoek		Trop. Japonica	Indonesia	May	30	Aug.	16	Oct.	2	Aug.	20
72	Bodat Mayang		Trop. Japonica	Indonesia	Jun.	2	Aug.	15	Sep.	30	Aug.	23
73	Masumikir		Trop. Japonica	Indonesia	Jun.	18	Aug.	31	Oct.	27	Aug.	28
74	Padi Kenikir Puti		Trop. Japonica	Indonesia	Jun.	19	Sep.	1	Oct.	24	Aug.	30
75	Geraldine		Trop. Japonica	Brazil	May	25	Aug.	16	Oct.	2	Aug.	19
76	Afgha WYR-5088		Trop. Japonica	Russia	May	19	Aug.	31	Oct.	2	Aug.	19
79	Shwe war		Trop. Japonica	Burma Theilend	Jun. Mov	5 15	Aug.	18	Oct.	22	Sep.	26
70	NU 70-1 Dipalage		Trop. Japonica	Dhlippines	Moy	15 25	Aug.	14	Sep.	24	Aug.	20
80	Vista		Trop. Japonica	USA	May	21	Aug. Aug.	6	Sep. Sep.	24 23	Aug. Aug.	$\frac{21}{11}$
81	North Rose		Trop. Japonica	USA	May	14	Aug.	7	Sep.	25	Aug.	15
82	Labelle		Trop. Japonica	USA	May	20	Aug.	18	Sep.	28	Aug.	20
83	Texas Fortuna		Trop. Japonica	USA	Jun.	2	Aug.	16	Sep.	29	Aug.	21
84	CS-S4		Trop. Japonica	USA	May	12	Aug.	7	Sep.	15	Aug.	24
85	Tambo		Trop. Japonica	Brazil	Jun.	9	Aug.	29	Oct.	15	Aug.	23
86	Dourado Precoce		Trop. Japonica	Brazil	May	22	Aug.	16	Oct.	1	Aug.	15
87	Moroberekan	1 22	Trop. Japonica	Liberia	Jun.	12	Aug.	23	Oct.	15	Sep.	2
88	Asahi	旭	Temp. Japonica	Japan	May	18	Aug.	21	Sep.	19	Aug.	31
89	Akage	亦毛	Temp. Japonica	Japan	May	6	Aug.	2	Sep.	14	Aug.	2
90	Shirakawa	日川	Temp. Japonica	Japan	Мау	12	Aug.	4	Sep.	22	Aug.	6
91 02	Shinshu-kaneko	信州金子	Temp. Japonica	Japan	May	9	Aug.	10	Sep.	16	Aug.	7
92	Shinshu	1吉 /11	Temp. Japonica	Japan	May	9	Aug.	11	Sep.	18	Aug.	7
93 04	Oba Sekiyomo	八场	Temp. Japonica	Japan	May	0 7	Aug.	8 5	Sep.	15	Aug.	10
94 05	Kahei	天山 夏亚	Temp. Japonica	Japan Japan	Mov	78 28	Aug.	5 17	Sep.	10	Aug.	1/
90 96	Kokuryoumiyoko	加 一 熱白都	Temp. Japonica	Japan Japan	May	20 6	Aug.	1/7	Sep.	∠0 15	Aug.	10 24
97	Tamanishiki	玉錦	Temp Japonica	Japan	May	7	Aug.	5	Sen	15	Aug.	24 24
98	Jikkoku	十石	Temp. Japonica	Japan	Mav	6	Aug.	9	Sep.	15	Ano	23
99	Ginbozu	最坊主	Temp. Japonica	Japan	Mav	11	Aug.	12	Sep.	23	Aug.	8
100	Banzai	万才	Temp. Japonica	Japan	May	6	Aug.	10	Sep.	15	Aug.	30

