ISSN 1341-9730

Sweetpotato Research Front

Kyushu National Agricultural Experiment Station (KNAES) No. 11, January 2001

Contents

Report on the International Workshop on Sweetpotato Cultivar Decline

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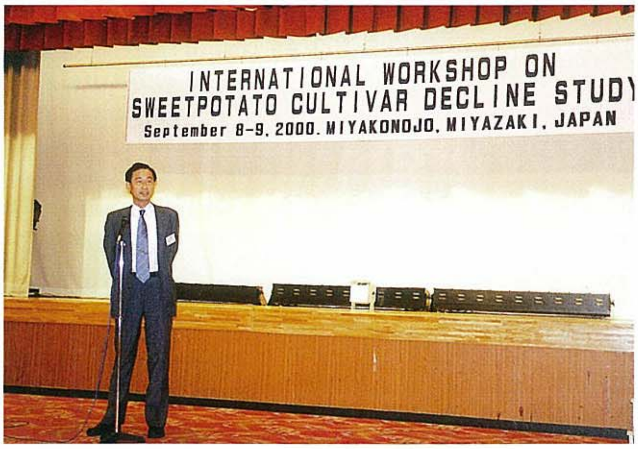
Laboratory of Upland Crop Genetic Resources

The international workshop on Sweetpotato Cultivar Decline was held September 8 to 9, 2000, inclusive in Miyakonojo City, Japan. Fifty researchers from six countries and one international organization (CIP) met to report on 26 up-to-date results in four sessions. Abstracts of the workshop can be viewed at http://ss.mykz.affrc.go.jp/~spws/ .

Purpose:

It is expected that sweetpotato will serve as an important crop for security of food production in the 21st century. However, performance decline of sweetpotato cultivars is a limiting factor to production. The primary factors in cultivar decline are viruses and sudden variation. Therefore, we held an international workshop on the problem and discussed issues related to sweetpotato cultivar decline.



Program:

Special Lectures

1. Mutations in sweetpotato : Dr. D.R. La Bonte, USA
2. Molecular characterization of sweetpotato viruses occurring in Japan : Dr. K. Hanada, Japan.
3. Current knowledge on virus diseases of sweetpotato : Dr. L.F. Salazar, CIP

Session 1 : Quality and yield decline of sweetpotato cultivars in each country

1. Sweetpotato varieties decline in China and the prevent practices : Dr. Ma Daifu, China
2. Problems related to yield performance decline in sweetpotato in Malaysia : Dr. Tan Swee Lian, Malaysia
3. Problems in sweetpotato production related to 'cultivar decline' in Kagoshima Prefecture : Dr. K. Shimonishi, Japan
4. Sweetpotato (kumara) virus disease surveys in New Zealand : Dr. J.D. Fletcher, New Zealand
5. Yield and reaction of non-indigenous sweetpotato clones to sweetpotato virus disease in Uganda : Dr. Aritua V., Uganda
6. Present state of quality and yield in South African sweetpotato cultivars : Dr. Sunette M Laurie, South Africa
7. Sweetpotato cultivar decline in the USA : Dr. Christopher A. Clark, USA
8. Problems and subjects of performance decline of sweetpotato in the Philippines : Dr. Algerico M. Mariscal, Philippine

Session 2 : Detection and identification technology for sweetpotato viruses

1. Properties and variability of sweetpotato : Dr. R.A. Valverde, USA
2. Identifying the role of viruses in sweetpotato cultivar decline in Louisiana, USA : Dr. Christopher A. Clark, USA
3. Identification of four SPFMV strains and SPVG by RT-PCR and RFLP methods : Dr. J. Sakai, Japan
4. Sweetpotato virus isolation, identification and

detection - 20 years later - : Dr. J.W. Moyer, USA
5. Application of NASH (Nucleic acid spot hybridization) in diagnosis of SPFMV to facilitate indexing of sweetpotato germplasm : Dr. Kazuo N. Watanabe, Japan

