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Sweetpotato Research Front

Kyushu National Agricultural Experiment Station (KNAES) No.10, July 2000

Contents

In Memory of SPORF Publication 10th

Kei Ogawa

Director General of Kyushu National Agricultural Experiment Station

As Director General of the Kyushu National Agricultural Experiment Station (KNAES), I am pleased to celebrate the publication of the 10th edition of SPORF, which was first published in 1995. SPORF has a circulation of about 500 copies and has been distributed to 137 research organizations in 40 countries around the world. These are Argentina, Australia, Belgium, Brazil, Canada, China, Colombia, Cuba, Czech Republic, Finland, France, Honduras, India, Indonesia, Italy, Korea, Mexico, Malaysia, the Netherlands, New Zealand, Nigeria, Norway, Oman, Papua New Guinea, Peru, the Philippines, Portugal, Russia, Scotland, Spain, Sri Lanka, Sweden, Taiwan, Thailand, Turkey, the USA, the Union of South Africa, and the United Kingdom.

I am fully convinced that SPORF has served as a useful, open vehicle for information interchange on sweetpotato research, thereby strengthening the bond of union among researchers.

I firmly believe that the sweetpotato is a potential-packed crop, not only as material for food but also for chemical goods and as an energy resource.

Taking advantage of the publishing of the 10th SPORF edition, I am looking forward to taking major steps to fully exploit the unutilized potential of the sweetpotato.

Report on the 13th Research Meeting for Root Crops Held in Miyazaki Prefecture

Osamu Yamakawa

Chief of Sweetpotato Breeding Lab., KNAES

The 13th Research Meeting for Root Crops was held December 9 to 10, 1999, at the Upland Farming Department of KNAES in Miyazaki Prefecture. About 90 researchers engaged in research on the sweetpotato and potato attended the meeting to exchange up-to-date information on the results and plans for future studies. The discussions on the sweetpotato are summarized as follows.

1. Performance trials conducted by the Pref. Agri. Exp. Stn. for newly distributed breeding lines were described. Kyushu-135 with high starch and yield is good for starch and fermentation industries. Kyushu-136 showed a good taste and shape for table use. Kyushu-137 with a high anthocyanin content was selected for table use due to its good taste and shape.

2. The following six short research topics were presented.

1) Estimation of potatoes introducing P450 gene metabolizing alien substances.
2) Varietal evolution of Taro by isozyme analysis.
3) Suppression of normal cells changing to cancer cells by sparking liquor from purple sweetpotato.
4) Fixation of nitrogen in the atmosphere by microorganisms in sweetpotato top.
5) Maltose production by rotary column reactor using β-amylase of sweetpotato.
6) Hardened ridge-surface method for environmental conservation compatible with sweetpotato production.

3. Introduction of sweetpotato research work and facilities in the Upland Farming Department.

The next meeting will be held in Nagasaki Prefecture from December 7 to 8, 2000.

Research Paper

Antipromotion Activity of Brewed Sweetpotato Beers on TPA-induced Transformation of Mouse JB6 Cells

De-Xing Hou, Makoto Fujii, Yoshihiro Sameshima and Makoto Yoshimoto***

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****Department of Upland Farming, KNAES**

The antioxidative and antimutagenic effects of sweetpotatoes have been reported previously. In the present study, the antipromotion activity of brewed sweetpotato beers on TPA-induced cell transformation was investigated in mouse JB6 P^+C141 cells. The brewed sweetpotato beers (Fig. 1) were made in Satsuma Shuzo Co., LTD (Kagoshima, Japan). Satsuma Purple beer was made from a sweetpotato variety with purple-colored flesh; Satsuma Gold beer, from a sweetpotato variety with yellow colored flesh; and Satsuma Black beer, from roasted sweetpotatoes. The beers were dried and sterilized by filtration. The cells ($1x10^4$) were plated on a soft agar medium and exposed to TPA with or without the beer samples. The dishes were cultured at 37℃ in a humidified atmosphere of 5%CO_2 and 95% air for 14 days. The TPA-induced colonies were counted with a microscope. The inhibition efficiency of brewed sweetpotato beers on transformation of JB6 cells was presented as the fraction of the cell transformation by TPA only. As shown in Fig. 2, TPA-induced transformation of JB6 P^+ cells was significantly blocked by Satsuma Purple and Satsuma Black in a dose-dependent manner ($P<0.05$). However, Satsuma Gold and commercial beer showed no inhibitory effect on TPA-induced transformation in a concentration range of 1.5 to 6.0%. The results indicated that brewed colored-sweetpotato beers had antipromotion activity. Furthermore, we demonstrated that the antipromotion activity of Satsuma Purple beers resulted in anthocyanin of purple sweetpotatoes (data not shown).