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			Varietal		Heading date											
No.	Variety name		group	Origin	Ishiga	aki I	Ishiga	ıki II	Ishigaki 🏼		Tsuk	uba				
101	Kameji	亀治	Temp. Japonica	Japan	May	4	Aug.	10	Sep.	16	Aug.	30				
102	Shinriki	神力	Temp. Japonica	Japan	May	11	Aug.	21	Sep.	19	Sep.	5				
103	Kogyoku	黄玉	Temp. Japonica	Japan	May	15	Aug.	23	Sep.	19	Sep.	5				
104	Damattero	タ゛マッテロ	Temp. Japonica	Japan	May	16	Aug.	4	Sep.	21	Aug.	11				
105	Huanggu	黄穀	Temp. Japonica	China	May	7	Aug.	6	Sep.	15	Aug.	22				
106	North China 16	北支16号	Temp. Japonica	China	May	19	Aug.	19	Sep.	22	Aug.	22				
107	Lizihong	李子紅	Temp. Japonica	China	May	16	Aug.	11	Sep.	19	Aug.	23				
108	Sinaba		Temp. Japonica	Philippines	Mav	19	Aug.	7	Sep.	23	Aug.	19				
109	Norin 1	農林1号	Temp. Japonica	Japan	May	11	Aug.	11	Sep.	21	Aug.	3				
110	Norin 8	農林8号	Temp. Japonica	Japan	May	7	Aug.	5	Sep.	15	Aug.	26				
111	Norin 29	農林29号	Temp. Japonica	Japan	May	6	Aug.	7	Sep.	14	Aug.	26				
112	Fujisaka 5	藤坂5号	Temp. Japonica	Japan	May	8	Aug.	5	Sep.	15	Aug.	5				
113	Hokuto	北斗	Temp. Japonica	Japan	Apr.	20	Jul.	16	Sep.	5	Jul.	12				
114	Kitahikari	キタヒカリ	Temp. Japonica	Japan	Apr.	29	Jul.	21	Sep.	12	Jul.	17				
115	Todorokiwase	トト [*] ロキワセ	Temp. Japonica	Japan	Mav	15	Aug.	12	Sep.	23	Aug.	5				
116	Sasanishiki	ササニシキ	Temp. Japonica	Japan	May	11	Aug.	5	Sep.	20	Aug.	5				
117	Reimei	6121	Temp. Japonica	Japan	May	7	Aug.	5	Sep.	16	Aug.	5				
118	Kinmaze	金南風	Temp. Japonica	Japan	May	17	Aug.	12	Sep.	16	Aug.	26				
119	Akihikari	7+271	Temp Japonica	Janan	May	6	Ang.	5	Sep.	14	Ano	4				
120	Toyonishiki	トヨニシキ	Temp. Japonica	Japan	May	10	Aug.	5	Sep.	17	Aug.	7				
121	Honenwase	ホウネンワセ	Temp. Japonica	Japan	May	9	Aug.	6	Sep.	19	Aug.	6				
122	Kinuhikari	キヌヒカリ	Temp. Japonica	Japan	May	4	Aug.	3	Sep.	16	Aug.	9				
123	Koshihikari	コシヒカリ	Temp. Japonica	Japan	Mav	5	Aug.	3	Sep.	18	Aug.	15				
124	Kochihibiki	コチヒヒギキ	Temp. Japonica	Japan	Mav	5	Aug.	5	Sep.	14	Aug.	18				
125	Nipponbare	日本晴	Temp. Japonica	Japan	May	4	Aug	10	Sen.	14	Aug	22				
126	Kogapemasari	コカ゛ネマサリ	Temp Japonica	Ianan	May	7	Ang	7	Sen	15	A119	26				
127	Nakateshinsenbon	中生新千本	Temp Japonica	Iapan	May	11	Ang	13	Sep.	15	Aug.	26				
128	Reiho	レイホウ	Temp Japonica	Ianan	May	12	Ang.	14	Sen	15	Aug.	30				
120	Nishihomare	ニシホマレ	Temp Japonica	Japan	May	6	Δ11σ	12	Sen	15	Δ11σ	31				
130	Shiranui	シラヌイ	Temp. Japonica	Japan	May	8	Aug.	12	Sep.	17	Sep.	2				
131	Hoshivutaka	ホシユタカ	Temp. Japonica	Japan	Mav	19	Aug.	21	Sep.	22	Aug.	30				
132	Ochikara	オオチカラ	Temp. Japonica	Japan	May	17	Aug.	7	Sep.	22	Aug.	14				
133	Owarihatamochi	オワリハタモチ	Temp. Japonica	Japan	May	10	Aug.	3	Sen	19	Aug	7				
134	Hokurikumochi 141	北陸糯141号	Temp. Japonica	Iapan	Mav	11	Aug	9	Sep.	20	A110	8				
135	Taichung 65	台中65号	Temp Japonica	Taiwan	May	30	Ang.	19	Oct	4	A110	21				
136	Wzbeuskii 2	ш 100-0	Temp Japonica	Russia	May	6	Inl	29	Sen	15	Ang.	21				
137	K78		Temp Japonica	India	May	4	Jul.	20	Sen	17	Aug.	2				
132	R M		Temp. Japonica	Italy	Mov	11	Δυσ	20	Sep.	10	Aug.	л Л				
120	IX.IVI. Domoo		Temp. Japonica	Italy	Mov	11	Aug.	2	Sep.	17	Aug.	47				
139	Komeo		remp. Japonica	nary	iviay	0	Aug.	3	Sep.	10	Aug.	1				