Session 3 : Countermeasure for the performance maintenance

1. CIP's strategy for controlling sweetpotato virus diseases in developing countries : Dr. Dapeng Zhang, CIP
2. Application of virus free techniques to make healthy sweetpotato cuttings : Dr. R. Nagata, Japan
3. Mass-production of sweetpotato transplants with roots on a plug tray using single-node leafy cuttings under artificial light and CO_2 enriched conditions in a closed system for increasing yield and for decreasing resource input : Dr. Toyoki Kozai, Japan
4. The approach for breeding of virus resistant sweetpotato : Dr. Y. Kai
5. Sweetpotato feathery mottle virus derived resistance - CP mediated resistance and gene silencing - : Dr. M. Nishiguchi, Japan
6. Virus resistance in the progeny of transgenic sweetpotato (*Ipomoea batatas* L.(Lam)) expressing the coat protein gene of sweetpotato feathery mottle virus : Dr. Y. Okada, Japan

Session 4 : Section technology of the mutation and occurrence mechanism

1. Detection of mutation in sweetpotato : Dr. D.R. La Bonte, USA
2. Analysis of sweetpotato mutants and retroelements : Dr. M. Tanaka, Japan
3. TAIL PCR to detect mutation caused by possible transposition of a retrotransposon in sweetpotato genome : Dr. Makoto Tahara, Japan

After we exchanged the latest research information about sweetpotato cultivar decline problems, we recommended creation of an overall working group and establishment of an international network on sweetpotato cultivar decline. Creation of working groups on cultivar decline with long-term objectives and strategies is important for facilitating efficient research on cultivar decline.

In the workshop, creation of the following working groups is proposed.

1) Creation of a working group on viruses
2) Creation of a working group on sudden variation
3) Creation of a working group on protection against cultivar decline.

I. Creation of a working group on viruses

Sweetpotato viruses may be the main factor of the cultivar decline. But the economical importance of each virus is not well defined, so this working group will deal the following :

1) Define the sweetpotato viruses currently recognized with standard names and set up criteria necessary for identification.
2) Coordinate efforts on virus identification, especially potyvirus, crinivirus and geminivirus groups, so that efforts can be concentrated most productively.
3) Determine the geographic distribution and economic importance of the different viruses.

II. Creation of a working group on sudden genetic variation

Sudden variations may be another factor of the cultivar decline. But the detection of sudden variations is very difficult and the mechanism of sudden variation is not yet clear, so this working group will deal with the following subjects

1) Develop techniques to detect sudden variations using recent gene technology like molecular markers and random approaches.
2) Define factors trigger sudden variations on sweetpotato cultivar.

III. Creation of a working group on protection

Protection of sweetpotato from cultivar decline is important for the sustainable production in the world. For this purpose, the working group on protection will work with the followings.

1) Develop techniques to be used easily, cheaply and efficiently in order to provide virus-free, genetically stable planting material.
2) Establish new techniques like transgenic plants in order to make virus resistant sweetpotato cultivars.
3) Survey gene resources and develop selection methods for breeding of virus-resistant, stable cultivars; with emphasis on establishing methods for virus inoculation, detection and resistance screening.

IV. Establishment of international network on sweetpotato cultivar decline

Sweetpotato cultivar decline is a world-wide problem and requires expertise from several scientific disciplines. Facilitation of communication on this problem among sweetpotato researchers is important as an international collaboration. Share information on resistance in sweetpotato to cultivar decline and discuss possible approaches to identifying and exploiting resistance is important. For this purposes, we should develop a mechanism for regular, continuing exchange of information on cultivar decline.

The proceeding of this workshop will be issued soon.

Research Paper

Effect of Harvest Times on the Vitamin Content of Sweetpotato Leaves

Makoto Yoshimoto, Shigenori Okuno, Kazuo Suwa , Terumi Sugawara and Osamu Yamakawa***

Laboratory of Upland Crop Utilization,
*** Laboratory of Farm Operation Mechanization Systems,**
**** Laboratory of Sweetpotato Breeding**

Agriculturists and nutritionists, faced with the problem of feeding the worlds hungry, are becoming increasingly interested in previously neglected tropical green leafy vegetables, such as sweetpotato greens. Low yield is one reason for this neglect. Our data revealed that the problems of low yield could be overcome by repetitive harvesting (data not shown). However, so far, the effects of harvest times on the nutritive value of the leaf have not been reported. This paper describes the relationship between repetitive harvesting and vitamin content when using the sweetpotato leaf as a vegetable or raw material for processed food.

Kyukei 58 (K 58), K66Mu 72-2 (K66Mu) and Simon-1 (S-1) were used for the present study. Seed root (8 kg) of these varieties was planted in the nursery on April 7, 1999. The vines were harvested six times between May 7 and Oct. 12. The material was weighed, washed and leaves and petioles were separated.