*Note: TPA (12-O-tetradecanylphorbol-13-acetate)

Fig. 1. Brewed sweetpotato beers

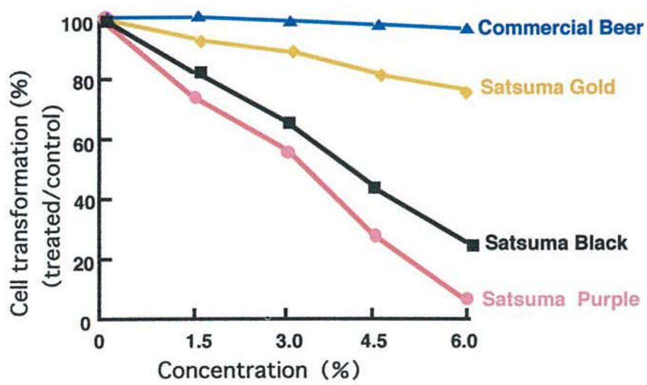


Fig. 2. Inhibitory effect of the brewed sweetpotato beers on TPA-induced mouse JB6 cell transformation

Research Paper

The Safety Index of Sweetpotato Production in Japan

Itaru Shiotani

Professor Emeritus of Mie University

The root-knot nematode (*Meloidogyne incognita*, RKN) is an obligate endoparasite that remarkably reduces yield and quality. Another problem with RKN is its polyphagous feeding habit, as its host range is so wide that no vegetables can be grown safely in a field once it has been infested.

In general, every sweetpotato cultivar has a response to RKN as an inborn trait. This trait is referred to as resistant, susceptible, or intermediate according to the host symptoms. The nature of resistance is usually stable, as shown by a high between-years correlation coefficient of 0.95 to 0.99. Therefore, if a farmer fails to harvest due to infection, there is a great risk that he will fail again the next year. In contrast, resistant cultivars clean his fields, and crops will continue to be safe.This cleaning is done by the roots; the RKN larvae invade the roots (a trapping effect), but they are killed through reactions between plant cells and nematodes (an exterminating effect).

We can calculate the safety index as a mean score weighted by the cultivation area of each cultivar to assess the safety of sweetpotato production. The term safety index is used as a short form nere that refers to the safety index for the RKN only.

In the calculations reported here, a score of 1.0 was given to resistant cultivars, 0.5 to intermediate cultivars, and zero to susceptible cultivars. We used the cultivation areas as listed in the 1999 MAFF statistics. Sweetpotato production in Japan's 29 prefectures that have cultivation areas exceeding 200 hectares was studied. Their index values ranged from zero to 0.50, with a grand mean of 0.21 (See Fig.). This indicates that approximately 80 percent of the total area is not secure against attack by RKN. Thus, sweetpotato production has been proceeding through the threat of infestation every year.