Note

	Ishiga	ki I	Ishiga	ıki ∏	Ishiga	Tsukuba		
Sowing date	Feb.	21	May	23	Jul.	17	May	9
Transplanting date	Mar.	12	Jun.	17	Aug.	3	Jun.	12

研究資料

石垣島の二期作栽培におけるイネ品種の出穂の特徴

長峰 司 , 山守 誠 , 勝田眞澄 , 河瀨眞琴

^{a)}国際農林水産業研究センター沖縄支所 (〒907 沖縄県石垣市真栄里川良原1091-1)

^{b, c)} 農業生物資源研究所 (〒305 茨城県つくば市観音台2-1-2)

摘要

作物の育種において雑種集団初期世代の世代促進は育 種操作の一つとして欠かせない手段となっており,最近 育成された大部分の新品種は世代促進を経過している。 沖縄県石垣島にある国際農林水産業研究センター沖縄支 所では亜熱帯の立地条件を生かして圃場におけるイネお よびコムギの世代促進を1981年から行っている。遺伝変 異の拡大を図り,多様な特性を有する品種を育成するた め,イネの交配母本には日本品種のみならず,さまざま な外国品種が用いられている。外国品種を用いた雑種集 団の固定には日本品種同士の雑種集団よりも長期間を要 するが,このような雑種集団の世代促進を効率良く進め るため,さまざまなイネ品種の石垣島における出穂特性 に関する知見を予め明らかにしておくことが重要であ る。

本報告では、石垣島における一期作および二期作にお ける品種の出穂の特徴、あわせて日本本土のモデルとし てつくば市における出穂期と石垣島における出穂期を比 較して、石垣島におけるイネ品種の出穂の特徴を報告す る。

世界各地の在来イネ77品種および改良イネ62品種の 合計139品種(インド型が55品種,日本型が84品種)を 用いた。ただし、インド国の農業生態型品種群のアマン は含めなかった。 まず,石垣島における一期作と二期作における品種の 出穂特性の違いを調査した。その結果,すべての品種に おいて二期作の出穂迄日数は一期作より短くなり(Fig. 1),一期作,二期作ともに日本型品種群のほうがインド 型品種群より出穂期の変異幅が大きかった(Table 1)。 また,一期作,二期作ともに温帯の日本型品種群には早 生が多く,熱帯の日本型品種群と温帯のインド型品種群 には晩生が多いことが分かった(Table 1)。

つぎに、石垣島における品種の出穂特性を明らかにす るため、茨城県つくば市をモデルとして出穂期を比較し た。その結果、ほとんどのインド型品種群および熱帯の 日本型品種群は低緯度の石垣島で栽培しても出穂はあま り早まらなかった。また、熱帯型を除く日本型品種群の 多くは石垣市で栽培するとつくば市での栽培より出穂迄 日数が短くなった。温帯の日本型品種はつくば市におけ る出穂期と石垣島における出穂期の間で相関が小さく (Fig. 2)、石垣島で早生個体を選抜するのは困難と推定し た。

以上の結果から,石垣島の一期作,二期作におけるさ まざまな品種の出穂特性および品種群の間の出穂特性の 違いが明らかになり,効率的な世代促進栽培の基礎的な 資料を得ることができた。

キーワード:イネ,インド型,出穂特性,世代促進,二期作,日本型,品種群

^a"現在:農業生物資源研究所(〒305 茨城県つくば市観音台2-1-2)

^{°)}現在:四国農業試験場(〒765 香川県善通寺市仙遊町1-3-1)