Samples harvested on May 7, July 28 and Aug. 30 were analyzed for nutritive value. Beta-carotene, vitamin C, E and K content was analyzed using high performance liquid chromatography (Figure).

Beta-carotene content of S-1, K66Mu and K 58 leaves harvested on May 7, July 28 and Aug. 30 ranged from 41.3 mg to 42.1 mg, from 50.8 mg to 42.1 mg and from 29.6 mg to 53.0 mg/100 g powder. Beta-carotene content of leaves harvested on July 28 was 51.7 mg, 70.7 mg and 61.6 mg/100 g powder and was higher than on the other two occasions. The content of beta-carotene in S-1, K66Mu and K 58 harvested on three occasions was on average 44 mg, 53 mg and 48 mg/100 g powder. When these values are converted per fresh weight, beta-carotene content of S-1, K66Mu and K 58 leaves is 5.28 mg, 6.26 mg and 5.76 mg/100 g (fwb). Although this is not conclusive, the difference might depend on the variety.

The vitamin C content of S-1, K66Mu and K 58 leaves ranged from 106 mg to 290 mg, from 78 mg to 231 mg and from 115 mg to 293 mg/100 g powder. Vitamin C content at the second harvest time was two to three times higher than at the first harvest. The average vitamin C content of the three cultivars at the third harvest time was 199 mg, 171 mg and 214 mg/100 g powder. These values were one third that of spinach (660 mg).

The vitamin E content of S-1, K66Mu and K 58 leaves harvested ranged from 18.5 mg to 39.9 mg, from 9.1 mg to 59 mg, and from 4.8 mg to 40.4 mg/100 g powder. Vitamin E content at the second harvest was two to eight times higher than at the first harvest. The average content of vitamin E in S-1, K66Mu and K 58 harvested at the third harvest was 28.5 mg, 35.5 mg and 24.7 mg/100 g powder. These values were similar to that of spinach (25 mg).

The vitamin K content of S-1, K66Mu, and K 58 leaves ranged from 5.4 mg to 4.1 mg, from 7.1 mg to 5.8 mg, and from 6.8 mg to 6.4 mg. Content was not observed to vary significantly with harvest time. The content of vitamin K in S-1, K66Mu and K 58, averaged over the three harvest times, was 4.9 mg 6.7 mg, and 6.8 mg/100 g dry powder.

Our data indicates that repetitive harvesting of the leaf did not cause an extreme decrease in the vitamin content. The present study showed that sweetpotato leaves can be used as a leafy vegetable or as raw material for processed food. However, the taste of sweetpotato leaf is not always liked. Therefore, it seems to be preferable for the leaves to be utilized as raw material for noodles, bread, drinks and confectionery rather than as a fresh vegetable.

In order to promote the use of the sweetpotato leaf, its physiological function of maintaining and improving health must be shown. It is reasonable to anticipate the use of the sweetpotato leaf as a functional food material. At present, we are continuing to examine its physiological function.

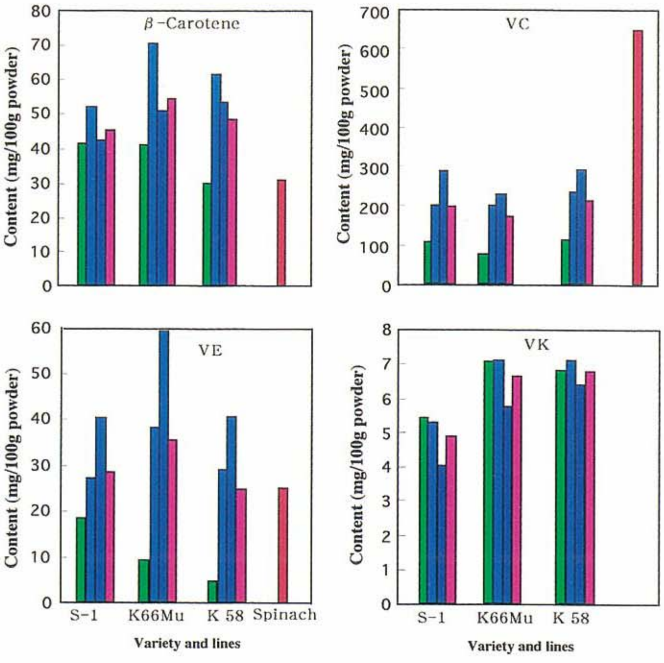


Fig. Change of vitamin content in Simon-1, K66Mu 72-2, and Kyukei 58 leaves
, May 7; , July 28; , Aug. 30; , average; , spinach