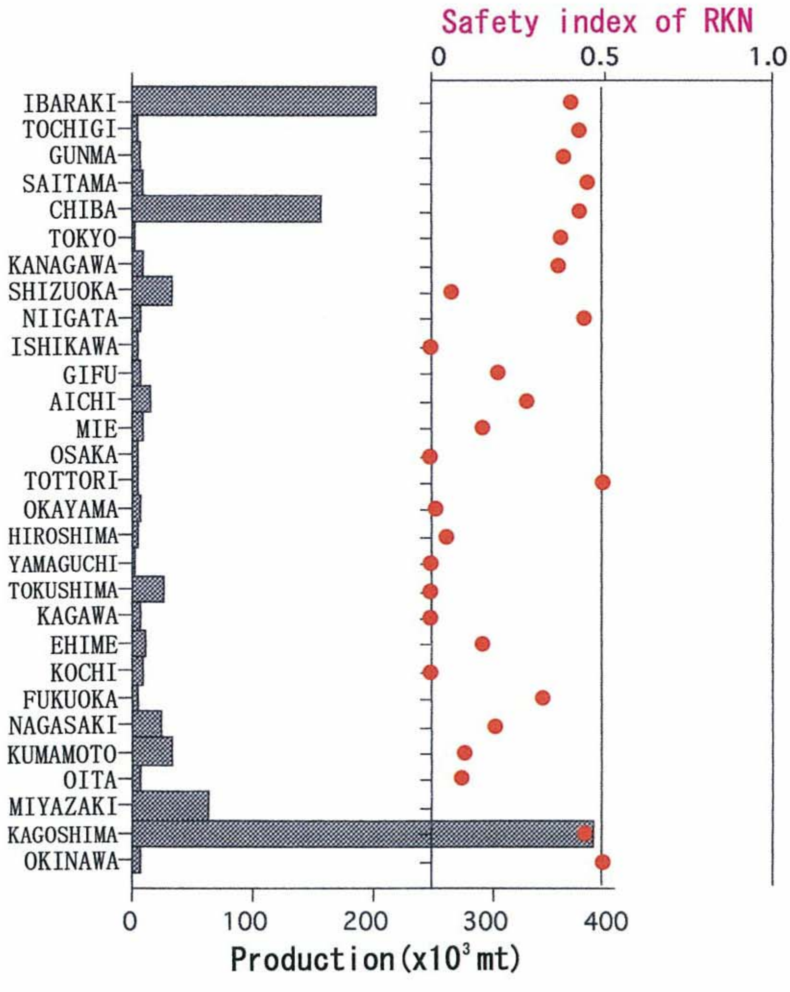
Let us examine history. The safety index of the national base was 0.26 in 1953, when the total cultivation area was five times as large as it is today. The index in 1940 was 0.11. This was the time when a few breeders first recognized the serious problem with RKN in Chiba. These indices suggest that there has been little progress in improving sweetpotato production safety during the last 60 years.

We may then wonder why we can find such excellent sweetpotatoes in stores at any time and whether these products are from those fields with a safety index of near zero.

According to statistics of Japanese agricultural chemical use in 1999, the main soil fumigants were D-D, chloropicrin, and methyl bromide. The total quantity of these chemicals used in Japan was 28,701 kiloliters, almost equal to that used by all the nations of Europe. Therefore, Japan is the greatest consumer of these chemicals in the world.

Table-type sweetpotatoes are usually produced by intensive farming to ensure their marketable quality. Their production centers are restricted to seven prefectures: Ibaraki and Chiba in the Kanto district; Tokushima, Kagawa, and Kochi in Shikoku; and Miyazaki and Kagoshima in Kyusyu. The sum quantity of chemical use in these prefectures was 11,466 kiloliters; about 40% of the total. This suggests that the excellent sweetpotatoes we are familiar with may come from chemically controlled production. We found that the safety indices of production are zero to 0.45 in these prefectures.

Last winter, O. Yamakawa of KNAES described to us a research plan to develop methods for selecting resistant plants using molecular markers. Resistance breeding and related basic research are urgently needed until the infestation threat is eliminated at farming sites.



Research Paper

Varietal and Annual Variations in Pasting Properties of Sweetpotato Starch

*Kenji Katayama, Seiji Tamiya and Katsumi Komaki**

National Agriculture Research Center
***Agriculture, Forestry and Fisheries Research Council Secretariat**

In Japan, most of the sweetpotato starch is consumed for producing glucose syrup or isomerized glucose syrup, and the rest is used for foodstuffs. However, the use of sweetpotato starch in Japan is comparatively limited. The use of sweetpotato starch is primarily determined by the physicochemical properties. Pasting properties influence the quality of food processing materials and industrial products and are often determined to evaluate the performance of starches practically. Crop quality is generally influenced by both cultivars and environmental factors. To breed varieties for starch-pasting properties, it is necessary to evaluate the varietal and environmental variations.

To analyze the varietal and annual variations in starch-pasting properties in sweetpotato storage roots, twenty cultivars and strains were grown in both 1996 and 1997. The starch-pasting properties were investigated using a Rapid Visco-Analyzer (RVA), and the amylose content and starch content were also examined.

The pasting properties exhibited a wide ranges of variation among cultivars and strains, and the amylose content ranged between 13.3 and 17.2% (Table 1). The correlation coefficients were 0.867*** for the pasting temperature, 0.654** for the peak viscosity, 0.784*** for the setback, 0.902*** for the amylose content, and 0.864*** for the starch content between the two years. Analysis of the variance demonstrated that the varietal differences were significant at the 0.1% level for the pasting temperature, setback, amylose content and starch content. The differences among strains and years were significant at the 1% level for the pasting temperature, peak viscosity and breakdown. The estimated heritability values were 0.80 for the pasting temperature, 0.49 for the peak viscosity, 0.77 for the setback, 0.88 for the amylose content, and 0.85 for the starch content. The amylose content had significant positive correlations in both years with the pasting temperature, the peak viscosity temperature and the setback. The starch content did not have any significant correlation with the pasting properties and the amylose content. These results indicate that it is possible to breed cultivars for improving the starch-pasting properties in sweetpotato.