Research Paper

Konahomare: New Sweetpotato Cultivar for Starch Production

Toru Kumagai, Osamu Yamakawa, Yumi Kai and Koji Ishiguro

Laboratory of Sweetpotato Breeding

Introduction

"Konahomare" is a newly released cultivar with a high starch content and high yield, developed at the Kyushu National Agricultural Experimental Station. It was evaluated at prefectural agricultural experimental stations as breeding line "Kyushu No. 126" and was officially registered as "Sweetpotato Norin No. 52", for starch production in 2000, by the Ministry of Agriculture, Forestry and Fisheries.

Origin

"Konahomare" is the progeny of a cross between "Hi-Starch" and "Kyukei82124-1" conducted at the Ibusuki Branch of the Station in 1990. "Hi-Starch" has a high starch content and high yield, while "Kyukei82124-1" has a good combining ability. 3,307 single-crossed seeds were sown in the Sweetpotato Breeding Laboratory nursery. Selection was based on field performance and starch content.

Description

"Konahomare" displays a moderate sprouting ability and a prostrate plant type. The color of the top leaves is light green. The mature leaves are green and cordate. The vine is slightly thin with a medium internode length. There is no anthocyanin accumulation in the vein and node. The storage root is short, fusiform with light brown skin and has a light yellowish-white flesh. As the taste of the steamed root is not palatable, "Konahomare" is not suitable for table use.

Performance

The yield, dry matter content, and starch content of "Konahomare" are higher than those of "Koganesengan" and "Shiroyutaka." Depending on cultivation conditions, the starch yield is 20 to 30% higher than for "Koganesengan." It showed a 50% higher starch yield in the local agricultural experimental station than a standard cultivar undergoing long-term mulching cultivation with plastic film.

"Konahomare" exhibits a slightly weak resistance to black rot but an intermediate resistance to the root lesion nematode and a slightly strong resistance to the root-knot nematode. The storage ability of the storage roots is slightly low during winter.

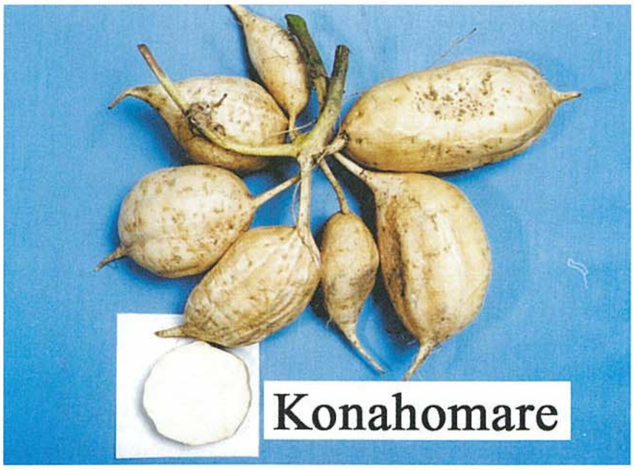


Table. Yield and other traits of "Konahomare" in yield trial (1995-1999, standard harvesting)

Traits	Konahomare	Koganesengan	Shiroyutaka
Root yield (t/ha)	25.5	23.4	24.1
Root size (g)	252	192	211
No. of roots per hill	2.7	3.3	3.1
Dry matter content (%)	39.2	36.7	35.8
Starch content (%)	27.3	25.4	25.1
Starch yield (t/ha)	7.0	6.0	6.1
Brix value (%)	3.7	5.0	4.2
Root-knot nematode resistance 1)	SR	SS	SR
Root-lesion nematode resistance 1)	I	SS	I
Black rot resistance 1)	SS	S	-
Storage ability 2)	SL	SL	M

1) SR: Slightly Resistant. I: Intermediate. SS: Slightly Susceptible. S: Susceptible.
2) M: Medium. SL: Slightly Low.