Table 1. RVA pasting properties of starch (5%), amylose content and starch content of sweetpotato cultivated in 1996 and 1997.

Cultivar or strain [1)]		Pasting temperature (℃)	Peak viscosity temperature (℃)	Peak viscosity (RVU)	Breakdown (RVU)	Setback (RVU)	Amylose content (%)	Starch content (%)
Beniazuma	(R)	69.6 ± 0.4	77.5 ± 0.0	56 ± 1	5 ± 1	89 ± 3	14.6 ± 0.1	21.5 ± 1.4
Kokei 14	(B)	70.5 ± 0.8	77.4 ± 0.1	58 ± 0	7 ± 2	92 ± 4	15.3 ± 0.6	19.0 ± 0.0
Koganesengan	(R)	69.7 ± 0.6	76.2 ± 0.0	59 ± 2	6 ± 0	93 ± 3	15.1 ± 0.3	21.4 ± 1.4
Hi-starch	(R)	69.3 ± 0.1	78.0 ± 0.1	57 ± 3	6 ± 2	84 ± 1	14.4 ± 0.0	23.5 ± 2.1
Tamayutaka	(R)	68.8 ± 0.2	76.9 ± 0.1	64 ± 3	4 ± 1	96 ± 1	14.9 ± 0.0	19.8 ± 0.9
Izumi 13	(L)	68.7 ± 0.3	86.2 ± 8.8	55 ± 2	3 ± 3	85 ± 3	16.0 ± 0.0	23.2 ± 1.2
Benihayato	(R)	69.1 ± 0.8	95.0 ± 0.0	51 ± 1	0 ± 0	76 ± 1	14.7 ± 0.1	11.8 ± 1.9
Kankei 7	(B)	73.5 ± 0.5	88.9 ± 6.1	59 ± 6	2 ± 1	80 ± 3	16.5 ± 0.2	30.0 ± 0.5
Kankei 25	(B)	71.1 ± 1.4	79.4 ± 0.5	63 ± 7	12 ± 7	69 ± 2	14.6 ± 0.1	27.7 ± 0.3
Kyukei 36	(B)	69.7 ± 0.6	76.1 ± 0.9	69 ± 9	13 ± 3	81 ± 5	15.0 ± 0.1	20.9 ± 0.4
Tokyokintoki	(L)	67.8 ± 0.5	95.0 ± 0.0	53 ± 5	0 ± 0	96 ± 5	17.2 ± 0.2	21.9 ± 1.3
Hayatoimo	(L)	68.5 ± 0.1	93.2 ± 1.8	50 ± 0	1 ± 1	97 ± 6	15.2 ± 0.7	10.1 ± 4.2
Tanegasimamurasaki	(L)	66.8 ± 0.2	84.8 ± 8.1	62 ± 0	2 ± 1	90 ± 4	14.3 ± 0.5	16.9 ± 0.0
Oki87-14	(O)	68.2 ± 0.5	75.4 ± 0.1	69 ± 2	6 ± 1	79 ± 1	13.3 ± 0.1	15.9 ± 2.5
Oki88-29	(O)	68.6 ± 0.4	75.4 ± 0.1	62 ± 1	6 ± 1	81 ± 1	13.4 ± 0.1	15.1 ± 1.7
Oki88-77	(O)	70.9 ± 0.6	77.7 ± 0.4	65 ± 3	3 ± 2	87 ± 5	14.1 ± 0.2	20.0 ± 0.8
Oki89-69	(O)	70.6 ± 1.4	88.3 ± 3.4	64 ± 5	1 ± 0	84 ± 2	14.1 ± 0.2	12.4 ± 1.2
Bis20-1	(I)	73.1 ± 0.8	95.0 ± 0.0	59 ± 2	0 ± 0	124 ± 3	16.7 ± 0.0	14.7 ± 0.3
Bis397-1	(I)	73.6 ± 0.7	92.7 ± 2.3	66 ± 4	1 ± 0	95 ± 13	16.8 ± 0.1	13.2 ± 0.7
Markham-1	(P)	70.7 ± 0.4	86.6 ± 7.6	63 ± 1	4 ± 3	95 ± 1	15.1 ± 0.5	15.3 ± 0.6
L. S. D. (0.05)		1.52	10.67	7.9	5.0	11.8	0.73	4.51

Each value: mean ± standard deviation.
1) R:Registered cultivar by Ministry of A.F.F,Japan, B:Japanese breeding line, L:Japanese local cultivar, O:Collection in Okinawa, I:Introduction from Indonesia, P:Introduction from Papua New Guinea.