Research Paper

PCR-RFLP-Aided Survey of Principal Plant-Parasitic Nemotodes Associated with Sweetpotato Fields in Central and Southern Parts of Kyushu, Japan

*Hideaki Iwahori, Zen-ichi Sano and Tetsuji Ogawa**

Laboratory of Plant Nematology
***Nagasaki Prefectural Plant Disease and Insect Control Station**

Root-knot nematodes (*Meloidogyne* spp.), root-lesion nematodes (*Pratylenchus* spp.) and the reniform nematode (*Rotylenchulus reniformis*) are the common plant-parasitic nematodes harmful to sweetpotato, one of the most important crops of central and southern Kyushu, Japan. Using the PCR-RFLP method, we surveyed three prefectures of Kyushu (Kumamoto, Miyazaki and Kagoshima) to determine the distribution of these nematodes in sweetpotato fields. Existing reports on plant-parasitic nematodes are few and old, and updated information is urgently required to understand current nematode problems in sweetpotato cultivation in Kyushu.

Soil samples were collected from 85 sweetpotato fields in the Kumamoto, Miyazaki and Kagoshima prefectures during October and November 1999. Nematodes were extracted by the Baermann funnel technique. Initially, principal plant-parasitic nematodes were identified morphologically. Species of root-knot nematodes were then identified using the PCR-RFLP method with a single second-stage juvenile for each field, along with perineal pattern morphology using about 10 adult females. Species of root-lesion nematodes were also identified using the PCR-RFLP method with a single nematode from third-stage juvenile to adult.

Root-knot nematodes were detected in almost all fields (Table 1). This suggests that root-knot nematodes are inflicting serious damage on sweetpotato fields in central and southern Kyushu. More than 90% of the nematodes were identified as *M. incognita* and the rest as *M. arenaria* or *M. javanica* (Table 2). Identification of *M. arenaria* and *M. javanica* using morphology is difficult because *M. arenaria* identified using the PCR-RFLP method have a range of different perineal patterns. These perineal patterns are of the *M. javanica* type or, rarely, similar to the *M. hapla* type. Our results and other reports suggest that *M. javanica*, previously considered to be common in western Japan, might in fact have been *M. arenaria*. *M. javanica*, identified using the PCR-RFLP method or isozyme patterns, was detected only in the southernmost part of Japan (e.g. Ryukyu Is.), with one exceptional population in central Honshu. No or few *M. javanica* seem to be distributed in central and southern Kyushu.

Root-lesion nematodes were detected in 22.4% of fields (Table 1). The incidence of detection was greater in the southern areas surveyed. Sweetpotato crops, especially in Kagoshima, need this nematode to be controlled in addition to root-knot nematodes. The species were primarily *P. coffeae* (68.4%). *P. vulnus* and *P. zeae* were each detected in one field (Table 3). The latter two species have no pathogenicity to sweetpotato and seem to live on weeds or a preceding crop other than sweetpotato.

The reniform nematode was isolated from 65.9% of fields (Table 1). Such a high incidence might bring about the cracking of tubers associated with injury by this nematode. Spiral nematodes were isolated in 29.4% of fields (Table 1). Despite its being detected so frequently, the spiral nematode does not appear to be a serious sweetpotato pathogen.

To identify nematode species, DNA analysis, such as the PCR-RFLP method, is stable, unambiguous and worthy of increasing use, especially for root-knot nematodes. Recently, several root-knot nematode races, differing in pathogenicity to various cultivars of sweetpotato, have been identified by the inoculation tests. These races, however, cannot be distinguished from each other morphologically or even by the PCR-RFLP method so far. Accurate identification of nematode species and races using DNA analysis would provide useful information, not only for selecting cultivars, but also for planning the cropping system in sweetpotato fields in the future.

Table 1. Incidence of principal plant-parasitic nematodes in sweetpotato fields in central and southern parts of Kyushu.

Location of fields	Root-knot nematodes	Root-lesion nematodes	Reniform nematode	Spiral nematodes	Cyst nematodes
Kumamoto (n=22)	21 (99.5)	0 (0.0)	10 (82.1)	1 (15.5)	0 (0.0)
Miyazaki (n=34)	34 (100.0)	6 (17.6)	19 (55.9)	8 (23.5)	0 (0.0)
Kagoshima (n=29)	28 (96.6)	13 (44.3)	27 (93.1)	16 (55.1)	0 (0.0)
Total (n=85)	83 (97.6)	19 (22.4)	56 (65.9)	25 (29.4)	0 (0.0)

Results shown are the number of detected fields and their percentages(in parentheses).

Table 2. Percentages of each root-knot nematode species identified by perineal patterns(peri) and PCR-RFLP in sweetpotato fields in central and southern parts of Kyushu.

Location of fields	Mi		Ma		Mj		Mh		Unknown	
	peri	RFLP	peri	RFLP	peri	RFLP	peri	RFLP	peri	RFLP
Kumamoto (n=21)	93.5	95.2	0.0	4.8	5.1	0.0	0.0	0.0	1.4	0.0
Miyazaki (n=34)	90.7	97.1	6.0	3.9	3.3	0.0	0.0	0.0	0.0	0.0
Kagoshima (n=28)	86.2	96.4	0.0	3.6	6.9	0.0	0.0	0.0	6.9	0.0
Total (n=83)	90.0	96.4	2.6	3.6	4.9	0.0	0.0	0.0	2.5	0.0

Mi: *Meloidogyne incognita*, Ma: *M. arenaria*, Mj: *M. javanica*, Mh: *M. hapla*

Table 3. Incidence of each root-lesion nematode species identified by PCR-RFLP in sweetpotato fields in central and southern parts of Kyushu.

Location of fields	Pc	Pv	Pz	Pp	Unknown
Kumamoto (n=0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Miyazaki (n=6)	5 (83.3)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)
Kagoshima (n=13)	8 (61.5)	0 (0.0)	1 (7.7)	0 (0.0)	4 (30.8)
Total (n=19)	13 (68.4)	1 (5.3)	1 (5.3)	0 (0.0)	4 (21.0)

Results shown are the number of detected fields and their percentages (in parentheses).
Pc: *Prathylenchus coffeae*, Pv: *P. vulnus*, Pz: *P. zeae*, Pp: *P. penetrans*

Research News

Physiological Function Assessment Center for Producing Healthy Food

Ikuo Suda

Laboratory of Crop Quality, Stroage and Processing

Outline of the Center

The Physiological Function Assessment Center for Producing Healthy Food was constructed in April 2000, beside the Analytical Assessment Center for Producing Crops with High Quality, at Nishigoshi, Kumamoto Prefecture. These experimental centers are used for postharvest research by analysts, biochemists, clinical chemists and food processing specialists. Up-to date facilities are concentrated in both centers and can be shared by outside postharvest researchers linked to our study. With the completion of the new building, we have started to study the prevention of lifestyle-related disease (chronic disease) using crops with high physiological functionality.

Main Facilities

NMR spectrometer, ESR spectrometer, UV/VIS, ELISA, Fluorescence spectrometer, Chemiluminescence analyzer, HPLC, GC, GC/MS, Supercritical fluid chromatography, Accelerated solvent extractor, Spray dryer, Freeze-drying apparatus, Far infrared radiation oven, Dietary fiber analyzer, Atomic absorption spectrometer, Amino acid analyzer, Protein sequencer, Peptide synthesizer, Air-conditioned animal rack, Clinical automatic analyzer.

Research Paper

A Piece of Travel Writing about Sweetpotatoes in China

Makoto Yoshimoto, Nakatani Makoto, and Kumagai Tooru

Department of Upland Farming, KNAES

(Continuation with the last issue)

3) Crop Research Institute, Sichuan Academy of Agricultural Sciences

Sichuan province accounts for 20% of the sweetpotato yield in China and is the largest producer. Most of the yield, 70% including vines, is used as livestock feed for hogs. The rest is used for food, processing, and raw materials for starch production. The variety for livestock feed has a high yield, including vines and roots. The root peel of the variety for food is pink

The Institute conserves the genetic resources of about 400 lines and actively performs research into processing. The sweetpotato variety with orange-colored flesh recently came to be recognized as useful for cancer prevention, as well as having other health benefits. However, the consumption of sweetpotatoes is still low. People's opinions of sweetpotatoes have changed over the last ten years, and sweetpotato processing is progressing. The subjects being studied include development of a machine for starch and noodle production, making sweetpotato flour, and fried sweetpotatoes.

4) Crops Research Institute, Guangdong Academy of Agricultural Sciences

The Crops Research Institute, Guangdong Academy of Agricultural Sciences, plays a central role in sweetpotato study in the southern five provinces and conserves the genetic resources of about 1000 lines. Varieties for high yield and disease resistance are mainly being developed at present, and the study of a high-quality variety for confectioneries and baked or steamed sweetpotatoes is in progress.