Research Paper

Economical Estimation of Direct Planting in Sweetpotato Production

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Laboratory of Farm Management

*** Research Project Team 2**

Direct planting method is being deveroped for laborsaving and reduction in cost in sweetpotato production. In the direct planting method, mechanized seeding of storage roots cut into a half substitutes manual transplantation of cut sprouts in the conventional method. We compared working term, production cost and profits between the both methods and estimated the effect of the direct planting method on laborsaving and reduction in cost in the production.

The survey of working term, cost and course profits in sweetpotato production was carried out at the 4 farms , Miyakonojo Agricultural Cooperative and the Laboratory of Farm Operation Mechanization Systems in the Kyusyu National Agricultural Experiment Station in Miyakonojo city. Data on working term and production cost for other several crops were offered through the Kitamorokata Agricultural Improvement and Advisory Center in Miyakonojo.

The survey of working term showed that transplantation and seeding took 14.7 hrs per 1000 m^2 and 1.9 hrs per 1000 m^2, respectively. The working term for seeding reduces by 87%, comparing with transplantation. However sweetpotato production requires many managirial works, including seeding or transplantation, that have to be applied in each suitable time. These are factors to determine productive scale of sweetpotatoes. Considering the factors, the maximum scale of production was estimated to be 3.23 ha in the conventional method and 3.32 ha in the direct planting method. The result led us to conclude that the merit of the direct plant on extention of production was a little.

Production cost , total income and income per hour by the conventional and direct planting method were compared in Fig. 1. The production cost by the direct planting become lower than that by the conventional method as the productive scale extended. The income per hour by the direct planting become higher than that by the conventional method with extention of productive scale because of laborsaving. However total income by the direct planting was always lower than that by the conventional method because of investments for machines.

On the other hands, changes in suitable times for managirial works by the direct planting made possible production of or extention of productive scale of other crops in Miyakonojo, as shown in Fig. 2. The figure shows possible scales of the production of burdock , a early taro and a scallion which were estimated by linear programing under the combination with the maximum scale of sweetpotato production possible by the direct planting or conventional method.

These results suggest that the direct planting might improve the farming income by combining sweetpotatoes with other profitable crops.

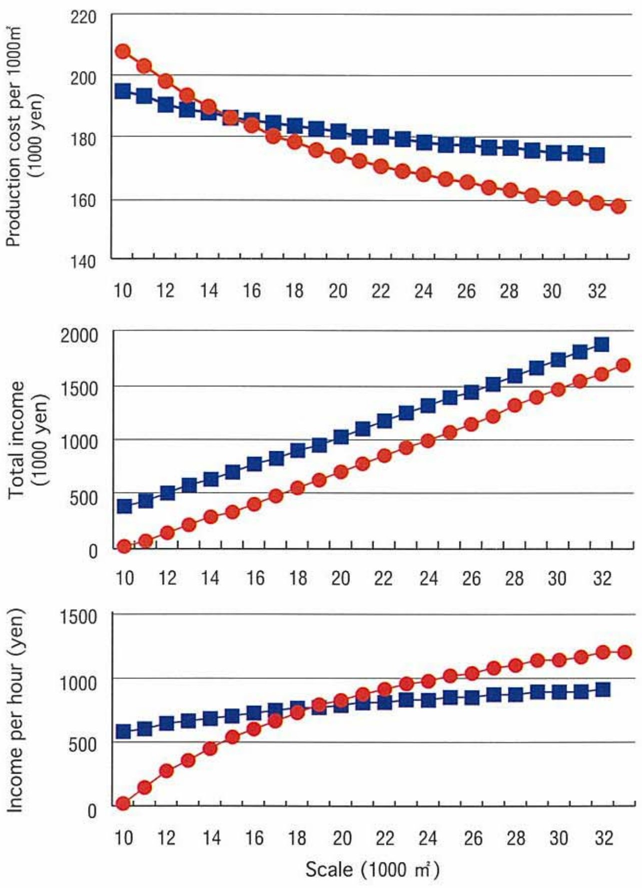


Fig. 1. Production cost, total income and income per hour for direct planting or conventional method

—■—Conventional, —●—Direct

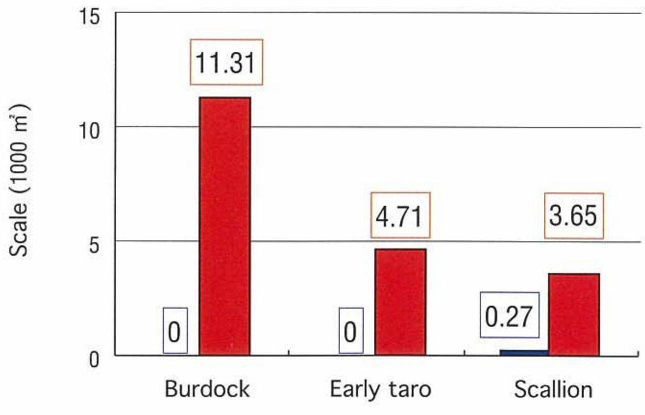


Fig. 2. Maximum scale of burdock, early taro and scallion production possible

■Conventional, ■Direct

Research Paper

Starch Properties from Sweetpotato Roots Differing in Planting and Harvesting Dates

Takahiro Noda, Yasuhiro Takahata and Tetsuo Sato, Hiroki Ikoma** and Hideyuki Mochida****

Laboratory of Crop Quality, Storage and Processing
***Associate Director for Research**
****Research Project Team 2**
*****Laboratory of Crop Production Management**

Sweetpotato starch is an important raw material for industrial processing in Japan, particularly in Kagoshima prefecture. Starches with the same botanical origin exhibit different characteristics according to the environmental conditions. Our present investigation was undertaken to obtain information on the combined effects of planting and harvesting dates on starch properties from sweet-potato roots.

Sweetpotato roots (Ayamurasaki and J-Red) differing in planting and harvesting dates were used for this study. We isolated starch from each sample and analyzed its properties, amylose content, gelatinization properties, pasting properties and amylopectin structure. The effects of planting and harvesting dates on amylose content were not so important (data not shown). The gelatinization properties were determined by differential scanning calorimetry (DSC), and the results are shown in Fig. 1. DSC thermograms varied among the starch samples from the same cultivar. Late planting and harvesting obviously reduced the values of the onset and peak temperatures for gelatinization. A rapid viscoanalyzer (RVA) was used to analyze the pasting properties, and the results are presented in Fig. 2. The starches from sweetpotato roots whose planting and harvesting dates were later exhibited higher values of peak viscosity. Late planting and harvesting clearly enhanced the value of breakdown for J-Red, whereas such tendency was not observed for Ayamurasaki. The distributions of amylopectin chain length were analyzed using a high-performance anion exchange chromatograph equipped with a pulsed amperometric detector. As shown in Fig. 3, late planting and harvesting caused a high proportion of short chains between DP 6-10 and a low proportion of long chains between DP 16-45, suggesting that the later planting and harvesting dates, the higher the degree of branching of amylopectin. Thus, planting and harvesting dates were important factors in changing the properties of starch from sweetpotato roots. The data obtained in this investigation would be useful to breeders, farmers and starch users.

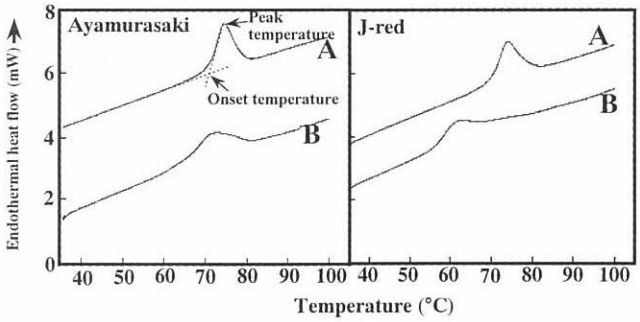


Fig. 1. DSC thermograms at 30% starch concentration for starches from sweetpotato roots differing in planting and harvesting dates.

Reference: T. Noda et al., *Carbohydr. Polym.* **33 (3)**: 169-176 (1997).