Sweetpotatoes have been actively studied in the Sweetpotato Research Center and the regional Crop Research Center. Consequently, studies into the development of new varieties, improvements in breeding methods, and biotechnology have produced excellent results. The present target for breeding appears to be to develop varieties with high starch content, disease resistance, and those with many uses. The physiological func-tions of the sweetpotato have been vigorously studied in Japan through cooperation with food scientists in universities and companies. The sweetpotato has recently been reassessed in China as a healthy food because of people's increasing interest in health. Progressive research into sweetpotatoes as functional food is expected in the future. This visit gave us a new understan-ding of the sweetpotato as an impo-rtant crop that could resolve the above-mentioned global issues all over the world. We should expedite sweetpotato studies in cooperation with researchers and companies around the world.

Finally, we are very thankful to many people for the kindnesses they showed us during our stay in China. Furthermore, we sincerely thank the Chinese and Japanese governments for the opportunity that they gave us.

Photo. 1 Sweetpotato fields in Sichuan province

Photo. 2 Sweetpotato nursery in Crops Research Institute, Guandong Academy of Agricultural Sciences

Reader's Talk

Announcements

Back numbers of SPORF are now on the KNAES home page. Please access: http://ss.knaes.affrc.go.jp/sporf/sporf.html

Editor's note

We missed one of the editorial staff, Dr. Masaoka, who is a specialist for crop science, and moved to Hiroshima Univ. as a professor. Instead of him we welcomed Dr. Sano, nematologist. Let' clap your hands for his entrance.(O.Y.).

Reader's Talk

Letter to theeditor

Successful International Workshop on Sweetpotato Cultivar Decline Study held at Miyakonojo City

Christopher Clark

Department of Plant Pathology & Crop Physiology, Louisiana State University AgCenter, Baton Rouge, Louisiana

Sweetpotato is expected to serve as an important crop for food security in the 21st century. To help sustain production of sweetpotato, the subject of cultivar decline was identified as a priority area of mutual research interest during an international workshop held in December, 1997. It is well recognized that viruses can cause rapid decline of cultivars in some countries, but their importance in many other countries is not well understood. In addition, mutations may have a role in quality and yield decline of sweetpotato cultivars. Since detection of viruses and mutations relies on sim-ilar molecular technologies, since programs for producing planting materials for farmers must strive to maintain freedom from both viruses and mutations, and since breeding programs must address both virus resistance and genetic stability, there is good reason for collaboration among scientists from various disciplines in studying cultivar decline. Therefore, an international workshop on Sweetpotato Cultivar Decline Study was held September 8 to 9, 2000 in Miyakonojo City, Japan. The workshop was organized by Kyushu National Agricultural Experiment Station (KNAES), Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF), and Science and Technology Agency (STA) of Japan.

Presentations regarding the current state of knowledge related to cultivar decline were made in several sessions. Special lectures provided overviews of the subjects: D. La Bonte introduced the subject of mutations, K. Hanada described molecular characterization of viruses, and L. Salazar summarized current knowledge on virus diseases of sweetpotato. Twenty two presentations were give in sessions devoted to: quality and yield decline of sweetpotato cultivars in different countries, detection and identification technology for sweetpotato viruses, countermeasures for maintaining performance of sweetpotato cultivars, and detection and mechanisms of mut-ations in sweetpotato.

Following the presentations, general discussions were held which led to development of recommendations on research priorities and mechanisms for continuing collaborations on subjects related to cultivar decline. From this workshop, creation of working group on viruses, sudden variation, and on protection against cultivar decline were proposed. Specific research priorities were agreed upon for each working group. For viruses, identifying, standardizing nomenclature, determining geographic distribution and economic importance, and coordinating research efforts, especially for the potyvirus, crinivirus, and geminivirus groups that infect sweetpotato were identified as priorities. Priorities for the working group on sudden variation are to develop molecular techniques to detect mutations, and to identify the factors that trigger sudden variation in sweetpotato. Priorities for the working group on protection include developing techniques to easily, cheaply and efficiently produce virusfree, genetically stable pla-nting material; and to develop methods for screening for virus resistance and producing virusresistant cultivars both from transgenic methods and from existing genetic resources. It was recommended that key individuals from Japan, USA, and CIP take responsibility for providing regular periodic updates on a website of progress by each working group. Hopefully, this is just the beginning of a well focused international collaboration on a subject of great importance. Special thanks go to Osamu Yamakawa, Yoshinori Nakazawa, KNAES, MAFF, and STA for their hospitality to the participants and many other efforts to make this a successful workshop.

Sweetpotato Research Front (SPORF)

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published by the support from the Kyushu National Agricultural Experiment Station, MAFF, Nishigoshi, Kumamoto 861-1192, JAPAN