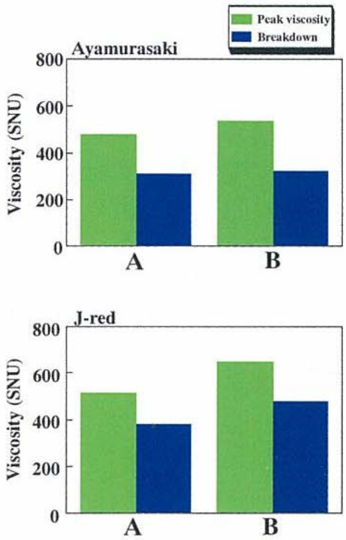


Fig. 2. Pasting properties by RVA of starches from sweetpotato roots differing in planting and harvesting dates.

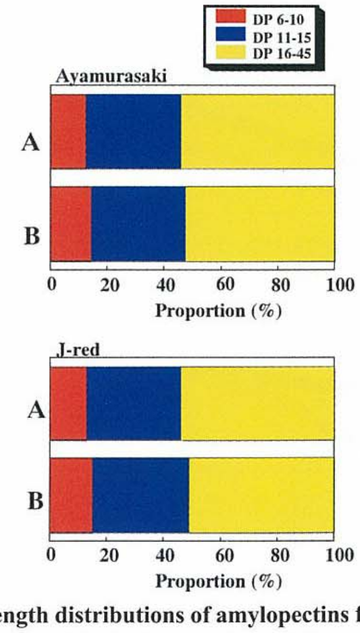


Fig. 3. Chain-length distributions of amylopectins from sweet potato roots differing in planting and harvesting dates.

Research News

A Piece of Travel Writing about Sweetpotatoes in China

Makoto Yoshimoto, Nakatani Makoto, and Kumagai Tooru

Department of Upland Farming, KNAES

Sweetpotatoes will play an important role in resolving global issues that involve food, energy, natural resources, and the environment in the 21st century. China is the world's largest producer of sweet-potatoes. Sweetpotato yields in China are double those of the rest of the world, and consumption per head is 20 times that of other countries. We had a chance to visit the Xuzhou Sweetpotato Research Center, the Crop Research Institute in Sichuan Academy of Agricultural Sciences, and the Crop Research Institute in Guangdong Academy of Agricultural Sciences for a technical agricultural exchange from 16 to 29 August, 1999. The purposes of the exchange were as follows: 1) to investigate the characteristics of different varieties, 2) to study breeding and planting, 3) to investigate utilization for food, animal feed, and industrial materials, and 4) to attend the International Symposium of Sweetpotato Breeding in Xuzhou, Jiangsu.

1) International Symposium of Sweetpotato Breeding

The symposium was held in Xuzhou city for three days, from August 18 to 20. Sixty-two research subjects were reported in the meeting. Most reports were related to breeding, development of new varieties, and viruses. There were five reports about processing. Mr. Kumagai made a presentation on "Mechanization of sweetpotato cultivation in Japan," and Dr. Nakatani reported on "Molecular and physiological characterizations of some sweetotato mutants." There was an active exchange of opinions following each report. We felt the uncommon enthusiasm of the Chinese researchers for the sweetpotato study (Fig. 1). We particularly got the impression that the investigations were vigorous and effective in all fields, including the development of new varieties and processing.

Fig. 1. Lively discussion in the symposium

Fig. 2. Germ plasm plots in Xuzhou Sweetpotato Research Center

2) Xuzhou Sweetpotato Research Center

This institute conserves the genetic resources of 1,300 lines. Sweetpotato varieties developed by this center, including Xushu 18, account for about 50% of the sweetpotato breeding areas in China. This center widely distributes breeding materials, not only to various places in China, but it also selects the varieties for each northern province in Inner Mongolia (Fig. 2). The center has also actively studied sweetpotato processing. Sweetpotato preserves, which are made by steamed, stick-cut, and dried sticks of the variety with orange-colored flesh, are commercialized in the market. In addition, the processing of Simon No. 1 was studied and its processed goods were manufactured as a trial and later exhibited.

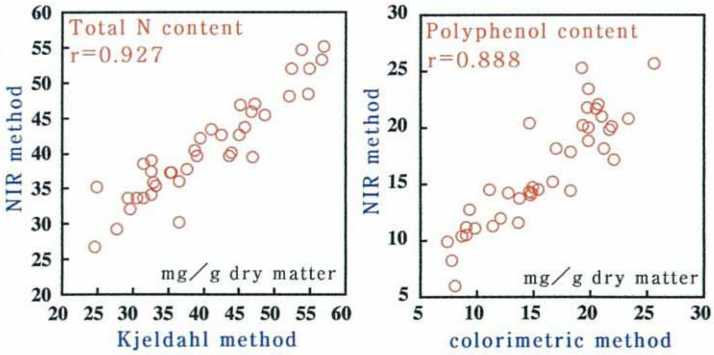
(To be next issue.)

Associate Director for Research, Department of Crop Breeding (Nishigoshi)

Use of Near Infrared Spectroscopic Method for Estimating Total Nitrogen and Polyphenol Contents in Sweetpotato Leaves

Tetsuo Sato

The feasibility of using the near infrared (NIR) method to estimate total nitrogen and polyphenol contents in sweetpotato leaves was examined. The leaves were dried, milled, and sieved through 0.25 mm holes. Total nitrogen was determined by the Kjeldahl method. Polyphenol was determined by colorimetry at 600nm. NIR was measured using InfraAlyzer 500 (Bran+Luebbe) with packing in the standard cell. The samples were separated into two groups: the calibration set (45 samples) and the prediction set (39 samples). Multi-linear regression analysis was performed using chemical data and spectral data with IDAS software (Bran+Luebbe). The prediction results are shown in Figure. The standard error of prediction was 3.71 [mg/g dry matter] for total nitrogen or 2.34 [mg/g dry matter] for polyphenol contents. The NIR method might be used for roughly estimating these contents for the simple and rapid scree-ning of leaves as new resources.



The prediction test resuls by NIR method

Reader's Talk

Letter to the editor

Trypsin Inhibitor Activities of Sweetpotato and KNAES

Yeoh Hock-Hin

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My stay at the Department of Upland Farming, Kyushu National Agricultural Experiment Station at Miyakonojo from 22 October to 30 November 1999 was indeed fruitful (more like a bountiful harvest!), scientifically stimulating and memorable. Our task was to study trypsin inhibitor activities in all parts of the sweetpotato plant. Numerous samples (running into the hundreds) were meticulously prepared before I arrived. The fun then began, and I must admit that I enjoyed working with Drs. Yoshimoto, Yamakawa, and Toyama.

My 40-day stay resulted in the following. A protocol for extraction of trypsin inhibitor in sweetpotato roots was modified for preparation of the trypsin inhibitor in sweetpotato leaves, petioles and vines. A comparison of the level of trypsin inhibitor activities in the different parts of the plants revealed that the roots had the highest activity both in terms of dry matter and protein content, followed by the vines, leaves and petioles. A correlation between the level of soluble protein content and trypsin inhibitor activity in the roots (r^2 = 0.68), and to some extent a similar trend for the leaves (r^2 = 0.36), was observed. Leaf trypsin inhibitor activity, however, did not show any correlation with that of the root (r^2 = 0.04 on a dry matter basis and r^2 = 0.15 on a protein basis). The effect of N-fertilizer application and duration of growth (i.e., harvest time) on trypsin inhibitor activity in sweetpotato roots were also evaluated. Time of harvest appeared to have a greater influence on levels of trypsin inhibitor activities in roots than the amount of N-fertilizer applied. Activity staining after electrophoresis revealed two trypsin inhibitor activity bands in sweetpotato roots, corresponding to molecular sizes of 54.2 and 23.3 kDa. This work also raised certain issues. One useful project would be to purify and characterize the sweetpotato trypsin inhibitor to provide some answers to the nature and existence of the two forms of inhibitor molecules. Understanding the properties of the inhibitor would certainly help design methods to reduce its activity during processing of sweetpotato materials. This study has also revealed that time of harvest influenced the level of trypsin inhibitor in roots. Can we control this through agronomic processes? A thorough understanding of the nature of the sweetpotato trypsin inhibitor might be helpful.

KNAES is indeed a place worth visiting for those who engage in sweetpotato research. In addition, Miyakonojo is a charming little place unlike many big cities in Japan. I would like to thank Dr. Yamakawa and Dr. Yoshimoto for introducing KNAES and Miyakonojo to me.

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Announcements

The 12th Symposium of the International Society for Tropical Root Crops will be held September 10 to 16, 2000, in Tsukuba City in Japan. For abstract submission and other detailed information, please email istrc@ws5.narc.affrc.go.jp.

Editor's note

The 10th edition of SPORF was published using contributions from all concerned parties. I was impressed by the extent of the sweetpotato research. (M. Y.)

Sweetpotato Research Front (SPORF)
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